

Weights and Marketplaces from the Bronze Age to the Early Modern Period.

Proceedings of Two Workshops

Funded by the European Research Council (ERC)

Edited by Lorenz Rahmstorf and Edward Stratford

Weight & Value

Edited by Lorenz Rahmstorf
Seminar für Ur- und Frühgeschichte
Georg-August-Universität Göttingen

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and Social Impact on Bronze Age Europe, West and South Asia

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Weights and Marketplaces

from the Bronze Age to the Early Modern Period

Edited by

Lorenz Rahmstorf and Edward Stratford

with contributions from

Enrico Ascalone, Grégory Chambon, Jessica Dijkman, Gary M. Feinman, William B. Hafford, Hans Peter Hahn, Edward M. Harris, Kenneth Hirth, Thomas Höltnen, Fang Hui, Nicola Ialongo, Jane Kershaw, Stephen A. Kowalewski, Lionel Marti, Anna Michailidou, Juan Carlos Moreno García, Linda M. Nicholas, Adelheid Otto, Karl M. Petruso, Luca Peyronel, Lorenz Rahmstorf, Felix Rösch, Edward Stratford, David A. Warburton, Elsbeth M. van der Wilt

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Cover:

Front cover (top left): Reconstruction of the scale from Bordjoš, Banat, Serbia, ca. 1200 BC
(modified after Medović 1995, fig. 5, cf. p. 124).

Front cover (top right): Spool-shaped balance weights with markings from Tiryns, Argolid, Greece,
mid and later third millennium BC. Courtesy of Lorenz Rahmstorf.

Front cover (bottom left): A cubo-octahedral weight from Cttam, East Yorkshire, England,
ca. 9th century AD. Courtesy of Jane Kershaw.

Front cover (bottom right): A stone 'amulet' from Tepe Gawra, northern Iraq,
ca. mid fifth millennium BC (Speiser 1935, pl. XLIIIb, cf. p. 30).

Back cover (top): Detail of the marketscene in the tomb-chapel of Nianchkhnum and Chnumhotep, Saqqara, Egypt, ca.
25th century BC (Moussa/Altenmüller 1977, fig. 10, cf. p. 182).

Back cover (bottom): Reconstruction drawing of the waterfront with market in Schleswig, Schleswig-Holstein,
Germany, ca. 1100 AD. Courtesy of Felix Rösch.

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Preface by the editor of the series

The Seminar für Ur- und Frühgeschichte (Institute for Prehistory and Early Historical Archaeology) at the Georg-August-University of Göttingen has been publishing archaeological research for over more than half a century. Within the „Göttinger Schriften zur Vor- und Frühgeschichte“ monograph series, 35 volumes – mostly PhD and Habilitation theses – have appeared since 1961, original archaeological data are presented and analysed in detail. The more recent „Göttinger Forschungen zur Ur- und Frühgeschichte“ (three volumes so far), appeals also to a wider public and presents specific research areas of the Institute. „Neue Ausgrabungen und Forschungen in Niedersachsen“, is a series designed to bring smaller studies such as MA theses from the region of Lower Saxony to publication. Within the monograph series „Studien zur nordeuropäischen Bronzezeit“, which is funded by the Academy of Sciences and Literature in Mainz, the results of a research project directed by my predecessor, Karl-Heinz Willroth, are presented. Now, a new series „Weight & Value“ – of which this is the first volume – sets a new and additional focus on weights, scales and weight regulated artefacts in prehistoric and early historical archaeology and the relevance of these objects for the reconstruction of ancient concepts of material value. The title was inspired by two books by Anna Michailidou with the same title. First and foremost, the results of the ERC-2014-CoG ‚WEIGHTANDVALUE: Weight metrology and its economic and social impact on Bronze Age Europe, West and South Asia‘ [Grant no. 648055] will be presented in the new series. However, as no series exists so far for the publication of detailed studies on early metrology and the material evidence, we hoped to establish this series for publications even after the ERC project has come to an end. There is a substantial need for a such a publication series dealing with issues of „weight and value“ for the whole time-span from the Chalcolithic period and Bronze Age to the Me-

dieval and early modern period. To attract an international author- and readership, the peer-reviewed series will be published in English (Current guidelines for submission can be found at the back of this volume).

This first volume presents two workshops in a series of workshops funded by the ERC-2014-CoG ‚WEIGHTANDVALUE‘. The workshop „Weights and their identification. Methodological challenges in the study of ancient weights and metrological systems“ was hosted at the Institut für Vorderasiatische Archäologie (Institute for Near Eastern Archaeology) at the Ludwig-Maximilians-University, Munich, which took place on 25-26 June 2016. I would like to thank Adelheid Otto and her team for their great hospitality in Munich. Most of the papers presented at this workshop are published in the first part of this book with the very welcome addition of Karl Petruso’s paper who unfortunately was unable to attend. The workshop „Weights and marketplaces. The phenomenology of places of exchange within a diachronic and multi-cultural perspective“ took place over a year later at the Seminar für Ur- und Frühgeschichte in Göttingen on October 19-21 2017. Not only nearly all participants submitted papers for the proceedings volume, but with Juan Carlos Moreno García, Felix Rösch, Gary M. Feinman, Fang Hui and Linda M. Nicholas, further renowned specialists, contributed to the theme of the workshop in the present volume, though they could not attend the event itself. I would like to thank all authors for their contributions and my co-editor Edward Stratford for his support. Editing and layout lay in the hands of Heinz-Peter Koch with the help of Sandra Busch-Hellwig. The printing and the open access of this publication has been financed by the ERC Grant.

Göttingen, July 2019

Lorenz Rahmstorf

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Contributors

Enrico Ascalone is a postdoctoral researcher in the ERC-2014-CoG 'WEIGHTANDVALUE' project at the Georg-August-Universität Göttingen. He received his PhD at the University of Naples ("L'Orientale"). He researches the Bronze Age archaeology of Syro-Mesopotamia, Iran, Central Asia the Indus region with special focus on seals and weights.

Grégory Chambon is Directeur d'Etudes at the Ecole des Hautes Etudes en Sciences Sociales (EHESS), Paris. He has been trained in Assyriology and the history of science at the EPHE and at the EHESS, Paris. His research focus is primarily the use of measures and numbers in Mesopotamia in their social and cultural context. He also interested in the accounting and bookkeeping practices in Syria (middle of third to late second millennium BC).

Jessica Dijkman is an assistant professor in economic history at Utrecht University (Netherlands). She attained her PhD at the same university in 2010. Her research focuses on medieval and early modern northwestern Europe. Her research interests include the organization and performance of commodity markets and the response to food crises and famines.

Gary M. Feinman is the MacArthur Curator of Anthropology at the Field Museum of Natural History, Chicago. He has academic degrees from the University of Michigan and the Graduate Center of the City University of New York. His interests include changes in human political and economic organization with principal fieldwork directed in Oaxaca, Mexico, and Shandong, China.

William B. Hafford is a research associate at the University of Pennsylvania Museum of Archaeology and Anthropology. He received his Ph.D. in Art and Archaeology of the Mediterranean World from the University of Pennsylvania in 2001. His primary research interests are in economic anthropology, investigating the origins, definition, and use of weights and measures especially as they relate to ancient trade networks and the concept of money.

Hans P. Hahn is Professor of Anthropology with special focus on Africa at Goethe University of Frankfurt/M. He received his academic training in anthropology and archaeology from Goethe University Frankfurt and Bayreuth University. His research interests are oriented towards material culture, consumption and the impact of globalization on non-western societies.

Edward M. Harris is Emeritus Professor of Ancient History at Durham University and Honorary Professorial Fellow at the University of Edinburgh. He received a BA in Classics from Stanford University (1974), a BA in Literae humaniores from Oxford University (1976) and a PhD in Classical Philology from Harvard University

(1983). He has written extensively on many aspects of the history of ancient Greece including political and legal institutions, epigraphy and economic history.

Kenneth Hirth is Professor of Anthropology at the Pennsylvania State University and Senior Fellow at Dumbarton Oaks Library and Research Collections in Washington D.C. He received his BA in business administration and his PhD in anthropology at the University of Wisconsin-Milwaukee. His primary research field is Mesoamerica but has broad ranging interests in the comparative economies of ancient complex societies.

Thomas Höltken studied Pre- and Early History, Cultural Anthropology and Historical Geography and received a doctorate. Between 1996 and 2010 he worked as scientific consultant on the excavation of the cathedral of Cologne. Since 2010 he is Scientific Consultant, Romano-Germanic Museum/Office for Archaeological Preservation of Cultural Heritage of the City of Cologne. The focus of his activities is on urban medieval history and archaeology.

Fang Hui is Dean of the School of History and Culture and Professor in the Department of Archaeology at Shandong University, Jinan, China. He received his Ph.D. from Shandong University. His interests include Neolithic and Bronze Age archaeology in China, and he has directed fieldwork projects across Shandong Province.

Nicola Ialongo is a postdoctoral researcher in the ERC-2014-CoG 'WEIGHTANDVALUE' project at the Georg-August-Universität Göttingen. He received his PhD at the University of Rome "La Sapienza". His interests comprise prehistoric economy and trade, religion and power in prehistoric societies, Bronze Age hoards and votive depositions, relative chronology of the European Bronze Age and statistical methods in archaeological research

Jane Kershaw is Principal Investigator of the ERC Project, Silver and the Origins of the Viking Age, at Oxford University. She received her PhD from Oxford and was a Kennedy Scholar at Harvard. She researches the archaeology of early medieval Britain and Scandinavia, with a focus on Viking-Age material culture.

Stephen A. Kowalewski is Professor Emeritus, Department of Anthropology, University of Georgia, in Athens, Georgia. He graduated with a BA degree from DePauw University and earned his Ph.D. in anthropology at the University of Arizona in 1976. His research interests are in regional archaeological survey, economic anthropology, and ecological anthropology, and he has carried out research in Oaxaca, Mexico, and in Georgia in the U.S.

Lionel Marti is researcher at CNRS (UMR 7192), Paris. He has been trained in Assyriology at EPHE IVE section and in archaeology at University Paris I Panthéon-Sorbonne, Paris. His research focus is primarily on the history of northern Mesopotamia and Syria, from the Old-Babylonian to the Neo-Assyrian period, with a particular interest in the Assyrian world with its representations of power and administration.

Anna Michailidou is Research Director Emerita at the Institute of Historical Research at the National Hellenic Research Foundation, Athens, Greece. She received her PhD ('Akrotiri on Thera. The Study of the Upper Storeys of the Buildings of the Settlement') from Aristotle University of Thessaloniki, Greece. Her main research interests are metal technology, scripts, metrology and economy in Bronze Age Aegean and the Near East.

Juan Carlos Moreno García (PhD in Egyptology, 1995; Habilitation, 2009) is a CNRS senior researcher at the Sorbonne University in Paris since 2000. He has published extensively on pharaonic administration and socio-economic history. Recent publications include *The State in Ancient Egypt: Power, Challenges and Dynamics* (2019), *Dynamics of Production in the Ancient Near East, 1300-500 BC* (2016) and *Ancient Egyptian Administration* (2013).

Linda M. Nicholas is Adjunct Curator of Anthropology at the Field Museum of Natural History, Chicago. She has academic degrees from the University of Montana and Arizona State University. Her interests include settlement pattern studies and household archaeology with principal fieldwork directed in Oaxaca, Mexico, and Shandong, China.

Adelheid Otto is Professor of Near Eastern Archaeology at the Ludwig-Maximilians-University in Munich (Germany). She got her PhD from FU Berlin, was research assistant at the German Archaeological Institute in Damascus and Professor at JGU Mainz. Her research focusses on the archaeology, cultural history and art history of the Near East with special emphasis on daily life and seals and sealings. She has conducted fieldwork in Syria (Bi'a, Bazi) and Iraq (Fara, Ur).

Karl M. Petruso is Professor of Anthropology at the University of Texas at Arlington (USA). He earned his PhD in classical archaeology at Indiana University in 1978. His research interests include the economic prehistory of the eastern Mediterranean, historical metrology, Greek archaeology, and the rise of complex societies in ancient Old World.

Luca Peyronel is Professor of Archaeology and Art History of the Ancient Near East at the International University of Languages and Media (IULM) in Milan. He received his PhD in 2001 from the University of Rome „La Sapienza“. He has special research interests in the trade and commerce in the Ancient Near East and in the pre-classical Mediterranean.

Lorenz Rahmstorf is Director and Professor at the Seminar für Ur- und Frühgeschichte at the Georg-August-University of Göttingen, Germany. He has academic degrees from the Universities of Bristol (MA), Heidelberg (PhD) and Mainz (Habilitation). He is leading the ERC Consolidator Project WEIGHTANDVALUE as the Principal Investigator and has specific research interests in early trade.

Felix Rösch currently holds the position of a research fellow at the Seminar of Pre- and Protohistory at Göttingen University. He is a trained scientific diver and received the degree of a Magister Artium (M.A.) in 2011 and his doctoral degree in 2015, both at the Institute of Pre- and Protohistory, Kiel University. His research interests are historical archaeology, the maritime Middle Ages, settlement archaeology, urbanisation, trade and exchange and digital methods.

Edward Stratford is Associate Professor of History at Brigham Young University. He received his Ph.D. from the University of Chicago in 2010. He researches various aspects of the Old Assyrian trade including, chronology, trade activity, and the ways in which narrative affect our understanding of the trade.

David A. Warburton is Guest Professor of Egyptology, Institute for the History of Ancient Civilizations, Northeast Normal University, Changchun, China. He received degrees from the American University of Beirut (MA), the University of Bern (PhD) and the University Paris I (Habilitation). His research interests comprise economic history & theory, warfare, religion, colour terminology, early history of science, archaeological stratigraphy and ancient chronology

Elsbeth van der Wilt was a Dahlem Research School postdoctoral fellow at the Freie Universität Berlin until 2018. After studying Egyptology at Leiden University, she obtained her doctorate in Archaeology from the University of Oxford in 2014. Her research focuses on the material culture of Egypt in the Late and Ptolemaic periods, particularly in the fourth century BC, and has an emphasis on economic history.

Weights and their identification: A short introduction to the workshop

by LORENZ RAHMSTORF

Despite its significant impact on our understanding of the economic and social organisation of early societies, the study of metrological systems and weight-use has been highly neglected in the past. Previously, many assumptions were based on poorly researched and inadequately published material evidence. The aim of the workshop was to discuss new methodological approaches in order to assess and enlarge our data sets of weighing equipment in various regions, from the Atlantic to the Indus and dating from the late 4th millennium BC to the Early Medieval period. The theme of the workshop was chosen in order to define the basic problem of the ERC project: how can we identify weights and weighing systems in the archaeological record? This fundamental problem has rarely been considered. So far, the majority of weights in the archaeological literature belong to easily identifiable types, so called ‘canonical weights’. Examples include sphendonoid weights in hematite or similar minerals in the east Mediterranean and western Asia or duck weights in Mesopotamia. Some of these weights bear inscriptions or markings. To date, not a single clearly marked weight is known from Bronze Age Europe (outside of Greece). For this reason, early weights are often difficult to recognise within the archaeological record. In order to discuss problems of identification and related issues of weight use, metrology and weight-regulated artefacts, a questionnaire was presented to the contributors:

Identification

- Various methodological approaches (archaeological, sequential and statistical) help to make the identification of weights plausible, yet the overall indications are often rather ambiguous. Can we develop a rigorous scheme of tests in order to assess the probability of the suggested identification?
- The problem of identification does not arise with weights of well-known shapes (‘canonical weights’) but is related to randomly produced weights, of only slightly modified or even purely natural forms. In the latter case even the terminology is not yet established (*cf.* pebble weights, unregulated weights, non-canonical weights)
- Their identification depends especially on the archaeological context (sets of such objects found in a closed context, at best with other indications of metrological practice, *e. g.* the presence of a scale) and on its full publication with

the mass of the objects provided. Are there any other indications which we may use to support the identification of such objects as weights?

- Scale beams were most often made of perishable material (wood, bone). This holds true also for scale plates (bast, textile, wood, *etc.*). More detailed studies on archaeozoological material may increase our knowledge, especially in regard to small fragments.

Morphology, material and size

- Sometimes morphologically distinct weight types were used in a similar way in specific cultures. What does this indicate? – were different shapes used for different units/weighing systems or for weighing specific goods and commodities?
- Moreover, were different weights used in different economic zones?
- What materials were used for the weights – stone, bronze, lead, *etc.*? Do we have any indications to why this specific material was chosen? Are there chronological, regional or cultural preferences?
- In several cases the mass range of the weights attested in a specific culture is rather limited. Sometimes we only know of rather light weights but we lack the heavy ones or the other way around. Does this merely reflect the current state of identification (*i. e.* very heavy or light weights were of different/unusual morphology and are not yet identified) or were only light or heavy commodities weighed out (*i. e.* economic implications)?

Metrological analyses

- Traditionally the metrological assignment of weights to certain units is often the result of the experience and authority of the scholar. The mass of the objects, however, often allows for various and contradicting interpretations. Can we move beyond this by applying *non-a priori* assumptions?
- The cosine quantogram analysis seems to be one key to make interpretations testable on a quantitative scale, but what is the effect of the sample size and material on the statistical detection of measurement units?
- Random non-quantal simulation data sets have so far only been used in very few studies in order to assess the validity of cosine quantogram analysis.

- To what extent may further studies in the textual data on different weight units used in different places enlarge our knowledge on contemporaneously used standards?

Weight-regulated artefacts, hoards and *Hacksilber*

- From textual evidence we know that metal artefacts were sometimes produced according to a specific weight representing multiples of a fraction of a certain weight-unit. Such objects can be called weight-regulated artefacts. The investigation of such classes of objects is still in its infancy, but it seems to be especially rewarding for objects made of gold and silver.
- While it is already difficult to prove that an object is a weight, it is even more difficult to present watertight evidence for the existence of so-called weight-regulated artefacts. Thousands of bronzes from the European Bronze Age are either often produced in a similar shape or are intentionally fragmented. So far, investigations of any metrological basis for these fragmentations have mostly failed to produce convincing evidence. However, a statistically significant approach has not yet been applied systematically.
- Extensive hoarding is a phenomenon often encountered in regions and periods when weights were used as well. This also often comprised the intentional fragmentation of artefacts of gold and silver (*Hacksilber*). What does this tell us about the general modes of exchange (barter/ *Hacksilber*/ monetary) and the origin of money?

Weights and their economic, political & social implications

- What does the use of weights indicate? The existence of precise and generally shared concepts of material value?
- It has been argued that the use of weights in Syro-Mesopotamia primarily indicates concerns with payment to the temples/palaces, and not necessarily evidence for trade and transactions such as buying and selling. Is this a realistic assumption in light of the archaeological evidence (*i. e.* the contextual distribution of weights and scales in various sites)?
- Moreover, to what extent is it possible to enrich the long-standing debate of the relevance of state-driven and independent ('private') economy in the ancient world with the archaeological evidence from weights and scales?
- Who was responsible for the dissemination of a certain weight standard in the first place and how weight systems were maintained/policed across large areas? By the 'state?', the king?, traders?, the elite? As weights were used both in state societies (Western Asia) and in seg-

mentary societies (Europe) it seems difficult to answer this question unequivocally.

- Who used weights, specialists or entire communities? If they were specialists what social rank did they hold in their societies?

Each of the contributors addressed some, but not all, of the questions in the papers. Yet in the aggregate, much of the intent of the questionnaire has been addressed. The result is a significant step forward in forming a methodology for identifying weights in the archaeological weights and a useful point of reflection for the field of metrology and for ancient economies. In the following, we briefly summarise the papers.

Karl Petruso's contribution provides a historiographic retrospective on the theories that can affect the exploration of ancient weights and weighing. Petruso asks if purely computational methods can be used, especially when they cannot account for practice on the ground, and when instead they are influenced by contemporary issues, such as propositions in the past that have been too easily swayed by the creation of the euro currency. In the past the importance of mathematical "correspondences" between different unit-systems was often overstated, since such correspondences can be traced between any pair of random numbers. Petruso argues that considering conversion mechanisms and its technology serve to correct past propositions based entirely on computational methods.

The second contribution on weights comes from **William B. Hafford**, who provides an overview of what the site of Tepe Gawra, lying at the northern end of Iraq, can supply for the development of weights and weighing already at the end of the fifth millennium. Working back in time through the archaeological layers of Tepe Gawra, Hafford traces material remains that support a development of weighing and weights as far back as the end of the fifth millennium. Hafford reviews possible weights, related objects, such as seals and accounting tokens, and their contexts to support his proposal. It is a fascinating hypothesis that the origins of weighing go back as early as the Ubaid period in Mesopotamia. Supportive evidence from other contemporaneous sites in the region would strengthen the case.

Enrico Ascalone examines potential weights from the recent excavations at Shahr-i Sokhta, located in the Iranian portion of the Helmand valley to explore the potential for an otherwise poorly attested economic interface in the Iranian plateau. Ascalone finds candidates for weight stones dated to the second half of the third millennium that seem to match shape and weight profiles for both the Indus Valley and Mesopotamia/Syria. After reviewing the candidates, Ascalone strengthens the proposition that commerce overlapped between

Mesopotamia and the Harappan cultures as mediated by actors working with elements of weight systems in both regions.

Lionel Marti and **Grégory Chambon** offer a review of how the textual record in two instances, the Old Babylonian documents from Mari and Middle Assyrian documents, both from the second millennium BC, provide some of the interesting administrative contexts for the use of weights and weighing, even when they are less helpful in clarifying actual weights. The two authors find that the textual evidence does not always divulge weights that are, strictly speaking, the result of weighing procedures. Still, textual sources also demonstrate that actual mass was a concern in some contexts, with metals checked and weighed by administrative authorities.

Luca Peyronel reviews weighing in the Middle Bronze Age Near East and the archaeological and textual evidence for multiple regional standards (Mesopotamian, Levantine, *etc.*) and the presence at many sites of the ability to work with several systems. After a methodical review of weights, Peyronel gathers the data on silver hoards and closely analyzes those available from Ebla to make a proposal based on the preliminary analysis: that statistical analysis of hacksilver suggests that some pre-determined amounts of silver could have functioned as units that could easily traverse multiple ponderal systems, forming a meta-system, and bolstering the value of forthcoming analysis of his current project on the relation between metrology and silver circulation in the early second millennium Near East.

Anna Michailidou examines archaeological and textual evidence on weights and weighing from the Bronze Age Aegean and the second-millennium Near East to outline the relation between weight and value, not only in metals but also in other objects, including sheep fleeces and grain. Particularly metal objects were valued in direct relation to their

weight, though ceremonial exchange could imbue increased value. Metals (silver, copper, gold, lead) as money did change hands in the Aegean economy of the mid and later second millennium, as evident in the Near East as well. In addition, she argues that in the Mycenaean period, lead could function as a medium for customary standards for metrology alongside stone balance weights.

Nicola Ialongo and **Lorenz Rahmstorf** provide a description of the archaeological evidence for balance weights in Europe in the pre-literate Bronze-Age, arguing that by the middle of the second millennium, a technology of weight-based exchange had diffused from the Italian peninsula across the whole of Europe. Drawing on more than five-hundred candidates for weights, five shapes are found important (rectangular, disc, spherical, Kannelurensteine, and piriform) that closely group according to quantitative analysis using frequency distribution analysis and cosine quantogram analysis. The study functions as a first step in charting the development of weight-based commerce in Europe.

Jane Kershaw takes stock of the patterns of weights in Viking-Age Scandinavia and England and also argues to move beyond pure metrology, proposing that the results of her review of Viking weights show those weights were both less ‘regulated’ than supposed and more broadly distributed in rural contexts and among women. Despite characteristics that they were regulated, both kinds of distinctive weights in the Viking world were part of a more complex system than previously understood. The broader distribution, even in rural areas, of the complex to manufacture oblate-spheroid weights suggest that they functioned for larger. Meanwhile, the higher variability in weight and alloy composition of smaller cubo-octahedral weights suggest that they were not centrally manufactured, despite the fact that they were clearly used in urban areas for very small transactions.

A “theory of everything” in ancient weight metrology?

by KARL M. PETRUSO

Historical metrology, weights and measures, balance weights, ancient economics, ancient trade, early mathematics

The most fundamental step in the archaeological study of early systems of weight measurement is to identify the masses of standard units. This is often a straightforward exercise: the mathematical relationships among identifiable balance weights of different masses found on a particular archaeological site have the potential to tell us about how an ancient people counted and quantified their world, and evaluated and inventoried their raw materials and products. Typically scholars who work in this esoteric field cannot resist the next step, namely searching for parallels elsewhere, on the assumption that a particular system attested regionally will enhance our understanding of economic relationships among polities – specifically, trade.

Some researchers have taken a further step, arguing that ancient weight systems based on different standard masses and different mathematical structures could be converted to one another, on the assumption that convertibility was desired because it would have facilitated inter-polity – indeed, international – trade. This is a seductive but hazardous endeavor.

This paper explores the theme of conversion as expressed in some recent research in historical metrology. It is argued that our ability to calculate metrical conversions can lead to illusory pictures of economic relationships, and that modern searches based on computation alone are anachronistic: they ignore significant constraints inherent in the technology of ancient weighing.

Eine “Weltformel” für die frühe Gewichtsmetrologie?

Historische Metrologie, Maße und Gewichte, Wiegegewichte, antike Ökonomie, früher Handel, frühe Mathematik

Die Identifizierung früher Gewichtssysteme ist ein grundlegender Schritt in archäologischen Untersuchungen. Dies wird meist als eine direkt lösbare Aufgabe angesehen: Durch die mathematischen Beziehungen von identifizierbaren Gewichten verschiedener Massen, die an einem bestimmten Fundplatz gefunden wurden, besitzen wir die Möglichkeit, zu erkennen, wie die damaligen Menschen zählten, ihre Welt quantifizierten und wie sie ihre Rohmaterialien und Produkte bewerteten und dokumentierten. Typischerweise können Forscher, die in diesem “esoterischen” Gebiet arbeiten, sich nicht zurückhalten weiterzugehen, indem sie nach Parallelen zu Gewichtssystemen in anderen Regionen suchen. Dabei wird davon ausgegangen, dass der überregionale Verbreitungsnachweis unser Verständnis von wirtschaftlichen Beziehungen und des Austausches zwischen verschiedenen Gemeinwesen erweitert.

Einige Forscher unternehmen einen weiteren Schritt und argumentieren, dass frühe Gewichtssysteme, die auf verschiedenen Gewichtseinheiten und mathematischen Strukturen basieren, gegenseitig umgewandelt werden können. Diesbezüglich wird angenommen, dass Konvertibilität erwünscht war, da sie Handel zwischen verschiedenen Kulturen – auch in internationalen Dimensionen – ermöglichte. Dies ist ein verführerisches, aber auch riskantes Bestreben.

In diesem Beitrag werden Ansätze zur Umwandlung von Gewichtssystemen, die in Publikationen vor einigen Jahren vorgestellt worden sind, untersucht. Dabei wird argumentiert, dass die Möglichkeit, metrische Umwandlungen berechnen zu können, zu illusorischen Vorstellungen hinsichtlich der ökonomischen Beziehungen geführt haben. Die moderne Forschung, die allein auf Berechnungen (mit heutigen Taschenrechnern) basiert, ist dabei anachronistisch. Sie ignoriert die grundsätzlichen Beschränkungen in der Technologie des frühen Wiegens.

Introduction

The fundamentals of measurement in the Bronze Age – the absolute values of units and the mathematical structures of the systems on which they were based – have received significant attention in this new century, as scholars have increasingly focused on the pertinent archaeological materials that survive from ancient sites, regions, and periods of the antiquity of the Old World. The purpose of this paper is to share some reflections that have been on my mind for several decades, a product of the evolution of my own thinking about the weight metrology of Minoan Crete and Mycenaean Greece. I shall focus here on how we *do* historical metrology. I will make some observations about what sometimes inspires our approaches to our data and influences the hypotheses we generate. I want to suggest that some of our fundamental approaches to the data are not always well thought out. I shall make my point by reviewing a popular paper published at the turn of the millennium.

In a conference at the British Museum in 2000 on the development of accounting in the Ancient Near East, Alfredo Mederos and Carl Lamberg-Karlovsky presented an attractive argument, developed more fully the following year in the journal *Nature* about systems of Bronze Age weight measurement throughout the Old World, with a view to identifying links among them on the basis of their standard masses (MEDEROS/LAMBERG-KARLOVSKY 2001). The authors' argument, briefly stated, was that ancient accountants and merchants were capable of converting each of the standard masses of several so-called "national" weight systems to all of the others. This capability, they argued, greatly facilitated exchange in a truly international – indeed, intercontinental – commercial milieu. The "national" systems they considered stretched from the Aegean and Egypt in the west to the Indus Valley in the east, between *ca.* 2500 and 1000 BCE. The evidence they adduced for this sweeping argument was presented in the form of two detailed tables showing mathematical relationships among the masses of ten chosen regional systems of weight.

I myself became aware of this research when it was noticed in the popular press in the United States, specifically the *Atlantic Magazine* (MURPHY 2002) and *Discover Magazine* (RIST 2002). Both articles hailed this work as proof that in the Bronze Age this purported international convertibility would have "...facilitated the emergence of the Ancient World System" (MEDEROS/LAMBERG-KARLOVSKY 2001, 437). To see the appearance in the media of news about a new theory of ancient economic organization was gratifying in that it raised the profile of the rather esoteric discipline of historical metrology. There was another dynamic at work here, though, to which I shall return presently.

Let us examine the project of Mederos and Lamberg-Karlovsky using an example taken from their *Nature* tables. It was argued that 25 Indus Valley "shekels" of 6.84 g were equal to 26 Aegean "shekels" of 6.58 g (the names of the denominations are of course merely matters of convenience and tradition). It was asserted that an Aegean "talent" weighing 31.6 kg implied a "stater" of 65.8 g and that a Mesopotamian "talent" at 30.8 kg implied a "shekel" of 6.84 g in the Bronze Age Indus Valley. It will be observed that each of these calculations is based on a single chosen mass for a talent – traditionally the maximum weight that can be carried comfortably by one person. To assume that the several ancient Old World polities used a talent-level mass for tracking bulk commodities (copper ingots, grain, lumber, textiles, *etc.*) is indeed reasonable. But it must be understood that the mass of the talent varied to a greater or lesser degree over time and space due to economic vicissitudes and issues of weighing precision. Thus, to single out one talent mass among many and to express the standard smaller standard denomination in a system is to invoke an artificial sense of accuracy and precision, and casts doubt on the entire endeavor.¹

Once targeted single masses for two system units have been isolated, it is ostensibly a simple and straightforward task to calculate their relationship: nowadays it is in fact merely a spreadsheet exercise. The standard mass of one national system is simply multiplied by integers from 2 to N until they equal the mass of multiples from 2 to N of the other national system. In comparing the Aegean system with that of the Indus, this "match" is highlighted in Tab. 1.

A perspective from the Indus

The system of weight in the Bronze Age Indus civilization is a marvel, not least for its unprecedented precision *vis à vis* all other well-known Old World weight systems. The empirical evidence

1 Any ancient standard of weight expressed as a single mass is in fact an approximation only, and must be understood with respect to measures of central tendency. The empirical evidence (the aggregated data from excavated balance weights) shows clearly that any targeted ancient denomination of weight in a system is to be expressed in a range – that is, a *Normzone* – which acknowledges *inter alia* the procedural inaccuracies in manufacturing ancient sets of weights, even if overseen by a strong centralized administrative authority (VIEDEBANNT 1923). Given that most sets of balance weights were likely manufactured by duplicating existing sets, errors were necessarily introduced in the manufacture of each set, and would likely be compounded in the manufacture of subsequent copies of copies. It follows that basing calculations on a single chosen mass standard – to two decimal places, no less – is highly arbitrary, and ensures that all calculations that arise from any such choice are suspect. For the corpus of Aegean balance weights, this author has calculated a *Normzone* for marked weights on the order of 5.4 % (PETRUSO 1992, 61 and references), and Tab. 2.

demonstrates that the standard mass was carefully regulated among the cities (notably Harappa, Mohenjo Daro and Chanhu Daro, which have yielded the largest collections of balance weights). They are instantly recognizable: carefully crafted cubical or rectangular forms (HEMMY 1931; 1937-1938; KENOYER 1998, 98-99; 2010, 115-117; RATNAGAR 2004, 246-255), made from hard stones often apparently chosen for their color and veining (see Fig. 1 for typical specimens). Statistical analyses have demonstrated a famously small *Normzone*, attesting to an unprecedented precision of manufacture assuring consistency over the 500,000 km² of the culture. There was clearly careful regulation of the masses and the denominations created. The most common denomination in the system was *ca.* 13.7 g (twice the figure of 6.85 g cited in Mederos and Lamberg-Karlovsky, which was apparently derived from the Dilmun “mina”). That denomination was the fifth in this binary series, generated by doubling (factors of 1, 2, 4, 8, 16, 32, 64, *i. e.*, the 16-weight). It is worth noting that halving and doubling are the easiest, most natural, and most precise way to structure a system of weight that relies on the double-pan balance. Larger weight series in the Indus cities were decimally generated multiples (160, 200, 320, 640), as were a higher series which included denominations of 1600, 3200, 6400, 8000, and 12,800 (KENOYER 2010, 116). The design of the Indus system facilitated commercial and other enterprises among the cities. While parities were surely struck to enable the Indus cities to trade with Mesopotamia, no surviving accounting documentation in any medium survives in the Indus that can compare to the tablets from the city-states of southern Mesopotamia with which the Indus had sustained trading relationships.

UNITS	AEGEAN	INDUS
1	6.58	6.84
2	13.16	13.68
3	19.74	20.52
4	26.32	27.36
5	32.90	34.20
6	39.48	41.04
7	46.06	47.88
8	52.64	54.72
9	59.22	61.56
10	65.80	68.40
11	72.38	75.24
12	78.96	82.08
13	85.54	88.92
14	92.12	95.76
15	98.70	102.60
16	105.28	109.44
17	111.86	116.28
18	118.44	123.12
19	125.02	129.96
20	131.60	136.80
21	138.18	143.64
22	144.76	150.48
23	151.34	157.32
24	157.92	164.16
25	164.50	171.00
26	171.08	177.84
27	177.66	184.68
28	184.24	191.52
29	190.82	198.36
30	197.40	205.20
<i>etc.</i>		

◀ *Tab. 1. Comparison of standard masses (in g) in the Aegean and Indus systems per (MEDEROS/LAMBERG-KARLOVSKY 2001).*

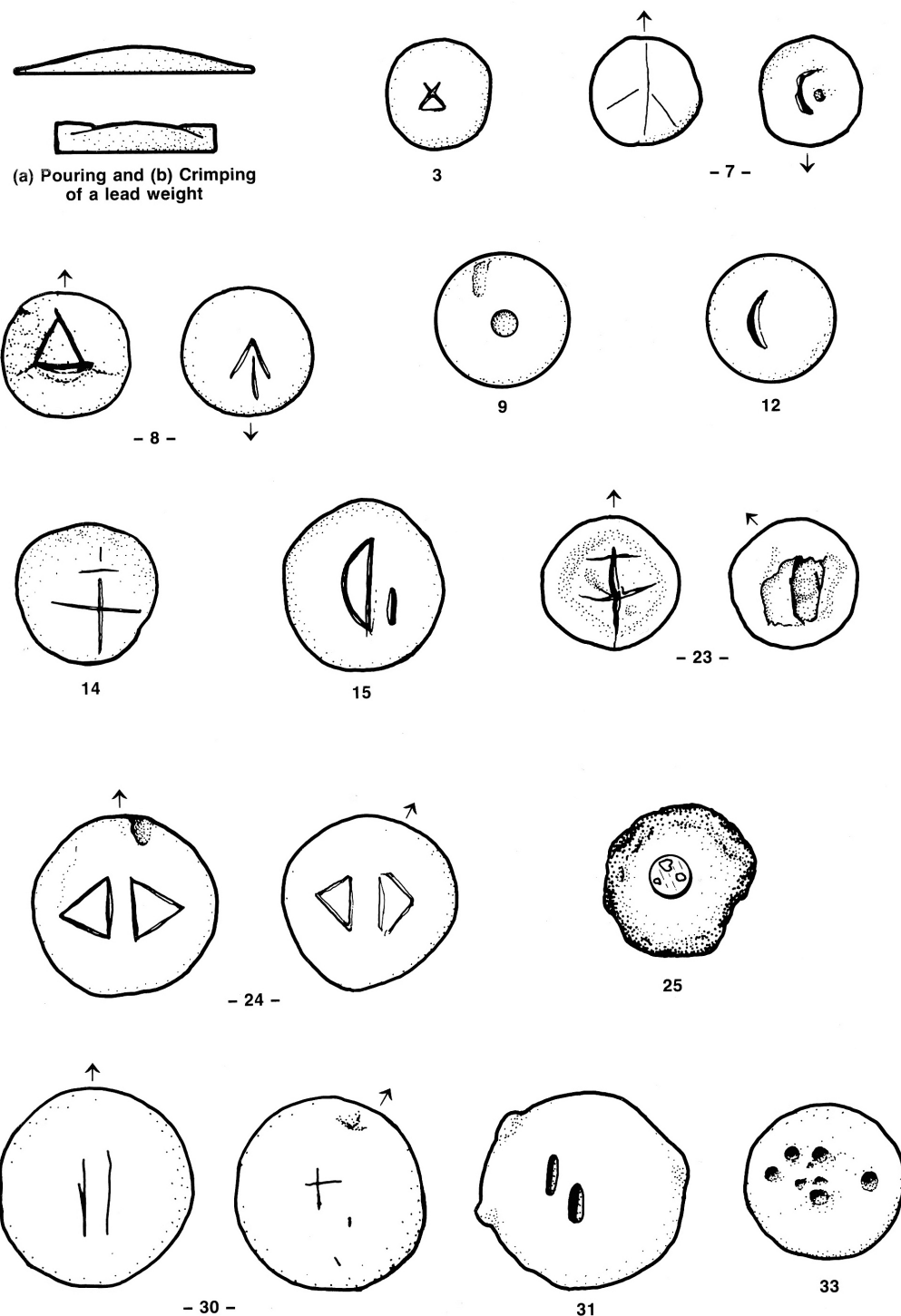


◀ *Fig. 1. A series of Bronze Age Indus Valley balance weights and a balance (<https://www.indiaandtheworld.org>).*

A perspective from the Aegean

Let us explore this particular comparison further. In the Bronze Age Aegean, balance weights (typically lead or stone discs, many of which bear signs which can be interpreted as fractional or whole-number values; see Fig. 2 for typical specimens) consistently point to a single significant denomination in the Aegean in the vicinity of 60-65 g. The system is best attested in Crete at the

Palace of Knossos and in the Cycladic islands, notably at the Minoan towns at Akrotiri in Thera (Santorini) and Ayia Irini in Keos. It is clear that the system was invented in Crete to serve the economy and industries of the several Minoan palaces. The structure of the system was inherited by the Mycenaeans, as the many tablets in Linear B script amply demonstrate (VENTRIS/CHADWICK 1973, 53-58; PETRUSO 1992, 17-20, 63-64).



► Fig. 2. Selected Late Bronze Age lead disc balance weights from Ayia Irini (Keos, Greece). Scale 1:1 (PETRUSO 1992, pl. 4).

While a calculated theoretical Aegean “shekel” of 6.58 g would thus be approximately one-tenth of a mass of 65.8 g, there is no firm evidence in the Aegean for either a denomination answering to this mass nor decimal division in the smaller units; the *archaeologically* attested subunits of the denomination are one-half, one-third, one-fourth, and one-eighth of a derived standard of a unit of 60-65 g.

By the same token, the multiples of this popular denomination are 2, 4, 6, 8, 12 and 24 (again represented by specimens with readable marks, from many sites). Again, these are convenient and practical multiples of the standard unit, manufactured by doubling (2, 4, 8) and supplemented with specimens on a useful duodecimal scale (6, 12, 24). Tab. 2 summarizes the preceding discussion.

Marks	Provenience	Mass(gm.)	Attribution	Resultant Unit
	unknown	3.6	1/6 (P)=1/18 unit	64.8
	Palaikastro	7.8	1/8 unit	62.4
	Knossos	15.57	1/4 unit	62.3
... +	Mochlos	19.4	1/3 unit	58.2
triangle	Akrotiri	20.2	1/3 unit	60.6
	Ayia Irini	20.25	1/3 unit	60.8
	Ayia Irini	30.35	1/2 unit	60.7
	Ayia Irini	31.6	1/2 unit	63.2
	Pachyammos	31.7	1/2 unit	63.4
	Knossos	(59.92)	1 unit	(59.92)
	Ayia Irini	61.15	1 unit	61.15
	Ayia Irini	64.0	1 unit	64.0
	Ayia Irini	87.9(-)	3/2 units	
	Ayia Irini	121.0	2 units	60.5
4 dots	Akrotiri	224.4(-)	4 units	
4 circles	Akrotiri	252.5	4 units	63.1
	Knossos	(273.47)	4 units	(68.4)
	Knossos	(327.02)	6 units	(54.5)
	Ayia Irini	506.6	8 units	63.3
	Praisos	(506.9)	8 units	(63.4)
	Mochlos	720.3	12 units	60.0
	Zakros	1421.3	24 units	59.2
	Knossos	(1567.47)	24 units	(65.3)
mean resultant unit:				61.7 gm.
σ:				1.85
Normzone:				5.4%

◀ Tab. 2. Interpretation of marks on Aegean balance weights (PETRUSO 1992, 61).

► Tab. 3. *The proposed Aegean “stater” and its equivalences (Mederos and Lamberg-Karlovsky, supplementary material).*

Aegean talent	kg	31.600				
mina	g	480 x 65.8				
Aegean „stater“ (AS)	g	65.8	x 72	x 4800	12/25 of 13.68	(AS) 10+10+5=10+2 (DS)
		6.58			1/2 of 12.83	(AS) 2=1 (ED)
					5/9 of 11.75	(AS) 5+2+2=5 (SH)
					7/10 of 9.4	(AS) 10=5+2 (US-EK)
					10/13 of 8.55	(AS) 10+2+1=10 (MS)
					5/6 of 7.9	(AS) 5+1=5 (EKS)
					25/26 of 6.84	(AS) 10+10+5+1=10+10+5 (IS)

It should be noted with respect to Tab. 2 that the masses of resultant units listed in parentheses are not included in calculations of the mean and standard deviation, since those specimens are damaged and visibly underweight; their reconstructed masses are approximations only. A fuller treatment of these calculations may be found in PETRUSO 1992, Chap. I and II and App. I. On *Normzone*, please refer to Footnote 1, above.

All the smaller units in Tab. 2 are simple fractions, most of which were produced by halving. Moreover, these archaeologically attested masses are represented in lead and stone discs designated with simple geometric symbols which are clearly numerical markings. Conspicuously absent in the corpus of Aegean balance weights, however, is any indication of a decimal-based denomination of $\frac{1}{10}$.²

Tab. 3 reproduces Mederos and Lamberg-Karlovsky’s proposed procedures for manufacturing equivalences of the so-called Aegean stater in the weight systems of Dilmun, Egypt, Mesopotamia, Hittite Anatolia, Ugarit, Ebla/Carchemish, Ashdod, and the Indus Valley. All the hypothetical equivalences listed in Tab. 3 between the so-called Aegean “stater” and the standards of the several other “national” systems are nothing more than cumbersome sums and modern calculated fractions (*e. g.*, $\frac{5}{9}$ and $\frac{10}{13}$) whose denominators would have been both implausible and meaningless in terms of the physical operations of ancient weighing. They are clearly to be rejected.

2 Since this author’s publication of the known Aegean balance weights in 1992, a number of thoughtful and stimulating analyses have appeared which both refine and supplement the published masses in that earlier work. The reader is referred especially to PULAK (1996), BROGAN (2006), ALBERTI (2006) and MICHAÏLIDOU (2008). The later Mycenaean balance weights are not a focus of the present study, but generally the main lines of the system in use in mainland Greece and Mycenaean Crete are illuminated by the Linear B tablets dealing with commodities weighed. The reader is referred to VENTRIS/CHADWICK (1973, 53-58), PETRUSO (2003), and especially RAHMSTORF (2008, 153-163) and references.

Any hypothesis about denominations that seem unusual or cumbersome – especially those based on awkward, complex ratios (*e. g.*, 25:26 in the examples cited above) – should be considered suspect in the absence of compelling empirical evidence to the contrary. Beyond this caveat, we might ask what it means to invoke *any* equivalence between, say, Aegean and Indus Valley units of weight. Now any two units of mass can be related by the equation

$$(a * x) = (b * y),$$

where *a* and *b* are masses, and *x* and *y* are factors (either fractions or whole numbers). An infinite number of masses and factors will satisfy this equation, although we may logically limit our investigations to those that are historically plausible. So far as I am aware, there is no evidence that would permit us to invoke any direct commercial traffic in the 2nd millennium BCE between the Aegean and the Indus Valley. That such mathematical equivalences theoretically *could* have been struck by no means suggests that they *were* in fact struck.

A Bronze Age “theory of everything”: The modern context

In an interview about his research, Lamberg-Karlovsky suggested that a specific mass of about 1370 g might have served as a kind of “...Bronze Age euro – in which a series of simple calculations could be used to convert one system into another” (RIST 2002, 42). But one needs to step cautiously here: the euro is, after all, a unit of currency, not mass. Its utility and power lie in its abstractness, which of course is the most subtle and sophisticated characteristic of currency. It is worth recalling that some ten years of complex international legal, economic, and commercial negotiations in the late 20th century among member EU nation states were required before the euro could be circulated. More to the point, the euro – a transnational currency – was of course established to *obviate* precisely the kind of “simple calculations” to which Mederos and Lamberg-Karlovsky refer.

Let us return to the procedures of ancient weighing – namely, the operational mechanics that would have governed transnational equivalences in the Bronze Age. We might wonder how an ancient accountant using a double-pan balance could have determined precisely that the weight of 26 units on one standard coincided with the weight of 25 units on another standard. The very challenge of distinguishing accurately between two hypothetical small masses in the vicinity of 7 g would have required a balance of extreme sensitivity – and let us recall that the “shekel” masses were expressed by the authors to two decimal places, a precision that could not have been achieved at low masses using scales of the design and construction available in the Bronze Age (PETRUSO 1992, 75-77; MICHAILIDOU 2008, 43-58). Finally: if one reviews the corpus of surviving identifiable balance weights from both the Aegean and the Indus, it is not at all clear that a mass in the vicinity of 171 g (the Aegean-Indus “crossover” mass spotlighted in Tab. 1) has any significance within either region. But again, this was the product of calculation using pure numbers. Today our technology allows us to test for mathematical relationships so easily that we tend to lose sight of the trial-and-error work that would surely have been necessary to determine any equivalences in mass four thousand years ago. There would have been regional variations due to replication error of balance weight standards both within and among sites. To assume that we can express an ancient standard as a specific gram value (to two decimal places, no less, as in Tab. 1) over two polities some 6000 km apart, through a millennium and a half, is quite simply untenable.

I have no desire to impugn the efforts Mederos and Lamberg-Karlovsky have made to bring order to what was certainly a congeries of approaches to measurement in the Old World Bronze Age; I merely propose a cautionary tale here, and I myself freely admit to having been seduced into pursuing such cosmic connections many times over the years, hoping to find evidence of a “string theory.”³ In gen-

eral, I am convinced that simpler explanations are to be preferred over complex ones. In some instances, weighing was no doubt done with multiple “national” sets of weights. This indeed should be expected in ancient *entrepôts* and high-traffic ports of call, as well as aboard itinerant merchantmen plying the eastern Mediterranean such as those that sank off Cape Gelidonya (BASS 1967; 1991) and Uluburun (PULAK 1996). Whenever we find closed deposits of balance weights in different shapes – as on those shipwrecks – we are naturally inclined to see their forms as possible tipoffs to different national identities, and rightly so.

Concluding remarks

In closing, I would like to make an observation about the *Zeitgeist* of the period in which the *Nature* paper was published. It is no coincidence that both the *Atlantic* and *Discover* magazines welcomed the suggestion that there was an ancient international trade network stretching from eastern Europe to South Asia over a period of a millennium and a half. We archaeologists reflexively venerate complexity and subtlety in the ancient cultures we study; and the further back in time we can invoke such characteristics, the more gratified we are. Lamberg-Karlovsky, in an interview, articulated a sentiment that many of us who study ancient economics implicitly accept: that “The Bronze Age economies were far more sophisticated than we previously believed” (RIST 2002, 42). With trembling voice, I would suggest that we ask ourselves to what extent this trope drives our research – and not merely at a cosmic level. A more interesting question, however, is this: Do we *discover* ancient complexity, or do we *invent* it?

It is no accident, perhaps, that the project on which I have focused here appeared at a time when the euro was soon to be born, when the world was anticipating with a sense of awe the wonderful things that would come with the dawning of the modern age of globalization, as commerce benefited from a new era in communication and as bold, robust economic relationships were developing rapidly thanks to rapid advances in digital technology. Sometimes our species gets what it wishes for, and more. It might be the case that every age gets the globalization it deserves. The brilliant soliloquy in the 1976 film *Network* presaged the era I have glibly characterized above. In this scene, the chief executive of a multi-billion dollar corporation waxes eloquent on the state of the world as it is and as it will one day be:

“There *are* no nations. There *are* no peoples. There *are* no Russians. There *are* no Arabs. There *are* no third worlds. There *is* no West. There is only one holistic system of systems, one vast and immanent, interwoven, interacting, multivariate, multina-

3 The ur-source for a cosmic and diachronic unified/comprehensive approach to world metrology is the oft-quoted book entitled *Historical Metrology* (BERRIMAN 1953), whose author argued that all modern metrical standards are to be derived from geodetic principles which can be observed in mass, length and volume as early as the 4th millennium BCE. On that basis the author proceeds simply to calculate equivalences to a precision of three (sometimes four) decimal places. The premise of the book is badly flawed and strains credulity. Among other authors, POWELL (1979) and recently IALONGO *et al.* (2018) have also critically examined the general methodology of what has come to be known as comparative metrology, a venerable subject of research. An early and dense meditation on this topic is that of ELLIS (1863); but the interested reader is especially referred to the work of W. M. Flinders Petrie, an archaeologist with a preternatural understanding of concepts of both precision and accuracy – a function of his training as a surveyor. Although his establishment of distinctions among ancient Near Eastern weight standards was quite doctrinaire, his logical approach to doing ancient metrology remains essential reading (PETRIE 1926, esp. 2-4).

tional dominion of dollars. Petrodollars, electrodollars, multidollars, Reichmarks, rurs, rubles, pounds, and shekels. It is the international system of currency which determines the totality of life on this planet. *That* is the natural order of things today. *That* is the atomic, and subatomic, and galactic structure of things today ...

"There *is* no America. There *is* no democracy. There is only IBM and ITT and AT&T and DuPont, Dow, Union Carbide, and Exxon. *Those* are the nations of the world today. What do you think the Russians talk about in their councils of state? Karl Marx? They get out their linear programming charts, statistical decision theories, minimax solutions, and compute the price-cost probabilities of their transactions and investments, just like we do.

"We no longer live in a world of nations and ideologies ... The world is a college of corporations, inexorably determined by the immutable bylaws of business. The world is a business ... It has been since man crawled out of the slime.

"And our children will live ... to see that perfect world in which there's no war or famine, oppression or brutality – one vast and ecumenical holding company, for whom all men will work to serve a common profit, in which all men will hold a share of stock. All necessities provided. All anxieties tranquilized. All boredom amused ..."

Let us ask the question: do we, after all, need a "theory of everything" in ancient metrology? My answer is no.

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Address of the author

Karl M. Petruso
Program in Anthropology
University of Texas at Arlington
University Hall 430, Box 19599
Arlington, TX 76019
USA

petruso@uta.edu

Accounting for civilization: Early weights and measures at Tepe Gawra

by WILLIAM B. HAFFORD

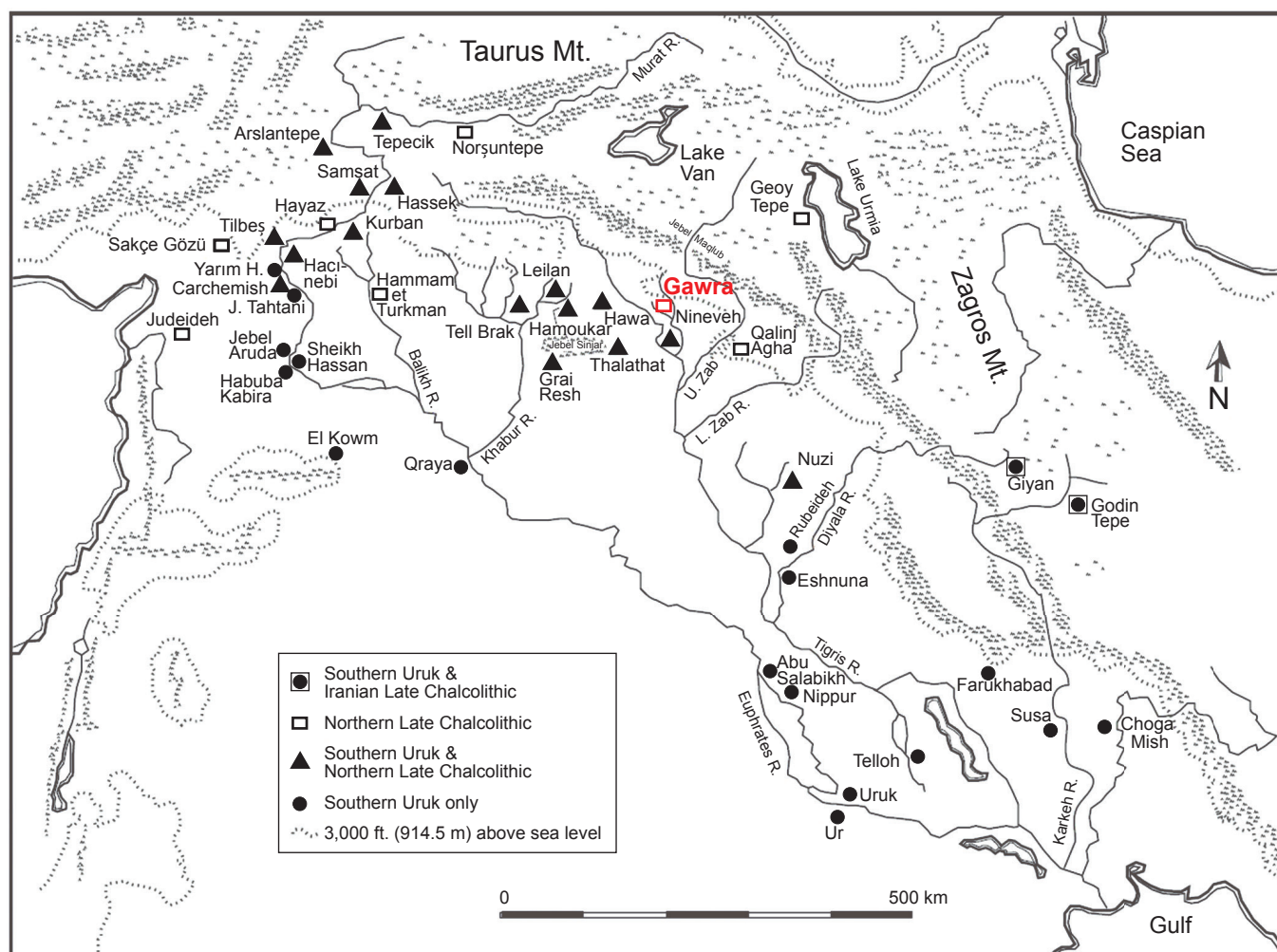
Ancient numeracy, ancient economy, Mesopotamian weights, Mesopotamian accounting, early accounting tokens, ancient abacus

Standardized balance pan weights are clearly apparent in the archaeological record of the Ancient Near East as early as 2800 BCE and certainly by 2500 BCE. However, the conceptual development of weighing may have begun much earlier. The need for evaluation of materials increased greatly with the extension of trade networks and specialized manufacture that were developing in the 5th millennium. This growing need led to the development of measuring and accounting systems, which, in turn, led to writing. The evidence of a developing weighing system is not easy to find as the weights are unlikely to be solidly standardized in unit, material, or shape. The lack of well-examined and/or recorded sites of these early periods also hinders analysis. Evidence of an emerging system might be demonstrable at Tepe Gawra, however. This site has recently been reanalyzed to place its levels more firmly in time and its artifacts more firmly in their contexts using the original field notes and there is good evidence for increasing craft, trade, and accounting in the Late Ubaid through Early Uruk levels (XIII-VIII). This rising complexity led to a clear division of wealth, with a few graves of Levels XI and later containing many luxury goods. The use of seals, sealings, and accounting tokens also increased. Furthermore, not only were potential weights noted by the excavators, but many of the objects catalogued as ballistae, tokens, or game pieces might actually have been used for weighing and/or accounting, or at least may have influenced the development of weight manufacture in specific shapes and materials. This paper investigates these artifacts and their contexts in an attempt to demonstrate the possibility of a developing weight system as much as 1000 years earlier than previously thought.

Ein Abrechnungswesen für die Zivilisation. Frühe Gewichte und Maße in Tepe Gawra

Frühes Rechnen, frühe Ökonomie, mesopotamische Gewichte, mesopotamisches Abrechnungswesen, frühe calculi („tokens“) zur Wirtschaftsprüfung, früher Abakus

Standardisierte Wiegegewichte treten in der archäologischen Überlieferung Mesopotamiens seit wahrscheinlich 2800 v. Chr., sicher ab 2600 v. Chr., auf. Jedoch könnten die konzeptionellen Entwicklungen, die zum Wiegen führten, wesentlich früher entstanden sein. Das Bedürfnis, Materialien zu evaluieren, stieg mit der Ausdehnung von Handelsnetzwerken und spezialisierter Manufaktur im 5. Jahrtausend v. Chr. beachtlich. Der anwachsende Bedarf führte zur Entwicklung von Mess- und Zählsystemen, dies wiederum zur Entstehung von Schrift. Hinweise für ein aufkommendes Gewichtssystem sind nicht einfach zu finden, da bezweifelt werden kann, dass ein solches Gewichtssystem bereits fest in Einheiten, Material und Form standardisiert war. Der Mangel an sorgfältig ausgegrabenen und dokumentierten Fundorten dieser frühen Epoche beeinträchtigt ebenso die Analyse. Allerdings kann ein entstehendes Gewichtssystem möglicherweise in Tepe Gawra nachgewiesen werden. Die originale Dokumentation der Ausgrabungen wurde kürzlich neu untersucht, um sowohl die Fundschichten sicherer chronologisch als auch die Artefakte eindeutiger in ihrem archäologischen Fundzusammenhang einordnen zu können. Es gibt dabei klare Anzeichen für zunehmende Anstrengungen im Handwerk, Handel und in der Administration in den Funden und Befunden aus den späten obeid- zu den frühen urukzeitlichen Schichten (levels XIII-VIII). Diese ansteigende Komplexität führte zu einer klaren Differenzierung von Reichtum, wobei zunächst nur wenige Gräber aus Schicht XI angeführt werden können, während in den späteren Schichten zahlreiche Luxusgüter gefunden werden. Weiterhin wurden nicht nur potentielle Gewichte bereits durch die Ausgräber vorgelegt. Auch andere Objekte, die als Schleudersteine, tokens oder Spielsteine katalogisiert wurden, könnten möglicherweise zum Wiegen und zur Administration genutzt worden sein. Zumindest könnten sie die Entwicklung der Gewichtsherstellung in spezifischen Formen und Materialien beeinflusst haben. Der vorliegende Beitrag untersucht diese Objekte sowie ihre Fundzusammenhänge und stellt einen Versuch dar, die Entstehung eines Gewichtssystems mehr als 1000 Jahre früher als bislang angenommen aufzuzeigen.



▲ Fig. 1. Location of Tepe Gawra and other sites of Uruk and Late Chalcolithic cultures (ROTHMAN 2002, 7, fig. 1.1).

Introduction

Ancient weights and measures have long been a subject of study,¹ but recent advances in understanding the earliest numerical and metrological systems written down in Mesopotamia (*e. g.*, ROBSON 2008; CHAMBON 2011a; 2011b; ENGLUND 2011), combined with increased close studies of specific groups of physical weights and measures,² have led to renewed questions surrounding the origins of the conceptual process of measurement itself.³

Conventional wisdom holds that the process of weight metrology truly begins in the Early Dynastic III, *ca.* 2600 BCE (ROBSON 2007, 419; RAHMSTORF 2010, 100). This is the first period for which we have clear evidence of physical weight standards alongside textual confirmation of a system of weight measurement. Length and volume measurement may have begun earlier, as cuneiform texts appear to indicate a system in place for these attributes in the late Uruk period (NISSEN *et al.* 1993, 27; ENGLUND 2011). It is also possible that the system known as EN (NISSEN *et al.* 1993, 28; WOODS 2010, 41) was used to indicate weight measurement in these early texts, though it has not yet been confirmed.

Weight measurement is thought to have been closely tied with the trade and use of copper and other metals (POWELL 1990; RAHMSTORF 2016, 29; 2010, 101), a process that greatly intensified in the Early Dynastic III. Metals were traded earlier, however, and a system of weights and weighing may well have been developing for centuries before being more securely standardized and thus clearly detectable by modern researchers.

Many weights – or objects recorded as weights – were collected in Mesopotamian excavations of the late 19th and early 20th centuries and now reside

1 Many 18th and 19th century studies were made on the complex origins of European weights and measures (see for example, GREAVES 1745) but these typically began with Greco-Roman predecessors. More ancient weights came into closer study in the early 20th century, particularly with PETRIE (1926) and HEMMY (1937), but these studies largely focused on Egyptian examples. Mesopotamian weights were known but became a more intense focus of study under POWELL (1973; 1990), ZACCAGNINI (1979), PARISE (1989) and many others in the later 20th century.

2 There are too many to mention all, but they include ARNAUD (1967), BASS (1967), COURTOIS (1990), PETRUSO (1992), PULAK (1996), ALBERTI (1995).

3 See in particular the volume of papers edited by MORELY/RENFREW 2010, *Archaeology of Measurement: Comprehending Heaven, Earth and Time in Ancient Societies*.

in museums. These, however, were typically collected as small finds with little or no reference to their context making it nearly impossible to place them in time. Occasionally weights have been recorded from Uruk levels, but in most cases they have not been given adequate description nor even weighed and thus cannot be confirmed.

Even when early potential weights are well described and measured they are difficult to confirm. The earliest attempts at standardized weighing would almost certainly have been highly variable in their accuracy and localized in their extent. This would make their detection nearly impossible without intense excavation and study of a single site, expanded hopefully to similar sites in very close proximity in the same time period. The site would need to be one excavated in large horizontal extent in the crucial time period and would need to show administrative sophistication, intense trade and perhaps control of, or at least importance in, trade networks. Tepe Gawra displays many of these aspects and much of its material from the excavations of the 1930s is available for study at the University of Pennsylvania Museum of Archaeology and Anthropology (hereafter Penn Museum) in Philadelphia; therefore, it is the subject of this particular investigation.

Gawra is a small site in northern Mesopotamia, located in the piedmont zone between the Zagros Mountains and the Tigris River plain (Fig. 1). The site was initially slated for complete excavation in the 1930s. Its lowest levels did not make this goal; nevertheless, large exposures of Uruk and Ubaid levels were made. Unfortunately for this study, in the most crucial period of the late Uruk period Tepe Gawra was abandoned and we are thus missing the most critical metrological link of the late 4th millennium (Fig. 2). There were also problems with recording at the site; Gawra was excavated and documented to varying standards in different seasons, making the task of determining specific contexts of find difficult. However, ROTHMAN/PEASNALL (1999) and ROTHMAN (2002; 2009) has recently reanalyzed the excavation records and the stratigraphy, artifact placement, and building functions are now much better understood than ever before.

Weights are recorded from many levels at Gawra, including some of the earliest (SPEISER 1935; TOBLER 1950). With the help of Rothman's reanalysis, we can attempt to understand their dating, their possible functions and their associations with other artifacts. This might allow us to determine whether the Uruk levels contain standardized weights, and if they do, whether they are intrusive into the lower levels from above.

Weights from Tepe Gawra in Penn Museum

Because the Penn Museum sponsored the excavations at Gawra in the 1930s, it has in its store-

B.C.E	Southern Mesopotamia		Gawra
	Traditional		
	Akkadian		
2500	Early Dynastic	Early Bronze	Tepe Gawra VI
3000	Late Uruk		Tepe Gawra VII
3400	Late Middle Uruk	Late Chalcolithic	hiatus
3600	Early Middle Uruk		Tepe Gawra VIII
3800			Tepe Gawra IX-X
4000	Early Uruk		Tepe Gawra XI/XA
4200	'Ubaid transitional		Tepe Gawra XIA/B
4500	'Ubaid 4?	Middle Chalcolithic	Tepe Gawra XII
			XIII

rooms roughly half of the objects from the dig. The rest resides primarily in the Iraq National Museum in Baghdad and is currently inaccessible.⁴ Nevertheless, the half that is available makes for an interesting study, particularly the potential weights since many have never been closely investigated or weighed.

In order to bracket the 4th millennium period of interest, this paper examines potential weights from Levels XIII to VI, covering the middle of the 5th millennium to the middle of the third. This amounts to 105 small stone objects at the Penn Museum catalogued as weights, spheres, counters, tokens, game pieces, pebbles, polishers, whetstones, or ballistae (sling bullets). The objects for study were chosen either because the excavators called them weights or because their size, shape and material indicate they might have been weights.

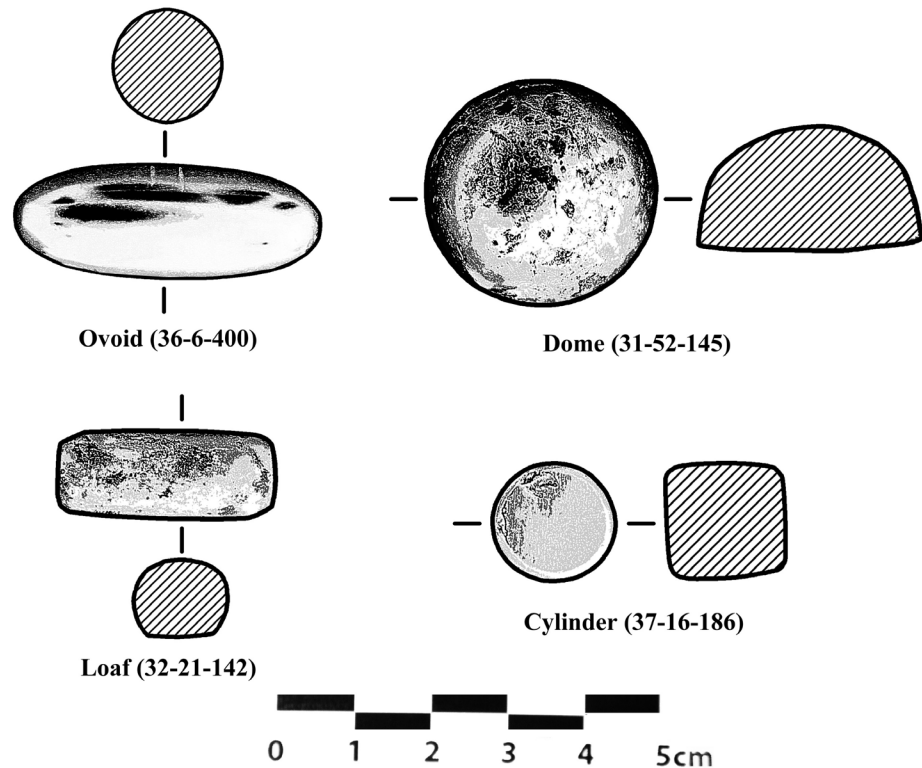
Of the 105 artifacts, only 22 are undeniably weights, but a further 26 show characteristics that make them possible, or in some cases likely,

▲ Fig. 2. Rough dates of the various levels of Tepe Gawra under discussion (ROTHMAN 2002, 3, tab. 1).

⁴ After the looting in 2003, the Iraq Museum was largely sealed off. Although it officially reopened to the public early in 2015, it remains difficult to study there due to various troubles in Iraq in general. I visited late in 2015 and continue to work towards the potential of analyzing some of the artifacts stored there and again in 2019.

► *Tab. 1. Tepe Gawra confirmed weights in the Penn Museum.*

Level	VI	VII	VIII	IX	X	XI/XA	XIA/B	XII	XIII
ovoid	7	3	1	1					
cylinder	1		1						
loaf	2	2		1					
dome	2	1							
total	12	6	2	2					



► *Fig. 3. Drawings of representative examples of the four main weight shapes at Gawra. Scale 1:1.*

weights. Many of the remaining pieces are relatively uniform in shape and manufacture, often resembling later confirmed weights, but do not follow a strong weight progression. The most common of this group are small polished stone spheres, likely tokens for administrative calculation and recording. The two activities of measuring and accounting are clearly linked, however, and the shapes of later weights may be related to earlier counting tokens.

Weights can be identified by their material, manufacture, shape and connection to a regulated system of mass. The material used for weights is typically a hard, dense stone, particularly hematite. In fact, when a polished piece of hematite was found in the levels under investigation at Gawra, it was almost without exception classed as a weight (SPEISER 1935, 90). Hematite was also used for beads and for cylinder seals, but not often before 2000 BCE (MOOREY 1999, 74, 85). Because it is such a hard stone it was difficult to drill with the tools of the 4th and 3rd millennia; it could, however, be ground down to a specific weight and polished. Hematite is rarely found prior to Level IX at Gaw-

ra, but it was not the only stone used for weights; hard stones like gabbro and softer stones like limestone were also used.

In most cases confirmed stone weights have been shaped and polished, which constitutes the criteria of manufacture. Grinding marks in the form of fine linear scratches across the surface of the stone are often noted, though well-polished examples may have removed these scratches. When chipping is noted it may indicate unintentional damage but can be evidence of the stone's use as a hammer rather than a weight. This kind of use wear generally disqualifies a stone from consideration as a weight, though it is possible to reuse a weight as a hammer stone. It is also important to note that natural stones with no use or manufacture wear can be found that fit into a weight system and were used as weights. These are known as 'make-weights' but they are difficult to detect unless found alongside confirmed weights.

The shape into which a weight was formed is relatively variable. In his analysis of weights at Gawra, SPEISER (1935, 89) notes "ellipsoidal, barrel-shaped, cylindrical, prism-shaped, cone-shaped,

roughly duck-shaped, discoid, and cube-shaped, not to speak of marginal and indefinite types.” He states that only the ellipsoidal (ovoid) and barrel-shaped (ovoid with flat ends) were definitively weights, with the others being harder to confirm.

The most common weight shape across the Near East is the ovoid, known more technically as the sphendonoid (sling-bullet shaped). The next most common, particularly in the southern floodplain, is the sleeping or trussed duck. This form has not been found at Gawra even though the weight system most indicated at the site is the southern Mesopotamian one.⁵

Confirmed Gawra weights stored in the Penn Museum are noted in four general shapes – ovoid (sphendonoid), cylindrical, rectangular (loaf), and hemispherical (dome) (see Tab. 1; Fig. 3).

Ovoid is a general term to include ‘cigar,’ ‘olive,’ and ‘date’ shaped weights. The form most often has rounded ends and a circular cross-section but may have a flattened base, altering the cross-section, and may also have flattened ends. If the body is particularly thick and the ends particularly flattened, it can be described as a ‘barrel’ shape.

Cylindrical weights are typically squat, that is, they have a height equal to or less than their diameter and therefore are reminiscent of tall disks. They can, however, be full cylinders, higher than their diameter. In such a case, if the height is taken as the length, they resemble ovoids with flat ends except that they have no tapering to those ends. The form in this case can be difficult to confirm as a weight because it resembles a blank cylinder seal and may have been intended for later drilling. At Gawra, the cylinder type is almost always the disk-like, squat form that would not be used for cylinder seals.

Loaf weights are typically rectangular in plan but rounded at the top, resembling a modern loaf of bread. The form in its ideal is thus a cylinder with a sharply flattened side and thus resembles a sphendonoid with flat base but with little or no tapering to the ends. The form, however, is often less than ideal and may include ‘bar’ weights that have flattened tops and bases, making essentially a square cross-section, as well as cruder versions that are more like elongated irregular domes.

5 SPEISER (1935, 92 no. 22, pl. XLIII no. 1) lists a duck weight weighing 7.49 g and indicates that it was allocated to Philadelphia in the division, but the photograph quality in the plate is poor and no duck weight from Gawra is in the Penn collection. Furthermore, the field number Speiser associates with the object is found on a Penn Museum hematite piece that is roughly domed and weighs 17.5 g. Elsewhere SPEISER (1935, 89) speaks of “roughly duck-shaped” weights, but these do not show details of a head and are essentially somewhat irregular ovoids. TOBLER (1950, 206) lists a black marble “duck-weight” (G6-503, said to weigh 24 g) from Level XV, but it was allocated to Baghdad. Tobler’s drawing (pl. CLXXIX, 54) shows that it is not the typical southern Mesopotamian duck shape with its head resting on its back, but rather has its head facing forward. It is also unlikely to represent a bird, but a couchant quadruped. Its mass of 24 g could potentially be 3 shekels of 8 g each, but this cannot be confirmed at this time.

Penn Museum no.	Gawra Level	grams	incised lines	grams per unit
35-10-361	VI	65.4	8	8.175
32-21-143	VI	17.4	2	8.7
36-6-400	VI	16.7	2	8.35

Dome weights are round in plan with a flat base and rounded top; in the ideal, a sphere cut in half. Like all other forms, however, they vary and may have a much higher dome, reaching near conical proportions, or a lower dome, making more of a ‘button’ shape. In the unconfirmed weights at Gawra, this shape includes crudely formed sub-spherical and sub-cubical stones that may actually have been used as grinders.⁶ In this analysis, domes are only confirmed as weights if they are well-formed hemispheres, but cruder examples have been analyzed and some placed in the possible weight category.

▲ Tab. 2. *Tepe Gawra marked weights in the Penn Museum.*

Weight systems

The weight system to which various examples conform can be a particularly tricky piece of evidence since any numeral can be forced into any base system through the use of unusual multiples or divisors. Different systems also overlap or are interrelated so that one weight might have multiples in two or more systems. The most effective way of confirming weight systems is through marked examples. In other words, when the ancient manufacturer or user marked the number of units on the weight itself, it can be taken as a relatively secure indication of the system in use. Marks on weights are not overly common, but they do occur and three of the analyzed weights at Gawra are marked (see Tab. 2).

All of the marked Gawra weights in this study come from Level VI in the Early Dynastic III to Akkadian period, very roughly 2500 to 2300 BCE.⁷ The system indicated is the southern Mesopotamian shekel at approximately 8.4 g. It is immediately evident that the standard is not as specific as might be hoped, ranging as it does from 8.2 to 8.7 g in these examples. SPEISER (1935, 91) found this range difficult to accept and wanted to interpret an almost imperceptible dot near the incised lines on the 8.7 gram example as an intended extra $\frac{1}{10}$ unit. However, the variance noted in these three marked examples is typical of that demonstrated at other sites (HAFFORD 2005; 2012) and is almost certainly a reflection of the accuracy of ancient scales (KISCH 1965; SKINNER 1967). Some tolerance must be accepted around the standard, as much as 5 % either side, leading to a demonstrable normal

6 For more details on shapes and materials used in Near Eastern weights, see HAFFORD 2005; 2012.

7 There are other marked weights at Gawra, but in levels above those examined in this study (e.g., a Level IV marked weight of 10 shekels, see SPEISER 1935, 90 no. 1).

Standard	Lvl VI	Lvl VII	Lvl VIII	Lvl IX
8.4	8	4	1	2
9.4	3	1	1	
7.8	1	1		

▲ *Tab. 3. Standards in g represented by confirmed weights at Gawra, including marked and unmarked examples. The two in Level IX both indicate a standard around 8.0 g and could be high examples of 7.8 g rather than low examples of 8.4 g.*

curve variance between 8.0 and 8.8 shekels for the standard southern Mesopotamian unit.

Another efficient way of confirming weight system is through a collection of stone objects in the same archaeological context that are in clear mass relationship to one another, such as 1, 2, and 5 times a unit value. The find of clearly associated weight sets does not occur at Gawra, though a few individual weights were found in relatively close proximity (within the same 10 m x 10 m square, for example, and occasionally two in the same room of a building), but single weight finds are very common in ancient Near Eastern sites. Abandonment and other post-depositional processes tend to scatter small finds, and single weights might be lost or discarded during their use lives for various reasons.

When other weights are not in close proximity but shape and material indicate an object's possible use as a weight, we can only compare its mass to known systems starting first with clearly indicated systems from the same site and same archaeological level. Divisors and multipliers of the unit should be clearly understandable, *i. e.*, a multiplier of $3 \frac{1}{2}$ is not at all likely. Then again, we must allow a certain amount of tolerance around the standard and a $3 \frac{1}{2}$ multiplier of 8.4 g might actually have been intended as $3 \frac{1}{2}$ multiplier of 8.1 g or $3 \frac{1}{2}$ multiplier of 8.5 g. Although both of these multiples are more regular and understandable than $3 \frac{1}{2}$, neither is common in confirmed weights across the ancient Near East and would still raise suspicion as to the use of the object as a weight.

Unmarked weights at Gawra tend to adhere to the 8.4 gram standard, but several appear to conform to the 9.4 gram northern Mesopotamian (sometimes called Levantine) standard and a few to

the 7.8 gram Eblaite/Syrian standard (see Tab. 3). This latter is notably close to the low end of the 8.4 gram tolerance, but it has been increasingly recognized as a separate system, particularly in Early Bronze Age Syria (ASCALONE/PEYRONEL 2001).

Once again, a certain amount of tolerance around the intended standard must be allowed even in set groups. The standard and its tolerance might be measurably clear in a set, but single weight examples are much more difficult to pin down. For example, a weight of 77 g might be 8 units of 9.625 g or 9 units of 8.555 g (or even 7 units of 11 g). These unit values are all near known standards in various parts of the Near East and likely reflect the interrelated nature of the systems. Some weights may even have been cross-over weights intended for comparison across different systems (PARISE 1989).

Unfortunately, standard does not correlate with shape, so that any shape can represent any of the potential standards. In this case, all of the marked weights are ovoids and on the 8.4 standard, but there are very identifiable unmarked ovoids at Gawra on the 9.4 standard, such as Penn Museum no. 32-21-141 weighing exactly three units of 9.4 g.

Possible weights at Gawra come in the same general forms as the confirmed weights, though less defined, and a few are more amorphous, being natural pebbles that could potentially be make-weights. These cannot be confirmed, but some of the possible weights are rather convincing in their shape, material, and coherence to known weight systems (see Tab. 4-5).

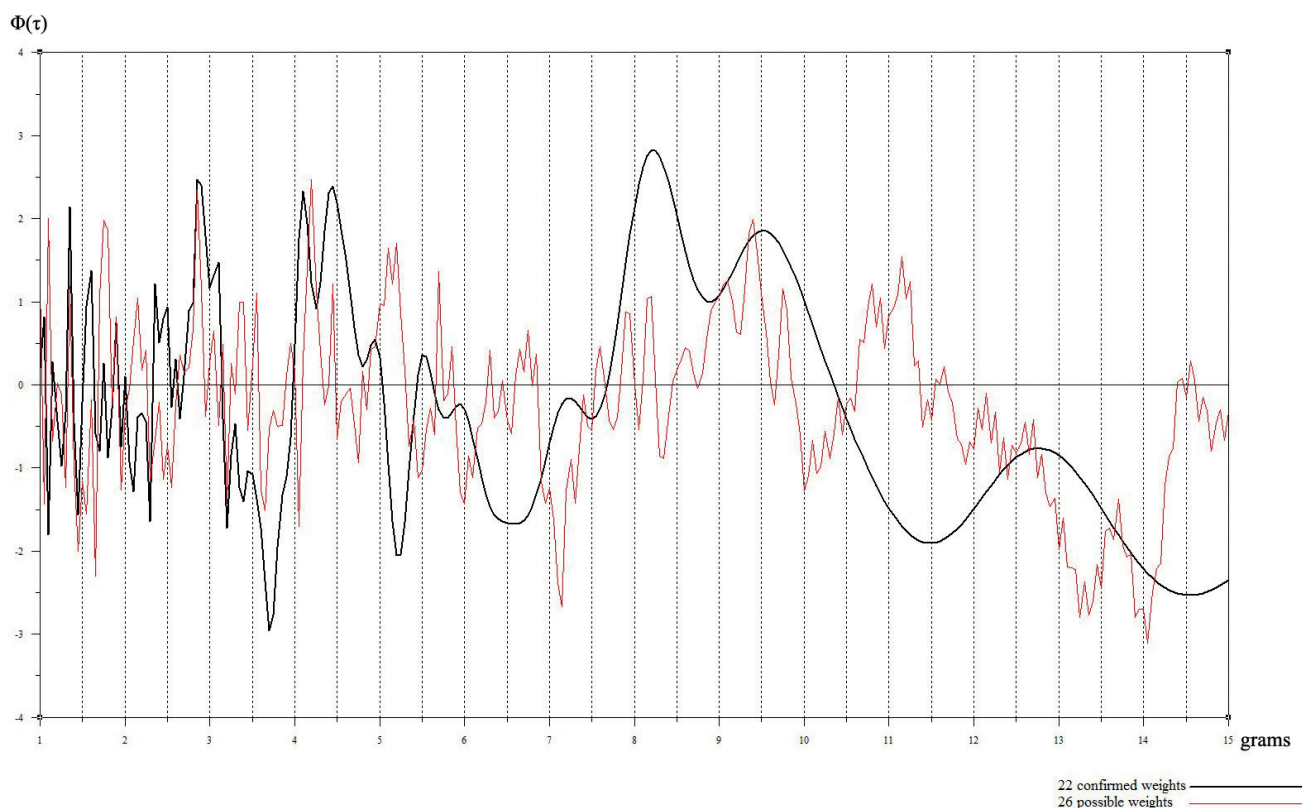
Weight standards are calculated here only by using sensible multiples or fractions and cannot be absolutely reliable; however, the marked pieces do show that at least the 8.4 standard was in use. Both SPEISER (1935, 89-96) and TOBLER (1950, 206-207) analyzed weight examples from Gawra in an attempt to demonstrate standards across the site. RAHMSTORF (2006, 19) and ROTHMAN (2002, 67) felt that they had not demonstrated a convincing standard, particularly for the examples earlier than Level VII.

► *Tab. 4. Number of possible weights from Tepe Gawra in the Penn Museum divided by level and shape.*

Level	VI	VII	VIII	IX	X	XI/XA	XIA/B	XII	XIII
ovoid		1	1			1			1
cylinder				1				1	
loaf	1		1		1				1
dome	1		4	3	1	2			
pebble		1	1		2			1	

► *Tab. 5. Potential weight standards of possible weights from Tepe Gawra.*

Standard	VI	VII	VIII	IX	X	XI/XA	XIA/B	XII	XIII
8.4	1		3	2	3	2		2	1
9.4		1	2	1	1				1
7.8	1	1	2	1		1			



▲ Fig. 4. Cosine quantogram analysis of confirmed and possible weights stored at Penn from Levels VI-XI-II at Tepe Gawra. The error term ($\varphi\tau$) indicates goodness of fit at particular gram values.

TOBLER (1950, 206) makes reference to an 8.34 gram shekel of Gawra Level VIII (referring to SPEISER 1935, 92-93). He then mentions a 7.70-7.75 gram shekel unit found in strata XI and X and an 8.31 gram unit in strata IX and VIII, based on a very small set of examples.

A more mathematical and potentially more reliable method of analyzing base units in a set of numbers is called Cosine Quantogram Analysis. It was used by KENDALL (1974) to analyze ancient length measurements and thereafter often used to analyze ancient weight standards in groups of observations.⁸ Using this method on a small sample can be problematic, but the 22 confirmed weights in this study of Penn Museum pieces show a definite pattern with peaks at 2.9, 4.1, 8.2, and 9.5 g (see Fig. 4). The graph indicates the dual use of units in the range of 8.2 and 9.5 g (with peaks also at $\frac{1}{2}$ and $\frac{1}{3}$ these values).

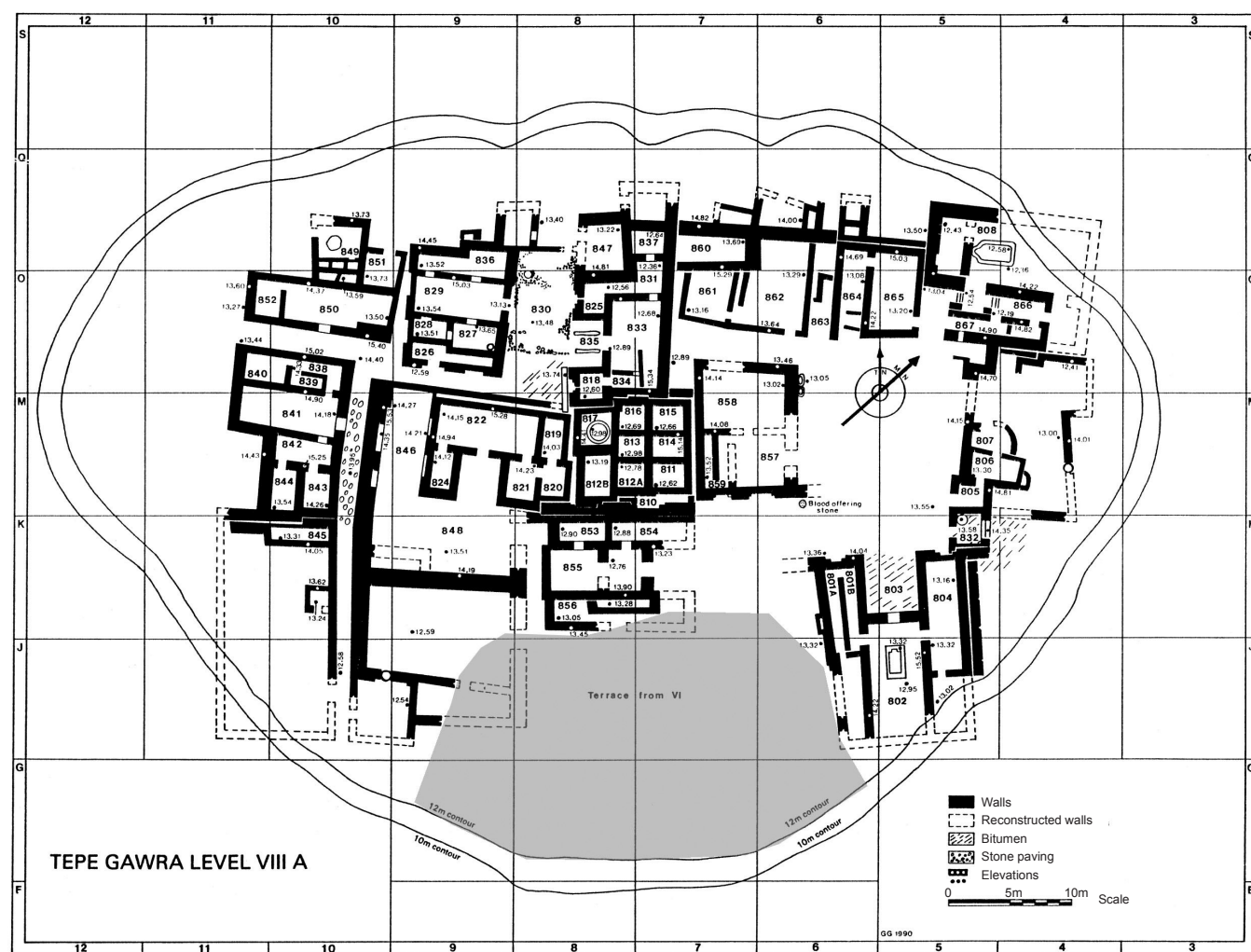
The possible weights show peaks at 1.8, 4.2 and 9.4 g. These peaks, as expected, are not clear and it is very likely that many of the included examples are not weights at all. The best peak in this sample sits around 9.4 g and when only the eight examples thought to be the most likely candidates

for weights based on their material and form are shown, this peak is clearer, but there is also a peak around 11 g. We might be seeing a mixture of 8.4 ($\frac{1}{2}$ of this value is the peak 4.2) and the 9.4 gram standards and the broad, noisy peaks might reflect developing systems that have not yet solidified at these numbers.

That confirmed weights should be found in Level VI is no surprise given its date in the Early Dynastic III and into the Akkadian. This was a time when many weights are known elsewhere in Mesopotamia. In fact, it has been suggested that balance pan weights, and the idea of weighing itself, originated around the beginning of the Early Dynastic III period (*ca.* 2600 BCE, with unconfirmed evidence perhaps as early as 3000 BCE; RAHMSTORF 2011, 113). Because the evidence for earlier weights has been seen as equivocal, finding confirmed weights in Gawra Level VII is of great interest as it dates in the Early Dynastic I up to the beginning of the Early Dynastic III (very roughly 3000-2500 BCE) and helps place detectable weighing activities more firmly in the early range.

It is, of course, possible that the Level VII weights come from the latest period represented by the level, but they nonetheless represent some of the earliest confirmed weights known. Admittedly, the solid evidence of early weights from Gawra is meagre,

⁸ See for example PETRUSO (1992), HAFFORD (2005), RAHMSTORF (2010), for the formula and a discussion of its use in analyzing weights.



▲ Fig. 5. Plan map of Level VIII A (ROTHMAN 2002, 49, fig. 3.15), showing apparent extent of disturbance from Level VI. Note however, that more of Squares 7, 8, and 9K may have been disturbed.

amounting to only 10 confirmed and 24 possible weights in the Penn Museum collection from Level VII or below. Furthermore, there are problems with the context of some of these.

Context of earliest weight finds

Level VII

Level VII consisted of badly denuded mud brick architecture with no stone foundations that resulted in unclear building patterns (SPEISER 1935, 21). Six weights were discovered securely in this level, however, among the mud brick ruins in the north and central portions of the mound. Another, likely weight (32-21-273) from this level is a perfectly formed ovoid shape, but it is made of calcite, not a common material for balance weights (though common for earlier and smaller tokens/counters). It weighs 63.2 g and thus could be 8 shekels of 7.9 g.

Though it is unclear what function the badly ruined buildings of Level VII served, SPEISER (1935, 21) notes that in the level as a whole there is much less copper and much more obsidian as compared

to Level VI.⁹ This might reflect a shift in trade patterns with the introduction of major copper networks in the Early Dynastic III, which would promote the rapid increase in weights in Level VI over Level VII. Nevertheless, copper items are found in Level VII and Level VIII, showing that metal circulated earlier – in fact, the first worked copper appears in Level XII (ROTHMAN 2002, 81). Other exotics such as lapis and gold are also found, though in small amounts, in these and earlier levels.

Between Levels VII and VIII Gawra was abandoned for around 500 years (ROTHMAN 1999; 2002). The inhabitants of Level VII built directly atop the burned and long-weathered remains, but later inhabitants dug down through parts of Level VII and in some cases all the way to Level IX. In the southern region of the Tell, Level VI lay directly on the remains of Level VIII and, in the extreme southern reaches, Level VI builders disturbed Level IX deposits.

⁹ By SPEISER's (1935) count there were 334 copper finds in Level VI and only 42 in Level VII. The two levels are not truly comparable in volume of finds; even so, the difference in copper is substantial. In Level VIII, 500 years earlier, there were 22 copper finds.

Level VIII

According to ROTHMAN *et al.* (1989, 284), “Notes also indicate that the terrace from level VI into levels VIII and IX, mentioned by Speiser, was more extensive than originally thought, disrupting all of squares 7J, 8J and 9J, and parts of squares 7K, 8K and 9K of VIII.” This terrace greatly endangers the dating of our confirmed Level VIII weights, since both were found in the partly disturbed Square 9K (see Fig. 5).

The exact limit of disturbance in 9K is not known, but the context of one of the confirmed weights is known more accurately than the 10 m x 10 m square in which it was found. It comes from a room called ‘the silo’ in field notes, a context that included the hematite weight, two chisels, a needle, a sickle blade and a straight-sided cup.

The moniker ‘silo’ appears to have been applied to small, enclosed rooms or large bins that might have their origins in levels above, similar to a ‘well’ but not as deep. There is another of these silos in Square 8K inside Room 856. This one produced no weights but did have two small bronze disks that might have been balance pans (ROTHMAN 2002, 394-395, no. 2724-2725).¹⁰ The silo in Square 8K is known to have post-dated its find level and ROTHMAN (2002, 136) expresses the possibility that the one in 9K did as well. Thus, even without knowing the extent of the disturbance from Level VI, there is some likelihood that at least one of the weights in Level VIII (32-21-459) is later than its level.

The other weight (32-21-461) is not localized to a specific area of Square 9K but might still be considered suspect in date because of the general disturbance. Nevertheless, there is another reported hematite weight (field number 5755) in Level VIII that was allocated to Baghdad. It comes from Square 6M, well away from the disturbance from Level VI, and is said to measure 29 mm x 10 mm. The elongated form, with length three times its width, would likely be an ovoid or loaf and the material makes it an excellent candidate for a confirmed weight. Unfortunately it cannot currently be examined.

There are seven potential Gawra weights in the Penn Museum from Level VIII. Most are the large (fist-sized or larger) crude sort of flattened sphere (dome or loaf) that may have been weights for large and heavy materials, or may have simply been grinders. All are made of a dark gabbro or grano-diorite and are ground down to a flat base or resting surface. The best example (32-21-450) has a highly polished upper surface and weighs in at 1195 g,

perhaps 2.5 minas of 478 g each.¹¹ Notably, this stone was found in Square 9K, generally associating it with confirmed weights but also potentially with Level VI.

A relatively convincing weight in the group is 32-21-460, another gabbro piece that is clearly shaped, resulting in something of a cross between ovoid and loaf. It weighs 74.9 g and thus could be 10 shekels of 7.49 each, or 8 shekels of 9.36 g. SPEISER (1935, 93) took it to be a weight, placing it at 9 shekels of 8.34 g. It was found in Square 9M, just north of 9K where other weights are known, but it was found with obsidian and flint blades, and may have been a specialized, well-shaped hammer stone for manufacturing them.

Square 9M in Level VIII is notably part of a complex known as the Western Temple, but which Rothman prefers to call the Western Tripartite Building as he finds much of an administrative or manufacturing function and little of the religious within it. In the southwest room of this building were found six ‘wide flower pots’ stacked in 5 cm of charred grain (ROTHMAN 2002, 135), suggesting a storage or dispersal function. The wide flower pot may be the predecessor of the beveled rim bowl, often said to be the ration bowl of the Uruk period (see, for example, WOODS 2010, 49), mass produced and attempting standardization (JOHNSON 1973, 135).¹² Such bowls may have been used for doling out and/or approximating measures of grain but they were not strictly standardized in volume.

At this point, roughly 3700-3500 BCE, Tepe Gawra was an administrative and religious center. As ROTHMAN (2002, 138) states, “It had little existence as a town outside its role in mediating relations within the polity encompassing its hinterland and with other, distant centers.” Such a place would need a way to evaluate and account for goods in its administrative and transshipment role. That regulated local or even regional weights (and other measures) might exist in level VIII, therefore, is not impossible. A weight system may have already been in use alongside the clearly extant seals, sealings, and counters/tokens that demonstrate the administrative complexity of the site.

Level VIII was a deep, very active level that ended in a large-scale fire. Architecturally it was divided into three sublevels, A-C, but sub-levels were not often noted on artifact records and attributing weights to these sublevels is therefore not possible.

11 SPEISER (1935, 93) believed this stone to be a weight. He reports it at 1368 g and equates that to “163 shekels at slightly under 8.40 g. to the shekel, the approximate mean value in Str. VIII from which our piece has come.” I have weighed it on a calibrated digital scale at 1195 g, which would instead equate to 142 of these 8.4 gram shekels. Neither of these multiples is likely, but 150 is (2 and ½ minas of 60 shekels each). This would make for an 8.0 gram shekel.

12 Note, however, that analysis of beveled rim bowls by BEALE (1978, 293) indicates such a large statistical deviation in volume that he believed they were not standardized at all.

10 At least five balance pans, each around 8cm in diameter and having four holes for suspension, come from Level VI, a period when weights are known to be in use (SPEISER 1935, 115).

► Fig. 6. Top and profile views of 33-3-49, Level IX dome-topped weight(?) with flattened base. Scale 1:1.



Level IX

The finds from Level IX were not documented more closely than their 10 m x 10 m squares. Both confirmed weight examples from this level come once again from Square 9K, but at this level the square was apparently not affected by the cut from Level VI. There was no architecture in the square at this time, however, and with the weights and potential disturbance in the same square of the level above, there is at least some suspicion that they may have filtered down.

Nevertheless, the likelihood of disturbance is substantially less than that for Level VIII and there are two convincing possible weights from nearby squares. Both are domed. One (33-3-285) is less worked and may have been a polisher but its weight of 67.0 g would make 8 shekels of 8.38 g. It comes from Square 8K, where disturbance from Level VI is possible. The other is still more convincing and comes from Square 9M where no disturbance is reported even in the level above. It is a well-shaped hemispherical stone (33-3-49; see Fig. 6) that resembles much later dome-topped weights, sometimes called ‘cupcake’ weights due to their straight, angled sides and domed top. This one is made of a fine-grained marble or other metamorphosed limestone and might conceivably be a jar stopper, but its shape and weight of 45.9 g makes it a good candidate for 5 shekels of 9.18 g.

Level IX was a relatively shallow stratigraphic layer, as the builders of Level VIII cut much of it away, particularly in the east where little if any architecture survives. The graves associated with this level have many finds but the buildings do not, probably due to clearance by the Level VIII builders. A few exotic objects (gold beads on copper wire for example) were found in the Level IX temple, however, indicating some level of import of high status



▲ Fig. 7. Level IX spherical stone token 33-3-110 with substantial chip possibly made to act as a base. Scale 1:1.

goods. There also appears to have been specialty craft production around the temple – bone working, wood working and possible lithic production. There were a number of tokens or counters (sometimes called gaming pieces) in the area (Squares 8K and 8M, 9K and 9M), and seals and sealings of this level tend to group in and around the temple, indicating a probable administrative function.

ROTHMAN (2002, 127) sums up the level as follows: “Level IX appears a shorter-lived, stripped-down version of Level X. A central temple and at least one large, coherently laid-out building dominated each level. ... The trend started in Level X of a specialized center with a small population appears to have continued in Level IX.”

Levels X and XI

Levels X and XI display rather confusing phasing in Tobler’s analysis; ROTHMAN (2002) has worked through and re-assigned them. For the general purposes of this paper they can be analyzed together, noting that there is increasing complexity and centrality in these levels as compared to XII and XIII.

By the time of Level X (roughly 4000-3800 BCE), Gawra was already a specialized center and appears to have been developing sophisticated administrative tools, as witnessed by a large number of counters/tokens, seals and sealings. Although there are no confirmed weights from Level X, and even the possible weights are not particularly convincing, the tokens may have special significance in the development of weights. Those found at Gawra are often made of stone rather than clay, and run against the grain of SCHMANDT-BESSERAT’s (1992) theory. In her analysis, complex (clay) tokens increase in number in the mid to late Uruk, yet at Gawra tokens are almost entirely simple and stone (admittedly, the Late Uruk is missing at this site). Furthermore, stone is more labor intensive to work than clay and thus SCHMANDT-BESSERAT (1992, 7) suggests that stone tokens were symbolic items for elite burial, not tokens used in everyday administration.¹³

Indeed, many stone tokens at Gawra come from graves, particularly in Levels X and XI, but by no means all. Many are found in central storage buildings as if in use for commodity calculation. Most are spherical and well-made of calcite, marble, or fine-grained limestone. They often have a flattened base and some are so flattened that the result is hemispherical. Those that do not have a flat base often have an intentional break or chip so that the sphere can sit on a surface without rolling (see Fig. 7).¹⁴ Tokens or counters for use on a counting board would require such a feature (WOODS 2017, 429).

Could these stone tokens have been used for counting goods, moved on an abacus drawn as a grid in the

13 Yet, of 46 stone spheres noted in the field catalogue of Levels X and XI, only 17 are found in graves.

14 Of the stone spheres examined in the Penn Museum, 63 % were found to have an intentional chip or other flattening of one area, possibly to prevent rolling on a board.

dirt, on a brick, or on a table? Schmandt-Besserat believes that the Mesopotamians of the Early and Middle Uruk period had not yet abstracted numbers, and therefore counters of this nature would not be possible. Yet, as WOODS (2017, 428) has noted, “counters were in many ways the driving force behind numeracy in Mesopotamia.”¹⁵ It is true that concrete numbering (where count is tied to the item being counted and not recognized as an abstract number applicable to any item) is indicated where a token represents both, the item and its count. Nonetheless abstraction may have been developing (such as through use of a larger token of the same shape to represent a higher number of that item).¹⁶ Perhaps stone counters were used at Gawra to calculate additions and subtractions (of a particular good, such as grain) to communal stores. Clay tokens representing the final amount could then be placed in the store-room and the room sealed.¹⁷ When next that door was opened, the clay tokens would show the starting amount of the commodity in the room; more of that item could be added or some taken away, new calculations made, different clay tokens representing the new total amount placed in the room, and the door sealed again.

In such a case, the tokens, and indeed the abacus grid or counting board, might come to represent the people who did the calculations, a rare and innovative skill in the eyes of early Mesopotamians. They might then become symbols of a rising elite and be buried with them to indicate status.

Nine stone tokens were found in a child's grave at Gawra (Locus 181, discussed further below), perhaps indicating the status of the child's family. Furthermore, and admittedly a stretch, at least two ‘amulets’ have been found from early levels with grid-like hatching that might represent an abacus (37-16-331; see Fig. 8), the working type of which was much larger and probably scratched on the ground or on a perishable table.¹⁸ Along these lines,

15 And ROBSON (2007, 419) adds “numeracy predates literacy by several centuries in Babylonia.” In fact it may predate literacy by a millennium or more.

16 POWELL (1995, 1949) shows that the earliest texts indicate a complex representational counting system in play in the pre-literate period, saying: “In sum, it seems likely that the Sumerians already possessed in the 4th millennium – before the invention of writing – a system of counters running up to the equivalent of 60³.”

17 As WOODS (2017, 429) rightly notes, “clay tokens are unlikely candidates for use on an abacus of any kind despite claims to the contrary.” He suggests, however, as I do here, that clay tokens might record amounts having been created from abacus notations.

18 Physical examples of, or even clear depictions of, the abacus do not appear until Greco-Roman times (WOODS 2017, 423-424). Yet, as PULLAN (1968, 2) states: “The normal abacus of the Greeks and Romans was a plain board or table on which a few parallel lines were drawn to mark the ‘places.’ The method was known in Greece five hundred years or more BC, but was certainly much older than this. Its origin is obscure but it may well have been devised at a very early stage in the development of mathematical ideas.” He goes on (p.16) to discuss calculi as pebbles in use for calculation on an abacus grid.

WOODS (2017, 449) shows that the early SANGA sign likely represents an abacus, and that the abacus itself, written ⁸¹⁸NIG₂.ŠID,¹⁹ is attested in an Early Dynastic text that deals with lengths and widths. Finally, even as late as the Old Babylonian period, a list of professions gives the title of a person responsible for calculation with counters, the ^{lu}₂-im-na^{na} or ‘man of the clay-stones’ (WOODS 2017, 431).²⁰ Calculation with tokens or counters thus continued in the literate period. Whether it was a sign of elite status at that time is not clear.

An abacus used for calculation might depend on a grasp of abstract numbers, though different grids and different shapes could potentially be used for different concrete counts of different goods or commodities.²¹ Regardless of whether numbers were being abstracted or the abacus or tokens represented status in the Early and Middle Uruk period, token shape and manufacture may have influenced weight creation in this period or later.

A most interesting group of stone tokens was found in Square 4O of phase XI of Level XI/XA. In this case the finds can be considered an associated group; they were recorded to sub-square j7, a 1 m x 1 m context within the larger Square 4O. The group consisted of two limestone spheres, three egg-shaped pieces of calcite or marble, and five other stone spheres that were sent to Baghdad. This very sub-square also produced perhaps the most convincing of all potential weights of the early levels. If this object (35-10-89) was found in any context of the Early Dynastic or later, it would undoubtedly be accepted as a balance pan weight, and in fact Tobler and Rothman both catalogue it as such.²² It is a wide ovoid with well-flattened base, made of a dark gray stone that may be an intentionally heated fine-grained limestone (see Fig. 9). It weighs 30.8 g, which does not work well for divisors in the 8.4 or 9.4 gram unit, but would make 4 units of 7.7 g.

Levels X and XI showed much evidence of grain storage, with a large, apparently secular building – the Round House – at least partly dedicated to that function. Charred grain remains were found

19 The word is related to the Akkadian *nikkassu*, account/calculation. The determinative *giš* shows that the abacus in this case (a mathematical text possibly from Fara) was made of wood (WOODS 2017, 432).

20 Note that ^{na}₄ is also the word used for stone weight (*abnu* in Akkadian).

21 These points are well discussed by WOODS (2017, 424), who shows the basis of concrete number manipulation in the abacus and the potential of abstracting numbers through its use. Even SCHMANDT-BESSERAT (1992, 7) states that tokens likely shifted to use on an abacus, but in her opinion it was after early writing began: “When pictography was achieved, the token system reverted to a few shapes, mostly spheres and disks, probably used as an abacus.”

22 But note that ROTHMAN (2002) incorrectly lists the museum number as 35-10-99 in the concordance and in the catalogue as 35-10-19.



▲ Fig. 8. At top, Level XIII stone ‘amulet’ 37-16-331 showing grid hatching. At bottom, similar from SPEISER (1935, pl. XLIIIb). Speiser called his example a ‘diorite tablet.’ It was found in a trial trench near the base of the mound. Scale 1:1.



▲ Fig. 9. Top and profile views of 35-10-89, Level XI/XA ovoid weight(?) with highly flattened base. Scale 1:1.

► *Tab. 6. Stone tokens from Gawra in the Penn Museum.*

Level	VI	VII	VIII	IX	X	XI/XA	XIA/B	XII	XIII
sphere				1	16	10	3	2	1
dome					1	2			
disk					1	3	1	1	
egg							3	2	
'pawn'						1			

► *Fig. 10. Stone token shapes at Gawra: 36-6-351 'pawn', 35-10-316a 'large sphere', 36-6-104 'small sphere', 35-10-83 'egg', and 36-6-101 'disk'. Scale 1:1.*



here and clay tokens were also found,²³ in one case together in a group of six cylinders, two cones and two disks. In a similar context at Tell Abada, storage rooms were found containing groups of clay tokens in bowls (JASIM/OATES 1986, 355). These tokens were almost exclusively spheres, cones, disks or rods (narrow cylinders), similar shapes both to Gawra tokens and weights. The context at Abada containing these potential accounting tokens is Late Ubaid, approximately 4800-4500 BCE, corresponding roughly to Levels XIV and XIII at Gawra.²⁴

In fact, tokens at Gawra increase in number in the lower levels – those immediately beneath the levels containing confirmed weights – with stone tokens peaking in Levels X and XI/XA (see Tab. 6 and for examples of types, see Fig. 10). In other words, as stone tokens disappear, weights come into wider use. The stone tokens are typically made of calcite or marble and do not follow a discernible sequence of mass, at least not in the 48 examples measured in

the Penn Museum. The most common shape, the sphere, shows some general divisions in size with a smaller (*ca.* 20 mm diameter) and a larger (*ca.* 28 mm)²⁵ but there is much variance, including some as small as 14 mm and as large as 32 mm.

Tokens of the sphere and dome shape may be related, as many spherical tokens have a chip or partly flattened base. No rod or cylinder shapes were seen in the examined stone tokens from Gawra, but elongated spheres, with one end more pointed than the other and thus resembling an egg, are known. The one example listed as a 'pawn' is similar in shape to the chess piece of that name. Two of these were found in a grave alongside seven other tokens in a child's grave, Locus 181 in Level XI/XA. The association with a child has given rise to the interpretation of the items as gaming pieces (TOBLER 1950, 205), but it has also been linked with familial status (JASIM/OATES 1986, 352; SCHMANDT-BESSERAT 1992, 171; HØYRUP 1994, 69).

Numeracy may have functioned as a marker of status before literacy developed. This numeracy would have naturally been linked to quantifying commodities in a growingly heterogeneous society with greater numbers of available goods, and this process may have increasingly divided levels of society. Perhaps while the state was developing, weights and other measures were also becoming more firmly established.



► *Fig. 11. 37-16-186, hematite cylinder from Level XII. Scale 1:1.*

23 TOBLER (1950, 170) and ROTHMAN (2009, 86) call them gaming pieces. Tobler mentions clay gaming pieces from earlier levels, including some zoomorphic and anthropomorphic examples. He says their use in games is confirmed by their bases which "are obviously adapted to the surface of a gaming board." Yet, the base might be for use on another type of board, one for calculations, and the different types (like the complex tokens in Schmandt-Besserat's theory) could represent different commodities. In the case of zoomorphic types, they might correspond exactly to the type of animal represented and count might be in the concrete rather than abstract mode. As JASIM/OATES (1986, 352) rightly note, "the distinction between a gaming counter and an accounting reckoner is a subtle one."

24 JASIM/OATES (1986, 352) equate the two upper levels of Abada with Gawra Levels XIX-XVII, but their situation in the middle of the 5th millennium would, by Rothman's dating, put them more in line with Gawra XIV-XIII.

25 WOODS (2017, 429) suggests a potential link between small and large spherical tokens and the historical writing of large numbers such as 60² and 60³.



▲ Fig. 12. 38-13-68, flattened barrel from Level XIII well. Scale 1:1.



▲ Fig. 13. Example of a ballista; 35-10-396 from Level XI/XA. Scale 1:1.

Levels XII and XIII

By the time of Level XII (*ca.* 4400 BCE), Gawra was already a functioning center, albeit a small one. ROTHMAN (2002, 81) states that in this period: “Gawra was a part of a far-flung network of exchange for materials coming from the hilly margins of Mesopotamia.” Although there are no confirmed weights in this level (and in fact none below Level IX) Level XII produced a small hematite cylinder (37-16-186; see Fig. 11) that is described by both Rothman and Tobler as a weight. Indeed, its material, size and mass (8.7 g) suggest very strongly that it was a weight, or an unusual token that was leading toward balance pan weights. It was found near the edge of the site, however, in Square 3J, and some disturbance might be possible, though not reported.

Level XIII also produced some intriguing artifacts, particularly in a well that had been cut down through Level XIV. In the well were found at least twenty clay sealings, several clay sling bullets, and a potential weight. This last object (38-13-68; see Fig. 12) is made of well-worked red stone (siliceous or metamorphosed limestone) in a flattened barrel shape (ovoid section and flattened ends). It weighs 47.1 g, or potentially 5 units of 9.42 g.

The well went out of use and was sealed over during Level XIII when the North Temple was built. Rothman used its contents to state that “some level of administrative control was already evident in the Ubaid 4 period.” This is notably the same general period as that showing evidence of complex accounting at Tell Abada.

Large sling bullets (ballistae) were not only found in the Level XIII well, but were quite com-

mon across the site in general, particularly in the early levels. By Level XI, ROTHMAN (1999, 106-107) notes a possible fortification function demonstrated by the thick walls of the Round House (and the fact that Level XII was burned in an apparent attack), but he also notes that ballistae are not solely found in areas that appear to be defensive in this or any level. He suggests that some, rather than having a military purpose, may have been used to separate pots in the kiln firing process (ROTHMAN 2002, 67). Whether used to hurl at enemies or to separate pots, their ephemeral usage would imply the need for quick manufacture and clay as a material speaks well to this need. Yet, there are many ballistae at Gawra that are made of stone. This, like the process of making stone tokens, is labor intensive and implies a separate, longer-lasting use for the stone objects as compared to their clay equivalents.

There are eight stone ballistae securely found in Gawra Levels XI to VI now in the Penn Museum (for an example, see Fig. 13). They are all relatively large, tending to around 60 mm in length and ranging from 53-114 g. They do not conform to any apparent weight system, but their shape is so similar to later ovoid weights as to highlight the early conception of the form and the ability to manufacture it from at least 4000 BCE.

The well of Level XIII likely contained materials swept out from an early administrative building or temple prior to the building of the North Temple. Along with the possible weight and clay sealings that indicate an administrative function, there was also a broken stone piece (38-13-67) whose usage is unknown and that TOBLER (1950, pl. XCVII, c)

► Fig. 14. Views of all four sides of the fragmentary Level XIII stone tally(?) or measuring stick(?) 38-13-67. Scale 1:1.



lists only as a steatite object.²⁶ Nonetheless, it is clearly complex and may bear on administration and measurement.

The artifact (38-13-67) appears at first glance to be part of the rim of a decorated stone bowl, but it has no curvature as would any part of a bowl. Moreover, all four sides are polished with only the ends broken, showing that it was once a long, flat object with rectangular cross section (see Fig. 14). Along one edge is a deep groove; a groove perpendicular to this runs down another edge, and incised lines and dots run along another. Alongside the longest groove are eight incised notches with approximately 4 mm of space between each.

Perhaps this was an early attempt to measure in grain widths, the apparent basis of the later length measuring system.²⁷ Or perhaps it was a simple tally, a count along a piece of stone meant to be a permanent record of those counts. We cannot know the purpose (or even if there was a purpose beyond decoration) but it is important to consider a possible counting function, particularly when combined with one of the clay pieces in the same context (TOBLER 1950, pl. CLVII, 71). It is a small, roughly rectangular object with many thumbnail marks along its face. JASIM/OATES (1986, 353) have interpreted this piece as a potential tally, with each nail mark being a single count. They call a similar piece from Tell Abada a ‘proto-tablet’.

Conclusion

Balance pan weights were clearly in use at Tepe Gawra in the Early Dynastic period, but potential weights appear in the Late Ubaid through the Uruk periods. Whether or not they can be confirmed as weights, the site was developing increasingly sophisticated accounting and measuring methods in its

role as a local center and transshipment point on long-distance trade routes. Such a position is an ideal place for the development of comparative systems of value that might carry throughout the region to assist in the evaluation and exchange of an increasingly varied and complicated set of goods. As such we just might be witnessing the early stages of standardized measurement of length (stone ‘tally stick’), volume (‘wide flower pots’), and mass (the potential weights discussed in this article) at the end of the 5th to the middle of the 4th millennia.

Calculations were almost certainly conducted in the Uruk and possibly even the Ubaid period. WOODS (2017, 449) highlights that idea: “The invention of writing brings to light for us the mathematical heights that had been achieved by the close of the pre-literate era, preserving computations of remarkable complexity that must have been carried out with the aid of a calculation device.” The people who carried out these complex computations were, perhaps, rising to become an elite stratum of society under an increasingly centralized authority; evidence of centralization grows markedly from Gawra Levels X–VIII (ROTHMAN 1999, 110). The inhabitants may have been utilizing increasingly standardized, even if local, measures of length, volume, and mass, in their activities. The potential Uruk period weights from Gawra presented here may be few in number, but the material available for examination was only around half that uncovered, and the strata below Level X were not completely excavated at the site.

The interpretation of these data is speculative, but we must consider the possibility that measurement arose along with numeration and the process of abstracting numbers concomitant to the development of state level society in the proto-urban period.

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²⁶ Note that on this plate (XCVII, c), Tobler incorrectly lists the level as XII. It is actually the Level XIII well.

²⁷ A grain kernel (še) appears to have established the smallest unit in length measurement, just as it did the smallest weight measurement; or at least the term for grain kernel was used for this small unit ($\frac{1}{30}$ of the shekel) in literate periods (POWELL 1990; ROBSON 2008).

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The data tables that follow feature the following information:

Museum Nr. = Accession number of the artifact in the Penn Museum.

Shape = Brief wording of overall shape (refers to weight type if confirmed or possible weight). Includes brief notes such as rounded or flattened, which refers to the cross section (a flattened ovoid has a flattened side that was probably intended as a base). Sometimes the word 'chunk' appears; this refers to a large, shaped piece that is somewhat amorphous. For tokens, spheres are represented as complete or as chipped or flattened. Chipped spheres appear to have been intentionally damaged at one point and flattened ones have been ground down at one point perhaps to help them stay steady on a board or flat surface.

Material = Stone type from which the object was made. This is never exact since it would require a geo-chemical analysis, so it often includes a question mark. Without a question mark, the material is relatively clear. With one it is not clear. For example, fine-grained gray stones have often been called 'basalt' but they are more likely to be an intentionally heated fine-grained limestone.

Weight = Weight in g. Smaller objects (those below 50 g) were measured to 0.01 gram fineness (even though this could not be recognized by the majority of ancient scales). Larger objects were measured to 0.1 gram fineness on calibrated digital scales.

Note = A small column that is used to mark detail on some items. For confirmed weights it shows which were marked with their value by the ancients. For possible weights it shows which are most convincing (and in one case notes that an artifact that might have been used as a weight was certainly used as a cap for a bow drill at one point as it shows defi-

nite wear on both sides). For tokens it shows which might possibly function as weights. The disks, for example, are somewhat close to a system and are similar to some cylindrical weights.

Units = Potential number of standard units that a weight may represent. Only where the number of units are marked on the object can this number be securely stated. Other numbers are possible when systems are checked. Units are calculated for possible and confirmed weights.

Standard = If the number of units is divided into the weight of an object, it reveals the potential standard unit that is represented, *i. e.*, the weight system base shekel. This, too, cannot be taken as absolute except in the case of marked weights and even then there is variance around the norm.

Length = Length of object in millimeters.

Width = Width of object in millimeters.

Height = Height of object in millimeters.

Square = Excavation square number (10 m x 10 m grid unit of the site). This is as calculated by ROTHMAN (2002) after corrections across the seasons, since several seasons used different grid references.

Subsquare = Subdivision of the 10 m x 10 m excavation square. These were not always recorded since the excavators did not use them in all seasons, but when they did the subsquare represents a 1 m x 1 m portion of the overall 10 m x 10 m square. This category also includes Room number or Burial number where appropriate.

Level = Stratigraphic level from which the artifact comes. This is after corrections by ROTHMAN (2002) since many of the levels were confused and/or disturbed.

Museum Nr.	Shape	Material	Weight	Note	Units	Standard	Length	Width	Height	Square	Subsquare	Level
32-21-141	ovoid, rounded	amphibolite	28.20		3	9.4	49	19	19	5 O		VI
31-52-143	loaf	hematite	12.13		1.5	8.086	27	13	12	6 K?		VI
32-21-142	loaf	hematite	7.81		1	7.81	27	11	10	6 K?		VI
32-21-143	ovoid, rounded	amphibolite	17.4	marked	2	8.7	37	18	18	6 O		VI
35-10-362	ovoid, rounded	hematite	5.80		0.666	8.7	29	10	13	7 K		VI
35-10-361	ovoid, rounded	gabbro	65.4	marked	8	8.175	57	27	27	7 K	Room 612	VI
31-52-142	ovoid, rounded/ chunk	hematite	9.32		1	9.32	22	16	14	7 M		VI
31-52-144	dome	hematite	8.24		1	8.24	20	20	11	8 J	Room 606	VI
31-52-146	ovoid, rounded	hematite	9.21		1	9.21	30	11	11	8 K	Room 614	VI
31-52-145	dome	hematite	49.7		6	8.283	29	24	24	8 K	Room 614	VI
31-52-148	cylinder	hematite	40.0		5	8	36	21	21	9 O	Room 641	VI
36-6-400	ovoid, rounded	hematite	16.73	marked	2	8.365	38	14	14	9 O	Room 641	VI
32-21-267	sphere/chunk	hematite	17.50		2	8.75	22	19	21	5 M		VII
32-21-270	loaf	grano-diorite	8.32		1	8.3	27	13	12	5 O		VII
31-52-353	pebble/chunk	hematite	9.3		1	9.3	28	17	16	7 M?		VII
31-52-350	ovoid, flattened	basalt(?)	5.04		0.666	7.57	29	11	10	7 M?		VII
31-52-352	ovoid, rounded	hematite	8.51		1	8.51	28	12	12	7 M?		VII
31-52-354	ovoid, rounded	hematite	49.00		6	8.166	47	20	18	8 M?		VII
32-21-459	ovoid, flattened	hematite	2.83		0.333	8.49	18	9	8	9 K	silo	VIII
32-21-461	cylinder/fat disk	hematite	9.39		1	9.4	18	18	10	9 K		VIII
32-21-534	loaf	hematite	24.02		3	8.007	29	19	19	9 K		IX
32-21-535	ovoid, flattened	grano-diorite	5.28		0.666	7.92	28	13	11	9 K		IX

▲ Tab. 7. Confirmed Weights from Tepe Gawra Levels VI-XIII in the Penn Museum.

Museum Nr.	Shape	Material	Weight	Note	Units	Standard	Length	Width	Height	Square	Subsquare	Level
31-52-149	dome/flat sphere	gabbro	88.0	*	10	8.8	45	45	36		trial trench	VI
32-21-144	loaf	marble(?)	10.80		1	10.8	25	19	14	7 M?		VI
32-21-273	ovoid, rounded	calcite	63.2	*	8	7.9	52	34	34	7 M?		VII
32-21-460	ovoid, flattened	gabbro	74.9	*	10	7.49	58	30	21	9 M		VIII
32-21-451	dome/flat sphere	gabbro	205.1		25	8.204	52	52	39	10 O		VIII
32-21-453	loaf	gabbro	188.3		20	9.415	68	40	36	9 K		VIII
32-21-450	pebble	gabbro(?)	1195		150	7.967	138	89	49	9 K		VIII
31-52-398	pebble	basalt(?)	25.90		3	8.633	58	19	15	6 K?	trial trench	VIII
32-21-452	dome/pebble	nephrite(?)	21.11		2.5	8.44	28	24	18	6 O		VIII
32-21-446	dome/flat sphere	gabbro	302.4		40	7.56	59	55	40	none		VIII
33-3-49	dome	marble(?)	45.60	*	5	9.12	35	35	25	9 M		IX
33-3-275	dome/flat sphere	gabbro	245.3	drill cap	30	8.178	77	57	45	9 M		IX
33-3-285	dome	limestone(?)	67.0		8	8.375	36	37	36	8 K		IX
33-3-8	cylinder/fat disk	obsidian(?)	3.69		0.5	7.38	14	14	10	4 M		IX
35-10-89	ovoid, flattened	basalt(?)	30.82	*	4	7.705	34	28	20	4 O	j7	XI
37-16-186	cylinder	hematite	8.70	*	1	8.7	14	14	14	3 J		XII
36-6-188	loaf? (triangular)	diorite(?)	34.08		4	8.52	49	25	12	5 Q	a8	XII
36-6-277	disk	marble	4.61		0.5	9.22	23	20	4	5 Q		XII
38-13-68	ovoid, flattened	limestone	47.1	*	5	9.42	37	31	27	3 M		XIII
35-10-282	loaf? (trapezoid)	diorite(?)	5.54		0.666	8.31	22	14	14	5 O		XIII

▲ Tab. 8. Possible Weights from Tepe Gawra Levels VI-XIII in the Penn Museum.

Museum Nr.	Shape	Material	Weight	Note	Units	Standard	Length	Width	Height	Square	Subsquare	Level
33-3-110	sphere, chipped	marble	10.72				21	21	21	9 Q		IX
35-10-316a	sphere, chipped	marble	32.72				32	32	32	4 K/M	Burial 110	X
35-10-316b	sphere, chipped	marble	28.19				31	31	31	4 K/M	Burial 110	X
35-10-316c	sphere, chipped	marble	31.49				32	32	32	4 K/M	Burial 110	X
35-10-293b	sphere	limestone	16.11				21	21	21	5/6 M	Burial 107	X
35-10-293a	sphere, chipped	limestone	14.63				21	21	21	5/6 M	Burial 107	X
35-10-293c	sphere, chipped	limestone	12.97				20	20	20	5/6 M	Burial 107	X
35-10-290d	sphere	limestone	9.93				20	20	20	5 O	Burial 102	X
35-10-290a	sphere, chipped	calcite(?)	34.48				29	29	29	5 O	Burial 102	X
35-10-290b	sphere, chipped	calcite(?)	17.65				22	22	22	5 O	Burial 102	X
35-10-290e	sphere, chipped	calcite(?)	12.00				20	20	20	5 O	Burial 102	X
35-10-290f	sphere, chipped	calcite(?)	11.81				19	19	19	5 O	Burial 102	X
35-10-290g	sphere, chipped	calcite(?)	10.41				20	20	20	5 O	Burial 102	X
35-10-290h	sphere, chipped	calcite(?)	7.33				17	17	17	5 O	Burial 102	X
35-10-290c	sphere, flatten	limestone	8.98				19	19	19	5 O	Burial 102	X
35-10-289c	sphere, flatten	basalt	7.68				18	18	15	5 O	Burial 102	X
35-10-291a	dome	calcite(?)	10.17				21	21	16	5 O	Burial 102	X
35-10-291b	loaf(?)	basalt(?)	8.87	?	1	8.87	18	14	12	5 O	Burial 102	X
35-10-289a	pebble	limestone(?)	24.07	?	3	8.023	48	25	15	5 O	Burial 102	X
35-10-289b	pebble	limestone(?)	20.26	?	2.5	8.104	33	20	15	5 O	Burial 102	X
33-3-286	dome	basalt(?)	19.37	?	2	9.685	28	12	12	5 Q		X
33-3-184	sphere	marble	6.10				15	15	15	6 M		X
33-3-179	disk	marble	4.45	?	0.5	8.9	20	20	4	6 M		X
36-6-353A	sphere, chipped	calcite	13.87				26	26	24	4 K	Burial 181	XI/XA
36-6-353B	sphere	limestone	7.42				17	17	17	4 K	Burial 181	XI/XA
36-6-352A	dome	calcite	17.54	?	2	8.77	23	23	16	4 K	Burial 181	XI/XA
36-6-352B	dome	calcite	16.44	?	2	8.22	23	23	15	4 K	Burial 181	XI/XA
36-6-351	pawn	calcite	24.10	?	3	8.033	20	20	30	4 K	Burial 181	XI/XA
36-6-386	sphere, chipped	limestone	10.95				20	20	20	5 J	b3	XI/XA
35-10-82	sphere	calcite	20.21				23	23	23	4 O	j7	XI
35-10-83	egg	calcite	7.65				20	17	17	4 O	j7	XI
35-10-81	sphere	marble	23.11				24	24	24	4 O	j7	XI
35-10-84	egg	calcite(?)	7.18				19	15	15	4 O		XI
35-10-85	egg	marble	5.03				19	14	14	4 O		XI
35-10-294	sphere	marble	7.01				19	19	19	5 K	h/i1	XI
36-6-104	sphere	marble	5.11				15	15	15	5 M		XI
36-6-103	sphere, chipped	marble	5.50				17	17	17	5 M		XI
36-6-100	disk	marble	3.10	?	0.333	9.3	19	19	4	5 M		XI
36-6-101	disk	marble	2.23	?	0.25	8.92	16	16	3	5 M		XI
36-6-102	disk	basalt(?)	1.39	?	0.1666	8.34	17	17	2	5 M		XI
35-10-86	sphere	calcite	4.76				14	14	14	5 Q	g8	XI
35-10-80	sphere	marble	7.85				17	17	17	6 Q		XI
38-13-26a	egg	limestone	1.64				14	10	10	none		XIA/B
38-13-26b	egg	limestone	1.33				14	10	10	none		XIA/B
36-6-99	disk	marble	8.93	?	1	8.93	26	26	5	3 M		XIA/B
36-6-274	sphere	limestone	7.68				17	17	17	4 O	h10	XII
35-10-355	sphere, chipped	marble	9.96				18	18	18	4 O	c7	XIA/B
36-6-191	sphere, chipped	marble	9.82				19	19	19	5 M		XIA/B
35-10-169	sphere	limestone	6.67				16	16	16	5 O	i8	XIA/B
36-6-275	sphere, flatten	marble	11.68				20	20	20	none		XII
38-13-57	sphere, flatten	calcite	14.68				21	21	21	6 G		XIII

▲ Tab. 9. Stone Tokens/Counters of various shapes from Tepe Gawra Levels VI-XIII in the Penn Museum.

Museum Nr.	Shape	Material	Weight	Note	Units	Standard	Length	Width	Height	Square	Subsquare	Level
31-52-138	ballista	basalt	78.8		10?		66	37	37	8 O		VI
32-49-40	ballista	basalt	53.6				58	32	32	9 M		VIII
32-21-464	ballista	basalt	114.3				75	42	42	7 Q		VIII
32-21-465	ballista	limestone	88.6		10?		65	40	40	9 M		VIII
33-3-254	ballista	basalt	86.2		10?		75	39	39	8 O		IX
33-3-256	ballista	limestone	102.1				69	40	40	8 J		X
35-10-396	ballista	limestone	69.7				67	38	38	7 Q	h1	XA
35-10-88	ballista	limestone	75.3		10?		62	41	41	5 O		XI

▲ *Tab. 10. Stone Ballistae from Tepe Gawra Levels VI-XIII in the Penn Museum.*

Address of the author

William B. Hafford
 Research Associate
 Penn Museum, Near East Section
 3260 South Street
 Philadelphia, PA 19104
 USA

whafford@upenn.edu

Potential weights at Shahr-i Sokhta

by ENRICO ASCALONE

Weights, Shahr-i Sokhta, Iran, Bronze Age, integration, Indus

New evidence of potential weights from Shahr-i Sokhta allows us to confirm preliminary analysis on the diffusion of an integrated cultural system in eastern Iran during the Bronze Age period. The apparent presence of Harappan and western (Mesopotamia in primis) weighing units in a not-standardized system of values confirms the role carried out by Shahr-i Sokhta in the commercial dynamics dated to the second half of 3rd millennium BC.

Potentielle Gewichte aus Shahr-i Sokhta

Gewichte, Shahr-i Sokhta, Iran, Bronzezeit, Integration, Indus

Neue Daten zu potentiellen Gewichten aus Shahr-i Sokhta bestätigen frühere Analysen zu einer Diffusion eines wirtschaftlich integrierten kulturellen Systems in den östlichen Iran während der Bronzezeit. Die wahrscheinliche Präsenz der Gewichtssysteme aus Mesopotamien und aus dem Indus-Bereich in einem nicht-standardisierten Wertsystem bestätigt die Rolle von Shahr-i Sokhta in den kommerziellen Dynamiken der zweiten Hälfte des 3. Jahrtausends v. Chr.

1. Preliminary approach

This paper presents the preliminary research on a collection of weights and potential weights from Bronze Age Iran;¹ unfortunately, our knowledge of the weighing materials (weights, balances, and/or other metrological evidence) is scanty or totally absent in Central Asia and eastern Iran where only a duck-shaped weight found at Gonur Depe has been published (ROSSI OSMIDA 2002, 100). In the main excavations of Central Asia (Gonur Depe, Anau, Sapalli Tepe, Namaza Tepe, Shortugai) and eastern Iran (Shahdad, Tepe Hissar, Bampur, Tall-i Malyan), weights were generally not identified as such, and those that were, were either ignored or not published. In some case, the weights were not understood as important evidence for the Bronze Age economy or their real meaning and value were not understood. Evidence for weights or weighing procedures relating to the Oxus civilisation is totally absent in the published data. In eastern Iran the archaeological data on weights is uncertain and incomplete; until now, only a very small collection of weighing related-materials could be listed for future research (Tab. 1).

The Gorgan Plain (Tepe Hissar and Shah Tepe)

In the Gorgan plain, at Tepe Hissar, evidence was collected from Stratum I, in which a “ring weight” was found but published without its mass, drawing and photo (SCHMIDT 1933, 360); other evidence came from Hissar IC refuse, where an irregular sandstone object with grip was considered a “weight” by the excavators, but no data about its mass was given (SCHMIDT 1937, 58, pl. 18,A). A bi-conical object dated to the Hissar II period was considered to be a weight (SCHMIDT 1937, 122, pl. 31), while a chipped irregular stone from the same layer was presented as a possible weight (SCHMIDT 1937, 221, pl. 63). Later evidence for weighing was identified in a room of the Burned Building of Hissar IIIB, in which remains of charred wheat were also found (SCHMIDT 1937, 221, pl. 63, fig. 90); a well-polished stone weight was found in archaeological association with oval stones with cross-shaped grooves on their surfaces, both complete and fragmentary, which were also potentially weights (no. 15 in Tab. 1; SCHMIDT 1937, pl. 63). The evidence from Shah Tepe is unclear. Numerous pebbles, pestles and unidentified stone objects from this site are documented, but it is unclear if any of

these were weights (no. 1-7 in Tab. 1; ARNE 1945, 279-280, pl. 72, fig. 579c, 580a-f).

Shahdad

Shahdad lies on the edge of the Lut desert between the Oxus regional complex and the Jiroft civilisation. As we have suggested, its role in the transmission of cultural heritages among the main urban entities of Central Asia and eastern Iran was remarkable (ASCALONE 2018, 27-50). However, weights were not identified by the excavators, although numerous pebbles, as well as ellipsoid, cylindrical, and conical stones were found (no. 17-22 in Tab. 1; see in details HAKEMI 1997, 201, 224, 255, 352, 354, 371).

Mundigak

Mundigak is situated in the north-eastern part of Helmand river. The site shows a strong affinity with the cultural horizon known from Shahr-i Sokhta. Two objects were considered weights by J.-M. Casal, however no references to their mass was published; the first one is an ovoidal-shape limestone object with perforation in the upper part from I.5 phase dating Chalcolithic period (CASAL 1961, 234, fig. 135,4); the second specimen is an ovoid-shape object with an incised line on surface for a suspension-use, known in III.4 period, but widely attested in IV.1 archaeological phase of the site (end of 3rd millennium) (no. 29-30 in Tab. 1; CASAL 1961, 237, fig. 136,26).

Shahr-i Sokhta

Evidence for weights has recently been collected at Shahr-i Sokhta, in the south-western corner of the Helmand valley. Before discussing the evidence, however, it is useful to consider both the material found in the 1970s excavations in the necropolis area, and the Bronze Age administrative items found in the recent Iranian excavations. From the necropolis of Shahr-i Sokhta six pebbles were found in five different burials (PIPERNO/SALVATORI 2007, 175, fig. 375; 180, fig. 389; 209, fig. 461; 224, fig. 501; 282, fig. 653). Pebbles, as well as finished, worked, and polished stones were found in the graves excavated by S. M. S. Sajjadi at Shahr-i Sokhta during 2004-2005 archaeological campaigns; in particular, cubical, spherical and flat stones were found in the necropolis area along with two sets of stone objects from the same grave (no. 23-28 in Tab. 1) (SAJJADI 2015a; 2016). More recently, storage rooms with numerous administrative items (Level E) were excavated from Building no. 1, in the so-called “Monumental Area” (SAJJADI/MORADI 2014, 179-182, fig. 7-8).

Indus Valley

For the scant presence of weights from eastern Iran and Central Asia, the Indus valley metrological corpora represent the most important evidence from the Middle and Southern Asia during the

1 Studies and analysis on the Iranian weights were supported by the European Research Council under the European Union's Horizon 2020 Framework Programme and was carried out within the scope of the ERC-2014-CoG 'WEIGHTANDVALUE: Weight metrology and its economic and social impact on Bronze Age Europe, West and South Asia', based at the Georg-August-Universität of Göttingen, Germany [Grant no. 648055], Principal Investigator: Lorenz Rahmstorf. I would express my deepest gratitude to S. M. S. Sajjadi, Director of the Archaeological Expedition at Shahr-i Sokhta, who entrusted the study of weighing material from Shahr-i Sokhta to me. The photos of weights have been made by Media Rahmani.

Bronze Age period. The publications of the Mohenjo-daro (HEMMY 1931, 589-598; 1938, 601-612), Chanhu-daro (HEMMY 1943, 236-239) and Harappa (VATS 1940) excavations in the first half

of 20th century supplied the basic archaeological data about the Indus Valley civilization and still constitute the starting point for every analysis of the Harappan material culture.

▼ *Tab. 1. Possible or related weighing material from old excavations.*

	Site	Literature	Number	Period	Context	Material	Shape	Measures [cm]	Reference
1	Shah Tepe	Pestle	601	II		Diorite	truncated cone		ARNE 1945, 279-280, pl. 72, fig. 579 c
2	Shah Tepe	Polishing stone		III	F III	Stone	ellipsoid		ARNE 1945, 279-280, pl. 72, fig. 580 a
3	Shah Tepe	Black whetstone			E II	Stone	ellipsoid		ARNE 1945, 279-280, pl. 72, fig. 580 b
4	Shah Tepe	Polishing stone	422		C II	Stone	ovoid		ARNE 1945, 279-280, pl. 72, fig. 580 c
5	Shah Tepe	Polished pebble			H I	Stone	ovoid		ARNE 1945, 279-280, pl. 72, fig. 580 d
6	Shah Tepe	Polished pebble	1193	II	E III	Stone	ellipsoid		ARNE 1945, 279-280, pl. 72, fig. 580 e
7	Shah Tepe	Polishing stone			F III	Stone	parallelepiped		ARNE 1945, 279-280, pl. 72, fig. 580 f
8	Tepe Hissar	Ring weight							SCHMIDT 1933, 360
9	Tepe Hissar	Weight	H 2095	IC	Refuse DH 69	Stone	ovoid with handle	26.5 x 17.0 x 2.2	SCHMIDT 1937, 58, pl. 18, A
10	Tepe Hissar	Pestle	H 2645	I	DG 96	Stone	ovoid	7.0 x 4.0	SCHMIDT 1937, 58, pl. 17
11	Tepe Hissar	Pestle	H 1722	II	DF 78	Hematite	truncated cone	3.5 x 3.4	SCHMIDT 1937, 122, pl. 31
12	Tepe Hissar	Weight	H 2772	IIIB	Burned Building	Red-brown stone	ovoid	3.9 x 3.2 x 1.7	SCHMIDT 1937, 221, pl. 63, fig. 90
13	Tepe Hissar	Weight	H 2896	IIIB	Burned Building	Red-brown stone	ovoid	2.8 x 2.3 x 1.7	SCHMIDT 1937, 221, pl. 63
14	Tepe Hissar	Pestle	H 3079	III	CF 89	Diorite	ovoid	4.4 x 6.3	SCHMIDT 1937, pl. 63
15	Tepe Hissar		H 1819	III		Stone	ovoid with grooves		SCHMIDT 1937, pl. 63
16	Tepe Hissar		H 1685	III		Stone	ovoid with flat base		SCHMIDT 1937, pl. 63
17	Shahdad	Rounded stone	0359		Grave 40 (A)	Stone	oval	5.2	HAKEMI 1997, 201
18	Shahdad	Ellipsoid stone	0545		Grave 60 (A)	Stone	ellipsoid	18.5 x 6.0	HAKEMI 1997, 224
19	Shahdad	Ellipsoid grooved stone	0897		Grave 96 (A)	Stone	ellipsoid	13.6 x 14.2	HAKEMI 1997, 255
20	Shahdad	Elliptical gray stone	2233		Grave 192 (A)	Stone	elliptic	16.0 x 14.0	HAKEMI 1997, 352
21	Shahdad	Flat stone	2264		Grave 193 (A)	Stone	ovoid		HAKEMI 1997, 354
22	Shahdad	Conical stone	2518		Grave 209 (A)	Stone	conical	13.0 x 32.0	HAKEMI 1997, 371
23	Shahr-i Sokhta	Flat pebble	7122	II-III	Grave 130	Grey lime-stone	oval flat	5.8 x 4.1	PIPERNO/SALVATORI 2007, 175, fig. 375
24	Shahr-i Sokhta	Flat pebble	7145	II-III	Grave 132	Grey lime-stone	oval flat	5.0 x 4.3 x 0.4	PIPERNO/SALVATORI 2007, 180, fig. 389
25	Shahr-i Sokhta	Flat pebble	7146	II-III	Grave 132	Grey lime-stone	oval flat	8.4 x 6.2 x 1.1	PIPERNO/SALVATORI 2007, 180, fig. 389
26	Shahr-i Sokhta	Flat pebble	7672	II-III	Grave 311	Grey lime-stone	circular flat	6.7 x 1.3	PIPERNO/SALVATORI 2007, 209, fig. 461
27	Shahr-i Sokhta	Flat pebble	7057	II-III	Grave 415	Grey lime-stone	ovoid	7.5 x 6.6	PIPERNO/SALVATORI 2007, 224, fig. 501
28	Shahr-i Sokhta	Flat pebble	8329	II-III	Grave 726	Limestone	ovoid	8.7 x 7.2 x 1.0	PIPERNO/SALVATORI 2007, 281, fig. 653
29	Mundigak	Poids		I: 5		Limestone	ovoid with hole		CASAL 1961, 234, fig. 135,4
30	Mundigak	Poids		III: 4		Stone	ovoid with groove		CASAL 1961, 237, fig. 136,26

In total, more than 900 weights can be identified in the bibliographical references. Cubical weights were found in Early and Mature Harappan sites representing archaeological markers of the Mature Harappan culture. Weights have been found in both large and very small sites, but the most important corpora come from Mohenjo-daro, Harappa and Chanhudaro and, in more recent excavations, including Lothal (RAO 1985, 560-565, pl. 257,B), Kanmer (KHARAKWAL *et al.* 2007, fig. 11-12), Bhirrana (RAO *et al.* 2004-2005, 66), Kotada Bhadli (RUIKAR *et al.* 2015, fig. 7), Dholavira (BISHT 2015), Banawali (BISHT 1993, 119, pl. 10, 18), Kalibangan (THAPAR 1975, 28; LAL *et al.* 2003, 237, pl. LIII), Rojdi (CHITALWALA 1989, 158, fig. 82,1-4; 2004, 93, fig. 8), Rangpur (RAO 1962-1963), Nagwada (HEGDE *et al.* 1991) and Surkotada (MARGABANDHU 1989, pl. LXXI,a). The weights were principally made from chert or banded chert, with occasional use of limestone, agate or chalcedony, while the standard shape in the region, as known from 516 published weights, is principally cubic. However, spherical, barrel-shaped, conical, conical with hole, cylindrical, hemispherical, and spherical with flattened base and top weights are also attested. The metrological system follows a binary system for the submultiples and a decimal system for the multiples of the 'standard' unit. According to the most recent analysis of their masses by L. Rahmstorf (in press), using Cosine Quantogram Analysis (Kendall formula), the standard unit has been fixed around 13.65 g, similar to the Persian Gulf area, where a later Dilmun mina has been calculated around 1350 g (= 100 units of *ca.* 13.5 g). Metrological systems based on the units of 8.4 g, 7.8 g and 9.4 g are also attested.

However, the Indus documentation seems to be insufficient for a complete evaluation of weighing in the Harappan world. A further problem is related to the archaeological literature. Even when the weights were considered "weights" by the excavators, often no more information was given in the publication; thus we have a large quantity of weights, but no information about their archaeological contexts, their association, shape, material or their mass (the most important examples come from Rojdi, Surkotada, Rangpur, Allahdino, Lothar and Lakhiyo). There is also a long list of uncertain items, probably weights, which can be compiled from the main sites of Harappan civilisation, such as the conical-shaped object with or without perforation, used at Ebla for weighing operation of large amount of lapis lazuli.

Other evidence related to weighing are the ingots (also published without masses) found in the Near East excavations; they were found at Susa in the "Vase de la Cachette" (dating ED IIIb period), two at Qala'at al Bahrain, three at an-Nasiriyah in western Bahrain, at Shortugai, two at Hissar, one

a Lothal, three in a single room at Mohenjo-daro, one at Chanhudaro, and twenty-two in a house at Maysar I in Oman. In addition to this there are also bar or rod ingots found at Chanhudaro, Tell edh-Dhibai and Ur (RATNAGAR 2004, 117) and silver items also served as a means of payment, a unit of account, and a store of value from Akkadian time onward.

2. New data from Shahr-i Sokhta

New data have been collected in the recent excavations at Shahr-i Sokhta by an Iranian team (already mentioned above), in which new evidence of weights was identified. In the first preliminary campaign of study and research,² it has been possible to identify a corpus of 24 objects (the numerous "pebbles" or spherical objects in limestone are not included in this count), 10 of them balance-weights used for economic transactions (15 are uncertain and need further analysis in a successive publication; see Tab. 2 and Catalogue). The metrological material found at Shahr-i Sokhta represents the first evidence of balance-weights in the broad area between Susiana and Indus valley dating to the 3rd millennium BC. From a historical perspective this evidence confirms the role carried out by Shahr-i Sokhta in economic transactions, commercial activities and cultural transmission during the Bronze Age period. The above weights, coming from 1997-2015 Iranian excavation seasons, have been divided according to their presumed base unit, as follows:

- four weights related to the Indus valley based on the unit of 13.65 g: cat. no. 1?, 3, 5 and 8 (Fig. 2, 4, 6, 9);
- two weights related to the Southern Mesopotamian system based on the shekel of 8.40 g: cat. no. 2 and 4 (Fig. 3, 5);
- two weights related to the Inner Syria and Northern Mesopotamia regions based on the value of 7.83 g: cat. no. 7 and 10 (Fig. 8, 11);
- one weight used for weighing equivalence between Indian and Mesopotamian system: cat. no. 9 (Fig. 10).

All weights (except cat. no. 10) were made of local material and well standardized in shape; in particular, the specimens related to the Indus system are parallelepiped or discoid in shape, while the western unit (Mesopotamian and Inner Syria) is represented by sphendonoids, well attested in the western regions. Particularly important seem to be the discoid weights cat. no. 5 and 8 for their morphological comparisons with Harappan specimens

2 The material has been collected during the preliminary research campaign of the Multidisciplinary Archaeological Italian Project at Shahr-i Sokhta (= MAIPS) carried out in January 2017 and directed by the author. I would express my thanks to ICAR and the Director of Archaeological Expedition of Shahr-i Sokhta, S. M. S. Sajjadi, for giving us their hospitality.

No.	Exc. No.	Shape	Condition	Material	Length [cm]	Height [cm]	Width [cm]	Diameter [cm]	Mass [g]	Ratio	Unit [g]
1	SiS 3961	ovoidal	good	Limestone	8.1		2.9		104.22	8	13.03
2	SiS 2859	cylindrical with traces of passing robe	missing a part	Limestone	3.8	6.0			83.97+x	10	8.40
3	SiS 1939	parallelepiped	good	Red stone	4.1	2.6	2.6		68.61	5	13.72
4	SiS 2017	sphendonoid	missing a part	Chert	4.1	3.1	2.07		49.10+x	6	8.18+x
5	SiS 2225	discoid	good	Limestone	4.0	1.4			40.67	3	13.56
6	SiS 1949	cylindrical	broken	Marble		2.9		2.0	22.45+x		
7	SiS 2018	sphendonoid with flat ends and base	good	Chert	5.0	3.2	3.0		77.89	10	7.79
8	SiS 1961	discoid	good	Marble		3.3		4.8	135.92	10	13.59
9	SiS 3984	sphendonoid	slightly erased	Stone	5.0	4.0	4.5		132.92	10; 16	13.29; 8.30
10	SiS 2211	spherical	slightly chipped	Stone				1.7	7.13+x	1	7.13+x

attested at Dholavira (BISHT 2015) and Kotada Bhadli (RUIKAR *et al.* 2015, fig. 9A, no. 340, 342, weighing respectively 5.14 g and 9.47 g). Cylindrical shapes, as in cat. no. 2 and 6, are known in few specimens found at Lothal and Mohenjo-daro (see respectively HEMMY 1938, 604-605, no. DK 4990, 5679; RAO 1985, 560). Specimen cat. no. 10 is particularly interesting in terms of mass, shape and material. The spherical dark stone has white spots. Although it is slightly chipped, the specimen seems to be easily related to the western shekel of 7.83 g (7.13 g+x). The material used for weight cat. no. 10 is an intrusive volcanic rock, probably granite or schist, with presence of white silicates, very common in the Harappan archaeological sites, where a large number of these weights were found (see also the mace-head found at Shahi-Tump in BESEVAL 2005, 3, fig. 8 and the vessel from Jiroft in MADJIDZADEH 2003, 53, no. 9975); the closest comparisons are from Lothal (RAO 1985, pl. CCLVIII, 3-6.8; CCLIX, A) and Mohenjo-daro (MACKAY 1938, pl. CXI, 61). The above evidence suggests that this object was directly exported by Harappan cultural contexts in foreign countries, confirming the growing relationships between Indus valley or Indian coasts and the lower course of Helmand river. According to the mass (related to the western unit of 7.83 g), shape (scarcely attested in the Harappan contexts) and material (from the Indus), I suggest for this weight a possible Harappan provenience, likely originated in a commercial regional context involved in a long-distance trade system. On this basis, its unusual morphology could perhaps have been chosen to allow an immediate identification of its foreign value (ASCALONE *in press*). The knowledge of the shekel of 7.83 g along Indus valley is confirmed by 17 specimens from Mohenjo-daro, 13 from Chanhudaro and 13 from Harappa (ASCALONE/PEYRONEL 1999, tab. 2-4).

The majority of weights come from II and III period of the site, dating to around the second and third quarter of the 3rd millennium BC (*ca.* 2800-2200 BC), well within a historical period

marked by the transition from the Kot-Diji phase/early Harappan to the Mature Harappan period, a meaningful phase representing the transition from the proto-state to the full-state organization in the Indus valley (specimen cat. no. 9 which was found on the surface and is therefore without chronological references).

A more detailed contextual analysis can be attempted for 6 weights (cat. no. 2, 4, 5, 8 and 10), all coming from Building 1 located in the Residential Quarter, where extensive excavation activities have been carried out since 1999 by an Iranian team (SAJJADI/MORADI 2012; 2014, 77-84). At our current state of knowledge, the whole architectural complex measures 250 m x 250 m with a total extension of 1600 m². The building seems to have closest comparisons with the "green model" identified by A. Sarcina in the Lower Town of Mohenjo-daro, where six similar buildings were excavated (for further considerations on the Mohenjo-daro architecture see SARCINA 1979). Six main phases of occupation were identified from period II to III (Levels A-F). Four of the above weights (cat. no. 2, 8 and 10) come from well-defined rooms in close relation with other administrative material of Level D and E, dating around 2500-2200 BC (Fig. 1). The cylindrical potential weight (cat. no. 2; Fig. 3) was found in Space 10, a narrow room, bordered on the north with Space 6, a storage area located in the south-eastern part of the building (with Space no. 9, 31, 32, 52, 53), in which numerous administrative items (such as clay bi-cones, clay balls, triangle-shaped terracotta cakes, bone rings, clay disks, storage vases, seal impressions and jar stoppers) were found (SAJJADI/MORADI 2014, 81). Weights cat. no. 5, 8 and 10 were excavated in Space 2, both bordering rectangular rooms situated in the central part of the Building 1. According to their function, the weights were found in archaeological association with seals, seal impressions, textile fragments, metal, stone and wooden artefacts, and zoomorphic/anthropomorphic clay figurines. The evidence collected in Building 1 allows us to

▲ Tab. 2. Potential weights from Iranian excavations at Shahr-i Sokhta.



▲ Fig. 1. The archaeological context of the potential weights from Building no. 1 (from archaeological Iranian expedition). Scale: 1:150.

identify a complex administration system during the second half of the 3rd millennium BC in the lower part of Helmand river: a well-structured organization aimed at controlling economic practice through the use of administrative markers (but without writing) as known in Mesopotamia in the same period.

Although still not exhaustive, this preliminary evidence of weights at Shahr-i Sokhta seems to suggest that the native people of Helmand valley had a significant degree of knowledge about the weigh-

ing systems of those cultures with which they had economic relations. The shape of the weights combined with the use of local material is proof of accurate production of weights in the Shahr-i Sokhta stone workshops. The craftsmen of Shahr-i Sokhta intentionally created a group of weights following the western (South and North Mesopotamia) and eastern (Indus) standards according to their shape and metrological unit (and perhaps with different shapes allowing for the identification of the different systems). At the same time, the use of parallelepiped shape, and not the cubic one, for the unit

of 13.65 g might reflect the need to distinguish the local production from the contemporary specimens created in the Indus valley; in this perspective, we should ask ourselves if the scant presence of parallelepiped-shaped weights in the Indus valley corpora could be explained with its external production, and seen as imported material from eastern regions of Iranian plateau or Helmand valley.

The use of multiple units in the Indus-related weights at Shahr-i Sokhta remains to be explained. Apparently the cubical weights from Harappan sites express multiples in a system of 2, 4, 10, 20, 40, 100, 200, *etc.* (HEMMY 1943, 237, fig. 1; HENDRICKS-BAUDOT 1972, 13, n. 12). The Indus-related weights found at Shahr-i Sokhta follow 3, 5 and 10 units, and are not apparently aligned to the Indus binary system; however, this apparent discrepancy of data can be explained with the geographical provenience of weights (Helmand and not Indus), with their shapes (not cubic), with their value for equivalence among different metrological systems (for example 3 Indus shekels = 5 Mesopotamian shekels). In this perspective, we assume that we should distinguish a strongly standardized class of weights in shape, material and system; a class of weight (cube-shaped, mostly in chert and following a binary mathematical progression) well-rooted in the Indus valley and used mainly, but not only, for internal use. To this metrological system, in order to create equivalence among different metrological units, a different system based on 13.65 g was added “for” and “in” foreign contexts. It seems to be possible that the outer regions, bordering with the Indus valley and having wide and frequent commercial or economic contacts with Harappan civilization, organized their transactions without following the metrological orthodoxy known in a well-structured state organization along the Indus valley. Due to their need to organise their transactions without relying on local systems of measurement, a hybrid system could have been accepted and acknowledged by the “international” merchants coming from the Indus (for internal transactions the binary system continued to be used). In this perspective, the presence of sphendonoid weights coming from Mohenjo-daro, Harappa and Lothal appear particularly meaningful, in which the shekel based on 13.65 g is counted respectively with the following unconventional ratio estimated at 3 (HEMMY 1938, DK 11232: 2), 4 (HEMMY 1938, DK 11096), 6 (VATS 1940, n. 24362), 7 (HEMMY 1938, DK 5302), 11 (HEMMY 1938, DK 11232: 1) and 15 (RAO 1985, pl. IV). The above evidence of weights at Shahr-i Sokhta may also be important in reconstructing the economic importance of the Helmand valley in the cultural integration system that involves Middle Asia between the end of fourth and the beginning of 2nd millennium BC (ASCALONE 2018); the weights confirm the role

carried out by Shahr-i Sokhta in this integrated system in which it played a decisive part in the diffusion of materials, ideas and people.

In our current state of knowledge, it is still hard to recognize the existence of a local unit for weighing activities. However, it is possible that ‘foreign’ units were used at least in some of the transactions. The presence of sphendonoids based on the western shekel of 7.83 g (a unit adopted mainly in inner Syria and northern Mesopotamia) (ASCALONE/PEYRONEL 2006, 75-124) and of the ‘Mesopotamian’ shekel of 8.40 g (central and southern Mesopotamia) (ASCALONE/PEYRONEL 2006, 249-345) hints at the possibility of directional contacts between Shahr-i Sokhta and the Near East. The evidence provided by these weights suggests that both the northern and southern routes were used towards Mesopotamia in the second half of 3rd millennium BC (TOSI 1974a, fig. 1). Materials from the east reached through these routes the Mesopotamian alluvium and Inner Syria (ASCALONE 2006, 112-151).

Starting from Shahr-i Sokhta, the northern route follows the road to Mashad, along the oases of the eastern range of Qain and Birjand, and continues into the “Great Khorasan Road”, as it was called by Arab geographers (LE STRANGE 1905, 61); a main route linking the Afghanistan highlands and the Kopet Dag mountains to the Zagros range, where a gate towards northern Babylonia and Diyala region was represented by Shahabad. The southern route links Afghanistan, Sistan, Jiroft, Anshan (Elam), Susiana and southern Mesopotamia. The first part of this itinerary is helped by navigability of the Helmand, from Afghan mountains to Shahr-i Sokhta, where the river ends in a delta basin with a surface of *ca.* 16,000 km². The route continues in the Kerman region (from where an easy access to the sea route is ascertained), passing through Shahdad, towards Anshan and the so-called “Royal Road”, widely used in historical times to link the capitals of the Achaemenid empire, Susa and Persepolis.

The evidence of weighing procedures at Shahr-i Sokhta has to be related to exchange activities carried out in a wide global system and influenced by the proximity to the mines of raw material (BULGARELLI/TOSI 1977), although we are still waiting for new data about weighing procedures for heavy material such as tin. The region is well endowed with metallic mineral resources. Tin deposits have been discovered south to Herat and are reported from eastern Afghanistan (POTTS 1994, 157; HELWING *et al.* 2011). Indirect evidence for the exploitation of local copper sources in Iran comes from copper-working installations at Tall-i Iblis (CALDWELL/SHAHMIRZADI 1966; MUHLY 1983, 352), Tepe Gabristhan (MADJIDZADEH 1979), Shahdad (HAKEMI 1997), Malvan

(SUMNER 1986, 204), Shahr-i Sokhta (JARRIGE/TOSI 1981, 137; TOSI 1984, 34-50) and recently at Arisman (HELWING *et al.* 2011, 11-18). The potential balance weights found at Shahr-i Sokhta could be considered as evidence for (semi)precious raw material exchanges with western regions (gold, carnelian, lapis lazuli, alabaster, calcite, turquoise and small amount of silver, probably coming from argentiferous silver deposits known in Azerbaijan, Miyana-Zanjan, Qazvin, Isfahan, Anarak and Kerman regions, see MOOREY 1985, 111).

Chalcedony/carnelian

Carnelian occurs as a secondary deposit in the alluvial flats and gravel beds of Helmand river and its processing at Shahr-i Sokhta is supported by tools, debitage and unworked lumps in the II-III period of the site. In the same timespan, six graves with bead makers micro-drills were found, while one grave from phase 5 has returned other kinds of raw material, such as chalcedony at various stages of processing (PIPERNO 1979, 125, 132). Similar evidence was found at Mundigak, where a high presence of barrel-shaped and faceted-surface beads were found (JARRIGE/TOSI 1981, 137).

Lapis lazuli

The use of lapis lazuli in Iran is attested from the 4th millennium BC, as well as at Susa I, Giyan VC, Sialk III, Yahya VB and slightly later at Susa II, Hissar IIA-III tombs, Yahya IVC and Middle Banesh period. At Shahr-i Sokhta its presence has been identified in I period, becoming more common in II-III periods (TOSI 1974a, 17; TUSA 1977, 259; PIPERNO 1983, 320). Evidence from archaeological excavations support a local production of beads and other small objects at Shahr-i Sokhta, Mundigak (JARRIGE/TOSI 1981, 130), Shahdad, where drills, beads and blocks were found (HAKEMI 1972; SALVATORI/VIDALE 1982), Tall-i Malyan (SUMNER 1986, 204) and Tepe Hissar, where survey and excavations have revealed widespread evidence of lapis bead manufacture (PIPERNO/TOSI 1973; BULGARELLI 1979; DYSON 1987, 653). In details, drill bits with lapis traces, lapis waste flakes and raw lumps weighing to 0.5 kg (a western mina?) were identified at Shahr-i Sokhta II-III periods; a grave (no. 19) of a lapis worker with his materials and tools was found in the necropolis area (PIPERNO/TOSI 1973, 18-19), in HTR.2701 grave (SAJJADI 2003, 75) and finally, in area EWK, where, in a single room, over 200 microliths and more than 2 kg of lapis lazuli wasters from various stages of the working process, ranging from the rough blocks to finished beads and pendants were found (BISCIONE *et al.* 1974, 41).

The wide evidence in graves, the presence of finished/unfinished objects and the diffusion of raw lapis lazuli (in the form of trimmed blocks) confirms both that local consumption occurred and

supports the existence of trade activities of Shahr-i Sokhta merchants directed toward Mesopotamia, where strong relations with Ur beads (in shape and manufacturing) have been underlined (PIPERNO/TOSI 1973, 23; POTTS 1994, 206). It has been generally accepted that the lapis came from the mines in the Kerano-Munjan region of Badakhshan, very close to the Hindu Kush range (Darius the Great records the origin of lapis from this region for his palace at Susa, see HERMANN 1968, 27-29). The Kerano-Munjan region was easily linked to Shahr-i Sokhta thanks to navigability of Helmand river, which was probably preferred to roads. The wide evidence of raw and finished material in lapis lazuli at Shahr-i Sokhta confirms its local working and consumption, but, at the same time, has to be considered as proof of the role carried out by the site of Helmand in the “international trade” of the so-called “blue stone”. Shahr-i Sokhta was a lapis-using centre and an entrepôt for a western trade; a trading-point open to the western “markets” as confirmed by large amount of lapis in the Late Uruk layers of Tepe Gawra, Silak IV and Susa II, in a chronological framework contemporary with the first occupation of Shahr-i Sokhta (see also CASANOVA 1992; 1994). The scarcity of lapis in the Mature Indus sites suggests that the main route of lapis was towards Mesopotamia using the northern and southern itineraries (as argued for the use of weights of 7.83 g and 8.40 g) passing through Shahr-i Sokhta where, according to M. TOSI (1974a, 13-20), some lapis was “semi-processed” to reduce its weight and successively sent to the Mesopotamian alluvium.

Calcite/gypsum/alabaster

Calcium-based stones are widely diffused across Iranian plateau and specifically around the site of Shahr-i Sokhta. There is clear evidence that vessels were made at Shahr-i Sokhta using the local calcite deposits (CIARLA 1979; 1981). Finished wasters have been found at Shahr-i Sokhta, dating to every phase of the settlement life (from I to IV period), showing that the common vessels were made at the site using, at least, three nearby supplies of stone (TOSI 1969, 329). Further considerations have to be made of the close site of Tepe Graziani, 5 km to east of Shahr-i Sokhta, which seems to have been a specialised production centre according to the high amount of vessels blanks found during the survey carried out by M. TOSI (1989, 24). For the absence of sources of calcite stones around the high course of Helmand, the finished vessels found at Mundigak should be seen as imports from Shahr-i Sokhta. The principal types at Shahr-i Sokhta are tall cylindrical vases with everted rim and slightly convex base (CIARLA 1979, tab. 6), cylindrical bowls with everted rim and slightly convex base (TOSI 1969, fig. 40,h-i) and sub-conical bowls (CIARLA 1981, fig. 3a; for a general study see also SAJJADI 2003, 71-74).

Turquoise

Although the absence of turquoise in Mesopotamia in the 3rd millennium BC appears an anomaly that has not yet been completely explained, this kind of stone was produced and traded at Shahr-i Sokhta II-III and is well known at the site (see the recent excavations in graves no. 2, 21, 23, 36, 309, 712, 725, 749 published in SAJJADI 2015b, 33-34). The sources of turquoise are found in the Kerman region, with the closest supply zones identified in Nishapur, Herat and Kyzyl Kum areas, whence were supplied also the early urban centres of Turkmenistan, but not the Indus, in Namazga III-V periods (TOSI 1974b). A high presence is attested at Mundigak where a large number of cores and wasters indicate a local workmanship for turquoise in period IV and III (JARRIGE/TOSI 1981, 130).

Gold

Near Shahr-i Sokhta, gold and silver occur in placer deposits with tin, in Turkmenistan and Afghanistan. A gold mine is known at Zarkashan, ca. 150 km south-east of Mundigak (JARRIGE/TOSI 1981, 137). Gold from the western regions could be traded through Shahr-i Sokhta, the gateway to the Iranian plateau from the Oxus civilization, Jiroft, and the Persian Gulf coast where a maritime route seems to be attested from the half of the 3rd millennium BC. In "Enmerkar and the Lord of Aratta", gold and lapis lazuli are mentioned in the description of the wealth of the unidentified eastern lands of Aratta (probably to east of Markhashi) (JACOBSEN 1987, 282, 288, 318). The epigraphic evidence is supported by the archaeological evidence collected at Shahr-i Sokhta, where the recent excavations have shown an intensive use of gold material and an *intra-situ* production as several unfinished beads were excavated (SAJJADI 2016, 676).

Summing up, although the use of balance-weights at Shahr-i Sokhta is a new field of research and will require further studies, the first preliminary evaluations made on the specimens found in the 2017 research campaign allow us to suggest the use of the weighing procedures by people living in Shahr-i Sokhta. Weighing operations were probably used for equivalences, economic transactions and recording of raw material in a socio-economic system structurally different from Mesopotamia, the Indus valley and, probably, Jiroft civilisations.

3. Conclusions

In our future researches we will try to identify further weights, or possible weights, or weight-related artefacts, however, based on the current evidence, north Iran (Gorgan plain and Mashad area), eastern Iran (Helmand valley) and Central Asia seem not to have developed standardization of weighing activities. The scanty use of weights in

those regions, if compared to the Indus and Mesopotamian evidence, should change our approach to the economy of Central Asia and, at the same time, suggest a new historical meaning to weights in the social evolution and decline of Bronze Age stratified societies.

Finally, due to the absence of published evidence, the relatively old studies on this topic, the opportunity to have access to unpublished materials, and the considerable historical importance of the relations between the four rivers civilisations (Helmand, Indus, Oxus and Halil), future researches on this topic could yield several significant opportunities: identifying the existence of Oxus and eastern Iranian weighting systems, possibly correcting the Indus valley documentation (with new data), enhancing our understanding of the economy of the Bronze Age Central Asia, and identifying social and economic transformations in the Indus Valley, southern/eastern Iran and Central Asia. At the same time, it may also be possible to chronologically define the cultural developments in the Halil, Oxus and Indus valley and identify cultural interactions (spheres) and commercial relationships between the Harappa, Elam, Oxus and Markhashi regions during the Integrated Cultural System (= ICS) period (ASCALONE 2018, tab. 1).

Catalogue of balance-weights from Shahr-i Sokhta

1. SiS 3961 (uncertain) (Fig. 2)

No. of excavation	47
Area	MJO
Historical period	I-IV
Chronology	3100-1800 BC
Shape	ovoidal
Material	Limestone
Length	8.1 cm
Width	2.9 cm
Condition	good
Mass	104.22 g
Ratio	8
Unit	13.03 g

▼ Fig. 2. Potential weight from Shahr-i Sokhta (cat. no. 1). Scale 1:1.



► Fig. 3. Potential weight from Shahr-i Sokhta (cat. no. 2). Scale 1:1.



2. SiS 2859 (Fig. 3)

No. of excavation	4056
Area	Building 1
Layer	Cut 15
Locus	Space 10
Historical period	III
Chronology	2500-2200 BC
Shape	cylindrical with traces of passing robe
Material	Limestone
Length	3.8 cm
Height	6.0 cm
Condition	missing a part
Mass	83.97 g+x
Ratio	10
Unit	8.40 g+x

► Fig. 4. Potential weight from Shahr-i Sokhta (cat. no. 3). Scale 1:1.



3. SiS 1939 (Fig. 4)

No. of excavation	2901
Historical period	II-IV
Chronology	2800-1800 BC
Shape	parallelepiped
Material	Red stone
Length	4.1 cm
Height	2.6 cm
Width	2.6 cm
Condition	good
Mass	68.61 g
Ratio	5
Unit	13.72 g

► Fig. 5. Potential weight from Shahr-i Sokhta (cat. no. 4). Scale 1:1.



4. SiS 2017 (Fig. 5)

No. of excavation	734
Area	Building 1
Layer	Cut 3
Locus	Space 74
Historical period	III
Chronology	2500-2200 BC
Shape	sphendonoid
Material	Chert
Length	4.1 cm
Height	3.1 cm
Width	2.07 cm
Condition	missing a part
Mass	49.10 g+x
Ratio	6
Unit	8.18 g+x

► Fig. 6. Potential weight from Shahr-i Sokhta (cat. no. 5). Scale 1:1.



5. SiS 2225 (Fig. 6)

No. of excavation	180083
Area	Building 1
Layer	Cut 6
Locus	Space 2
Historical period	III-IV
Chronology	2300-1800 BC
Shape	discoid
Material	Limestone
Length	4.0 cm
Height	1.4 cm
Condition	good
Mass	40.67 g
Ratio	3
Unit	13.56 g

6. SiS 1949 (Fig. 7)

Historical period	III-IV
Chronology	2300-1800 BC
Shape	cylindrical
Material	Marble
Height	2.9 cm
Diameter	2.0 cm
Condition	broken
Mass	22.45 g+x



◀ Fig. 7. Potential weight from Shahr-i Sokhta (cat. no. 6). Scale 1:1.

7. SiS 2018 (Fig. 8)

Layer	Cut 7
Locus	33
Historical period	II-IV
Chronology	2800-1800 BC
Shape	sphendonoid with flat ends and base
Material	Chert
Length	5.0 cm
Height	3.2 cm
Width	3.0 cm
Condition	good
Mass	77.89 g
Ratio	10
Unit	7.79 g



◀ Fig. 8. Potential weight from Shahr-i Sokhta (cat. no. 7). Scale 1:1.

8. SiS 1961 (Fig. 9)

No. of excavation	458
Area	Building 1
Layer	Cut 5
Locus	Space 2
Historical period	III
Chronology	2500-2200 BC
Shape	discoid
Material	Marble
Height	3.3 cm
Diameter	4.8 cm
Condition	good
Mass	135.92 g
Ratio	10
Unit	13.59 g



◀ Fig. 9. Potential weight from Shahr-i Sokhta (cat. no. 8). Scale 1:1.

9. SiS 3984 (Fig. 10)

Layer	Surface
Historical period	II-IV
Chronology	2800-1800 BC
Shape	sphendonoid
Material	Stone
Length	5.0 cm
Height	4.0 cm
Width	4.5 cm
Condition	slightly erased
Mass	132.92 g
Ratio	10; 16
Unit	13.29 g; 8.30 g



◀ Fig. 10. Potential weight from Shahr-i Sokhta (cat. no. 9). Scale 1:1.



▲ Fig. 11. Potential weight from *Shahr-i Sokhta* (cat. no. 10). Scale 1:1.

10. SiS 2211 (Fig. 11)

No. of excavation	2934
Area	Building 1
Locus	Space 2
Historical period	III
Chronology	2500-2200 BC
Shape	spherical
Material	Stone
Diameter	1.7 cm
Condition	slightly chipped
Mass	7.13+x g
Ratio	1
Unit	7.13+x g

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Address of the author

Enrico Ascalone
Georg-August-Universität Göttingen
Seminar für Ur- und Frühgeschichte
Nikolausberger Weg 15
37073 Göttingen
Germany

enrico.ascalone@libero.it

Identifying weights in cuneiform texts from Mari and Assyria: Management and circulation of silver

by LIONEL MARTI & GRÉGORIE CHAMBRON

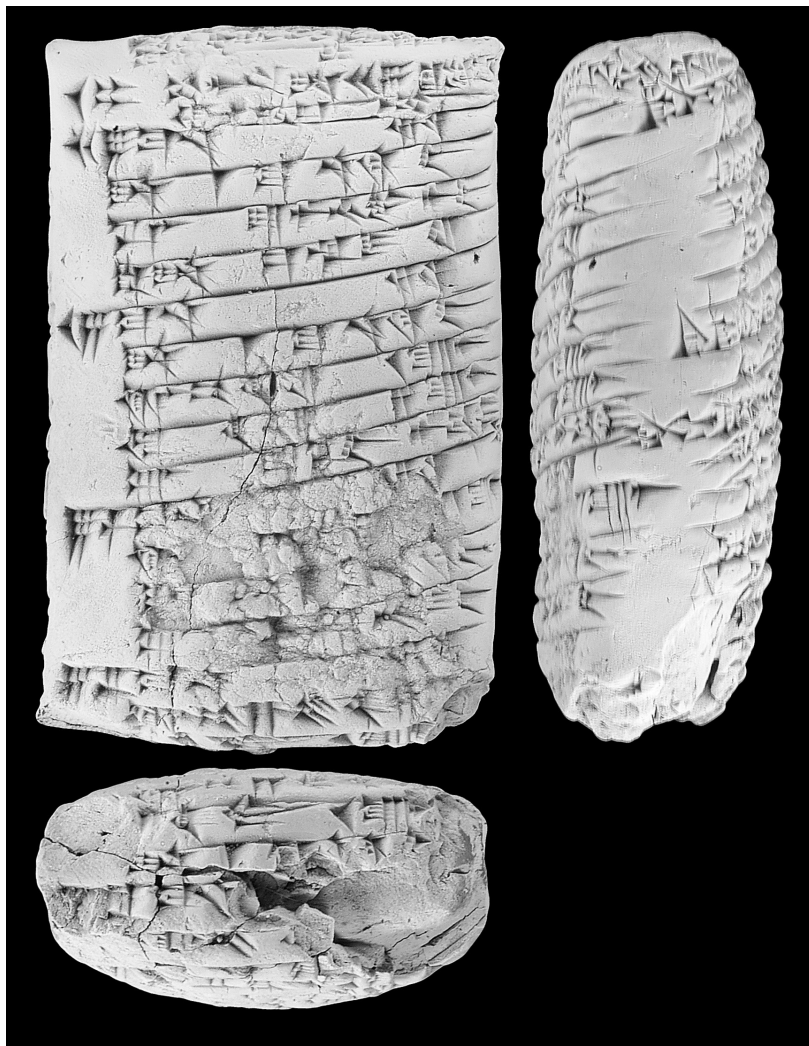
Cuneiform, 2nd millennium BC, notations of weights, administrative practices, epigraphic material, certification and checking of metals

New trends in the study of archaeological and epigraphic materials concerning metrology in Ancient Near East have opted to take into consideration the socio-cultural contexts of measuring and weighing. On one side, the archaeologists have paid attention to the manufacturing and the conservation of material weights, as well as the use of different weight standards, depending on institutions or geographical areas. This paper aims to point out that, on the other side, the epigraphic sources most of the time provide the opportunity to identify administrative practices rather than actual material weights standards. Some expressions in texts from two different periods – the Old Babylonian Period and the Middle Assyrian Period – actually refer to the certification and/or the checking of the quality and the nominal value of amounts of metal, which were lent to persons or given for manufacturing, by an administrative authority; the purpose of such expressions concerns more accounting practices than metrological ones.

Zur Identifikation von Gewichten in Keilschrifttexten in Mari und Assyrien: Die Steuerung und Zirkulation von Silber

Keilschrift, 2. Jahrtausend v. Chr., Bezeichnung von Gewichten, administrative Praktiken, epigraphisches Material, Zertifizierung und Kontrolle von Metallen

Neue Entwicklungen in der Untersuchung von archäologischem und epigraphischem Material zur Metrologie im Alten Orient tendieren zu einer stärkeren Beachtung der sozio-ökonomischen Kontexte des Messens und Wiegens. Auf der einen Seite haben Archäologen sowohl den Herstellungsprozessen und der Konservierung von Gewichten als auch der Nutzung von verschiedenen Gewichtsstandards – abhängig von den Institutionen und den geographischen Regionen – mehr Aufmerksamkeit gewidmet. Der vorliegende Beitrag betont, dass auf der anderen Seite die epigraphischen Quellen die Möglichkeit bieten, administrative Vorgänge statt tatsächliche Gewichtsstandards zu identifizieren. Einige Ausdrücke in Texten aus zwei verschiedenen Perioden, der altbabylonischen und der mittelassyrischen Zeit, beziehen sich auf die Zertifizierung und/oder die Kontrolle der Qualität und des nominalen Wertes von Materialmengen, die von administrativen Autoritäten an Personen zur Verarbeitung geliehen und gegeben wurden. Der Zweck dieser Ausdrücke betrifft eher abrechnungstechnische als metrologische Vorgänge.



▲ Fig. 1a.
A. 3413 (ARM XXXII
p. 358).
Old Babylonian administrative text with amounts of tin, gold and silver for different purposes concerning an expedition of the king of Mari to the North-West. The text mentions l.29: "according to the weight of 3 shekels of the king's service" (i-na na, 3 su nì-šu lugal).

The study of weights in the cuneiform documentation has always been important for philologists, despite the bluntness of the numerical data and the diversity of the measure notations in the texts. Nowadays, the interest in metrology is closely linked to the current debate occurring among Assyriologists and archaeologists concerning such concepts as "money", "market exchange" or "private business", which is largely based on the study of the circulation of precious metal – mostly silver – in the Near-Eastern societies.¹ One of the major issues surrounds remains how weight units should be translated into the current weight system (in kg), in order to draw up, through a quantitative approach, a reliable economic picture of the Ancient Near Eastern societies.

New trends (stimulated by innovative works on metrology²) in the study of archaeological and epigraphic materials have opted to take into consideration the socio-cultural contexts of weighing more precisely.³ More attention has been paid to the manufacturing and the conservation of material weights,⁴ thus to their identification in the archaeological field, as well as the use of different weight standards. In this respect, philologists seem not to have been as fortunate as archaeologists who have diversified materials at their disposal, which were found in precise contexts and which enable them to reconstruct the purpose of weighing (ASCALONE/PEYRONEL 2006). To what extent do texts and archaeological data complement each other, in order to better understand the economic, political and social implications of weights in society? This paper aims to point out that the epigraphic sources most of the time provide the opportunity to identify administrative practices rather than actual material weights standards. Through two case studies, only based on texts, from two different periods – the Old Babylonian Period and the Middle Assyrian Period – we would like to explore three main questions:

- 1°) Is it possible to identify the use of different weights in the texts?
- 2°) What did exactly the ancient scribes record as "weights"?
- 3°) Which kind of administrative practices are involved in weighing, according to epigraphic sources?

1. Weights in the Old Babylonian administrative texts of Mari

The administrative archives dating from the reign of Zimri-Lim (1774-1762 BC) and which were found in the city of Mari located on the Middle Euphrates offer interesting information on the use of weights during the Old Babylonian Period (*ca.* 2000-1600 BCE) (see JOANNÈS 1989; CHAMON 2006). These administrative documents provide economic data, regarding in particular the management of goods by the palace – or, more accurately, by the "king's house" – and inform about the exploitation and consumption of available resources supplied by agriculture, livestock farming, or trade.⁵

1 Undoubtedly, silver was used as a reference value and a medium of "commercial" exchange. Nevertheless, the apparently irreconcilable debate between the Substantivist and Formalist Schools, concerning whether the "money" function for this precious metal existed or not (see a summary of this debate in STOL 2004, 904-911), has been recently challenged: see for "this silver issue" PEYRONEL 2010; 2014.

2 In particular, see the innovative works of N. Parise and C. Zaccagnini in the 1980s and 1990s (for the bibliography and the historiography, see CHAMON 2011, 36).

3 See PEYRONEL 2000; 2008; ALBERTI *et al.* 2006; RAHMSTORF 2016 and the current outstanding ERC-project "Weight and Value" (dir. Lorenz Rahmstorf, University of Göttingen).

4 See in particular the works of the archaeologist A. Otto: OTTO 2006; 2008a; 2008b.

5 For an overview of the archives, see CHARPIN 2008.

The king himself was particularly involved in the purchase and working of precious metals (DURAND 1983, 187-197; GUICHARD 2005, 39, 33-36). However, there is no evidence of his deliberate accumulation of wealth. The purpose was threefold. First, silver was the predominant means of payment and of exchange in the Old Babylonian Period: for example, the king used to arrange commercial operations to purchase wine from regions situated far away from Mari, in the north-west, and covered the different costs (purchase of wine and jars, charter and boat rental, staff expenses...) with amounts of silver (CHAMBON 2009, 19). Second, gold and silver played a crucial role in the circuit of ceremonial and gift exchanges of prestige goods among the elites and royal courts (PEYRONEL 2014). And third, precious metals were melted for the manufacturing of devotional objects, decorations of statues, and jewellery. Therefore, amounts of silver or gold were scrupulously recorded in the administrative texts, and the weighing of refined or raw metals was generally made in front of King Zimri-Lim, who supervised the process and paid particular attention to the risks of wasting of the metals (JOANNÈS 1989, 114).

1.1. Interpreting amounts of precious metals

The common notations for the weight system used in the administrative texts are well known. The talent is divided into 60 minas, and each mina is divided into 60 shekels, each of them composed of 180 barleycorns. The weight units are the following (in increasing order):

Barleycorn (sign ŠE):	1			
Shekel (signs SU or GÍN):	180	1		
Mina (sign MA-NA):	10,800	60	1	
Talent (sign GÚ):	648,000	3600	60	1

For example, the beginning of the text M. 18472 (ARM XXXII p. 268) records an amount of gold which is expressed in this weight system.

- 1.1 $\frac{1}{3}$ ma-na 2 $\frac{2}{3}$ su 22 $\frac{1}{2}$ še kù-GI
 1.2 ki-lá-bi 8 har šu
 ...

The first line should be read “ $\frac{1}{3}$ mina, 2 $\frac{2}{3}$ shekels and 22 $\frac{1}{2}$ barleycorns”, that is to say 22 shekels and 172 $\frac{1}{2}$ barleycorns. The difficulty arises when attempting to interpret such an amount. In the second line, the administrative term ki-lá-bi indicates that it concerns the “weight” of 8 bracelets (har šu). The English word “weight” (as the French word “poids”) has actually a twofold meaning: it refers to the mass of an object (the property of a physical body), as well as to a material artefact which is used to weigh. The term ki-lá-bi and its Akkadian equivalent *šūqultum*, while usually translated as “weight”, references – to be more precise – manufactured objects by their *weight*: but should we necessarily



interpret this as the physical mass of the objects? We usually take it for granted that the inscribed amount of metal is the result of weighing practices that the scribes carefully recorded for economic purposes. Yet some evidence in the administrative documentation suggests that the physical amount (the mass) of one precious object should be distinguished from its “nominal value.” As L. PEYRONEL (2014, 370) quite rightly pointed out:

“The ceremonial exchange of silver occurred mainly through standardized objects, *i. e.* vessels and rings, which retain together both symbolic and economic values. During the Late Bronze Age, only silver vessels seem to maintain this function, also in the international system of gifts between peers. But in this case the ‘personality’ of the object, *i. e.* its peculiar decoration or shape, becomes the most important element determining its value, superseding its ‘intrinsic’ one.”

The circulation of precious objects and vessels has not only an economic aspect, but also an ideological one in the diplomatic gift exchanges of in-

▲ Fig. 1b.
Reverse of fig. 1a.

ter-state relations. Therefore, the amounts of precious metal that are recorded in the texts are above all the product of conventional values, which are based on a consensus among the parties in the exchange system. This notion of “estimated value” is clearly evidenced by a letter from Mari, sent by the Army General Ibal-pi-El to Zimri-Lim. Ibal-pi-El informs his king that the Mari troops, which were sent in order to assist the king of Babylon Hammurabi in its military campaign against common enemies, had just arrived in Babylon.

A. 486 + M. 5319 (= LAPO 17 579)
(Extract)

...
l. 40 [ú-b]a-bi-lu ma-di-iš a-na ka-ša-ad ha-na-meš
ba-di
qí-ša-tim i-qí-iš hu-ul-lum har ša kù-gi túg ú
gú-è-a bu-ur-ru-um-mu {[q]}
l.42 qí-iš-ti ba-ab-di-^dIM ½ ma-na hu-ul-lum ú
har ni-bu-um
18 su kù-gi ki-nu-um 12 lú-meš [...]
...

“[Hammurabi] was elated with the arrival of the Bedouins (Mari troops). He made some gifts: a *bullum*-ring, a gold ring, a multi-coloured garment. It is the gift for Bahdi-Addu. ½ mana (= 20 shekels) (of gold) are the nominal value (*nibum*) of the *bullum*-ring and of the ring. 18 shekels of gold are the real value (*kinum*)”.

Hammurabi offered diplomatic gifts to the allied troops of Mari: rings, garments, and precious objects. But, as the letter mentions further, the soldiers seemed to be unhappy: the real value for all the gifts was in each case less than their nominal value, that is to say the value which was estimated by Hammurabi’s administration. The scribes distinguished these values with two Akkadian words, *nibum* and *kinum* respectively (JOANNÈS 1989, 145-151; DURAND 1997, 228; CHAMBERON 2011, 159).

This example exposes the ambiguity in interpreting the amounts of precious metal in the administrative texts, which are more concise than the letters and used the generic term *ki-lá-bi*, without mentioning the terms *nibum* and *kinum*. Are these amounts objective record of weighing? Or estimated values in a complex network of gifts exchange? It may depend on each case’s circumstances and on the economic or social consensus among the parties involved in the transaction, which is tricky to reconstruct today.

1.2. Identifying weights in the text

However, some administrative texts seem to provide more evidence of material practices. The scribes sometimes used a specific word for “material weight”, written *na₄* in Sumerian and *abnu* in Akkadian. As a matter of fact, this term has differ-

ent meanings:⁶

- stone in its natural form
- stone prepared for specific use (building material, stone objects...)
- precious stone (referring to trade or to jewelry...)
- pebble, counter
- stone weight, weighing stone

Two kinds of expressions with *na₄* (or the plural form *na₄-há*) must be distinguished according to whether the preposition *ina* is written or not before the term. In the former case, the expression *ina na₄-(há) ša...* is usually translated “according to the weight(s) of...”, followed by the name of an administrative office of the palace (for example, “weights of the house of bitumen”⁷ or “weights of the house of administration”⁸), by a personal name or by the mention “weights of the market” (see CHAMBERON 2006, 6-7; 2011, 147-148);⁹ some ten expressions of this type have been collected. The text *ARM XXV 62*, which records the transfer of an amount of silver to an official, provides a good example of such an expression:

ARM XXV 62 (ARM XXXII p. 288)

	½ ma-na kù-babbar
2	i-na na ₄ -há nì-šu lugal
	a-na ub-bu-uz
4	1 giš-ban
	te-er-di-tum
6	a-na mu-ka-an-ni-ši-im
	iti e-bu-ri-im u ₄ 9-kam
8	mu zi-im-ri-li-im
	giš-gu-za gal a-na ^d utu
T.10	ú-še-lu-ú
	½ mina of silver
2	according to the stone weights of the king’s office for decorating
4	a bow
	transferred (<i>terditum</i>)
6	to Mukannišum
	DATE (9/xii/ZL 5)

Mukannišum was an all-purpose palace official, who headed an administrative service and supervised a workshop, where weapons, metallic instruments and ritual objects were manufactured from precious materials. The indication “according to the stone weights of the king’s office” refers, on a material level, to the set of weight stones used by

6 CAD A/1: 54b. The term *NA₄* could be used as semantic determinative for different types of stones or artefacts made of stone.

7 *na₄-há ša bīt kuprim*.

8 *na₄-há ša bīt tērtim* / *na₄-há bīt tērtim*.

9 *na₄-há mahirim* / *na₄-há ša mahirim* / *na₄-há mahirātim* / *na₄-há ša mahirtim*.

the king's office under his control,¹⁰ as well as, on an administrative level, to the office responsible for weighing the amount of silver. Similarly, the expressions "according to the stone weights of the house of bitumen" or "according to the stone weights of the house of administration", which are also often mentioned in the texts, convey an administrative information about the circulation of precious metals through the various offices of the palace by indicating where the metal was weighed. This circulation was carefully controlled by the king,¹¹ and his servants had to check each stage of the manufacturing of an artefact and to thoroughly record the use of the metal which had been entrusted to them and may well have been the cause of losses (JOANNÈS 1989, 114; CHAMBON 2011, 153).

Another type of texts, considered as describing weighing practices,¹² allow us to know exactly the specimens of material weights used in the palace offices. The masses are, in increasing order:

- 5 barleycorns, 10 b., 15 b., 45 b., 60 b., 90 b., 120 b.;
- 1 shekel, 2 s., 3 s., 5 s., 10 s., 20 s., 30 s., 40 s., 50 s.;
- 1 mina, 2 m., 3 m., 5 m., 10 m.;
- the talent is not mentioned because, very likely, it was too heavy to use.

The material of the weights has sometimes been noted: weights could be made of lead, stone, or hematite (JOANNÈS 1989, 140; CHAMBON 2011, 147). The sets of weights sometimes comprised specimens of different materials, used together in a weighing procedure. For instance, the list of silver vessels *ARM XXIV 93* begins with:

ARM XXIV 93

- | | |
|---|---|
| | 50 ma-na kù-babbar |
| 2 | <i>i-na</i> na ₄ 10 ma-na ša <i>a-ba-ri-im</i> |
| | na ₄ 5 ma-na na ₄ 1 ma-na |
| 4 | na ₄ ½ ma-na na ₄ 10 su nì-šu lu[gal] |
| | ki-lá-bi 10 ^{gal} <i>gu-ul-li</i> |
| | ... |
| | 50 minas of silver |
| 2 | according to the lead weight of 10 minas, |
| | the weight of 5 minas, the weight of 1 mina, |
| 4 | the weight of ½ minas, the weight of 10 shekels |
| | of the king's office: |

10 A set of weights stone of the king's office belonged to Mukannišum, according to the letters *ARM XIII 4* and *ARM XIII 8*.

11 The texts with the expression "according to the weights of the king's office" are often sealed by the king's cylinder seal. For example, *ARM XXV 221* (*ARM XXXII* p. 307-308), a record of two amounts of gold, weights of different jewels, according to the "weights of the king's office" and received from Mukannišum, was sealed by the king.

12 About 20 texts describing some weighing practice and 20 texts describing "subtractive" weighing have been found in Mari: see JOANNÈS 1989, 141-144.

'weight' of 10 *gulli*-vessels
(and others vessels)

The sum of the stone weights, which were used on the weighing platform of the scale in front of the other weighing platform with the amount of silver, is 16 minas 40 shekels, exactly one third of the 50 minas. As F. JOANNÈS (1989, 139) pointed out, when the weight of the metal exceeded 25 minas, it was too heavy for the scale in use and therefore the weighing operation had to be performed three times consecutively.

As a matter of fact, the main question with this kind of texts describing weighing practices concerns the reason for such precise descriptions: why did the scribe carefully record the type of weighing stones, while only the result of weighing (here 50 minas) should be relevant for accounting purposes? As mentioned above, administrative texts were concise, merely recording necessary information, in order to give palace accountants the numerical data, the name of the people involved in the transaction, the craftsmen, the intermediaries and, of course, the name and the number of manufactured objects. In this respect, why are the details of material weight sometimes needed? It could be argued, that the expressions in texts concerning weights refer to different weight standards, which were identified by excavations in Mari.¹³ But the use of a set of weights based on different standards would have been irrelevant in the same administration and would have rendered the circulation of metal through the various administrative offices of the palace more complicated.

However, the weights of the various offices could differ very slightly in mass, as a letter from Mukannišum (a palace administrator, see above) evidences:

ARM XIII 4 (LAPO 16 105)

(extract)

- | | |
|----|---|
| | <i>a-na be-lí-ia</i> |
| 2 | <i>qí-bí-ma</i> |
| | <i>um-ma mu-ka-an-ni-šum-šum</i> |
| 4 | <i>ir-ka-a-ma</i> |
| | 6 ⅔ ma-na kù-babbar <i>be-lí ú-ša-bi-la-am</i> |
| 6 | <i>um-ma-a-mi a-na mi-ti-it</i> |
| | <i>ih-zí</i> 1 me ^{gis} <i>igi-kak-há kù-babbar šu-pí-iš</i> |
| 8 | kù-babbar <i>še-tu i-na</i> 5 ma-na 1 ma-na |
| | ½ ma-na ù ⅓ ma-na <i>i-na</i> na ₄ -há {NĪ ŠU} |
| 10 | nì-šu <i>be-lí-ia aš-qu-ul-ma</i> |
| | 2 su kù-babbar <i>im-ti</i> |
| | (...) |

"To my lord speak! Your servant Mukannišum (says): My lord send me 6 ⅔ minas of silver (saying): "Use it to compensate for what is lacking in the mounting of 100 silver spears. I weighed this silver, with (weights of) 5 minas, 1 mina, ½ mina, ⅓ mina,

13 The "Mesopotamian shekel" (about 8.4 g) and the "Ugaritic Shekel" (about 9.4 g): see CHAMBON 2011, 144-145.

according to the weights of the office of my lord:
there lacks 2 shekels of silver”.

In the different processes concerning the circulation and transformation of precious metals, any loss of silver or gold was to be carefully reported to the king. It seems that, in actuality, there were not many sets of weights available in the palace: one belonged to the “king’s office” and was used in this case by Mukannišum; one was the property of the “house of the bitumen”; one was of “the house of administration”; and one is designated as “weights of the market” and used in the context of purchasing (CHAMBON 2011, 148). Thus, the aim of the indication of specific weight stones in the texts was twofold: it was possible to know, on one side, exactly which set of material stone weights was used and, on the other side, which office was in charge of weighing, in order to check the exact amount of metal and explain possible losses.

In this respect, epigraphic data and archaeological data can be compared, but, in the case of the Mari palace, the exact archaeological context (and dating) of the material weights is still to be defined in order to identify the offices where the sets of weights were used according to the administrative documentation (CHAMBON 2011, 143-146).

1.3. “Material weights” or “administrative weights”?

Another expression concerning weights in the Mari texts ought to be differentiated from the previous one, which describes weighing stones in detail. Some loan contracts from Mari mention *na₄ ma-ri^{ki}*, without the preposition *ina* and the plural form of *na₄*, that could be translated verbatim: “weight of (the city of) Mari”.¹⁴ For example, *ARM VIII 23* records an amount of silver lent both by the sun-god Šamaš and an individual:

ARM VIII 23

7 ⅔ su 6 še kù-babbar
2 *ša-ar-pu-um*
na₄ ma-ri^{ki}
4 máš 10 su igi-4-gàl ta-àm
dah-hi-dam
6 ki ^dutu-ta ù *da-da*
¹puzur₄-^dma-ma
Tr. 8 dumu *i-lí-i-din-n[am]*
iti *ki-nu-nim* u₄ 8-k[am]
Rev. 10 kù-babbar šu-ba-an-ti
iti ne-ne-gar
12 kù-babbar ù máš-bi ì-lá-e
igi *i-din-^dIGLKUR*
14 igi *é-a-aš-ra-ia*
igi *iš-bi-^dIM* du[b-sar]
16 mu *zi-im-ri-[li]-im*
til-lu-ut ká-din[*gir-ra*]^{ki}
18 *il-li-ku*

¹⁴ *ARM VIII 22, 23, 26, 27, 31, 32, 33, 35, maybe 36, 79.*

7 ⅔ shekels 6 barleycorn of silver
2 *šarpum*
weight of (the city of) Mari
4 to which the interest of ¼ shekel for 10 shekels
will be added
6 from the god Šamaš and from Dādā
Puzur-Mama
Tr. 8 Ili-iddinam’s son
in month vii, the 8th
Rev. 10 received the silver.
In month v (of the next year)
12 he will pay the silver and the interest.
witness: Iddin-hubur
14 witness: Ea-ašraia
witness: Išhi-Addu, the scribe
16 DATE (ZL 11)

In the Old Babylonian period, the loan contracts in which a divinity and a person both appear as creditors are well documented (CHARPIN 2015, 159-160). It is not surprising that the Sun-god Šamaš, which was accountable for justice, appears as a creditor in the majority of cases. It also has been assumed that the temple of Šamaš operated as a bank of some sort (HARRIS 1960, 128). D. Charpin pointed out that Šamaš is mentioned as a creditor in the documentation of cities which did not host any temple of this deity. Moreover, debts with the mention of Šamaš have been found in the temple of another deities.¹⁵ Thus, the link between the loans contract with Šamaš as creditor and the institutional role of his own temple in the loans system during the Old Babylonian Period still needs some clarification.

In Mari, the archaeologists have found a temple of Šamaš dated from the 3rd millennium BC and renovated by the king Yahdun-Lim in the 19th century BC;¹⁶ it was located in an area directly alongside the palace to the South East (MARGUERON 2002). Moreover, the man named Dādā and recorded as co-creditor seems to be the high priest of Šamaš.¹⁷ Nevertheless, the loans contracts with Šamaš as creditor were found near the king’s private rooms inside the palace.¹⁸ Only a small number of such documents were indeed discovered. It could be explained by the fact that the creditor usually

¹⁵ CHARPIN 2015, 156. In Mari, the gods Itūr-Mēr and Bēlet-mātim can be creditors with Šamaš (see CHARPIN 1990, 256).

¹⁶ See for example the year name in *ARM VIII 51*.

¹⁷ According to the administrative text M. 11877 (courtesy of J.-M. Durand). A letter from the queen mother Addu-dūri mentions also a man named Dādā as the high priest of the goddess Eštar-Bišrī (*ARM X 50* = LAPO 18 1094) but is it the same person? Dādā appears also in an administrative text recording an expenditure of significant amounts of barley from the storage house of the palace (M. 6861; see CHAMBON 2011, 171): does it represent the rations for the staff of the temples?

¹⁸ The majority of the loans contracts were found in the rooms S. 108, S. 107 and S. 115, around the “Cour du Palmier” (in the West of the Palace), in front of the bīt mayyali, where the king resided (see DURAND 1987, 50-51). The loans contracts from Mari will be published by D. Charpin.

kept the loan contract sealed by the debtor until the recovering of the loan, and eventually broke it. Does it mean that the unbroken contracts found in the palace provide evidence that the corresponding loans have not been recovered? It is doubtful, because not all of these documents have been sealed and therefore they could be just duplicates of originals, kept for administrative purposes.

What does the expression “weight of (the city of) Mari » mean in this respect? It differs from the expression mentioned above because the preposition *ina* as well as the mass of a weighing stone is not inscribed and therefore a reference to an actual weighing is doubtful. Furthermore, the expression is always connected with the Akkadian term *šarpum*.¹⁹ This term, based on the verb *šarāpum*, “to burn; to fire (bricks); to refine (metal by firing)”²⁰ is generally translated when associated with silver as “refined (silver)” and thus seems to refer to the quality of the metal.²¹ In later periods, *šarpum* could mean “silver” (without the usual term for silver *kaspum*), for example in some Middle Assyrian texts. However, there is no clear evidence of this interpretation in the documentation from Mari. Only the meaning “to dye in red” for *šarāpum* when concerning textiles is well attested (DURAND 1983, 378). I. ARKHIPOV (2012, 29) has in particular identified examples where the meaning “to refine metals by firing” should be clearly rejected because only manufactured objects and not raw metal are subject to the process *ana šarāpim*. He suggests to interpret *šarāpum* as a kind of cleaning operation performed on the objects and *kaspum šarpum* as “silver used as currency” (*i. e.* as a means of payment), but he is not convinced entirely.²²

In his study on silver in Old Assyrian Trade, K. VEENHOF (2014, 405-406) has suggested that “another purpose of *šarāpum* [which he translated as “to fire, melt, refine”] could be to check the quality of precious metal”. Following this suggestion, we propose to interpret the verb *šarāpum* as an opera-

tion aiming at checking and estimating the quality of precious metal before silver is put into circulation as currency.²³ This operation did not necessarily include the process of refining, because silver as well as manufactured objects were often entrusted to the silversmiths, who are expert in weighing practices and in estimating the quality of silver.²⁴ We could also understand why special authorities called *ebbum* (“prud’hommes” in French), who used to guarantee the fairness of processes concerning metal, regularly supervised this operation.²⁵ The administrative text ARM XXIV 138 (ARM XXXII p. 411) even states that some gold earrings had to be “put in good condition, in order (that is to say, renovated)” (*ana šušūrim*) before being estimated and “certified (?)” (*ana šarāpim*). Two similar administrative texts offer an interesting case. The first, A. 3542 (ARM XXXII p. 274), records different jewels in gold and silver which had been entrusted to the silversmith Yanšib-Dagan for the operation *šarāpum* and the second, M. 8556, records the same precious objects but whose weights were yet slightly different and which had been brought to Mukannišum for the same operation.²⁶ In our opinion, the documents and the context should be understood as following: several manufactured objects were given to Mukannišum, the person responsible for the management of precious metal in the palace of Mari, in order to check and estimate their weight (that is to say “their nominal value”: see above). Then, Mukannišum delegated this task to the silversmith Yanšib-Dagan, and finally Yanšib-Dagan, after estimating the value of each object in silver, changed this value slightly.²⁷

The term *šarpum* in the loans texts should designate the result of the *šarāpum*-operation, *i. e.* the estimation of the quality and the “nominal value” of silver which was lent. The meaning “silver” for *šarpum* in the Middle Assyrian texts (later than the Old Babylonian texts) is probably the result of a semantic shift, since this precious metal was preferentially used as a reference value for “commercial” exchange; the term “*šarpum*” was then given to the

19 Except in the text ARM XXIII 553, which records an amount of silver given for the releasing of a person, according “the weights of (the city of) Mari” (*i-na na₄-há ma-rí^{kí}*).

20 CAD S / *šarāpu* A, p. 102. This term is usually translated as “to melt” (in French “fondre”) by the editors of the administrative texts from Mari (see for instance BIROT 1960, 129; KUPPER 1983, 319; TALON 1985, 79; LIMET 1985, 515 and JOANNÈS 1989, 119).

21 The term is translated as “geläutert, gebrannt” in AHw 1086a and “refined (said of silver)” in CAD S / *šarpu* A1, p. 113a. See for a general overview REITER 1997, 97-98; for the documentation from Mari: “(argent) raffiné” in BOYER 1958, 203 and DURAND 1983, 223; *šerpum* is translated as “melt” by JOANNÈS 1989, 144; for the documentation of Alalakh (IV): “refined (silver)” in GIACUMAKIS 1970, 100; for the documentation of the Old Assyrian merchants, “refined (silver)” (*kaspum šarupum*) in VEENHOF 1972, 46-49. In the Middle Assyrian period and following periods, the term *šarpum* seems to be equivalent to “silver” (CAD S / *šarpu* A2, p. 113b) and the verb *šarāpu* could mean in this respect “to buy, acquire” (CAD S / *šarāpu* C, p. 105).

22 ARKHIPOV 2012, 12. He based his argument on the text ARM XIV 17 (= LAPO 17 829), where *kaspum šarpum* represents a kind of “cash”, opposed to silver that will be obtained as a result of the sale of livestock.

23 For this issue concerning silver *šarpum* as currency, see ZEEB 1991, 415.

24 See for example S 134.37 (ARM XXXII a p. 233-234), A. 3542 (ARM XXXII p. 274), M. 8556 (ARM XXXII a p. 274), M. 9875 (ARM XXXII a p. 420), M. 11694 (ARM XXXII a p. 424), M. 11681 (ARM XXXII a p. 472-473), M. 12019 (ARM XXXII a p. 473), ARM IX 189, ARM XXIV 138 (ARM XXXII a p. 411).

25 See for example ARM XXII 237 (ARM XXXII p. 222-223).

26 I. ARKHIPOV (2012, 274) has already pointed out the similarity of the two documents.

27 The two texts’ dates refer to the same month (viii) of the same year but the day in the damaged date of M. 8556 cannot be read, so it is not possible to know exactly in which chronological order the texts were written. We assume that the first written document was A. 3542, which indicates that the precious object “are entrusted” (Sumerian SI-LÁ) to Yanšib-Dagan. Then the exact values of the objects, obtained by the *šarāpum*-operation, have been recorded in M. 8556, where the scribe only reminded that the objects “had been brought” (*ublu*) to Mukannišum.

metal whose “monetary” value was certified. In this respect, the expression “weight of (the city of) Mari” should refer not directly to weighing practices but to the institution which guaranteed this process of certification and gave the nominal value (which depended on the institution involved...). Is this institution to be identified with the palace (*i. e.* the “king’s house”)? It is difficult to answer this question because the king himself could lend silver in his own name and on his own account, and in this case the scribe informed that: first, the creditor is the king (and not the god Šamaš or anyone else) and second, the amount of silver (never qualified as *šarpum*) was weighed according to the weights of the king’s office (*ina* na₄-há nì-šu lugal).²⁸ Therefore, the loans contracts with the term *šarpum* linked to the expression “weight of (the city of) Mari” might concern economic activities of temples,²⁹ as seen above, and/or trade activities. This second assumption is supported by the fact that two similar expressions, “*ina* weight of (the city of) Karkemiš” and “weight of (the city of) Aleppo”, appear in connection with silver qualified as *šarpum* in a context of trade transactions.

The first expression is mentioned in the Old Babylonian text ARM VIII 78 concerning the releasing of a person called Yaqqim-Addu, seized as hostage and brought to the city of Karkemiš in the North.³⁰ Two merchants paid 15 shekels of silver *šarpum* in Karkemiš for his release, according to the weight of (the city of) Karkemiš (*i-na* na₄ *karkamiš*^{ki}). When arriving in the neighbourhood destined for merchants (*kārum*) of the city of Ni-hādu, in the Mari kingdom, Yaqqim-Addu had to refund ½ mina of silver and the merchants made by this operation a profit of 100 %. Within this context, the expression “15 shekel of silver *šarpum* according to the weight of (the city of) Karkemiš” may indicate that the 15 shekels of silver paid for the Yaqqim-Addu’s release were established and certified by some authority of the city.³¹

The expression “weight of (the city of) Aleppo” (na₄ ^{unv}*ha-la-ab*^{ki} without *ina*) is used in an Old Babylonian purchase text (ALT 33) found in the city of Alalah:³²

“The men of (the settlement of) Awirraše-Šenni-akka, Niqmi-Addu, Neru, Kusan, Muzi, Išme-Addu, Hirše, Šerdiya, Akkulenna, Arundi, Teššub-bani, Putri, Haruhulla, and Kusah-atal—took 135 shekels of *šarpu* [si]lver (according) to the weight of Halab [= Aleppo] from Sumuna-abi, in order to giv[e] (back) 13[5 jars of top-quality beer] measured by the jar of Hal[ab]. Each man [gives] a guarantee [for the other]. A sur[iv]or will pay (the entire amount of) silver.

(Witnesses.)”

The commercial transaction is clear: Sumuna-abi, a business woman (ZEEB 1991, 416), gives the men 135 shekels of silver in order to buy 135 jars of beer. Consequently, the standard price for one jar of beer in Aleppo is 1 shekel. It is interesting to note the parallel between the expression “weight of (the city of) Aleppo” and “jar of (the city of) Aleppo”. According to our interpretation, the former guarantees the weight (*i. e.* the nominal value) of the amount of silver used as currency, and the latter guarantees the standard (nominal) volume of the jars. Thus, the fairness of the transaction is assured.

As in the case of Mari, it seems there is not any direct connection between, on one side, the “weight of (the city of) Karkemiš” and the “weight of (the city of) Aleppo” and, on the other side, the rulers of the cities Karkemiš and Aleppo respectively. It is well known that the palace could have the status of a legal person as for loans or commercial contracts,³³ but neither the palace nor the king are mentioned in the documents above. Moreover, there is no evidence that the “weight(s) of the palace” (na₄-(há) *ša é-gal*) which appear(s) in some texts from Mari,³⁴ has to be identified with the “weight of (the city of) Mari”; the context of its use does not concern loans but internal activities of the palace³⁵ in connection with the king’s office, and the “weight(s) of the palace” seem(s) to refer to weighing stones in the same way as the set of the “weights of the king’s office” (CHAMBON 2006, 9). It may be assumed that in each case the city itself played the role of a legal entity, whose authority and competence in setting and controlling the commercial rates on the one hand, and in estimating and guaranteeing the value of silver on the other hand, were recognized, even outside the kingdom. This recognition was certainly grounded on the “international” trade network, where silver fulfilled the functions of a medium of exchange and payment, as a standard of equivalence. The difference in exchange rate or purchasing power of silver between the Old Babylonian cities, which set in each cases the “nominal value”, was

28 See ARM VIII 37, sealed by the debtor Yasmah-Addu.

29 In this respect, an interesting comparison can be drawn with the mention of “the weight of (the god) Šamaš” in Old Babylonian contracts from Sippar in Southern Mesopotamia. M. STOL (1999, 580) has pointed out that “wir können folgern, daß in jedem Fall, in dem Silber ‘nach dem Gewichtsstein des Samas’ genannt wird, der Silberbetrag zweckgebunden (ear-marked) war, und wahrscheinlich im Tempel des Samas autorisiert wurde”.

30 See the remarks in DURAND 1983, 110 and CHAMBON 2011, 90-91.

31 Similarly, the text ARM XXIII 553 concerns the releasing of a person, certainly captured in Mari, and the silver given for this release was established according to “the weights of (the city of) Mari” (*i-na* na₄-há *ma-ri*^{ki}).

32 Text translated in LAINGER 2015, 70 with bibliography. However, here we are maintained the term *šarpum*-silver, which the author has translated as “refined silver”. See comments in CHAMBON 2011, 84-85.

33 See for instance ARM IV 5: 9, ARM XIII 39: 23, ARM XXI 205: 7 and ARM XXVIII 181: 20 (we thank I. Arkhipov for drawing our attention to these texts).

34 ARM XXV 339, ARM XXI 227 (*i-n*[a na₄]-há *ša é-gal*, “according to the weights of the palace”), M. 15266 (*i-na* na₄ 10 *ma-na ša é-kál-lim*, “according to the weight of 10 minas of the palace”).

35 See for instance ARM XXI 227: the text records an amount of “sealed silver” (*kaspum kankum*) which is entrusted to craftsmen for the manufacturing of precious vessels.

the basis for the success of the trade and for generating profits.³⁶ As stated earlier, the question that was left open is to which extent the palaces of these cities are involved in this network.

A further argument in favor of a broader context for the loans texts of Mari than the local activities is the month mentioned in the date formula. In each case, the month during which the loan was made belonged to the local calendar in use in Mari, while the month during which he had to repay the loan is written *ne-ne-gar*, equivalent to the 5th month written *abum* in Mari, but used in southern Mesopotamia³⁷ (in the so-called “Nippur calendar” (COHEN 2015, 379-447; CHARPIN forthcoming)): see for example the text *ARM VIII 23* studied above (the first recorded month is *kinūnum* and the second is *ne-ne-gar*)³⁸. This seems to offer evidence of the “international” character of the transaction. While the lenders are clearly persons from Mari, it may be assumed that the debtors were merchants and/or foreigners in Mari and it is quite understandable that the first recorded month follows the rules of the local calendar in Mari, the place where the debtor has received the amount of silver, and that the second recorded month (*ne-ne-gar*) for the loan reimbursement refers to the calendar to which the debtor is accustomed, in order to facilitate his planning concerning the reimbursement: did the “Nippur calendar” have an “international” character for transactions? More broadly, the date formulae in loans contracts written in Mari may have followed general rules, concerning the format and the terminology and used in a large area.³⁹

The loans contracts with the mention of the weight of Mari were not a special feature of the reign of the ruler Zimri-Lim. The loan text *ARM VIII 75* dating from the reign of Yahdun-Lim in Mari, records 20 minas of silver weighed “according to the weight of 10 minas of (the city of) Mari” (*i-na na₄ 10 ma-na š[a] m[a]-r[ī^{ki}]*).⁴⁰ But in this case, it is more likely that this expression refers to an actual weighing (20 minas of silver weighed with 2 weighing stones of 10 minas) as the mention of the verbal form *ì-lá-e* “he has weighed” (= the amount of silver has been weighed), which follows the expression, seems to evidence. It is not mutually exclusive with the fact that silver was estimated and certified. In this case, the link between the weight of the city and the ruler is clear.

Another important question arises: how were the quality and the value of silver estimated? The

information “weight of the city of...” in loan or trade contracts may have been sufficient to guarantee this process. But it is also possible that the estimated value of silver was conveyed by some kind of material mark, like traces of colour – which are visible for example on some clay tablets (CHARPIN 1984) – or hallmarks on silver. Under the second assumption, the amount of silver was probably melted and silver-*šarpum* might refer to “refined and certified” silver. Precious metal was actually shaped as rings, ingots, or scraps.⁴¹ When circulating as scraps, silver was put into small leather bags, fastened by a threadlike, sealed string. The sealing states the weight of the silver contained in the bag and the institution which has checked the value of silver (CHARPIN 2017, 95); such practice is usually expressed in the texts as *kaspum kankum*, “sealed silver”, and opposed to *kaspum piṭrum* “loose silver”.⁴² But none of the documents studied above mentions one of these two terms, therefore it remains difficult to know the exact shape of the amount of “certified” (*šarpu*) silver.

2. Weights in the administrative texts from the Middle Assyrian period

The structure of the weight system of the Middle Assyrian period works is identical to the one of the weight system of the Old-Babylonian period (1 talent = 60 minas, 1 mina = 60 shekels, 1 shekel = 180 barleycorns).⁴³

2.1. The documentation

The Middle Assyrian documentation contrary to that of the Old Babylonian period is limited.⁴⁴ Nevertheless, one finds the whole range of available documentation, administrative and legal documentation, letters *etc.*⁴⁵ The vast majority of texts comes from the capital of the kingdom of Aššur. The overlapping of the so-called “private” and “public” spheres can also be noticed without difficulty.

For example, Bābu-aha-iddina, whose archives including management of his home were found in Aššur,⁴⁶ was a member of the royal family and involved in the Assyrian administration, but his status is still unknown. Other archaeological sites have also delivered archives such as the sites of Dūr-Katlimmu, Tell Rimah *etc.* (see POSTGATE 2013, 260-326). If the texts on farm management (see RECULEAU 2011) are numerous and illustrate the use of

36 For the Old Assyrian trade, see VEENHOF 2014, 393.

37 For this peculiar combination of a local month and the month *ne-ne-gar* see CHARPIN forthcoming (courtesy of D. Charpin). D. Charpin points out that we can also observe this phenomenon in the Diyala Region (in Šaduppum) as well as on the lower Middle Euphrates, at Yabliya-Al-Kapim (Šišin).

38 A loan contract dating from Yahdun-Lim's reign (1810-1793 BC) mentions the month *ne-ne-gar*, too.

39 All the loans texts found in Mari will be published by D. Charpin.

40 See the new edition in CHARPIN 1997, 342.

41 For these different shapes, see PEYRONEL 2010.

42 See STOL 1982, 151 and CHARPIN 2017, 94-95. See an example of *šarpum kankum* in the text *ARM XXI 227*.

43 For an overview on this issue see POSTGATE 2013, 54-55.

44 CANCIK-KIRSCHBAUM/JOHNSON 2011-2012, 92.

45 For a presentation of this documentation and its “raison d'être” see POSTGATE 2013.

46 See POSTGATE 2013, 201-236. An edition of the texts kept in Berlin can be found in FREYDANK/SAPORETTI 1989. For a summary of those kept in Istanbul see DONBAZ 1997, 101-109.

volumes, especially for barley, those which mention the use of weights are rare. Overall, the weights were used in the context of manufacturing of objects: jewellery, metal *etc.* All ancient cities, found in these sites, were under the control of the Middle Assyrian kingdom. Thus, the archives belong to a homogeneous political and administrative structure.

2.2. Weights in the texts

According to the documentation, manufactured objects were weighed, and the weight was checked. The most common form in the texts is the following: “number”, “kind of object(s)”, “the weight of the object(s)”, as this text from Aššur illustrates:⁴⁷

“10 bronze cauldrons, for a weight of 1 talent, 39.5 minas and 5 shekels which is in the charge of Šilli-Aššur, the metalworker; Šilli-uraše, the steward received for the palace, (...)”

This document was discovered in a house where several texts recording receipts of metal have been found.⁴⁸ It is quite possible that it is the house of the blacksmith Šilli-Aššur. After receiving an amount of metal from the palace to make cauldrons, a process not documented in the text, he gives to the steward of the palace the produce of his work.⁴⁹ The fact that the text was sealed shows that there was an attempt to guarantee that the cauldrons had been indeed handed over to the palace.⁵⁰

The text records each stage of the manufacturing and circulation of goods, in order to check their production and their use. The items, which came out of the stocks, were weighed. It was important for the administration to control the total weight of metal removed from storage as well as the total weight of metal obtained during the manufacturing. But the text does not mention where exactly the weighing took place, nor which kind of weights were used. Was it the result of a weighing of all the cauldrons or a sum of the weighing of each cauldron? The result of an actual weighing or the use of several texts specifying the weight (*i. e.* nominal value) of each vase?

Conversely, the weight of objects was sometimes stated, and then the total weight established, as this text, found in a house with palatial administrative archives, shows:⁵¹

“1 *qermu* weight: 36 minas ½; 2 *qermu*: 1 talent 16 minas. Total 3 *qermu*, weight: 1 talent 52 ½ minas, which were brought to the palace; PN has received.”

It seems that *qermu*⁵² was a product, whose weight could vary. From the administrative point of view, this text records two different incomes of *qermu* for the palace and it should be noted that these three items seem to have a relatively similar weight.⁵³

Fortunately, some letters from the archives of Bābu-aha-iddina⁵⁴ provide some idea on the organization of the administration in a much more concrete framework. The interest of this archive is to include a part of the correspondence dealing with “private” business between this person and his staff. Some letters make it possible to contextualize the question of the weight of the objects and the management of the stocks. For example, this letter which Bābu-aha-iddina sent to his staff allows to better understand the ancient concept of weight:⁵⁵

“To Ma’nāya, Kidin-Gula, Aššur-zuquppanni and Aššur-bēl-šallim thus speaks Bābu-aha-iddina:

Send me, (...) the ivory which has been taken out of the storeroom and placed under the responsibility of the house supervisor. Seal (the package) with your seals, give (it) to Mušallim-Aššur so that he brings it to me. Its weight is inscribed on the ivory – you send me (notification of) its deficient weight.”

Or the following letter concerns a similar case. Bābu-aha-iddina asks:⁵⁶

“(…) Open the box of ivory and ebony, remove the ivory and ebony *šuristu*, weigh it, write the weight, put it into something, seal with your seals and send it over to me (...)”.

These two texts illustrate, first of all, what was important for the writer of the letter and the careful description of the administrative process. The author highlights the crucial role of the seals, and also the fact that the weight of the objects has to

47 FREYDANK/FELLER 2007, text 57 l.1-9 :10 utul₂-meš zabar, 1 gū-un 39 ½ ma-na 5 gín, a-na ki-lá. ša šu ^mšil-li-a-šur, lú simug, ^mšil-li-ú-na-še, lú agrig, a-na é-kál-lim, ma-bi-ir. For a comment of this text see JAKOB 2011, 249.

48 It belongs to the archive M 13: see PEDERSEN 1985, 118-120 and MAUL 2017, 93-98. The texts of the M13 archive kept in Istanbul are published in DONBAZ 2016.

49 For an analysis of this form *ana ekallim* see POSTGATE 2013, 163-164.

50 For comments on the use of seals in this documentation see POSTGATE 2013, 229-232.

51 Located at (cE6V / 7i, FA6V). A copy of the text can be found in FREYDANK/PRECHEL 2011, text 18, and an edition in FREYDANK/PRECHEL 2014, 36, text 20.

52 For this term see in particular GASPA 2016, 35, 37; 2017, 64. See MARTI 2015, 452. Given the great variability of weights and especially in this text the weight of about 18 kg for this object, we prefer to consider it as a blanket, carpet wall covering (which works well with the root cover), a coat. Note that a type of product may, according to its weight, designate a garment or an adornment. See for example DURAND 2009, 31, n. 28.

53 Assuming that the weights of the last two *qermu* are equivalent.

54 From the archive M 11. For this archive see PEDERSEN 1985, 106-113. See POSTGATE 2013, 202-204.

55 KAV 205, published in FREYDANK/SAPORETTI 1989, 33, 73 and comment in POSTGATE 2013, 216-217.

56 KAV 99, published in FREYDANK/SAPORETTI 1989, 20-21, 61-62.

be recorded. However, the weighing procedure is not described.

In all these cases, there is no mention of specific units or weights standards and it seems that only one system was in use. Moreover, these activities concerned the palace.

2.3. The different designations of weights

In the Middle Assyrian documentation, only few examples concerning specific weights, are mentioned. In most of the cases, they appear in contracts, particularly in loans contracts.

In each case, the texts follow this pattern: “amount of metal, belonging to PN1, owed by PN2, deadline of refund, overtime penalty.” Normally, there was no mention of specific weights as for example in the following contract:⁵⁷

“12 minas of lead (...) belonging to Iddin-kubi, son of Riš-Nabu, owed by Ili-malik, son of Iddin-Bēl, son of Kubi-ēreš, has received.

Within 6 months, he will pay the capital of lead. If time is exceeded, the lead shall bear interest. (...)”

In rarer cases, specific weights can be mentioned as following: “amount of metal, *ṭi-ri* na₄ *é a-lim*, belonging to PN1, owed by PN2, deadline of refund, overtime penalty”, as for example in the following text:⁵⁸

“1 talent 5 minas of lead, *ṭi-ri* na₄ *é a-lim*, from Iddin-kube, son of Riš-Nabu, Ibašši-ilu, son of Sīn-nadin-ahhi, son of Lubuniya, has received. Within 6 months, he will pay the capital of the lead (...)”

How can we interpret the expression *ṭi-ri* na₄ *é a-lim* on line 2? It can be observed that, except for this line, the contract is identical to the previous one, and that the same person is involved. This expression is still unclear.⁵⁹

The *bīt ālim* is considered as the “town hall” of the city of Aššur.⁶⁰ It is very poorly documented in the Middle Assyrian period⁶¹ but well attested in the Old Assyrian one. This institution is involved in metal management and control. Moreover, one of the seal of the god Assur in the Old Assyrian Pe-

riod is that of the *bīt ālim*.⁶²

Traditionally na₄ *bīt ālim* is translated as the “weight of the *bīt ālim*”,⁶³ or “(according to) the weight of the ‘city house (*i. e.* the city hall)’”. This expression can be understood in several ways. Does it refer to a particular weight standard, a particular weighing stone or information concerning the office involved in the transaction as guarantor? This expression appears in contexts outside the palace and in connection with “private” activities, especially in loans texts written outside the city of Aššur, since several examples can be found in the documentation from Tell Rimah.⁶⁴

If we consider the expression as a weight standard, we should normally expect a preposition *ina* before na₄.⁶⁵ Such a form was documented at that time, as the following letter shows (FAIST 2001, 251-254):

“2 minas 5 shekels of silver, according to the weight of the country of Kinahu.”⁶⁶

As in the case of the “weight of (the city) of Mari” and the term *šarpu* studied above, the expression “weight of the *bīt ālim*” is closely connected to the term *ṭiru*. The meaning of the term *ṭiru* is still problematic. The dictionaries are undecided⁶⁷, and suggest that this word derives from the verb *ṭerû*, “to penetrate, rub into, stamp, impress”.⁶⁸

In an Old Babylonian text found in Sippar, which records loans of silver, two loans involve Assyrian people and mentions the *bīt ālim* (WALKER 1980, 19 (H) and 21 (M)).

The first (H) begins as follows:

⁴²1 ma-na kù-babbar *ša-ar-pu* ⁴³na₄ *é a-lim* ...

⁶² One finds the seals of Aššur on the treaty of succession of Assarhaddon: see in particular WISEMAN 1958, 1-99; PARPOLA/WATANABE 1988, 28-58; LAUINGER 2012, 87-123; FALES 2012, 133-158. The sealing on this text shows the continuity of the god Aššur over time. We find the seal of the god Aššur of the Neo-Assyrian, Middle Assyrian and finally Old Assyrian period with the short inscription: *ša a-šur, ša é a-lim*^{ki}. See DERCKSEN 2004, 90-91 and VON DER OSTEN-SACKEN 2011, 747-751. The whole unrolling of seals being considered as the seals of Aššur, mentions on the first line: “seal of the god Aššur, king of the gods” (na₄-kišib *a-šur*₄ lugal dingir-meš...).

⁶³ See the comment in POSTGATE 2013, 32, n. 94.

⁶⁴ As in the texts from Aššur, all the texts dealing with metal do not include this expression. See for example TR 3021 and TR 3030 (cf. WISEMAN 1968, 183-185).

⁶⁵ Although it can be assumed that an absence of preposition is possible, it should be noted that in most other cases (for example in the case of capacity measures), the *ina* preposition generally precedes the “type” of measure unit used.

⁶⁶ 2 ma-na 5 gin *šar-pu i+na* na₄-meš *ša kur ki-na-bi*.

⁶⁷ AhW p. 1392b s. v. *ṭiru*(m) “Prägung”; CAD t 113a s. v. *ṭiru* A (*ṭiru*) (mng uncert.); CDA 415a s. v. *ṭiru*(m) II “impression, stamp”.

⁶⁸ It is not certain. See the comments in POSTGATE 2013, 32, n. 94.

⁵⁷ KAJ 11. For this text see in particular Saporetti 1978-1979, 52.

⁵⁸ KAJ 14 see his new edition in POSTGATE 2013, 32.

⁵⁹ See VEENHOF 1989, 522-523; DERCKSEN 2004, 94-95; POSTGATE 2013, 32, n. 94. It usually appears in the form *ṭi-ri* na₄ *é a-lim*, but sometimes with variants like in KAJ 32: 1-2: % ma-na kù-babbar *ṭi-ir-ru*, na₄ *é a-lim*. See FAIST 2001, 151-153.

⁶⁰ For this institution in the Old Assyrian period, see DERCKSEN 2004, 5-75; 2014, 69.

⁶¹ For the City Hall after the Old Assyrian period see DERCKSEN 2004, 94-95.

The second (M) begins as follows:

⁶⁰2 ma-na kù-babbar ⁶¹na₄ é a-lim

One may wonder to what extent the formulation of the second (M) might not, as a matter of fact, be a short version that should be understood as kù-babbar <ša-ar-pu>.

The parallel with the expression kù-babbar *tí-ri* na₄ é a-lim is interesting. Are the two expressions equivalent, one (with *tí-ri*) specific in the Assyrian language, and the other (with *šarpu*) a translation of the term into the Babylonian language?

If today everyone agrees on considering it to be a kind of certification, this does not settle the fundamental question of whether the metal was actually weighed according to a weighing stone of the *bīt ālim* or not. This leads to the assumption that the *bīt ālim* was an active institution in the Middle Assyrian period, that it was a place where weights were used, and may have been some sort of certification authority in the flow of metals. If we follow the translation proposed by N. Postgate for *tí-ri* na₄ é a-lim, “stamped by the stone of the city hall”, then it is important to emphasise that the notion of weighing is absent in this expression. Nevertheless, we must pointed out again that na₄ “stone” may carry other meanings than “weight” (like for example na₄ in the na₄ kišib, “seal”). As a result, we may assumed that the translation could be “certified by the *bīt ālim* mark”.⁶⁹ The notion of weighing would then become secondary, which would explain the surprising case of KAJ 47 which records an amount of silver as well as an amount of barley, followed by the expression *tí-ri* na₄ é a-lim.⁷⁰

5 minas of silver and 100 emāru (an capacity unit) of barley, *tí-ri* na₄ é a-lim (...).

Although one could assume the scribe made an error, we propose to understand it as “5 mina of silver and 100 emāru of barley, certified by the city hall.” This obviously raises other issues. If the *bīt ālim* was actually a sort of certification authority, does that mean that the loans contracts were established in Aššur? Or was there a *bīt ālim* in all the cities of the kingdom?

Conclusion

Some conclusions can be drawn from these two case studies belonging to two different periods.

The amounts of precious metal and the “weights” of manufactured objects recorded in the texts are not always the results of actual weighing. In the case of the Old Babylonian documentation from Mari,

it is clear that precious metals were weighed for administrative purposes, and the results of weighing were scrupulously recorded with details about the set of weights used, and the office in charge of the weighing, in order to control the circulation and the transformation of metals through the different offices. However, once the objects in precious metal had been manufactured, their “weight” could refer to their actual mass and/or to their nominal value, probably including the manufacturing costs and conforming with symbolic and economic values in a complex network of gift exchange. In the case of the Middle Assyrian documentation, the values of manufactured objects or vessels were usually determined by their “weights”, as in the case of the Old Babylonian documentation, but details of weighing practices are never communicated. Sometimes, the texts from the two periods mention what seems to be a “weight standard”, with the expression *ina* na₄ ša [name of an office, an administrator or a city], “according to the weight of...” but it is actually difficult to know whether it refers to a material weight standard or an “economic metrological standard”, used for the stating of commercial rates.

This kind of expression also appears without the preposition *ina* in loans texts from the Old Babylonian and Old Assyrian periods as well as in administrative texts from the Middle Assyrian period. Our hypothesis is that the quality and the nominal value of amounts of metal, which were lent to persons or given for manufacturing, were checked and certified by an administrative authority depending on the city, where the transaction took place. During the Old Babylonian period, it seems that there was such an authority in each city (in Mari, Karkemiš, Aleppo...). The Middle-Assyrian texts mentions the weight of “the house of the city” (*bīt ālim*), an institution of the city capital Assur. To what extent the local palaces were involved in this process of certification is still an open question.

The use of these two sets of documentation offers an interesting point of comparison and calls for further investigations that shall prove fruitful, undoubtedly. In particular, the issue concerning the “measuring results” vs “administrative practice” can be raised for the Old Babylonian and Middle Assyrian capacity measures, of which there are also several varieties, because the same uncertainty applies: are they “real” or “nominal”? (see POSTGATE 2016).

Abbreviation

ARM IV = G. Dossin, *Correspondance de Šamši-Addu et de ses fils (suite)*. ARM 4, Paris, 1951.

ARM VII = J. Bottéro, *Textes économiques et administratifs*, ARM 7, Paris, 1957.

ARM VIII = G. Boyer, *Textes juridiques*, ARM 8, Paris, 1957.

ARM IX = M. Birot, *Textes administratifs de la salle 5 du palais*, ARM 9, Paris, 1960.

⁶⁹ na₄ being the determinative of stone objects it is part of the composition of the seal's ideogramme na₄-kišib for example.

⁷⁰ KAJ 47 l. 1-3 : 5 ma-na kù-babbar, ù 1 me anše-meš še-um, *tí-ri* na₄ é a-lim. See the new edition in FAIST 2001, 159-162, and the comment of POSTGATE 2013, 32, n. 94.

- ARM X = G. Dossin & A. Finet, *Correspondance féminine*, ARM 10, Paris, 1978.
- ARM XIII = G. Dossin, J. Bottéro, M. Birot, M. L. Burke, J.-R. Kupper & A. Finet, *Textes divers offerts à André PARROT à l'occasion du XXX^e anniversaire de la découverte de Mari*, ARM 13, Paris, 1964.
- ARM XIV = M. Birot, *Lettres de Yaqqim-Addu, gouverneur de Sagarâtum*, ARM 14, Paris, 1974.
- ARM XXI = J.-M. Durand, *Textes administratifs des salles 134 et 160 du palais de Mari*, ARM 21, Paris, 1983.
- ARM XXII = J.-R. Kupper, *Documents administratifs de la salle 135 du palais de Mari*, ARM 22, Paris, 1983.
- ARM XXIII = G. Bardet, F. Joannès, B. Lafont, D. Soubeyran & P. Villard, *Archives administratives de Mari*, ARM 23, Paris, 1984.
- ARM XXV = H. Limet, *Textes administratifs relatifs aux métaux*, ARM 25, Paris, 1986.
- ARM XXVIII = J.-R. Kupper, *Lettres royales du temps de Zimri-Lim*, ARM 28, Paris, 1998.
- ARM XXXII = I. Arkhipov, *Le vocabulaire de la métallurgie et la nomenclature des objets en métal dans les textes de Mari*. Matériaux pour le Dictionnaire de Babylonien de Paris tome 3, ARM 32, Leuven/Paris/Walpole, 2012.
- KAJ = E. Ebeling, *Keilschrifttexte aus Assur Juristischen Inhalts*, Leipzig, 1927.
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Addresses of the authors

Lionel Marti
CNRS - UMR 7192 PROCLAC
Collège de France
11 Place Marcelin Berthelot
75005 Paris
France

lionel.marti@college-de-france.fr

Grégory Chambon
EHES - UMR 8210 ANHIMA
2 rue Vivienne
75002 Paris
France

gregory.chambon@ehess.fr

Weighing silver on the scales. An overview of silver hoards and balance weights during the Middle Bronze Age (ca. 2000-1600 BC) in the Near East

by LUCA PEYRONEL

Middle Bronze Age, Ancient Near East, scale weights, silver bullion

Silver was the main medium of exchange and standard of value in the ancient Near East. Written documents inform that when it passed through hands it was always weighed on a balance. However, texts are less informative regarding practical operations involving such exchange. On the contrary, coherent assemblages of balance weights reveal much about official standards, how widely were they acknowledged within a given territory and how far were different official systems reciprocally interconnected, and they can also offer precious information on the practical weighing operations. A first evaluation of sets of Near Eastern weights and silver hoards from sites dated to the Middle Bronze Age is here presented together with the methodological approach for the analysis of silver bullion elaborated by an interdisciplinary research group of Italian archaeologists, assyriologists and numismatics.

Silber auf der Waage wiegen. Ein Überblick über Silberhorte und Gewichte während der mittleren Bronzezeit (ca. 2000-1600 v. Chr.) im Vorderen Orient

Mittelbronzezeit, Alter Orient, Gewichte, Silberbarren

Silber war im Vorderen Orient das hauptsächliche Austauschmittel und ein Wertmaßstab. Aus den schriftlichen Quellen wissen wir, dass Silber beim Austausch immer gewogen wurde. Die Texte sind weniger informativ, wenn es um die praktischen Vorgänge geht, die hierbei abliefen. Im Gegensatz dazu können kohärente Assemblagen von Gewichten viel zur Frage von offiziellen Standards, ihrer Verbreitung in einem bestimmten Territorium und ihrem reziproken Zusammenspiel mit anderen offiziellen Systemen beitragen. Eine erste Auswertung von vorderasiatischen Gewichtssets und Horten mit Silber aus Fundplätzen der Mittelbronzezeit wird hier zusammen mit der methodologischen Herangehensweise für die Auswertung von Silberbarren präsentiert, die aus einer interdisziplinären Zusammenarbeit von italienischen Archäologen, Assyriologen und Numismatikern hervorgegangen ist.

Introduction

From the mid-3rd millennium BC onwards silver (Sum. *kù-babbar*; Akk. *kaspu*) became a standard of equivalence in the economy according to a system which selected certain specific materials and products, taken as reference for others. In Mesopotamia the system became structured early on with silver and barley used as standards of equivalence for other goods and materials (at the beginning also together with copper); reciprocal values became fixed and remained largely unchanged over time, with a shekel of silver corresponding to one gur of barley (MILANO 2003; POMPONIO 2003; MONACO/POMPONIO 2009). In Syria, according to the evidence from Ebla, instead of barley, wool was used as a standard of value, although silver largely predominated, and a specific series of wool measures was also adopted by the palace administration (BIGA 2011; 2014).

In the absence of explicit, unequivocal indications in the oldest texts, the exact meaning of silver being referred to as the ‘equivalent/corresponding’, ‘value’, or ‘price’ (of purchase) of goods remains uncertain. In terms of financial practice, it is therefore difficult to assess the effective extent of circulation of metals of equivalent value. However it is a matter of fact that in Early Dynastic IIIa-b written economic records of sales of houses, land and slaves, the ‘value’ is expressed in silver (and also in copper and barley). At the end of the 3rd millennium BC (Ur III) written sources unambiguously record the use of silver as a currency that functioned as a means of equivalence, exchange/payment and wealth accumulation (PAOLETTI 2008; MANDER/NOTIZIA 2009), and at the same time the control of weights and measures by the political authority through their standardization and the manufacture of official standards (CHAMBON 2011, 38-40; PEYRONEL 2012a, 23-26).

The process must have started well before, probably already at the time of the urban revolution, and developed through the Early Bronze Age, culminating in a series of normative interventions at the time of the Akkad and Ur III kingdoms. Silver (and gold) circulation in objects (ingots, bowls, bracelets, daggers, rings) of standardized weight was already carefully registered in the economic accounts of Ebla, whatever the modes of their movement (redistributive, gift-giving, ceremonial) (MAIOLCHI 2010), possibly indicating that the process of normative regulations of standard values began earlier in larger territorial entities in the northern regions with respect to the city-states of Early Dynastic Mesopotamia, where balance weights display a greater variability of values (PEYRONEL 2012a, 10-13).

As recent trends in ancient metrology suggest, however, the normative aspect is but a part of the problem. Norms attempt to regulate instances of human behaviour, which do not necessarily con-

form to the theoretical exactness that is inherent in normative systems. In order to address the question of the relationship between practice and institutional norms, as well as the operative modes of silver circulation in the Bronze Age Near East, an interdisciplinary group of Italian archaeologists, numismatics, assyriologists and economists started in 2017 a research project, under the scientific coordination of the Author (‘Silver Circulation in the Ancient Near East’, SCANE; PEYRONEL 2018).

Thus, the occasion of the workshop that marks the beginning of the important multi-year ERC project headed by L. Rahmstorf comes at the right moment to present as a material for discussion an overview on some sets of weights and silver hoards dating to the Middle Bronze Age (hereafter MBA) and a preliminary analysis related to an on-going study carried out together with N. Ialongo and A. Vacca, which attempts to address the relation between hacksilver circulation and weight standards (IALONGO *et al.* 2018a).

The late 3rd-millennium prelude

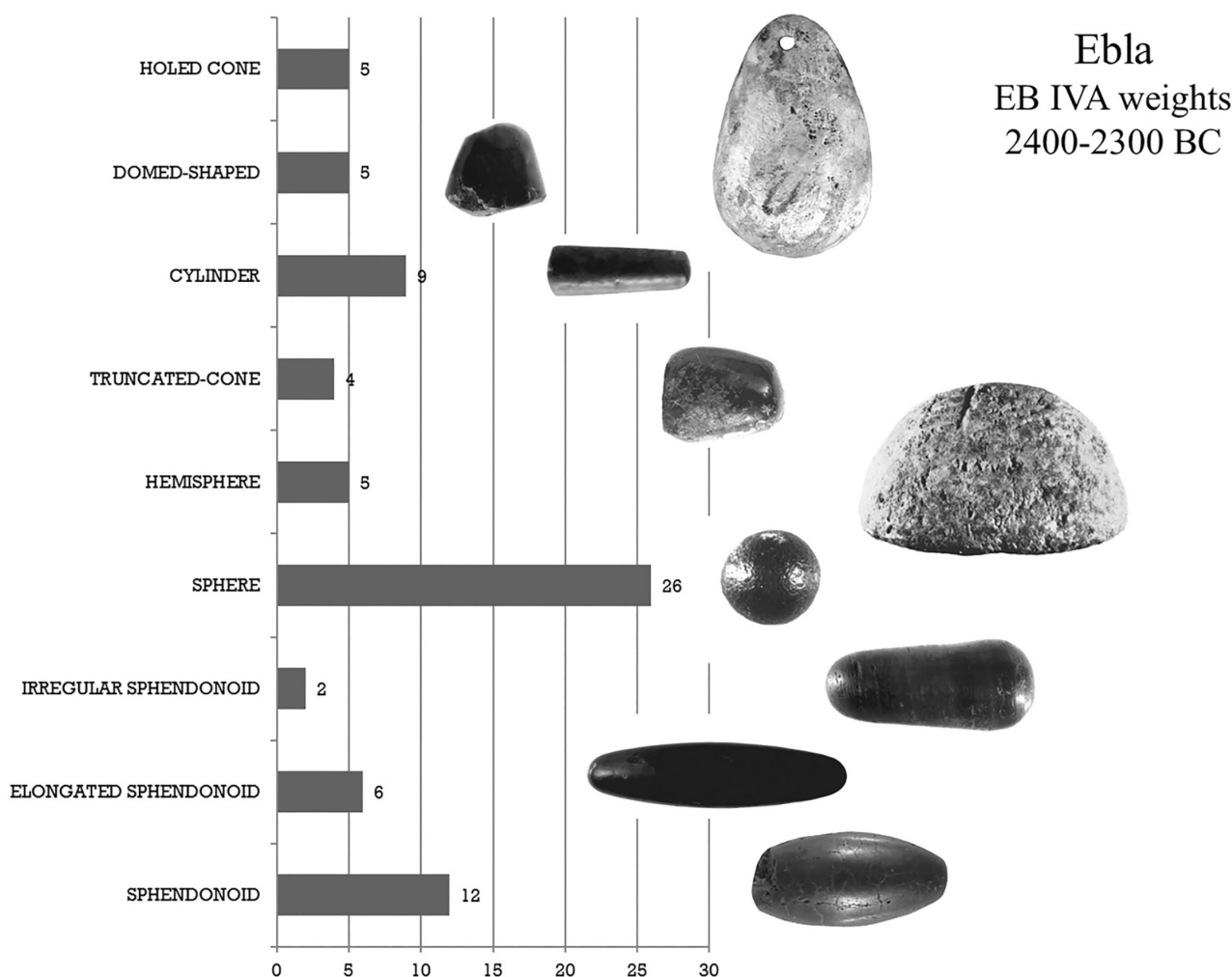
Metrological research usually focuses on reconstructing standard units that operated within a system of established ratios. The general approach often aims to characterize differences and peculiarities between different official systems as well as continuity and changes over time (POWELL 1990; ALBERTI/PARISE 2005). The official acknowledgement of a standard unit by a state administration in fact reflects an attempt to establish political control over an economic system, also provided a tool to negotiate exchange politics at an inter-state level, as reflected in the huge amount of administrative cuneiform documents from the 3rd millennium BC onwards, and was the result of a process that included the quantification and commensuration of different commodity values (RAHMSTORF 2010). The historical and culturally oriented study of ancient metrology should always begin with an archaeological evaluation of the weights, as careful as any other class of artefact, taking into account their intrinsic features, provenance, and context (ALBERTI *et al.* 2006). As a result, this socio-political implication of inter-state exchange translates into the search for recurrent modules in the distribution of weight values in a spatially and chronologically defined set of balance weights, establishing correlation between the exemplars and the units in use of a certain historical metrological system (ASCALONE/PEYRONEL 2006a, 23-49). The most common statistical/mathematical procedure currently adopted for identifying ‘quanta’ related to the theoretical units is the modular or ‘quantal’ approach (the so-called Kendall formula, or cosine quantogram analysis, hereafter CQA), which is specifically tailored for the identification of a norm

(PAKKANEN 2011, with previous references). This statistical method might reliably be used to test proposed standards obtained through empirical evaluation of masses against fixed norms known from texts and marked/inscribed exemplars. Texts in fact attest the principal metrological units in Mesopotamia from the late 26th century BC (Fara texts, POWELL 1990, 510; cf. KREBERNIK 1998) and in Syria from the 24th century BC (Ebla archives, ARCHI 1987). Meanwhile, although some stone objects dated to the 4th and early 3rd millennium could be considered possible scale weights (RAHMSTORF 2014; Hafford in this volume), the first inscribed Mesopotamian royal weight is from the reign of Uruinimgina of Lagash, and the earliest set of proper weights, *i. e.* marked/inscribed exemplars, in Syria in a well-dated context comes from the Royal Palace G of Ebla, both dating to the 24th century BC (PEYRONEL 2012a, 11-13).

The case of Ebla shows the political control as evidenced by metrological reconstruction. Out of 79 Early Bronze Age weights 47 have been retrieved on the floor level of Royal Palace G and 3 in Building P4, a multifunctional public complex to the north of the palace (ASCALONE/PEYRONEL

2006a, 80-121, 179-207). A modular approach to the empirical evaluation of those weights suggests that several systems of unit measure were present in the city. Spherical and ovoidal shapes (more or less elongated and without bases) made from iron oxides (hematite and goethite) predominate, with masses ranging from 1 to 150 g and clustered on values of multiples and sub-multiples of the local unit of 7.8 g (ASCALONE/PEYRONEL 2006a, 82-84, tab. 3.1) (Fig. 1). Some exemplars can be also related to the 9.4 g and 11.7 g units systems, showing that the sub-regional systems related to the Western mina of ca. 470 g were already in use during the Early Bronze Age (hereafter EBA). Moreover a group of small weights, mainly of spherical shape, have masses fitting well with a unit of 6.6 g and its decimal multiple, and a scale set of fractional mina multiples composed of limestone and basalt weights bearing marks of debated metrological interpretation come from a small archive-room opening onto the palace courtyard (PEYRONEL 2014b, 126-128; 2016, 58-61). Some conical limestone weights, pierced atop and carefully worked, always corresponding to a double mina (local or foreign, including the only inscribed EBA Eblaite weight),

▼ Fig. 1. Quantitative distribution of the EB IVA (ca. 2400-2300 BC) scale weight's types from Ebla (© Italian Archaeological Expedition to Ebla).



were associated without doubt with weighing operations related to precious raw materials, and specifically to lapis lazuli, as demonstrated by the presence of a wooden beam found together with a weight of this type and unworked pieces of lapis in a room at the back of the reception room in the Administrative Quarter (PEYRONEL 2011, 110-111; 2016, 60-62) (Fig. 2).

Of paramount importance, the state archives of Ebla give us the possibility to match data recovered from the balance weights with those from the economic and administrative records. The Eblaite system was sexagesimal and different terms were employed to indicate the main metrological values (*e. g.* *ma-na* = 1 mina, *ša-pi* = $\frac{1}{2}$ of a mina or 40 shekels, *TAR* = $\frac{1}{2}$ of a mina or 30 shekels, *gur*₈ = $\frac{1}{3}$ of a mina = 20 shekels, *gin-DIL-MUN* = 1 shekel) and a series of shekel sub-multiples (2-NI, 3-NI, 4-NI, 5-NI, 6-NI, respectively $\frac{2}{3}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$ and $\frac{1}{6}$ of a shekel) (POMPONIO 1980; ARCHI 1987, 67-83; CHAMBON 2011, 58-61).

The complex system of precious metal accumulation and circulation evidenced by the written sources seems to have been based on importing quantities of silver and gold and redistributing manufactured items in standardized masses. An object's weight was carefully recorded by the administration and weighing operations were certainly carried out under the control of the palace bureaucracy, as revealed by the official weight sets found in the Royal Palace (ARCHI 2011; PEYRONEL 2014a, 362-365).

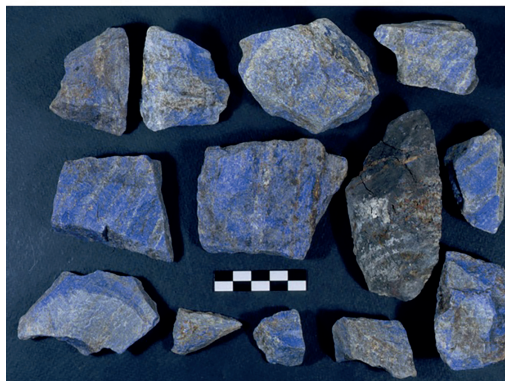
Middle Bronze Age scale weights

The largest variety of groups of weights from individual sites in the ancient Near East are dated to the Middle Bronze Age (*ca.* 2000-1600 BC). They come from some of the major urban centres of Mesopotamia, the Levant, Anatolia and Western Iran, and allow the mensuration systems used at both local and interregional levels to be evaluated. Middle Bronze Age metrology is much better evidenced than in later periods. For the subsequent Late Bronze Age, (*ca.* 1600-1200 BC) few large groups of weights have been published. Two groups stand out: Ras Shamra/Ugarit – more than six hundred scale weights, mostly dating to the 13th century BC (COURTOIS 1990; BORDREUIL 2006), and the Uluburun shipwreck (early 13th century BC) – 103 stone, 38 bronze, and 8 lead exemplars pertaining to different scale sets (PULAK 2000; PAKKANEN 2011). Later periods do not offer significantly better evidence. Our knowledge of 1st millennium metrology – in particular the systems employed by the Neo-Assyrian and Neo-Babylonian empires – is derived from written evidence and a small number of published inscribed or marked weights (see recently PEYRONEL 2015 and FALES 2016 for Assyria). The numerous exemplars discovered at Assur lack reliable contexts and consequently their chronology is uncertain (see, however, ASCALONE/PEYRONEL 2006a, 423-430). The situation in the Northern Levant and Anatolia is even worse, with little published material (*e. g.* Zincirli: ARCHI/KLENGEL-BRANDT 1984), making impossible an in-depth evaluation of the systems used by the Neo-Syrian and Neo-Hittite kingdoms.

Within the variety offered during the Middle Bronze Age, not all evidence is equally valuable, but the corpus is robust. Notwithstanding the hundreds of weights discovered in several large Mesopotamian urban centres (such as Ur, Nippur, Uruk, Shuruppak, Kish, Neribtum, Eshunna, Tutub, see POWELL 1979 and KARWIESE 1990 for a list), exemplars without inscription collected during excavations carried out before World War II are not chronological reliable, with the exception of sets from funerary assemblages. However, new data come from a recent analysis of the Ur and Nippur groups by W. HAFFORD (2005; 2012).

Woolley reported *ca.* 500 weights found at Ur during his excavations and Hafford identified 370 proper weights, 270 kept in the University Museum of Philadelphia and the British Museum and one hundred in Baghdad (HAFFORD 2012; PEYRONEL in press). Moreover, several exemplars – still unpublished – have been found during the renewed American investigation in Area AH (*cf.* STONE/ZIMANSKY 2016, fig. 12, 18, 23).

Most of the material from Woolley's excavations can be dated to the Ur III and Old Babylonian periods, although the contexts are not always reliable or precisely indicated. 255 weights are sphendonoids,



▲► Fig. 2. Conical weight and lapis lazuli from room L.2982 in the Royal Palace G of Ebla (© Italian Archaeological Expedition to Ebla).

with several sub-types (a basic distinction is made between flattened and unflattened types), and 59 are ducks (against 92 reported by Woolley, several of which must therefore be scattered in other institutions and museums: HAFFORD 2012, tab. 2-3). The only other zoomorphic shape is the boar's head (one example: U.1202/116791; HAFFORD 2012, 29-30), although it is probable that small precision weights shaped like frogs and shells are catalogued in the museum's collections as amulets/figurines. One cube of chert noticed by S. RATNAGAR (1981, 186) is a weight imported from the Persian Gulf or more probably from the Indus Valley (Woolley also mentioned in his weight shape chart other two exemplars). Beside sphendonoids and ducks, stele (6), domed (18), and loaf (10) types are also attested.

The materials predominantly used are hematite/goethite (155 exemplars), diorite/gabbro (77 exemplars) and limestone (31 exemplars). A small group of semi-precious stones (chalcedony, banded agate and carnelian) with 18 small weights and 4 specimens of shell complete the inventory (HAFFORD 2012, 31-32).

The Mesopotamian sexagesimal system largely predominates with 244 weights, and HAFFORD's (2012, 32-36) CQA on sphendonoids and duck-shaped weights reveals a quantal base of 8.3. The different units of the local system are specified by a considerable number of marked and inscribed weights (*ca.* 50 according to Woolley and 32 analyzed by Hafford), including the Neo-Sumerian series with royal inscriptions guaranteeing the established value (PEYRONEL 2012a, 17-24, tab. 1 no. 1-2, 4, 6, 8-11), while other inscriptions are always very short, expressing the unit (shekel or mina), and/or the owner's name (HAFFORD 2012, 40-43, tab. 7). Metrological signs comprise parallel lines, strokes, grooves, sometimes associated with a winkelhaken, crossed incisions and dots (indicating the numeral ten). Most of the weights bear an indication of the Mesopotamian unit, but some exemplars have marks which could be considered indications of equivalence with foreign units (in particular the Levantine unit of *ca.* 9.4 g). A unique specimen (U.18778C, mass 314.3 g) could be associated with the western mina of *ca.* 470 g, bearing the inscription '2/3 ma-na'. It was found together with inscribed weights (1/6, 1/3, 2 and 5 minas) clearly belonging to the Mesopotamian system and therefore may be part of the same set as a 'foreign' exemplar (HAFFORD 2012, 42).

Taking into account the masses, the presence of western standards ('Syrian' and 'Levantine' units, *ca.* 7.8 and 9.4 g) occurs at Ur with *ca.* 60 weights, although the distinction between the shekels of 7.8 g and 8.4 g is problematic as rightly pointed out by HAFFORD (2012, 37-39, fig. 8). However, the fact that eight exemplars of 7.6-8.0 g possibly correspond to one 'Syrian' shekel, while no units between 8.8 and 11.3 g are documented, strongly suggests knowledge of that standard (PEYRONEL

in press; *contra* HAFFORD 2012, 43). Moreover, the CQA carried out on unbroken specimens confirms the empirical evaluation, revealing peaks at 7.7 and 8.3 and significant quanta in the range of 9.4 (IALONGO *et al.* 2018a, 26-27, tab. 1, fig. 3-4).

It is thus very probable that people involved in economic affairs and long-distance exchange at Ur may have possessed Syrian and Levantine scale-sets, as also suggested by some weights from funerary assemblages at the site (PEYRONEL 2000; in press). The presence of the decimal system of the Indus Valley, besides the unique cubical weight, is doubtful (only four weights), as are the standards of *ca.* 6.6 g and 11.7 g.

Hundreds of balance pan weights were discovered at Nippur, the holy city of the Sumerian chief-god Enlil, and those kept in the university museums of Philadelphia and Chicago have been studied by HAFFORD (2005). Unfortunately, most of the 261 exemplars included in the analysis lack precise contexts, and the long-lasting chronological sequence of the site prevents a reliable chronological attribution, with the exception of the specimens found after World War II.

The main shapes and materials are the same as in the Ur set, with a predominance of sphendonoids (163) and ducks (23) in hematite/goethite (85 % of Hafford's 126 precision weights). Limestone, diorite/gabbro and agate/carnelian exemplars also occur and two hematite boar's head weights testify to the diffusion of this rare type in Mesopotamia (HAFFORD 2005, 352, fig. 4). According to the CQA applied to unbroken precision weights, the Mesopotamian unit with its common fractional and multiple values is almost exclusive at Nippur, although some minor differences in the limits of the unit can be recognized by type (HAFFORD 2005, 354-358, tab. 2, fig. 7). However some pieces have masses that might be indicative of the Western mensuration sub-systems of *ca.* 7.8 g and 9.4 g (HAFFORD 2005, 361, tab. 3, fig. 9) and a CQA conducted on complete specimens shows marked quanta peaks at 7.9 and 8.3 (IALONGO *et al.* 2018a, 26-27, tab. 1, fig. 3-4).

Compared with Ur, the number of inscribed/ marked weights (19 specimens) is quite low: 12 unbroken weights are certainly related to the Mesopotamian system, and only two have masses and metrological indications compatible with the Syrian system (a pebble weight of 78.4 g marked with ten strokes, and a hematite sphendonoid of 79.1 g inscribed 'ten shekels').

The impressive collection of weights found at Susa in Khuzestan and kept in the Louvre Museum, with *ca.* 600 exemplars retrieved during de Morgan's and de Mecquenem's excavations, is the only evidence available for reconstructing Elamite metrology (SOUTZO 1911; BELAIEV 1934). With the exception of several sets from burials and tombs dating to the late 3rd millennium and the end of the Middle Elamite period, the other exemplars cannot

be assigned to archaeological contexts. However, 245 specimens selected by Ascalone/Peyronel from Belaiew's catalogue are seemingly related to funerary assemblages spanning from 2100 to 1550/1500 BC (Ur III, Simashki or Sukkalmakh periods) and their analysis allows a definition of the weight system/s adopted during the MBA in Western Iran (ASCALONE/PEYRONEL 1999; BASELLO/ASCALONE 2018, 708-712; PEYRONEL in press).

The group basically conforms with the Mesopotamian tradition, following shapes, materials and the metrological standard used in the alluvial plain. Notwithstanding this, some differences reflect a local Elamite re-elaboration, for instance the use of bitumen compound, widely adopted also for the manufacture of cylinder-seals, objects and containers, which is not attested elsewhere (CONNAN/DESCHESNE 1996, 269-273, no. 248-256). Taking into account Belaiew's sample, the predominance of hematite/goethite is outstanding with 179 weights (73 %), but Soutzo and Belaiew's rather vague classification of materials needs to be accurately verified, especially in order to distinguish between limestone, diorite, basalt and bitumen compound (PEYRONEL in press). According to Belaiew diorite is very rare, while Soutzo's catalogue reports this material in 29 cases (10 inscribed duck-shaped weights, 5 marked sphendonoids and 9 ducks and sphendonoids): since diorite is an imported material, while bitumen compound is manufactured locally, it is important establish a petro-mineralogical classification of the Susian weights, still not available. Some small weights attest the use of semi-precious stones (agate/carnelian), showing again a situation very similar to the Mesopotamian sets of Ur and Nippur.

The sphendonoid is attested in several sub-types (flattened, without base, with cut or elongated edges) and is the most common type, constituting 58 % of the MBA group (142 exemplars), followed by the duck-shape with 27 exemplars (17 in hematite). Other zoomorphic shapes are adopted for rare small precision weights: frog (2), insect (4), shell (2), and lion (1) (ASCALONE/PEYRONEL 2006a, 457-458, tab. 8.43). One cube-shaped weight of 26.5 g (AMIET 1986, 143, fig. 93) is certainly related to the Indus Valley tradition (2 units of 13.25 g) and might have been imported from a Harappan centre or from the Persian Gulf.

At Susa (ASCALONE/PEYRONEL 1999, 366-367, tab. 5), the standard of 8.3-8.4 g is the system most used during the MBA, with 133 specimens out of 245 weights (53.6 %, with the percentage rising to *ca.* 60 % if all of Belaiew's corpus is considered). The shekel and the double shekel are present with 22 (between 8.1 and 8.6 g) and 16 exemplars (between 16.2 and 17.1 g), and $\frac{2}{3}$ (17 specimens), $\frac{1}{2}$ (12 specimens), and $\frac{1}{3}$ (11 specimens) shekels are the most common fractions, revealing a homogeneous frequency distribution of multiples and sub-multiples of the Mesopotamian unit. Inscribed/marked weights (62 specimens published

by Soutzo and Belaiew in their catalogues) confirm the predominance of the Mesopotamian system (from the EBA to the Iron Age) at Susa, as well as the use of the same kind of metrological notations and short inscriptions attested in Mesopotamia, although no weights with royal inscriptions have been found in Elam (PEYRONEL in press).

Interestingly, at Susa the Syrian and Levantine base units also seem to be documented by quite a large number of weights (respectively 55 and 32 weights; ASCALONE/PEYRONEL 1999, tab. 6). It is noteworthy that the Syrian system may be represented by 55 exemplars, which have masses compatible with fractions ($\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$) and multiples (2, 3, 4, 10, 20) of the 7.8 g shekel (documented by 7 weights), showing a situation quite different from the contemporary Mesopotamian sites, where the Syrian unit is represented by small numbers of pieces.

Moreover – and this is another striking difference from the groups of weights from Ur and Nippur – 17 weights could be assigned to the Harappan system on the basis of their masses, but these are 'Mesopotamian' in shape and materials (ASCALONE/PEYRONEL 1999, 367, tab. 6). However, it should be noted that these weights represent mostly fractions or multiples of the Harappan unit and the unit or double unit – which are the most frequent weights documented in the Indus Valley settlements – are attested only by two weights, one of which is the imported cubical weight already mentioned. Unlike Belaiew, who recognized in his catalogue a large number of 'Harappan' weights, HEMMY (1938) denied any metrological connection between Elam and the Indus Valley, pointing to the fact that many of the masses can be also explained as values referring to other systems. In my opinion it seems reasonable that the Harappan system was known at Susa, given the intense cultural and commercial interactions with the Indus and the Gulf regions; the manufacture of weights related to a foreign system, but following the local traditions of shape and material, is quite common in the Near East.

According to the available evidence – but the lack of any documentation from other Elamite sites, and from Tal-i Malyan/Anshan in primis, must be underlined – the local system used at Susa during the late Early and Middle Bronze Age was the Mesopotamian one, while the presence of some weights possibly related to the 'western' units and the Indus Valley/Dilmun system can be explained by the city's strategic position at the junction of various trade routes linking the Mesopotamian lowlands, the Persian Gulf and the Iranian plateau.

In Northern Levant it is Ebla, where two hundred weights were discovered in different buildings (palaces, temples, defensive buildings, houses), that gives a detailed picture of metrology during the Middle Bronze Age (ASCALONE/PEYRONEL 2006a, 125-178, 209-247). More than half of these finds come from primary contexts and their distribution shows widespread weighing activities, both

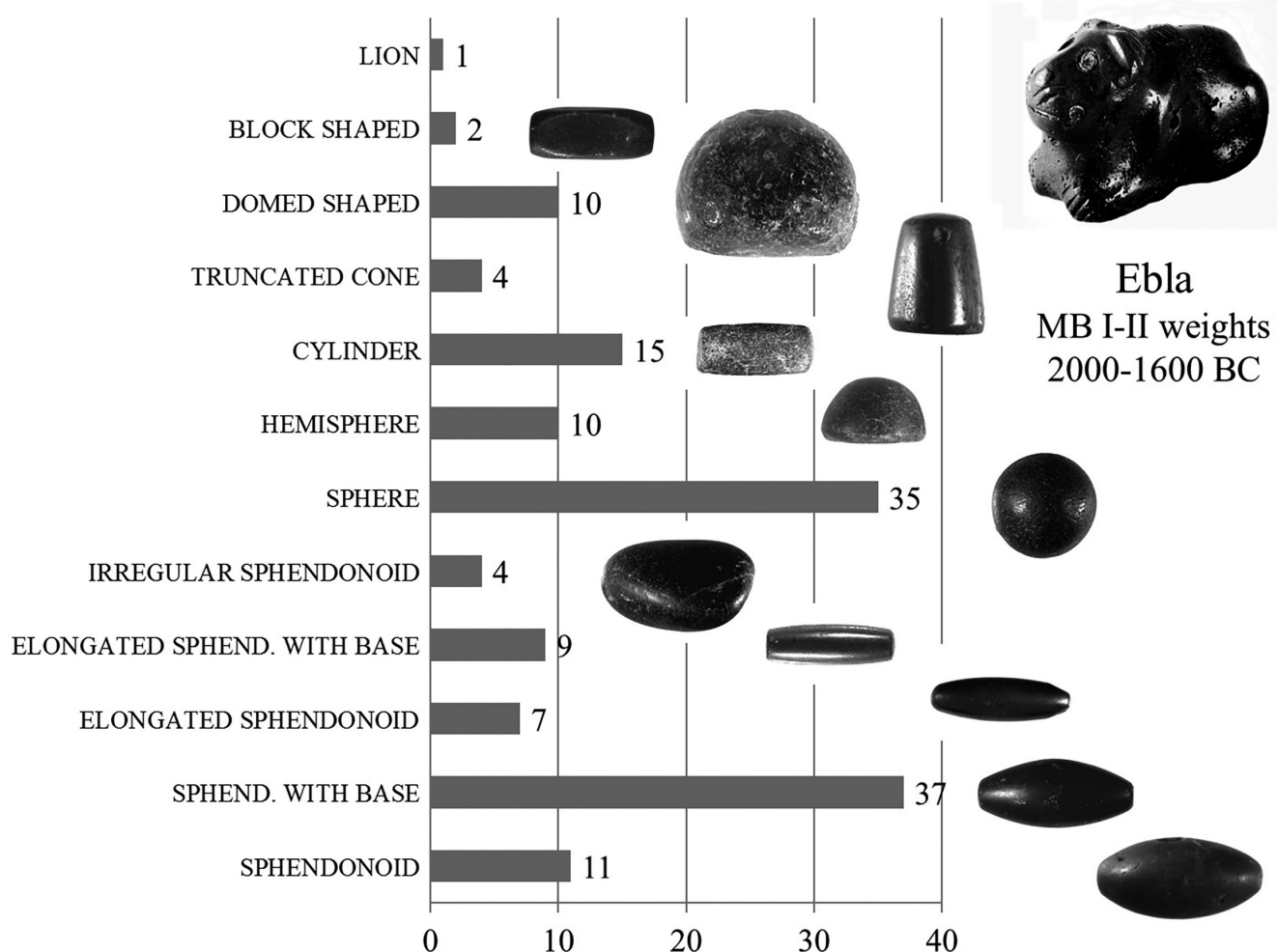
in official buildings and private households, and some specimens associated with cultic buildings also suggest the ideological value of metrological practice (ASCALONE/PEYRONEL 2001; 2006b). The sphendonoid – usually with a flattened long side and cut edges – was the most frequent type, followed by spherical and domed weights, whereas surprisingly the duck shape so common in Mesopotamia is not attested in the Eblaite Middle Bronze corpus (Fig. 3). A striking agate weight found in a building next to the Temple of the Rock cultic area dates to the end of the 3rd millennium BC and was probably imported from a Mesopotamian centre (ASCALONE/PEYRONEL 2011) (Fig. 4). The only other zoomorphic weight is lion shaped and corresponds to a double western mina. It was found in the Western Palace – probably the Crown Prince's residence – and has been interpreted as a unique 'royal' weight (MAZZONI 1980) (Fig. 5).

As a consequence of the new interregional economic and political relations established in the Amorite period, involving trade with southern Mesopotamia on the one hand and with Northern Mesopotamia and Cappadocia on the other, the most striking change between the metrology of the EBA and MBA is the spread of the Mesopotami-

an system in the latter period at Ebla. The shekel of *ca.* 8.4 g and its multiples and sub-multiples are well represented, with a number of attestations similar to the local system based on a shekel of *ca.* 7.8 g (respectively 37 and 29 exemplars), although the two systems partially overlap in the lower values taking into account an accuracy threshold of $\pm 5\%$ (ASCALONE/PEYRONEL 2006a, 142-152). It seems that the other common sub-multiples of the western mina (the Levantine shekel of 9.4 g and the Anatolian one of *ca.* 11.7 g) were also used (ASCALONE/PEYRONEL 2006a, 152-159). It is interesting to note that the only MBA Eblaite marked weights are two small exemplars both weighing 5.9 g (one bearing a single straight groove and the other with two oblique incisions), corresponding to half a unit of 11.8 g. Together with other 18 specimens which can be ascribed to the Anatolian system, they point to direct relations with the northern region (PEYRONEL 2017, 206, fig. 13).

Another notable group of weights (33 specimens) is related to a unit of *ca.* 6.6 g with its binary and decimal multiples (ASCALONE/PEYRONEL 2006a, 160-164). The widespread diffusion of this 'international' unit in the Near East and its relation with the Aegean system on one side and with a spe-

▼ Fig. 3. Quantitative distribution of the MB I-II (*ca.* 2000-1600 BC) scale weight's types from Ebla (© Italian Archaeological Expedition to Ebla).



cific metrological system created to weigh wool and textiles on the other side has been suggested especially by C. ZACCAGNINI (2000; 1999-2001). The presence of the unit during the MBA in the Levant and Anatolia seems indisputable (*e. g.* at Kültepe, see *infra*), while it is rarely attested in Mesopotamia and the East, thus reinforcing the possibility of an 'Aegean' connection developed during the MBA after its first, independent establishment in Syria and Mesopotamia during the 3rd millennium BC.

The CQA shows a breakdown of quanta confirming the presence of different units, with four

high values (6.8, 7.4, 8.3 and 9.1), which can be assigned to known theoretical shekels (IALONGO *et al.* 2018a, tab. 1, fig. 3).

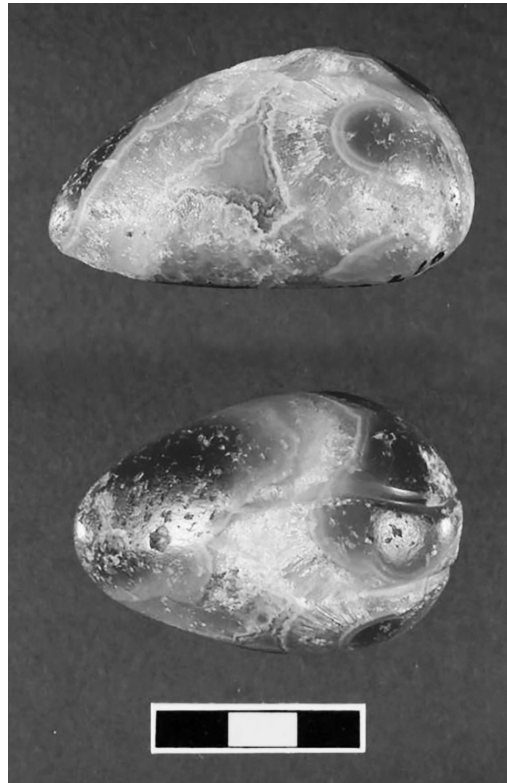
The epigraphic documentation from Mari is very informative especially on the different weighing procedures, weight qualification, and the craft and economic activities involving weight specifications (JOANNÈS 1989; CHAMBON 2006; ARKHIPOV 2012; Chambon and Marti in this volume), but since very few MB weights from the site have been published a comprehensive evaluation of the metrology of the kingdom is not possible (ASCALONE/PEYRONEL 2006a, 354-356).

Another MBA set of weights from the region comes from Alalakh, with ten weights dated to Level VII (6 from the Palace of Yarim-Lim) (ARNAUD 1967; ASCALONE/PEYRONEL 2006a, 356-363). Similarly to Ebla, a variety of systems – with the predominance of 7.8 g and 9.4 g units together with the Mesopotamian shekel of 8.4 g – appear to have been employed at the site.

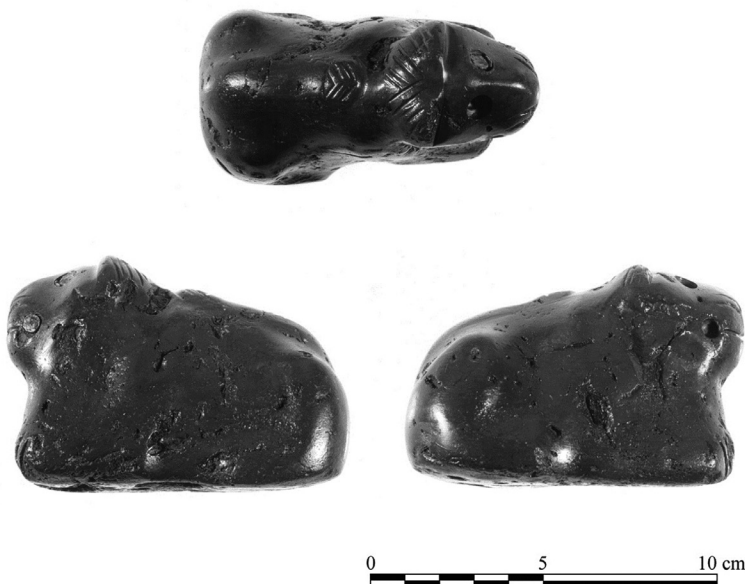
In Anatolia, the largest group of balance pan weights of this period comes from the Lower Town of Kültepe, where the weights have been found scattered in the houses and workshops of *kārum* level Ia-b and II and in funerary assemblages in burials. These are clear evidence of the business and craft activities carried out by Assyrians and Anatolians in Cappadocia, and also reflect the wider geographic horizon of the long-distance direct trade conducted by Assyrian merchants.

An updated catalogue of Kültepe balance weights found during the Turkish excavations has been recently published (KULAKOĞLU 2017), giving complete information on the masses and measurements of 168 exemplars, as well as information on their discovery contexts. A fresh evaluation is therefore possible, integrating previous analyses (ÖZGÜÇ 1986, 77-81; DERCKSEN 1996, 80-89, 251-253, app. 5; 2016; ZACCAGNINI 2000; ASCALONE/PEYRONEL 2006a, 410-422), which reported an expected predominance of Mesopotamian weights, but also the presence of Syrian and Levantine exemplars and a puzzling low number of specimens based on Anatolian units. Old Assyrian merchant's documents relate that beside the system pertaining to their motherland, testified by the use of private weight-stones and official exemplars (property of the 'house of the *kārum*', which was the office of the colony, and of the 'house of the City' of Assur) and widely used to regulate transactions from and to Northern Mesopotamia, another system was also employed ('the weight of the land'). The local unit is only mentioned in a dozen transactions involving copper-trading activities in the Anatolian circuit (DERCKSEN 1996, 86-88; 2016, 15-17; PEYRONEL 2017, 206-207). While the former is evidently the Mesopotamian sexagesimal system, the latter might be an indigenous standard presumably established by the palace of Kanesh and adopted by the local people/institutions, as also suggested by ref-

► Fig. 4. Duck weight in agate from Area HH at Ebla (© Italian Archaeological Expedition to Ebla).



▼ Fig. 5. Lion weight in hematite from the Western Palace of Ebla (© Italian Archaeological Expedition to Ebla).



erences to weights of the towns of Durhumit, Tuhpiya and Purushhattum (DERCKSEN 2016, 15). On the basis of some documents in which quantities of metals and wool are expressed in both the standards, it has been suggested that the absolute value of the local mina was *ca.* 10 % less than the Assyrian one. The latter being *ca.* 500 g, the weight of the local mina would thus have been *ca.* 450 g (with a $\frac{1}{40}$ sub-multiple of 11.25 g). If this is the case, the local mina was 20 g less than the 'Western mina' of *ca.* 470 g, widely attested since the mid-3rd millennium, and the shekel unit *ca.* 0.5 g less than the 'Anatolian' unit of *ca.* 11.7 g. However, the lack of exemplars related to a unit of between 11.2 and 11.7 g is puzzling and no satisfactory explanation has been proposed. In contrast, 'foreign' systems seem to be documented by dozens of weights, indicating that the Assyrian merchants were well aware of these metrological interactions and were equipped to check goods coming from the Levant. It is interesting to note that 17 weights have masses that fit well with the 'Syrian' system (7.8 g unit), making this system the most attested at Kanesh after the Mesopotamian one. A unit of *ca.* 6.1-6.6 g (mean value 6.44 g) and its decimal multiple are also widely attested, with 16 exemplars indicating a system well known at Kültepe and revealing metrological interactions with Western Anatolia and the Aegean. The unit is also clearly indicated by a sphendonoid of 24.6 g, bearing four dots ($\div 4 = 6.15$ g) and thus indicating that the exemplar is a 4x multiple of that system, corresponding also to 3 Mesopotamian shekels of 8.25 g (KULAKOĞLU 2017, 345-346).

Statistical analysis of Kültepe data with CQA confirms the picture, with four high values (6.9, 7.5, 8.2 and 9.0), which can be assigned to known theoretical shekels (IALONGO *et al.* 2018a, 26-27, tab. 1, fig. 3-4).

The commercial system highlighted by the weights worked basically through the exportation of tin and textiles from Assyria and the importation of precious metals (silver and gold), and was also accompanied an inner Anatolian circuit involving wool and copper (DERCKSEN 1996). Cappadocian trade is thus well known and widely discussed, especially in relation to the lively debate revolving around the role of private business and economic assets in ancient Mesopotamia. It is undeniable that the Kültepe texts show that silver and gold represented for the Assyrian merchants both their 'profit' and the 'capital' that was re-invested in Assur, although we should always take into account that we lack the documentation from the capital as well as the documents produced and kept by the official institutions.

Silver was therefore the pillar of the system from the Assyrian perspective and its circulation was regulated by a careful recording of its weight according to the Mesopotamian standard (DERCKSEN 2005, 21-24; VEENHOF 2014). The metal

circulated in ingots of various shapes, rings/coils, lumps and scraps and its quality was also indicated by terms such as 'fine' (*dammūqum*) and 'refined' (*šarrupum*), although the difference between the two types may not be understood from the texts, and 'checked' (*ammurum*), the latter perhaps meaning a quantity of sealed/checked or verified silver. The metal obtained by selling tin and textiles was re-melted and refined at Kanesh (with a mean loss of *ca.* 4 %) and again at Assur; additional evidence comes from several metal workshops excavated in Kültepe Lower Town, with a wide range of working facilities and implements, including a large number of stone moulds (LEHNER 2014).

The most informative direct evidence of weights and silver from a single closed context is the so-called 'goldsmith's hoard' found in the Ebabbar of Larsa, buried under a room joined to courtyard I of the temple complex of the sun-god (ARNAUD *et al.* 1979; see also BJORKMAN 1993; HUOT 1995). The hoard was hidden at a time pre-dating the raid against the town by Babylon in 1738 BC, and contained 67 balance weights (including the item considered a touchstone by ARNAUD *et al.* 1979), administrative/economic instruments other than weights (one inscribed hematite seal, 18 sealings with cylinder seal impression and one small cuneiform tablet), semiprecious stone beads and faience micro-beads, some precious gold and silver ornaments (medallions and earrings), silver bullion (with fragments, small lumps, sheets and broken pieces of ornaments, but no rings/coils or ingots), and craftworking tools (an anvil and three probable bronze design-blocks, according to the hypothesis of BJORKMAN 1993, 10-13).

Ilshu-Ibinishu, possibly a temple goldsmith, has been proposed as the hoard owner, since his name is written on the seal legend (ARNAUD *et al.* 1979; HUOT 1995), although this attribution is questionable, and other officials that sealed the small *cretulae* found inside the jar – Sin-uselli, a high official responsible for weighing operations in the Egina (a weights bureau, according to ARNAUD *et al.* 1979) of Ur, Bēlānum and Ishtar-ilum, priests of Shamash, and the head of the stone-cutters (name missing) – are also good candidates (especially Sin-uselli).

13 sealings bearing short cuneiform inscriptions with weights indicated in shekels (from $\frac{1}{3}$ to 20 verified shekels) testify in fact to metrological operations carried out by Sin-uselli, who sealed all of these. Moreover, on the small tablet the total amount is given ($\frac{1}{2}$ mina, 4 shekels and $\frac{1}{2}$ shekel), precisely the sum of the weights recorded on the sealings. It is very probable that the total weight written on the tablet indicates the jar's precious metal contents (that would therefore have been *ca.* 285 g), with the 13 sealings recording the different metrological 'operations', thus suggesting that it contained several quantities collected together in the weights bureau (ASCALONE/PEYRONEL

2006a, 451-455; PEYRONEL 2010, 932-933). It must be underlined that a further 5 *cretulae* with cylinder seal impressions were found in the hoard: they do not bear any numerical indications and possibly refer to bundles of items grouped inside the jar (the weights?).

A recent re-analysis of the written documents from the hoard in an enquiry into the functions of Mesopotamian temples by D. CHARPIN (2017, 86-99) argued that the Egina in which Šin-uselli performed his official activity as assayer was the ceremonial name of the temple of Kittum of Ur, and not a simple weights bureau. This interpretation is very convincing, since Šin-uselli (likely the same official of the Larsa hoard sealings) is said to be an official of the Kittum's house in a document of the dossier of Shep-Šin, chief of the Larsa merchants (STOL 1982, 150-151). Kittum was a god/goddess said to be Shamash's son/daughter, representing divine justice and worshipped in a temple/shrine attested at Ur, as well as in other towns (KLEIN 2001). According to FÖLDI (2014, 102-109) the *bit Kittim* was rather an office working under divine protection and not a sacred building. Whatever the case, several administrative documents seem to indicate that inside the 'house' of Kittum a verified set of weights was kept, silver was weighed and sealed in bags certifying its quantity. A small tablet kept in the British Museum bearing only three lines with the Sumerian text 'one mina, weights of Shamash, Egina', could have been a model for official weight inscription, adding a further interesting piece of evidence about the relation between the great sanctuary of Shamash and the shrine/chapel (?) of Kittum (STOL 1999; CHARPIN 2017, 97-99, fig. 3.6).

The 67 balance weights in the Larsa hoard are all without marks or metrological inscriptions (11 agate, 53 hematite and 3 shell; 38 sphendonoids and 25 ducks, plus 2 shell-shaped, one frog and one boar's head) and do not include different coherent balance sets, on the basis of their fractions or multiples, shapes or material (ASCALONE/PEYRONEL 2006a, 455-464). 48 weights (71.6 %) can be easily related to the Mesopotamian system (with fractions of $\frac{1}{9}$, $\frac{1}{8}$, $\frac{1}{5}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$ and multiples of 2, 3, 5, 10, 20, with 3 exemplars of one shekel), and two small groups of weights could be linked to Western standards (7 to the 7.8 g unit and 11 to the 9.4 g unit) possibly used to check material coming from the Levant (ASCALONE/PEYRONEL 2006a, tab. 8.44-49). The Syrian group is constituted of a set of $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$ and $\frac{2}{3}$ (2 specimens) shekel (mean value 7.6 g) and it seems quite coherent with the agate and hematite ducks (from $\frac{1}{8}$ to $\frac{1}{3}$), a shell-shaped and a sphendonoid weight. The Levantine set cannot be referred to a clear series, including ducks and sphendonoids in agate and hematite, and frog-shaped weights related to $\frac{1}{6}$ (2 exemplars), $\frac{1}{3}$ (2), $\frac{1}{2}$ (4), $\frac{2}{3}$ (2) and 2 units (mean value 9.2 g).

The CQA analysis gives a peak at 8.3, but the results are probably altered by the unusually high number of $\frac{2}{3}$ shekel weights (ca. 5.6 g), and it does not confirm the presence of western units (IALONGO *et al.* 2018a, 26-27, tab. 1, fig. 3-4).

The co-occurrence of weights, sealings and silver in the Larsa hoard is an extraordinary archaeological indication of silver circulation under the control of the Mesopotamian administration during the Old Babylonian period. Notwithstanding the presence of several silver hoards in the Near East from the 3rd millennium BC to the Achaemenid period, the role of silver in the embedded economies of the ancient Near East – widely discussed on the basis of the written sources (see e. g. VAN DER SPEK *et al.* 2018) – has been surprisingly neglected in recent years by archaeologists.

Silver hoards during the Middle Bronze Age

Silver makes its first appearance in the Near East in the 4th millennium BC when the technology of cupellation allowed the extraction of the metal from silver-lead ore. It has been rightly observed that the great increase in quantity of the metal in Mesopotamia during the Late Uruk and Early Dynastic period would be connected with the economic functions silver acquired as the standard of equivalence and means of wealth accumulation (HELWING 2014). The sign KU₃ in the archaic Uruk texts (Eanna IVa and III) resembles half a ring and indicates (among other meanings) the noun 'shining/precious metal'. Therefore a pictogram for silver might be found in the first written sources of the 4th millennium BC, and it has been suggested that its shape derived from the silver ring that was one of the main forms in which the metal circulated from the 3rd millennium onwards (KRISPJIN 2016).

The prominent role of silver in Near Eastern economies also left a meaningful echo in the literary production: the Sumerian poem 'Silver and Copper', which is a so-called 'debate poem' composed at the beginning of the 2nd millennium BC, exhibits the complementary practical and 'cultural' functions of the two metals through the rhetorical fiction of a dispute between them that emphasizes their complementary spheres of use (VANSTIPHOUT 1990; 1992). Unfortunately the poem's end is lost, making impossible to know several crucial passages as well as the final solution of the dispute, although the importance of these metals – which were considered materials characteristic of cultural life and urban society – is nevertheless clear.

In the very fragmentary segments A-B silver's shape is said to be 'in small pieces', alluding to fragmented ingots and scrap silver, put into reed boxes, and among silver's achievements making lead shine is mentioned. A reference to silver's value is made

in segments E-F, where a one-shekel piece of silver is equated to 3-4 minas (of copper?) and 10-shekel silver pieces are also mentioned. The following two passages from segment D are particularly interesting since they reveal how silver was perceived in the Mesopotamian world:

18-23: Copper says: ... Men caulk tiny, very strong boxes for you, as they do a boat. They cover you over with their oldest rags, and someone digs a hole for you in the middle of the cattle-pen. Or they pour clay on top of you, as on a jar with a sealed mouth, and then, in the darkest place inside the house, someone buries you in the most obscure corner of a grave.

38-46: Silver, you are forgotten in the soil inside the house. A scared mouse in a silent house, -- Silver, the palace is not your station! An obscure place, a grave, such is your station. Silver, banquets are not your assigned task -- fasting is your assigned task. Silver, to make lead shine (?) is not an important achievement. The task of making divine statues is not likely to fall within your capabilities. Why do you keep attacking me like a dog? You snake, get back in the darkest part of the house and lie down in your grave!

(translation from the Electronic Text Corpus of Sumerian Literature: <http://etcsl.orinst.ox.ac.uk/section5/tr536.htm>).

Thus, first of all silver is characterized by its primary function of wealth accumulation and the way in which it was kept is clearly stated: 'in the soil inside the house,' that is buried under the floor, in 'an obscure place, a grave,' the poem says. The description of the hidden silver hoard is very precise and also the use of sealing is mentioned. Silver's task is 'fasting' (as opposed to 'banqueting' for copper), that means that it was basically perceived more as having 'value' in relation to its weight than as a precious metal to be transformed into finished objects.

However, it is clear that this was not the only use of silver and the simplification serves the purpose of the poem. From the Early Bronze Age onwards silver is in fact attested in the form of finished objects of various types, including standardized vessels, as well as metal made into more or less regular shapes to be exchanged and/or transformed later into finished items, and scraps of metal to be recycled and/or exchanged. These silver items are also mentioned in economic and administrative documents, making it possible to compare archaeological and epigraphic data. Of course, the distinction between these categories is not always easy, as in the case of coils and rings. I do not here develop an answer to this question, which has been discussed by several scholars, especially taking into account the written sources of the late 3rd and 2nd millennium BC (PAOLETTI 2008, 150-152 with references), but far less so the archaeological evidence (PEYRONEL 2010, 933-934; 2014a, 367-368). I would like only to remark that silver rings/coils are mostly found

hoarded together with other silver items (ingots of various shapes, pieces of scrap) and therefore might be studied as single items *and* together with the other silver material forming the hacksilver bullion. The large number of silver rings/coils kept in the Oriental Institute of Chicago and preliminarily published by M. A. POWELL (1978, app.) was considered a direct link with the objects called *ĪAR/šewirum* in the Ur III and Old Babylonian texts, suggesting their use as 'ring-money' in the Mesopotamian economies. They were purchased all together by H. Frankfort in Baghdad in 1930 and are only alleged to have come from the Diyala region, specifically from Khafaja/Tutub. Consisting of items without decoration and with the edges twisted, beaten off or cut, with masses ranging from 0.55 g to 75.4 g (beside three exceptional coils of 241 g, 470 g, 492.5 g), they seem quite different from rings and coils found in archaeological contexts. Moreover, their weights do not fit well with the epigraphic evidence mentioning the *šewirum*, whose standardized manufacture shows a predominance of 5-shekel pieces.

The fact is that, in order to obtain a well founded reconstruction of silver circulation during the Bronze Age, we need a carefully oriented enquiry, choosing first of all dated contexts which offer the lowest risk of interpretative mistakes and at the same time give the largest amount of information on silver use. The only contexts in which we find together different kinds of silver items are hoards or 'treasures', usually buried or hidden under floors. After a first reconnaissance of the available published data regarding Bronze Age silver hoards (PEYRONEL 2010), I have proposed a distinction between (a) hoards with only silver items (perhaps with a few gold objects, and with further subdivisions if the metal was kept in a perishable bag or a ceramic container, and if impressed bullae sealed the hoard), (b) hoards with silver items included among various items, together with other precious materials and objects, and (c) hoards with silver, precious materials and craft objects or administrative economic tools (sealings, balance weights, metalworking or seal-cutting implements).

As far as I know, 35 Bronze Age silver hoards from the Near East have been reported in publications, and type (a) with only silver items (25 hoards) have been found mainly hidden under the floors of private dwellings (EBA: Khafaja, Taya, Chuera; MBA: Acemhöyük, Ebla, Terqa, Shiloh, Megiddo, Gezer; LBA: Ugarit, el-Qitar, Munbaqat, Ajjul, Shechem, Beth Shean), while the mixed caches and hoards containing silver together with administrative/economic tools (b-c) may be related either to domestic or public buildings (temples and palaces) (PEYRONEL 2010, fig. 1; ESHEL *et al.* 2018, 220, tab. 1). Silver hoards of Middle Bronze Age date come from Ebla (PEYRONEL 2010, 930, fig. 3-8; 2012b, 480, fig. 6; IALONGO *et al.* 2018a), Terqa (ROUAULT 2001, 10,

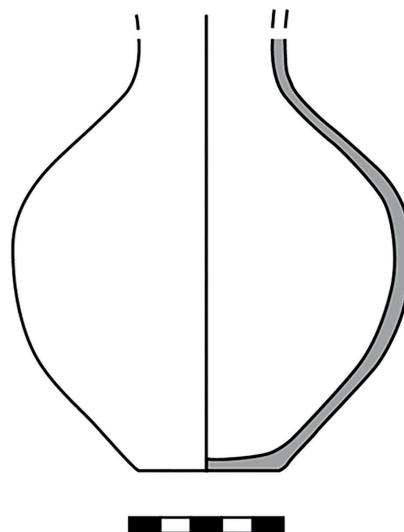
fig. 9), Kültepe (GATES 1997, 257), Acemhöyük (ÖZGÜÇ 1995; ÖZTAN 1997), Larsa (ARNAUD *et al.* 1979, see *supra*) and in the Southern Levant from Gezer, Megiddo, Shiloh, Nahariya (ESHEL *et al.* 2018, tab. 1). However, notwithstanding their outstanding importance for the investigation of ancient Near Eastern economies, to date complete catalogues of silver pieces from Bronze Age hoards is available only for Ebla (MBA; IALONGO *et al.* 2018a, app. A), Acemhöyük (MBA; ÖZTAN 1997) and Munbaqat (LBA; CZICHON/WERNER 1998, 191-225, pl. 130-139, 213-216). The evidence from Anatolia is particularly interesting, since it should be indicative of silver exploitation and circulation at the time of the Assyrian trade in Capadocia: the Kültepe hoard (*ca.* 2 kg of hacksilver) was found in a jar associated with stone moulds and crucibles, near a furnace in a metalworking atelier of the Lower Town Level II (20th-19th century BC) and those from Acemhöyük (210 silver pieces for a total of 1.8 kg, kept in a trefoil jug, and 250 g of small silver ingots in a broken jar) come from two houses of level III, contemporary with the Sarıkaya palace and dating to the 18th century BC (corresponding to Kültepe Lower Town Ib).

The partial, insufficient documentation of Bronze Age silver hoards contrasts with the detailed analysis and publication of the evidence from the Southern Levant dating to the Iron Age (KLETTER 2003; THOMPSON 2003; ESHEL *et al.* 2018; HEIMANS 2018). These differences in information availability have resulted in research mainly focused on the silver question in the Levant during the 1st millennium BC, which has been investigated without taking adequately into account the general phenomenon in the whole Near East, or its diachronic range. It has been suggested that the presence of hacksilver in some sites can be explained by economic changes related to Neo-Assyrian control (GITIN/GOLANI 2001), or by the Phoenician commercial network, postulating an increase of the silver due to the exploitation of the Iberian sources (THOMPSON/SKAGGS 2013). Moreover, the specific regional type of cut square ingots ('chocolate-bar' ingots) have been assumed to have been chiselled off from pre-portioned bar-ingots in order to obtain pieces of standardized mass, then grouped in bundles sealed to assure quality and checked weight (THOMPSON 2003; GITIN/GOLANI 2004). The hypothesis that this pre-formed money was a decisive step in a linear development towards coinage must be rejected (see in particular the criticisms of KLETTER 2003; 2004), although the explanation that the 'chocolate-bar' pieces were chiselled off for quality control is not fully convincing (ESHEL *et al.* 2018, 221). Even if some local features – such as the predominance of the distinctive type of hacked ingots, the use of sealed bundles of silver, a high gold content (up to 5 % in the Tel Miqne hoards) – are possibly related to regional socio-economic trends and historic developments,

the Levantine Iron Age silver hoards cannot be correctly understood if they are not studied in a long-term historical perspective, as a part of the process of silver circulation attested all over the Near East from the Early Bronze Age onwards. Silver bullion appeared in the Southern Levant in the 2nd millennium BC (MBA: Megiddo, Nahariya, Gezer, Shiloh; LBA: 'Ajjul, Beth-Shean) and the phenomenon is the same as that attested in Syria and Mesopotamia from the Early Bronze Age, which then spread into other regions (Anatolia and Southern Levant). The presence of silver with sealings was introduced into Mesopotamia in the 3rd millennium; the evidence from the Southern Levant should be therefore considered in relation to the administrative and economic procedures adopted for silver circulation from this perspective. The Old Babylonian texts reporting the circulation of 'sealed silver' (*kaspum kinkum*) as opposed to 'loose' silver (*kaspum pitrum*) clearly indicate the existence of a system guaranteed by the administration in which sealings (with indication of the weight, as testified by the Larsa hoard) were attached as a kind of tag to small perishable bags, assuring that the quantity of silver was checked and verified. The most interesting document comes from the Sinkashid Palace at Uruk and deals with metals, reporting a large number of *kinkum*-bags of one, half and one third of a shekel, for a significant total amount of more than 14 silver minas (SANATI-MÜLLER 1990). The critical point is to understand the mode of exchange of these sealed bags: did they circulate without any need of further weight verification? If this was the case they constituted a kind of currency, possessing the features of proper money. Conversely, if the system was basically an adaptation of the Near Eastern administrative sealing practices, which guaranteed the provenance of and responsibility for the administrative procedure – limited in time and space (the MBA in Syria-Mesopotamia), we cannot be sure that the bags were passed unconditionally from hand to hand.

The Italian SCANE Project's precise aim is to fill the documentary gap concerning silver finds, and has started by analyzing the hoard found at Ebla in order to establish a documentation protocol and test appropriate tools of statistical analysis (PEYRONEL 2018).

The silver hoard was found in an unsealed MB IIA ovoid jar discovered under a floor (L.3702) of a poorly preserved house located at the edge of the southern Acropolis (PEYRONEL 2012b, 480) (Fig. 6). The small circular pit in which the jar was buried was located near an adult under-floor pit burial containing five pottery vessels (D.3765=D27). The excavators initially saw it as being related to the funerary assemblage (BAFFI 1988, 4, fig. 2.6-11; Baffi in MATTHIAE *et al.* 1995, 430, no. 308), but more probably the jar is a silver hoard hidden under the floor and not a part of the grave assemblage. The stratigraphy seems consist-



◀ Fig. 6. Silver hoard from Area G at Ebla (© Italian Archaeological Expedition to Ebla).

ent with the former interpretation, and – as far as I know – silver hoards are not attested in any other funerary contexts in the Near East during the Bronze and Iron Ages. In the same area a further six burials were excavated, all dating to the beginning of the MB II (1900-1800 BC) (POLCARO 2014-2015, 208-209), including one with unusual grave goods related to metalworking activities (a large stone anvil, two striking pairs of moulds for fenestrated axes) (NIGRO 2003). This peripheral part of the Acropolis was occupied by houses and working places suggesting the existence of a 'specialized' domestic quarter, in which productive activities for the nearby Royal Citadel were carried out.

The jar, with the mouth deliberately broken, was completely filled with 172 silver objects weighing 5043.5 g, silver bullion roughly corresponding to 10 Mesopotamian minas. The hoard includes complete or fragmented ingots of different sorts with masses ranging from 1.3 g to a maximum of 285 g: more than half are fragments clustering between 1.3 and 20 g (94 specimens), and the heavier pieces are complete bar and discoid ingots of 160 g, 173 g, 223 g and 285 g. Small irregular flat discoid ingots, both complete and – mostly – fragmentary, constitute the majority, but larger elongate ingots (complete, halves or fragments) with round or straight ends also occur (20 specimens, 40.7-223 g) (Fig. 6). Some thick lengths of wire and rod (cut, folded or twisted, masses 7-82 g), several small rings, 8 thin sheets (13.6-35.9 g), a large biconical bead (8.6 g), and several irregular lumps of different sizes and weights complete the inventory (Fig. 7). The set does not include fragmentary jewels or objects to be recycled, beside the sheets and the bead. The presence of items melted together as a result of post-depositional metal alteration could be indicative of the presence of different bundles inside the hoard, although no evidence of textiles or organic materials was noted at the time of excavation, nor

when the hoard was studied by the Author in 2008-2009.

Thirteen pieces from different morphological groups have been selected for surface analysis of chemical composition (2 rods, 4 elongated bar ingots, 6 discoid ingots and the bead) using a portable XRF spectrometer. The most interesting result is that all the samples were made from silver alloyed with copper, the latter ranging from 2 to more than 30 % (PEYRONEL 2012b, 480, fig. 6). However, it is difficult to reliably assess copper percentage only through XRF surface measurements (3-6 per item performed on different parts), since surface composition may differ greatly from that of the core, due to several factors (corrosion, bulk inhomogeneity). The trace amounts of gold and lead detected were always very low (Au max 0.5 % and Pb max 1.3 %); quite similar results have been obtained from selected samples of the Acemhöyük silver (YENER 2015, 3-4). Data from Southern Levantine silver hoards differ significantly, however, usually with a relatively high gold percentage (2-5 %) indicating gold-rich silver sources located either in Egypt or Iberia (SHALEV *et al.* 2014; ESHEL *et al.* 2018, 209-210, 214-220).

Hacksilver and weights – towards an integrated approach

The interpretation of silver hoards as means of wealth accumulation, which is suggested by the debate poem 'Silver and Copper' is clearly indicated by the presence of a number of hoards containing only ingots and scrap metal associated with households. The circulation of hacksilver as bullion, the deliberate fragmentation of the metal pieces, the textual evidence suggesting the presence of standardized silver ingots as well as 'sealed silver' of verified quality and weights, raise the question of the

► Fig. 7. Silver items from the Ebla hoard (© Italian Archaeological Expedition to Ebla).



relation between the mass values of silver fragments and standard weights. Is it possible that silver items are related in any way to known systems of units? In general terms, could the metrological analysis of silver shed light on the relation between norm and practice, between administrative trade and private exchange?

The study of the Ebla hoard, with a detailed description of each silver item, gave the opportunity to build up a statistical methodology useful for a metrological evaluation of the silver pieces (IALONGO *et al.* 2018a). The silver dataset has been compared with the contemporary group of weights from Ebla (94 complete specimens), and also with the weights from Kültepe/Kanesh in Cappadocia (162 specimens), and with weight sets from Mesopotamian centres dating to the MBA (Larsa hoard, 67 exemplars, Nippur, 132 exemplars, and Ur, the largest group with 327 weights). The comparison was aimed at testing the statistical properties of fragmented silver as a form of bullion currency; in particular, the enquiry focused on testing whether balance weights and silver fragments share similar quantitative properties. As already remarked, we can count on a number of effective approaches to identify norm-dependent regularities in arrays of balance weights, and CQA was performed on the different datasets, giving interesting results (see *supra*). Additionally, shifting from the modular approach, frequency distribution analysis (FDA) of weight values was also carried out, in order to obtain a more nuanced picture.

CQA has shown that the distribution of quantita in the datasets corresponds well with the values

of the ponderal systems adopted in the Near East during the Bronze Age, indicating the presence at the sites of the main metrological units and the contemporary use of different systems. Moreover, the compatibility of the groups has been tested using quantogram correlation analysis: the Eblaite hacksilver sample shows a good correlation with Ebla and Kültepe groups especially, and also Ur and Nippur weights show scores beyond the significance threshold, a clear signal of the strong interaction and integration of the Levantine and Mesopotamian metrological spheres (IALONGO *et al.* 2018a, 25-27).

FDA allowed assessment of the convergence of hacksilver and weights on certain values ('standard average quantities', SAQs) that occurred more often than others. The analysis tests the working hypothesis that commerce and exchange beyond the regional sphere of interaction can produce a convergence between different normative systems, resulting in certain values being more frequently used than others. Following a methodology already applied to Italian metal hoards and Early Bronze Age weight sets from the Levant and Anatolia (IALONGO *et al.* 2018b), significant concentrations (or "peaks") were identified in the frequency distribution of the weight values of the silver items contained in the Ebla hoard, and these were compared with similar analytical results obtained from the sets of balance weights. The FDA shows that the peaks of the two Eblaite sets (silver and weights) match almost perfectly and that the peaks of the other weight sets also show a strikingly similar distribution (with some differences

for the Larsa group). The average values of such peaks correspond precisely to a series of sub-multiples and multiples of the alleged Mesopotamian shekel of *ca.* 8.4 g ($\frac{1}{2}$, $\frac{2}{3}$, 1, 2, 3, 5, 10, 20). What produces such a convergence between balance weights and hacksilver? The combined statistical analysis of CQA and FDA seems to reveal that the variability of masses found in silver and weights is related to the multitude of normative systems adopted at a local level, while the convergence of SAQs is the result of the predominance of the Mesopotamian units at the global scale. Moreover, the frequency of the use of certain weight values might be somehow related to the economic demand curve: the more frequently a certain amount was exchanged, the higher its occurrence in the archaeological record. The occurrence of the same cluster of values in different contexts should not have been a problem for each specific administrative organization, since each mass value could be easily converted into any existing system of measurement, represented by the nearest integer multiple of the different units, even if it circulated mainly checked and weighted according to the most-used Mesopotamian system. The convergence of silver and weights on these SAQs might therefore be the consequence of a long-lasting practice of interregional exchange in which it was necessary to minimize the dispersion between different standards.

Evaluating silver circulation between norm and practice during the Bronze Age is a subject that impacts the general debate about economic procedures and exchange systems in the ancient Near East, and undoubtedly requires more reflection. As a next step, the SCANE project is analyzing data from other silver hoards (including archeometric studies), to be managed in an open-source database, and plans the development of a comprehensive vocabulary for silver terminology in the various textual corpora in order to cross-check archaeological and epigraphic information.

In general, these preliminary results seem to indicate that pieces of silver and scale balance weights exhibit the same statistical behaviour, and therefore imply that silver fragmentation practices could have been designed to obtain pre-determined quantities. Weighed silver used as an economic and financial commodity that was accepted throughout the whole ancient Near East, easily transported and with a convenient value-to-weight ratio, may thus have been the best means for the circulation of fixed quantities that could readily be converted into diverse ponderal systems used by different economic and administrative systems. The presence of a sort of meta-system that the SAQs appear to reveal would have greatly facilitated above all interregional and long-distance exchange, offering an effective compromise between the requirements of trade and those of the bureaucracy and administration of the Bronze Age public authorities.

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Address of the author

Luca Peyronel
Professor of Near Eastern Archaeology and Art History
University of Milan
Department of Literary Studies, Philology and Linguistics
Via Festa del Perdono 3
20122 Milan
Italy

luca.peyronel@unimi.it

Balancing from weight to value and *vice versa*

Weight-regulated artifacts and currency in Aegean and Near Eastern pre-coinage economies

by ANNA MICHAÏLIDOU

Weight, value, Linear B, metal standards, wool standards, lead balance weights

The focus of this paper is on the stage between measuring by weight and value estimating in the ‘money barter’ economies of the Bronze Age Aegean and the Near East. Commodities crucial for the subject of standardization are reviewed: copper, silver, gold, lead and wool. With the help of Aegean weight-regulated items and the relevant bibliography based on Near Eastern textual evidence, we proceed to pursue questions on commodity values and on their possible role as currencies. A new enquiry is introduced on lead standards and their possible function as unit of account or cheaper money, along with their participation in the metric system throughout the Aegean.

Von Gewicht zu Wert und vice versa Gewichtsregulierte Artefakte und Währung in ägäischen und vorderasiatischen Ökonomien vor der Verwendung von Münzen

Gewicht, Wert, Linear B, Maßeinheiten von Metall, Maßeinheiten von Wolle, Bleigewichte

Der Beitrag untersucht das Stadium zwischen dem Wiegen nach Gewicht und der Wertschätzung in “Tauschgeld”-Wirtschaften in der Ägäis und im Vorderen Orient während der Bronzezeit. Handelswaren, die sich für eine Standardisierung besonders anboten, wie Kupfer, Silber, Gold, Blei und Wolle, werden betrachtet. Unter Berücksichtigung der ägäischen gewichtsregulierten Gegenstände und den relevanten textlichen Belegen aus dem Vorderen Orient analysieren wir Fragen des Materialwerts von Handelswaren und ihre mögliche Rolle als Währungen. Weiterhin werden standardisierte Bleiobjekte und ihre Funktion als Verrechnungseinheiten oder als Kleingeld sowie deren Nutzung innerhalb des ägäischen metrischen Systems behandelt.

The concept of money: an introduction

Almost a decade ago, the first chapter in an introductory volume to the above subject started with the following statement: “The project on Weight and Value is a study of the relationship between two concepts pertaining to pre-coinage societies of the Bronze Age in the Eastern Mediterranean and the Near East: *weight*, which can determine the degree of standardization for the quantity of a circulating commodity, and *value*, which represents the degree of the commodity’s importance in the exchange network” (MICHAILIDOU 2005, 15). The first archaeologist to connect the material reality of weight to the economic concept of value was Arthur Evans (EVANS 1906; cf. MICHAILIDOU 2004). Christos TSOUNTAS (1893) and Barry KEMP (1991, 248) both contributed to the view that balance weights stand only one step before the invention of coinage. One may add the argument that in regard to the Aristotelian requirements for coinage by virtue of *being metal, weighed and guaranteed* (Aristotle, *Politics* I, iii, 14-15), it was the official stone balance weight which in many pre-coinage states of the Orient was bearing the mark of the central authority accompanied by the mark of denomination (cf. MICHAILIDOU 2001a). It is as if the guarantee sign was at the last stage simply transferred from the surface of the stone balance weight to the piece of standardized metal, transforming it to a coin. The minting of coins in the 1st millennium represents not only “the end point” in the gradual development of the invention of money (according to RAHMSTORF 2016, 20)¹, but a radical *innovation*. This *καινοτομία*² liberated the currency of metal from the dubious measurement by the balance: the authorized metal pieces would now simply be counted in easy agreement of both parts, the seller and the buyer, without any interference of witnesses or experts of the balance, as was the rule in the previous stage, before the innovation of coinage (cf. JOANNÈS 1989).

Turning back to the 2nd millennium we have first to agree that any definition of the Late Bronze Age as a period of *pre-monetary* stage of economy, is wrong. As rightly put, although “coinage is money, money is not necessarily coinage” (cf. references in RAHMSTORF 2016). In general terms, money is “anything that serves as a commonly accepted medium of exchange” (HARRIS 2008, 178), with a priority to grain and metals. As is evident from some of the dialogues on the Old Kingdom Egyptian “market scenes”, such as: “*Here is a very beautiful cane, my friend! A measure of wheat for it*”, or “*x cubits of cloth in exchange for 6 shat*”, the notion of money far preceded coinage, existing within the barter econo-

my system in foodstuffs (cf. MICHAILIDOU 2015, 674). The critical point is that money, whether it is an index of value or a store of wealth or a means of payment, it certainly needs to be measured; so RAHMSTORF (2016, 37) correctly attributes the evolution of metric systems of weight to the value-estimating process and I may add that metric systems of capacity would have been equally important for measuring grain (or oil) not only in storage but also in payments in kind. Of course, qualities, such as durability and convertibility, led to the preference for metals over grain, although both metal and grain sometimes co-existed in prices in Near Eastern texts (POWELL 1978; 1996). There is a vast bibliography on money³ where prices and means of payment more usually do not coincide. Paraphrasing the saying “Money makes the world go round”, Pare entitled his book “Metals make the world go round” (PARE 2000). Metal value is a monetary concept in pre-coinage early societies, and clearly indicative of this are the 24 ‘*metal debens*’ mentioned in a letter of the farmer Hekanakht of the 11th dynasty in Egypt, referring not to 24 weight units/*deben* of copper, but to 24 pieces of copper (of unspecified shape) each weighing one *deben* (ca. 90 g) and sent for payment of the land rent (JAMES 1962, 44, n. 57). The term ‘money’ reflects a vaguer concept than ‘currency’ – the later referring to *codified forms of money* – and currency in turn is a vaguer concept than coinage which refers to formalized metal bullion guaranteed by a state.

Commodity standards by weight

In this chapter we will concentrate on the step between measuring the weight and estimating the value of a circulating commodity. This step is the *standardization of the commodities by weight (or volume) and quite often also by form*. Copper and all other metals, in addition to wool and some other commodities (cf. MICHAILIDOU 2010, 74-75) were measured and accounted by weight.

Standards of copper

We know that during the Late Bronze Age copper as raw material was circulated in long distance trade in the standardized form of ox-hide ingots or bun ingots (cf. PULAK 2005 for the Uluburun cargo) and was stored (and weighed) in palaces and settlements. In the records of the Mycenaean palatial archives, there is no obvious distinction between copper or bronze (MICHAILIDOU 2008b, perhaps due to a lack of relevant experience of the scribes?). In the Linear B script, both the word *ka-ko* and the ideogram AES appear on the tablets.

1 If indeed we are to accept that there is an end to this process, where paper money and plastic money, even bit-coin have followed since then.

2 This ancient Greek word metaphorically meaning the innovation, had as first meaning the naming of the opening a new vein in ancient Greek mines (the verb *καινοτομέω* = *cut fresh into*).

3 Cf. references in the chapter “Demand for Goods. From Use Value to Exchange Value and the Means of Payment”, MICHAILIDOU 2008a, 205-216. See also more recently PEYRONEL 2014b and the contributions in “*The Archaeology of Money*” (eds. HASELGROVE/KRMNICEK 2016).



▲ Fig. 1. Both bronze lavers, found in different houses at Akrotiri, Thera, are approximately of the same size and approximately of the same weight value (ca. 1500 g).

Ingots are also found in fragments kept in hoards in settlements (cf. SOLES 2008 for Mochlos, Crete). Breaking the ingot facilitated measurement and transport, while also offering the opportunity to check the quality (MICHAILIDOU 2008a, 104-105, n. 166). And in Old Assyrian texts, the term “broken off” is used for copper (and silver) pieces occasionally transported in packets (VEENHOF 2014, 401-402). Copper of good quality was distinguished by the name of production area in Anatolia in the Old Assyrian period, perhaps this distinction was based on the typical shape and/or marks on the ingots (DERCKSEN 1996).

For copper ingots kept in houses as *personal property*, an illuminating information on their value comes from the following Old Babylonian letter:

“About the bronze hatchet and the bronze ingot which were left for you as pledge, ...I did not have any corn available and did not send any, but at the sheep-shearing I will send you 2 shekels worth of wool...On the day I send the wool, send me the bronze hatchet and the bronze ingot”

(POSTGATE 1992, 193, text 10.3)

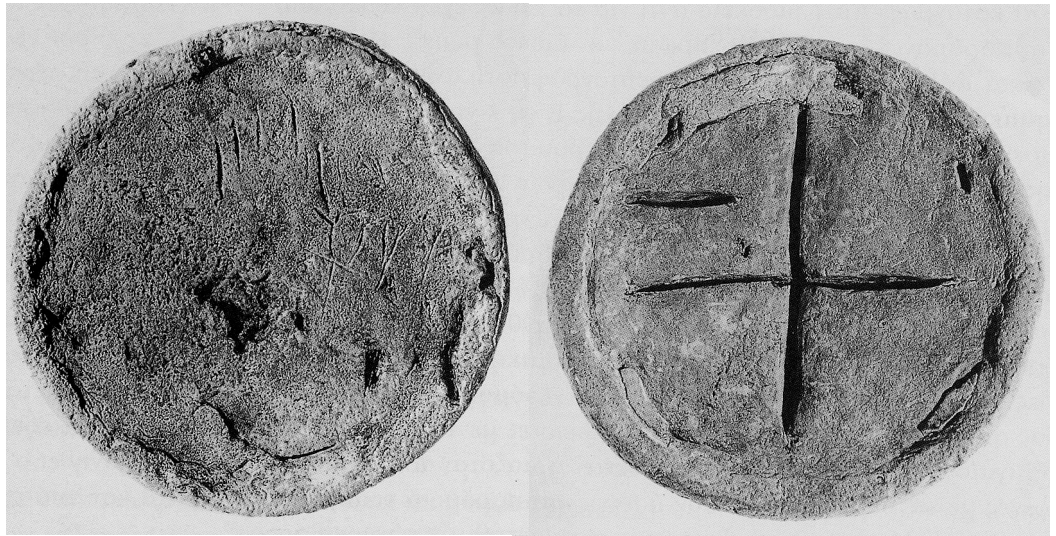
In the above text, the amount of wool to be sent is not specified by its actual quantity but by its silver value (2 shekels) and it should be conceived as equal to the value of the amount of corn promised.

Heavy bronze tools were a kind of property as well. Apart from their great utility value, they required a great amount of metal for their manufacture. An example from a Deir el-Medina ‘ostracon’ illuminates how a woman was accused in court of stealing the chisel that her neighbor had buried un-

der the threshold of his house (MCDOWELL 1999, 187). In a modern house in the area of Archanes, Crete, a Minoan chisel was found hidden in a gap between stones of the interior wall (SAKELLARAKIS/SAKELLARAKI 1997, 602). Two ingot fragments found between the stones of an additional wall in the upper storey of a house in the Bronze Age settlement at Akrotiri, Thera (MICHAILIDOU 2008a, 101-104, fig. II.82-II.93) may be considered as a hidden property: with the smaller ingot fragment, of 341 g, various items could be produced by a smith, from fish-hooks (e.g. of 12 g) to daggers (of 303 g) or chisels (of 272 g), etc. (MICHAILIDOU 2001b, 97, tab. 1). The big ingot fragment of ca. 3 kg (2956 g) would be sufficient for the manufacture of two vessels like the two lavers from Akrotiri (Fig. 1), deriving from different houses yet having similar size and weight, that is, representing a *possible standard* of 1500 g for this shape and size of vessel (MICHAILIDOU 2008a, 112-113, fig. II.102-II.104). Each one of them could be weighed with a lead balance weight of 1 ½ kg such as the inscribed disc (Fig. 2) from Mochlos, Crete (OLIVIER 1989; MICHAILIDOU 2001a, 56-57, fig. 4; 2008a, 113, fig. II.105). Standardization in size/type would be helpful to assess the capacity, transport costs, and exchange value of the vessel itself and of its contents.

It is significant that some Old Assyrian documents list the inventory of bronze household items and their total weight, e.g. 93 items from a single merchant’s house weighing over a total of 100 minas (DERCKSEN 1996, 76-78; see also MICHAILIDOU 2008a, 269, n. 429-430). Because of the paucity of Aegean texts on the subject of prices, we turn again

► Fig. 2. A lead balance weight from Mochlos, Crete, with a Linear A inscription, of 1 ½ kg weight value.



to the Egyptian texts on ostraca (JANSSEN 1975, 101), where nearly all the vessels mentioned in the price entries are made of metal, and face the difficulty of determining whether it is the weight of the copper item itself or its price in quantities of copper that is recorded in the private transactions among the Deir el-Medina inhabitants. It seems that in principle, the weight of a copper vessel is equivalent to its exchange value when measured in copper, if we take the example of an Egyptian ostrakon, where a bronze vessel of 20 *deben* (ca. 1800 g) and a basket of 4 *deben* (evidently the price of the basket) are recorded as giving a *total* (price of) 24 *deben* (of copper).

Standards of silver

Precious objects of silver and gold are recorded side by side in early Near Eastern documents. In Sumerian they had analogous names: silver was *kug-babbar*, “shining white”, while gold was *kug-gi* “shining yellow” (KRISPIN 2016, 8). And various forms of silver standards in circulation are textually documented in the Near East: *e. g.* ingots, rings, coils and scrap metal (PEYRONEL 2010; 2014b).

Why, then, is silver not recorded in the Linear B tablets? Apart from the description in the tablet PY Sa 287 of a pair of wheels as *a-ku-ro de-de-me-no*, that is, fastened with ἀργυρος (=silver), this metal is not mentioned. There is a more recent view, still under discussion, expressed by GODART (2009, 114) who supports the existence of an ideogram for silver in the tablets Tn 316 (listing gold-AUR vessels) and Tn 996 (listing copper-AES vessels). He names it ARG as abbreviation of ARGentum. There is also a discussion on the KN Og series, where some unspecified commodity/ies are listed by weight. As already mentioned (MICHAILIDOU 2001b, 104-105; DIALISMAS 2001, 123-124), the quantities of these unknown commodity/ies are not converted to talents but remain as multiples of the subdivision units *M* or *P*: they are possibly

accounted according to the actual process of weighing, therefore these records of multiples of smaller units may indicate accounts of precious metals.

In contrast to the Mycenaean texts, silver artifacts are included in the archaeological record: 30 silver objects were found in the Shaft Graves of the Mycenae acropolis (KELDER 2016, 307), not to forget two silver cups found in the Vapheio tholos tomb (DAVIS 1977; KILLIAN-DIRLMEIER 1987) and many others (AULSEBROOK 2018, 92-96). Because silver is rare in later periods, Kelder poses the question: “what happened to the silver that was extracted from the mines of Laurion?” (KELDER 2016, 311). But in the Annals of Thutmose III, silver objects are mentioned as sent by the prince of Tanaju (=Mycenae), and there is a view that the earlier Töd treasure, found in Egypt, with more than 153 silver cups, perhaps included vessels of Mycenaean craftsmanship (as KELDER 2016, 312-314). Silver cups certainly represented a reserve of value exchanged as a diplomatic gift among rulers. Perhaps this may be one of the reasons why silver items are not as yet securely identified in the Linear B tablets, which mainly covered the internal bureaucratic needs (although accounts of textiles produced for exports exist).

Though the majority are found in fragmentary condition, silver vessels did exist both in Minoan Crete and Mycenaean Greece (see more in DAVIS 1977; SAKELLARAKIS/SAKELLARAKI 1997, 605; MOUNTJOY 2003, 164-165). A good example of preservation is the silver cup from a Mycenaean burial weighing 261 g, ca. N 1 in Linear B units (MICHAILIDOU 2001b, fig. 15). Silver vases were found in houses as personal property: in the South House near the palace of Knossos, 3 silver bowls and a small jug were found tightly placed one inside the other and fallen from the room above the basement Pillar Crypt. Unfortunately they are not intact, so no estimation of their original weight is possible. MOUNTJOY (2003, 166) emphasizes: “Evans idea that they were stored together in a container is more plausible. They could simply be part

of the house furniture, the private possession of the resident of the house caught in a disaster". They certainly represent wealth accumulation. Strongly indicative for silver as house property are some Old Assyrian texts where silver cups appear among the valuable assets present in the house of a trader who has died, *e. g.* in one of them we read about "the 4 cups that are in his house" (VEENHOF 2014, 400).

Standards of gold

At the highest levels of the exchange system – ceremonial gift exchanges – it was gold that, as a prestige material, was the gift par excellence. The Near Eastern political entities acquired it from Egypt in the form of artifacts but also as raw material in the form of gold-dust or ingots (and rings): *e. g.* in an Amarna letter "much gold that has not been worked" is asked from the Pharaoh (MORAN 1992, EA 20:72; see also PEYRONEL 2014b, 357-359). And Egyptian wall-paintings inform us that gold might be stored (a) as gold dust in bags, (b) as ingots or nuggets, and (c) as ring-ingots (*cf.* MICHAÏLIDOU 2001b, fig. 6). In contrast to many records of gold (and silver) vessels as gifts or tributes, frequently of standard shapes and weight (PEYRONEL 2014b, 360 with references), there is less archaeological evidence. Two gold bowls from Ugarit were found on the acropolis near the Baal temple weighing 179 g (=20 Levantine shekels) and 218 g (= 30 Syrian shekels of 7.5 g), while another one-handled silver bowl decorated with gold from a tomb at Enkomi has a precise parallel in the bowl from the tomb at Dendra in Mycenaean Greece (PEYRONEL 2014b, 361).

The Akkadian word for gold was *hurāṣu*, from which comes the loan word *ku-ru-so* in the Linear B Mycenaean script. The Pylos tablet Jo 438 is as yet the only textual Mycenaean evidence of gold recorded by weight (since no weight estimation follows the gold vessels of the other tablet, the Tn 316). PETRUSO (1992, 64) has well observed that the records of gold in Jo 438 are tallied from the quantity defined as *M 1* (that is the Mycenaean metrogram for one double mina equivalent to 1 kg) down to the quantity defined as *P 3* (*P* is the Mycenaean metrogram for a weight of 20-22 g) a quantity equivalent to the earlier Minoan unit of 61-65 g. The recorded total of *ca.* 6 kg gold offerings to the palace of Pylos (CHADWICK 1998-1999) is far from small if we take into account that two shekels of gold (about 17 g) were considered enough to organize a whole banquet, as mentioned in a Middle Assyrian letter (VAN DRIEL/JAS 1991, 65). The tablet Jo 438 certainly poses the question as to what form gold took in circulation. Since gold cups, recorded as gifts among rulers, are mentioned in many Near Eastern texts, together with their weight, it would be interesting to take into account any weight measures on intact Mycenaean vessels (*e. g.* in DAVIS 1977). Thus, the Linear B record of a donation of gold weighing *M 1* could represent a gold cup like, for instance, the gold

goblet inv. no. 351 in the National Archaeological Museum (Athens) coming from the Mycenaean shaft grave IV and weighing 1004 g (MICHAÏLIDOU 2001b, fig. 7). Each one of the eight contributions of the quantity *N 1* could represent gold in the form of a cup like the no. 629 in the National Archaeological Museum coming from the Mycenaean shaft grave V (MICHAÏLIDOU 2001b, fig. 11) and weighing 253.6 g. The donation of a quantity of *P 3* (four records) could have been in the form of a gold cup like the no. 73 in the National Archaeological Museum from the Mycenaean shaft grave III, weighing 65.5 g, and so on (*cf.* MICHAÏLIDOU 2001b, fig. 7-20, tab. 2). Although the above mentioned gold vases from the Mycenae shaft graves are of an earlier date, it is significant that similar weight standards existed for gold cups of the (later) period of the Linear B tablets. In addition, some of their shapes are even comparable to Linear B ideograms of vases. For example, the gold cup no. 6441 in the National Archaeological Museum (MICHAÏLIDOU 2001b, fig. 18), found with LH IIIA pottery in a pit burial below the floor of a tholos tomb at Marathon, is related to the ideogram * 221 and weighs 66.7 g, very close to one Minoan unit (or to *P 3* in Linear B metrograms). Four gold chalices, of identical shape (DAVIS 1977, 291-293), were found in a LH II-IIA1 hoard outside the Mycenaean Acropolis (*cf.* Fig. 3), and their shape is related to the ideogram * 215 (VANDENABEELE/OLIVIER 1979). The weight 314.7 g, for one of them (MICHAÏLIDOU 2001b, fig. 17), is equivalent to 5 Minoan units, perhaps to be recorded as *N 1 P 3* (or *P 15*) in Linear B metrograms. The two famous gold "Vapheio cups" of 280.5 g and 276 g respectively (DAVIS 1977, 256-257) could be estimated as 21 Egyptian *deben of gold* (of 13.3 g) or 3 New kingdom *deben* (of 91-93 g). However, such pieces of art in precious metal certainly pose the unresolved question for an added value by their magnificent workmanship.

Thus, from the point of view of manufacture, the weight values of most of the Mycenaean cups of precious metal clearly fall within both the earlier "Minoan" unit (61.0-65.5 g) and the later Linear B units *M (dimnaion)* and *P* (20-22 g). A lead balance weight from Akrotiri, Thera (Fig. 4), coming from a house where also a few Linear A tablets and Minoan sealings were found, represents this weight value of the *dimnaion* and is marked with two triangles. Possibly kept as a trade standard in the upper floor of the house of a priest or merchant (MICHAÏLIDOU 2008a, 90, 248) it introduces us to the subject of standards of lead.

Standards of lead

Lead objects were widespread throughout Anatolia, North Mesopotamia and the Levant from the Late Chalcolithic period onwards, while the term of lead in cuneiform sources is in Sumerian *a-gar* and in Akkadian *abāru*, (*cf.* PEYRONEL 2016 with many references). In the Mycenaean tablets, the

► Fig. 3. Gold chalices, gold rings and gold coils from Mycenae, in the National Museum at Athens.



term used for lead is *mo-ri-wo-do* (documented in the tablet Kn Og 1527).

In the Aegean Late Bronze Age, lead was used for various objects, sheeting, rivets and pot mends, figurines, net weight sinkers, wire, spearheads, bullets, jewelry in the form of rings and pendants, even vessels and above all balance weights (MOSSMAN 2000). The Minoan metric system based on the unit of 61.0-65.5 g had a wide diffusion in the whole Aegean area (cf. PETRUSO 1992; NIEMEYER 2013; BERTEMES 2013). It is easily identified by the discoid shape of the balance weights themselves, made either of stone or, more commonly, of lead. Lead weights were used as trading standards throughout the Aegean. A transitional stage between Minoan and Mycenaean metrology is quite apparent in the functional cluster of 9 lead balance weights found in the LH II A Vapheio tholos tomb (TSOUNTAS 1889; KILIAN-DIRLMEIER 1987; MICHAILIDOU 2008a, 156-177). As ALBERTI (2006, 318, tab. II) emphasized, every multiple from the Minoan unit to four Mycenaean *M*-units can be composed and the whole cluster is consistent with the Minoan system of 62-65 g, in fact the smallest of the balance weights is of this particular value. Particularly noticeable is the emphasis on the existence of three samples of the unit *M*, which is the prevailing unit in the Mycenaean Linear B tablets, at the expense of the Minoan unit of which there is only one specimen (MICHAILIDOU 2008a, 167). Thus, although, in Alberti's words, the Vapheio cluster is "strongly embedded in the Minoan tradition", we probably have here the adaptation of the old system to the new bureaucracy because it was managing *greater quantities* of products (cf. the addition of a new Linear B sign for the number 10,000 to the old

numerical system of Linear A). We should consider that the smallest balance weight is equivalent to P3, the smallest quantity of gold recorded on the Linear B tablet Jo 438. And the larger balance weights of *M* 1, are each equivalent to the larger offer of gold in the same tablet.

Another lead disc from Akrotiri (Fig. 5) displaying four dots is regarded by Nicola PARISE (1986) as denoting a weight unit corresponding to one sheep's fleece and he assigns the same nominal value to other lead balance weights from the Cycladic islands of Thera and Kea (of weight values from 690 to 744 g). It seems that there was a widespread diffusion of a common standard referring to one sheep's fleece and that, before the evolution of precise systems of measurement, wool was regularly bartered in terms of its most natural unit, namely the clip of one sheep at shearing time. If we take into account that in the contemporary Linear A script of the Aegean, quantities of commodities were recorded as fractions of a greater unit, then the four dots on this disc may indicate that it corresponds to the fraction of one fourth of a greater wool unit which should have the same value with the later Linear B wool unit LANA of 3 kilograms (MICHAILIDOU 2008a, 92-93, fig. II.66, 228-230, fig. V.13-V.15a). It is very significant that, like metals, wool was also standardized by weight.

Standards of wool

Wool was certainly among the staple commodities used in everyday life (with the exception of Egypt, where linen cloth prevailed, though wool was also used for blankets *etc.*, MICHAILIDOU 2008a, 184). It is quite indicative that in an arrangement of adoption in Old Babylonian Ur, the

‘son’ adopted by a couple was promised to inherit all their possessions, while he, in return, would support them with provisions of 360 liters barley, six liters sesame oil and 3 kilograms wool (= 6 minas) each year (VAN DE MIEROOP 1992, 217: BIN 2, no. 73). In Ur-III texts we see the following annual rations of wool: 4 minas for the adult man, 3 minas for the woman and 2 minas for the child (BIGA 2014, 144-147).

Wool is a good example of a storable wealth, easy to arrange in standard shapes such as balls, hanks, bales, often estimated also in loads of donkeys. It had the qualities required for a trade item, particularly if dyed (cf. VAN SOLDT 1990 for colored wool in Ugarit and MICHAILEDIOU 2008a, 185, 203-204). Important – for indicating inter-system correlations – is the following text: “Seven talents of wool (measured) with the talent of Ašdod, and (measured) with the talent of Ugarit five talents” (VAN SOLDT 1990, 334). Obviously, it was not an easy process to actually weigh in talents. This unit was more useful for recording totals. By using smaller units, such as minas or shekels, both weighing and evaluating became easier. The quantity of a double mina or a mina of wool was also used, e. g. this was the weight of a standard bale of wool for sale in Egypt, in later times (e. g. in Hellenistic times: MICHAILEDIOU 2008a, 202).

According to Old Assyrian texts, wool was not transported in wagons but by donkeys, inside bags or packed by large pieces of cloth, each one holding about 45 kg of wool, that is 1.5 talents (LASSEN 2010, 167). A real ‘standard of wool’ is the fleece (called *mašku*: VEENHOF 1972, 132-134 and MICHAILEDIOU 2008a, 183) as also suggested for other cultures (see below the view by M.-L. Nosch). A special weight for wool also existed in Kültepe, as we read in a text where 65 stones for wool are mentioned but without information on weight (DERCKSEN 2016, 18). This reminds us of the existence of the earliest stone mina of wool of Dudu of 680 g weight, contemporary to a weight from Ebla of ca. 666 g (PEYRONEL 2014a, 126).

Turning to the Aegean Bronze Age, few records of wool are preserved in Linear A tablets. As PALAIMA (1994, 317) noted, wool occurs on tablets from Hagia Triada, Phaestos and Khania in quantities not easily determined, except one entry which is possibly connected to the amount of five talents, that is, 150 kg (see more recently MILLITELLO 2014). For the subject of Mycenaean wool and weights one should further consult Marie-Louise NOSCH (2014, 392-393) who specifies clearly how the Mycenaean LANA unit for wool, although equivalent to $\frac{1}{10}$ of the talent, is not a fractional sign but a logogram for the commodity of wool in a particular quantity, that is, 3 kg. She also comments on the well-consolidated relationship between the weight of a fleece and the weight system: since fleeces naturally vary in weight (e. g. in Alalakh text 1 sheep gives 1 $\frac{1}{2}$ minas wool, that



▲ Fig. 4. A lead balance weight from Akrotiri, Thera, inscribed with two triangles, may represent a two-mina standard.



▲ Fig. 5. A lead balance weight from Akrotiri, Thera, marked with four dots, may represent the weight of one sheep's fleece.

is a fleece of 704.7 g), such a “standard sized fleece” is theoretical, therefore “the concrete counting has been replaced by an abstract counting and measuring system for wool” (NOSCH 2014, 392).

The fullest series of lead discoid weights from a single house in Akrotiri on Thera, is considered as used for weighing wool, since also in the upper



▲Fig. 6. Silver rings, experimentally “weighed” in the smallest balance pan from Akrotiri, Thera.

floor of this house a large number of loom weights were found (MICHAILIDOU 2007; 2008a, 66-73). Although contemporary with the period of Linear A tablets, in the conversion of the larger specimens of the cluster into units of wool (MICHAILIDOU 1990, tab. III) it emerges that all might be multiples of Linear B denominations either of the M-unit or of the wool unit LANA calculated in weight M 3 = 3 kg. There must have been little difference in the scale of ponderal values – despite the different way of writing them – between the Linear A records, with which the balance weights are contemporary, and the Linear B accounts. NOSCH (2014, 393) supports – to my full agreement – that this combined wool logogram and metrogram LANA of Linear B script is well integrated into the LBA Eastern Mediterranean system of the talent and mina.

The important wool product, the textile, deserves a separate treatment as a trade item par excellence (for standardised and mass produced Mycenaean textiles, see NOSCH 2012, 50; cf. also TZACHILI 2001a; 2001b; MICHAILIDOU 2008a, 193-202).

Commodity money: The means of payment

POWELL's (e. g. in 1999, 227-228) definitions that barley and copper in Mesopotamia were the cheap money and silver the most expensive, are currently accepted by most scholars. In our discussion we will exclude barley because it was measured by volume. In Near Eastern texts, the Akkadian verb *šaḡālu* “to weigh” is used also for the action of paying (cf. RENGEL 1984, 102). Unfortunately, no Mycenaean accounts with values or prices of commodities are preserved (with very rare possible exceptions: SACCONI 2005).

Silver ‘money’

Silver was the main metal used as reserve of wealth and standard of equivalence from at least

ca. 2500-2350 BC (PEYRONEL 2010; 2014b). According to KRISPIJN (2016, 8) silver occurs as a means of payment already in the ancient *kudurrus*, the earliest contracts of landed property. And the use of silver in the dairy texts might indicate the ratio of 1 shekel silver to 5 liters of fat, which seem to be one of the earliest price equivalencies in history (KRISPIJN 2016, 9).

The difference in the rate of exchange of silver in Ashur and Anatolia was the commercial basis for the success of the Old Assyrian trade caravans (VEENHOF 2014, 393). Veenhof seeks in texts the shape in which silver circulated: apart from terms to be interpreted as bracelets, rings and coils and also broken ingots – forms known also in Ur III and Old Babylonian periods (cf. POWELL 1978; 1996) – Veenhof states that “silver was also stocked and circulated in the shape of cups, *kāsum*” which he defines as another form of “concrete money”. The weight of their silver is frequently mentioned, often preceding the noun, as if the amount of silver mattered more than its shape (VEENHOF 2014, 400). Finally, some moulds found in Kültepe/ Kanesh, with matrices possibly meant for ingots, “might have yielded circular bars with a weight of ½, 1 and 1 ½ mina of silver”. It seems that silver was refined and more probably cast into ingots in Anatolia before being shipped to Ashur (VEENHOF 2014, 417). Some marks – a cross for instance – on the moulds from Kültepe, perhaps facilitated the use of the produced ingots as weight-regulated objects (cf. MÜLLER-KARPE 1994, taf. 20.4,6a; also MICHAILIDOU 2008a, 60, fig. II.23).

As PEYRONEL (2010, 927) put it: “the debate on silver revolves around two basic questions: can we consider silver a form of currency? And how frequently silver passed from hand to hand?” There existed a reluctance to offer raw silver as gift: silver is listed among gifts only in the form of manufactured items (PEYRONEL 2014b, 360).

It seems that although there was a preference in payments in other commodities against the silver prices, silver did indeed change hands. Kleber notes in the Old Babylonian period, when silver in ingots and rings/coils remained high-range money with a higher significance for the commercial sphere than for local market, that it was still available to parts of the urban population, particularly used whenever geographical distances had to be bridged (KLEBER 2016, 38; see also DOĞAN/MICHAILIDOU 2008, 41-45 for silver carried by merchants).

For the Aegean/Minoan world, a monetary system based on metals is equally likely (cf. MICHAILIDOU 2008a, 266-267), although there is no secure textual documentation as yet to support this hypothesis. I have suggested that some silver rings found in a “shop” at the settlement of Akrotiri, Thera, may in fact represent this form of money, since they are found in the same room where two balances, with the biggest and the smallest balance

pans, were left behind (MICHAILIDOU 2008a, fig. V.54-55). The total weight of the rings (Fig. 6) is ca. 8.4 g, approximately 1 Mesopotamian shekel of silver. If we take the liberty to imagine the owner of the rings as travelling to the Near East in regions where commodity values prevailed according to the Eshnuna Law Code, then he could be able to exchange the rings for quantities of various goods, such as 300 liters barley or three liters best-quality oil or three minas copper or six minas wool *etc.* (MICHAILIDOU 2008a, 267). For a possible function of small axe-heads as currency, we note that the approximate weights of the (fragmented) silver axes of Arkalochori, Crete, vary from at least 2 shekels to half a shekel, and one shekel in Mesopotamia usually represents a month's payment for many trades (for more on the silver (and gold) axe heads of no functional use possibly serving as currency, see mainly MICHAILIDOU (2003) and below chapter on copper money).

Vargyas has drawn attention to cases where Mesopotamians used silver inside small, *pre-weighed and stamped* linen bags, as *e. g.* in the hoard from Larsa, dated 1738 BC (VARGYAS 2002, 113). The importance of a later "sealed silver" in a hoard from Tel Dor (11th-10th century) lies in the fact that it consisted mainly of small flat tokens cast in the shape of small coins and other pieces of cut silver (STERN 2001). For silver money still evaluated by weight and not merely counted in coins during the 1st millennium *cf.* chapters (with references) in KLEBER/PIRNGRUBER (2016).

Payments in copper

The language of value, although connected with the weight value of metals is not confined to it. Postgate points out that the metal pieces had both the practical value that the raw material of finished artefacts gave them as well as any value assigned to them *by society* as currency (POSTGATE 1992, 204, n. 345).

In the Sumerian debate between copper and silver (VANSTIPHOUT 1992; MICHAILIDOU 2008a, 124), copper emphasizes its great utility value against Silver's lack of practical use and describes silver as "forgotten in the soil inside the house" (from PEYRONEL 2014b, 355). We must emphasize that apart from its utility value, copper had also a pre-coinage function at the beginning of the 3rd millennium (PEYRONEL 2014b, 355) and it seems that it never ceased to have such a role in private, at a lower range, transactions, as *e. g.* recorded in the Deir el-Medina accounts already mentioned above.

Even agricultural tools were widely accepted for minor expenses in the Near East. In the Sumerian debate, the use value of the sickle is emphasized, as copper declares to silver: "...At harvest time you don't give man the bronze sickle. That's why no one takes any notice of you..." (PIGGOT 1996, 167). In texts recording transactions within Anatolia, 'old sickles' were used as means of payment by Old As-



syrian merchants (DERCKSEN 1996, 223), along with copper scrap (DERCKSEN 1996, 221-222). The following text is an example:

"I gave them two minas of tin, [x] minas in sickles, their expenses"

(CAD s. v. *nigallu*)

Aegean economies need not differ in this aspect. Scrap metal found at Akrotiri, like broken and non-repairable copper sickles, apart from recycling, may occasionally be kept to be given in private transactions (see MICHAILIDOU 2008a, 116-129).

Metal household vessels were acceptable to creditors as 'money' as, for instance, in a well known Egyptian papyrus (GARDINER 1935; MICHAILIDOU 2001b, 99; 2005, 39-40) where the value of a Syrian slave stated at 4 *deben* and 1 *qedet* of silver, is paid in copper vessels and cloth, with their values stated in silver at a ratio of copper/silver 100/1 (in the Ramesside period). No distinction in value is made between beaten *copper* plate and *bronze* vessels, which the seller claims that she has bought from her neighbors.

Copper may also have circulated in codified forms of currency of very low weight values, as is the view expressed for rings, strips and particularly bided strips (Fig. 7) found in Akrotiri, in the same room where also one balance and a set of lead balance weights, all under 300 g in weight, were found (MICHAILIDOU 2008a, 284-285, fig. V.74-75). Thus the tenant of the house was in a position to "weigh out" copper in codified forms for payment in transactions of lower values. Apart from Akrotiri on Thera, such bands of copper strips, possibly functioning as a liquid asset (BROGAN 2006; SOLES 2008), are found also in various places in Crete (Mochlos, Gournia and Juchtas). I have also suggested that 'sacred' representative money may take the form of small non-functional double axes, like the gold and silver miniature double axes from

▲ Fig. 7. Copper rings, each currently weighing ca. 1 g and bound strips, currently weighing ca. 5.5 g, from Akrotiri, Thera.

Arkalochori on Crete, perhaps of similar function as the *ḥaṣṣinnu* (=axe heads) cited by a text from Mari, elsewhere discussed (MICHAILIDOU 2003). Particularly for the same term in Nuzi texts, OPPENHEIM (1938, 659) has remarked “Notons bien qu’il ne s’agit pas d’une véritable hache, mais d’une *monnaie de bronze* en forme de hache”. I believe that a ‘cheaper’ form of sacred money may be represented by the thin copper cut-outs in the shape of axe-heads from Juchtas on Crete with no provision for the shaft and obviously mass-produced (MICHAILIDOU 2005, fig. 9).

Payments in gold

From a letter sent by the ruler of Ashur to the colony of Old Assyrian traders at Kanesh, we learn that there existed a law (inscribed on a stela) which prohibited the sale of gold to non-Assyrians on penalty of death, since the goal was the shipment of all gold acquired by the caravan-trade back to Ashur. There, gold functioned as a standard of value in the *naruqu*-system (the contributions of merchants to the joint-stock capital funds managed by individuals over the course of roughly a decade), although the actual investments were paid in silver. The rate of exchange between silver and gold was 4 to 1 at the time of investment, whilst the market value was 7 or 8 to 1, guaranteeing the investor a 100 % profit if the fund was successful (cf. DERCKSEN 2004, 81-86 with also the references).

What about the form of circulated gold? We have already mentioned cups and axe-heads of precious metals, which have something in common, possibly following the same way of circulation, as tribute, as gift and as a votive offering (cf. ZACCAGNINI 1991, 374). VEENHOF (2014, 400) applies the term “concrete money” to the goblets of precious metals (cf. also POWELL 1996, 238), and I have used the term “special purpose money” and “sacred money” even “representational monies” for the gold and silver axe heads and the cut-outs of copper in the same shape (MICHAILIDOU 2003, 313, n. 109-113).

Another form, significant to our study on forms of currency is the discoid one. Even at the beginning of archaic states, in the kingdom of Ebla of the Early Bronze Age, along with silver and gold bracelets and rings with standardized weights circulated among elites, there were gold and silver plates or DIB (= *discs*), with masses ranging from 10 shekels (ca. 78 g) up to 1 mina (470 g), suggesting that specific needs imposed a highly standardized manufacture (PEYRONEL 2014b, 363, n. 37-38).

If we now turn to the Aegean, LUJÁN (2011, 30) comments that the PY Jo 438 tablet, already discussed above, is at least indicative of a circulation of gold inside the Mycenaean kingdoms. To the gold cups already mentioned, we may add the gold discs without any means of attachment, found in enormous numbers in the Mycenae shaft Grave III (701 pieces), of two sizes weighing 1.5 and 3.0 g

(= 1/3 of the Levantine/Syrian shekel), recalling the Homeric *chryssio* talanta (*Χρυσσοῖο τάλαντα*), which Phaeacians offered to Odysseus as gifts: one *φάρος* (cloak) one *χιτών* (tunic) and one *χρυσσοῖο τάλαντον* (gold talent). In Homeric texts the talanta of gold are sometimes weighed and gold is described as precious (*τιμήεις*) and well worked (*εὐεργής*), so probably Homer conceived of gold in a physical form close to that of the Mycenaean discs (SVORONOS 1906; NICOLET-PIERRE 2006; MICHAILIDOU 2008a, 135-149).

Was there a *gold standard* in Mycenaean times? Texts in Babylonia from the reign of Burnaburias II (1359-1333 BC) display the innovation of replacing silver by gold as the index of value. This interlude in the Kassite period, with the introduction of gold standard in Kassite Babylonia, may be explained by a possible shortage of silver, an interruption in commercial routes or an excess of gold (see KLEBER 2016). Depending on qualities, the ratios recorded are 1:8 between “red gold” and silver, or 1:4 between “white gold” and silver. In Babylonia, physical gold rarely changed hands: in an interesting text on a lawsuit after a purchase of a slave, she is said to be bought for nine shekels of white gold but the payment is stated by the term KU.BABBAR-*ia*, meaning “my money” and consisting of other various undefined commodities. Whenever gold money – in contrast to the commodity of gold – is specifically listed, e. g. in an unpublished merchant’s archive, it is difficult to decide its form (KLEBER 2016, 39-40, n. 17).

Gold ring-ingots from the Acropolis treasure at Mycenae were weighed by THOMAS (1938/39, 72). They are exhibited in the National Museum at Athens (Fig. 3) together with the four gold chalices, already mentioned, and some gold coils. The rings are of the same diameter (2.5 cm) with weight-values as published of 21, 21, 21, 22 and 17 g, and Thomas considers them as probable forms of currency (cf. also RIDGEWAY 1889, 91). If the above measures are correct (cf. a different view by PETRUSO 1992, 12), then they can be attributed to the Linear B unit P, equivalent to 20-22 g and very appropriate for estimating precious metals. As for the gold coils, they are regarded by Thomas “as currency media, or more accurately, bullion in portable form from which pieces could be cut or broken as occasion arose” (THOMAS 1938/39, 74; cf. also POWELL 1978).

Gold coils from a Submycenaean tomb in Elateia, Greece, were considered by DAKORONIA (2007, 62) not as ornaments but as depositions for their value. She further comments on the custom of accumulating bronze rings or spirals in the tombs of the area considering them as a possible Charon’s fee for the deceased. Perhaps it is not irrelevant that during the 13th century onwards there were, according to written sources, three standards of value in Babylonia, simultaneously. Gold, silver and copper standards existed side by side (KLEBER 2016, 43).

Payments in wool

In Ebla of Syria, the palace paid with wool to purchase goods, especially in fairs. Sometimes both wool and textiles were used to purchase other goods and wool was also used as payment for various workers *e. g.* carpenters and smiths working in the temple, and for services by functionaries and workers in the palace (BIGA 2014, 144-145).

According to Old Assyrian texts, wool inside Anatolia was sold by colour and by quality (*e. g.* good, long, thick, soft) so the quantity of wool one could obtain against the price of 1 shekel silver varies from 2 to 10 minas. The average price was 6 minas for 1 shekel, as also in the Laws of Eshnunna, and the average production was 2 minas wool per sheep; for exceptional qualities the prices were higher, *e. g.* in one inscription we have an amount of "extra fine soft and long wool" valued in 2 shekels of silver (LASSEN 2010, 167).

In intra Anatolia trade, the Assyrians exchanged wool for copper. The usual price in copper was 2 talents of wool for 1 talent of copper. Wool was first exchanged to copper, then copper was turned to silver. *e. g.* in an Old Assyrian text, 30 minas wool (15 kg, that is $\frac{1}{2}$ talent) are to be sold to Anatolians for copper, at a ratio of 3:1 for copper ingots or 2:1 for ingot fragments, the latter case considered as a better bargain since the quality could be checked (DERCKSEN 1996, 58-59; MICHAÏLIDOU 2008a, 270). There were prices offered and prices per cost (LASSEN 2010, 172) as prices in Old Assyrian transactions were based on supply and demand.

In general, prices along large geographical areas depend also on the accessibility to silver resources. The standard of value of silver had less buying power in Anatolia than in Mesopotamia. In Mari (MICHEL 2014, 244-245), the prices are 15, 17, 20 or 25 minas per shekel and the goat hair is cheaper, one could buy 30 minas with 1 shekel of silver. Wool rations were also given as compensation by the palace of Mari.

I have suggested that the measuring units used in recording wool were related to the process of estimating value. It is not irrelevant that 6 minas (a weight value equivalent to the Mycenaean LANA unit and also to the *nariu* unit at Nuzi) is the quantity of wool equivalent to the price of one shekel of silver in the Laws of Eshnunna. The phrase "*I will give you (for 1 shekel of silver) 6 minas of fine soft wool*" (Old Assyrian) quotes to the same price in the Laws of Eshnunna: 1 shekel of silver for 6 minas wool which is equivalent in the same code to 2 to 3 minas of copper (POSTGATE 1992, 193, text 10:2).

This idea (MICHAÏLIDOU 2008a, 271), that the six-minas wool-unit, was defined on grounds of its value (six minas wool for 1 shekel silver) is supported by the division of the official Linear B LANA unit in 3 parts (three *dimnaia*) and not in 4 parts (as expected in relation to the Mycenaean production ratio of 4 sheep to one wool unit). This division facilitated: a) the integration of an existing

wool unit⁴ in the bureaucratic Mycenaean system of weight measures based on the unit M (the double mina) and b) the connection of wool's value with copper measured in double minas (M).

Thus, a common concept on weight standards for the commodity of wool was based to the *mode of production* (when measured by the clip of either one or four sheep) and also connected to the *exchange value*, estimated in copper. As for the clip of one sheep, if we take as an example the owner of a balance weight of this weight-value, such as the specimen from Akrotiri (Fig. 5), if he happened to be a wool producer, he would have been in the position to check by weight his produce in connection with the number of sheep. If a textile producer, he would be able to instantly calculate the cost of raw material in numbers of sheep. If he was employing human labour, he could have used it to estimate standard rations on the size of the payment to be made in wool. For, in conclusion, wool was commonly used as part of the rations for dependent personnel, as transit goods and as means of payment.

Payments in lead?

Weighing is an act related to the abstract idea of measuring, by the invention of a unit, also related to the actual materialization of *value*, by introducing 'metal value'. It is significant that the only problem referring to weighing in the Egyptian Rhind Mathematical Papyrus, asks for the value of precious metals, including lead (ROBINS/SHUTE 1987). Since metal value was a monetary concept in 'money barter', a question arises: were standards of lead also connected with the role of money? After all, POWELL (1996, 227-228; 1999, 14-15) defines lead as a cheaper form of money, along with copper/bronze and barley (and tin as a mid-range money).

Rings made of lead, as those from Kültepe (ÖZGÜÇ 1986), are regarded by DAYTON (1974, 50-51 with references) not merely as ornaments but also as a form of pre-coinage money, by following the concept applied to rings and coils made of precious metals, due to their precise value (in standard weight) and to the possibility of fractioning (PEYRONEL 2010, 933 citing DAYTON 1974; also POWELL 1978). "If the rings represent money it is interesting that examples of such rings of an overlapping type occur both in copper and in lead, as well as in silver..." (DAYTON 1974, 51).

The discussion at the end of this paper will concentrate on a possible multiple function of *the weight regulated discs made of lead, commonly identified as balance weights*.

The connection of the lead discs to metrology is evident, but Powell argues that "minas and shekels themselves were monetary terms in ancient Mesopotamia, as is evidenced not only by internal Meso-

4 In Younger's view, both in earlier Cretan Hieroglyphic and Linear A scripts, wool is recorded in units equivalent to LANA and sub units equivalent to the double mina (YOUNGER 2005).



▲ Fig. 8. A lead balance weight, of half the Minoan standard, may easily have functioned on the smallest balance pan (of diam. of 5.8 cm) from Akrotiri.

potamian usage but also by the fact that they turn up as words for monetary units in other languages” (POWELL 1996, 228). Words are always indicative⁵; the balance weight was in essence the *stone* that measures (*abnu* in Akkadian and *tnr* in Egyptian). In Deir el-Medina, a fragment of stone, whose function was to serve as a witness of the total mass of the yarn measured on scales with the help of two stone balance weights, bears the following inscription:

12 deben, with the weight of two stones, the weight of the yarn of PN

(VALBELLE 1977, 3-4)

The main question arising, is why in Minoan and Mycenaean economies, the items identified as balance weights are not made only of stone but also of lead. Lead was certainly “valued for its own qualities, particularly that of high density and hence heavy weight per unit of mass” (MOSSMAN 2000, 105), so this was one of the advantages (Fig. 8) pointed out by PETRUSO (1992). The disadvantage was the minor accuracy as compared to stone weights, therefore there was some range of weight values among balance weights constructed around the same unit. I suggest that while the stone weights are closer to the idea of official weights (Fig. 9), the lead discoid weights, easy to reproduce (MICHAILIDOU 1990), are close to the idea of the Standard Average Quantity (*cf.* last paragraph of this paper).

To date only texts from Mari (JOANNÈS 1989) mention the use of lead balance weights (unspecified in shape) by the palace administration for weighing heavier masses, along with lead ingots in two different types, *kubdu* and *lê'u*. But, there is as yet no physical representation of lead weights in Mesopotamia. Lead discs, more or less similar to the Aegean balance weights, are identified in the

archaeological record of central Anatolian sites (as already BUCHHOLZ 1980, 231-232, n. 43). Whatever the origin of concept, they are thicker than the Aegean, more close to the idea of ingots (MICHAILIDOU 2015). PEYRONEL (2016), in his important article on lead ingots, emphasizes that a precise functional distinction between ingots and weights is not always possible but tends to believe that those from Kültepe are balance weights, since their masses are related to weight units (PEYRONEL 2016, 107-109 with references; *cf.* also more references to these lead discs in MICHAILIDOU 2015).

In one of the Old Assyrian texts where straw is given against copper items, we read (DERCKSEN 1996, 80): ‘...5 bundles: I am holding as pledge 2 *su'u* (discs of metal)’. It is interesting that the metal mentioned here as pledge is defined in the form of discs. We have already discussed that the discoid shape was favorable for ingots of precious metal, *cf.* gold ones from the Uluburun wreck (PULAK 2005), and flat discoid silver ingots from Ebla (PEYRONEL 2010, 944, fig. 4). In order to consider the possibility that also lead discs, as ingots of special shape, may function as currency, we must face the subject of *the value of lead*.

PEYRONEL (2016, 104) emphasizes the widespread class of lead figurines produced during the Middle Bronze Age in Anatolia. Lead figurines were also found in Mycenaean contexts. Lead vessels were found in numbers at the main Mycenaean sites (see MOSSMAN 2000, 90-94, 102, fig. 5-6), and bun ingots were also found in domestic and workshop contexts (MOSSMAN 2000, 98). MOSSMAN (2000, 102-103) notes that we do not have documentary evidence for the value of Mycenaean lead, and if we take the example from the Rhind Mathematical Papyrus, where lead is half as valuable as silver, we should take into account that value may change with time and geographical area. To my view, local availability of the metal is not a crucial parameter for lower value, since interregional demand may increase its exchange value. I am not sure if the deposition of six huge lead vessels in the Shaft Graves of Mycenae, along with many vases of precious metal, points only to the availability of lead. Very indicative for the accumulation of lead in palatial contexts is the large amount of lead in ingots, with a total weight of more than 500 kg, stored in the Northern palace in Ugarit (PEYRONEL 2016, 110). The ingots are of various dimensions and shapes (mainly disc- or oval shaped). If we turn to the oldest – Early Bronze Age – lead ingot from Ebla, again from a palatial context (Royal Palace G), this is a very interesting example of a weight regulated ingot: made of pure lead and cast in plano-convex shape in an open mould, it corresponds to *six western minas* of 470 g (PEYRONEL 2016, 105). Converted to Aegean wool units, it represents a standard similar in weight with the 3 double minas of the later, Mycenaean, LANA unit.

5 Powell also concludes that the Sumerian sign for “shekel” actually seems to be the stylized picture of an axe and moreover, the Sumerian word “gin” not only means shekel but also axe.

The same quantity of lead (3 kg) is recorded in the single Aegean textual evidence of lead (*mo-ri-wo-do* = Gk. *moliwdos*), from the Knossos palatial context (CoMIK II):

KN Og 1527

1.]	mo-ri-wo-do M 3
2.]2	mo-ri-wo-do M 3
3.]N 2	mo-ri-wo-do M 3
4.		mo-ri-] wo-do M I[

I quote DEL FREO's (2014, 23) description in his article on the tablet KN Og 1527: "On the first three lines, *mo-ri-wo-do* is always followed by the weighed quantity M3 (*ca.* 3 kg); on line 4 it is followed by M I[but, considering the position of the figure and the size of the lacuna, the amount is probably incomplete and can be restored as M 3. On lines 2 and 3, immediately right of the break, the amounts]2 and]N 2 (*ca.* 0.5 kg) are still visible. Finally, given the physical characteristics of Og 1527, it is likely that the tablet was originally twice as wide as the present fragment and that it contained a list of commodities arranged in two parallel columns". He suggests that the preceding commodities may be all of metal, but in the Og series there are also records of M 30 of ivory, M 1[of *ri-no*, RO 2 (of saffron?). According to DEL FREO (2014, 24), the missing part may contain the names of commodities or the names of individuals followed by the ideograms of the commodities. He suggests that the tablet registered distribution of lead (and perhaps of other metals too) for the production of lead balance weights, and he further mentions the comment (by MICHAILEDIOU 2001b, 105) on the consistency of the quantity M 3 of lead to the LANA wool unit and to the actual lead discoid balance weights weighing 3 kg from Akrotiri and Thebes.

The fact that the same quantity of lead is repeated four times (?) perhaps has its parallel in the allocations of copper/bronze in some Jn tablets, but may have another meaning *in combination with the different quantities registered in the unpreserved column*. This repetition of the M 3 lead quantity in the second column recalls the repetition of shekel 1 silver quantity, again in the second column, of the text of the Eshnunna Law Code (YARON 1988, 44-45) with the following prices of commodities:

6 minas wool for 1 shekel of silver
3 minas copper for 1 shekel of silver
2 minas wrought copper for 1 shekel of silver, etc.

In accordance with the above, we may suggest a very daring restoration, only as an alternative working hypothesis⁶:

⁶ With an arbitrary, though indicative, selection of the commodities for the first column.

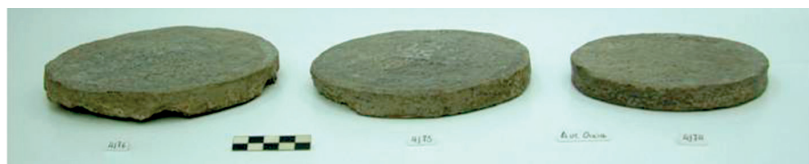


▲ Fig. 9. A marble discoid balance weight from Akrotiri, inscribed with a circle and representing the Minoan standard of 62 g, tested inside the same smallest balance pan.

1.	LANA 1] mo-ri-wo-do M 3	1:1	(6 minas wool: 6 minas lead)
2.	ri-no M]2 mo-ri-wo-do M 3	⅔:1	(4 minas linen: 6 minas lead)
3.	AES M 1]N 2 mo-ri-wo-do M 3	½:1	(3 minas copper: 6 minas lead)
4.	ka-ko M 1 mo-ri-] wo-do M I[⅓:1	(2 minas copper: 6 minas lead)

If tablet Og 1527 preserves a unique indication of lead functioning as a unit of account, we should take into account that no similar text is as yet preserved. However, this tablet is both contextually and paleographically isolated (DEL FREO 2014, 26). We will not proceed further, for the time being, and only face the obvious question: was lead used for payments? In the best archaeological documentation available, that is, the distribution of lead discs among houses in Late Bronze Age Akrotiri, it is evident that whole clusters of lead discs, found in some houses, are connected with the metrological tables for this period, therefore their function as balance weights is more probable than as merely weight regulated items. However, there are houses revealing only one or just a few (MICHAILEDIOU 2008a, 59-100), how useful these might be for weighing? The discoid lead ingots/ weights from Middle Bronze Age Kültepe, found in houses, workshops and rarely in burials, are mostly *isolated finds*, according to the published information on contexts (as supports PEYRONEL 2016, 108). For Mycenaean period, MOSSMAN (2000, 102) argues that the weights *found singly*, may have a different function from those sets of weights used for measuring.

► Fig. 10. Intact or deliberately fragmented lead discs. The stone disc in the middle of the last row, was found in Akrotiri together with a lead weight and two balance pans.



▲ Fig. 11. The three heaviest lead discs from the cluster of 27 weights found in the West House at Akrotiri, possibly a weaving workshop. The smallest on the right, is equivalent to the wool unit.

There follows the next question: why a few balance weights at Akrotiri were deliberately cut? (Fig. 10). Even small ingots stored in palatial context at Ugarit, had been deliberately cut into pieces (PEYRONEL 2016, fig. 6) some are comparable to fragmented lead weights at Akrotiri. And I quote recent words on the practice of *weighing money* in the ancient Near East, even in the period when coins were elsewhere counted: “it is well known that money, whether coins or scrap silver, was weighed until the end of cuneiform documentation. Coins were considered bullion and were weighed on a balance. *If a weight smaller than the coins was needed, the coins were cut into pieces without hesitation*” (VARGYAS 2002, 113).

In conclusion, the Aegean lead discs, along with their function as balance weights, they represented formalized metal bullion accepted by their society as *customary standards* (Fig. 11), in contrast to the *official standards* represented by well worked stone balance weights⁷ (as Fig. 9). The customary standard was brilliantly named (in IALONGO *et al.* 2015) as representing the Standard Average Quantity – SAQ – a convenient tradable quantity of mass, in fact a very practical unity. When materialized in metal (of whatever form) it also functions as currency in pre-coinage economies.

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⁷ It is significant that in Akrotiri, many stone weights were also customary standards, cf. MICHAILIDOU 2006.

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Address of the author

Anna Michailidou
Section of Greek and Roman Antiquity
Institute of Historical Research
The National Hellenic Research Foundation
Vassileos Constantinou 48, Athens 116 35
Greece
amihail@eie.gr

The identification of balance weights in pre-literate Bronze Age Europe: Typology, chronology, distribution and metrology

by NICOLA IALONGO and LORENZ RAHMSTORF

Bronze Age, Europe, balance weights, typology, chronology, metrology

In this chapter we address the archaeological evidence for balance weights in pre-literate Bronze Age Europe (ca. 2300-800 BC, with the exception of the Aegean), as a proxy for the adoption of weight-based trade. The study is introduced by a theoretical and methodological framework for the identification of balance weights, in the absence of inscriptions and texts. The analyzed sample amounts to 566 potential balance weights, with a distribution covering most of continental Europe and major Islands. Five major formal types are identified. The statistical analyses support the identification for the sample under analysis, and suggest the existence of a “Pan-European” weight system. The results of the study show that weighing equipment, and hence weight-based trade, was widespread in Bronze Age Europe at least by the mid-2nd Millennium BC.

Die Identifizierung von Gewichten im bronzzeitlichen Europa (ohne Griechenland): Typologie, Chronologie, Verbreitung und Metrologie

Bronzezeit, Europa, Gewichte, Typologie, Chronologie, Metrologie

In diesem Beitrag werden die archäologischen Funde von Gewichten aus dem bronzzeitlichen Europa (ohne Griechenland) zwischen ca. 2300 und 800 v. Chr. als ein Beleg für die Aufnahme eines gewichtsbasierten Handels angesehen. Zunächst wird der theoretische und methodische Ansatz zur Identifizierung von Gewichten dargelegt, der hier verfolgt wird, wenn man nicht auf Inschriften und Markierungen auf solchen Objekten sowie auf Texte, welche die Verwendung von Gewichten erwähnen, zurückgreifen kann. Die Stichprobe umfasst 566 potentielle Gewichte, die über große Teile Europas verbreitet sind. Fünf hauptsächliche formale Typen können unterschieden werden. Die statistischen Analysen unterstützen die vorgeschlagene Identifikation der behandelten Objekte als Gewichte. Darüber hinaus legen sie die Existenz eines “pan-europäischen” Gewichtssystems nahe. Die Ergebnisse der Studie zeigen, dass Werkzeuge zum Wiegen und damit gewichtsbasierter Handel im bronzzeitlichen Europa weit verbreitet waren, zumindest ab der Mitte des 2. Jahrtausends v. Chr.

1. Introduction

How was the value of physical things estimated in early times? Which devices were used in such an evaluation process? And how can we detect them in the archaeological record? These are some of the questions which are being addressed in a current research project which focusses on the early history of weights and concepts of value¹. With the Copper Age and even more extensively during the Bronze Age metals changed preexisting concepts of value. Their low volume, portability, storability, preservability and meltability made metals excellent candidates for a measure of value. However, metal needed new formats for its value to be assessed, because it cannot be counted easily as it is amorphous in its physical state. During the Copper Age and the Early Bronze Age (in most parts of Europe) this problem was probably solved by using *aes formatum*: artefacts which were intentionally standardized in shape and therefore also roughly in mass (RAHMSTORF 2016a, 25-27). Before then, metals had no established relations of value to the other goods. New cognitive frameworks were needed in order to assess their value precisely: metals required an understanding of the concept of weight and the abstract expression of certain units of measurement. As a consequence, this had implications for abstract and mathematical thinking. In the context of exchange, the use of weighing equipment in economic transactions implies the abstraction of the concept of economic value, and the detachment of trade from ceremonial means of exchange (*cf.* RENFREW 2012). Regardless of whether the exchange system is based on currency or barter, assigning a value to a trade-good based on its weight requires the existence of an established “index of value” (POWELL 1979). Such indexes of value are well expressed in Ancient Near Eastern documents, like for example the Codex Ešnunna, which lists commodities one could buy for one shekel (in this case *ca.* 8.4 g) of silver (POSTGATE 1992, 192-193, text 10:2). This justifies why, within an economic-anthropological perspective, the spread of weighing equipment in Bronze Age Europe is regarded as the material correlate of “commodification” (PARE 2013), *i. e.* the process according to which the value of goods and services becomes commensurable based on an abstract frame of reference. Weighing equipment represents the necessary technology for this process to take place, as it is documented in the Bronze Age of the Mediterranean and the Near East. The abstraction of economic value according to an external index, in other words, allows incommensurable quantities to become commensurable, facilitating their circulation in economic networks. Commodities, however, have dynamic lives. Goods, services, ideas and people can enter

and exit the status of commodity several times during their life-spans, in modern as well as in ancient societies (BOURDIEU 1977; APPADURAI 1986). Understanding if, when, how and to what extent this process might have taken place represents the ultimate goal of metrological research in Prehistoric Europe.

The debate on the Ancient Near East has long moved past strict Polanyian positions. Terms like “market”, “money”, “profit” and “private economy” have become commonplace in the archaeological and historical lexicon (*e. g.* POWELL 1996; STEINKELLER 2004), without this implying rigid mercantilist interpretations of economic agency. On the other hand, a proper debate on the many facets of the economy of pre-literate Bronze Age Europe never actually took place, at least not with the same intensity. Since SAHLINS’ (1972) seminal work, prehistoric economy has been a somewhat elusive subject, mainly focusing on its connections with power rather than on its mundane, utilitarian aspects (*e. g.* EARLE 2002). For Bronze Age Europe, some conservative positions still deny the very existence of “trade” proper (HARDING 2013), or tend to explain every instance of economic interactions in terms of ceremonial exchange (BRÜCK 2016). On the opposite side, in the last 25 years or so, a few studies began posing the question of interested economic agency, focusing on weight-based exchange as its material correlate (*e. g.* PERONI 1998; PARE 1999; 2013; RAHMSTORF 2010; 2016b; 2019; RENFREW 2012; BRANDHERM 2018; IALONGO 2018).

Despite how promising this approach may look for future developments in understanding prehistoric economies, our knowledge about the tools of weight-based exchange is still extremely scanty, and every attempt to bring metrological studies to the fore of the economic debate must start from a serious appraisal of its material evidence. In this article, we present the first holistic attempt to address the growing corpus of weighing equipment collected, so far, in the framework of the ongoing research of the Weight and Value Project. The study aims at providing a starting point for future research on weight-based exchange, addressing the typology, distribution and metrology of potential balance weights.

2. The identification of balance weights: A hypothetical process

In a fully prehistoric context, such as pre-literate Bronze Age Europe (outside of the Aegean), the identification of potential balance weights is a hypothetical process (IALONGO 2018); the absence of texts and inscriptions, in fact, makes the task more difficult than it is in regions and periods where writing is available (RAHMSTORF 2010). “Hypothetical”, however, does not necessarily stand for “uncertain” or “inaccurate”; it simply implies

1 ERC-2014-CoG ‘WEIGHTANDVALUE: Weight metrology and its economic and social impact on Bronze Age Europe, West and South Asia’ [Grant no. 648055].

that the identification must follow a rigorous hypothesis-testing process.

Pre-literate Bronze Age Europe is an almost uncharted territory. A few pioneer studies have brought the question of balance weights to the fore, by testing potential evidence and proposing convincing identifications. However, we are still far away from a sound knowledge of balance weights as an independent object-category. We still cannot rely on a well-developed *corpus* of information that can aid in univocally connecting the shape of an object to the function of a balance weight. Here lies one of the greatest challenges for the identification: unlike, *i. e.*, swords and axes, the function of a balance weight is (almost) completely unrelated to its shape, and (almost) completely dependent on its mass. Since the earliest adoption of weighing technology, balance weights can assume a variety of forms during the Bronze Age, such as sphendonoid and duck-shaped weights in Mesopotamia (*e. g.* HAFFORD 2005, tab. 1); theriomorphic metal weights in the Levant, Cyprus and Egypt (in the Late Bronze Age *e. g.* SKINNER 1954; TODD 1989; BORDREUIL 2008, fig. 26-27); spool-shaped, disc and sphendonoid weights in the Aegean (*e. g.* ALEXIOU 1967, pl. 28a; PETRUSO 1992; RAHMSTORF 2003), and cubic and biconical weights in the Indus Valley (HENDRICKX-BAUDOT 1972; MILLER 2013). If it were not for the rare occurrence of inscriptions and quantity-marks on balance weights from the Mediterranean and the Near East – and for the correspondence between text-derived and empirically-calculated conversion factors – most of these objects would have gone unnoticed as miscellaneous “small-finds” (RAHMSTORF 2003; 2010). This brings us back to the question of how we might be able to identify, with some confidence, the likely wide variety of balance weights in Bronze Age Europe, without the aid of ancient writing.

A first working hypothesis can be formulated as follows: an object can be a balance weight if

1. it has a recurrent shape, that is not plausibly connected to any other practical function;
2. it does not present use-wear that can be plausibly connected to any other practical function;
3. its mass can be ascribed to a rational unit-system.

The presence of quantity-marks can obviously aid the identification, but their occurrence is too rare to represent a requisite. Only a small percentage of the whole dataset of weights (and excluding the potentially large corpus of pebble weights – see below) in the East Mediterranean and the Near East have quantity-marks. *Ca.* 11 of 480 spool-shaped weights (2.2 %) in the Early Bronze Age Aegean and Anatolia are marked (RAHMSTORF 2016c, 241); on 27 of 765 weights (3.5 %) from Mesopotamia marks are present (MELEIN 2018,

34) and 4.4 % of the ancient Egyptian weights bear inscriptions, most often including a marking (COUR-MARTY 1991, 142). The lead and stone disc weights from the Aegean of the 2nd millennium BC are an exception in this regard, because one quarter of them is marked (PETRUSO 1992: see catalogue). In the Indus valley not a single marked cubical weight is known. The association of potential weights and balance beams or scale-pans is extremely important, but the case is so rare – even in the Eastern Mediterranean and in the Near East – that it cannot be considered a mandatory requisite either. For example, only in four graves (Vaphio, Kazarma, Thorikos, Mavro Spilaio; see STEINMANN 2012, 282 n. 78) scale pans and weights have been found together in the Bronze Age Aegean, and there are approximately another 30 graves where either weights or scales have been recorded, including also some Early Bronze Age graves with spool-shaped weights. Such an “empirical checklist” can aid the identification of potential balance weights, but it is still flawed in several aspects. For example, use wear such as traces of pounding is not always an argument against the identification. Use-wear traces from secondary use are quite often documented on balance weights (PETRUSO 1992, 4; RAHMSTORF 2016c, 245-246). Moreover, different shapes are not necessarily related to different weight-systems; in other words, a given weight-system can make use of different formal types of balance weights, and different weight-systems can make use of the same formal types of balance weights. Furthermore, the same formal types can be shared by both balance weights and other kinds of related or even unrelated tools, such as duck-shaped seals in Mesopotamia (BUCHANAN/MOOREY 1988) and spool-shaped weights and pestles in the Aegean (*cp.* WILSON 1999, 150-151, pl. 96, SF-111-SF129, SF130-SF-132). Finally, it is also very likely that even apparently homogeneous assemblages include balance weights belonging to different weight-systems (*e. g.* PETRUSO 1992; ASCALONE/PEYRONEL 2006; HAFFORD 2012; IALONGO *et al.* 2018a).

In order to solve the intricacies of balance weight identification, it is necessary to abandon an object-oriented approach, and to adopt a category-centred one. In other words, we need to give up on the possibility of confidently identify single objects, and focus, instead, on entire categories: we must ask if a whole object-category possesses the requisites that can let us interpret it as a potential *class* of balance weights. This entails accepting that not every single object in that class must necessarily present all the requisites, but that the class, as a whole, has an acceptably low occurrence of exceptions (*i. e.*, a moderate deviation from the norm) to be considered valid. The drawback of this approach is, of course, that once we are confident with the identification of a class, it is not given that every single object in the class is actually a balance weight.

By focusing on entire object-categories, rather than single objects, we can now formulate the balance weight hypothesis. An object-category can be confidently identified as a class of balance weights if:

1. it has a standardized shape, that is not plausibly connected to any other practical function;
2. it is made of a hard and durable material, like stone or metal;
3. it is found at least occasionally in sets (two or more similar objects appear together in a closed archeological context);
4. it does not show systematic presence of use-wear, that can be plausibly connected to any other practical function;
5. individual objects can be ascribed to rational multiples of one or more unit-systems;
6. deviation from the norm, in every aspect, must be within an acceptable margin of error.

This kind of approach cannot lead to unquestionable identification. However, it has the advantage of being explicitly enunciated, empirically testable and, above all, analytically falsifiable. In other words, the balance weight hypothesis – once positively tested – “holds” until a better explanation is proposed.

3. Balance weights in Bronze Age Europe: The state of research

General quantification

Pre-literate Bronze Age Europe provides an exceptional sample of balance beams. At least 18 bone/antler balance beams are known from Late Bronze Age contexts (RAHMSTORF 2014a, fig. 1, 1-7.14; IALONGO 2018; ROSCIO 2018), and several more uncertain exemplars (CARDARELLI *et al.* 2001; RAHMSTORF 2014a, fig. 1, 8-13). This documentation is outstanding if compared, for example, to the Ancient Near East, where only very few balance beams are known for the entire Bronze Age (*e. g.* GENZ 2011), despite thousands of balance weights occurring in hundreds of contexts. The European sample certainly represents only a small part of all the balance scales that must have been in use in the Bronze Age. We know from Sumerian texts that, at least since the 3rd millennium BC, balance beams and pans were normally made of wood (PEYRONEL 2011). Bone and antler balance beams likely represented rare exceptions, while most of the tools were made of wood, and they are hence not preserved whereas bronze scale pans are preserved from a few Mesopotamian (MÜLLER-KARPE 1993, pl. 66) and Aegean sites (STEINMANN 2012, 282 n. 78).

A few studies have led to the identification of a sound sample of potential balance weights from Bronze Age contexts, all over Europe (excluding

Greece: CARDARELLI *et al.* 1997; 2001; 2004; PARE 1999; VILAÇA 2003; 2011; LO SCHIAVO 2006; FETH 2014; IALONGO 2018; 2019; RAHMSTORF 2019) (Fig. 1). All these studies target broad territories, and attempt to analyse the question of balance weights critically, based on contexts, typology, distribution and metrological analyses, and they constitute the groundwork on which any subsequent research on balance weights in prehistoric Europe should be based. Use-wear traces are never systematically present on classes of potential balance weights addressed by these studies. The analysis of use-wear on the materials newly acquired in the framework of the research project was executed both at a macroscopic level and with the aid of a 3D scanner. Wear marks were recognized in almost none of the objects that were identified as potential balance weights.

The sample amounts to 566 objects, distributed in 162 sites. 360 objects belong to settlements (64 %), 137 to graves (24 %), 19 to hoards (3 %), 13 are from cultic contexts (caves and Sardinian sanctuaries (2 %) and 37 from undetermined contexts (7 %).

Potential balance weights in Europe present the whole range of materials commonly recorded in Aegean and Near Eastern assemblages: 172 are made of copper/bronze (30 %), 34 of lead (6 %) and 356 of stone (63 %) (Fig. 2). In four cases the material remains unclear (1 %).

Typology

Thirteen different formal types can be singled out (Fig. 2). Rectangular, *Kannelurensteine*, piriform, disc and spherical weights are the most frequent types; counted together, they represent 90 % of the sample, and they will be analysed in detail. “Pebble-weights” represent a problematic category, and they were not included in the count. There is evidence that common pebbles were used as balance weights. There are at least two cases where natural pebbles, with apparently regular mass-values, are associated with scale-beams in closed contexts: one from a grave (Le Petite Moulin, France; ROSCIO *et al.* 2011; RAHMSTORF 2014a) and one from a pit in a settlement (Bordjoš, Serbia; MEDOVIĆ 1995). However, natural pebbles occur very frequently in every kind of excavation and surface collection, and systematically separating potential balance weights from ordinary tools and random occurrences of natural rocks would be impossible. Therefore, potential pebble weights were not considered.

Geographical distribution

Despite a few voids in the distribution (entirely dependent on the history of research), weighing equipment is widespread everywhere in Continental Europe and on major Islands. As mentioned before, Greece is excluded from this study (see *e. g.* PETRUSO 1992; RAHMSTORF 2016c). Based on

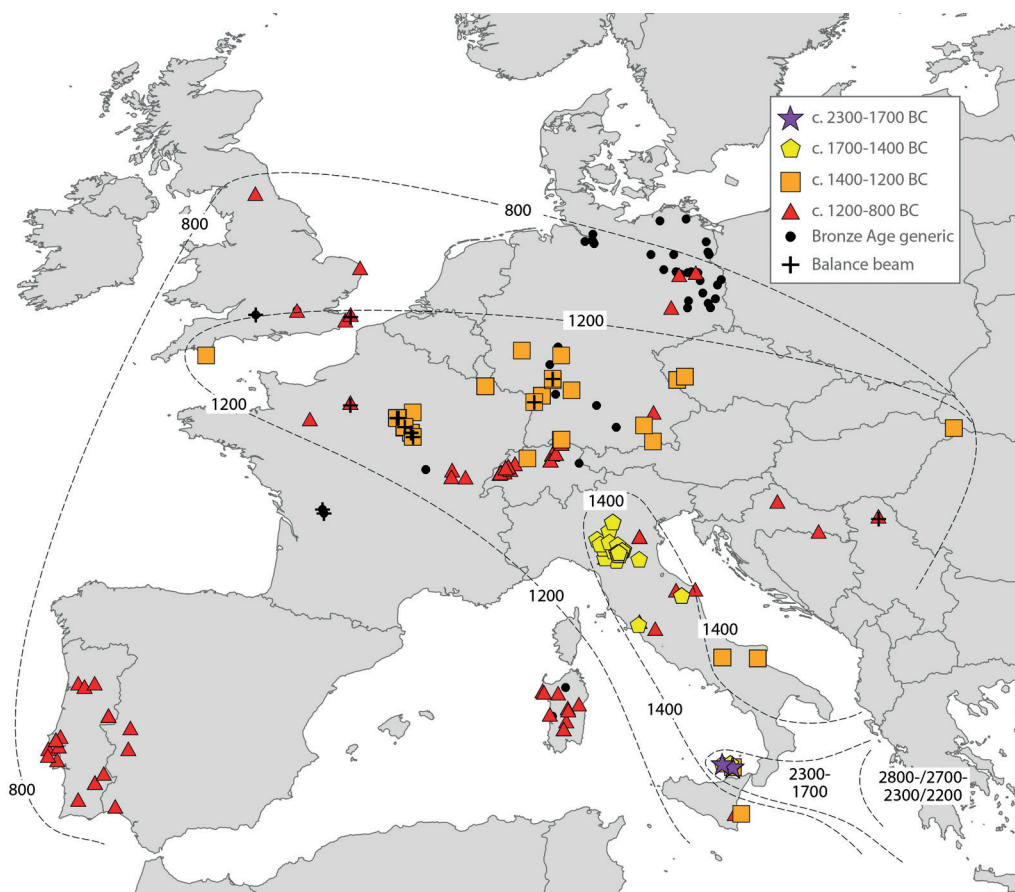


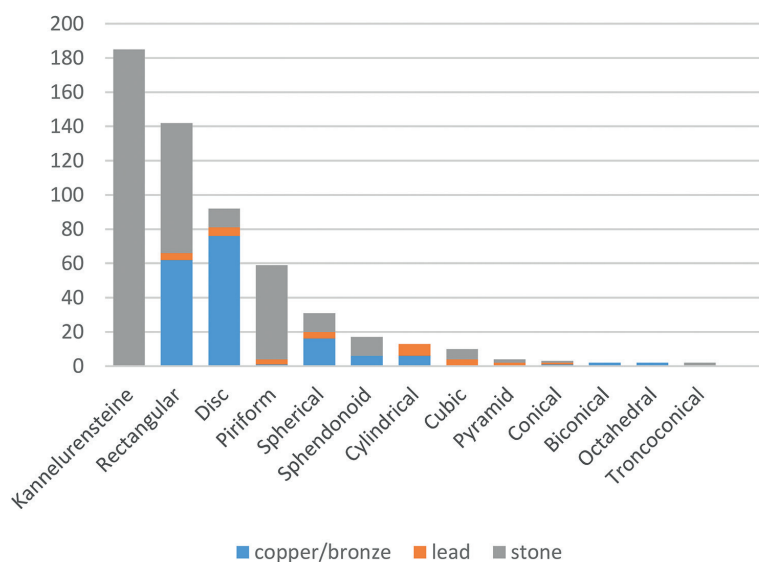
Fig. 1. Diachronic distribution of weighing equipment in BA Europe.

the chronology of the find contexts, the sample was divided into four arbitrary phases, taking into account the correlation of several different regional sequences (Fig. 3).

The finds from The Aeolian Islands (Sicily, Italy; IALONGO 2018) represent the only attestation in the first phase (*ca.* 2300-1700 BC), with fifteen potential balance weights belonging to layers dated to the Early Bronze Age.

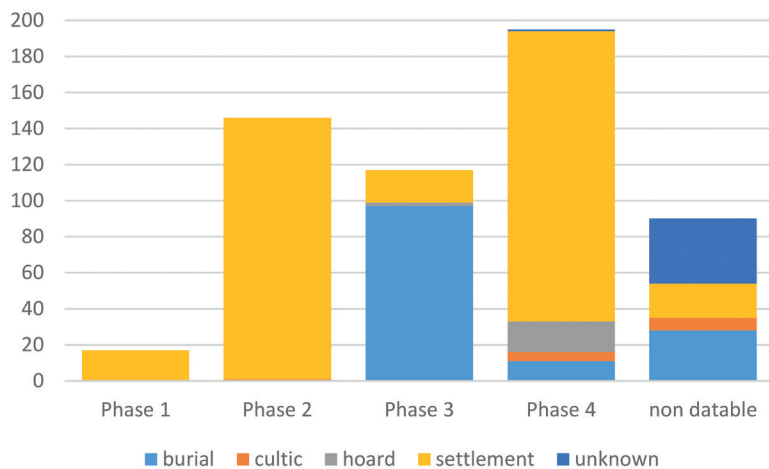
The distribution of the second phase (*ca.* 1700-1400 BC) is still limited to Italy. Many potential balance weights are documented in the *terramare* settlements in the Po Plain, all in stone. Very few finds have reliable find contexts, most of them coming from old excavations (CARDARELLI *et al.* 2001). However, *terramare* seem to begin around 1600 cal. BC (VANZETTI 2013). Not all the finds illustrated in the map may date so early; however, at least one balance weight from the site of Gaggio comes from a reliable context, belonging to a settlement-phase beginning approx. 1600 BC (BALISTA *et al.* 2008).

Finds belonging to the third phase (*ca.* 1400-1200 BC) are widespread between Italy and central Europe, and mostly belong to funerary contexts. Nineteen bronze balance weights are documented in Thapsos (Sicily, Italy) from two collective graves (IALONGO 2019). Weighing equipment is also widely attested in central European graves dating to Bronze D (*ca.* 1350-1200 BC), where weights are often associated with balance beams (PARE 1999;



ROSCIO *et al.* 2011; ROSCIO 2018). The easternmost finds known to date belong to the same phase, from the hoard of Tiszabecs, in Hungary (PARE 1999). In the site of Salcombe (England) two balance weights (RAHMSTORF 2019) were found together with nearly 400 metal objects on the bottom of the Channel, off the coast of Devon (NEEDHAM *et al.* 2013); most of the objects date to the Penard phase (*ca.* 1300-1150 BC), a few to the Ewart Park phase (*ca.* 1000-800 BC). It cannot

Fig. 2. General quantification of potential balance weights, according to their typology.



▲ Fig. 3. Diachronic quantification of potential balance weights, according to types of contexts.

be excluded that the assemblages stem from two different events (cp. WANG *et al.* 2016, 90). The balance weight with wavy mouldings is similar to weights from the third phase in central Europe and is the westernmost earliest weight known so far.

The fourth phase (ca. 1200-800 BC) includes finds from northern Germany, England, Portugal and Sardinia. The finds from northern Germany coming from reliable contexts are dated between Periods IV and V of the Nordic Bronze Age (ca. 1100-800 BC); they consist of three cremation graves (BUSSE 1900, 55; SEYER 1967; SCHMALFUß 2007, fig. 2) and a small votive deposition containing weapons, ornaments and scrap metal (REINBACHER 1956). All these contexts contain *Kannelurensteine*, a class of stone objects widespread between Italy and Central Europe, for which statistical tests support the interpretation as balance weights (CARDARELLI *et al.* 2001; IALONGO 2018). In England, all the collected evidence is dated between the phases Penard and Ewart Park (ca. 1300-800 BC; RAHMSTORF 2019). The balance weights from Portugal seem to belong to the Iberian Bronze Final (ca. 1200-800 BC; VILAÇA 2003; 2011; VILAÇA *et al.* 2012). Most of them seem to date late within this timespan. Finally, finds from Sardinia entirely belong to the Primo Ferro period, datable between ca. 950-725 BC (IALONGO 2018).

Different types of contexts are unevenly distributed in the four phases (Fig. 3). Materials from phases 1 and 2 come exclusively from settlements, while in phase three there is a striking predominance of burials, with the few settlements being documented exclusively in Italy. This indicates that the sample is unbalanced: settlements being clearly underrepresented in central Europe means that there is a large amount of documentation still to be assessed, and that the late appearance of weighing equipment in central Europe might simply depend on the fact that settlements have been insufficiently sampled. Phase 4 appears more balanced, with a predominance of settlements but more or less evenly distributed.

In summary, weighing technology is first attested in the western Mediterranean around 2000 BC, and it is widely adopted between Italy and central Europe by at least ca. 1400 BC. The seemingly later appearance in the Atlantic façade is based on scanty and discontinuous data, and shall require further investigation. The unbalanced documentary framework suggests caution in interpreting the distribution map. The ‘appearance’ of weighing equipment in different regions of Europe should be regarded, for the time being, as a *terminus ante quem* for the adoption of weight-based trade, rather than an accurate representation of a gradual spread.

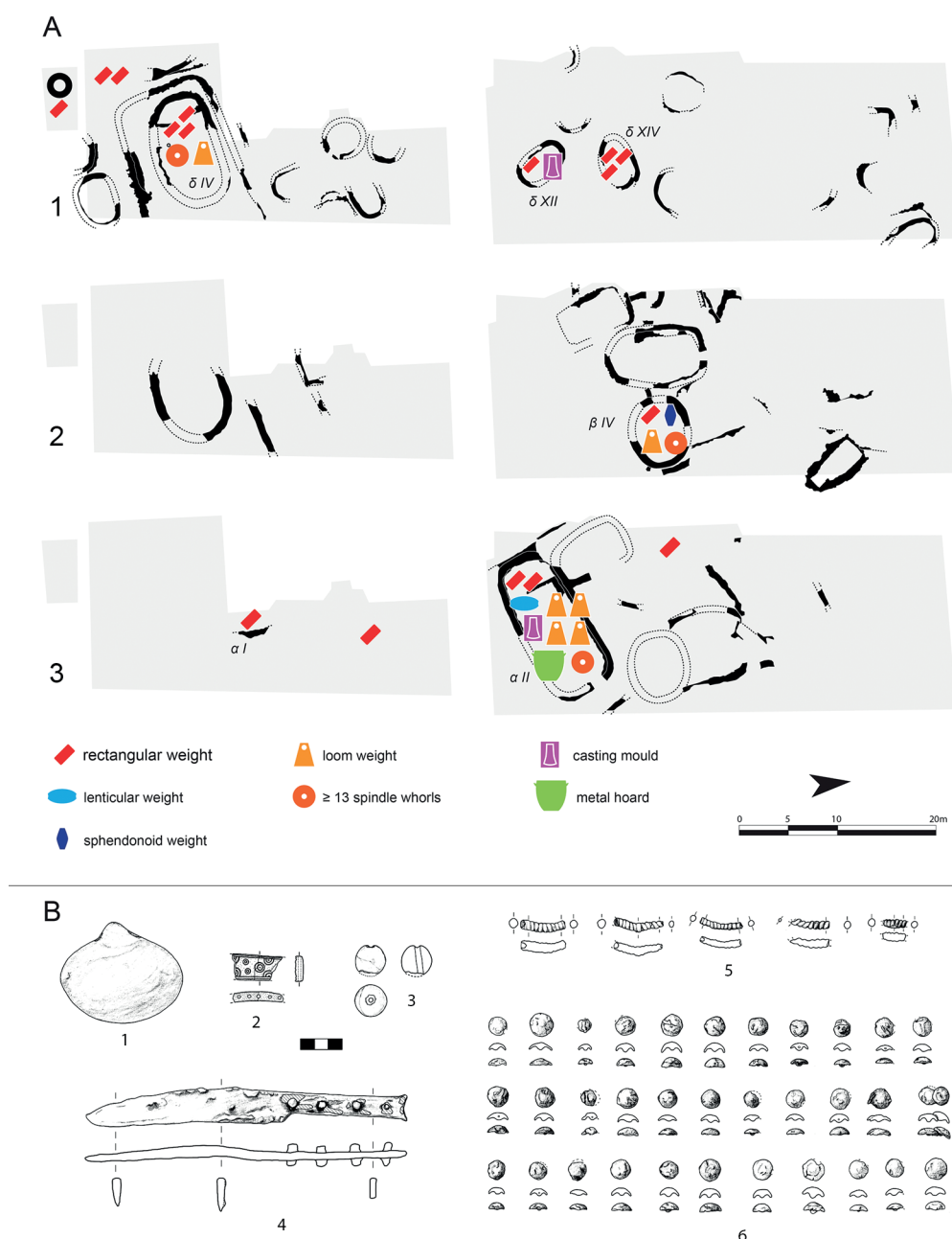
Contexts

Potential balance weights in pre-literate Bronze Age Europe tend to occur in association with metal trade, metallurgy and textile production (IALONGO 2018). According to earlier and contemporary textual and archaeological evidence from the Aegean and the Near East (e.g. ARCHI 1988; PETRUSO 1992, 35-36; POWELL 1996; LIVERANI 1998, 52-58; RAHMSTORF 2003; 2014b; HAFFORD 2005; BRENIQUET 2008, 274-278; BIGA 2011; KULAKOĞLU 2017), metallurgy and textiles are exactly the instances of economic activities that are most commonly associated with weight-based exchange.

The best-documented contexts from settlements are located in southern Italy. In the multi-stratified settlement of the “acropolis” of Lipari (Aeolian Islands, Sicily), sets of potential balance weights are concentrated, in each level, in one or two houses at a time, and they are systematically associated with casting moulds, metal hoards and loom-weights through the whole Bronze Age sequence (ca. 2200-950 BC) (Fig. 4.A; IALONGO 2018). In the fortified settlement of Coppa Nevigata (Apulia), a piriform weight is associated with bronze, bone and rock crystal artefacts, in an open area located close to the main gate, interpreted as a workshop or a marketplace area dating to the Recent Bronze Age (ca. 1350-1200 BC) (Fig. 4.B; CAZZELLA/RECCHIA 2017).

Documentation from burials mainly comes from central Europe. Grave-goods associations provide clear-cut sets of potential balance weights, sometimes together with balance beams. One of the most peculiar finds is represented by grave 298 of the necropolis of Migennes-Le Petit Moulin (France). In this exceptional male inhumation, two antler balance beams are associated with complete sets of balance weights, in bronze, lead and stone, belonging to different formal types (Fig. 5.A; ROSCIO *et al.* 2011), in association with metalworking tools. Complete sets of bronze weights are also documented in several other burials (PARE 1999), such as the inhumation grave in Steinfurth (Germany), containing eight bronze rectangular weights and four pin-heads whose stem was intentionally removed, for which Pare proposes an interpretation as potential balance weights (Fig. 5.B).

Fig. 4. Balance weights from settlement contexts. A: Lipari, acropolis (Sicily), multi-stratified settlement (LALONGO 2018); 1: Capo Graziano phase (ca. 2300-1700 BC); 2: Ausonio I phase (ca. 1350-1200 BC); 3: Ausonio II phase (ca. 1200-950 BC). B: Coppa Nevigata (Southern Italy), cluster of materials from an open area of the settlement, in proximity of the main gate of the Subappennine phase (ca. 1350-1200 BC), interpreted as a workshop (CAZZELLA/RECCHIA 2017); 1: piriform weight, stone; 2: bone; 3: rock crystal; 4-6: bronze.



4. Potential balance weights in focus: Typology, geographical distribution and chronology

Premise

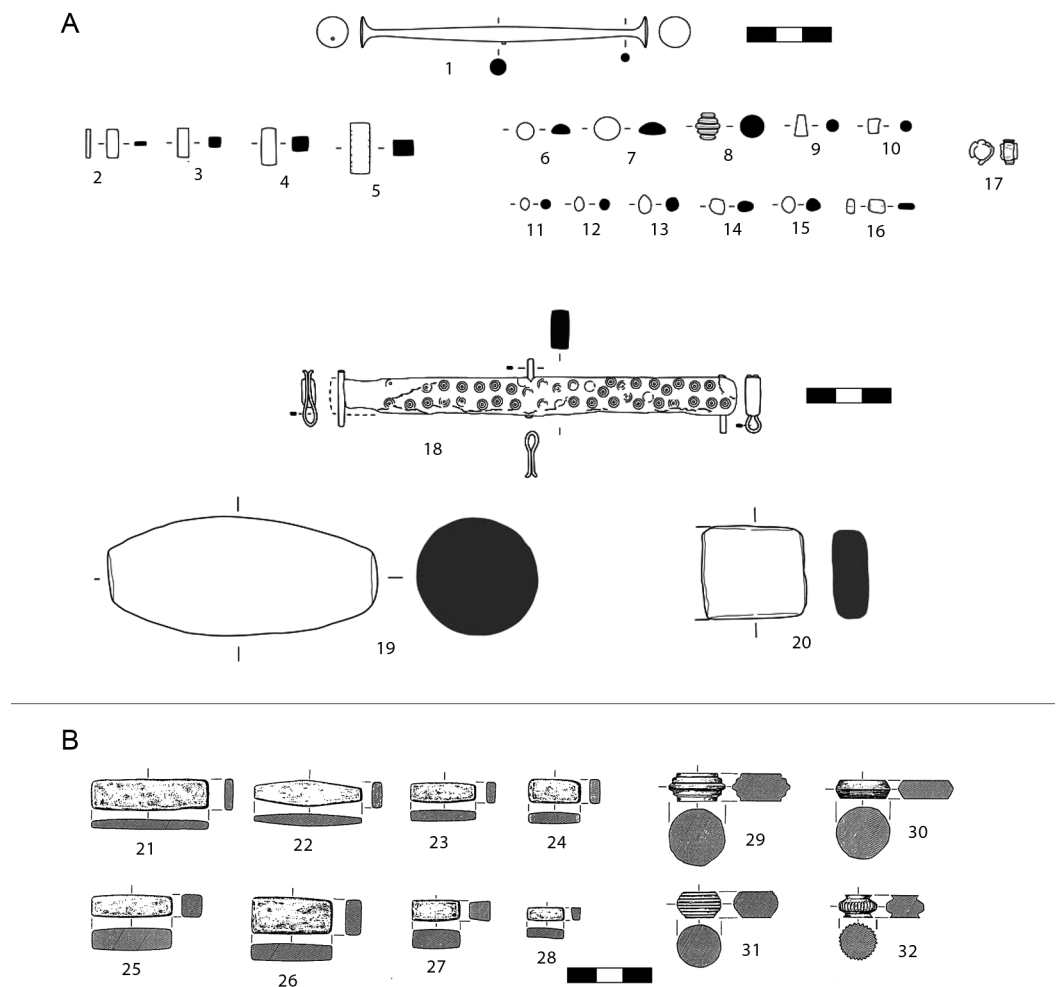
Rectangular, *Kannelurensteine*, piriform, disc and spherical weights represent 90 % of the sample. They provide a dataset big enough for statistical tests, and will be the object of a focused analysis. The variables considered are typology, geographical distribution, chronology and metrology. Typology is the only aspect providing the means for an “objective” classification, and represents a crucial aspect in the identification of entire categories of balance weights. Distribution and chronology are “corollaries” to typology: once a formal type is defined, its geographical and chronological distribution are assessed. The first three variables normally

represent the focus of material studies, providing the basic knowledge for any kind of object-category, while metrology is a peculiar aspect of balance weights, and weight-regulated artefacts in general.

Rectangular weights

Potential rectangular weights are parallelepipeds, with straight or convex sides, made of stone, bronze or lead (Fig. 6). Some bronze exemplars present engraved wavy-lines, sometimes with inlaid copper-wires, and a single object has an attached bronze loop. Some stone exemplars may present a hole towards the top end. The current sample comprises 142 objects, with 109 known weight values ranging from 0.3 g to 2128 g. Based on Cosine Quantogram Analysis (see below), PARE (1999) proposed the identification as potential balance

► Fig. 5. Sets of weighing equipment from burials.
A: Migennes – Le Petite Moulin, grave 298 (Eastern France) (ROSCIO et al. 2011); 1-17: set 1; 1: balance beam, antler with a bronze peg; 2-16: balance weights, bronze; 17: balance weight, lead; 18-20: set 2; 18: balance beam, antler with three bronze pegs; 19-20: balance weights, stone. B: Steinfurth (Western Germany); 21-32: balance weights, bronze (PARE 1999).



weights for a group of bronze objects from Central Europe. The identification was later confirmed for a larger sample – including exemplars from Italy and the Alpine region – and supported by tests for statistical significance (IALONGO 2018). Potential rectangular weights tend to be mostly attested in graves in Central Europe and in settlements in Italy.

The sample includes finds from Italy (IALONGO 2018), Switzerland (PARE 1999; BOLLIGER et al. 2004), Germany (PARE 1999), France (PARE 1999; ROSCIO et al. 2011; ROSCIO 2018), Spain (VILAÇA et al. 2012), Czech Republic, Hungary (PARE 1999) and England (RAHMSTORF 2019) (Fig. 6). The rectangular weights from the Aeolian Islands date to the early centuries of the 2nd millennium BC, and represent the earliest balance weights known so far in pre-literate Bronze Age Europe (IALONGO 2018). The finds show a notable concentration in the phase Bronze Age D (ca. 13th century BC) in burials in central Europe (Phase 3), but they also occur in Phase 4 contexts in Italy, Switzerland, England and Spain.

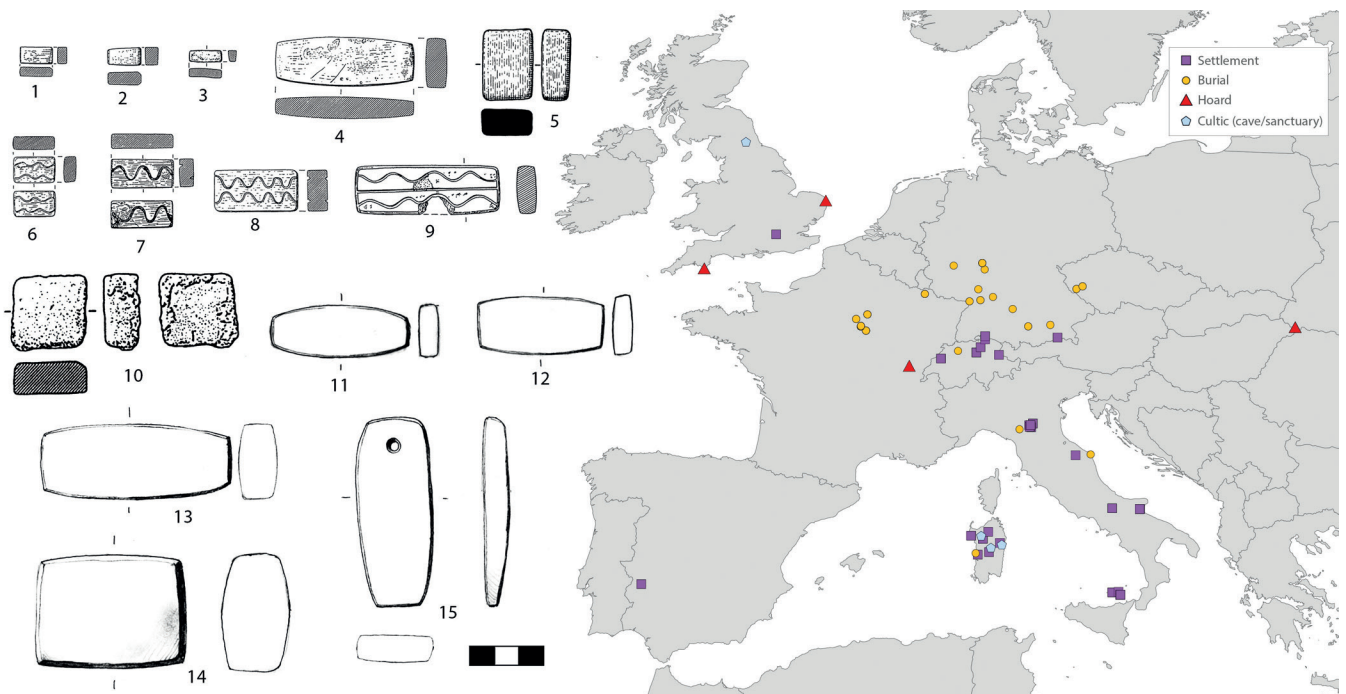
Disc weights

Potential disc weights present a certain variability in shape (Fig. 7): plain discs, of different thickness,

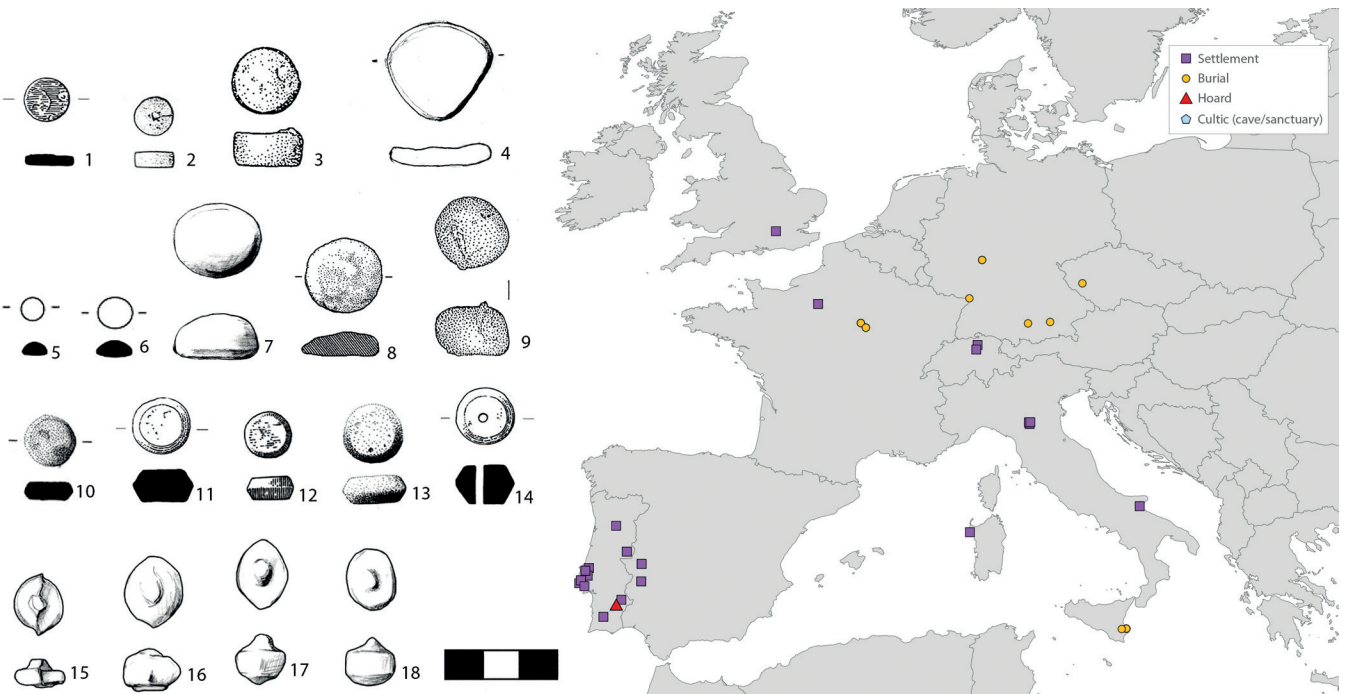
discs with a convex surface and with biconical profile, with or without a vertical hole. As proposed by PARE (1999), some of the objects included in this type are pin-heads, whose needle was intentionally removed (Fig. 7,7.18). The sample comprises 92 exemplars, with 80 known weight values, ranging between 0.36 g and 728 g. The type is documented in Italy (IALONGO 2019), Switzerland (BOLLIGER et al. 2004; FETH 2014), Germany (PARE 1999), France (ROSCIO et al. 2011), Switzerland (BOLLIGER SCHREYER et al. 2004, Taf. 228.2550), the Czech Republic (PARE 1999), England (RAHMSTORF 2019, fig. 2,9-11), Portugal (VILAÇA 2003; 2011; 2012 et al.) and Spain (VILAÇA et al. 2012) (Fig. 7). In Italy and central Europe, datable disc weights tend to occur in burials of Phase 3, while in Atlantic Europe the chronology is limited, for now, to Phase 4.

Spherical weights

Potential spherical weights range from very small, plain objects to relatively large exemplars provided with a small hook (Fig. 8). Some of the objects included in this type are the already mentioned pin-heads (Fig. 8,8-9). Most exemplars are realized in bronze, but also stone and



▲ Fig. 6. Rectangular weights. Typology and distribution. 1-9: bronze; 10: lead; 11-15: stone.

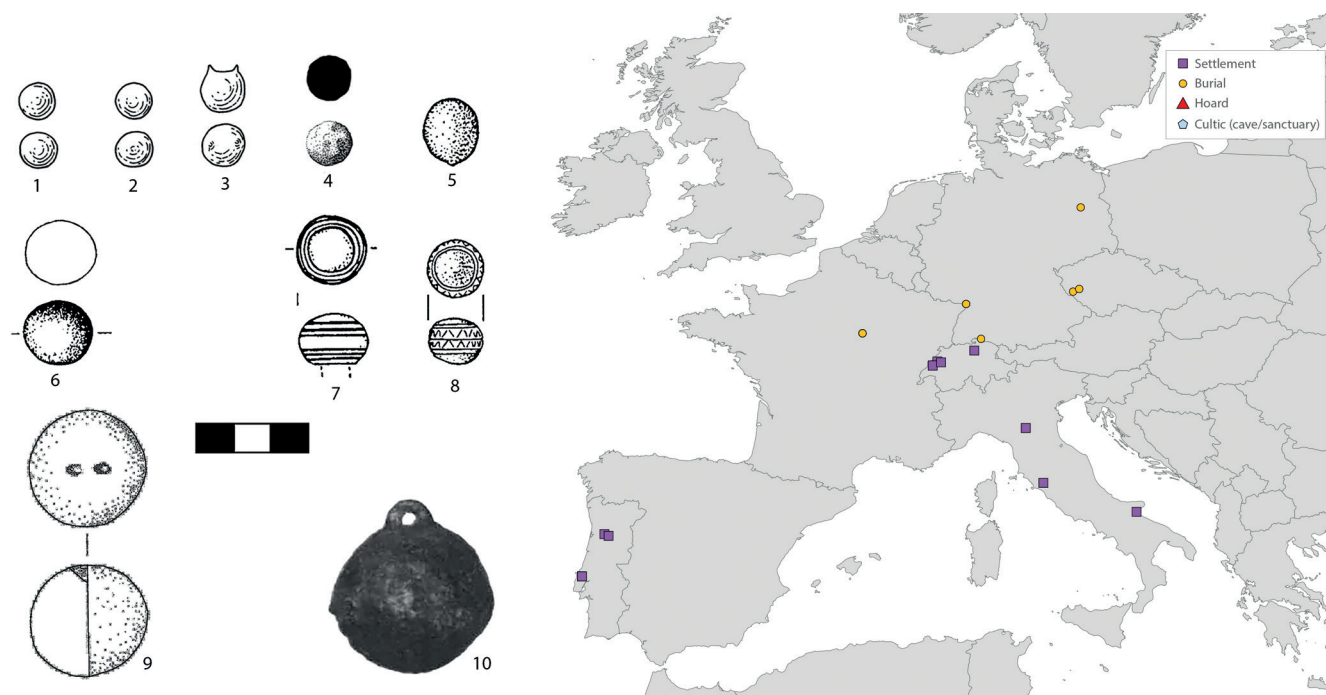


▲ Fig. 7. Disc weights. Typology and distribution. Bronze.

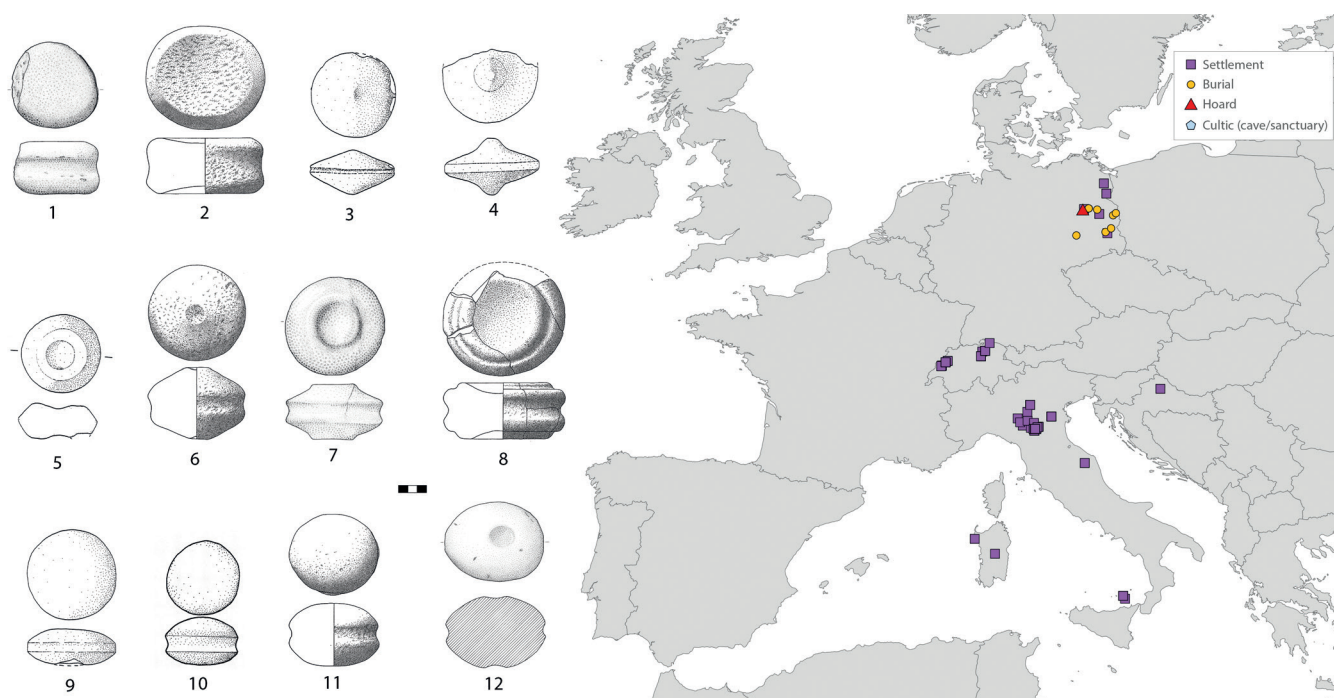
lead objects are documented. The sample includes 31 items, ranging between 0.16 g and 731.50 g. Potential spherical weights are present in Italy (CREMONESI 2006), Switzerland (FETH 2014), Germany (PARE 1999), France (ROSCIO *et al.* 2011), the Czech Republic (PARE 1999) and Portugal (VILAÇA 2003; 2011; VILAÇA *et al.* 2012) (Fig. 8). They show a chronological distribution similar to disc weights, occurring in central European burials in phase 3 and mainly in settlements in phase 4.

Kannelurensteine

The term *Kannelurenstein* (“grooved stone”) is used in German literature to describe a widespread class of stone objects, typical of the Late Bronze Age of Central Europe (*e.g.*, HORST 1981). *Kannelurensteine* have a relatively wide typological variability, with spool-like (Fig. 9,1-2), bi-troncoconical (Fig. 9,2-7) and lenticular profiles (Fig. 9,9-12). These objects have been known in the archaeological literature for a long time, but the first convincing explanation for their use was suggested by CARD-



▲ Fig. 8. Spherical weights. Typology and distribution. 7-8: pin-heads, with intentionally removed shaft. 1-8: bronze; 9: stone; 10: lead.

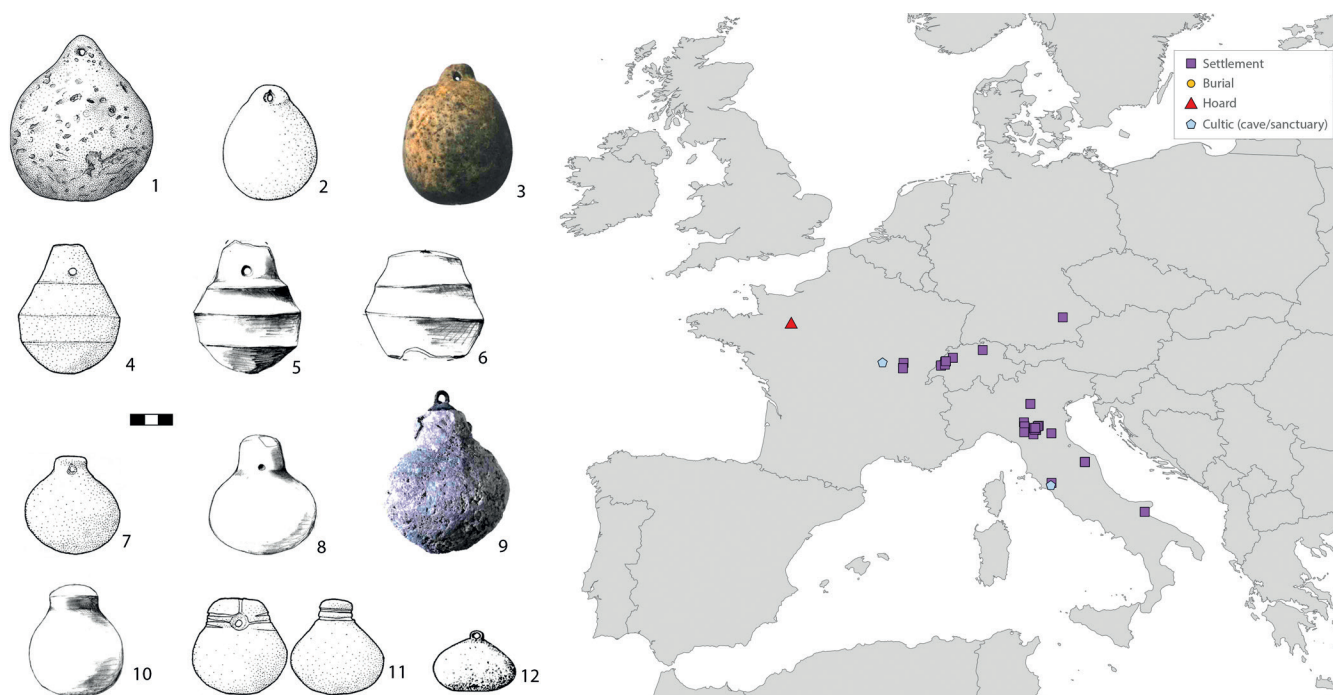


▲ Fig. 9. Kannelurensteine. Typology and distribution. Stone.

ARELLI *et al.* (1997; 2001; 2004), who interpreted the exemplars of northern Italy as potential balance weights. Cosine Quantogram Analysis (see below) and tests for statistical significance later supported the balance weight hypothesis (IALONGO 2018).

Almost all the objects come from settlements, but they occur also in burials and hoards in Northern Germany. 184 objects of this type are includ-

ed in the sample; for 168 exemplars the weight is known, ranging from 36.8 to 3073 g. The current sample includes finds from Italy (CARDARELLI *et al.* 1997; 2001; 2004; IALONGO 2018), Germany (BUSSE 1900; REINBACHER 1956; SEYER 1967; JOCKENHÖVEL 1986; SCHMALFUß 2007), Switzerland (LEUVREY 1999; BOLLIGER SCHREYER *et al.* 2004) and Croatia (VRDOLJAK/STAŠO 1995) (Fig. 9). The Italian objects are mainly dated to



▲ Fig. 10. Piriform weights. Typology and distribution. 1-11: stone; 12: bronze.

Phase 2, with the exception of one exemplar from the Aeolian Islands and one exemplar from Sardinia, dating to phase 4 (IALONGO 2018). The finds from Central Europe all date to Phase 4.

Piriform weights

Piriform weights have a globular body, more or less squat, and they all present a protruding upper part, mostly with a pierced hook or an attached metal loop (Fig. 10). 59 objects are included in the sample, and for 41 the weight is known, ranging between 36.5 and 1413 g. The sample includes finds from Italy (CARDARELLI *et al.* 2001; 2004; CREMONESI 2006; CAZZELLA/RECCHIA 2017), Switzerland (LEUVREY 1999; FETH 2014), Germany, and France (FETH 2014) (Fig. 10). R. FORRER (1906) originally proposed the identification of this class of objects as potential balance weights, but the first systematic study was conducted in more recent years (CARDARELLI *et al.* 1997; 2001; 2004). Most piriform weights are made of stone, but copper/bronze and lead are also documented. With the only exception of a single metal weight from a hoard, all the other finds belong to settlements. Most of the Italian finds are dated to Phases 2 and 3, while all materials from the rest of Europe date to Phase 4.

5. Metrology

Methodology of metrological analysis

Any method employed in metrological analyses of ancient weights must be able to answer an apparently simple question: are (most of) the sampled

weight-values multiples of a single, fundamental value? Different methods have been used to answer this question, and they can be traced back to two main statistical approaches: Frequency Distribution Analysis (FDA) and Cosine Quantogram Analysis (CQA). FDA is a descriptive method, the most commonly used in metrological studies (*e. g.* PERONI 1966; 1998; SOMMERFELD 1994; CARDARELLI *et al.* 2001; FETH 2014). The aim of FDA is to identify significant clusters of values; once they are located (if they are present at all) the analysis follows up with checking if the mean values of each cluster may correspond to approximate multiples of a same basic value. If the sample is well clustered, FDA can provide solid hints, but it is insufficient for a thorough evaluation of potential weight systems. CQA is a more advanced method, devised and first introduced in archaeological research by the statistician D. G. KENDALL (1974), and first employed in weight metrology by K. PETRUSO (1992). Based on a “Fourier transform”, CQA allows making inferences about a sample. Kendall’s original article provides a detailed, although extremely clear explanation of the method.

Given a dataset of mass-values (or any other physical quantity), CQA can tell us whether a single value is a “good fit” for the largest possible amount of individual measurements in a sample. Such a basic value is called *quantum*. The advantage of CQA over FDA mainly consists in the fact that the former provides an estimation of possible quanta, while in the latter case the possible quanta must be calculated separately, and in the absence of a strict framework. On the other hand, FDA has the unique capability of providing an accurate de-

scription of the sample with clearly visible clusters, while the results of the CQA are not intuitively related to the actual distribution of the sample, and require further testing in order to be validated or rejected (KENDALL 1974; PAKKANEN 2011).

Although not immediately comparable, FDA and CQA address different aspects of the same problem, and should be used in conjunction, since the respective results are mutually illuminating. A closer look at the CQA formula can help clarify the relationship between the two methods. CQA was devised to test whether an observed measurement X is an integer multiple of a “quantum” q plus a small error component ε . X is divided by q and the remainder (ε) is tested. Positive results occur when ε is close to either 0 or q , *i. e.*, when X is (close to) an integer multiple of q :

$$\phi(q) = \sqrt{2/N} \sum_{i=1}^n \cos\left(\frac{2\pi\varepsilon_i}{q}\right)$$

where N is the sample size. Plotted in a graph (“quantogram”), the results show high positive peaks where a quantum gives a high positive value for $\phi(q)$. Technically, CQA tests the results for $\phi(q)$ for a given quantum. Since the “right” quantum is not known *a priori*, many different quanta must be tested; this is typically obtained by instructing a software to test a range of quanta with fixed small increments (*e. g.*, a series of 1000 quanta, ranging from 1 to 10, with a fixed increment of 0.01). In order to understand how CQA works (and how it is related to FDA) it is crucial to consider that each quantum is tested for each single measurement in the sample, and the individual results for $\phi(q)$ are summed. Thus, a high peak in the graph indicates that a large number of measurements in the sample gives a high $\phi(q)$ for a given quantum, *i. e.*, that the corresponding quantum is a “good fit” for many mass values. It follows that a concentration of many similar mass values in the distribution of the sample will produce very high values for the corresponding “good-fitting” quanta. For example, given a sample of three potential weights weighing respectively 30 g, 40 g and 55 g, CQA will give good results for a quantum of 5 (the highest common divisor). On the other hand, given a sample of 20 potential weights – one weighing 30 g, eighteen weighing 40 g and one weighing 55 g – we would still have a peak at 5, but also very high peaks at 8, 10, 20 and 40. This would happen because 40 g is, by far, the most represented value in the sample (*i. e.*, it forms a cluster in the frequency distribution), and all its submultiples would be identified as very good-fitting quanta by CQA, even if most of them are not “as good” for the remaining values in the sample. It follows that, while CQA can provide useful information on patterns that are “hidden” behind the data, FDA is a necessary complement for a correct interpretation.

For the purpose of this article, CQA is used to test hypotheses derived from FDA. The frequency distribution of each type of potential weights will be examined for the identification of clusters, and distributions of different types of potential weights will be compared, in order to assess possible similarities. The distribution of clusters will be analysed, in order to derive hypotheses to be tested through CQA.

Tests for statistical significance

When dealing with relatively small samples – as in our case – there is always the possibility of obtaining false-positives, that might lead to biased interpretations (PAKKANEN 2011). The problem of false-positives resulting from CQA is well known in metrological research, ever since the first definition of the method. The main problem with small samples is that even a small number of values can produce random clusters in the frequency distribution, which are not necessarily significant from a statistical point of view: in other words, the emergence of “peaks” in a distribution can be the result of a random chance. One way to address the problem is testing whether an artificially-generated random distribution of values can give results that are as good (or better than) those given by the archaeological sample. In his original article, KENDALL (1974) proposed a method to test the statistical significance of archaeological samples. The test is based on the reiterated generation of random numbers (“Monte Carlo” test), and aims at checking whether random datasets would give better results than the actual sample. If equal or better results occur more often than a predetermined threshold (*i. e.* “alpha level”), it means that it cannot be excluded that the good results obtained from the actual sample are simply due to chance, and therefore they should be rejected.

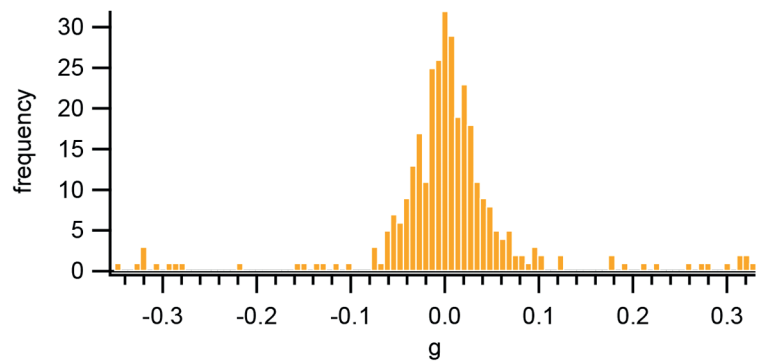
Following Kendall’s method, a simulation of randomly generated datasets was executed. Each original sample was randomized, by adding a random fraction of $\pm 15\%$ to each measurement. The simulation was applied 100 times for each sample, and each generated dataset was analysed through CQA. The aim of the test is to observe whether a random dataset with similar distribution can produce values for $\phi(q)$ equal to or higher than those obtained for the original sample, under the null-hypothesis that the sample is randomly constituted. The alpha level is set to 0.05, *i. e.*, equal or higher results must not occur in more than 5 % of the iterations, in order for the null-hypothesis to be accepted. In order to reject the null hypothesis, it is sufficient that at least one positive result is above the alpha-level.

Quanta, units and the problem of the exact identification of weight systems

A quantum only vaguely relates to the notion of “unit” (LO SCHIAVO 2006; PAKKANEN 2011). Both archaeological and modern examples document that a good-fitting quantum, resulting from

CQA, only seldom corresponds to a unit of measurement proper (IALONGO 2018). Good-fitting quanta can correspond to fractions as well as to multiples of a given theoretical unit, or even to common multiples or fractions shared by different unit-systems (IALONGO *et al.* 2018a). This heavily affects the research question that is behind the choice of CQA as an analytical method. We do not ask CQA to “find” a unit; we ask it to determine whether most measurements in a sample can be divided by a limited set of numbers, for a negligible remainder. If CQA can identify such numbers, then the only way to determine whether they are units proper, fractions, or even common fractions shared by different systems is to possess inscribed weights. For pre-literate BA Europe, this kind of evidence is completely missing (and, for example, also in the Early BA Harappan culture in the Indus valley with ample evidence of definite weights); for this reason, the identification of exact units is, at least for the time being, beyond the capabilities of a European metrology. However, the identification of exact units is by no means necessary, since the identification of an array of good-fitting quanta provides all the information that we need to validate the balance weight hypothesis, and to evaluate the underlying weight system (KENDALL 1974; IALONGO 2018).

A further, common source of bias is the excessive reliance on the supposed exactitude of alleged units of measurement. Units become exact only as soon as they are written down in official accounts, and even then, they are exact only in a purely theoretical fashion (CHAMBON 2011). Real-world measurements are always imprecise – in ancient as well as in modern measuring – and always produce a statistical dispersion. How much “precision” should we expect from ancient balance weights? A relative standard deviation of *ca.* $\pm 5\%$ is generally accepted as a standard threshold (IALONGO 2018; RAHMSTORF 2010), and there are cases where this value can be even higher (HAFFORD 2012). Precision, however, can be easily determined based on simple calculations. In order to set a baseline for the analysis of European balance weights, one might first analyse a set of supposedly highly precise balance weights and determine a threshold based on actual values. The balance weights of the Middle Bronze Age from the Mesopotamian city of Ur (*ca.* 2000–1600 BC) were chosen as a test sample. The analyses of the Ur weights clearly show that most of the sample is structured around the “Mesopotamian” *shekel* of *ca.* 8.4 g (HAFFORD 2012; IALONGO *et al.* 2018a). In order to determine the overall accuracy of the system of measurement, all the weight values in the sample ($n=328$, range=0.14 g–4951 g) have been approximated to the closest multiples and submultiples of the unit of *ca.* 8.4 g, and the relative difference from the expected value was computed for every single value. The results represent a normalization of the standard error for the entire set of balance weights (Fig. 11), and show that the overall error is $\pm 9.3\%$ at



1 standard deviation, which means a total error of *ca.* 18 % at 2 standard deviations. These values are strikingly higher than the normal expectations for ancient weights, and demonstrate that the issue of precision vs. approximation should be taken carefully into account, in order to avoid biased interpretations. These results, in turn, strongly argue against the common practice of setting pre-determined thresholds for the accuracy of ancient measures, since the real structure of weight systems is much more approximate than it is usually believed to be.

There have been several proposals for the identification of Mediterranean or Near Eastern “units” in European contexts (*e. g.* PERONI 1998; PARE 1999; HOSSFELD 2006; RAHMSTORF 2010), but such proposals never take into account statistical dispersion and are never supported by tests for statistical significance. Overlooking dispersion can lead to substantially biased interpretations; when two different units are very similar to each other (such as the “Syrian” and “Mesopotamian” *shekels* of *ca.* 7.8 g and 8.4 g) the respective error ranges can significantly overlap, making it virtually impossible to assign individual balance weights to this or that unit (HAFFORD 2012; IALONGO 2018). CQA is a powerful instrument to overcome the difficulties of an exact identification, if its results are interpreted properly. CQA simply reveals patterns, and tests for statistical significance can confirm that such patterns are good descriptors for a large number of values in a sample.

In order to avoid the pitfalls of an exact identification, our goal is to explore the structure of potential weight systems, rather than look for theoretical units. We will try to determine if the significant values emerging from CQA represent a logical series of multiples and fractions, regardless of the possible units.

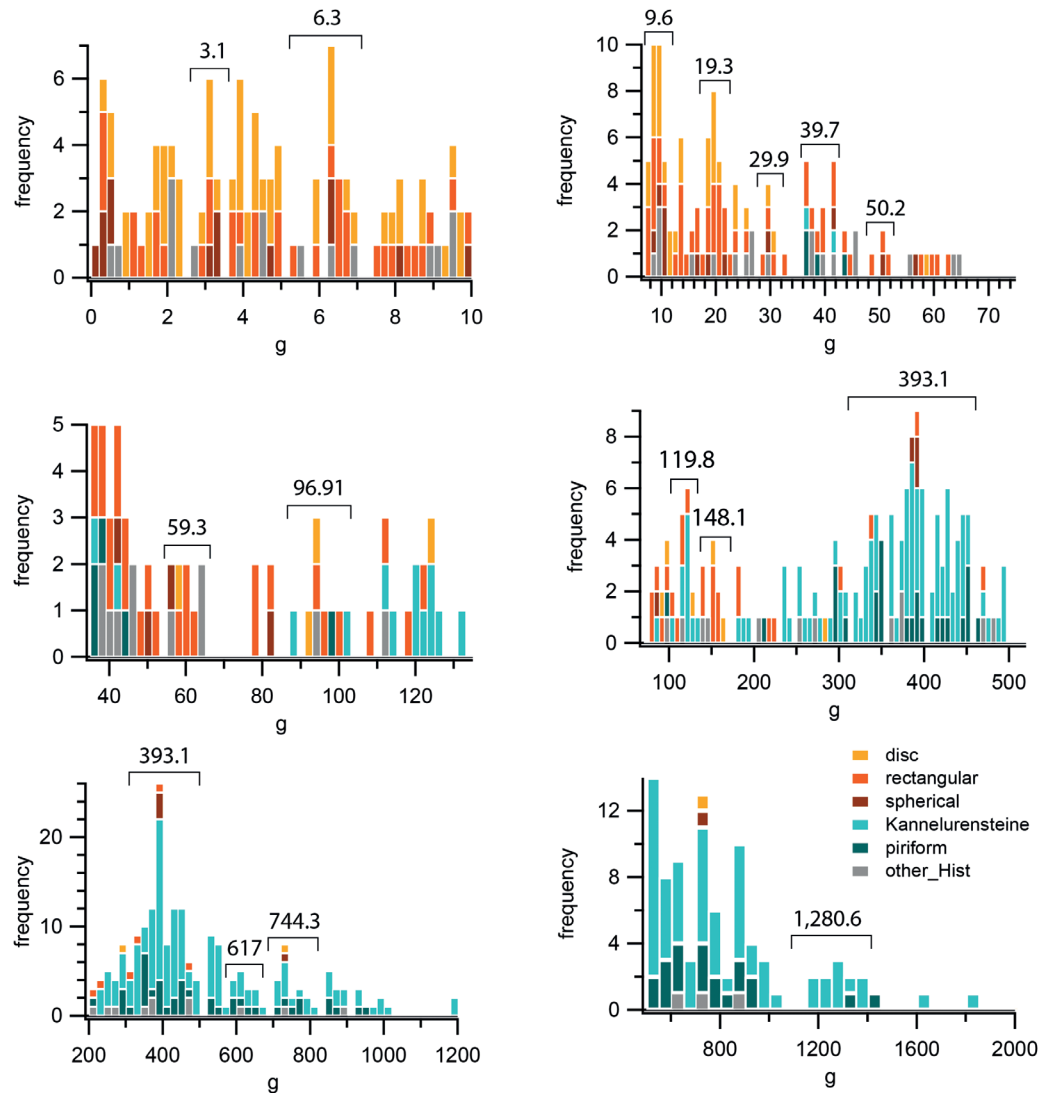
Frequency distribution analysis

The sample includes all the exemplars pertaining to the rectangular, disc, spherical, *Kannelurensteine* and piriform types, plus other types of potential balance weights. The sample includes 478 objects ranging from 0.16 g to 3073 g.

The range is too wide for a single graph; therefore, the sample was split into six partially-overlapping subsets, based on natural breakpoints in the distribution

▲ Fig. 11. Normalized error distribution of the balance weights from Ur, Southern Mesopotamia (*ca.* 2000–1600 BC). The error estimation was obtained by dividing each mass value for the closest multiples and fractions of the “Mesopotamian unit” of *ca.* 8.4 g. The graph shows the relative difference of the remainder of each measurement from the expected value. $N=328$, mean: 0.004, standard deviation=9.3.

► Fig. 12. FDA. Main clusters of mass values.



(Fig. 12). The data form at least fifteen major clusters characterized by bell-shaped curves, which account for a large part of the variability of the sample.

The frequency distribution provides a good basis for guesses, to be tested through CQA. If we take the cluster at *ca.* 9.6 g as a reference, we obtain a logical sequence of roughly $\frac{1}{3}$ - $\frac{2}{3}$ -1-2-3-4-5-6-10-12-15-20 for the values between *ca.* 3.1 g and *ca.* 393.1 g. The higher clusters are not clearly related to one another, with the possible exception of the clusters at 617 g and 1280.6 g, with a ratio of roughly 1:2. If the sample is “quantally configured”, and if the non-clustered data are compatible with the quantal structure of the clustered ones, we expect significant quanta around *ca.* 10 g or *ca.* 20 g for the values up to *ca.* 200 g.

Cosine Quantogram Analysis

CQA must be executed on datasets of homogeneous magnitude. Therefore, the sample was divided into four partially overlapping subsets, following natural breakpoints in the distribution, with the aim of targeting and testing the clusters

identified by FDA. The three subsets range between 1.5 g-10 g, 7 g-70 g, 17 g-200 g and 200 g-2000 g. Values lower than 1.5 g were not considered in the analysis, due to the high uncertainty of very small measurements.

The test rejects the null-hypothesis at 1 % significance, and supports the balance weight hypothesis for the sample under analysis. In other words, CQA confirms the guesses derived by FDA, mostly above 1 % confidence level (Fig. 13.A,13), and shows that the sample is quantally configured. Statistically significant peaks of light weights are located at approximately 1.6 g, 9.5-10.2 g and 19.7 g (Fig. 13.A), while those of the heavy weights are at *ca.* 48.5 g and 417 g (Fig. 14).

Further good-fitting quanta are highlighted by the analysis, conforming to the same logical sequence. The complete sequence proceeds as follows: 1.6 g, 4.7-4.9 g, 6.2 g, 9.5-10.2 g, 19.7 g (light weights) and 48.5 g, 195 g and 433 g (heavy weights). If we take the peak at *ca.* 20 g as reference (for no other reason than being the one with the highest score), we obtain the following series

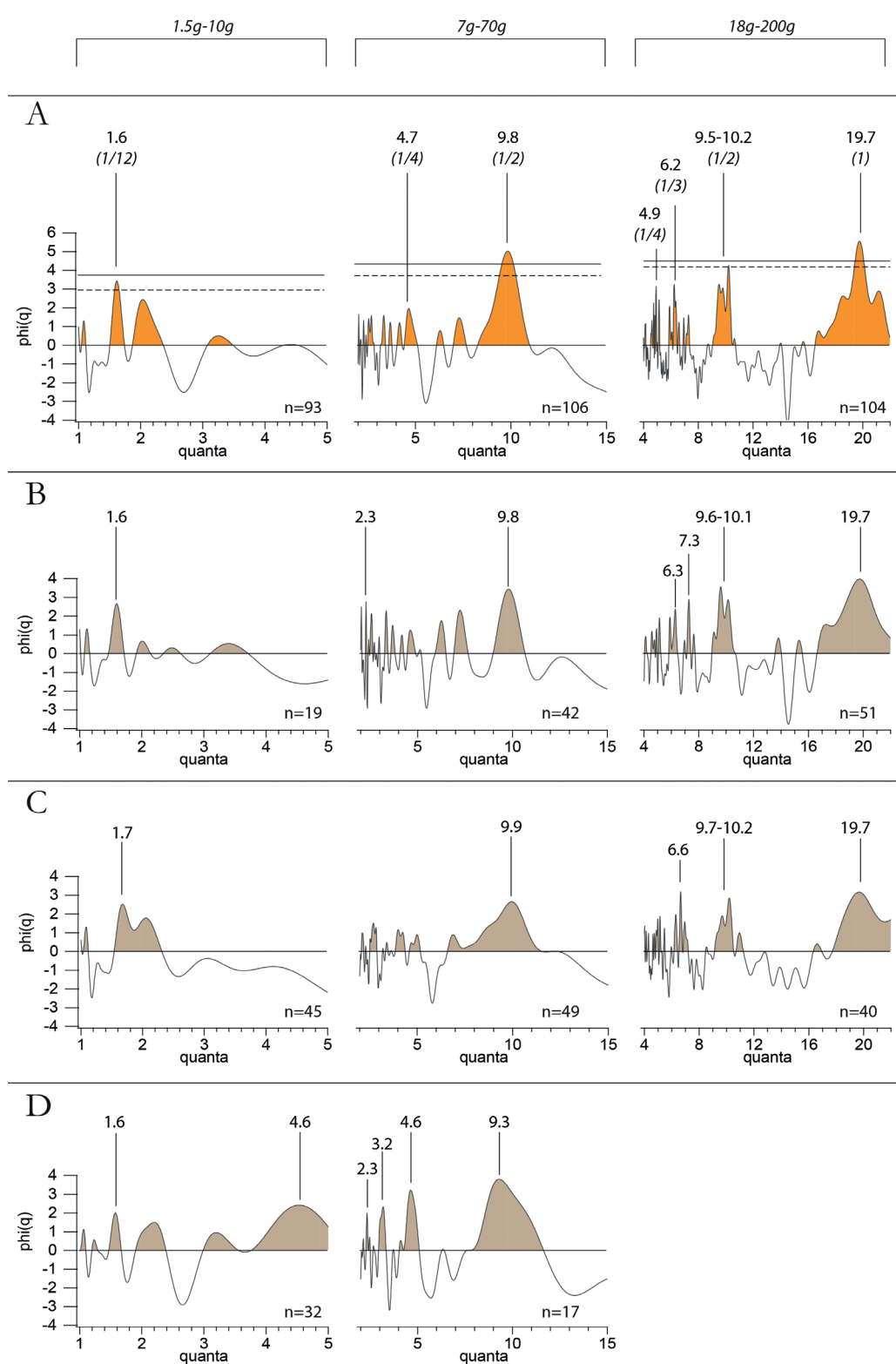
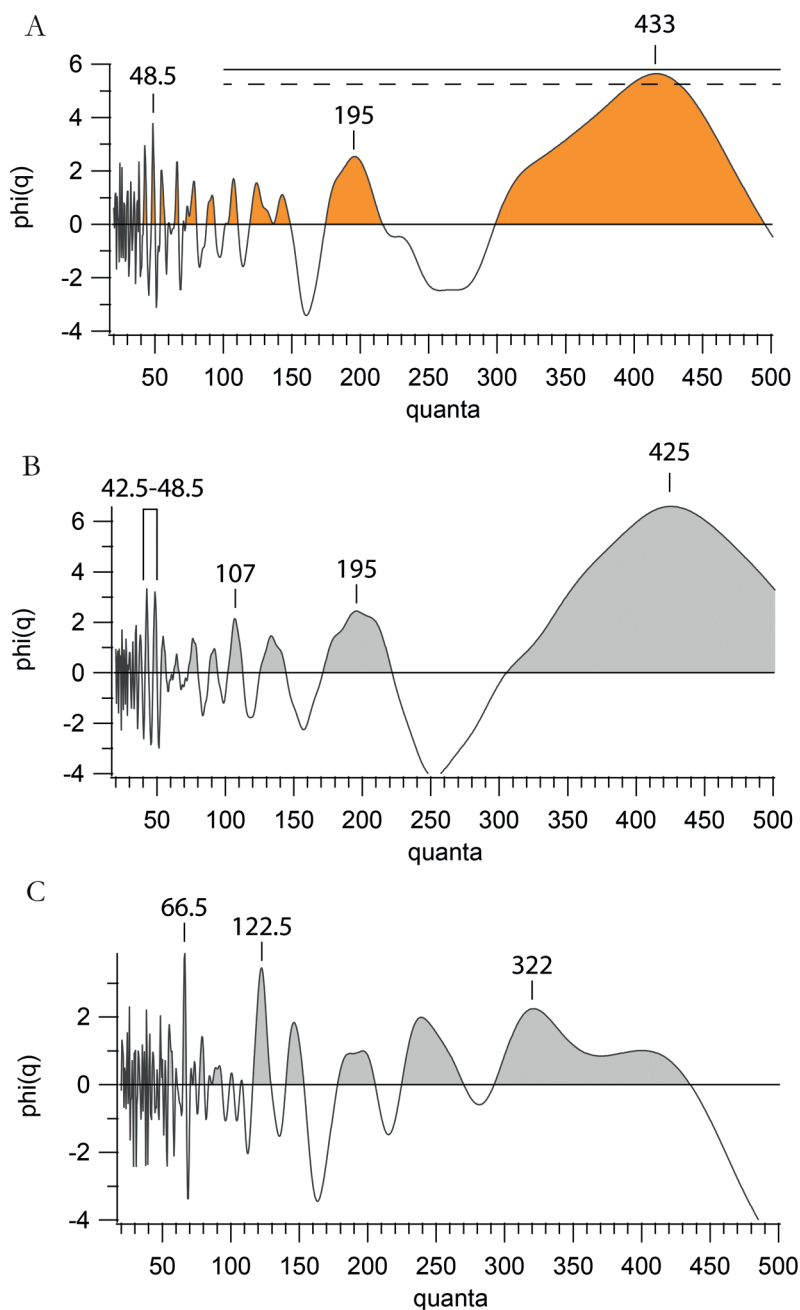


Fig. 13. CQA of light weights (1.5 g-200 g). A: total sample; dashed lines: 5 % significance level; solid lines: 1 % significance level. B: Italy. C: Central Europe. D: Atlantic Europe.

of fractions and multiples for the values until *ca.* 200 g: $\frac{1}{12}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$, 1, $2\frac{1}{2}$, 10. The peak at *ca.* 433 g is more difficult to interpret. It is clearly related to the big cluster with average value of *ca.* 393 g (Fig. 12), which shows a relative standard deviation of 9.6 %. Such a dispersion is rather high, but still compatible with the expectations for ancient weights, as shown by the balance weights of Ur (Fig. 11). The high dispersion might as well derive from weights

belonging to different units of measurement clustering around similar values. The sample of heavy objects is composed almost entirely by *Kannelurensteine* and piriform weights. In support of their interpretation as balance weights, it can be noted that these two types form three more clusters in the lower range of weight values, at *ca.* 120 g, *ca.* 97 g and *ca.* 40 g, together with other types of potential balance weights (Fig. 12).



▲ Fig. 14. CQA of heavy weights. A: total sample; dashed lines: 5 % significance level; solid lines: 1 % significance level. B: Italy. C: Central Europe.

The results of both FDA and CQA for the full sample are perfectly compatible with the results obtained by the separate analysis of rectangular weights and *Kannelurensteine* (IALONGO 2018). It must be noted, finally, that the figures emerging from CQA do not represent exact numbers, but just approximate values, always implying some dispersion.

6. Discussion

The typological study and the statistical analyses support the balance weight hypothesis for the rectangular, disc, spherical, *Kannelurensteine* and piriform weights. The objects pertaining to these

types have standardized shapes, are not intuitively connected to any practical or ornamental function, do not show systematic presence of use-wear, and all present a regular “quantal configuration”, which is even shared between different formal types. As already remarked, the positive identification of formal types does not imply that every single object pertaining to such types is necessarily a balance weight. It is very important to bear in mind that the methodological framework adopted in this study relies on big samples, in order to find out whether or not such samples tend to follow a metrological norm. The deviation from the norm is entirely expected from samples of real balance weights, but a deviating object might as well be a different kind of tool that just happens to share formal characteristics with weighing equipment. Unfortunately, this kind of indeterminacy is impossible to solve. However, the positive outcome of the analyses indicates, beyond reasonable doubt, that the balance weight hypothesis is the one that best explains the variability of the vast majority of the items included in the sample, regardless of the possible inclusion of a few spurious objects.

Diachronic distribution

The diachronic distribution appears to support a gradual diffusion of weighing equipment, originating in southern Italy and gradually spreading through continental Europe and the British Isles over the course of almost a millennium. The analysis of the contexts, however, suggests caution. The distribution of the finds in Central and Atlantic Europe, in particular, encourages further research on the subject (Fig. 3). Weighing equipment is apparently not attested in Central Europe before *ca.* 1400-1350 BC (our Phase 3), but nearly all the finds come from burials. Knowledge of central European materials is largely based on PARE’s (1999) seminal study, which, however, focussed on specific finds that are common in burials dating to the Bronze D phase. Since the study did not address the problem of weighing equipment in previous periods systematically, the possible presence of weighing equipment in earlier phases of the Bronze Age – especially from settlements – cannot be excluded. Similar considerations can be made for Atlantic Europe. The documentation from Portugal and Western Spain mostly relies on the research carried out by VILAÇA (2003; 2011), who was specifically concerned with a particular class of bronze weights that is exclusive to the final phase of the BA. Finally, the data from the British Isles are still scanty (RAHMSTORF 2019), and future research might change the picture substantially.

However, despite the limits of the documentation, it seems plausible that weighing equipment was first adopted in Southern Italy, in the framework of the early contacts with Aegean and Cypriot traders (IALONGO 2018). The adoption of balance weights is, in fact, an instance of technological

transfer that can be interpreted in the framework of diffusion models (RAHMSTORF 2011): weighing technology was first developed in Egypt or the Ancient Near East around 3000 BC, and was adopted in Greece only 100-200 years later (RAHMSTORF 2016c). The frequent contacts with Mediterranean traders – starting in the first half of the 2nd Millennium BC (JONES *et al.* 2014) – probably encouraged the adoption of such a technology by southern Italian communities. The later steps of this possible diffusion process are more difficult to interpret, given the problematic state of the documentation. The process may have been gradual, but a gap of (at least) 500 hundred years between southern Italy and Atlantic Europe would imply a very slow adoption of weight-based trade; while this can be theoretically possible, an explanation would be required as to why it might have taken so long. In summary, a gradual diffusion is a plausible model, but future discoveries might reveal that the process was actually faster than it might seem today.

A Pan-European weight system?

Statistical analyses show that different types of potential balance weights, coming from all over Europe, probably pertain to a homogeneous weight system: is it possible to hypothesise the existence of a Pan-European weight system, based on the widespread use of the same unit?

The answer to this question is rather complex, and must start from the premise that a Pan-European weight system does not necessarily require a Pan-European unit. In order to clarify this statement, it is useful to compare the European situation to the much better studied framework of the Mediterranean and the Near East during the BA. Between Greece and Mesopotamia, the exclusive use of a single unit is never attested across very wide territories. A multitude of official or semi-official units existed, which were all legitimately employed during transactions, according either to the place where exchange occurred or to the provenance of the merchants involved (MICHAILIDOU 2001; CHAMBON 2011; IALONGO *et al.* 2018b; ZACCAGNINI 2018). Still, such a multitude of concurring systems never appears to have hampered “international” or “cross-cultural” trade in any noticeable way. How, then, was this seemingly chaotic situation managed?

While not much is known about cross-regional normalization of weight systems in the Aegean, we know, for example, that Near Eastern states developed normative devices to level out incongruities between different weight systems. By the 2nd millennium BC (maybe already during the 3rd millennium BC: RAHMSTORF 2010, 101-102), different local systems were equated around the value of the “*mina*” of ca. 470 g, corresponding to 60 *shekels* ‘of Karkemish’, 50 *shekels* ‘of Ugarit’ or 40 *shekels* ‘of Khatti’ (PARISE 1971; 1984). This provides a clear example of how different systems can effectively merge into a single one, while retaining their

respective specificities at the same time: a *mina* is always a *mina*, regardless of whether it is counted according to this or that *shekel*.

There is evidence that this kind of process was not only the outcome of a top-down regulation, but could also arise from unregulated customary practice (CHAMBON 2011). Based on CQA, assemblages of balance weights in Anatolia, Syria and Southern Mesopotamia all show the full array of units known for the 2nd millennium BC. However, FDA of such assemblages shows that clusters of weight values always correspond to multiples of the “Mesopotamian” unit of ca. 8.4 g. This means that the Mesopotamian system was probably acknowledged as some kind of international standard, but also that each “Mesopotamian value” was counted in different local units, by using those multiples that most closely approximated to the corresponding Mesopotamian multiple. For example: if a Levantine merchant possessing “Levantine” weights (unit=ca. 9.4 g) wanted to weigh a quantity of 10 Mesopotamian *shekels* (=ca. 84 g), he would simply use the closest Levantine multiple (=9.4 g*9=84.6 g) for a remainder of just 0.6 g, *i. e.* an error of less than 1 %, far less than the instrumental accuracy of any balance. This process can produce “meta-systems”, effectively bypassing the normative differences between official systems while still complying with each of them (IALONGO *et al.* 2018a).

Weight systems are pure theoretical concepts, and are, in practice, much more “fluid” and indeterminate than one generally thinks (IALONGO *et al.* 2018b). We can derive a few considerations to inform our interpretation: 1) Single weight units are never employed exclusively over very wide territories (with the exception of very few cases like in the Indus valley/Mature Harappan culture); 2) normative devices can level out differences between weight systems, while retaining their specificity; 3) customary practice can largely bypass normative differences, producing parallel “meta-systems”. There is no reason to think that the structure of weight systems in pre-literate Europe was based on different principles; on the contrary, the total absence of strong, central authorities would suggest that European weight systems were possibly even more fluid and indeterminate than their eastern counterparts were.

What is the evidence in support of a Pan-European meta system? Dividing the sample into smaller subsets, corresponding to different regions, can shed light on how local systems were structured, and to what extent they were connected to one another. The sample was split into three subsets: Italy, Central Europe and Atlantic Europe (the latter does not present enough measurements in the range 18 g-200 g for CQA to be significant) (Fig. 13.B-D). Such a subdivision corresponds to major geographical areas. The comparison shows that local weight systems all have the same structure, which is, in turn, perfectly compatible with the total sample. Furthermore, since the regional subdivision also

corresponds roughly to the diachronic distribution of the finds, it seems that the European system remained relatively stable throughout the 2nd Millennium BC. The analysis supports the meta-system model, and suggests that frequent cross-regional exchange might have produced a convergence towards international “Standard Average Quantities” (IALONGO *et al.* 2018a). The convergence of the metrological structure might be correlated to the possible use of small weights to weigh metal currencies, mainly in the form of fragments. This would strengthen the analogy with the Ancient Near East, where small weights of roughly the same mass range (*ca.* 1 g-200 g) were clearly used to weigh silver fragments, used as currency (IALONGO *et al.* 2018a).

The heavy weights show a higher variability (Fig. 14). The comparison between Italy and Central Europe shows that the total sample is substantially skewed by the Italian sample (*n*=134), which is significantly larger than the Central European one (*n*=82). Even though the individual samples possess a coherent metrological configuration – with quanta fitting in a scale of multiples and fractions – they present a completely different structure. This phenomenon might suggest that heavy weights were used in more local networks, and did not have an important role in the long distance connections that seem to shape the structure of the light ones. The study of a very large sample of *Kannelurensteine* from Swiss pile-dwellings is currently underway, in the framework of the Weight and Value project, and the results might clarify the situation.

Getting back to the initial question, we propose that the apparent uniformity of the light weights on a continental scale is, in fact, the result of a process of convergence of a multitude of different local units. In other words, the existence of a Pan-European weight system is a concrete possibility, but the existence of a Pan-European unit is highly unlikely.

7. Conclusions

This paper represents the first systematic appraisal of the evidence related to weighing equipment in pre-literate Bronze Age Europe, on a continental scale. The sample is still insufficient, compared to the complete documentation that would be, theoretically, available for research, if more scholarly attention had been devoted to the subject. Nonetheless, a few provisional points can be made, whose validity, we hope, will be tested by future research.

Perhaps the most important point is that balance weights seem to occur everywhere a systematic research was conducted. This suggests that they were tools of everyday use, whose actual importance is currently vastly underestimated due to the scarce attention to the subject. Balance weights are represented mainly in settlements and graves, often in association with trade-dependent economic activities, such as metallurgy and textile production.

The second point is the likely existence of a Pan-European weight system. Although a multitude of local units was probably in use at the same time, the statistical analyses strongly suggest that different local systems were globally interconnected in a *meta system*.

The last point is a reminder for future research. The sample illustrates a developed, standardized framework – in terms of both formal types and metrological systems – that was already fully functional in most of Continental Europe by at least *ca.* 1400-1350 BC. This means that what we observe is but the outcome of a complex process of technological, cognitive and economic development, whose origin is yet to be precisely traced back in time.

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Addresses of the authors

Nicola Ialongo
Seminar für Ur- und Frühgeschichte
Georg-August-Universität
Nikolausberger Weg 15
37073 Göttingen
Germany

nicola.ialongo@uni-goettingen.de

Lorenz Rahmstorf
Seminar für Ur- und Frühgeschichte
Georg-August-Universität
Nikolausberger Weg 15
37073 Göttingen
Germany

lorenz.rahmstorf@uni-goettingen.de

Metrology and beyond: New approaches to Viking-Age regulated weights

by JANE KERSHAW

Viking Age, hack-silver, regulated weights, accuracy, trade, gender

The emergence and rapid spread of so-called ‘regulated weights’ is a striking feature of Viking-Age archaeology. Found across the Scandinavian world, from Russia in the East to Ireland in the West, they provide evidence for the transmission across cultural borders of a Scandinavian bullion (metal-weight) economy and for a unifying value system. Yet despite a recent increase in the number of weights identified in the archaeological record, we still know little about the objects themselves and their users. Previous studies have focused on identifying weight units, but a fixation on metrology risks obscuring other, potentially more fruitful avenues of research. Drawing on newly discovered Viking-Age weights in England, as well as the broader Scandinavian evidence, I will suggest that new approaches to the study of weights, such as materials analysis, can be used to address several outstanding questions, including: where were the weights made, and by whom? To what extent were they truly ‘regulated’? What do the weights tell us about the nature and scale of the Scandinavian silver economy? And what did they come to signify in a Scandinavian overseas territory (England) where a rival currency (coinage) was already well established?

Jenseits der Metrologie: Neue Ansätze zu wikingerzeitlichen genormten Gewichten

Wikingerzeit, Hacksilber, genormte Gewichte, Genauigkeit, Handel, Gender

Die Entstehung und Ausbreitung der sogenannten “genormten Gewichte” ist ein bemerkenswertes Kennzeichen der Archäologie der Wikinger. In ihrem Verbreitungsgebiet in der erweiterten skandinavischen Welt, von Russland im Osten bis Irland im Westen, verdeutlichen sie die Weitergabe der skandinavischen Hacksilber-Ökonomie und eines einheitlichen Gewichtssystems. Obwohl in der letzten Zeit zahlreiche neue Gewichte publiziert wurden, wissen wir immer noch wenig über die Objekte selbst und ihre Nutzer. In bisherigen Studien wurden in erster Linie die Gewichtssysteme untersucht, eine Fixierung auf die Metrologie kann jedoch dazu führen, dass andere, vielversprechende Forschungsmöglichkeiten nicht einbezogen werden. Auf der Grundlage von Neufunden sowohl wikingerzeitlicher Gewichte aus England als auch von anderweitigem skandinavischem Material werden in dieser Studie neue Untersuchungsansätze zu Gewichten besprochen. Dazu gehören etwa Materialanalysen, mit denen verschiedene offene Fragen angegangen werden können, beispielsweise: Wo wurden die Gewichte hergestellt und von wem? Bis zu welchem Grad waren sie tatsächlich ‘genormt’? Was sagen uns die Gewichte über die Art und den Umfang der skandinavischen Silberwirtschaft? Und was bedeuten sie in einem skandinavischen Überseeterritorium (England), wo eine konkurrierende Währung (Münzen) bereits etabliert war?



▲ Fig. 1. An oblate-spheroid weight from Saxmundham, Suffolk (PAS Find-ID' SF-4B1547). Scale 1:1.

One of the most tangible archaeological indicators for the Viking-Age bullion economy is the presence of regulated copper-alloy weights, made to standard units of mass. From the late 9th century AD, hundreds are recorded across Russia, the Baltic countries and Scandinavian homelands, attesting the presence of a supra-regional currency system in which weighed silver served as the primary means of exchange. Past studies of these weights have focused on their origins, date and metrology, although with little overall consensus about how exactly the weights relate to proposed weight system(s) (BRØGGER 1921; KYHLBERG 1980; 1986; SPERBER 1996; STEUER 1997; GUSTIN 2004). In this paper, I aim to develop the ongoing debate over weight units, whilst also moving beyond questions of metrology, to address fundamental issues of trade and exchange in the Viking Age. Drawing on new data regarding the material composition of weights and investigating afresh their gender associations in archaeological contexts, as well as their overall weight ranges, I aim to address three questions: (i) How 'regulated' were regulated weights? (ii) Who used weights? And (iii) What do weights suggest about the scale of transactions involving weighed metal?

Viking-Age regulated weights: A brief introduction

Viking-Age regulated weights are made to (broadly) standardised weight units, and fall into two main types. The first is the oblate-spheroid weight, sometimes referred to as 'spheres with flat poles', made of an iron core and copper-alloy mantle (Fig. 1). The second is a solid copper-alloy cubo-octahedral weight, also described as polyhedral or 'dice' weights (Fig. 2). They occupy heavy (ca. 4-200 g+) and light (ca. 1-4 g) weight ranges respectively, but both types appear to make use of the same underlying weight unit of ca. 4 g, meaning that they could be used together within the same transaction (STEUER 1997, 112, 281-283). In both, their form and underlying weight unit, the weights reflect eastern trading contact with the Islamic Caliphate, the Islamic gold standard of the *mitqāl* weighing 4.23 g. While some weights were likely imported from the East, archaeological evidence indicates that they were also produced within Scandinavia (PEDERSEN 2008, 121; SÖDERBERG 2015).

Evidence from recent settlement excavations indicate that both weight types arrived in Scandinavia in the third quarter of the 9th century (PEDERSEN 2008, 132). This date is significant, for it corresponds with a time when a bullion economy, based on the use of weighed metal as payment, was becoming increasingly widespread across Scandinavia and the Baltic (WILLIAMS 2011, 349). The import into Scandinavia of high quality silver in the form

of Islamic silver dirhams had begun in the late 8th century, but the mid-to-late 9th century witnessed a substantial increase in numbers of Islamic (principally Abbasid) silver dirhams reaching northern Europe as well as a rise in the fragmentation of dirhams and other forms of silver (BLACKBURN 2008, 70). Regulated weights, along with accurate folding balances of Islamic origin, formed part of this innovative weight-based currency system and are strongly associated with the weighing of silver in fragmented form. Both types of weight are found in association with hand-held balances, hack-silver and Islamic silver dirhams at trading sites within Scandinavia and the Baltic zone (BRATHER 2010). This pattern points to the weights' primary use in commercial contexts, their perceived regulated form and mass serving to bolster trust and confidence in metal-weight transactions between unfamiliar trading partners in the region's emerging market centres (GUSTIN 2004).

In what sense were the weights 'regulated'?

The status of oblate-spheroid and cubo-octahedral weights as 'regulated' (German: *genormt*) rests on four main features. First, and most importantly, they were systematically part of a standardised weight system originating in the Islamic world, although exactly how standards were divided into sub-units remains a matter of contention (WILLIAMS forthcoming). Statistical analysis of well-preserved regulated weights, in addition to innovative 3D modelling techniques that recreate the volume, and thus the mass, of damaged weights, has shown that both, oblate-spheroids and cubo-octahedrals, reflect Islamic weight standards, specifically the *mitqāl* of c. 4.23 g, an Islamic weight based on the gold dinar, and its sub-unit, a silver dirham, weighing ca. 2.9 g (0.7 *mitqāls*) (SPERBER 1996, 54-55, 110; 2004, 62; SCHULTZÉN 2009). The division of the 2.9 g unit into quarters gives a sub-unit of ca. 0.7 g that is routinely – although by no means uniformly – evidenced among cubo-octahedral weights.

Second, regulated weights possess a regular, geometric form and standardised decoration, making them difficult to modify and counterfeit. Cubo-octahedrals are marked by the presence of 1, 2, 3, 4, or 6 punched dots on each square side, and there is some debate whether these mark the relative position of an individual weight within a set or fixed weight standards (BRATHER 2010; BLACKBURN 2011b, 238; WILLIAMS forthcoming). Whatever the case, the complete absence of 5 dots suggests a weight system based on multiples of twos and threes. Oblate spheroids carry a variety of punched decoration including circles, beaded borders, triskele motifs and, less commonly, pseudo-Arabic script, on their flat poles (see Fig. 1). The latter imitates that found on 'imitation' dirhams minted by the Volga Bulgars and thus reinforces the connection between ob-



▲ Fig. 2. A cubo-octahedral weight, with four dots, from Cottam, East Yorkshire (foto: author). Scale 3:1.

late-spheroids and the weighing of silver coins from eastern sources (PEDERSEN 2008, 169-170).

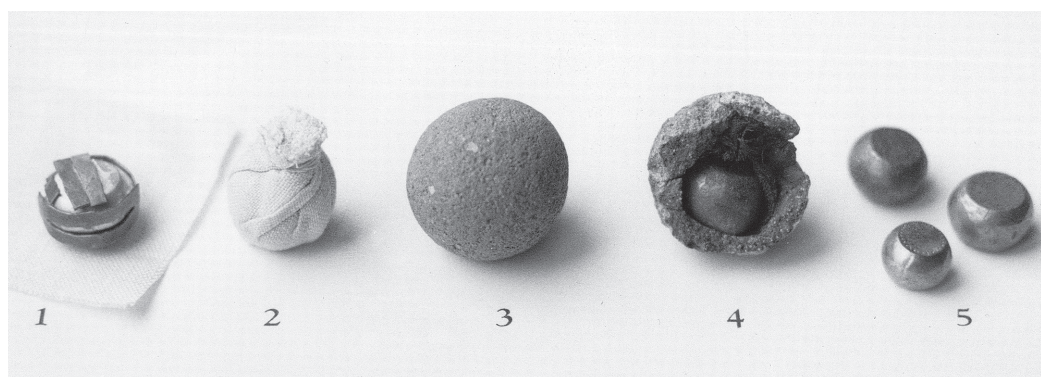
Third, the use of hard metals, and particularly the construction of an iron core and copper-alloy mantle, made modifications to the weights' physical form, and thus their mass, extremely difficult (RYGH 1885, 26). Regulated weights with visible signs of manipulation are incredibly rare (for one example, of an oblate-spheroid weight with file marks; see HOLM 2015, 92-93). Finally, the regulated status of oblate-spheroid weights was reinforced by a technically complex manufacturing process involving the brazing of an iron core with copper-alloy solder in a ceramic package (SÖDERBERG 2014) (Fig. 3). Within Scandinavia, archaeological remains of this manufacturing process have so far been found only at central, trade- and market place sites, suggesting that production was tightly controlled and required specialist skills (PEDERSEN 2008, 121, 126-127, with references; SÖDERBERG 2015). This has led Ingrid GUSTIN (1997) to argue that ultimate responsibility for the production and standardization of weights lay with kings. Conversely, Heiko STEUER (1987, 492) has suggested that the weight system was controlled by highly influential Viking-Age merchants 'banded together in a pre-Hanseatic trading organization', operating from nodal points such as the market centres of Hedeby and Birka.

Broadly speaking, copper-alloy regulated weights differ from a larger, and more varied, corpus of plain and decorated lead weights, which appear in various forms in settlement contexts before and throughout the Viking Age. Lead weights, sometimes capped with metalwork, were relatively easy to cast and to modify with a knife (PEDERSEN 2008, 137). They are frequently associated with workshop areas within settlement contexts and have conventionally been linked to metal casting. However, recent studies have revealed the existence of precise weight units among discrete assemblages, as well as the appearance of oblate-spheroid and cubo-octahedral forms of lead weight, suggesting that some lead weights may have functioned in weighed metal transactions (SPERBER 2004, 72-73; PEDERSEN 2008; HALDENBY/KERSHAW 2014; WILLIAMS

forthcoming). Whatever the degree of overlap between 'regulated' and lead weights, it is likely that copper-alloy oblate-spheroid and cubo-octahedral weights were perceived as reliable by the people who used them (GUSTIN 2004). Interestingly, the form and decoration exhibited by cubo-octahedral weights appears to have been transferred to certain types of silver jewellery, including penannular brooches, which adopted cubo-octahedral forms of terminal knobs, from the second half of the 9th century. This transfer has been interpreted by Gustin as a mechanism through which 'the wearer could signal trustworthiness and knowledge of payment transactions using weighed silver' (GUSTIN 2015, 29-30). In other words, regulated weights stood as symbols of trust in metal-weight exchange.

The reliability of regulated weights: perception *versus* reality

Available evidence thus suggests that regulated weights were perceived as reliable. But were they? Certainly, Viking-Age balances were capable of a high degree of accuracy, suggesting they met a need to weigh precise amounts of silver. These devices took the form of copper-alloy hand-held balances with pans suspended from either fixed or, from the end of the 9th century, folding arms. They have been found on settlements and in graves, often wrapped in textiles, birch bark or other casings, indicating that considerable care was taken over their handling and preservation (PEDERSEN 2008, 140). Balances conforming to Steuer's Type 3, dated to the late 9th and 10th centuries, are considered the most accurate, having been modelled on Arabic balances developed for the purpose of weighing silver dirhams (STEUER 1997, 25-26). Experimental testing indicates that they were capable of weighing a load of 4.25 g – the heaviest form of cubo-octahedral weight – to within an accuracy of 0.7 % (thus giving a range of 4.22-4.28 g). However, a proportional reduction in sensitivity has been noted at heavier loads, with Type 3 balances having an ideal maximum weighing capacity of 10-20 g (STEUER 1987, n. 203; PEDERSEN 2008, 139, fig. 6.17).



◀ Fig. 3. The brazing of oblate-spheroid weights. This process involves folding the iron core, together with a piece of copper-alloy (usually a brass), in cloth. The package is folded in clay and then heated to 900-1000° C, and the clay package broken to reveal the weight within (foto: courtesy of A. Söderberg).

The accuracy of regulated weights

Viking-Age balances were thus capable of a high degree of precision, but were regulated weights as precise? Assessing the accuracy of Viking-Age regulated weights is not straightforward, being complicated by the frequently poor preservation of surviving examples (KRUSE 1988, 287). The appearance of cracks in the copper-alloy coating of oblate-spheroid weights means that the iron cores of those weights are often extremely corroded; since metal oxides are lighter than the metals they replace, corroded weights will systematically be lighter than at the point of production (for the impact of corrosion on regulated weights, see SPERBER 1996, 27-30). Indeed, corrosion is so prevalent among this weight group that modern weight analysis is often considered futile (see, for instance, SPERBER 2004, 71; PEDERSEN 2008, 146-147). General wear and chipping may also adversely affect the currently observed mass.

Poor preservation thus makes it difficult to obtain reliable data on the original mass of weights. A second issue is that the weights themselves may have been calibrated to slightly different masses, at different times and places. It is possible that between or even within sites, weights were calibrated against different media, resulting in slightly different weight standards among visually identical assemblages. Christoph Kilger has suggested that regulated weights were calibrated against measures of local grain (KILGER 2008, 304-305, 314). However, given the weights' strong association with Islamic silver coin, it is surely more likely that actual dirhams were used in the calibration process, with one dirham broadly aligned with the weight of cubo-octahedrals with four punch-marks (a little below 3 g).

9th-century Abbasid dirhams are frequently described as weighing a fixed amount of 2.97 g (*e.g.* DARLEY-DORAN 2002). Significantly, however, recent analysis suggests that this notional standard was relaxed at a number of Abbasid mints during the late 9th century, when regulated weights first appear in Scandinavia (JANKOWIAK 2018, 16-17). Marek Jankowiak's analysis of records of *ca.* 70,000 dirhams from the Scandinavian and Baltic region suggests that the standard deviation of the mass of single Abbasid dirhams increased from 0.2 g at the start of the 9th century, to almost 0.4 g towards its end. Deviation was especially pronounced at the mint of Samarra in modern Iraq, where dirhams produced in the late 9th century could weigh anything between 2 g and 4 g (TREADWELL 2001, 153). This finding is important, for if whole dirhams were used to calibrate regulated weights in the late 9th century, we would expect to see small variations in the weights of whole dirhams carried over into the regulated weights, even among weights produced at the same time, at the same site.

It is thus not surprising that the results of recent metrological analysis, encompassing weights produced across different sites, at different times and

employing varying levels of screening for corrosion, have failed to yield convincing evidence for the presence of uniform standards. Few oblate-spheroid weights are sufficiently well preserved to enable close metrological analysis, but Erik SPERBER (1996, 110) has suggested that two, closely related, standards – of 4.23 g and 4 g – were in use among oblate-spheroid weights from Gotland and Birka, Sweden, respectively. Recent 3D reconstruction techniques likewise support the presence of a *ca.* 4 g unit at Birka (SCHULTZÉN 2009). A weight unit of 4.1 g has also been suggested for two large sets of oblate-spheroid weights recorded at Hedeby (NIELSEN 1983, 115). Such minor differences may reflect slightly different methods of calibration between sites, rather than the genuine co-existence of multiple, slightly varying standards among visually identical weights, although the possibility of there being real regional differences should not be ruled out (GUSTIN 1997, 173). It is also possible that systematic weight standards among oblate-spheroid weights were difficult to achieve because of their relatively complex manufacturing process.¹ However, modern experimental castings by Anders SÖDERBERG (1996) have demonstrated that it is possible to produce oblate-spheroid weights with very little metal-loss, suggesting that potential weight disparities could be minimized to negligible levels by experienced craftspeople.²

Regarding cubo-octahedral weights, Sperber's analysis of weights from different sites in Sweden led him to propose that the group was based around the *mitqāl* unit of 4.23 g, but with two contrasting sub-systems based on how the standard was divided, which he calls the Islamic market (dirham) system and the Islamic-Swedish system. These give, respectively, underlying sub-units of 0.7 g and 0.8 g (SPERBER 1996, 54-55). Again, differences in calibration techniques may be relevant here, although recent analyses of a new corpus of cubo-octahedral weights from Scandinavian-occupied sites in England also suggest the existence of both a heavier 0.75-0.80 g unit, and a lighter 0.6 g unit, this time applying to smaller weights (with 1 or 2 dots) and larger weights (with 3, 4 or 6 dots) respectively (BLACKBURN 2011a, 214; 2011b, 237-238; WILLIAMS forthcoming). In this case, however, no consideration was given to the weights' state of preservation. Moreover, there are considerable margins of error between the observed and proposed 'target' weight. This factor, combined with a lower overall frequency of small weights with 1 or 2 dots, makes it impossible to draw

1 I am grateful to Jari Pakkanen for this suggestion.

2 Specifically, Söderberg showed that, when thin copper-alloy rods were melted and brazed onto an iron core in closed ceramic packages, the metal-loss was limited to just 0.1 g. However, greater metal-loss was observed when copper-alloy filings were used in place of rods. Skilled craftspeople were likely able to anticipate low levels of metal-loss and accommodate them by adding calculated surpluses of copper-alloy (SÖDERBERG 1996 and personal communication January 2018).

conclusions about which specific weight modules, if any, are reflected in the surviving corpus.

Indeed, it is clear from the broad range of masses observed among cubo-octahedrals from areas of Scandinavian settlement in England that there is considerable disparity in weight units, even among weights of the same denomination (*i. e.* those with 1, 2, 3, 4 and 6 dots) (Fig. 4). Some potential reasons for this lack of precision were discussed above. But so broad are the observed weight ranges that it is worth posing the question: were target weights aimed for in the first place? An alternative possibility is that precise target weights were not, in fact, essential, and that a considerable degree of tolerance applied in bullion exchange, even in small transactions involving light sums of silver.

How regulated were 'regulated' weights?

Critical to this question is the issue of control over the production of regulated weights. Was the manufacture of regulated weights strictly governed, as conventionally argued? New evidence relating to the weights' material composition suggests that regulated weights were not, as tightly controlled at the point of manufacture as once thought.

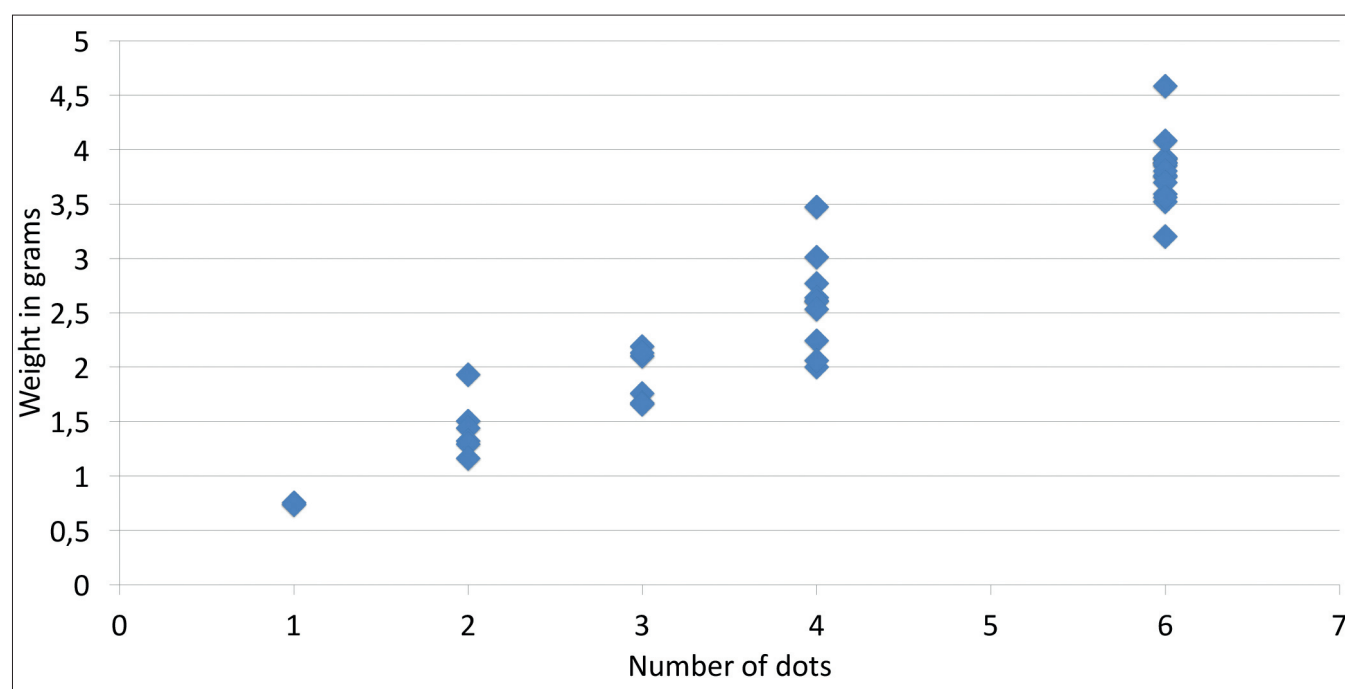
In 2015, I used portable X-ray Fluorescence (pXRF) to determine the surface alloy composition of seven 'bronze' cubo-octahedral weights, recovered, alongside a larger corpus of cubo-octahedral and oblate spheroid weights, hack-silver and dirhams, from Torksey, Lincolnshire. This site is named in the *Anglo-Saxon Chronicle* as the location of a Viking army camp in 872-873 AD. Extensive metal-detector campaigns and archaeological survey have revealed the existence of a huge site (55 ha) supporting a range of activities, while the evidence

of over 350 early medieval coins supports a date of occupation in the early 870s (for a full discussion of Torksey, see HADLEY/RICHARDS 2016). Given the short period of time during which Torksey was occupied, namely a single year, we can be confident that the weights recovered from the site were in contemporary use.

It was thus somewhat surprising that the results of the pXRF analysis indicated a heterogeneous mix of alloys among a relatively small sample of weights (Fig. 5). Six weights (Fig 5,1-6) could be classified as leaded gunmetals, containing variable mixtures of copper, tin and zinc with appreciable levels of lead, while the remaining weight (Fig. 5,7) contained such high levels of lead (49.5 %) that it could be considered a lead-, rather than copper-, alloy. Thus, none of the weights were truly 'bronze' (a mixture of copper and tin), with the prevalence of gunmetals possibly indicating that the weights were manufactured from varied assemblages of scrap metal. Overall, copper-alloy contents of the seven weights range from *ca.* 37 to *ca.* 80 %. Zinc and tin contributions are also variable, with the latter reaching 35 % in one case (Fig. 5,6). It is unclear how typical such mixed alloys were of cubo-octahedral weights, and further analyses are required to place the results of the Torksey analysis in a wider context. Nevertheless, it is worth noting that SEM analysis of two cubo-octahedral weights from Kaupang, Norway, has shown that their compositions varied further still, with one comprising a brass (85-89 % copper and 10-13 % zinc) and the other a brass with 'some traces of lead' (PEDERSEN 2008, 125-126).

Of course, weights of varying alloys may have still been produced to consistent weight standards. Yet

▼ Fig. 4. The weight distribution of cubo-octahedral weights from England. The data combines 19 single finds (author) and 22 finds from Torksey, Lincolnshire (GEAKE 2010).



the evidence for such diverse alloy compositions is inconsistent with the view that the manufacture of regulated weights was strictly controlled, particularly given the prevalence of mixed gunmetals. It is not known where the weights found at Torksey were produced. A variety of manufacturing locations within Scandinavia, and perhaps in Scandinavian-controlled areas overseas, are possible. Some weights may even have been produced at Torksey itself, as the site has yielded evidence for metalworking and coin production (HADLEY/RICHARDS 2016, 50-54), although no direct evidence relating to the manufacture of weights has so far been found outside of Scandinavia. Despite the potential for diverse places of production, we might still expect a level of consistency in the alloy composition of a supposedly regulated weight group. The very variable metal-alloy contents exhibited by the weights in use at Torksey demonstrate that this was not the case.

It seems counter-intuitive that a pan-regional weight system, making use of difficult-to-forge weights with an identical appearance and shared symbolism should not be tightly controlled or that uniform, precise weight units were not a prerequisite for regulated weights. Indeed, the very existence of light weights is indicative of the need to weigh small payments to a precise sum and/or to top up large payments to accurate amounts. Yet the available evidence suggests that precision was not achieved, nor was it necessarily aimed for.

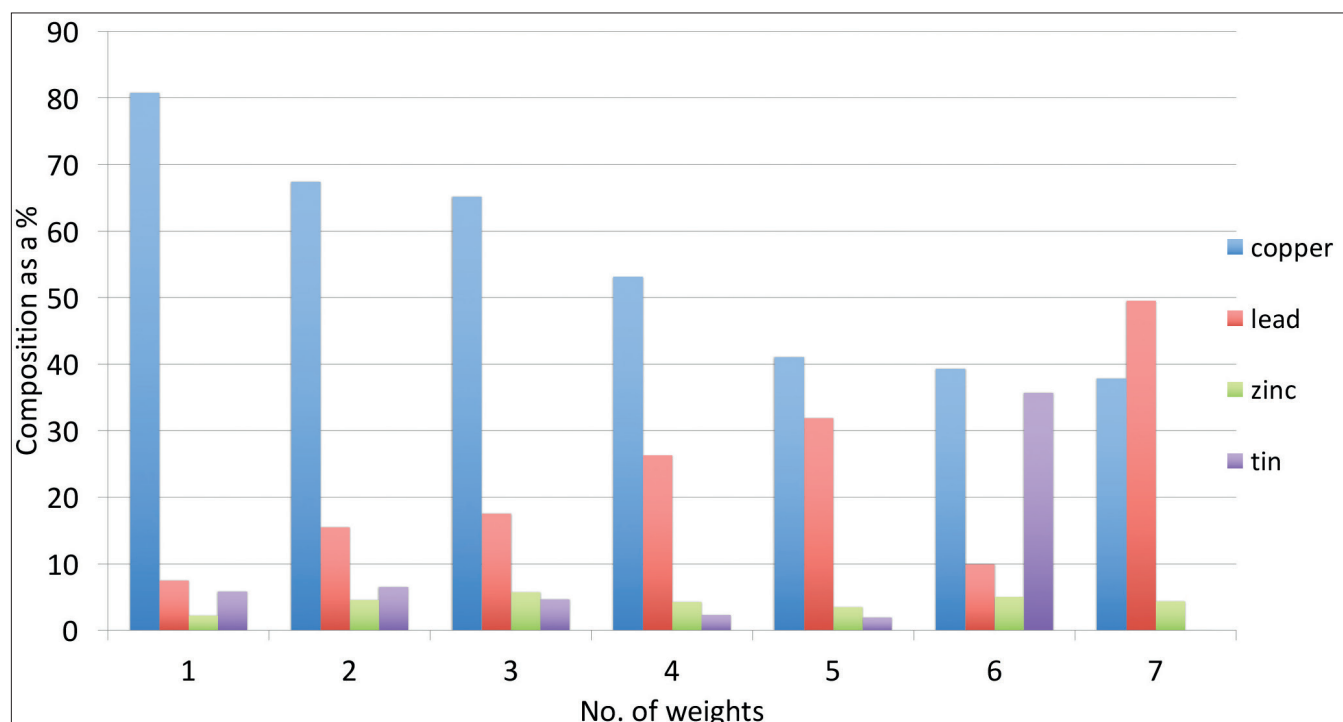
It is possible that, rather than weights conforming to a uniform fixed mass, certain errors in weight were accepted and mitigated by the practice of each trading partner weighing out the silver using their own scales and/or weights. A transaction would proceed only if both trading partners were satisfied

with the sum being transferred. In this context, we may speculate that what was important was not the accuracy of the weights, but ownership and use of the widely accepted tools of the trade. The use of regulated weights may have served principally to visually signal membership of a (professional?) culture centred on silver exchange. Certainly, the frequent inclusion of regulated weights in Viking-Age graves (see below), often in positions suggesting that they were placed in a purse (KYHLBERG 1980, 217), suggests that they were valued personal possessions, that formed an important aspect of individual as well as group identity.

Who used regulated weights?

It is thus possible that regulated weights were regulated not 'centrally', but by the individual weight users. This, in turn, raises the question: who used regulated weights? Was it entire communities or specialists? Was the use of weights restricted to centres of trade or was it more widespread? Over the last few decades, the predominant view has been that the use of regulated weights was largely restricted to 'actors in long-distance trade', that is, a merchant class, who deployed the weights in commercial transactions primarily within international trading contexts (GUSTIN 2004, 267). However, a small number of scholars have drawn attention to the presence of weights in rural grave assemblages (for instance, BRØGGER 1921; PEDERSEN 2001). More recent finds of regulated weights from non-urban contexts both within and outside of Scandinavia reinforce a more varied picture, with weight use permeating rural society and characterising the activities of women as well as men.

▼ Fig. 5. The alloy composition of 7 cubo-octahedral weights from Torksey, Lincolnshire.



How far did weight use permeate society?

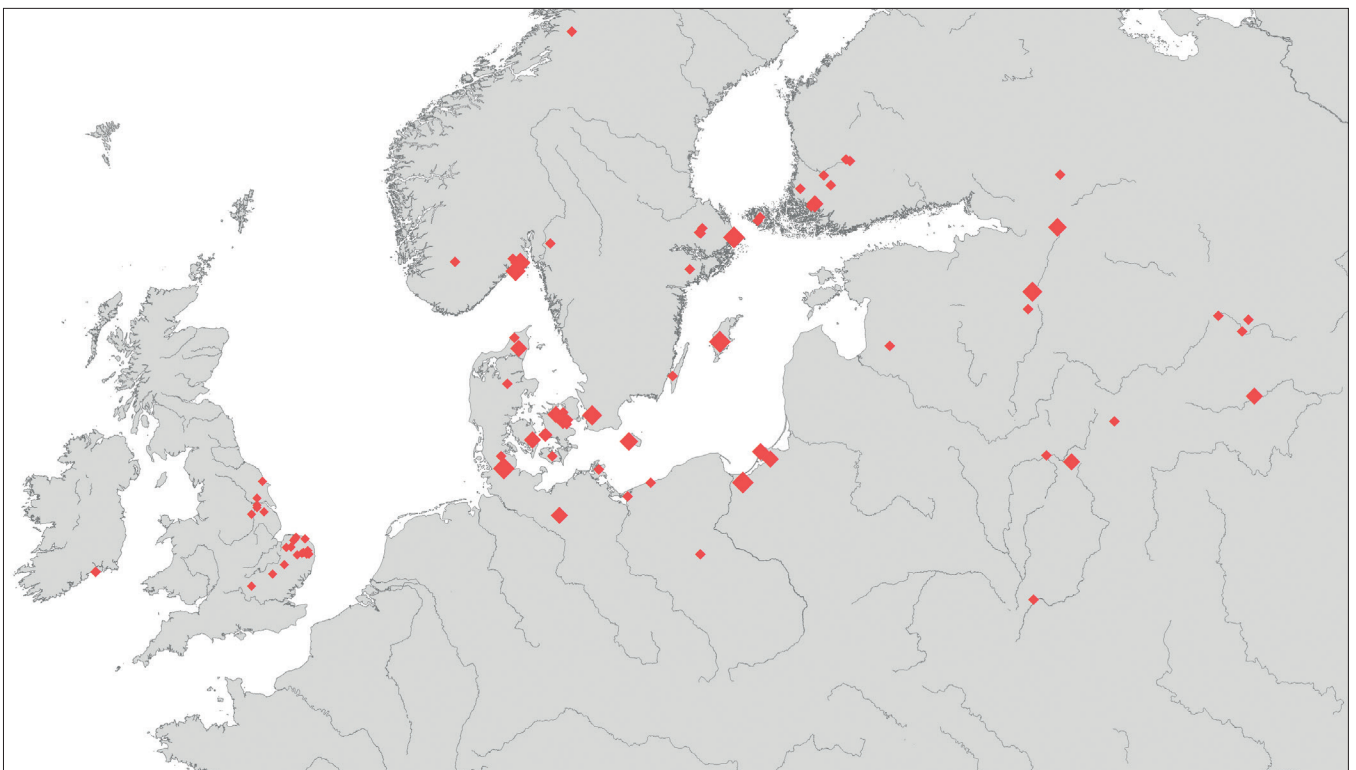
A growing corpus of weight finds from both Scandinavia and overseas territories settled by the Scandinavians, provides powerful new evidence that weights were not restricted to urban centres or locations of long-distance trade. Increasing numbers of metal-detector weight finds within Scandinavia suggests that weights were in use throughout rural areas, presumably at sites of varying size and character. On the Baltic island of Bornholm, Viking-Age regulated weights are widely dispersed, with a few weights per site, a pattern that has been interpreted as signalling a decentralised system of trade (INGVARDSON 2014). Both oblate-spheroid and cubo-octahedral weights are also increasingly common as metal-detector finds from rural mainland Denmark (Fig. 6) (ROESDAHL/KROMAN 1996, fig. 4; MADSEN *et al.* 2014, 278; see too <http://detectingpeople>). Importantly, these weights are single finds: we may thus presume that they were lost in locations in which they were in frequent use. The distribution of ingots, hack-silver and dirhams follows a similar pattern, highlighting the association between regulated weights and the bullion economy.

Metal-detecting operates within a different legal framework in Norway and Sweden and is far less common, but grave assemblages containing weights hint at geographically widespread use. Regulated weights appear in fifteen Viking-Age graves from south-eastern Norway, while Erik Jondell's thesis on Viking-Age balance scales from Norway recorded examples from 63 graves, distributed in coastal

areas across the country (JONDELL 1974, 15-18; PEDERSEN 2001). A reassessment of weight finds from Viking-Age burials in the northern Swedish province of Jämtland suggests that regulated weights permeated relative remote (from the perspective of the mainly southern Scandinavian market-centres) rural communities (HOLM 2015). In his study, Olof Holm found that between $\frac{1}{3}$ and $\frac{1}{2}$ of all excavated Viking-Age male graves from the region (of a maximum of 22) contained regulated weights and/or scales (HOLM 2015, 96). Weighing equipment was found not only in 'wealthy' graves, but also in burials of average rank, interpreted as belonging to 'a middle-class segment of the farming population in Jämtland' (*ibid.*, 97). The implication is that a relatively large segment of the rural population was able to weigh out silver for use as payment, perhaps in the exchange of locally-produced goods such as furs, textiles and iron (*ibid.*, 100-101).

Increasing numbers of both, cubo-octahedral and oblate-spheroid weights, have also been recorded from areas of documented Scandinavian settlement in England, particularly the so-called Danelaw area of the north and east. To date, 26 cubo-octahedral weights and 34 oblate-spheroids have been recovered, primarily as single finds through metal-detecting (KERSHAW 2017, tab. 1). Notably, the weights are widespread throughout rural areas of Scandinavian settlement (Fig. 6). In general, only one or two weights are recorded per parish, suggesting that while weights were widespread across rural communities, within each community their use was restricted to a small number of

▼ Fig. 6. The distribution of cubo-octahedral weights. The size of the diamond is scaled to the number of weights (data from STEUER 1997, with additions based on the author's own research).



individuals. The cumulative evidence thus suggests that ownership of regulated weights, and the ability to weigh out sums of silver to accurate amounts, was not restricted to those operating from urban centres, but also characterised rural communities, with responsibility for the weighing of silver possibly representing a specialist role within each community.

The gender of weight users

In the past, it has been uncritically assumed that weight use/ ownership was a male preserve (STALSBERG 1991, 77). Yet a striking pattern to emerge from the data on Viking-Age burials is that a significant proportion of graves containing weights and/ or weighing equipment are those of women. Given that, within Viking-Age archaeology, it is 'generally assumed that grave-goods were primarily, if not exclusively, drawn from the possession of the deceased' (HARRISON/Ó FLOINN 2014, 284), this implies that women, and not just men, were likely weight owners. This, in turn, suggests a significant role for women as economic actors (STALSBERG 1991).

Surveys of Viking-Age material from graves in Russia have revealed that 22 % of 37 graves that contained weights or weighing equipment were female-gendered graves, while a further 30 % were likely double burials of both men and women (STALSBERG 1991). A similar pattern was observed at Birka, Sweden, the main point of contact for trade with the east. Here, of the ca. 100 gendered-determined graves containing weights, over 50 % were likely female-gendered graves (KYHLBERG 1986, 149, tab. 17.2). Only five gendered graves from the trading site of Kaupang, southeast Norway, were found to contain regulated weights, but one of these was female (PEDERSEN 2008, tab. 6.1).

Importantly, it is not just at known market centres that women were buried with weights. In southeast Norway more widely, female graves constitute 3 or 4 of 12 gendered graves containing regulated weights (PEDERSEN 2008, 194-195).³ Notably, the grave to contain the highest number of regulated weights, from Nomeland, Valle, Aust-Agder, was a female grave, with 21 oblate-spheroid weights ranging in weight from 1.2 g to 24.4 g (ibid, Museum of Cultural History, Oslo C30539).⁴ In Jämtland, Sweden, two of ten professionally excavated Viking-Age graves containing weights and/ or scales have been identified as female via associated artefact types including brooches, beads and

pendants (HOLM 2015, 94). One contained an oblate-spheroid weight, the other a set of scales (HOLM 2015, cat. no. 9-10).

It thus appears that a consistent minority (in some cases, majority) of graves containing weights in the Viking Age were those of women. A reasonable implication is that women, as well as men, were associated with these tools of trade and regularly made payments in weighed silver, with the material from Russia in particular illustrating that women from Scandinavia could form part of long-distance voyages motivated by trading opportunities. Written sources suggest that women could accumulate wealth through inheritance and dowries, and could be expected to conduct transactions in silver. In his *Vita Ansgari* (Life of Anskar), written in ca. 875 AD, Rimbert describes how a woman from Birka travelled to the Frisian trading town of Dorestad in order to distribute alms left by her mother. Once there, she made payments for wine in coin (WAITZ 1884, 55; see too GUSTIN 2004, 229-230).

The later Icelandic saga material (mostly preserved from the 13th and 14th centuries) also contains numerous references to women making and receiving payments in silver (JOCHENS 1995, 152). In the *Saga of Gunnlaugr Serpent-Tongue* (*Gunnlaugs saga ormstungu er ormur*), a woman named Jófríðr offers her shepherd three marks of silver for the safe delivery of her newborn baby daughter to a wetnurse (ibid, n. 70). Women are said to own money purses, which they keep about their person. In the *Saga of the Sworn Brothers* (*Fóstbræðra saga*), the widow Sigrfríðr dips into her money purse, which she keeps tied to her belt, in order to make a payment of silver (ibid). Explicit mention of weighing silver is rare, but in *The Greatest Saga of Óláfr Tryggvason* (*Óláfs saga Tryggvasonar en mesta*), the prophetess Þórdís weighs three marks of silver from a purse given to her by Koðrán (ibid, n. 74).

It is possible, indeed likely, that women were active in the direct sale of goods. One market in which women may have been dominant economic agents is that of textiles, and other craft products which they could have produced themselves.⁵ Residential dwellings at the market sites of Birka, Sweden, and Kaupang, Norway, appear to have encompassed both living areas and workshop/ craft functions, suggesting domestically-located industry. At Birka, for instance, 'two-roomed' houses, with a large living room with hearth, and a subsidiary room used for storage or a workshop, appeared from ca. 800 AD (PILØ 2007, 203-211; AMBROSIANI 2012, 14, 16). Relevant in this regard is that, within settlements, silver transactions were not confined to the public sphere, but frequently took place in domestic settings. At Kaupang, the distribution of weights, as well as hack-silver and coins, is correlated with dwelling houses (PEDERSEN 2008, 159, 162). A similar distribution pattern has been

3 I have determined the likely gender by associated grave goods catalogued by the Museum of Cultural History, Oslo, with burials from Nomeland (C1672 and C30539: these may derive from a single grave), Skeimo and Gile representing female burials.

4 A further find complex containing weights from Nomeland may derive from the same grave. If so, the number of weights accompanying the woman would stand at 25 (PEDERSEN 2001, 32; 2008, 194-195).

5 I thank Adelheid Otto for this suggestion.

observed for weights and coins in late Viking-Age Sigtuna, Sweden (ROSLUND 1995, 154-156). At Birka, bullionised silver is widespread, but the discovery of four oblate-spheroid weights contained in a purse from a burnt house suggests a similar, private context of use in this instance (GUSTIN 2004, 94; 2011). It may be that, within these domestic environments, women had an enhanced role in silver exchange.

The scale of transactions involving weighed metal

If weights help to cast light on the agents of trade in the Scandinavian world of the Viking Age, they also provide information on the intensity and frequency of bullion exchange. Insights into these issues can be gleaned through a consideration of the weight ranges displayed by regulated weights, as well as by the relative ratios of cubo-octahedral and oblate-spheroids in different finds contexts.

Available data suggests a marked difference between the use of weights at proto-urban market centres and in graves/rural locations. The impression generated by finds of weights from Scandinavian market-sites is that they were predominantly employed in modest, low value transactions. At most of these sites, the regulated weight corpus is dominated by cubo-octahedral weights, weighing a maximum of *ca.* 4 g. Indeed, at some sites, cubo-octahedral weights outnumber oblate-spheroids by a ratio of 2:1 (GUSTIN 2004, 89-96; BOGUCKI 2007; PEDERSEN 2008, 123; HÅRDH 2010, 288-289). The same is true of Viking overwintering sites in England, which have been interpreted as having a proto-urban character (WILLIAMS 2015). Torksey, for instance, has yielded at least 57 cubo-octahedral weights and just 4 oblate-spheroids, although it is possible that the ratios observed here reflect the fact that oblate-spheroids were introduced a whole decade later than cubo-octahedrals, precisely at the time Torksey was occupied (the early 870s). Within these assemblages, large cubo-octahedral weights with 4 or 6 dots are typically more numerous than smaller weights with 1-3 dots, but whether this reflects genuinely different usage/loss rates, or the fact that smaller lighter weights are less likely to be retrieved, is an open question.

Nevertheless, this data accords well with that for the silver itself. One of the notable features of silver from the Viking overwintering sites in Britain is its fine degree of fragmentation, a pattern that suggests that silver was routinely weighed using cubo-octahedral weights. At Torksey, no complete dirhams are recorded, while the average weight of the dirham fragments is just 0.44 g, less than $\frac{1}{2}$ of a complete coin (BLACKBURN 2011b, 229-230). A similar pattern can be observed in Scandinavia. At Birka, dirhams were frequently cut into fragments 'with $\frac{1}{20}$ parts of a coin not being unusual' (GUSTIN 2011, 235), while at Kaupang, the hack-silver

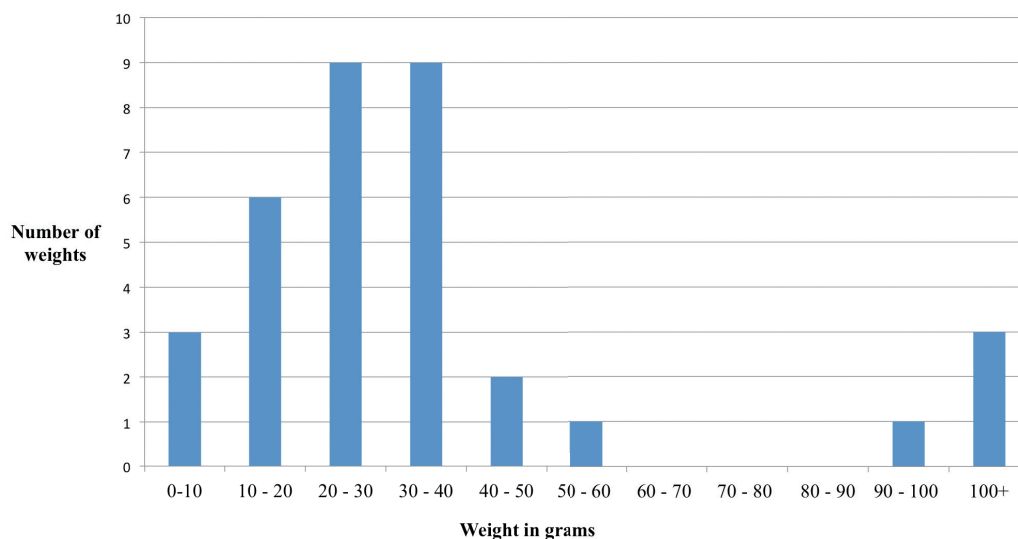
assemblage was dominated by small, light pieces of silver, weighing under 2 g (BLACKBURN 2008, 64; HÅRDH 2008, 100-103, tab. 5.3-4). The evidence for both the dominance of cubo-octahedrals and for finely fragmented silver points to a thriving bullion economy in which silver was regularly weighed out for small-scale purchases of an everyday character.

By contrast, weights recovered from graves and as single finds outside of market centres are more likely to be oblate-spheroids. Of just over 250 weights recovered from the graves at Birka, for instance, 63 % were oblate-spheroid weights, with cubo-octahedrals comprising 18 % and non-regulated types 19 % (GUSTIN 2004, 95-96). Oblate-spheroid weights are also by far the more common regulated weight type in Viking-Age graves from surveyed areas of Norway (PEDERSEN 2001, fig. 4). Interestingly, where cubo-octahedrals do appear in graves, they tend to appear in combination with oblate-spheroids (data derived from PEDERSEN 2008, 194-195). This may suggest that their primary role was to top up larger payments to accurate amounts.

Oblate-spheroid weights are also the more common among single finds from areas of Scandinavian settlement in England (34 oblate-spheroids *versus* 26 cubo-octahedrals). This pattern may reflect the fact that small, cubo-octahedrals are more difficult to recover as isolated finds than larger, oblate-spheroids; however, the fact that oblate-spheroids have a big iron core may also impact their recovery rate, as detectorists often screen out iron objects. It is also possible that oblate-spheroids genuinely had a more prominent role in bullion exchange in England than cubo-octahedrals. The oblate-spheroids under discussion here weigh between *ca.* 7 g and over 100 g, but most of the 33 examples whose weight is documented fall within the 20-40 g range (Fig. 7). Since an individual weight represents the minimum sum of silver that could possibly be weighed, this evidence suggests that transactions involving at least this weight of silver were being carried out. Of course, if multiple weights were used together in a single transaction, their weighing capacity would increase.

The prominence of bullion transactions in the 20-40 g range, as suggested by the weights, also fits with evidence of the silver itself. For instance, most complete, but tested (nicked), Scandinavian silver ingots from England weigh between 10 g and 20 g, a weight range well suited to the use of oblate-spheroid weights. Such sums of silver are too large to characterise daily exchange, but would be appropriate for the bulk purchase of foodstuffs, livestock and land, in addition to primarily social payments, such as bridewealth. Thus, the evidence afforded by regulated weights, supported by the silver, suggests two distinct economic environments, within and outside of market-centres, characterised by different weight and silver handling traditions.

► Fig. 7. The weight range of oblate-spheroid weights from England ($n = 34$).



Conclusion

Metrological approaches have dominated studies of Viking-Age regulated weights, but without reaching a consensus about the uniformity or applicability of particular weight standards. Here, my aim was to question whether precise weight standards were aimed for at all. New evidence for the variable alloy composition of cubo-octahedral weights suggests a looser organisation of weight production than has hitherto been assumed, raising the possibility that weight manufacture to standardised units was not strictly enforced. Instead, the use of widely accepted symbols of trade may have been sufficient to provide security and trust in metal-weight transactions.

I also aimed to go beyond metrology, to investigate the identity of weight users, and the types of transaction in which they were involved. New finds of weights from metal-detecting reinforces the view that weight use characterised rural, as well as urban, society in the Viking Age, while a review of the evidence of weights from graves indicates that women, and not just men, owned weights and balances. They likely took part in different types of bullion transaction, for while market centres appear to have been dominated by the use of cubo-octahedral weights for small-scale transactions in silver, in rural areas bullion transactions were mainly focused on larger payments utilising oblate-spheroids. This speaks, in turn, to (at least) two distinct economic zones. There is, in sum, a wealth of information contained in Viking-Age regulated weights, with the potential to address not just questions of metrology, but wider issues of economic agency and the very nature of exchange.

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Address of the author

Jane Kershaw
Institute of Archaeology
36 Beaumont Street,
Oxford
OX1 2PG
UK
jane.kershaw@arch.ox.ac.uk

Weights and marketplaces: A short introduction to the workshop

by LORENZ RAHMSTORF and EDWARD STRATFORD

The aim of the workshop was to discuss various issues related to the study of ancient marketplaces within a comparative perspective. The hope was to transcend debates about the theory of what markets were or, especially, whether looking for them was justified based on one or another theory of the historical evolution of markets. This hope led to an emphasis on the phenomenology of marketplaces, that is: how do they manifest, as themselves? This second workshop was thus, in effect, an extension of the intent of focusing on weights as physical evidence of exchange, however exchange be interpreted. Within this aim, the problem of merely identifying such sites was crucial, but issues of morphology, of geographical location and structures connected to marketplaces, and issues of the complementary significance and functions that marketplaces could include, in addition to places of exchange and control, were considered important aspects of the phenomenology of the marketplace. Many of these points were well addressed during the conference by the participants. The questionnaire below was distributed to the participants in preparation for the meeting and all participants were asked to address some of the issues raised therein.

Definition

- Are marketplaces known in the ancient or present cultures you are currently examining through written sources (literature, economic texts, epigraphy, *etc.*)?
- If yes, how common were they – is it perhaps possible to quantify them?
- What constitutes a marketplace for the examined culture (according to written sources and/or archaeological evidence)?
- Which defining elements are always present?
- Which words are used for “marketplace”? What is the marketplace’s semantic field?

Location

- Where are the marketplaces located and for which apparent or potential reasons?
- Could topography, access to waterways, routes, *etc.* be relevant to the choice of locality?
- Are the marketplaces located along historically known tracks and exchanges routes?
- Are marketplaces included in settlement areas or are they located ‘extra-muros’, for example at road junctions?
- How large are the marketplaces in average?

Structures and built features

- Is the market-area surrounded by built structures or is it open on all sides?
- What are the functions of such liminal buildings (if present)?
- Are built structures (huts, sheds, market-halls) attested for within the marketplaces?
- Are structures or areas of production/manufacture included in the marketplaces?

The exchanged goods

- What kinds of products were exchanged on the marketplace – victuals, tools, everyday-items, “valuable” objects, humans, workload, investments, debt, *etc.*?
- To what extent are they products of specialisation?
- Over what distances did goods have to be transported from their places of production to the marketplace(s)?
- Were specific types of products exchanged within specific areas of the marketplace(s)?
- Or were specific markets specialized in specific goods?

The actors involved

- Who were the sellers, who the buyers?
- How “professional” were the sellers?
- Are social differences perceptible and are they related to space use within the marketplace or to specific types of products?
- How are markets embedded in the every-day-life?
- What do they mean for the social relations of the persons involved?

Control and organisation

- Are the limits of the market-area clearly marked?
- Is a specific market tax attested for?
- Were overseers present?
- Who then controlled the overseers?
- Was the exchange regulated by law? If yes, how?

The exchange processes

- How were the goods exchanged?
- Are conventional exchange rates known for certain products?
- Is book-keeping attested for?
- Is there any direct evidence for barter or for (regulated/fixed) prices?

- Were different goods exchanged by different means?
- Were weights and scales involved? If yes, for what kind of products?
- Were weight-regulated artefacts/coins/ingots used in the exchange? If yes, for all exchanged goods or only a limited number of them?
- Were standardized products or standardized containers used for bulk products?
- Do we know of the existence of contracts?
- Are there indications for debt deriving from market exchange?

Marketplaces and places of worship

- Do you dispose of any evidence of religious activities taking place along or next to marketplaces?
- Is the market accompanied by religious feasts?
- Are cult sites/sanctuaries located next or close to marketplaces or were they related/incorporated in sacral architecture?

Regularity and duration

- How often and how long were marketplaces held?
- Were they connected with other specific events?
- What archaeological data may indicate regularity?

Historic and economic setting

- Are marketplaces present throughout the period of interest?
- Are they occurring in specific circumstances only?
- Is change in the significance of a particular marketplace or marketplaces in general perceptible throughout the period of time you are dealing with?
- Do marketplaces compete with other ways of exchange? If yes, how are these characterised?

Archaeological identification

- By which criteria do you identify a marketplace when based on archaeological records only?
- What are typical archaeological markers for (potential) marketplaces?
- In how far could soil analyses contribute to our understanding of ancient marketplaces and have such analyses already been carried out?

As mentioned above, many participants gratefully addressed the requested topics in some form or another. In addition to those topics mentioned above, participants also engaged in topics such as the uses and systems of standardized procedures during exchange and the functional relation of marketplaces to places of worship. The papers provided here included these topics and many

address a key focus of interest: how exchange was practiced at marketplaces and which potential devices (standardised products or capacity measures, coins) were used to enhance the exchange beyond pure barter. Not surprisingly, there was a special emphasis on the role of weights and scales in market exchange and on the question to which extent such finds may be archaeological indicators for marketplaces. Questions related to the definition or identification of marketplaces were at the centre of attention of researchers working only with prehistoric evidence. We are grateful for all participants to the conference and for those whose papers are included here.

In the spirit of a comparative perspective, we are pleased that the workshop participants covered many regions and historical periods. The workshop and the papers presented here range from investigations of potential marketplaces in prehistoric periods as well as concrete historical cases in a multicultural and diachronic perspective. By comparing places of exchange from the Bronze Age to the early modern or even contemporaneous period in Eurasia, Africa and America we sought to identify general and particular taxonomies and aspects of marketplaces, and to compare the phenomenon through time and space. We regret that one category of historical marketplaces which is missing in the volume are the Roman marketplaces¹. In the following, we briefly summarise the papers.

D. W. Warburton provides a broad review of Egyptian and Mesopotamian market activity, arguing that weighing and equivalency developed in intellectually distinct ways. Appealing to a range of evidentiary sources, Warburton fashions novel arguments about labor, equivalencies, bureaucratic roles in the development of markets, and prices. Focusing on Egyptian evidence, Warburton reviews a range of topics to argue that Near Eastern bureaucracies accidentally created the conditions for markets in the fourth and third millennia. While some of his reconstructions will be difficult to prove in detail, his wide-ranging essay provides a stimulating model of major economic developments in the Ancient Near East.

Juan Carlos Moreno García provides a case study of the importance of markets and trade in relation to political stability at Heracleopolis Magna near the end of the third millennium BC. Prying the exclusive right to agency away from royal actors, Moreno García portrays extra-regional trade emanating from Egypt as a composite effort between royal and regional actors from the beginning

¹ For this category one should consult the forthcoming proceedings of a conference of the Department of Ancient History at the University of Kassel: Market(s) – Market buildings – Market Squares. Investigating the Economies of the Market in the Ancient World, organised by Kai Ruffing and Kerstin Droß-Krüpe, February 26th–28th 2019. The proceedings will appear in the *Philippika* series.

of pharaonic Egypt. Within this context, Heracleopolis Magna stands out as a “gateway of the south” after the Old Kingdom, when city sizes, new positions, and riverine traffic all increased. Drawing on multiple lines of evidence, Moreno García argues that Heracleopolis rose to prominence on the strength of its trade ties in both the north and south.

Adelheid Otto reviews both textual and archaeological evidence for markets across Syro-Mesopotamia in the second millennium BC. Despite theoretical approaches that have downplayed the possibility of markets in the ancient world, Otto presents the linguistic evidence for market activity, and reviews archaeological candidates for markets from three Late Bronze Age sites: Ugarit, Tall Munbaqa, and Tall Bazi. At these sites, with large expanses excavated, open places can be found at junctures of roads and near city gates, some with built structures with characteristics suggesting workshops or shops. Finds include weights and even a measuring table. Otto argues that the larger spaces should be considered examples of the word for market in Akkadian (*maḥīru*), while candidates of broad streets offer likely examples of ancient *sūq* areas. Her study exemplifies the possibilities to identify marketplaces in Syro-Mesopotamia.

Edward Stratford provides a treatment of the marketplace as understood through the sources of trade between Assyrians and Anatolians in the early second millennium BC. After treating the use of the word *maḥīrum* (market) and references to the marketplace specifically in the Old Assyrian documents, Stratford provides results of preliminary research with portable X-Ray Fluorescence and frequency distribution analysis of the texts into the locations of some of the important cities known to host major market exchange in central Anatolia. By this, he offers evidence to track seasonal changes in the volume of trade at permanent markets in Anatolia.

Elsbeth M. van der Wilt argues that first millennium BC Egypt, though it offers more difficult evidentiary resources than earlier periods, saw the rise of temples as both sites and authorities for markets and market activity. Surveying several sites in the Nile Delta, van der Wilt suggests that open places in front of temples, some of which have yielded weights, functioned as marketplaces. Van der Wilt draws together these lines of evidence along with contemporary historical sources, and contemporary and later regional parallels to bolster her case.

Edward Harris’ overview of markets in the ancient Greek world provides an accounting of archaeological and textual evidence of markets of the Classical and Hellenistic period (5th-1st centuries

BC), principally the *agoras*, but also of *emporia* and periodic markets. Harris provides a survey of locations and layouts of *agoras* at various sites, their development, offerings, and administration in the Greek world. Along the way, he situates the *agora* in the social life of the city by covering the sights one would see (monuments, statues, decrees), the *agora’s* connection to public assembly and administration (which changed over time), and some sense of the diversity of persons who frequented the market.

Felix Rösch provides a description of the development of marketplaces and *emporia* in northern Europe from historical sources from the Early to High Middle Ages (ca. 500-1250 AD), contrasting inland and North Sea/Baltic developments. While Carolingian and Ottonian states provided for recognizable marketplaces in urban spaces inland, the North Sea Baltic was more influenced by the professionalization of sea-based trade, with attendant effects on the spaces used for marketplaces. This description of different developments is further strengthened by a close description of the development of the town of Schleswig from the 11th century onward through archaeological excavation of the riverine front. In all these places weights are typical finds.

Thomas Höltnen gives a thorough description of the archaeological activities in Cologne marketplaces from the Medieval period, describing the characteristics and findings at several of the principal marketplaces (Heumarkt, Alter Markt, Neumarkt, and Waidmarkt). Höltnen’s review benefits from interlacing historical records with scrupulous excavations, despite the scarcity of permanent structures being the most defining characteristics of each market. Höltnen traces the development of spaces from a Roman forum area, through Carolingian dockland, to a formalized marketplaces created by Archbishop Brun, through the rise of guilds.

Jessica Dijkman uses the frame of New Institutional Economics to consider medieval markets of the High and especially of the Late Middle Ages (11th-15th centuries) in northwestern Europe, arguing that markets fueled the commercialization of northern Europe during this period. Describing a burgeoning network of weekly markets and inter-regional fairs that developed at different paces in different areas, Dijkman notes the erosion of fairs as cities asserted rights to impose security and thus strengthened their own markets and marketplaces. Furthermore, marketplaces (as places) provided easy ways for buyers to compare prices and authorities to prevent irregularities in prices and measuring, and in turn these advantages of the marketplace further spurred the commercialization of northwestern Europe.

Stephen A. Kowalewski contributes a discussion of markets and marketplaces in Oaxacan and Mayan Mesoamerica from the Late and Terminal Formative to the Late Postclassic period (ca. 300 BC-1600 AD) and, kindly, closely follows the catalogue of issues raised in the questionnaire. Kowalewski reviews locations and characteristics of marketplaces in sites from both regions and touches on a range of topics, including structures, goods, actors, control, and common goods monies. Kowalewski points out that weights were apparently not known in Mesoamerica and thus not used for comparing value in economic exchange. Therefore, weights cannot be universally assumed to predate or accompany commercialization. While Old and New World markets have many broad similarities, the lack of weights in the latter is a reminder that such devices were not always an identifier for the presence of marketplaces.

Kenneth Hirth describes Aztec markets of Central Mexico as understood through early colonial descriptions of the early 16th century, then discusses the development of marketplaces in Aztec society, highlighting ecological diversity and the role of human portage as driving factor in a distribution of markets throughout the landscape in and around the Basin of Mexico. Covering an impressive range of issues (goods exchanged, the conceptualization of exchange, merchants, profit), Hirth then turns to archaeological approaches to identify marketplaces, arguing the merits of the 'distributional approach,' in which one identifies the existence of market behavior through the analysis of household assemblages for evidence of decentralized distribu-

tion. This elegant approach uses quantification of archaeological data and searches for certain patterns to trace potential market exchange.

Gary Feinman, Fang Hui, and Linda M. Nicholas present a review of major economic and political development in China from the third millennium BC through the China's first unified empires (Qin and Han dynasties: ca. 221 BC-220 AD) as a backdrop to the development of population centers in coastal Shangdong China. The authors review the settlement patterns of the area, the results of a long-term survey, which show first independent development, but then significant demographic growth during the Qin/Han periods. The authors argue that the convergence of historical and archaeological evidence reminds us that administrative development and the increase in markets need not be seen as antithetical forces.

Hans Peter Hahn treats present rural markets in West Africa through an ethnographic lens, using a phenomenological approach to frame his review. Hahn considers the use of money, gendered roles, daily and seasonal patterns and ritual space to consider whether or not markets should be considered embedded as previously defined. Hahn argues that markets are partially embedded, hybrid institutions, but represent a historical development incompatible with earlier framing of embeddedness. His rich discussion of present phenomena in West Africa markets, especially in Burkina Faso, give ample insights how markets are practically organised and by that give food for thoughts for our comprehension of prehistoric and ancient marketplaces.

The formation and transformation of value in Bronze Age Egypt

by DAVID A. WARBURTON

Ancient Egypt, markets, weights, equivalencies, prices, Heqanakhte

A survey of the evidence of markets, with references to balances in Pharaonic Egypt in the Bronze Age (c. 3000-1200 BC) taking the form of a theoretical, historical and documentary discussion of artefactual, iconographic and textual evidence, primarily based on actual written documents, covering the history and development of balances & weights, stressing the equivalencies, prices, payments, social status and products. Balances and weights are found in the Egyptian sources, but the most important aspect of the Mesopotamian and Egyptian weights was in forming the basis of values. After the invention of measuring systems followed the introduction and exploitation of balances and weights by the administrations of the major states of the Ancient Near East. These various systems of measurement facilitated the creation of equivalencies which offered the basis for prices and market activities. Stress is on the importance of the state and institutions having been responsible for the emergence of the earliest markets; given the evidence from Egypt, the stress is on the instruments and the phenomenon "market" more than specific "markets". The behaviour of bureaucrats, individuals and institutions acting within the constraints of the market and institutional environment contributed to both the division of labour and social stratification. The diachronic developments and the importance of these markets for theoretical analysis of the history of markets are also emphasised.

Entstehung und Umwandlung von Wert im bronzzeitlichen Ägypten

Altägypten, Märkte, Gewichte, Äquivalenzen, Preise, Heqanacht

Der vorliegende Beitrag ist ein Überblick über die Evidenz von Märkten mit Verweisen zu Waagen im pharaonischen bronzzeitlichen Ägypten (ca. 3000-1200 v. Chr.). Er bietet eine theoretische, historische und urkundliche Diskussion der Belege durch Artefakte, Ikonographie und Texte. Dabei wird die Geschichte und die Entwicklung der Waagen und Gewichte behandelt, wobei Äquivalenzen, Preise, Zahlungen, sozialer Status und Produkte besprochen werden. Waagen und Gewichte sind in den ägyptischen Quellen vorhanden, aber der wichtigste Aspekt in Bezug auf mesopotamische und ägyptische Gewichte war die Gestaltung der Basis von Werten. Nach der Erfindung von Messsystemen folgte die Einführung und Nutzung von Waagen und Gewichten durch die Administration der Hauptstaaten im Alten Vorderen Orient. Die verschiedenen Messsysteme ermöglichten die Generierung von Äquivalenzen, welche die Basis von Preisen und Marktaktivitäten bildeten. Es wird herausgestellt, dass der Staat und seine Institutionen für die Entstehung der frühesten Märkte verantwortlich zu sein scheinen. Im Falle von Altägypten fällt die Betonung eher auf die Instrumente und das Phänomen "Markt", als auf spezifische "Märkte". Das Verhalten von Bürokraten, Individuen und Institutionen, die innerhalb der Zwänge von Märkten und der institutionalisierten Umgebung handelten, führte sowohl zur Arbeitsteilung als auch zu sozialer Stratifizierung. Die diachronen Entwicklungen und die Bedeutung dieser Märkte für die theoretische Analyse der Geschichte von Märkten wird ebenso verdeutlicht.

Introduction

For Bronze Age Egypt (c. 3000-1200 BC), we have a number of different types of sources informing us about social life (such as excavated sites, tomb & temple reliefs, religious texts, administrative records, notes from daily life, *etc.*), but these do not offer all the information about markets that we would like. Nevertheless, from the mid-3rd millennium onwards, it is clear that markets & market-places, balances & weights were known in Egypt. Weights and balances are known philologically, iconographically and as actual objects. Markets are iconographically known from reliefs; none have been actually securely identified in archaeological excavations. Philologically, the term *mry.t*, generally meaning “river bank”, is known to be used with the meaning of market – and from the reliefs it is easy to extrapolate this conceptual market into a real place with weights and balances.

The important aspect of the earliest Ancient Near Eastern weights and markets is less the archaeological evidence of their nature than the fact that they were the earliest – and the developments of the 3rd millennium BC Near East had a lasting influence on the development of markets which deserves considerable attention, and probably requires elucidation. The systems of measurement were tools of the administration which pushed the emergence of markets through the implementation of equivalencies, which created the basis for estimating value and thus facilitating both exchange and production for the market.

▼ Fig. 1. Stone weight inscribed with the name of king Narmer, without provenance, Staatliches Museum Ägyptischer Kunst, Munich (MOLLAT 2007, fig. 1).



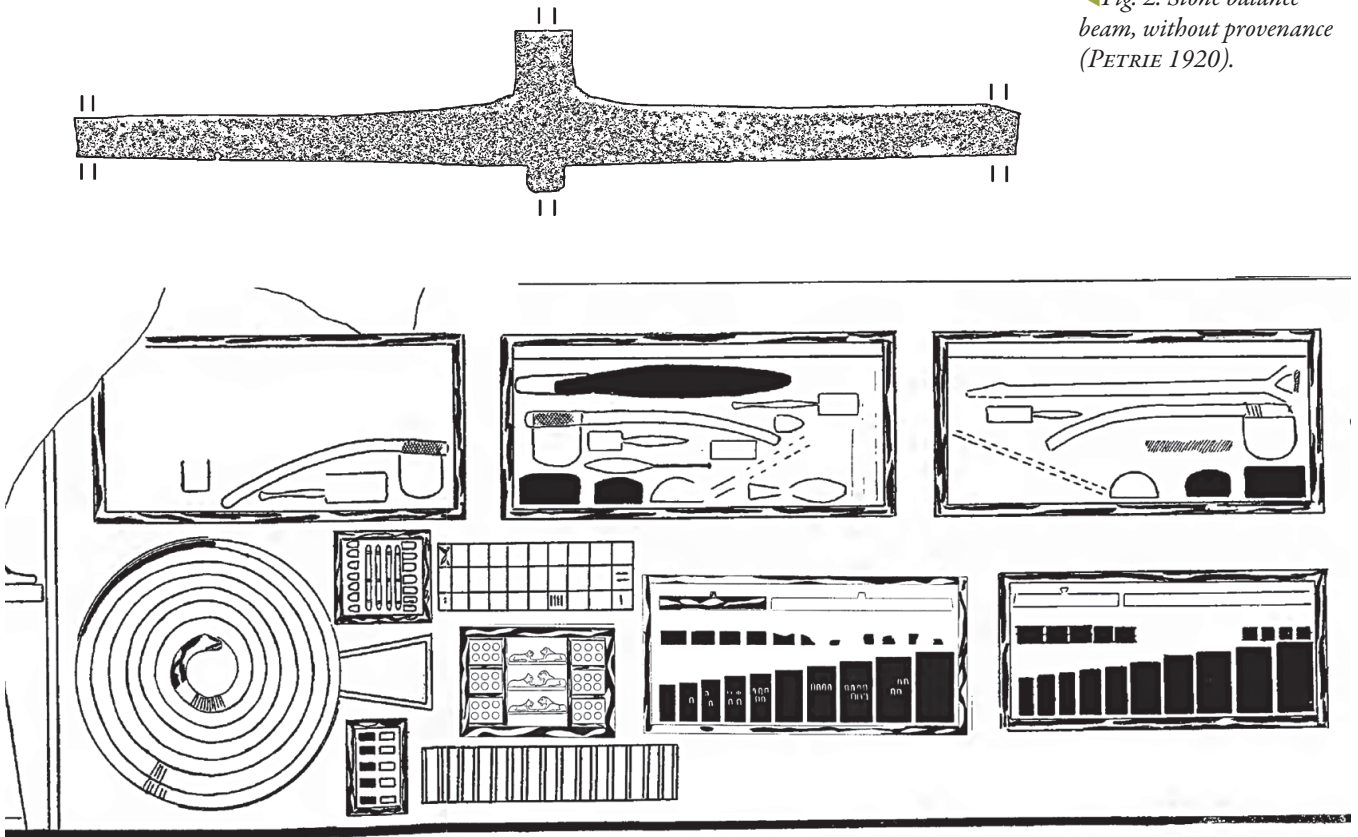
The origins and context of early Egyptian weights and balances

There have been numerous studies of ancient Egyptian weights (*cf.* POMMERENING 2013). Many cannot be dated, and none confirm that the weights really correspond to specific weights. As market places have not been identified, it cannot be claimed that the weights are from marketplaces – and aside from that, few of those known were found anywhere *in situ*. Almost half of the known weights were found either in villages or houses, and thus not in what we would call market-places; of extreme significance is that a very large number of weights were found at Naukratis, meaning that one can confirm that the usage of weights in urban centres in the 1st millennium (*i. e.*, after the Bronze Age) was high (COUR-MARTY 1990, fig. 15). However, the sources do not really permit judgements about the distribution of weights in the Bronze Age. Some of those found in the village of Deir el-Medineh and its vicinity may well have been used in the local village market – but not in the real physical river-bank market linking that village to the rest of the Nile Valley. However, that local market – in the village – may well be representative of part of the reality of Bronze Age Egyptian markets, as we will see. Nevertheless, the potential significance of Egyptian weights lies more in the date of the earliest weight than in the find spots of ordinary weights – and more in the cognitive changes which the weights wrought.

The earliest recognisable and datable weight may well be a flat-bottomed, circular, squat, domed, piece of quartzite (Fig. 1; *c.* height: 9.5 cm; lower diameter: 10.5 cm; weight: 1750 g; MÜLLER 1970, 185) inscribed with the name of King Narmer, the first king of the 1st Dynasty. Judging from the form of the writing, the inscription appears to be contemporary with that époque. The weight corresponds precisely to a ten-fold multiple of a unit known to have been used a millennium after Narmer, and thus if this is accepted as a weight contemporary with King Narmer, then the unit existed in Narmer's time as well – and it is merely a question of documentation. It should be evident that most out-of-situ weights cannot be dated and thus confirmation is improbable with our present knowledge. The form of the object can be viewed as corresponding to that expected of a weight. It follows that the object is probably a weight belonging to around the time of King Narmer.

I may think that Narmer may have lived around 3000 BC, but radiocarbon dates for his successor (Aha) fall at *ca.* 3190-3100 calBC (or even 3300 calBC, with other samples, *cf.* BOEHMER *et al.* 1993; GÖRSDORF *et al.* 1998); it therefore follows that in radiocarbon terms, Narmer will have been older than that – and any Prehistoric radiocarbon dates (for any other potential alleged prehistoric

◀ Fig. 2. Stone balance beam, without provenance (PETRIE 1920).



weights) should be compared with this, rather than by dates, postulated on historical grounds.¹

The date of what might be the earliest extant Egyptian balance beam (Fig. 2; *c.* length: 8.5 cm; PETRIE 1920, pl. 46) is unknowable, although it is likely to date to the centuries around the time of Narmer's weight. We have images (QUIBELL 1913) of what appear to be balance beams of a similar type in a tomb belonging to early Dynasty III, and thus these images probably date to sometime between 2700 and 2550 BC (depending on the ultimate consensus adjusting radiocarbon calibrations and historical methods; *cf.* HORNING *et al.* 2006; SHORTLAND/BRONK RAMSEY 2013). Significantly, the images of the balance beams appear along with weights; in the adjoining boxes are various other tools – and among these other items are several objects which appear to

be similar to weights known from Egypt (Fig. 3; but they could be other tools).²

We will now turn to the development of the use of weights, jumping forward to the equivalencies that are the basis of values and prices, and then going over the gradual development of how these emerged. Following that, we will return to focus on Egypt in context.

Equivalencies

The balance is itself a revolutionary technical innovation and a cognitive breakthrough because – metrically thinking – it is impossible to use a balance without weights and weights without a balance; both concepts must be transformed into concrete objects simultaneously and then joined together to work in tandem. This means of measurement bears no relation to the mere arbitrary establishment of a measure for surface area or volume; weights are determined by the equilibrium of the balance and not by arbitrary decisions.

▲ Fig. 3. Part of a damaged mural from the tomb of an official dating to Dynasty III (*c.* 2550 BC). Balance beams and weights are in the boxes to lower right; weights may possibly be in the toolboxes above. The white figures on the weights (centre, left weights box) are numbers giving a sequence of increasingly heavy weights, probably from 10 to 100 units (in Egyptian decimal system). The lions (centre, left) probably belong with the games (left) rather than the weights (right), yet they do resemble weights found later throughout the Near East (QUIBELL 1913, pl. XVI).

¹ WENCEL (2016, 640) presents the argument – which should have been recognised long ago – that the buildings post-dating the invention of writing in Mesopotamia belong to the middle of the 4th millennium BC, and it follows that writing was probably invented well before 3450 BC.

I (WARBURTON 2009, 97–99) have argued that the radiocarbon dates for the earliest writing in Egypt should be interpreted as meaning that writing might have been introduced into Egypt around or probably after 3200 BC (at the very earliest in radiocarbon terms). In this sense, the absolute priority of the Egyptian weight as being the earliest known certain weight is at present indisputable – and it corresponds to our impression of the philological evidence as we will see. The precise dating of prehistoric materials will become very important as it is gradually realised that there does not seem to be much evidence of prehistoric weights (RAHMSTORF 2014).

² I regard it as superfluous to point out that the weight bearing Narmer's name cannot be related to the earliest balance beam for the simple reason that two pans able to accommodate such a weight and the objects to be weighed would hardly have been able to swing freely under that specific balance beam. Such large weights would have demanded a larger beam than that of the precision balance beam which the Petrie beam represents – and Quibell's representations demonstrate that the scribes were accustomed to using balance beams of different sizes already in the first half of the 3rd millennium BC.

Balances and weights were indeed a transformation of methodology in comparison to ordinary measures. The truly revolutionary move was, however, the development of the equivalency whereby a volume of grain was assigned a value of silver in terms of weight. Equivalencies are the foundation of any means of calculating value, allowing an exchange to be understood economically (rather than merely socially). This is the basis of value in the sense of prices – and it is here that the ordinary pieces of stone (serving as weights to measure, *e. g.*, precious metals) become arbiters of value.

The balance is the precondition of those calculated equivalencies that enable market transactions. However, the balance alone was inadequate for the development of the concept of equivalencies: this required a second revolutionary cognitive transformation. I am persuaded that equivalencies are not ordinary features of human thought. Thus the balance itself requires multiple steps (developing the concept of a balance beam and weights, substituting symbolic weights for actual commodities, establishing scales for estimating weight and value, *etc.*), but equivalencies require more.

Significantly, before the existence of balances, there is virtually no evidence of the existence – let alone use of – any concept of equivalencies in the earliest texts from the 4th millennium BC. Even the administrative texts from early 3rd millennium Mesopotamia do not document much more than administrative transactions indicating, *e. g.*, allocations of the use of animals and equipment for labour (*cf. e. g.*, STEIBLE/YILDIZ 2015), but little evidence of equivalencies or trade. Egyptian texts from the late 3rd millennium confirm transfers of commodities around Egypt (*e. g.*, POSENER-KRIEGER 1976), but offer few hints at major trade.

Yet the concept of equivalencies probably dates to the early 3rd millennium, and by the end of the 3rd millennium, the administration of the Ur III state was using equivalencies regularly (ENGLUND 1990).

This was a revolutionary transformation – which was immediately followed by the activities of the Old Assyrian merchants in Anatolia. Their activities were completely dependent upon not only the system of measures and weights – and the ensuing equivalencies –, but also the production of textiles in southern Mesopotamia, which was itself the result of behavioural changes pushing investment decisions themselves guided by bureaucratic concepts of measurement and equivalencies. Only if the bureaucrats could understand the value of the textiles in silver was it reasonable to invest in the factories to produce them – and these included the employment of spinners and weavers, as well as increasing the requirements for wool and shepherds.

One of the largest of the Ur III textile production centres, producing “tens of thousands of garments” annually was conveniently located near the Persian Gulf, whence the products could be loaded

onto ships for export (LAURSEN/STEINKELLER 2017, 76-77). That production of textiles destined for local consumption in an exclusively subsistence economy would have been situated closer to the major centres of population indicates that the bureaucrats were adjusting to market demand.

This situation undoubtedly contributed to the gradual change whereby Mesopotamia exported increasingly more finished textiles as opposed to raw wool (visible in the chronological sequence in HEIMPEL 1987). And these south Mesopotamian institutionally produced textiles played a pivotal role in the Old Assyrian trade which is documented shortly after the end of the Ur III era: these North Mesopotamian trading firms depended on the South Mesopotamian bureaucrats.

There were no equivalencies in the administrative texts which date from the time of the invention of writing, nor in the immediately following centuries (ENGLUND 1998). Yet, a millennium and a half after the invention of writing, the Mesopotamian administrative documents are replete with equivalencies based on weights of silver (ENGLUND 1990). This demonstrates that the administration adjusted to, and exploited, the historical development of the concept of equivalencies, incorporating it into ordinary administrative procedures – and allowing it to determine bureaucratic behaviour. In Mesopotamia, these inducements were certainly not there before.

Given the fact that weights and equivalencies are common in later administrative texts – *e. g.*, from Egypt, Mesopotamia and the Aegean in the 2nd millennium BC – I view it as extremely important that the earliest Mesopotamian bureaucrats did not use either weights or equivalencies. I interpret this as meaning that they do not appear to have inherited concepts of weight or equivalencies from Prehistory – and these did not appear until centuries after the invention of writing. Yet, they were integrated into both administrative and commercial texts, implying that they had become a very convenient means of facilitating accounting in the millennium and a half between the invention of means of measurement and the regular usage of equivalencies in administrative texts. And this interpretation of the historical development of the methodology appears to me to be entirely compatible with the history of the development and spread of the terminology.

Equivalencies are the pre-condition for serious market trading, and thus understanding both the evidence and the interpretation is crucial to the understanding of the development of markets and their place in economic history. It was effectively the weights and equivalencies which brought about a transformation in bureaucratic behaviour in the 3rd millennium BC.

Weights and balances in human history

Above, we showed that balances and weights were present in Egypt during the first half of the 3rd millennium. The first certain references to weights

in Mesopotamian texts (KREBERNIK 1998, 305) probably belong to the end of the first half of the 3rd millennium BC, taking WENCEL's (2016, 640) dates for the start of ED IIIa at ca. 2650-2750 cal-BC. Yet it is significant that texts from the immediately preceding centuries are not well preserved, and therefore weights will probably have been recorded in texts a century or two earlier (but these texts were not preserved for historical reasons). Regardless, this date is virtually identical to the dates for the Egyptian balances and weights, and suggests that the procedures and instruments were familiar across the Ancient Near East at this time.

ENGLUND (1998, 118) notes that one system of counting in the 4th millennium BC may possibly have been "used to note weight measures". However – even if this hypothetical possibility is seriously considered – this system does not seem to have had any influence on later developments. In this sense it is quite different from the tradition that arose in the first half of the 3rd millennium BC.

By the middle of the 3rd millennium in Mesopotamia (ED IIIb), there is widespread use of the *mina* of ca. 500 g (Sumerian MA.NA, later known to the Greeks), e. g., for measuring the weight of wool used in wages (PRENTICE 2010, 84-85). This system integrated the *shegel* (Sumerian GIN, Akkadian *šiglu*) of ca. 8.33 g, 60 of which equalled a *mina* in the Babylonian system.

While the Mesopotamian *šiglu* was more or less stable in terms of weight, the term was adopted with diverging weights in other Near Eastern systems (e. g., the Levant and the Hittites) and these were not far from the Egyptian silver *kite* (9.1 g) or the Attic gold *stater* (8.6 g). Significantly, the Lydian system defined a *stater* as equalling 220 grains while the Mesopotamian *shegel* was supposedly 180 grains – and some early *minas* equalled 60 *staters* (rather than the 100 drachmas of the later Attic system).

There is, however, another point which is frequently lost when basing arguments on the evidence of the state administrative documents. This is that there is an important hint that balances were not exclusively a matter dictated by the states: the term *mina* (a unit of ca. 500 g, roughly a pound; Sumerian MA.NA, Akkadian *manu*, Greek *μνᾶ*) appears in Sumerian at a time of Sumerian rule – but is etymologically a Semitic term, and thus a loan word from the periphery that entered the core. It is likewise hardly coincidental that the Sumerian DAM.GAR, for "merchant" is probably a transliteration of Akkadian *tamkāru* (CAD 18, 125-140) and thus likewise drawn from the Semitic world.³ Thus,

the inclusion of Semitic elements in the other languages (e. g., Akkadian *manū* in Sumerian MA.NA, Egyptian *mn.w*, Greek *μνᾶ*; Warburton 2018, 76-77) is as important as the presence of Sumerian elements in Egyptian.

One extremely important example of such is also that Egyptian *ms* is probably derived from Sumerian MAŠ (MÁŠ = *šibtu* in Akkadian, and thus the origin of the word does not seem to be Semitic) suggesting that the Sumerian is the origin of the concept of "interest on a loan" (CAD 16, 158; Wb. II, 142, 2-4), meaning that the link of weight/value and time may have been their invention. It is perhaps not without interest that the concept of interest seems to be Sumerian (and not Semitic or Egyptian) in origin. As this is an arbitrary system based on imaginative thinking and invention without a need for recourse to verification, to my mind it reflects the Sumerian way of thinking. To my mind, the Egyptians were more inclined to observing the world and incorporating the visions of others; in my view the Semitic speaking Akkadians were more accustomed to reacting, absorbing and adjusting to what they were confronted with socially.

This would confirm that very different ways of thinking and different kinds of interaction and stimulus contributed to the development of systems of weight and equivalency, including both state and private activity in the entire region between Egypt and Mesopotamia in the early 3rd millennium. Furthermore, the delays between the development of the idea and the implementation suggest that even once the conceptual system had been developed and digested, it took at least another half millennium for the concept and use value of equivalencies to become widely appreciated and implemented.

Nevertheless, this system formed the foundation of the system of equivalencies which emerged in the 3rd millennium. Even if there had been an earlier system of weights before the beginning of the 3rd millennium – which I doubt – that system played no role in the development of equivalencies. Relevant here is that all coins in Classical Antiquity were understood as representing a specific weight of metal and, only by this weight did they have a value – and this conceptual system can be traced back to the first half of the 3rd millennium BC and not much further back.⁴

One of the most important facts about the early evidence is that the *talant* (of 29 or 30 kg, known from Mesopotamia and the Aegean; Sumerian

3 Ironically, the Ancient Egyptian *šwtj*, "merchant" (Wb. IV, 434) is probably derived from the Sumerian *šu ti/šu.te.g*, "receive", "oppose", "accept" (which also preceded the Akkadian *maḥāru* with similar meanings, "receive", "hand over", "face", "approach", "accept"; occasionally written *šu.te.gá*; CAD 10, 50-71; – but also by extrapolating from "oppose", reaching "be equal to", "equivalent", with the related *maḥiru* meaning "market price", "tariff", "market stall"; CAD 10, 92-99). This would link the Egyptian "merchant" with Sumerian for both

"trade" and "equivalency". However, this proposed etymological and semantic link has yet been recognised as established – and the Egyptians may have acquired the Sumerian word from Akkadian (where we do not always know how the writings were pronounced when Sumerian terms appear in Akkadian texts, and certainly not when Egyptians were reading them).

4 Even if it is a system of weighing, I consider it to be unlikely that Englund's other system is a system of conceptual weighing in the fashion for which the surviving system served so well.

GÚN, Akkadian, *biltu*, Greek *τάλαντον*) does not seem to be documented as a unit in the first half of the 3rd millennium BC.⁵ The balance beams of the first half of the 3rd millennium from Egypt (both the existing one and the representations, *supra*) are definitely those of precision balances rather than unwieldy larger ones.

This is extremely important because (a) the earliest and most important equivalencies are based on the smaller units (*minas* and *shegels*), while (b) it is widely assumed that heavy weights (GÚN and *biltu* primarily mean “load”, “burden” and *talant* secondarily; CAD 2, 229-236) are at the origins of weighing, and (c) the word for the Greek *talant* (already present as a unit of weight and as an icon in Aegean writing in the 2nd millennium BC, but only spelled out in the 1st millennium) is etymologically and conceptually related to weighing (*s. v.* *τάλαντον* in LSJ).

Collectively the evidence would imply that the *talant* as a specific unit of weight only came relatively late (*i. e.*, after the *shegel* and *mina* to which it was linked, with 60 *shegels* being a *mina*, and 60 *minas* being a *talant* in both Mesopotamia and the Aegean), and that the concept of the “load” as a unit was introduced into the existing system, rather than being at the origin of weighing. There seems to be a consensus that the signs for the *talant* and its weight in Linear A and Linear B are identical, at 29 kg. It is extremely curious that the earlier, Linear A Minoan A118 sign, seems to be a hand balance, while the later, Linear A Mycenaean B118 sign, is a stand balance, the latter being like the standard Egyptian hieroglyph of Dynasty XVIII (Gardiner Sign-list U38).⁶ Could this possibly be a hint that the precision hand balance was the first institutional concept of a balance, and that the larger balances only became significant later? This would corroborate the idea that the smaller units appeared earlier. Significant is that the *talant* evidently entered Greek conceptual thought long after the invention of the balance and the weight in the Near East, meaning that there is no evidence for an Aegean contribution to early weighing in conceptual terms.

It is worth stressing here that – regardless of the arguments about the earliest balances – the workmanship of the earliest Egyptian balance beam makes it clear that this was not the first effective balance beam ever produced. Just when, how and where the conceptual system of weighing was invented and developed remains to be established. Others must judge the evidence that balances were invented in prehistoric times or places. Certainly in

my view it is impossible to have equivalencies without weights and balances, and there is no indisputable evidence for either weights or equivalencies in the earliest texts (of the 4th millennium BC). Beyond that, it would seem that the entire conceptual system of equivalencies which was diffused is based on the weights of the earliest recognisable system, that of the *shegels* and *minas*.

In this sense, it would appear that there was an ancient system – based on the Mesopotamian *shegel* and the *mina* – which endured until Classical Antiquity. The Egyptians used the decimal system when counting, and it was the scribes of ancient Mesopotamia who developed the sexagesimal system when developing the first systems of measurement – and this system was inherited in both the Sumerian and Akkadian traditions, which fed into the Aegean world. The actual system can thus be traced back to Sumerian traditions integrating Semitic influences, using a technology shared by the Sumerians and the Egyptians around 3000 BC.

The Egyptian contribution

Thus, it is clear that it was the Mesopotamian system of measurements which was passed on. However, the early evidence of the Egyptian weight cannot be denied: there is hardly any reason to believe that it is not a weight, nor to doubt its early date. And – when taking account of the present state of radiocarbon dates – it would appear that the Egyptians may have been slightly ahead of the Mesopotamians since this real weight might antedate any Mesopotamian use of weights and balances.

In principle one could simply state that the matter is hardly evidence upon which to build the hypothesis that the Egyptians invented weighing. On the other hand, however, one could also simply confirm a couple of simple developments. First of all, it is clear that the Mesopotamian thinkers were excellent systematisers while the Egyptians may have been more inclined to observation – as can be suggested for the early history of astronomy where the Egyptians began ahead of, but fell behind, the Mesopotamians in the 2nd millennium (WARBURTON 2016b). Furthermore, the Egyptians were able to combine observation with technical innovations as is evident in the pyramids and other structures. Thus, it is possible that such a fundamental mechanism as a balance could be an Egyptian invention – but that the systematisation of the instruments moved faster in Mesopotamia, where various trends encountered one another in a more vibrant intellectual climate, and the decisive stimuli may have made this environment more receptive, and thus more effective in exploiting the system conceptually.

From the existing evidence, it is evident that (1) the Sumerians advanced while the Egyptians may have lagged behind, and (2) the Sumerians incorporated foreign terms into their system of thinking, revealing receptivity to external inputs.

5 S. CLEGG (2019) has recently confirmed that this initial impression is correct for the texts from Mesopotamia.

6 One should, however, note that one of the recorded versions of Spell 452 (cited below) seems to have had a hand balance (CT V: 321) and not a stand balance; the *Coffin Texts* from the Middle Kingdom are virtually contemporary with Middle Minoan II Crete, the era of Linear A. Mycenaean Linear B is contemporary with the New Kingdom *Book of the Dead* with the stand balances.

The idea that the precision balance imported from Egypt might have been one of those inputs is not impossible. This is one possible interpretation of such evidence as we have.

Systems of measurement: The estimation of value – and the markets

Regardless of who invented the balance, the evidence confirms that (for the moment), Egyptian and Mesopotamian systems of measuring weight are the earliest documented, and that the Mesopotamian system was probably the origin of the system of equivalencies. On this basis, it is worth making some projections based on their absolute priority. In my view, the sources demonstrate that equivalencies based on weights in silver and volume capacity measures for grain are the foundations of economic activity in the Bronze Age Near East (WARBURTON 2018). Equivalencies gradually appear with increasing frequency in the course of the 3rd millennium in Mesopotamia.

Evidence from Egypt is far rarer, but confirms that the same conceptual system existed. Both systems were based on measures; measures were invented in 4th millennium BC Mesopotamia, before the system of weights (which enabled the concept of equivalencies, which became values). It is thus admissible to refer to the development in Mesopotamia, where the use of equivalencies and the identification of measures of value (weights in silver) may have advanced more rapidly than in Egypt.

It is important to understand the transition from relatively insignificant Neolithic/Prehistoric trade systems (prior to *ca.* 3000 BC) to the active and interlocking trading systems emerging in the earliest historical period of the Ancient Near East (*i. e.*, after *ca.* 3000 BC). The impact of the invention of writing, and later equivalencies, influenced the behaviour of bureaucrats and the people under their control in the core regions. However, this price-influenced behaviour also had an impact on regions well beyond the core.

The appearance of Mesopotamian luxury articles in 3rd millennium Crete (COLBURN 2008) suggests that market exchange based on principles of value developed in Mesopotamia spread to Egypt and the Aegean relatively quickly. That most of the documented artefacts reached Crete towards the end of the 3rd millennium BC (rather than the 4th millennium when lapis lazuli is documented in Egypt) suggests that the integration of the Aegean followed the development of the market, in terms of Mesopotamian (not Aegean!) history, as opposed to forming part of the earliest exchange patterns (when lapis lazuli and silver began reaching Egypt).

Balances & equivalencies

Equivalencies are a means of estimating value, and usually achieved by measurements allowing incomparable items to be compared. Estimating a yield of a given quantity of grain from a given sur-

face area of field depends upon experience, expectations and measures (for surface and volume) – but is not a challenging cognitive task so much as one based on experience.

Simple hypothetical administrative equivalencies without balances

By contrast, equating a volume measure of grain with a day's or a month's work is an accomplishment dependent upon measurements of time and volume – and the concept of linking time and volume. It is entirely possible that some of the thus-calculated rations may not have been adequate to keep workers alive and well, as illustrated by a document from around 2000 BC, demonstrating that a considerable number of workers were unable to fulfil their obligations, or at least their expected obligations (ENGLUND 1991). It follows that such equivalencies (time worked against volumes of grain) were arbitrary or hypothetical and potentially incompatible with good health. It means that they were relatively abstract and not based on experience. Or at least not on an experience including concern for the workers. One must note that even more than two millennia after the first workers were issued the first inadequate subsistence wages, the lowest class of Mesopotamian workers had a short life expectancy. The data show that [the population of servile workers in late 2nd millennium Babylonia] was not viable without the continual import of fresh workers (TENNEY 2011, 135-136).

Thus, with adequate experience about the consequences of the persistent malnourishment of workers, the bureaucrats simply concluded that they did not need to worry about health care so much as replenishing the supply.

This is itself an illuminating indication about the cognitive processes of ancient bureaucrats working in a stable state balancing its own activities in the context of a market economy. We have no reason to believe that the bureaucrats suffered from persistent shortages of grain compelling such behaviour; in one example that I have cited, palace bureaucrats in Mari displayed little interest in arranging the transport of several tons of grain which had already been harvested and was on the quay ready to load (DURAND 2000, 21-22; WARBURTON 2003, 54-56). Nor can we claim that the bureaucrats thought that labour was plentiful; on the contrary, Assyriologists confirm that bureaucrats faced shortages of labour from the 3rd millennium BC through the 1st millennium BC (*e. g.*, BIROT 1993, 11-13; also P. Steinkeller and M. Stolper pers. comm.). Evidently, the market price of labour was not influenced by constraints in either the grain supply or impressions about the local labour supply. Thus, superficially at least, the bureaucrats could easily have offered higher wages.

However, the bureaucrats persisted. Although potentially lethal for the workers involved (and injurious to the family prospects of local casual la-

bour), this type of equivalency was a revolutionary bureaucratic cognitive change first documented in the Mesopotamian texts of the fourth and 3rd millennia BC, revealing that the bureaucrats could consciously establish and maintain arbitrary equivalencies.

The reality of the labour market was slightly different to the viewpoint of the bureaucrats. It is true that the bureaucrats had practical difficulties finding labourers whom they could compel to work (either because they were institutional dependents or could be legally compelled to work without remuneration). However, the reality is that the behaviour of the bureaucrats had a conveniently downward impact on wage-rates, as there was probably “a large reserve of cheap labor” (Powell in POWELL *et al.* 2003-2005, 611) from which replenishments could be sought at low market prices – if necessary. However, the ancient Near Eastern bureaucrats preferred not to hire casual labour if it could be avoided (as was the real concern of their complaints) – and thus many of those at the bottom of society were driven into dependency relations with low rations. In this sense, the hypothetical bureaucratic equivalencies could be maintained when the activities of the bureaucrats were compatible with market forces – and especially so when it was convenient for the merchants to profit from the decisions of the bureaucrats.

Complex equivalencies based on weights

Far more intellectually challenging and advanced was the system of relating a weight of silver with a volume of grain, and this emerged during the 3rd millennium BC (ENGLUND 1990; 1998). These conceptual systems facilitated the emergence of foreign trade, by which the Mesopotamians deliberately invested in the manufacture and export of cheap mass-produced textiles to acquire silver, copper, and also the wealth of preciousities exchanged in the 3rd millennium BC. This historical development had a direct impact in Egypt, the Gulf, the Indus Valley, and the Aegean (as visible, *e. g.*, in the “royal” cemetery at Ur; *cf.*, *e. g.* ARUZ 2003; LAURSEN/STEINKELLER 2017).

In this case, however, it is significant that in the 2nd millennium BC, the market changed the value of grain, by doubling the proportion of silver required to purchase grain (ZACCAGNINI 1997) – but the amount of grain offered in monthly wages for casual labour remained constant, with effects observed by Scheidel who remarked that from the early 2nd millennium BC until the early 2nd millennium AD, “the real incomes of unskilled laborers tended to be very low” (SCHEIDEL 2010, 425).

In this sense, the arbitrary bureaucratic equivalencies linking the respective values of grain and silver were realigned as a result of market forces, but this did not come to the benefit of the workers. Again, the doubling of the value of grain meant that the value of the product which the bureau-

crats produced (grain, using cheap labour) increased while the value of that commodity (silver, which they imported and thus had to buy with textiles) decreased. Clearly, the efficiency of the bureaucratically controlled textile industry – which provided the exports – was such that it could be relied on to increase the production of silver in the periphery, with the result that the market price of silver fell. That the bureaucrats were willing to accommodate this transformation by accepting changes in their market prices is hardly surprising. (We have no hint that in calculating their retail prices, the bureaucrats took account of the labour value involved; instead the labour value probably fell to the lowest possible wage level, regardless of the retail prices).

Complex equivalencies involving commodities, weights and time

One of the most important developments of the Bronze Age was the creation of interest rates. In Mesopotamia, the standard interest rates (maintained from the 3rd millennium through the 1st millennium BC) were 20 % for silver and 33 % for barley (for some references, *cf.* WARBURTON 2016a, 327). In Mesopotamia (as in Classical Greece), interest was calculated by stipulating that in exchange for a loan of money, a weight of silver be “re-paid” after a set period of time, with the time and the difference between the money lent and the payment expected revealing the rate of interest on the loan. Such procedures depended upon measurements of time and weight – and in this case, the methodology and the terminology spread. In this case, the market and weights are interlocked – but there is no need for a market place and no trade where commodities or services are exchanged: it is a purely financial “transaction” – and one legally sanctioned by the state (whose laws guaranteed interest payments, and whose elite of bureaucrats and land-holders benefitted from the scheme).

Money

In principle, interest on silver depends upon understanding silver as money, and thus in this sense, for us interest is an attribute of money. However – given the circumstances noted above, *i. e.*, that interest is probably Sumerian – one wonders if we are not thinking anachronistically, and perhaps confounding the true origins of money with an attribute of money. However, we may be getting ahead here.

Obviously, the use of a system of equivalencies in a market exchange system centred on silver implies that a kind of money is being used. Money is customarily assumed to have three or four characteristics: as a (1) unit of account, (2) measure of value, (3) store of wealth, and (4) medium of exchange. Certainly, in the Near East of the 3rd and 2nd millennia BC, silver served all of these functions – but it was certainly not the only medium of exchange.

One vexing question for those dealing with silver in Bronze Age Egypt is the matter of just how any tokens or coins might have played a role in market exchange. It is clear that there were weights corresponding to a *deben* (either the Middle Kingdom gold *deben* of 13.7 g linked to the Dilmun *sheqel* and the Indus system; or the New Kingdom *deben* of 91 g of copper) – but the charts in COUR-MARTY (1990) are hardly reassuring when trying to make certain statements about the reliability of the weights and their real role.

In this context a unit which is usually called the $\text{š}(n)^{\text{c}}.ty$ creates a problem. JANSSEN (1975, 102–108) somewhat arbitrarily and unconvincingly baptised this unit the *snw/snj.w*, but the problem is not confusion about the word. The issue is that in the Ramesside documentation from Deir el-Medineh it is quite clearly “a standard of value” which “with some confidence” can be understood as representing a silver value corresponding “to 5 *deben* of copper” (JANSSEN 1975, 105, 107) – but it appears merely in texts dating roughly to the era when the exchange rate for copper to silver lay at 100:1 (*i. e.*, Dynasties XIX and early XX; JANSSEN 1975, 105–107, 549–550). After the fall in the value of silver (to 60:1), it disappears. In this sense, my own impression is that the unit was clearly rooted in real silver – and not just a conventional measure of value used for exchanges; there would have been no reason to “withdraw” it from circulation, if it was based on a purely fictional arbitrary abstract equivalency level. Yet there is not the slightest hint of an actual existing coin or token which could correspond to this weight/value – even though the use of the unit is known for at least a millennium before the Ramesside Period. One explanation could be that the exchange rates had real values that were so deeply ingrained in the minds of the Egyptians that they really were conscious of a real change in monetary value – even if it was of no relevance to their daily life since few actually saw a lot of silver in Bronze Age Egypt (while copper with a far lower value was actually familiar to them, and there the usage continued).

Difficult to grasp as this development is, it demonstrates that silver probably was indeed the most important measure of value known in the ancient world. The degree to which an economy using silver in this fashion can be described as monetised is certainly debatable, and thus I would argue that monetisation really only took place when silver was widely used in the 1st millennium BC. It is, however, highly probable that there is more evidence for the use of silver as a store of wealth and medium of exchange in 2nd millennium BC Egypt than is generally allowed. In the following I will nevertheless place the stress on the use of silver as a measure of value as this is hardly controversial and very important when appreciating that balances (and thus weights) stand behind this usage.

A great deal of discussion has centred on the issue of what money is, assuming that it is primarily a medium of exchange. However, far more clarity may be had by going back to interest. In this sense, I would avoid the usual functions of money by stressing Keynes’s concept that, through interest, money is a link between the present and the future and von Glahn’s suggestion that money serves as means of settling state debts (WARBURTON 2016a, 14). In the case of the first, it is clear that money alone has its own rate of interest, and that this may have caused silver to become a medium of exchange – even while grain was being used to pay salaries and taxes in the Bronze Age. And indeed, such payments were probably the first financial transactions ever.

In this sense, silver gradually replaced grain as a unit of account and medium of exchange – and in so doing assumed a new role. However, its original role may well have been that of a means of paying interest in a material that was both a measure and store of value. As silver eroded the other values, these earlier roles of grain will have come together to form our understanding of money, and all bundled together in Greek silver coins.

Understood in evolutionary terms, the origins of money are un-related to the nature of money as we understand it – and this creates confusion when applying modern definitions. In effect, it is quite logical: when expecting something to correspond to its modern definition while that something is gradually emerging means that through purely circular logic one can only find the fully-emerged form, since that is what one is looking for. And thus, there is perpetual confusion about what money was in past worlds. It happens that money became what it is – but that is a mere accident. Working this way, we will not reach any useful conclusions. We cannot apply modern definitions to something that does not yet exist – and in doing so, we also risk misunderstanding its origins.

The historical impact of the bureaucratic mechanism of equivalencies

The systems of measurement developed and applied in the Ancient Near East lived on in Europe more than a millennium after the Ancient Near East had ceased to exist. This simply underscores the importance of Ancient Near Eastern and Egyptian measure for economics. I therefore consider it highly probable that if balances and weights were not invented in Egypt or Mesopotamia around 3000 BC, they were certainly present in the 3rd millennium Near East where they were exploited for economic purposes in a fashion without parallel anywhere in the world up to that point in time. Regardless of where they were invented, the idea certainly travelled rapidly, and was swiftly followed by the development and spread of equivalencies – based upon the Mesopotamian system of measures and equivalencies.

The transformations of the use of the balance and weights

I have stressed that the early Mesopotamian system was established as the initial paradigm for the use of weights. However, there are several indications of change in the use of the balance and weights over time – and these changed usages should (1) be understood as such, and also (2) understood as meaning that the role and understanding of the balance changed over time.

What would appear to be the first important change – which already took place in the 3rd millennium BC – was the introduction of the *talant*. Aside from the unit of weight and the general “load”, the term was used in Sumerian and Akkadian for “tribute”. In this sense, the Mesopotamian state was assessing the losers in a war (or those with no power to resist) to make payments. That these were onerous and heavy comes from the use of the word selected. Furthermore, such payments in materials of value revealed the growth of the economies on the periphery of Mesopotamia – as earlier it would have been impossible to acquire such “tribute” from impoverished neighbours.

The second is the increasing use of the balance in markets. Above, we noted that the market scenes in Egyptian tombs are rare, and that the balance in such scenes is rarer still. However, balances appear regularly in Egyptian tomb scenes from the 3rd millennium Old Kingdom through to the time of Alexander the Great – and mostly in bureaucratic contexts (*e. g.*, the tombs of viziers from Old Kingdom in Saqqara, DUELL 1938, pl. I,32; to the New Kingdom in Thebes, DE GARIS DAVIES 1943, pl. II,40), but also in those of provincial officials in the Middle Kingdom (*e. g.*, Khnumhotep in Beni Hassan, NEWBERRY 1893, I: pl. 29), and in those of subordinate officials of the Dynasty XVIII New Kingdom (*e. g.*, GUKSCH 1978, 18-19, pl. 8-9; SHEDID 1988, pl. 16).

The balance depicted in an administrative context in the tomb of the priest Petosiris – dating to the time of Alexander – is exceptional as the balance is common in religious scenes (due to the weighing of the heart of the deceased in *Book of the Dead* spell 125), and one would expect such in the tomb of a priest in Egypt just at the beginning of the Hellenistic period. However, among the scenes resembling the earlier scenes of daily life in older Egyptian tombs in this particular tomb of the almost Hellenistic priest depicts a balance related to the treasury (LEFEBVRE 1923-24, 54-55, pl. VIII). Significantly, the conversation of the officials bringing the balance into equilibrium not only stresses that the actions are to be supervised by a scribe, but also include phrases suggesting that the balance and its weights could be used unjustly. Such fears are intrinsic to the market – and thus there was a transformation from the era of the 3rd millennium when the issue was simply the bureaucratic one of getting the weights right and balance into equilib-

rium, to an era of mistrust. In the Old Kingdom, the remarks of those scribes and workers manipulating the balances and recording the results are frequently quite banal, *e. g.*, stressing that the weight is of stone, not metal (for an exchange of this type, *cf.* DE GARIS DAVIES 1902, pl. XIV, lowest right scene of the three registers on the left).

In the tale of “Eloquent Peasant” from near the end of the 3rd millennium, the balance itself is considered to be the metaphor for a worthy judge, and this is reflected in Spell 452 of the *Coffin Texts* referring to “that balance of Re” by which men are judged.

Yet only slightly later, in the Old Babylonian palace at Mari (in the first half of the 2nd millennium BC), we can recognise the change in the phenomenon: the merchants and the palace use different weights and distrust each other (DURAND 1983, 204-207). The balance itself is no longer an unquestioned authority. In fact, it is a common phenomenon of the era after the 3rd millennium that different systems of weights are used – while based on the same (or similar) principles, some of the same terms are linked to different weights.

Obviously, it would have been more convenient for everyone to stay with the Mesopotamian *sheqel*, *mina* and *talant* and just use whatever weights and balances were locally at hand available (except in Egypt where a different system was in use – and probably from early on, a hint that the Egyptians may indeed have invented the balance). In fact, however, merchants will increasingly have used their own weights and balances. Later, each of the Greek political units chose its metrical system as they desired. Later still, the Roman emperors would adulterate the coins. The very concept that such an irregularity was conceivable was anchored in the tradition that weight and value were virtually the same, and it should be evident that origin of the idea that the value and weight of a coin was linked to its weight can be traced back through the *denarius* and *stater* to the *sheqel*.

Thus, there was a transformation with increasing dishonesty on the part of merchants and rulers as the influence of the market spread – and it was realised that gains could be made by manipulating the means of accounting (and not only by simply aiming at high margins). In this sense, financial fraud using balances was one of the market-influenced results of the spread of the balance. Evidently financial fraud was potentially more rewarding than legally lending money at interest – probably because the wealthy landowners had silver, and the merchants had to work to catch up.

In any case, the earliest development which set the world on the way towards the market was the use of the balances by the bureaucrats to establish equivalencies which facilitated their work. At that time, the merchants were able to make their own personal gains using legitimate means while co-operating with the bureaucrats. Later, the balances

became one of the principal tools of the merchants, and their interests were very different from those of the bureaucrats (whose thoughts and behaviour were driven by serving political power, rather than seeking personal gain in the market).

The spread of market values

The development of equivalencies seemingly opened up the way to the emergence of market prices as the Akkadian term *maḥīru* combines the meanings of “market place”, “business transactions”, “price equivalent” and “tariff” (among other things; cf. CAD 10, 92-99). The Akkadian *kaspu* meant the metal “silver”, but also “money (as medium of exchange)” as well as “price, value, payment”, etc. (CAD 8, 245). The Egyptians used the word *ḥd*, “silver” to designate “means of payment” and “measure of value” (Wb. III, 210) as well as “money”, “price” and “payment” (JANSSEN 1975, *passim*; HANNIG 1995, 774) – and the means of payment frequently involved equivalencies, so that the system in Egypt and Mesopotamia was identical in structure (but not based on shared terminology). To my mind, such exchanges imply that the system of measures related to weights and values in silver (as expressed in the *mina* and interest) was a consequence of the spread of the system of measuring value via weight in silver, creating a concept of value, and relating this to time (for wages and interest, etc.). And the concept of equivalencies spread rapidly, facilitating trade, even far beyond the regions where Sumerian and Egyptian were spoken, and also in regions beyond those affected by Near Eastern demand.

Everyone should be familiar with the response of the mining operations in north-eastern Afghanistan which increased production – that had to be sent across Iran – to satisfy Near Eastern demand for lapis lazuli from the 3rd millennium onwards. This region was so far removed from Mesopotamia and Egypt that it is inconceivable that any social ties or coercion could explain the arrival of lapis lazuli in the Near East. I thus suggest that the increase in lapis lazuli reaching the Near East and Egypt was part of the transformation due to the creation of the market – based upon the newly developed concepts of equivalencies based on weights in silver.

Yet I am also thinking of jade axes, Grand-Pressigny *livre de beurre* blades, and symbolic sickles in Europe, certainly never an integral part of a Near Eastern Bronze Age market system. Nevertheless, here also peculiar developments take place in the 3rd and 2nd millennia which are not entirely comprehensible in terms of European developments alone. Axes of jadeite went out of fashion around 3000 BC, being replaced by bronze (KLASSEN 2004), roughly simultaneous with the invention of equivalencies in the Near East. The flint blades of Grand-Pressigny enjoyed a wide but relatively unfathomable circulation where the interpretations

of the archaeologists do not succeed, even when confusing utility value, economic value and prestige value (cf., e. g., the conclusions of PLISSON *et al.* 2002). Significantly, during the 3rd millennium, when equivalencies were developing in the Near East, the distribution of the blades changed; the blades are relatively unknown before and after this era. The wide geographical distribution of these specific blades was an – archaeologically speaking – short-lived phenomenon: it not only arose quickly, but also disappeared abruptly and unexpectedly. The development of bronze technology alone does not explain this – but the era of the wide distribution of the blades is the same as those centuries of the development of the use of equivalencies in Mesopotamia. The peculiar phenomenon of the European bronze sickles which were never intended to be used, but are extremely well documented, suggests that Sommerfeld may well be correct that they may have served as a kind of money (SOMMERFELD 1994); this idea can only have been inspired by the transformations taking place during the Near Eastern Bronze Age.

Thus I contend that this Ancient Near Eastern concept of equivalencies based on weights in silver (convertible to copper or bronze) spread not only East into Central Asia (whence came the tin and lapis lazuli), but also West not only to Egypt, but also into Northern Europe (which was irrelevant to the Near East). I assume that the concept of value based on weights both facilitated and hindered the circulation of certain categories of object, once it was possible to establish cash value in numerical terms. Ultimately, values understood in terms of “money” (which is what silver was in the Ancient Near East and Egypt) became virtually the exclusive basis of the system and concept of estimating value.

The quantities of grain or bronze alone were not the origins of value, but rather the abstract system of estimating value by making equivalencies to weights in silver. Thus, the origins of value lie not in ordinary commodities, but rather in measurement and preciosities.

State & market

In general, the development of the concept of equivalencies and their role in market exchange is easy to understand (once the parameters have been recognised). The role of the market in ancient Egypt itself is, however, a complicated problem, as the markets of Bronze Age Egypt must be understood in terms of an economy dominated or to some degree guided by the Egyptian state. Above, we have noted that there was linguistic input in the early Sumerian weighing technology that implies contact with outsiders. We also noted that the bureaucratic decisions could not only influence the market, but also that in some decisive cases, the markets responded in a fashion which matched state interests. In the opposite sense, the

bureaucrats used their access to cheap labour, large supplies of grain and wool to manufacture textiles which could be exported to acquire the goods the states sought. In this sense, the early states play an important role in both trade and economic development – while co-operating with, or exploiting, the market.

Certainly, the archaeological evidence of objects exchanged over long distances suggests that before the appearance of the Bronze Age states in Egypt and Mesopotamia, there was very little trade of any kind: the emergence of the states can be linked to the greatest leap in economic history since the beginning of the Neolithic. This economic transformation is not a mere change in subsistence strategies, but pushes transactions in a complex society involving exchanges of objects and services made or performed by specialists, *i. e.*, reflecting a complex division of labour, and thus the emergence of the market (WARBURTON 2003; 2016a; CASANOVA 2006).

Towards the end of the Near Eastern Neolithic (*c.* 5000-3500 BC), there is evidence of very different kinds of change. One significant element is the gradual emergence and use of seals, from the earliest Neolithic onwards, even in very small villages (*e. g.*, AKKERMANS/VERHOEVEN 1995), probably to mark bulk commodities of value in a particular place. This usage of seals expanded significantly in the era of the early states (*cf.* RAHMSTORF 2016a). Another is the evidence of actual objects traded over long distances, such as lapis lazuli (WARBURTON 2003, map 4). Again, this expanded immediately after the appearance of the first states. The appearance of the first real monumental architecture associated with the simultaneous storage and distribution of grain belongs to the fourth and 3rd millennia BC, when we can also confirm an increase in the amount of lapis lazuli (CASANOVA 2002) and other precious materials being traded across the entire region from Iran to the Aegean. The precious materials (gold, lapis lazuli, carnelian, *etc.*) are associated with wealth and social prestige throughout this region – even in Aegean Crete before the emergence of the first state (COLBURN 2008).

The earliest ordinary exchanges in the earliest states (*c.* 3500-2800 BC) will doubtless have been transfers from the peasants to the elite, and this will have led to further transactions between the elite and craftsmen. What happened with the appearance of the first states was that they demanded deliveries in-kind (labour, grain, *etc.*), which obliged the peasants to produce more than they would have otherwise. It was in this fashion that a surplus was produced which allowed the establishment of an elite class. While the very earliest texts from 4th millennium Mesopotamia record large quantities of ordinary commodities (oil, grain, *etc.*; ENGLUND 1998), they do not betray evidence of significant trading relations.

Thus, these methods (which were fiscal exactions and thus effectively financial) and the related activities (management, construction, *etc.*) contributed to the development of a division of labour defined in terms of exchange obligations, dictated by the state, or induced by the state through payments offered to, *e. g.*, craftsmen. Before this time, craftsmen and merchants purveying precious raw materials will have been peripheral to most of ordinary and elite life. In this sense, the emergence of the state (with its demands) will have led to the economic transformation facilitating the growth of the market.

It is from the end of the 3rd millennium onwards that the documents reveal substantial state activity demonstrating commercial trade between the Mesopotamian state and its neighbours, especially in the form of textile exports; thousands are employed in a textile industry designed to produce second rate products for export in order to acquire silver from abroad (WAETZOLDT 1972; 1987). It is during the 3rd millennium that equivalencies emerge, and only become common – N.B. in the state administration – at the end of the 3rd millennium BC (ENGLUND 1990).

Inevitably, the very nature of our documentation means that the state plays an overwhelming role, as it is the elite which conveys its conceptual understanding to us. However, some economic activities of the state either imitated or stimulated market practices. Aside from taxation, the state had a certain role in employment and determining social priorities. Significantly, actual private transactions relating to what we would term the “religious sector” (*i. e.*, determined by the state ideology) play an important role in the documentation as preserved, *e. g.*, private individuals paying workers for work on tombs or commissioning funerary goods. It is nevertheless clear that other market transactions (*e. g.*, selling vegetables, performing management services for private individuals) were less state dominated – although such private clients or employers were frequently members of the elite, bound into the highest parts of the hierarchy. Nevertheless, as a result of such activities, the private sector grew more important over time (*cf.* WARBURTON 2005; 2007a).

This means that in the Bronze Age Near East, historically the markets were gradually emerging from the shadows of the state – and our documentation demonstrates that this continued to be the case in both Egypt and Babylonia during the Iron Age. On the other hand, however, during the Bronze and Iron Ages, certain raw materials (*e. g.*, copper, lapis lazuli) were regularly imported from abroad – and these necessarily came from markets bound into the periphery. In this sense, there were two parallel developments: (1) one trend binding core and periphery together through market forces partially driven by state demand in the core and (2) one long-term tendency gradually creating a role for independent markets in the core.

Markets & “market forces”

Given the importance of silver as money in the sense of a measure of value means that the actual markets are merged into conceptual markets in this discussion, as “market forces” are expressed in terms of prices, and these are dependent upon weights rather than market places. Market forces are the result of prices – rather than *e. g.*, needs – determining behaviour, and market forces appear in market places as well as guiding investment and consumption patterns beyond the actual market. In this sense, weights in silver have a market significance ranging far beyond the market place.

The Egyptians understood the concept of a market as a context for the purchase and sale of goods. It is improbable that the Egyptians would have recognised abstract concepts such as “labour markets” and grasped the importance of the remuneration of labour as a fundamental factor in price formation. The extent to which the Bronze Age Egyptians – or anyone else – understood price formation is probably impossible for us to grasp (but *cf.* FINK 2018).

Price formation

The concept that scarcity would drive up prices just as abundance would drive them down was clearly understood, as they will have regularly experienced this just before and after harvest season. However, the degree to which they really understood that rare precious materials were high-priced because they came from distant lands was probably less apparent. They clearly appreciated that goods such as lapis lazuli belonged to the realm of divinity and royalty. Regardless of whether they knew that they were imported from distant lands (in this case Northeast Afghanistan, crossing Iran and/or the Persian Gulf, before crossing Syria or the Red Sea), they recognised preciousities and appreciated that they had a higher price, and will only have been found in special markets (even if such goods were not traded exclusively in elite contexts). They will also have understood that the locally manufactured imitations (*e. g.*, glass and faience, manufactured in proximity to state demand near palaces and temples in Egypt) necessarily had lower prices – but even these were by no means affordable for the greatest part of the Bronze Age population (only becoming far cheaper in the Roman era when blown glass came into its own).

From Mesopotamia, we have precise prices derived from information gathered in markets, where lapis lazuli was evidently to be found in 2nd millennium Western Asia; these sources confirm that lapis lazuli was generally worth twice (or more) its weight in silver and that its value was related to the distance travelled (*cf.*, *e. g.*, MICHEL 2001). From Egypt, we have no sources which give both the weight of lapis lazuli and its value in silver (as we have in Western Asia from Mari and from Kanesh), and thus neither estimates nor evaluations nor

prices. Thus, we can only confirm that it was evaluated in terms of silver – but not confirm the exact rate (and even this might not be as helpful as one could wish, since the price of gold was far lower in proportion to silver than in Mesopotamia, and the value of gold might have had an impact on its silver price in Egypt; for some details, *cf.* WARBURTON 2003; 2016a; Warburton in WARBURTON/THAVAPALAN forthcoming).

Regardless, prices and wages in ancient Egypt seem to reflect market forces, with what we would view as market prices determined by scarcity and abundance. These prices and wages would all be calculated in terms of equivalencies in weight-units of silver – and most Egyptians will have been aware of the going rates. This latter is indicated by the fact that the early 2nd millennium BC farmer Heqanakhte can simply stipulate equivalencies in terms of copper, oil, emmer and barley (ALLEN 2002), as if his clients will have agreed.

In this sense, by the end of the 3rd millennium BC, a system of values based on market forces seems to have been accepted by the commoners, elite and state in Egypt – and these values were convertible into silver.

Markets & the price of labour

Access to grain (either through rations, wages or land) was ultimately decisive for the quality of life in the ancient world. Those who had large plots of land could assure their own subsistence and rent out plots to others; the state could allot plots or link access to land with offices. Those who had no access to land had to either rent it or seek income by selling their labour as a service. Skilled craftsmen could easily find clients for their services or goods, but such people are rare. The state required manual labour and could either requisition it without compensation or pay subsistence salaries or rations when necessary for workers on expeditions in the desert.

In both Egypt and the Near East, the scale of the remuneration of labour meant that the numerous manual labourers were rewarded far less than the members of the elite (*e. g.*, 20 times as much in the case of one expedition – from the first half of the 2nd millennium BC – where the data is perfectly clear, revealing that the leader received 200 loaves/day and the manual labourers 10 loaves/day; FAROUT 1994). Whether the Egyptians understood these administrative allocations as (a) reflecting the abundance of manual labourers and the dearth of skilled managers or (b) simply confirming the disparities separating the upper and lower classes must remain a moot point. It could be that in the minds of the ancient Egyptians, the high value of lapis lazuli simply confirmed the same social disparities: wealth belonged to the powerful and poverty to powerless.

It is not clear how common it was for individuals to receive regular salaries paid in grain, as was the

case of the workers of Deir el-Medineh at the end of the 2nd millennium BC (JANSSEN 1975). There are hints (in accounts) that some temple officials received some kind of allocations during those months they were active in the temples, but in the Bronze Age such officials will rarely have been active in the temples all year round. By contrast, we can see that officials will have owned their own land and some will have been entitled to access to official land *ex officio*: their income will have been derived in part from the grain they harvested from their own plots and their official holdings. In some cases, in the early 2nd millennium BC the offices and attached land were hereditary, but could also be sold (COLLIER/QUIRKE 2004, 99-105).

When evaluating the prices of labour, the Egyptians had several different conceptual systems. As noted above, in allocating wages and salaries for institutions, higher status individuals were assigned higher quantities and the lowest status ones the lowest quantities. A similar system applied in the distribution of plots made available to individuals in exchange for the performance of services, with lower ranking individuals assigned smaller plots; this can be seen in P. Wilbour where scribes are assigned plots of more than a hectare and soldiers less than a hectare (GARDINER 1941-1948).

Probably perceiving that the price of grain in Ancient Egypt remained relatively low, EYRE (2010, 297) suggests that there was a “disjunction” separating the role of grain as a subsistence good from its gaining an adequate market value. My own analysis is that because wages for casual unskilled labour were maintained at a low level and the capacity to gather taxes and rents in grain nearly unlimited, the respective values of labour and grain were diminished simply by virtue of the reality that the Ancient Near Eastern economies were agrarian, where the market values of casual unskilled labour and grain were held down by abundance of both (*cf.* WARBURTON 2019). There may have been variations, but the prices will have remained low because of the market, not despite it or because of an hypothetical “disjunction”. To my mind, it is a matter of market forces, operating globally across the economy; for Eyre, it is a matter of their failure. However, this type of analysis – by Eyre and myself – is obviously completely different from what the Egyptians perceived in the market place.

Excursus: Surplus capacity in Ancient Egypt

Understanding the productivity of the fields is essential to understanding income and employment, and we will continue with this directly, after a brief excursus dictated by a subsidiary, but highly controversial matter: that of the capacity of Egypt to produce a surplus with the implications that the surplus went hand-in-hand with high underemployment.

This idea jars with the Western concept that economies function on the principle of full employment and that the economies of the ancient world

were subsistence economies because they could not free labour to be employed in the industrial sector (what economists call the Malthusian Trap). It is assumed that it was only via industrialization and the mechanisation of agriculture that workers were freed from agriculture to work in Lancaster. This may have been true of England where agricultural yields only reached *ca.* 2500 l/ha around the end of the 19th century AD (*cf.* WARBURTON 2019). The evidence from the Ancient Near East implies that this gradual European development of an increase from the 12th century AD onwards is simply irrelevant to global economic history (although potentially highly relevant to economics).

The situation in Egypt is easy to describe but apparently quite difficult for outsiders to grasp. At best one can summarise it this way: during the Classical Era, it is known that for centuries, Egypt annually exported around 100,000 tons of grain to the Mediterranean cities of Athens, Rome and/or Constantinople. This was possible during the Classical Era because there were cities like Athens which required imported grain to survive (being able to pay for it with silver); such markets did not exist in the Bronze Age (since virtually all of the existing states were primarily agrarian economies; commercial states such as Athens only emerged much later). These exports originated in the Hellenistic Age when Egypt's surplus capacity served the Ptolemies quite well, selling the grain to Athens brought silver from Laurion to Egypt. (Superficially, this could be taken as an example of comparative advantage, but in reality it merely reveals that Athens was a slave society dependent upon slave labour to provide the money so that the peasants of Egypt could turn over their grain to the Greek Ptolemies who sold it to Athens to gain the funding to support their wars against other Greeks).

Regardless, the Ptolemies simply exploited the far older administrative infrastructure which had created the capacity to produce the surplus. As noted, in Egypt wealth and pyramids were created by demanding that the peasants produce more grain than they required so that they could turn the surplus over to the elite and the state. This was the basis of the division of labour in which the number of professions increased with the spectrum of possibilities created by the disbursement of the newly created funding: bureaucrats, masons, craftsmen, jewellers, smiths, *etc.* were among the beneficiaries of the capacity of the peasants.

To understand the implications for the economic history of Egypt and the world, we can draw on the example of a single document, prepared on the basis of ordinary Egyptian bureaucratic procedures. In New Kingdom Egypt, estimates of the harvest of a plot were usually made in terms of surface area, with the assumption that an average parcel of one *aroura* (2735 m²) would produce 10 New Kingdom sacks (10 * 76.8 l) of grain, meaning *ca.* 3000 l/ha and in fact this is exemplified in one letter (P.

Valençay I, lines vso. 4-8; WENTE 1990, 130-131; also discussed in WARBURTON 2016a, 185), where an official reports that on a bit of land, he has had a worker cultivate four *arouras*, from which he delivered 40 sacks (c. 3070 l).

Below, we will refer to the Middle Kingdom farmer Heqanakhthe who – in the course of discussing business matters in a letter (ALLEN 2002, letter I, lines 11-13, using Middle Kingdom sacks) – makes a virtually identical calculation, reaching a total of slightly less than 2900 l/ha. In Heqanakhthe's case, we know that he was not employing labour, but rather expected that his family work the fields. Thus, we can assume that these were reasonable expectations.

In this sense, we have calculations based on real data which suggest that at the beginning and the end of the 2nd millennium BC, in the north and in the south of Egypt, farmers and bureaucrats assumed that they could reckon with a yield of 3000 l/ha from an ordinary piece of land. This corresponds exactly to the ordinary administrative expectations we know from New Kingdom Egypt.

We must not only compare this 3000 l/ha yield in 1200 BC with a yield of 2000-2500 l/ha in early 20th century AD England, but also with the implications in Ancient Egypt. First of all, this is extremely important because we have a figure confirming that in this one case one man farmed one hectare and turned over 3000 l of grain. We do not know how much grain he kept for himself because – although the mayor does not state this – from the administrative procedures, we can deduce that this is what the mayor expected, and he would hardly demand more. Thus, we can get the figure for the expected yield of an hectare – and this exceeds Early Modern Western expectations. That it is far ahead of European Medieval expectations should be evident; that it cannot be compared to expectations in Prehistoric Europe (contemporary with the decline of Egyptian civilisation) should be equally clear. For Egypt, however, we can assume that this must have been the norm from the 3rd millennium BC onwards (for otherwise the exports in the Classical World would not have been possible).

However, from other documents, we know that one worker could be expected to produce 200 sacks of grain (which would be the produce of 5 ha). Extrapolating from this figure and taking account of calorific requirements, we can calculate that from one crop one worker could produce (at least) enough grain for 40 individuals to live for a year.

Obviously, this type of productivity was only attained in the 20th century AD in Europe, but was the norm for Ancient Egypt. Obviously, if the state required grain, it could merely put workers on a field and expect them to produce it, quite aside from insisting that ordinary people pay their taxes. In principle, this means that if the state recognized private property and collected taxes, people would produce enough to satisfy demands – but little

more. Given the potential productivity, it would mean that “overcapacity” and “underemployment” were the norm. The number of workers necessary to cultivate enough land and produce adequate grain to nourish the perhaps 5 million people of New Kingdom Egypt will have been less than 200,000 field workers, as HIKADE (2006, 164), SPALINGER (2006, 30) and WARBURTON (2016a, 203-204) have suggested. (For discussions of the data and the implications, cf. WARBURTON 2003; 2016a; 2019).

The implications of agricultural productivity

Above, we noted that the Mesopotamian scribes simultaneously (a) maintained substandard salaries for the lowest classes of workers over millennia while (b) complaining about a lack of available workers. In the preceding paragraphs, we have demonstrated that the capacity to produce grain in Egypt (c) far exceeded local requirements while (d) requiring but a fraction of the potential labour force. The overcapacity and underemployment of manpower in agrarian economies is a familiar phenomenon to economists and observers (WARBURTON 2019). Obviously, the low wages on offer would discourage anyone who had access to land from seeking casual employment while those without any alternative offered a constant supply of labour allowing the scribes to maintain low wages – under the condition that access to grain could be restricted by bureaucratic procedures. As the bureaucratic procedures restricting access to grain were entirely compatible with the laws of the market as practiced by the merchants who served the institutions in circulating grain, silver and textiles, it follows that bureaucratic practice invented a market economy in which an artificial scarcity of grain rendered investment in the low value, high volume crop rewarding.

In Egypt, the state could create an artificial bottle-neck by restricting access to land (by recognising property rights, claiming state lands, and offering land in exchange for the performance of duties) and grain (by offering access to grain only in exchange for the performance of duties), meaning that the market would be artificially stimulated by those very state restrictions which created the basis for the overcapacity and enabled the state to undertake its projects. In this sense, the overcapacity fed the market economy, pushing developments in tandem with the administration and the system of measures.

Income in the Egyptian market economy

Regardless of the productive capacity and the possibilities, once on the market, the grain had a price. The parameters determining the price were

apparently ordinary market factors, since the price seems to have varied by season and the state of the Nile. However, we have some parameters which imply that the market forces reflected supply rather than, *e. g.*, labour value.

As noted, the state assigned parcels of land to various state dependents, among them scribes, priests and soldiers. The soldiers had three *arouras* and the higher-ups usually five *arouras*, and the respective prospective yields would have been 2250 and 3750 l respectively per year; each had to offer some part of this to the state as rent or taxes, but the assessment was made on the basis of an assumed yield rather than an actual crop. Below, we will note that each of the skilled craftsmen at Deir el-Medineh was paid more than 5000 l of grain a year, meaning that their wages were higher than both, hinting at a progression upwards. Immediately relevant is that the standard wages in 2nd millennium BC Mesopotamia for a casual labourer were *ca.* 10 l of barley/day, which would amount to something roughly between the priests and the soldiers – if the workers worked every day, which they did not. In effect, therefore, we can assume that the income levels for ordinary workers will have been roughly the same in Mesopotamia and Egypt in the 2nd millennium BC.

However, since the productivity of fields in Mesopotamia may have been lower than in Egypt, and the Mesopotamians received barley rather than wheat (where calorific values and weights have to be taken into account), these figures are not really comparable. However, all of these values could be calculated into silver; with the conversion in Mesopotamia of 10 l \approx 6 šē, the annual wage of a casual labourer in 2nd millennium BC Babylonia would amount to a (totally fictive) annual wage of around 100 g of silver; with a conversion in Egypt of 1 sack = 2 copper *deben*, the annual income of a soldier would be *ca.* 55 g of silver, for a priest *ca.* 90 g and for a worker at Deir el-Medineh *ca.* 120 g. In this sense, we can see that wages for the lower levels of society in the Bronze Age will have been roughly the same (N.B., at today's conversion rates [US\$ 0.46/g of silver], these income levels would have put the men and their families well below the poverty limit set by the World Bank).

In this sense, it is significant that the amount of work involved in producing a harvest in Mesopotamia (with labour intensive irrigation agriculture) was probably higher than in Egypt (which benefited from the inundation and basin agriculture). The Sumerologist Steinkeller (*pers. comm.*) estimates that the expected harvest in Mesopotamia was close to 1440 l/ha and thus roughly half that of Egypt. In the second half of the 2nd millennium in Mesopotamia, this would have been worth almost 40 g of silver, whereas a harvest of 3000 l in 2nd millennium Egypt was worth around 70 g of silver, meaning that it was roughly in accordance with the larger quantity of grain, and thus the labour involved does not seem to play any role.

It is highly significant that the workers at Deir el-Medineh were paid for their labour and that once finished, the tomb was supposed to remain closed and the work finished: there was no product to be sold, but they were paid for the work. This may be a hint that in the Bronze Age, when rewarding craftsmanship, the value of the labour was viewed as having been paid for at the time of performance; as far as we can tell, the value of metal objects was generally estimated exclusively in terms of the weight in copper or silver at the point of sale (JANSSEN 1975, 408), with the value of the craftsmanship presumably rewarded separately (as in the case of the tombs) – so that “added value” was not inherent to the object. This should allow an insight into the market for goods, as it means that these prices differ fundamentally from our conception of the economic importance of labour (WARBURTON 2007b).

Establishing prices

Measures served as a means of estimating equivalencies, with capacity measures used to defined the quantities of grain or oil under discussion, and weights in copper and silver defining value. Weights in silver and copper were therefore ultimately the basis for estimating all value (with relatively fixed proportions of volume measures for oil, barley, *etc.* to weights of silver).

However, we do not really understand how the mechanisms worked; for example, the ratio of silver to copper was 1:100 at one point in the Ramesside period (*c.* 1300 BC), but fell to 1:60 within less than two centuries, but we do not know when and why (by *ca.* 1150 BC; JANSSEN 1975, 106-107, 549-550). This could have been because copper production in Cyprus fell or because supplies of silver increased for some reason (which could have been a matter of plundering by the Peoples of the Sea, or increased liquidity from mining). Since both silver and copper were imported from abroad, the supplies of these were ultimately determined by the private market: either where the state purchased silver abroad or where merchants brought silver directly to Egypt. We can only say that external market forces had an impact on local prices in Egypt (abundant examples in JANSSEN 1975).

Beyond that, what is significant is that the value (defined by weight) of the foreign material “silver” was decisive for the price of both labour and grain in Bronze Age Egypt, since the value of a sack of grain – the basic measure of salaries and the subsistence good grain – was defined in silver.

What the Egyptians may not have entirely grasped is the concept behind these “market forces” which changed exchange rates. The market certainly served as a regulator and a means of distributing some goods, with weights and measures serving as the basis of estimating value. Furthermore, the system of weights and measures was also partially determined by state and institutional policy. More-

over, the state was the single most important actor in the system and its administrative system determined how transfers were made – and therefore possibly determined the actual nature of transfers on the market.

Obviously, all of this changed over time. In the following presentation we will stress balances more than weights because the subject of Egyptian weights has been comprehensively (but far from exhaustively!) treated whereas that of balances has been largely neglected.

The only really important point of detail worth stressing at this point is that due to an overcapacity in producing grain (for which see above), in the Bronze Age, both the price of grain and labour remained low – and that grain cannot possibly have been at the origin of value (as frequently suggested by economists); instead its price was fixed in relation to silver – and its value related not only to silver and subsistence but also the labour supply (as labour was generally remunerated in kind, and thus reckoned in silver or grain).

Preliminary observations about the emergence of early markets

During the two and a half millennia of the Near Eastern Bronze Age (c. 3500–1200 BC), the urban world of the Near East gradually shifted from a largely Neolithic rural subsistence economy to a nascent urban market economy. For most of the Near Eastern Bronze Age, the state was an essential element in all economic activity, and it was the state which enabled the emergence of the market economy.

The essential development was therefore the creation of a powerful bureaucracy. Without a bureaucratically organised system of demand (taxation, compulsory labour, *etc.*) which depended on measures (of goods in measurable quantities and of labour measured by time, products, *etc.*) surplus production would have been pointless: in a Neolithic village, every family produced the same goods and there was no need for surplus production or economically meaningful exchange (as opposed to reciprocal or communal social exchange).

Thus, through the demand that the villages and families work more and produce more (so that the scribes would be free to consider their work being the administration of work done by others), *i. e.*, by virtue of its mere existence, the bureaucracy itself created a division of labour which went beyond that of hunters, gatherers, farmers and warriors. It should not be forgotten that in the Neolithic, even pastoral sheep-herding did not really exist – because there were no wool-sheep until the animals were gradually created just before the emergence of the cities.⁷ It was the emergence of the state which

pushed people into categories identified by work. By institutionalising a system of remuneration for craftsmen who produced articles which would serve the ideological purposes of the state, this process spurred on a demand for luxury products. Based on the consumption of luxury materials, this opened the way for merchants and commercial exchange. Obviously grain alone would not have gotten the merchants moving. Yet over time, grain had its own value in silver: after the Mesopotamian bureaucrats organised the production of woollen textiles (using income from grain to offer salaries to workers who spun and wove the wool that was likewise acquired through taxation) for export, to procure the silver necessary to organise circulation along the trade routes. Without writing, measures, laws, *etc.*, the bureaucracy could not have demanded, managed and kept track of things. Without silver, there would not have been any facilitation of trade.⁸

Once the surplus production was institutionalised in Mesopotamia, working in tandem, the merchants and the bureaucrats developed a system whereby precision balances enabling the measurement of standardised weight units could be applied to silver. And then by virtue of arbitrary equivalencies, weights in silver were made equivalent to volumes of grain and beer, or quantities of fish, wood, *etc.*

These developments were the pre-conditions for the establishment of large scale markets. Equivalencies existed by ca. 2700 BC (at the latest); prices for labour and grain will have rapidly spread through societies (for a brief overview of my interpretation, cf. WARBURTON 2018).

Historically, Mesopotamia will have led in the 4th millennium BC; Egypt will have caught up before the end of the 4th millennium.

One very significant aspect of market activity is visible around the time of the establishment of the state. Before Dynasty I, one of the largest elite tombs (HARTUNG 2001) had more than 4000 l of wine, stored in jars of Palestinian origin, but sealed with Nile mud (meaning customs inspection at the border?). During the Early Dynastic period (the first half of the 3rd millennium BC), vineyards were already well established in the Delta (WILKINSON 1999, 119). This means that the creation of the state was not only related to the creation of an institutional framework – but also capable of implementing import substitution through local production on a massive scale.

By the second half of the 3rd millennium BC, prices for animals, products, labour, land, and preciousities will all have been commonplace (at least for

⁷ This part of Topoi project <https://www.topoi.org/group/a-4/> with publications appearing in the next few years. Cf. also ROSEN 2017.

⁸ Silver only gradually appears around the time of the emergence of the first states, only known archaeologically from the early 4th millennium Levant (PRAG 1978), and it appears philologically in the earliest texts from the mid-4th millennium BC. By contrast, gold was already known archaeologically at mid-5th millennium Varna (FOL/LICHARDUS 1988).

the elite). In the 2nd millennium, trade will have had a direct impact on prices so that the prices for grain and copper were “corrected” by the market, such that for Mesopotamia, we can use documents to demonstrate that the silver value of grain increased and that of copper decreased with respect to the prices established arbitrarily in the 3rd millennium BC. Production of copper in Cyprus increased as the price fell and Omani copper was swept off the market; the means of evaluating the price of copper was based on establishing the weight of copper and the weight of silver, and making a relationship between the two, with the ratio falling from roughly 1:100 to *ca.* 1:135 (for details and references, *cf.* REITER 1997; WARBURTON 2003; 2016a). In this sense, weights in the markets played a decisive role in the evaluation, creation and distribution of products. Whether purchasing on the market or determining administrative allocations, every single product could be awarded a price based on some measure. The volume measures (of *e. g.*, beer and grain) were all ultimately scaled according to weights in silver, and these were widely known as illustrated from the material at Deir el-Medineh (JANSSEN 1975: all of the “prices” discussed are derived from precise calculations made for real transactions) and letters of Heqanakhte (ALLEN 2002).

Most important is, therefore, that neither labour value nor utility value were the essential basis of the calculations: it was the weights in silver decided by the bureaucrats that stood at the basis of the system. These prices were negotiated on the market – but in principle, it was not activity in any one individual marketplace which will have determined prices, but rather the behaviour of the merchants which determined whether market forces changed prices. Over the long term, this happened with grain prices in Mesopotamia in the 2nd millennium BC (as illustrated by both discounts offered to merchants serving as tax farmers (VAN KOPPEN 2007) and the fall in the price of grain (ZACCAGNINI 1997).

But in many cases, conventional prices simply persisted for centuries (as *e. g.*, documented by JANSSEN 1975, 561) who thought “that tradition was the most important factor” in price formation. For Janssen, this meant that there was little evidence of profit-seeking. Others might speculate – with Polanyi – that merchants could simply develop strategies of making profits based upon their knowledge of prices. VEENHOF (2008) was, however, persuaded that merchants made profits by exploiting their knowledge of temporary price fluctuations, as dictated by scarcity in specific markets. I have the impression that the monetary prices based on rounded units tend to have a strong tendency to influence the understanding of value. This obviously changed in the Roman era when adulteration of the coinage had an impact on both the value of the coins and the prices – but such changes did not take place in the Bronze Age when coins played no role. In the Bronze Age, the price of silver could change

as a result of changes in the supply of silver – but this appears to be more anecdotal than important.

More important is the degree to which values which served the interest of the bureaucracy were maintained. For millennia, wages in grain remained relatively low and stable (SCHEIDEL 2010): rural poverty was thus institutionalised when urban commercial activity began, and the markets played a decisive role in perpetuating what the urban bureaucrats had begun. In this sense, markets gradually moulded society – but guided by the spirit of the bureaucrats, with the merchants merely adapting themselves to the market conditions set by the bureaucrats.

Egyptian Markets: the basics

Iconographically, markets are visible in two different senses: as representing the use of balances in markets on the one hand, and representing the use of balances in official contexts implying the use of balances in markets. Philologically, balances are implicitly present in textual genres which are specifically tied to market exchange, and explicitly present in religious texts suggesting a market context.⁹

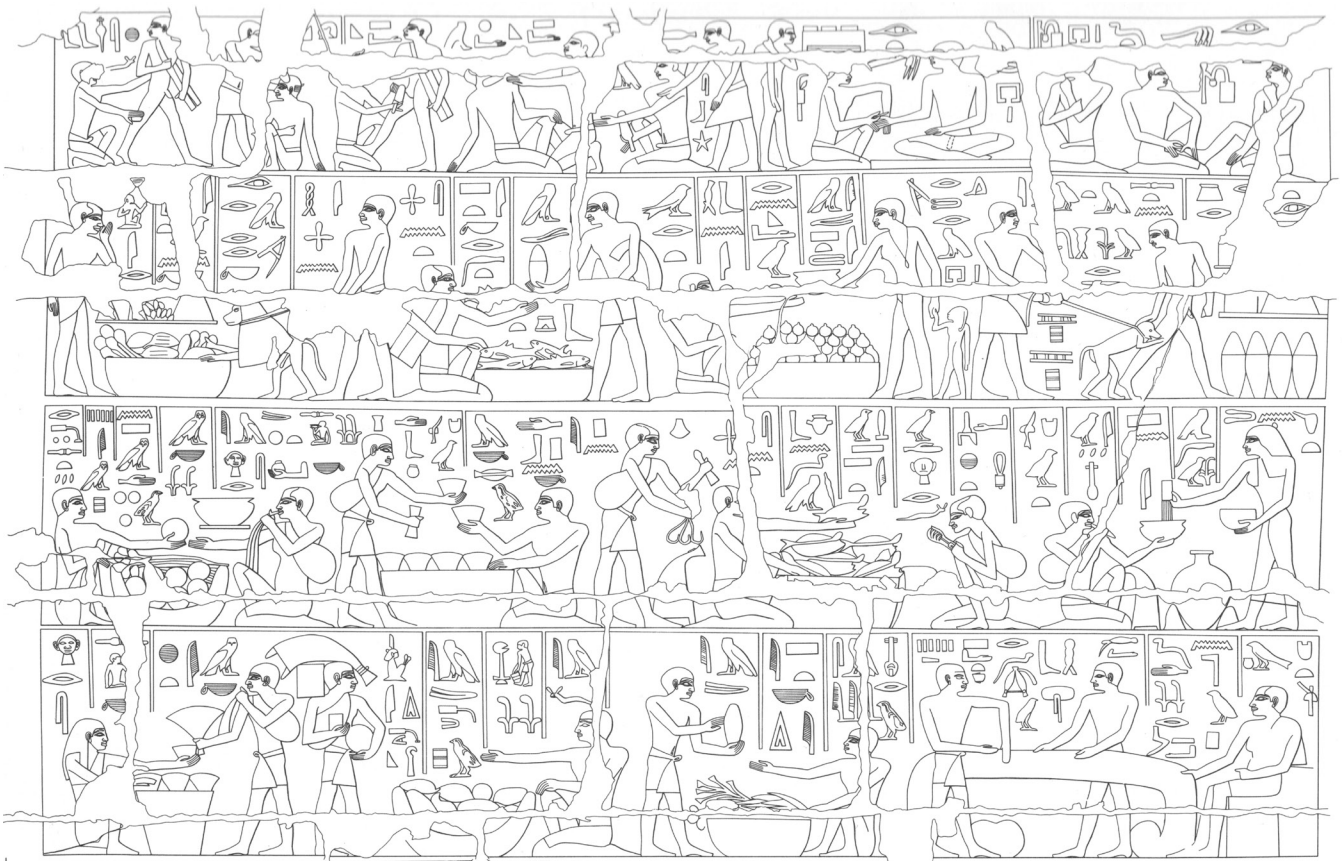
Iconography

The first and most obvious case where balances appear are the actual market scenes. Those from the Old Kingdom depicting the actual exchange of goods in reliefs (Fig. 4). One excellent example of this is the scene of some Syrian merchants arriving at a port in New Kingdom Egypt (Fig. 5).¹⁰

The New Kingdom Dynasty XVIII (15th-14th centuries BC) Theban tomb in which this served as decoration belonged to a relatively high official. The setting of the scene might be in Upper Egypt where the tomb was, and the tomb-owner lived and worked. However, hypothetically the scene could also be assigned to the Delta which is closer to foreign lands. Important is that the ships are moored on the river bank with several market kiosks ready to receive the crew and merchants immediately as they disembark; most of the translators and officials are behind the stalls. In two of the three market stalls, we can see precision and balances – and these were ready for use, and virtually the only possible use could have been for measuring small quantities of silver.

9 The markets of Bronze Age Egypt have been treated in works cited in the bibliography, particularly those under Eyre, Warburton and Zingarelli.

10 These scenes have been and published as images, and discussed with references to sources in several different contexts, among them GRIMAL/MENU (1998), ZINGARELLI (2010), RAHMSTORF (2016b, 293-294; 2018, 23-25), and vol. 26 of *Studien zur Altägyptischen Kultur*, 1998. EYRE (2010, 295-297) also refers to them with specific reference to their economic importance.



On the whole, the entire setting implies that this is an ordinary activity. The things on offer in the stalls are more or less what one would expect, such as sandals and textiles, meaning that products were not acquired from producers, but rather middlemen, lending credibility to the idea of an entrenched market economy. What should be unusual for us is the idea of zebu cattle coming from Syria to Egypt. Historically, they must have come from the Indian Subcontinent to Africa (a thousand or more years before this image was made, *cf.* GRIGSON 1996), and thus one would hardly expect to see any visible traces of the trade at this time – and certainly expect them to travel across the Arabian and Red Seas to get to Egypt. Yet here we observe them at a market served by Syrian ships most probably moving along the Nile, since there will hardly have been any large markets teeming with officials along the Red Sea. Significantly, the balances in this scene are handled in an offhand casual fashion, seemingly simply as part of the background. The idea of goods being exchanged on the river bank is also what would be expected since the Nile was the main thoroughfare of ancient Egypt and it would be along its banks that people would meet. Together, this testimony should enormously increase the credibility of the ancient Egyptian market in our eyes.

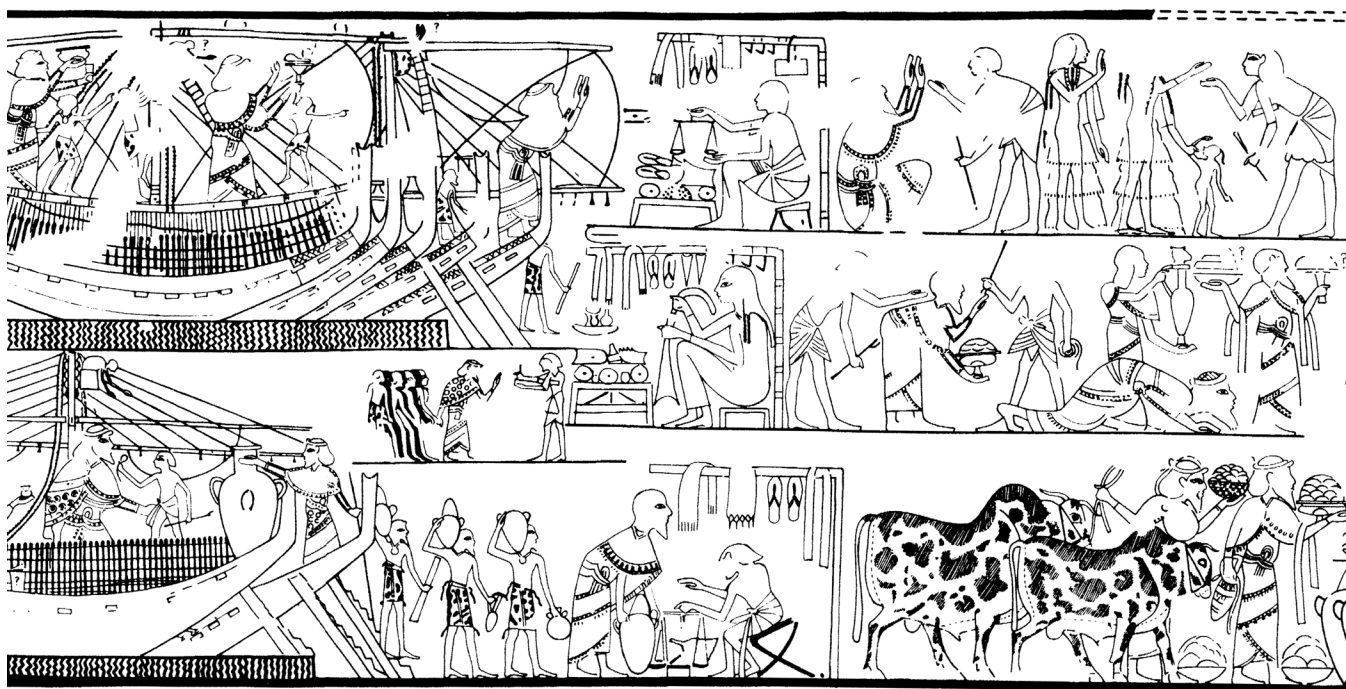
Interpreting the iconography

Yet it must be remarked that it is unusual to have such scenes in tombs in the mid 2nd millennium as

most of the few other scenes date to Dynasty V of the Old Kingdom, *ca.* 2400–2200 BC – and they are generally rare in any case. This issue is highly significant if we are to judge the importance of markets based on archaeological evidence. Above, I have argued that weights and measures were ubiquitous in Egypt and Egyptian thought, given the testimony of the written sources which demonstrate their presence. Yet, in terms of iconography, balances are far more common in the scenes of official activities (collecting taxes, examining goods in the treasuries, *etc.*).

Superficially, one could argue that markets were exceptional because market scenes were exceptional – and that the balances belonged only in the official world (where they regularly appear). However, one must understand the genres and conceptions. Most tombs belonged to officials clinging to the ideology of the state – and the tombs and their decoration were, of course, part of the state ideology. Where present, higher officials will usually have scenes from daily life taken either from their professional environment or from the supervision of their estates (or both). These officials will hardly have viewed ancient Egypt as a market economy any more than the aristocrats of 16th century Florence will have thought of their world as a market economy. Even if ubiquitous, markets will not have been the most important aspect of the lives of ancient Egyptian officials, just as the markets of the Middle Ages

▲ *Fig. 4. Market scene in the tomb-chapel of Nianchkhnum and Chnumhotep, 5th Dynasty (ca. 25th century BC) at Saqqara, Egypt (MOUSSA/ALTENMÜLLER 1977, fig. 10).*



▲ Fig. 5. Harbor scene from the tomb of Kenamun, an 18th Dynasty official, at Thebes West (DE GARIS DAVIES / FAULKNER 1947).

and Renaissance will hardly have been central to the lives of the aristocrats. However, it should be obvious that the markets will have been clearer to the Burgers of the Low Countries in the 16th and 17th centuries – as their world was actually changing, under their guidance. The merchants of the Bronze Age Near East could not have imagined such a momentous transformation – and thus in ancient Egypt we should hardly be seeking such adumbrations as can be seen in the art of northern Europe three millennia later.

Furthermore, some scenes that appear to be ordinary scenes of daily life in ancient Egyptian tombs are actually charged with traditional meaning, such as hunting in the marshes which has both erotic and religious connotations. Yet many of these scenes represent a world which may well have ceased to exist before the time when they were painted – or never have actually been part of the way of life in that place: some scenes were unconscious anachronisms representing traditional activities. In this sense, one could legitimately deduce that the market was a relatively ordinary part of the Egyptian landscape – potentially far more ordinary than the scenes of fishing and fowling for pleasure which appear routinely in the tombs of the high officials. And in fact, this particular official might actually have experienced the visits of Syrian traders as part of his official life as Mayor of Thebes. The Syrians might have been as unusual as the Mycenaeans we see elsewhere at this time – but not necessarily the market.

Viewed in this fashion, it may be important that the scenes of markets dating to a millennium earlier (Fig. 4) than the 2nd millennium scene (Fig. 5; with which we began this discussion of the iconography)

have more scenes of people purchasing fruit, meat, vegetables and other products directly from producers. There it can be seen that both craft products and also services (including personal hygiene and grooming) are on offer in the 3rd millennium scenes (aside from fresh vegetables).

Furthermore, it is important to note that the balances of the third (and early second) millennium are slightly more unwieldy and seen frequently apart from scenes directly related to the market (in some cases directly associated with metallurgy or household management). One could imagine a gradual evolution and spread of the market and a gradual improvement in the quality of hand balances. In this sense too, the scenes of the market in the tombs may well be of some conceptual value.

The second and less obvious iconographic source are those scenes depicting silver or gold being counted in state contexts. Although the scenes as such do not depict markets, the use of balances in official contexts such as this implies that the metals must have been acquired from somewhere, and in some cases, the specific context implies that silver was being collected in the Egyptian countryside, *i. e.*, from the people of Egypt. Ordinary Egyptians can hardly have acquired the silver by any means other than the market – and the use of balances to count the silver exacted as taxes in state bureaux will replicate on an official scale the inevitable presence of balances throughout the country, for otherwise the silver can hardly have been circulating (given the absence of coins in the Bronze Age).

In this sense, I would argue that the iconography confirms the image of the ancient Egyptian market economy that I projected at the outset of this paper.

Textual sources

The village of Deir el-Medineh offers the best documentation concerning markets in ancient Egypt; the example of the farmer Heqanakhte offers an alternative detail view of market behaviour; some religious and literary texts offer supplements to the evidence of the documentary sources.

Deir el-Medineh

The village of Deir el-Medineh housed the workers who excavated and decorated the royal tombs in the New Kingdom Valley of the Kings (cf. VALBELLE 1985). It seems to have been a state foundation to assure a constant supply of skilled craftsmen for this essential work; they inherited their jobs from their fathers in the time-honoured customs of the Egyptians, which will have dictated the potential career choices available to the sons of kings, officials, craftsmen and peasants. The institution may have been founded early in Dynasty 18 (after 1500 BC), but most of our documentation dates to the less than two centuries at the end of its existence, ca. 1300-1150 BC. Whether the workers should be viewed as state employees or as a royally chartered craft guild is probably a relevant (but unanswerable) question. Regardless, they seem to have held a monopoly on their hereditary right to perform whatever work was done in decorating the tombs in the Valley of the Kings.

According to the data we have, the workers received wages in grain and additional supplementary materials (wood, water, fish, greens; JANSSEN 1975, 455-493). Significantly, the real regular salary was supposed to be the grain, delivered each month. Admittedly, they were not always regularly paid, and this has attracted the attention of those studying the material from the standpoint of an academic who is regularly paid regardless of what he does. And indeed like modern academics, the workmen were not always fully occupied with state work, but they did expect to be paid. However, in the ancient world, their situation was a bit unusual. Many people had land from which to produce their income, either on official plots offered in exchange for services or simply *ex officio*. Mesopotamian institutions kept some dependents on low salaries all year round. In general, hired staff was only engaged when the need arise (for, e. g., building projects or at harvest time). Institutions were not accustomed to having well-paid dependents who were not ordinarily fully employed.

Yet, skilled, trained, competent, and trustworthy craftsmen were needed immediately at the start of a new reign when a newly crowned king planned his tomb. Thus the longer a king lived, the less there was to do; it was urgent to finish a new royal tomb as soon as possible so as to be prepared in the case of an unpleasant surprise. Those kings who did not expire quickly will have continued to have them work on their tombs as long as possible, but it is not clear that there was always a lot to do after the

minimal programme envisioned at the start of the reign was completed. However, as soon as the king died, they had to be prepared to start with the next tomb right away: and thus the new pharaoh needed educated craftsmen to be ready to start immediately. And in this sense, it was easier to keep them hanging around, but also logical that there was no urgency about paying their salaries until they were needed. On the other hand, however, kings were not interested in their offering their services too widely, since they had secret knowledge of the Netherworld that was in principle reserved for the king himself. Thus, they had to be paid regularly – and probably were – but perhaps not as regularly as we would think ordinarily.

Thus, in principle, they were paid, and their salaries were paid in out in physical sacks of grain; each sack amounted to a bit less than 80 l and was nominally worth 2 *deben* of copper (2*91 g), but real sacks of grain were actually traded at different prices depending upon market fluctuations. Yet Janssen does not claim to observe regular seasonal fluctuations (as has been assumed for Mesopotamia). Instead, JANSSEN (1975, 127) detects a trend that “the ordinary prices at the end of the 19th Dynasty were also well above” the ordinary rate in the commodity transactions. This could be related to political insecurity rather than economic fluctuations (a tendency which I believe to see in the price data from Babylonia at the end of the 1st millennium BC).

In principle, the ordinary workers of Deir el-Medineh (who were actually skilled craftsmen in some cases) each received 5 ½ (New Kingdom) sacks (of wheat and barley) per month (*i. e.*, around 5000 l annually). For comparison, one can note that the foremen received a bit more (7 ½ sacks) – and at 1 ½ sacks per month, the village doorkeepers (who were not actually proud members of the team) got substantially less. EYRE (2010, 297) also gives an ideal pay scale in copper *deben* reckoning the value of the grain salaries at 15 *deben* for the foremen, 11 for the workers, and 3 for the doorkeepers. This is obviously not quite correct as the price fluctuated, but it is quite instructive about Egyptian conceptions of status and wages; the social position was directly associated with a market evaluation of a person's worth – paid out in grain (when necessary).

The door-keepers' salary offers a chance for comparison, as Eyre gives 1 ½ New Kingdom sacks as a “minimum subsistence wage” in Egypt. In fact, however, the farmer Heqanakhte (for which cf. *infra*) throws some of his dependents into a relatively low position by offering them 0.8 Middle Kingdom sacks (which would be about half a New Kingdom sack) of grain as a low monthly salary – and considers 1 Middle Kingdom sack to be an ordinary low salary. Thus apparently, it was possible to live on less than the salary of the door-keepers. Regardless of the accuracy, the doorkeepers were always at the

bottom of the pile when institutional salaries were assigned.¹¹

Thus the salaries also are highly instructive about the attitude of the Egyptian state and the role allotted to the market in the system. Among the miscellaneous other goods that the workers received, they did not ordinarily receive any textiles – although the state produced and retailed textiles. Although state employees, the workers had to purchase textiles like everyone else in Egypt. In this sense, their in-kind wages not only clearly exceeded existence minimums – but actually offered grain which could be sold on the market, in a fashion which allowed them to understand their salaries in market terms, and also to use part of the salary as a market commodity or currency.

Among themselves the workers engaged in what appears to us to be a constant series of exchanges, while taking advantage of others' conviction that they could use their knowledge of esoteric religious secrets (acquired through their work in the Valley of the Kings, where they had access to absolutely state-of-the-art esoteric knowledge) to manufacture funerary equipment for the market (but fooled their clients as they never betrayed the real secrets). This allows an insight into ancient mentalities.

For various different reasons, the workers at Deir el-Medineh and their families left records of transactions written in ink on (and not scratched into) little flakes of limestone (the by-products of excavating tombs and making statues, *etc.*). For some reason, these “inscribed” flakes of limestone are called “ostraca”, as apparently someone thought the practice analogous to the Greek habit of writing notes on potshards. A seemingly infinite number of these “inscribed” flakes has been found, and many have economic information about transactions: as records or as legal documents, or copies of legal documents, *etc.* Other ostraca have records concerning their actual work practices, bits of literary texts copied for practice, or questions posed to oracles and almost everything else one could imagine that might be written down. The abundance of texts gives the impression of constant activity but the reality is that these are the product of a couple of centuries of activity.

All of the preserved transactions from Deir el-Medineh were based upon a system of prices equating sacks of grain with weights of copper. In principle, the whole system was based not only on weights, but also the capacity to estimate equivalencies with volumes or quantities of goods. To perform an exchange, the workers would agree on the price of an object, whether a bed or a donkey, *etc.*

11 One should also recognise that in societies such as those of ancient Egypt, both scribes and door-keepers will have had significant opportunities for what we would call “corrupt” activities to alter their income in their favour without any traces in the records. Such opportunities were not available to all, and thus may have been taken into account when calculating official salaries.

The estimated price was usually expressed in copper *deben* but also frequently used in combination with the word “silver”, *ḥd* meaning “price” or “money” to describe the total value of goods transferred in the exchange.

However, as a rule, there was neither copper nor silver anywhere in sight in the ordinary transactions among the workman and their wives and friends in Deir el-Medineh. Significantly, since the prices were just nominally related to metal, the transactions at Deir el-Medineh may not have required the regular use of actual balances. In practice, having agreed on a price as a weight in copper or silver, they would then assemble a number of acceptable goods (each with its own specific price) eventually equalling the price of the main good in the transaction. Every single individual object in Deir el-Medineh thus had its own specific price. The money involved was an accounting unit, and the currency was ordinary objects. This was not barter, but “money-barter” where the price was estimated in money but the price paid in kind. It is from these transactions that we can see that a sack of grain occasionally changed hands for a price different from the “price” or “value” of a sack of grain as 2 *deben* of copper. In this sense, the sack had one value as an accounting or book-keeping price, and another on the market, but JANSSEN (1975, 130) sees no compelling reasons for these changes.

Significantly, most of the actual objects purchased (donkeys, coffins, beds, *etc.*) were assigned round number prices (*e. g.*, usually 25, 30, 40 *deben* for a donkey; JANSSEN 1975, 168); the objects used to purchase them (serving as money in the sense of currency, and called “silver” *ḥd*) were likewise usually assigned “conventional” values (*e. g.*, multiples of 5 for textiles; JANSSEN 1975, 285). This means that the prices were determined by the estimated value in money and not on a precise understanding of utility value which led to a specific price in copper – and certainly not any understanding of labour value, since the value of metal vessels was based on the weight of the vessels and did not take any craftsmanship into consideration.

The price of every object traded in the community was thus defined in a fashion which assured that all participants understood the price as reflecting a weight of copper (which in their minds or in practice could be converted to silver or grain).

Based on our perspective, it looks as if in their own daily activities in the village, the workmen at Deir el-Medineh and their wives were involved in a never-ending series of transactions involving the sale and purchase of pots & pans, textiles, beds, baskets, donkeys, and everything else required for a normal life (including the borrowing of pots and pans to indulge in impulse purchasing of slave girls bought as servants; *cf.* GARDINER 1935). In this sense, in our eyes, their little artificial village is a small, distributed, but constantly open “market”.

We should simply be aware that far more material will have been written on papyrus, but is now lost. There are some papyri preserved from Deir el-Medineh, and other papyri that probably are preserved because of some relationship to Deir el-Medineh: this is because the village itself was in the desert and thus papyri there survived in a way that papyri in the cultivated parts of the Nile Valley would not have (given the inherent moisture, quite aside from the animals attracted to the fertile land, and the inundation itself, all of which threatened papyri). However, the limestone ostraca from Deir el-Medineh offer a tremendous insight into a specific context.¹²

While the village of Deir el-Medineh is itself a source of abundant documentation about market transactions, its own market is mentioned in a most interesting document recording the voyages of a trading vessel (for the general situation and literature, cf. JANSSEN 1980; WARBURTON 2016a, 174-176). The vessel seems to make regular stops at places it identifies as a “riverbank”, *mryt*, with this one word written in red ink, followed by the specification of the place, meaning that the red specification is meaningless without the specific toponym following. In this sense, it is not a generic term simply meaning riverbank (which is rather obviously ubiquitous in the Nile Valley): it identifies a specific place. At each stop the crew of the vessel seems to engage in transactions with local women; these involving silver, honey and textiles. Given this usage, one can easily render the term as meaning “riverbank market”, or just “market”. Thus, one of the stations is identified as “The market of the village of the tomb” (*mryt t3 why.t p3 hr*) – which can only be the market referred to in the texts from Deir el-Medineh – and this was a couple of market-place stops downstream from Armant.

From the documentation found at the village of the workmen at Deir el-Medineh itself, we know that in their “leisure time” they manufactured mortuary and funerary products on commission for the Theban elite (COONEY 2007). Beyond that, however, they could also assemble and decorate coffins which would be sent to the “market on the riverbank” (e. g., O. DeM 550). In this sense, this means that it was not production on commission, but literally production “for the market”. From the records of the ship, we can see that the vessel travels from market to market along a short stretch of the Nile, with most stops being defined as “markets” using the name of a local town or person combined with “riverbank”. In this sense, the word is quite evidently a translation of parts of the Akkadian *kārum*, “embankment”, “harbour quarter”, “mooring place”, “quay-wall”, “trading station”, “community of merchants” (CAD 8, 231-237). Curiously,

this would imply that there must have been buildings and guardians at the market so that things could be stored.

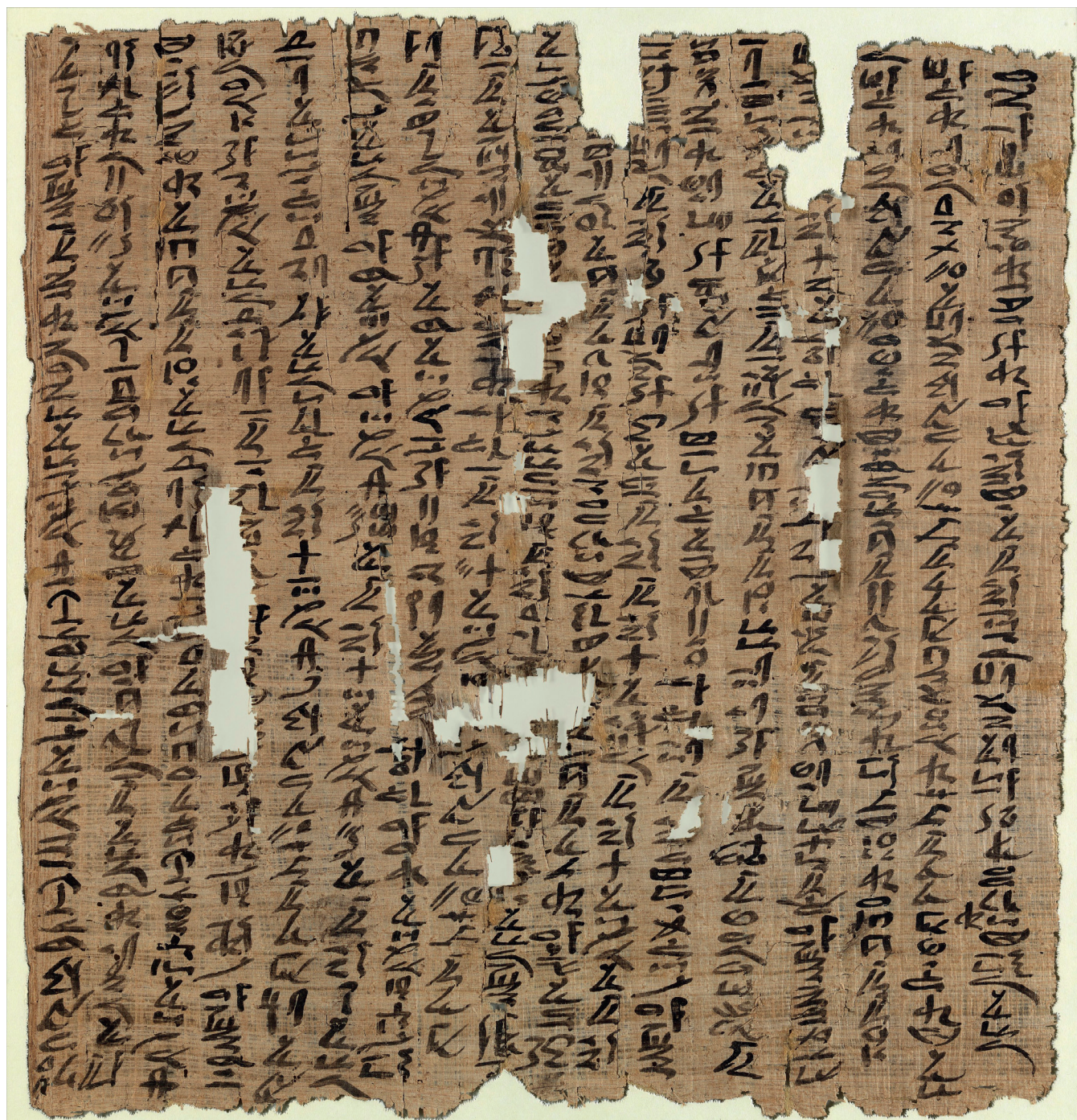
We cannot judge the distances between the markets, but here in sparsely populated Upper Egypt, there might have been markets every 5 km or so. Whether this should be extrapolated to other regions of Egypt is not clear. We cannot judge if the boat is switching from one bank to the other, but it is possible. From the text we have no hint that it also served as a ferry, but this would have to be a real possibility if one were to speculate that it moved from one bank to the other. In this sense, it is important that the sites are not designated as “landing places” (*mnjw* – incidentally, probably the etymological origin of Arabic *minā*, “harbour”); this may mean that the designations used may have been determined by those whose notes are passed on to us and thus that the same places may have been both markets and ferry-stops (depending upon the point of view). When the vessel stops at these various markets, it seems that the crew assesses or exchanges textile products (and honey) which are valued in silver.

Significantly none of the participants in these transactions is identified with a title. The lack of titles not only indicates that this may not be an official papyrus, but actually underlines this as virtually certain since the only connection between the names of unaffiliated people and the boat is the cash transactions. Thus, the boat is probably a merchant vessel.

We have another text recording the voyages of a boat which may have been on official business on the Nile. Here, it would likewise appear that at a stop along the Nile, one of the crew (probably on his own account) trades textiles (JANSSEN 1961, 70-71, 82-83, 85-86). There are two other papyri which seem to be official records, but where private exchanges involving the retail of textiles take place (JANSSEN 2004, vso. III; POSENER-KRIEGER 2004). Estimates of value may have been made in metals, but seemingly the purchases and payments may have both been made in kind. Whether or not silver actually changes hands or whether this is simply an accounting trick, it is evident that the prices of textiles in rural areas of Egypt were calculated in silver, the international currency of the Near Eastern Bronze Age. This is the viewpoint from the Nile.

The question of the actual use of silver in such transactions is obviously a bit difficult to judge. However, the images of the balances in the illustration mentioned above suggest that silver may have been expected at the markets of the riverbank. The fact that in the scenes of the Theban tomb of Rekhmire, taxes seem to be collected in silver might suggest that this tax income is the reflection of widespread market activity in the villages of Egypt. This would underline the idea that Egyptian markets and trading were in the hands of professionals who acquired the goods from producers – and this

12 JANSSEN (1975) offers an introduction to the market prices and salaries; VALBELLE (1985) and ČERNÝ (2001) to the village. There also several websites, among which the one from Leiden is probably the most central: <http://dmd.wep-wawet.nl/>



▲ Fig. 6. The Heqanakhte letter I from the early 2nd millennium BC (<https://www.metmuseum.org/art/collection/search/545445>).

would correspond to the image of the riverbank market in the illustration where we see sandals and textiles among the wares on offer.

The Heqanakhte documents and what they tell us

Most of the decisive information we have about markets comes from iconographical material which reflects an ideological image, or from terse documents the interpretation of which is difficult and/or debatable. Even the material from Deir el-Medineh reflects a fundamentally institutional state bias, since the workers were not only state employees, but deeply implicated in the state ideology, as their very lives depended exclusively on the funerary and mortuary industry which dominated the Egyptian

psyche. However, there are other windows, but in the space allowed, we cannot usefully cover the entire range of documents, and thus we take but one – and try to draw as much as possible from it.

This completely different perspective on markets is offered by a few documents found (in 1922 AD) in a layer of debris, dating to *ca.* 2000 BC (ALLEN 2002). The documents consist of several letters and some accounts: all were lost in Antiquity and the sealed letters therefore never reached their intended recipients (and were only opened for the first time nearly 4000 years after they were written!). This is not an archive but rather a chance find throwing some light on the character and concerns of Heqanakhte, a rather prosperous an-

cient Egyptian farmer whose existence, thoughts and methods would otherwise be completely unknown to us.

The letters (Fig. 6) reveal that Heqanakhte is both leasing land himself and also has tenants working his own land on lease and paying rent. His accounts reveal that he has cattle, wood, reserves of barley and flax, and considerable debts (usually quantities of grain that are) owed to him. For expenses, he calculates closely (and has salaries and allowances paid) in barley. He calculates his rents in barley, expecting to pay and to be paid in barley (using a specified container in one case), but is willing to accept oil or wheat – in specified proportions in place of barley. In one case, he clearly hopes that his steward will be able to sell a cloth (which he has ordered be woven) and to use the cash thus generated to lease fields. He also mentions a need to sell oil or whatever in order to get the money for a lease. He also refers to slightly more than 2 kg of copper which he has sent to pay for a lease on land. In another case, he specifies that the lease for land should be paid with copper, textiles, barley or whatever. The implications of these various remarks in his letters are that he assumed that in any village it would be possible to arrange the exchange of virtually any ordinary product at the going rates.

The basis of his domestic economy was grain production and to understand the overall situation we must understand something of production. From the documents of the institutional administration in Bronze Age Egypt, we know that Egyptian yields were estimated by (a) classifying the land according to some category and (b) estimating the corresponding crop yield as multiples of some unit of volume multiplied by the surface area. It would appear that the ordinary expectation was around ten New Kingdom sacks or 15 Middle Kingdom sacks per *aroura*, giving a total of *ca.* 3000 l/ha. As noted above, by pure chance Heqanakhte's one single complete calculation yields a sum (slightly less than 2900 l/ha) close to this estimate. Thus, we can assume that this was the way he estimated his income from fields leased out to others, when he lists quantities of sacks of grain as debts. In the New Kingdom a sack of grain was nominally worth about 2 copper *deben* (182 g); as Allen estimates that Heqanakhte can legitimately hope for a total crop of 1000 Middle Kingdom sacks (or 750 New Kingdom sacks), taking the New Kingdom exchange rates (1 sack = 2 copper *deben* = *ca.* 1.8 g silver), we can estimate that Heqanakhte could hope to have a crop worth a bit more than a kg of silver. However, he could not count that way, as he had to have enough grain to take care of his entire household, to keep seed-corn on the side, and use part of the crop for essential purchases. But, beyond that grain income, Heqanakhte also seems to have an entire, separate, project devoted to the production of linen from flax and therefore probably textiles. Thus obviously, Heqanakhte had far more leeway than a

well off family attached to a temple to which they owed minimal obligations in exchange for a plot of less than one hectare which they had to cultivate to get an annual harvest of 30 New Kingdom sacks of grain, from which to pay the rent and nourish themselves.

The key element here is that – as at Deir el-Medineh – the calculations depend upon values ultimately expressed in weights of silver: it is the measures which are decisive, as these determine the amount of the rent. The basis of all calculations are not actual yields, but rather prospective rents and yields based on measures, but convertible to silver.

Observations drawing on the Heqanakhte documents

Altogether, these documents offer some precious insights into the reality of life in ancient Egypt. The most important is (a) that Heqanakhte lives in an era when the administration of Egypt is evidently firmly established, and he is working as a mortuary priest in the southern part of the country while his family is near the capital, just south of the apex of the Delta. Thus he is in the south and leaving the management of his estates in the north in the hands of a steward (and thus the detailed instructions in the letters). In the south, things are tight, but he plans on staying until harvest season when he hopes things will get better for everyone. There was apparently a low Nile before the last harvest and this was not good for anyone, and even he is obliged to calculate his allowances and rents closely.

Under these circumstances, it is significant that (a1) he knows some of the highest officials in the land personally (perhaps even including the very highest, the vizier), but does not expect any support whatsoever from any hypothetical state buffer stocks, nor (a2) does he appear to reckon on paying any kind of tax on his grain production and rents (although a cattle tax is paid in grain), nor (a3) does he seem to count on any kind of income from his duties as a mortuary priest, nor (a4) does he tolerate being obliged to eat old grain himself, and instead insists that he expects his household to send him fresh new grain.

In this sense, the Egyptian agricultural economy would seem to be a purely market economy – but by no means a subsistence economy, except when it comes to short rations for the family because of a bad harvest the past year. Heqanakhte's household probably consisted of around 20 persons, and he was taking care of them in a rational market-generated and market-oriented patrimonial fashion.

The second insight (b) is that there is no trace of a market as any specific place in any of his accounts: his market is distributed all across the country. When ordering the cloth and oil to be sold and debts collected, he seems to assume that this will all take place in villages or in private houses (belonging to officials). And the third (c) is that weights of the material copper (not silver) are assumed to have been measured, but there is no reference to a bal-

ance or to weights anywhere in the texts. This probably means that balances were available at whatever market places one went to, or perhaps in the homes of higher officials (as these can be seen in the household scenes of daily life of this era, at Beni Hassan for example, and extrapolated to other times and places; cf. WARBURTON 2015, 189-198).

And this raises an interesting question. In his material Heqanakhte – as preserved – is not calculating in silver nor aiming at the purchase of a sarcophagus of Lebanese cedar nor purchasing trinkets of gold and lapis lazuli for his girls. Obviously such materials will not have been available at ordinary village markets. Such materials will probably only have been available at special markets. But were the transactions organised in an urban context with deliveries made to the rural households of the elite? And the weighing of the silver done in the comfort of one's own home? This would be a reasonable proposition, broadening the concept of marketplace, as even the transactions would be “distributed”, and not just the markets. This is probably entirely realistic when examining the data of the ancient Near East.

Another curious and relevant feature of Near Eastern thinking was the use of what we call a “list” for recording all kinds of practical and abstract knowledge. In the case of the Mesopotamian “kinglists” we know that chronologically parallel dynasties were lined up in a series, in a list. Needless to say, this is not helpful when trying to understand chronology – and even less so when trying to understand economic procedures. Heqanakhte occasionally used the term *śš/šb3* – usually translated as “writing” or “record” – when referring to his documents in a fashion which implied that he understood certain specific documents as meaning or containing a “list” (of rations, debts, stocks, etc.). In this sense, he is using lists in his own idiosyncratic fashion (although strongly influenced by his cultural and administrative environment) to keep track of his affairs. In this sense, his “bookkeeping” would not match our standards – but it did match those of his world, and evidently served his purposes.

Altogether, these various points should be revolutionary in terms of visions of the ancient Egyptian economy as an agrarian subsistence based upon a provider state. Some could argue that this is exceptional material which cannot be used to project onto the Egyptian economy as a whole. In fact, however, the situation is the opposite.

The letters clearly betray that Heqanakhte is fully integrated into the society in which he lives and knows from whom he wants to lease land, and to whom he will lease land or lend money. He understands the materials he expects to use to pay for his transactions and what people might potentially offer him. He has confidence in his official colleagues, assuming that he will be able rent land and to have them store what is owed to him. He does not ex-

pect any unremunerated assistance and relies on his family to provide the necessary labour. In this sense, the state supports the market system – and is not the foundation of a subsistence economy.

A fourth potential insight may be less certain in meaning, but is worth mentioning: given the nature of this corpus, we have no trace of anything except Heqanakhte's records and letters, but (d) there are no contracts, nor any mention of instructions concerning such. This could mean that any potential contracts were made where his household was (in the north) and that Heqanakhte did not need any potentially existing contracts; summary information about the agreements could be mentioned in a letter without any superfluous legal details.

However, this absence could also be interpreted as meaning that the society in which he worked was one where everyone knew everyone else and there was no means of absconding – and thus no reason for detailed written records. And in this connection, there is only one reference to a demand that a written record be made. Perhaps significantly, Heqanakhte requests that his steward send a written record (presumably meaning a list) of debts once they have been collected. Obviously, Heqanakhte kept records of his stores and the debts owed to him – and he would need to know what had been collected, to add this to his list of the materials stored. However, this reference could also imply that he was less concerned about written contracts than about recording what was actually paid (so as to keep his accounts complete).

When lending silver in Mesopotamia, the quantity of silver to be returned at the end of the term of the debt stipulated the implicit rate of interest and was thus an essential part of a deal which had to be settled in advance. This necessarily demands a contract to which reference can be had. With leases for agricultural land, it could suffice to orally demand that a certain number of sacks be delivered at harvest season, without detailed written contracts. (Obviously a system in which the expectations were specified in advance – as opposed to one in which, *e. g.*, a third of the harvest was stipulated – was based on both trust and a respect for mutual self-interest).

Yet in Heqanakhte's case, ALLEN (2002, 171) assumes that some of the accumulated debts owed to Heqanakhte were due to “grain loans” implying that he had lent out grain (presumably profiting from the bad harvest resulting from the last inundation), but we likewise see no trace of estimated rates of return; I assume that these “grain debts” are merely Heqanakhte's estimate of the yield of cultivating a parcel of a particular size (rather than due to lending grain as such – although he may have lent out seed-corn and calculated that in).

Regardless of the details, it is extremely significant that Heqanakhte's letters demonstrate that the practice of leasing land on strictly stipulated con-

ditions existed in Egypt at the start of the 2nd millennium BC (as demonstrated in one bit of a letter where Heqanakhte refers to the crop, surface area, the expected yield and the cost of the lease using explicit figures). Thus the practice of leasing existed, but the Heqanakhte documentation might actually support the contention that at that time the practice of insisting on detailed written contracts had not necessarily actually become ordinary practice (as certainly happened by the late 1st millennium). As far I know, none are preserved from this era. It is, however, quite clear that the practice was familiar to Heqanakhte.

In this sense, one could potentially recognise a sequence whereby a practice is instituted with the documentation only appearing later. The existence of the documentation may actually have later facilitated the collection of taxes on such commercial contracts, and thus led to a virtuous circle whereby the quantities of documentation increased over time, with each cycle offering more documentation – and higher yields, and higher taxes?

Ideological written sources

Anecdotally, we can confirm that until after the beginning of the 3rd millennium BC, in the poetical literature (such as the metaphors of the well-known tale of the *Eloquent Peasant*, or also a brief passage in *Coffin Texts* Spell 452), balances were regarded as being proxies for justice and honesty. From the second half of the 2nd millennium onwards, the religious sources imply that fiddling with the balance was commonly seen as an easy way of cheating. This is above all easily accessible in the Declaration of Innocence in *Book of the Dead* Spell 125 where we, *e. g.*, find an explicit denial of tampering with the corn measure, and more evasive hints at market misbehaviour. There was definitely a transformation in attitudes towards the expected norms of behaviour in the New Kingdom as the use of balances in the markets apparently became more widespread.

Significant is that Heqanakhte did not ordinarily expect to engage in barter, but rather that a textile would be sold and the proceeds used to pay the price expected. This means we are talking about ordinary market procedures, using money. Such procedures might also explain the presence of weights in Deir el-Medineh since the weights found in the village imply more weighing of metals than we see in the texts. In this sense, weighing might have been even more ubiquitous than hinted at by the textual evidence. Obviously, Heqanakhte was far wealthier than the craftsmen at Deir el-Medineh, and thus the gradual transition to an economy based upon the widespread use of weights can be followed – with the situation at Naukratis an indicator of what followed much later.

Just how officials kept their eyes on balances and weights is not entirely clear. Certainly we have no direct information about market supervisors

(as were known in China and Athens). However, there can be no doubt there was supervision. Yet that supervision might well have been entrusted to officials directly responsible for manipulating balances and thus the problem would probably have been bribery rather than the actual abuse of the balance which followed.

Understanding market thinking

Some of the written records we can use to follow market activity in the 2nd millennium BC do not seem to actually betray the recording of prices in a fashion which would allow us to understand how labour and profits were evaluated. One of my own favourite examples concerns a case where a workman at Deir el-Medineh expected to get a good donkey for a very low price – and the tribunal (for whom the document we have was prepared) found in his favour (WARBURTON 2016a, 169).

Another is that even in his own written records and letters, the farmer Heqanakhte seems to have kept the most important details to himself. When estimating how he rented land (both when renting out and when himself leasing land to till) he does not seem to be committing his most precious thoughts, speculation and information to writing. This is particularly striking as his letters give the impression of a “stream-of-consciousness” thinking that is emotional and erratic, quite aside from inconsistent. Yet the economic considerations suggest that the motives behind these explicit expressions of thought were carefully concealed. Thus, we can follow his calculations of stocks, yields and rents – but we cannot see how he consciously aimed in detail to make a profit from his various enterprises.

Perhaps significantly, his decisions about choosing to plant barley, flax or wheat seem (to us!) to be based on the arbitrary height of the Nile inundation – and not dictated by, *e. g.*, an interest in details of the textile market as such. EYRE (2010, 293) assumes that the decision of choosing which crops to cultivate, depended on the inundation, “the cultivable plots and available labour.” Heqanakhte clearly indicates that the inundation decides which crops are to be planted; and he specifies that his personal contacts will determine which lands he leases – and he decides where his people will work. Thus, I agree that the inundation was decisive, but in contrast to Eyre, am persuaded that neither labour nor fields influenced decisions. Heqanakhte probably deliberately chose the fields he himself took on lease with an eye to success – using what resources he had available; he doubtless leased out the fields he owned which were less valuable, leaving the tenants to manage: they probably had little leeway to decide on crops and labour.

In this sense, Heqanakhte may have been playing with his “sure bets”, knowing that he could use any of the three products to attain his ends (which is also why he prefers to be paid in barley, but will

also accept oil). The idea of playing with textiles was always a “sure thing” in the world of Near Eastern Bronze Age economics, and thus of speculative interest; however, a good Nile guaranteeing adequate grain would also guarantee the freedom to purchase and process flax.

I would be inclined to believe that Heqanakhte was calculating for himself in his own mind in barely – as he repeatedly says. This will have been at least partly because his expenses and income were actual barley, but also possibly because this was his ultimate frame of reference. The question is whether there was a difference between the New Kingdom world of Deir el-Medineh and the *Book of the Dead* in the second half of the 2nd millennium BC – where weights in silver were clearly decisive – and Heqanakhte’s Middle Kingdom world in the first half of the 2nd millennium BC. This seems entirely possible.

This could imply that in terms of market transactions using silver as a basic means of reference, Middle Kingdom Egypt may have been lagging slightly behind the contemporary Mesopotamia in the era of the Old Assyrians and Old Babylonians (where silver was far more consciously present). Such a development would hardly be surprising as Egypt was probably far less commercialised than Mesopotamia. Yet in both worlds, the state institutions were still decisive for the functioning of the market. This potential insight would merely underscore the importance of the state institutions in buttressing the market, while also stressing the gradual trend towards monetisation which would coalesce in the 1st millennium BC.

The division of labour

To understand demand in the markets, one must have an idea of employment and what economists call “disposable income”. Understanding the economic significance of employment in the Pre-Modern Near Eastern and Asiatic worlds is an extremely complicated problem for any Western-educated scholar.

In the West, we are accustomed to think of the Industrial Revolution as having happened at least partially because scientific methods of cultivation and the use of mechanisation gradually aided in building up a capacity to increase agricultural output such that labour would be freed to work in industrial jobs in the urban centres – and that this in turn led to a virtuous circle whereby additional labour could flow from agriculture into industry, and thereby increase prosperity.

Closely related to this is the idea of full-employment being an ordinary phenomenon, and that subsistence economies are poor because people are fully occupied trying to feed themselves. In this sense, it is assumed that the “division of labour” is a natural development arising from a need to spe-

cialise in order to increase production. And this contributes to the wide-spread idea that labour has some kind of intrinsic value, imputed both to agricultural and industrial labour, as labour contributes to the creation of wealth. This conceptual framework leads us to make some kind of link between labour and value.

However, there are a number of problems with this. The most important (1) is that the most recent historical statistical work on England shows that between 1700 and 1801 AD, as a proportion of overall employment, the percentage in industry increased from 34 % to 36 %, whereas employment in services grew from 27 % to 32 % (BROADBERRY *et al.* 2015). Thus, during the Industrial Revolution, employment increased more in services than in industry, meaning that the link between decreasing agricultural employment and increasing industrial employment is historically untenable; the increase in services implies that the change in agricultural employment was not a simple matter of freeing workers who swiftly increased industrial employment. One possible implication is that, rather than freeing up agricultural labour, urban employment was simply taking up slack (in the form of agricultural underemployment) as the economy grew (for reasons which may be related to finance and technology – rather than labour, with increased employment an accidental result).

The second (2) is that agricultural production in Ancient Egypt and Mesopotamia vastly surpassed that of Early Modern Europe (as noted above; *cf.* also WARBURTON 2019) meaning that with the exception of modern Europe, there is no historical pattern of workers moving into industry as agricultural production increases: instead, overcapacity can be pushed, and access to grain channelled through the market. In Egypt, Mesopotamia and China, it was the state which channelled workers into textile production. However, most simply continued to live poverty-stricken lives, with their labour value virtually nil (LEWIS 1954). In this sense, most non-Western societies have experienced widespread under-employment for most of history. The West is an exception in economic history.

The third (3) is that in the ancient world, those working in the bureaucracy were well rewarded, but not the actual workers. In one inscription mentioned above – from an Egyptian quarrying expedition in the first quarter of the 2nd millennium – recording allowances, the chief of the expedition got 20 times more than the average worker, with the craftsmen and experts getting nearly or twice as much as the unskilled manual labourers; only the administrative personnel (bureaucrats and officials) got three to ten times as much as the unskilled manual labourers (with references, WARBURTON 2016a, 128, 163). As detailed above, the workmen in the village of Deir el-Medineh were allotted wages in grain according to their status: foremen, ordinary workmen and doorkeepers

paid according to social standing. The craftsmen at Deir el-Medineh were unusually well paid because of their unique position. Few ordinary craftsmen could have commanded incomes well above the average usual income.

SCHEIDEL (2010) has demonstrated that wages in the Pre-Modern world remained steadily low. It is only in England in very recent times (after 1850) that wages for ordinary workers started to increase steadily and to stay stable at a high level for some time (ALLEN 2001). However, this trend may have lasted only a little more than a century since wages have now been relatively stable for decades in the rich world.

In this sense, in the ancient world of Mesopotamia and Egypt there was a market type hierarchical organisation whereby the rarest people (those at the top of the social hierarchy) were paid the most, and the most abundant (the masses of unskilled labourers) will have had the lowest allowances. All of these allowances were based on either volumes of goods (*e. g.*, loaves of bread, litres of grain & beer, *etc.*) or weights of goods (*e. g.*, wool, silver). This concept – of allocating salaries or rewards according to social status – was routinely applied throughout the Ancient Near East for estimating the value which a person merited.

Excellent work on the actual quantities of income, recreational rewards, and rations awarded according to social status in 3rd millennium Mesopotamia will be found in BRUNKE (2011; 2013) and PRENTICE (2010). Brunke demonstrates that the elite enjoyed very nutritious banquets while even the singers were given near subsistence rations. Prentice shows how the girls who kept the goats were even given half a measure of wool, whereas those higher up received several times as much. In every case, the measuring system was decisive for determining the proportions, and the proportions determined by social status.

Thus, at its original appearance, the division of labour was pushed by the bureaucrats and the elite who required seal-cutters, painters, carpenters, builders, stone-workers, bronze-smiths, wood-cutters, fishermen, gardeners, woman grain-grinders, *etc.* – but in terms of individual household income, the greatest allowances were made for the bureaucrats and the elite, while those doing the work received the lowest.

It was thus the states who not only established the systems of measurement, but also pushed the division of labour which defined society for most of the era up to the Industrial Revolution. This society was in no way similar to our own, and the role of the market was vastly different. Among the most important features is that the market for luxury articles will have been far more important and that for ordinary products far less. On the other hand, however, the role of the state as creating a framework for commercial and industrial activity was far greater.

The Independent

However, one should not exaggerate the importance of the state and its institutional framework. Above we noted that Heqanakhte expected little enough from the state, tending for his own people in a patrimonial commercial fashion.

There is a myth that almost everyone in Egypt was integrated into the institutional economy, because it is assumed that everyone was integrated into an institution and that every title held by anyone is related to an institution. Yet strangely enough, it turns out that even many craftsmen with titles – who were supposedly integrated into institutions because of their titles – cannot be related to institutions;¹³ it also transpires that one can find an Egyptian merchant who is definitely not affiliated with any institution – like both the merchants and clients in the papyrus recording the activities of a ship moving along the Nile mentioned above (*cf.* WARBURTON 2016a, 174-176, 182-183, 293-307).

It is clear that merchants were not really members of the ruling classes, but that state institutions in the hands of well-placed people did pay for the manufacture of textiles, and these textiles ended up on the markets. The stall-keepers visible in Fig. 5 will certainly not have been members of the elite – the people who supplied them with sandals and textiles may have been from the elite of merchant society, but the actual manufacturers of sandals will not have been.

Thus, between the peasants and the bureaucrats was a rather large group of people – artists, craftsmen, merchants, gardeners, *etc.* – most of whom may (at the very most) have been indirectly linked to the institutions – but they were virtually all dependent on the institutions because their clients were integrated into the institutions. And because the institutions determined the very division of labour and developed the balances and weights which defined the system, dependence on the institutions was literally “institutionalised”: the market had to adjust – and the individuals to the market.

Income & Ownership

Above, I drew up a list of four insights that one could legitimately draw from the Heqanakhte papyri. There may, however, be a fifth and extremely relevant insight concerning the economic market importance of the religious insti-

13 The fact that craftsmen and masons were working on their own accord is confirmed by the inscriptions of the 3rd millennium, when this was regularly stated in the tombs (*e. g.*, STRUDWICK 2005, 258-260) confirms the existence of free craftsmen working for wages paid by private individuals – and one of the systematic publications of these texts dates to 1933. It is thus astounding that this was not observed and incorporated into thought a long time ago.

tutions, and this remains true regardless of Heqanakhte's behaviour, but might well be buttressed by Heqanakhte's materials. Above, we noted that pay scales rose sharply for the higher levels of the bureaucracy when compared with ordinary workers or even skilled craftsmen. This in itself means that disposable income was an attribute of the dependents of the institutions and their supervisors (who either benefitted from personal or professional landholdings). In this sense, market demand will have been an attribute of those with higher social status, and higher social status was associated with high positions in the institutional hierarchy. Thus, the market process depended on the elite – and it was the elite that could afford the lapis lazuli and other preciousities. And that elite was dependent for the state and its ideology for their income.

ALLEN (2002, 149) assumes that some of the fields Heqanakhte cultivates are possibly part of “a perpetual endowment in return for his duties as ka-servant”. However, it must be admitted that there does not seem to be the slightest hint of this anywhere in the documentation. He certainly does not specify any special income as being his own. Furthermore, Allen seems to concur with my impression that all the fields under discussion are in the North while his obligations are evidently in the South; it would be improbable that any such fields would be so far removed from the responsibilities. Regardless, if some of the land he manages was part of the endowment, he certainly treats all of it as his own personal property as he repeatedly states – and thus it simply is part of his enterprise without any special treatment in his mind. In this sense, if his lands were institutional lands – as we know was the case with others – then Heqanakhte exploits these so clearly for market purposes that we cannot even trace it.

This demonstrates that the market certainly functioned very efficiently in the minds of the Egyptians, determining their thought and behaviour. However, it was the institutional economy which made the market work.

Interlocking Markets

The case of Deir el-Medineh showed that the workmen in the village exchanged things for prices among themselves – and that the village was linked to the outside world through the riverbank market. And this one riverbank market will have been connected to all of the other market-places in Egypt: a satirical text written by a well-off bureaucrat relates that the merchants spent their lives going from market to market, trying to sell things to people who have no money (quoted with literature Warburton 2016a, 294). It may be assumed that there were larger markets in Memphis and the larger cities. It is relatively clear that the Nile was the main

thoroughfare in Egypt and that any routes leading to the Red Sea or the oases in the Western desert will have led to cities along the Nile – and that markets would be found there.

In this sense, many markets may only have sprung to life when a merchant vessel came by – but others will probably have been virtually permanent, as in the major cities along the branches of the Nile in the Delta. Some of these in the East will have received ships from the Levant, while some of those in the West will have served the Aegean.

Markets & temples (1)

And on this note, it is worth taking a look at the forlorn temple at Umm al-Rakham on the Mediterranean coast, a few hundred km from Memphis. The port which justified the existence of this temple lay on the African coast southeast of Phaistos on Crete – and the temple was thus coincidentally roughly equidistant from Phaistos and Memphis, but more or less on the edge of the desert (at well over a hundred km West of the Delta). At the archaeological site of the temple – slightly inland from the coast – Aegean materials, including Transport Stirrup Jars were found. Significantly, the Egyptian temple was erected there near the end of the Bronze Age, in the late 2nd millennium BC – when things were getting rough in the eastern Mediterranean, with both the Egyptians and the Mycenaeans menaced by the mysterious “peoples of the sea”.

Exactly how and why the trade functioned here is far from clear. The ordinary procedure at the height of Mycenaean power was for olive oil to be dispatched from a harbour on the northern coast of Crete to Mycenae in Transport Stirrup Jars. There, the ungainly Transport Stirrup Jars would be discarded (or recycled) and the olive oil poured into the familiar, locally made, more attractive and smaller stirrup jars – for the retail trade. These small stirrup jars are found at settlements all over the eastern Mediterranean (along the coasts of the Aegean and the Levant, but also at Gurob and Amarna in Egypt; for the stirrup jars of both types and the trade; cf. Knapp/Demesticha 2017; Murray 2017).

Thus the presence of the Mycenaean Transport Stirrup Jars in Libya should be a rare exception, contrasting to usual practice, and is as difficult to understand as the existence of the Egyptian temple. In principle, it is possible that the temple served as a kind of advance customs post where Mycenaean merchants could negotiate with Egyptian officials, and repackage their goods for transport to Egypt. And it is difficult to imagine any other conceivable purpose for this strange outpost. Certainly it would be hard to imagine any Egyptian god who would have wanted to live there, let alone any Egyptian worshippers who would have chosen to go there.

In any case, during the New Kingdom, this Egyptian temple far to the West of the Delta was linked to Egypt by a chain of forts stretching across the desert (*cf.* MANASSA 2003, 48-49, n. 269-275). The forts must have been in use virtually until the end of the Mycenaean era. Such a series of forts might have been useful for transporting goods to Egypt, but it also proved to have some military value when the commanders observed foiled invaders escaping from Egypt (although Egyptian use of the temples and forts for collecting intelligence before the invasion would have been far more sensible). A similar chain of forts was occasionally maintained along the eastern border with Sinai, best known from the first quarter of the 2nd millennium when Egypt was ruled by the celebrated Dynasty XII of the Middle Kingdom. At this time, there was a real and justified fear of Asiatics wandering into Egypt.

However, the most celebrated chain of Middle Kingdom Egyptian forts was that dotted along the rock outcroppings of the Second Cataract in Nubia (VOGEL 2004). And there was a modest temple on the citadel of the impressive fortress at Buhen in Nubia (some 300 km south the Egyptian border at Elephantine), but this temple was in no way a major institution related to trade. This temple was related to Egyptian kingship, sovereignty and imperialism rather than any popular or local deities. It was there because the Egyptian king (who will himself have been a rare visitor) was staking out his claim to empire. Yet, simply by virtue of being part of the housing of the garrisons protecting trade along the Nile, this temple was similar to the other at Umm al-Rakham, as it lay at the other end of that part of the Egyptian empire on the African continent; the distance between the temple in the fortress at Buhen in Nubia and the temple at Umm al-Rakham on the Mediterranean coast was around 1400 km, as a crow could hypothetically (but would not) fly.

In this sense, two very different temples can be integrated into an image of trade routes protected by the Egyptian state.

Markets and temples (2)

A completely different, but extremely interesting detail about the use of the market by the state appears in the temple records of the late 3rd millennium mortuary temple of the Old Kingdom Dynasty V King Neferirkare. These records seem to have been maintained for decades and even centuries. It is known that the deficits in the deliveries were recorded without any clarity about whether any substitutes would ever be offered. The inventories also record that items that should be in the temple are indeed present, but it is also specified that some of these are broken (*e. g.*, POSENER-KRIEGER 1976, fig. 3, facing p. 134). Significantly, there does not seem to be any expectation that a priest

or supervisor of priests would go to the market to seek a suitable substitute to replace the object. In principle, it would seem that in the 3rd millennium the temples had certain standard equipment and regular supplies – but that recourse was not had to the market as a matter of course.

This contrasts significantly with the 2nd millennium temples we just discussed. They may not have been the popular institutions that we would involuntarily associate with the bacchanalia of Dionysian festivals in Classical Greece, and they did not serve as banks in the fashion documented for the 2nd millennium BC Old Babylonian temple of Shamash at Sippar in southern Babylonia, but they were integrated into a trading system.

Markets and religion

We have a tendency to associate temples with religion, but religion is far more than a matter of mere places of worship. Of course, many temples may have been standing near the river bank, and many were actually linked to a quay facilitating access to the river. In this sense, there may have been no real difference between what Janssen called the “riverbank markets” (visited by the ship mentioned above) and the temple, especially at times of festivals – and MOHAMED (2004) points out that festivals took place virtually every day of the year somewhere in Egypt. Indeed, in her dissertation, MOHAMED (2004; review WARBURTON 2006) largely concentrated on 2nd millennium Egyptian festivals where the situation might have been quite different from the third; the contrast is not just because of a lack of documentation, as Mohamed concluded that Egyptian festivals expanded in the course of time – if only for demographic reasons.

In any case, Mohamed assumed that preparations for temple festivals will have involved both expenditures and expectations. Vast quantities of cakes and flowers will have been ordered and organised, officials will have been expected to make advance payments to temples to be able to participate in festivals, and independent merchants will have anticipated crowds in a good mood willing to part with their money. Eating, drinking and the purchase of trinkets will have been standard elements of the programme. Archaeological excavations have indeed demonstrated that wine and beer jars as well as bread moulds are well represented in temple districts – and thus one can build on this evidence to support Mohamed’s conviction that merchants were involved in market exchange even in the preparation of officially sanctioned festivals. In this sense she understood that the ancient Egyptian temples will have been places of congregation, and one can assume that this may have been true to some extent, at least in the late 2nd millennium and 1st millennium BC.

The workmen in the village at Deir el-Medineh were involved in religion insofar as they were officially employed to prepare the tombs in the Valley of the Kings – and in their free time were able to manufacture funerary and mortuary articles for the Theban elite. Thus, they earned a living from religion – and yet spent more of their free time preparing their own tombs and funerary paraphernalia. And indeed, they lived in a region which enjoyed an unusual abundance of temples: the mortuary temples of the New Kingdom lay not far from their village – but they also had their own temples and shrines adjoining their village and its adjacent cemetery. Beyond that were the temples of Karnak and Luxor on the other bank of the Nile – and also both the temples and elite cemeteries which the gods visited during processions. In this sense, whenever a procession or a funeral took place, it would be an occasion for festivity as it was an occasion to celebrate profits (from the funerary industry) or to pose oracular questions to the gods in a festive environment.

In principle, since at least the beginning of the 2nd millennium BC, there will have been festivals associated with calendar dates where Egyptian gods would leave their temples and move to another temple, or take part in a procession wandering between temples. These events will have been dictated by the identities of the particular gods and the calendar. Such occasions will have become more frequent over the course of Egyptian history.

Diachronic developments

That trade was conducted in forts far from the Egyptian border is beyond any doubt. And it is clear that both continuity and very different forms of organisation characterise the 3rd and 2nd millennia, where we have tried to throw light on both transactions and mindsets. Yet, I have tried to stress that in almost every case, one can confirm that weights in silver will have formed the background to almost every commercial or administrative decision – even though the age of the monetarised silver economy really only arrived in the 1st millennium BC.

In this sense, it is significant that Hatshepsut's celebrated expedition to Punt, at the southern end of the Red Sea actually seems to have brought a very large precision balance along with them; at least, one has been illustrated there in the scenes at her mortuary temple at Deir el-Bahri. Regardless of the veracity, this scene demonstrates that the Egyptians perceived balances as being an elementary part of market exchange – and we noted that there were growing contrasts in the attitude towards balances. In the early 2nd millennium, balances may still have been identified with justice whereas in the second half of the 2nd millennium, people were growing distrustful of people who used balances. There was also an increasingly sceptical attitude towards the

capacity of the state to decide – even if the kings still aimed at assuring justice, they were increasingly unable to guarantee it. In this sense, the growth of civilisation can be linked to the institutions – and the increase in market activity accompanied some growth in prosperity, but distrust of the attributes of officials and merchants alike. The market was thus a part of social and cognitive history.

There can be no doubt that before the dawn of history a few high value preciousities were being traded in the Near East, but to my mind there was no clear means of assessing value before the development of balances and equivalencies (sometime in the early 3rd millennium BC). Under the circumstances, it was impossible to estimate risk or calculate potential rewards. Beyond that, the craftsmen had to learn how to work lapis lazuli so as to make stunning artefacts out of lumps of stone. Thus, to my mind it is hardly surprising that there was not much trade or wealth before the 3rd millennium BC.

And what began in the 3rd millennium took place – thanks to the bureaucrats – at both ends of the scale. The institutions had to be able to estimate their grain income, and the workers needed to produce it – quite aside from contemplating how to manufacture textiles and export them. At the same time, the institutions had to know how to assess the value of silver, lapis lazuli, carnelian, *etc.* in order to take care of the requirements of the gods, royalty and the elite.

During the third and 2nd millennia BC, the trading networks will have thrown the equivalencies established by the institutions into question, and revised the prices of grain, silver, copper and lapis lazuli accordingly. These procedures took place on the international markets and in the headquarters of the institutions. But the effects will have rapidly spread through all the societies integrated into the markets of the Ancient Near East.

Some remarks on alternative interpretations

It is extremely important to understand that for a long period of time, some Egyptologists were seriously persuaded that somehow or another all of the land in Egypt ultimately belonged to the king and that all of the grain produced on this land likewise belonged to the king and that a good deal of it was collected and then re-allocated to other people. It was also supposedly the king who chose his own elite to whom he would award land. And also assumed that the entire structure depended upon the king for survival. Unfortunately, despite an absolute lack of evidence to support these assumptions, aspects of this attitude still seem to survive in numerous different permutations. This, despite the fact that Egyptian testaments recording the sale or bequeathing of property have been known since the end of the 19th century. One of most dismaying

results of this way of thinking is (a) that it is still claimed that land was not really private property in Egypt (as assumed by *e. g.*, KATARY 2013). This attitude seems to be prevalent and ineradicable, regardless of the material sources available. It is, however, no more than an irritating spectre which simply refuses to be blown off course.

More important is, however, (b) the idea that grain did not really have a market value. This is an inevitable by-product of the idea of “redistribution” which reduces grain to allocations rather than exchange. Once “redistribution” is abandoned and the market accepted, grain becomes a commodity with a price. Yet, even Eyre – who has long been an ardent supporter of markets in ancient Egypt – actually assumes a “disjunction between” this “subsistence commodity and the market” (EYRE 2010, 297).

Yet, it was not a disjunction in the market and the commodity, but merely the result of market influences in the context of the potential productivity of the fields in Egypt. The productivity was such that far less labourers were required for the production of an adequate harvest than there were mouths to feed. Thus excess capacity meant low prices and low wages – and this situation was made worse in an economy in which grain served as currency to pay rents and wages, and thus limited the value of grain – but it was evaluated as a commodity with a price and treated as such. The economist LEWIS (1954) has dealt with this problem and described how in such an economy the marginal utility of labour is virtually nil and wages remain low – while the situation allows virtually unlimited gains by capital (also mentioned in Warburton forthcoming).

Another (c) vestige of archaeological thought is the patrimonial model, where both the state and the households of the elite are supposed to have been more or less self-sufficient autarkic institutions. While citing the evidence for exchange at 3rd millennium markets, EYRE (2010, 295) also refers to elite households as “patrimonial” (EYRE 2010, 304–306). Weber’s ideal prototypes never existed, and the actual development in ancient Egypt demonstrates that a model combining a powerful but understaffed state with an efficient market without any real liquidity is probably the best way to grasp Egypt. Thus Heqanakhte seems to have had a large household, but the only economically interesting part of his establishment was a textile enterprise far removed from his family’s household; in the household itself, we find no evidence of bronze-smiths but do encounter a reference to a hairdresser and another to a mere domestic servant who is superfluous because she disturbs one of the ladies of the house. Thus Heqanakhte was an efficient farmer with animals, land and grain, but he seems even to have outsourced textile production (which is among the domestic activities of a patrimonial household par excellence), and was certainly not aiming at an autarkic system.

A casual observer would note that the private tombs are full of scenes of daily life and that in the Middle Kingdom (the era of Heqanakhte’s letters) elite burials frequently had models reflecting the scenes otherwise found on tomb walls: carpenters, textile workers, butchers, granaries, brewing beer and making bread, *etc.* This gives the impression that the ideal household should be able to provide for itself. It is striking that in those New Kingdom palatial areas hitherto excavated, glass manufacturing and bronze working accompany leather working and other phenomena that one could link to a self-sufficient patrimonial house (but are not so frequently shown in private contexts). One wonders if royal commercial patronage of the craftsmen manufacturing such products may not have kept highly skilled craftsmen within the palatial world such that their products – even where not directly controlled by the state through administrative fiat – actually wandered into palatial or temple institutions before being retailed on markets elsewhere. This could be one potential explanation for the fact that the price of a metal vessel was usually understood as corresponding to its weight – without regard for the input of the craftsmanship, as the value of the craftsmanship may have been paid when the objects were turned over to the palace, when the value of the metal was also accounted for (either being provided by the palace or the craftsman). It would also provide a market-oriented interpretation for a phenomenon which would be difficult to explain – while also indicating a division of labour for the higher crafts where palatial and institutional sponsorship may have edged out competition in the market.

What the Heqanakhte documents do reveal is that whether using private land or public land, the procedures aimed at maximising gains – and that these rational methods were neatly fitted into a context where goods could be exchanged without problems in virtually every village. We need hardly imagine a market type situation as at Deir el-Medineh, but rather markets distributed across the country – and determining behaviour. And, if this has been properly understood, individuals like Heqanakhte could have played a role in driving up debt through their maximising agrarian policies. In this sense, his behaviour is market-driven – and by accumulating debts he may have used his wealth in a financially lucrative fashion.

That most of the population will have consisted of more lethargic farmers than Heqanakhte himself is quite evident. However, the financial power of Heqanakhte and those like him will have enabled him to employ underlings who had to accept his whims – or risk losing a relatively comfortable existence. Those people will also have been customers at the markets themselves: but their financial power was virtually non-existent, and therefore incapable of sustaining a constantly growing and expanding market economy. Thus professional commercial

farmers and professional industrious merchants will simply have pressed their weaker neighbours to the wall without increasing the wealth of society; the distrust expressed in the religious texts indicates that merchants and bureaucrats alike could be corrupt, and in that sense using their professions for personal advantage in a fashion injurious to society and the state. Cheating with measures seems to have been one of the most common phenomena known to ordinary people in Egypt.

Temporal and spatial aspects

The point made about the grain contracts (when discussing Heqanakhte, *supra*) is extremely relevant to the history of commerce. Contracts are common in both Mesopotamia and Egypt in the 1st millennium BC, but rarer before that time. I am persuaded that one could legitimately argue that this increase in the prevalence of contracts might actually be related to the increasing use of silver in the 1st millennium. This is extremely important because many of these 1st millennium contracts are still delineated using grain (rather than silver) – but it is possible that the more generalised use of real silver (instead of silver as an accounting unit, as we have primarily witnessed in our third and 2nd millennium data) contributed to the more generalised use of contracts for rather minor affairs.

We know that legal contracts for the sale (not leasing) of land existed in Mesopotamia (GELB *et al.* 1991) and Egypt (STRUDWICK 2005, 192–194) in the middle of the 3rd millennium BC; this could imply that contracts were initially reserved for more important matters (which would also explain the prominence of 2nd millennium real estate deeds in 2nd millennium Babylonia and the attention given to testaments in early 2nd millennium Egypt).

In contrast to what one finds in many of the brief allusions to the earliest economic organisation in Mesopotamia, contracts are far from prominent in the earliest texts. The most that can be identified in the texts dating to the era just before the middle of the 3rd millennium BC are “transactions” where the actual conditions are unknown, even where parts of the transaction (such as lending donkeys) are documented. This should be related to the fact that “equivalencies” are rare before the first third of the 3rd millennium BC.

It is a fact that preserved written contracts are much more common in Mesopotamia than in Egypt, and far more Mesopotamian contracts have been preserved than Egyptian contracts, and thus I shift to Mesopotamia here for comparisons. Significantly, many of the Old Babylonian (*i. e.*, first half 2nd millennium BC – in this case a couple of centuries younger than the Heqanakhte materials) contracts concern lending silver, and selling offices or real estate. In some cases, it is possible that the rental (rather than the sale) of fields is the subject

of the contract, but this is not certain and certainly not the most common type of contract known. In the late 1st millennium contracts for the lease of fields are common.

There is thus a clear change in the nature of the written evidence and its preservation: contracts for leasing land become more common over the course of more than two millennia of development. Combined with the evidence of Heqanakhte’s letters, this could be a hint at the gradual emergence of the systematic recording of leasing deals, *i. e.*, as preserved, the documentation does not tell the whole story. Just how such matters could be registered and taxed without written records is an important matter. But this may also be important for understanding how the taxation of commercial agreements concerning the rental of fields came into existence and was gradually but increasingly applied in the course of history (where 1st millennium leases specify seed-corn, rent and taxes). In Egypt “overseers of fields” begin to appear in the first half of the 2nd millennium BC – but are not yet the feared officials that they become at the end of the 1st millennium BC.

In the era of the Hellenistic Demotic contracts, one is in a world where the Ptolemaic state is aiming to maximize collection of grain revenues, precisely because in the Hellenistic and Roman worlds, the grain trade was a highly lucrative financial venture. This was certainly not done on anywhere near the same scale in the Bronze Age Near East, and I would be inclined to believe that the Bronze Age states were less concerned about this type of activity. In contrast to Greece, the Ancient Egyptian possibilities for pushing agricultural productivity led to production far exceeding local requirements (as demonstrated by the exports in Græco-Roman times). Yet during the Bronze Age, most of the other participants with urban economies were self-sufficient in grain. As a result, there may have been occasional local shortages of grain, but in principle a bumper crop could only lead to falling prices. In this sense, the value of agricultural productivity changed when Egypt was integrated into the Hellenistic world. And this means that the nature of trading also changed.

It is clear that in Athens, the city was always dependent on imports or – to say the same differently – the city of Athens was able to grow demographically beyond what its agricultural base could sustain because the silver from Laurion allowed it to purchase imports from abroad. This reality had a decisive impact on Athenian financial policy – and correspondingly on trade all around the eastern Mediterranean and the Black Sea. It also had a direct impact on the development of a two tiered system of markets: the *empóron* (ἐμπόριον) where foreign trade was carried out and the *agorá* (ἀγορά) where local and retail trade was carried out.

Significantly, in the Roman Empire, the grain collected in Egypt as taxes was simply used to sub-

sidize the people in Rome – and not used as a major financial instrument. At the start of the Byzantine Empire, the supply of grain was simply shifted to Constantinople, continuing to be used as a public subsidy. When the Arab conquest cut ties with Byzantium, the Egyptians turned to the production of flax and linen for export, rather than reduce grain production or attempt to export it within the Arab world. This is highly important as it stresses that in the region of the Bronze Age Near East, the export of grain was impossible, because the region was able to support itself – confirming that the situation of Ancient Greece (which was not self-sufficient in grain) – was exceptional. The difficulties of providing adequate grain supplies may also have been similar in other parts of Europe north of the Alps and therefore, together, Greece and early modern northern Europe may have contributed to the idea of full-employment being related to grain production.

Regardless, for Byzantium, the Arab conquest demanded a number of changes in policy in any case. Initially, the Byzantine rulers were discomfited, but stopped the public subsidies and within centuries largely privatised the grain market for Constantinople, relying on supplies from Anatolia and the Black Sea – and basing the public granaries in port cities allowing easy transport to Constantinople.

In this sense, the very nature of market-places was determined by state policies relating to trade in subsistence goods. That the Athenian model of *empóron* and *agorá* was neither widely replicated elsewhere nor sustained through time is simply an indication of the complicated and specifically local nature of developments – and our difficulty in trying to grasp exactly what was happening. The most important thing is that the market place was gradually changing its nature – and Egypt represents a source for the earliest part of these developments. Beyond that, the productivity of the fields of the Ancient Near East must be compared to those of Europe in order to grasp the complications of the development of concepts of value. It is doubtless a fundamental contribution of the Ancient Near East that grain was assigned a value in silver (thanks to balances and equivalencies); millennia later, this facilitated the development of financially backed grain markets in the eastern Mediterranean where Athenian tetradrachms came to play a highly important role.

A caveat about interpreting and extrapolating developments

Thus to my mind, it is clear that there is evidence of a delay between the development of a practice and the actual tendency to begin to regularly document a practice (as stressed in the case of contracts here). On the other hand, there is also real evidence of the gradual development of practices, such as the successive introduction and use of (a) measures,

(b) equivalencies, (c) accounting units and (d) the more generalised use of actual silver. It is obvious that these observations are dependent upon the development and spread of writing. However, to my mind, these practices are also dependent upon the gradual development and exploitation of balances and weights. Given the fact that the archaeological evidence demonstrates that the emergence of states in the Near East is directly related to an enormous increase in the amount of archaeological material, one could argue that the emergence of the state was primarily responsible for the increase in trade. However, it is highly probable that the balance also played a fundamental role in transforming trade from a matter of guesswork to rational exchange. And this is extremely important for understanding the history of trade and social development.

To my mind, projecting this documented activity of calculated trade with conscious equivalencies into the distant past should be tempered by an appreciation of what the evidence from the fourth and 3rd millennia reveal. I am persuaded that this means that the initial development of Neolithic trade will have worked without any clear definitions of value – and certainly a lack of an understanding of how to express and perceive it in numerical form (WARBURTON 2018). The concept of unusual beauty – in the sense of blue lapis lazuli or green jade – will have been associated with rarity and value will have emerged in that fashion. However, it will have remained vague. The system of understanding numerically calculable value could only emerge with the development of a system of accounting combined with the concept of equivalencies based on weights in silver. This depended upon the bureaucracy – and the merchants could exploit the system for their own purposes, underlining the authority of the bureaucrats and changing values.

In this sense, the world of the 3rd millennium (with balances and equivalencies using the silver standard) grew out of a vaguer world in the 4th millennium – a world where there was no wealth and a primitive division of labour. The emergence of the state channelled exchange in a new direction, and created the platform which led from Sumer to Athens. With its silver supplies, Athens was able to take an incredible leap onwards – economically, politically, literarily, philosophically, and architecturally – but a leap which depended on the gradual evolution that had begun in Mesopotamia millennia earlier. And one founded on the bounty of the Nile as harnessed by the Egyptian kings and exploited by the Ptolemies.

Final Remarks

We can be certain that from ca. 2500-1200 BC, the Egyptian economy was a largely agrarian economy in which most people were farmers, obliged to perform services or pay taxes and rents. This

agricultural economy was probably largely based on privately held landed property which could be leased or sold, and integrated into a vast market system in which all goods had prices easily recognisable in terms of grain, silver or copper. These markets were in the minds of the Egyptian people as well as in the cities and villages, near the river banks and the temples. Obviously, specific market places will have disappeared as a town or temple was abandoned for whatever reason, while others will have sprung up wherever people came together.

In this sense, one can imagine market places – where labour, goods and land were exchanged – appearing suddenly at Amarna, and disappearing immediately after the failure of Akhenaten's religious revolution. This had nothing to do with the market or the religious revolution, but was rather a consequence of the Egyptian expectation that the market served to distribute or allocate goods.

The existence of this system of markets does not negate the existence of a parallel state system which – in the eyes of a “free enterprise fanatic” may have “distorted” markets, *e. g.*, by selling textiles which were not produced based on market principles (being dependent on tax income), or *e. g.*, farmers like Heqanakhte who may have commercially exploited their access to fields intended for their subsistence. Although such activities do not appear to be compatible with a market system, the behaviour of the workers at Deir el-Medineh (who may have used their state created knowledge to profit for their own ends in the private mortuary industry) and Heqanakhte himself (who may have used plots related to his services as a mortuary care-person to increase his income rather than feed his household) revealed that this merely moulded the fashion in which transactions took place and that the market responded accordingly – with individuals then changing their behaviour to adjust.

In this sense, individuals and the market responded to the conditions set by the state. Although a “free-marketer” might view the state involvement in the local Egyptian market critically, the contents of the Tomb of Tutankhamun should give pause were one to allege that the state did not appreciate the markets. In that tomb, lapis lazuli from Afghanistan accompanied amber from the Baltic and incense from Arabia; in addition, there was jade, probably from Central Asia. All of these were acquired through the market because all were well beyond the reach of the military power of any Near Eastern state. The presence of Libyan desert glass in that tomb may have been due to a lone shepherd wandering in the desert – but the gold, turquoise and amethyst will have been brought by state-sponsored and organised expeditions. As far as I can tell, the state basically intervened to acquire hard stones that the market did not bring. In the sense that the state paid members of expeditions to participate, one could describe the actions of the state as being market-conform.

Just how the carnelian, jasper and other similar stones were acquired is a bit of a mystery. They not only appear in tombs, but also in lists of offerings, *etc.* It is entirely possible that these stones were acquired from private craftsmen or merchants – but whether this was done in the form a quota or tax, as opposed to direct purchase is not clear.

Regardless, the Egyptians of the New Kingdom were participating in a network of interlocking markets which stretched from the Baltic to Nubia and Central Asia. The fact that for most Egyptians, their contact with the market was probably restricted to ordinary requirements, which were locally produced – sandals, clothing, pots & pans, *etc.* – is probably of less significance than the fact that the distributed markets met their needs.

On the other hand, however, given the productive capacity of efficiently worked fields in ancient Egypt, the activity of efficient farmers like Heqanakhte illustrate how a small-scale agricultural enterprise made business sense to Heqanakhte. He was able to lease land because he managed to get a large surplus from his holdings – and this put him in a position to lease more land, while also collecting rents from others. Those who were able to wrest control of large institutional holdings – as HARING (2013, 629-637) reveals the family of the High Priest of Amun did at the end of Dynasty XX (*c.* 1200-1100 BC) – were able to demonstrate that at scale fortunes could be made. In this particular case, we can be almost certain that the only strategy of the house was exploiting the agricultural income of the Amun temple for family purposes.

The foundation of this procedure was exactly that policy initiated at the start of the Egyptian state: by demanding nominal grain taxes and gradually growing expectations of compulsory labour, the state was literally able to create a functioning economy which differed substantially from a Neolithic economy (as argued in WARBURTON 2003; 2016a, *etc.*). Eventually enough demand pushed the emergence of that market which was clearly visible by the middle of the 3rd millennium in the market scenes of the Late Old Kingdom private tombs. Heqanakhte himself demonstrates that even small scale land-holders could profit from that market for their own purposes by the start of the 2nd millennium BC – and the tomb scenes reveal that foreigners continued to be interested in the Egyptian market.

There can be little doubt about the professional behaviour of those involved in market activities. The merchants moving up and down the Nile will have been part of a world based on shipping. Farmers like Heqanakhte were paying close attention to their income and expenditures. However, the substantial power of the state is clearly revealed by the importance of seeking wealth through the state administration. SHIRLEY (2013, 883) observes succinctly:

“As a result of the power wielded by the Amun domain, an upper-level position within it would have given its bearer great economic wealth and power.”

Officials like Ramessesnakhte were aiming at consolidating the power of their family by occupying progressively more strategic offices. Their behaviour was rational in accordance with the rules of the market where the state had a strong influence on activity.

Thus, evidently, there was a lucrative market for grain, but the policies of the family of Ramessesnakhte would not have made sense if they could have sought wealth exclusively through farming as Heqanakhte had done. Farmers like Heqanakhte were small-time entrepreneurs who participated in a distributed market that fitted well with the activities of the state.

That the activities of officials like Ramessesnakhte & Sons brought down the New Kingdom state – the most powerful and lasting empire of the Bronze Age – as the royal household was bankrupted cannot be without significance. This was a danger as part of a long-term development which involved the creation of economically powerful institutions which were exploited by private individuals for their own purposes. They were independent of the kingship – and ushered in a new world where everything was commercially negotiable.

Conclusions: Summary of developments

In the 5th millennium BC, there were no states, no systems of measurement, and very little economically important trade. During the 4th millennium BC, the budding Mesopotamian rulers and their associates (including those bureaucrats who invented not only their own jobs, but also the very tools which made them powerful) created state institutions with a network of trading stations to bring products to Mesopotamia (ALGAZE 1993). The budding bureaucrats perfected writing and developed systems of measure to aid in the implementation of an administrative system which demanded that peasants deliver products and services to the growing state institutions. Writing reduced the necessity of maintaining large outposts on the periphery, while phenomenally increasing the power of the early bureaucrats to manage what became a growing economy: trade grew as exports (of textiles produced by the state institutions using cheap labour and cheap wool) were used to pay for imports (of silver and preciousness). This trading system was made possible by the existence of equivalencies based on weights in silver as a means of estimating value.

From the beginning, merchants seem to have been emerging alongside the state bureaucracies – and their activities left linguistic and procedural traces in the state administration. Gradually the state administration adjusted to the merchants, the markets and the market values resulting from

price formation determined by supply and demand (rather than arbitrary equivalencies). By the end of the 3rd millennium BC, market behaviour and market values were guiding activities in Mesopotamia and Egypt. However, as these societies were all agricultural economies, most of the people continued to live in relative poverty while the elites gradually understood how to exploit the market system, using market based equivalencies to maintain low wages and high rents.

In this sense, one really can enquire whether Peter Bang was really correct in suggesting that understanding these economies meant identifying whether or not these economies “depended upon a system of realizing the gains of trade” (quoted by RAHMSTORF 2016b, 292). In fact, the key was that the bureaucrats were able to exact surplus production of grain, providing not only nourishment and a ready source of income, but also a means of keeping wages low while restricting access to grain (of which the bureaucrats had plenty). The bureaucrats were interested in keeping their costs as low as possible. However, the mere fact that after the Ur III era, the Old Assyrian traders could buy South Mesopotamian textiles and sell them again elsewhere with a considerable mark-up (see Stratford in this volume) implies that the South Mesopotamian bureaucrats were more concerned about their costs than about profits. They were not maximizing in the fashion of merchants, but calculating in the sense of bureaucrats. This means that it was the bureaucrats and their prices (and not the certainty of gain) which determined behaviour; the manipulation of prices allowed the bureaucrats to control their labour force.

The exploitation of prices allowed the merchants to gain – but also opened up the possibility of loss. Therefore, the regions in the periphery and the local merchants simply responded to the demands of the institutional economies, and thus the market system emerged as an essential satellite to the institutional economy where gains were not esteemed – but provided an incentive to motivate others. Without the institutional economy, there would have been no economic development and no markets.

WILKINSON (2018, 41) assumes that “Weighing systems imply a need for establishing trust between strangers”. My own conclusion based on the evidence is that when developing the earliest systematic use of balances & weights in their administrative systems, the bureaucrats were simply concerned about precision, and the balances & weights served as an ideal means of measuring consistently. The first balances may well have served mostly in the bureaucracy, and most of the balances depicted in Egyptian tombs of the New Kingdom – well over a millennium after the appearance of balances – are in bureaucratic (rather than commercial) contexts.

However, already centuries earlier, in Western Asia we can recognise the phenomenon Wilkinson perceives, as merchants use different weights and distrust both officials and each other. However, this

distrust is part of that system of commercial distrust which arose as a result of increasing commercial activity. The distrust was not part of the origins, but rather part of the evolution which increasingly opened the way for market activities by merchants serving the state and their own interests.

In the third and early 2nd millennium, there were very few systems of measuring weight; from the 2nd millennium onwards, one finds increasing use of different systems – and from the 1st millennium onwards, the problem of adulterating currencies becomes more common. In this sense, the progressive commercialisation of the economies changed developments.

One should not be anachronistic and project the search for gain or mistrust as fundamental elements in the emergence of the use of weighing systems. The systems were part of the bureaucracy, which exercised its own form of exploitation simply through the rigid application of measurements, disregarding human needs. The early system depended upon the bureaucrats – and when the bureaucrats began behaving like merchants and sought personal gain, it doomed Bronze Age Egypt. In reality, the creation of prices and market stimulus were accidental by-products of Bronze Age Near Eastern bureaucratic procedures. This is the lesson from the Bronze Age Near East.

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Address of the author

David Warburton
Institute for the History of Ancient Civilizations (IHAC)
Northeast Normal University
5268 Renmin Street
130024 Changchun
Jilin Province
People's Republic of China

warburton@zedat.fu-berlin.de

Marketplaces and hubs of trade in Egypt at the end of the 3rd millennium BC: Heracleopolis Magna in context

by JUAN CARLOS MORENO GARCÍA

Ancient textiles, Early Bronze Age, Egypt, myrrh, Nubia, trade

Heracleopolis Magna, in the Fayum area, played a crucial political and economic role in the late 3rd millennium BC, when it became the center of a regional kingdom, in northern Egypt, once the monarchy that had ruled Egypt for a thousand years collapsed. The reasons underlying its rise to such a prominent position still remain obscure, but epigraphic and archaeological evidence suggests that Heracleopolis exerted some control over foreign trade and the arrival of precious goods into the Nile Valley through the Western Delta, the oases of the Western Desert, Middle Egypt and Nubia. This could explain why Heracleopolis was closely linked, in the late 3rd millennium BC, to localities and regions in these areas that were actively involved in international exchanges, Elephantine and Middle Egypt (Asyut, Bersheh, Beni Hasan) being the most prominent of them. In a context of expanding trade routes across the Eastern Mediterranean and the Near and Middle East, it seems that Heracleopolis played a pivotal role as trading intermediary with the Aegean and Anatolia (source of copper and textiles) as well as with Nubia and the southern Red Sea (from which aromatic plants and exotic items were exported to Heracleopolis). The vitality of this axis of exchanges could also explain why some localities flourished in the Western Delta (Kom el-Hisn, Barnugi) and why Nubians and Asiatics were present in the Heracleopolitan kingdom as soldiers and traders. In the end, the rise of Heracleopolis was the consequence of deep changes in the balance of power between regions and central authority in Egypt driven by the intensification of trading activities across Eurasia and the northern Indian Ocean in the Early and Middle Bronze Age.

Marktplätze und Umschlagsplätze in Ägypten am Ende des 3. Jahrtausends v. Chr.: Heracleopolis Magna im Kontext

Antike Textilien, Frühbronzezeit, Ägypten, Myrrhe, Nubien, Handel

Heracleopolis Magna im Fayum spielte eine bedeutende politische und ökonomische Rolle im späten 3. Jahrtausend v. Chr., als es das Zentrum eines regionalen Königreiches in Nordägypten wurde, nachdem das Königtum, das Ägypten für 1000 Jahre beherrscht hatte, kollabiert war. Die Gründe für die Entstehung einer solchen prominenten Rolle bleiben immer noch unklar, aber epigraphische und archäologische Indizien legen nahe, dass Heracleopolis den Fernhandel und die Zufuhr von Luxusgütern in das Niltal durch die Westwüste, die Oasen der Westwüste, Mittelägypten und Nubien steuerte. Dies könnte erklären, warum Heracleopolis im späten 3. Jahrtausend eng verbunden war mit Orten und Regionen in diesen Räumen, die aktiv in den internationalen Austausch eingebunden waren, wie insbesondere Elephantine und Mittelägypten (Asyut, Bersheh, Beni Hasan). Im Zusammenhang mit den expandierenden Handelsrouten durch den Ostmittelmeerraum und in Westasien scheint Heracleopolis eine Schlüsselstellung als Vermittler zur Ägäis und Anatolien (Kupfer und Textilien) als auch zu Nubien und dem südlichen Roten Meer (von wo aus aromatische Pflanzen und exotische Dinge nach Heracleopolis exportiert wurden) innegehabt zu haben. Die Bedeutung dieser Handelsachse könnte auch erklären, warum manche Orte in der Westwüste (Kom el-Hisn, Barnugi) aufblühten und warum Nubier und Asiaten in dem Königreich von Heracleopolis als Soldaten und Händler präsent waren. Letztendlich war der Aufstieg von Heracleopolis die Konsequenz eines tiefen Wandels in der Machtstruktur zwischen den Regionen und der zentralen Autorität in Ägypten, der durch die Intensivierung der Handelsaktivitäten über ganz Eurasien und dem nördlichen Indischen Ozean in der frühen und mittleren Bronzezeit angetrieben wurde.

Introduction

The late 3rd millennium BC was a period of intense changes in Egypt. The end of the monarchy that had ruled the country uninterruptedly for a thousand years was perhaps the most dramatic of

▼ Fig. 1. Map.



them, but not the more decisive. Far from that, this event might be considered a symptom of historical, social and economic trends that had been working deeply inside the very social fabric of Egypt and undermining some of its more basic foundations, well before their final political outcome with the division of the country into two rival kingdoms. The perplexity of historians and archaeologists facing the sudden end of the most long-lived experience of monarchical rule in ancient Near Eastern history (with few parallels, if any, in world history) has inspired different explanations (MÜLLER-WOLLERMANN 1986; MOELLER 2005; MORRIS 2006; MORENZ 2009; RÖMER 2011; MORENO GARCÍA 2015a; SCHNEIDER 2017). The most popular emphasize unexpected tragic events in face of which the monarchy could hardly react: catastrophic climatic events, foreign invasions, sudden changes in the volume of water carried by the Nile with disastrous consequences for the irrigation network of the valley, *etc.* Their corollary would have been a complete disorganization of the political, economic and social life of the country, a period dominated by warlords, famine and rivalries between regional kings, until a single monarchy finally prevailed and achieved the reunification of Egypt after a century and a half of crisis, putting an end to an era of darkness. The role played by political and economic factors, on the contrary, has not been so popular, mostly reduced to the setting up of some kind of “feudalism” given the political fragmentation of the country, the rise of local lords in a context of decentralization and the gradual reduction of royal income due to the exemptions granted to temples (KÓTHAY 2011). Being usually characterized as one of the most achieved examples of “despotic” absolutist rule in antiquity, Egypt of the pharaohs seemed to provide little scope for political action and deliberation. Also considered as a sophisticated example of a centralized redistributive economy, the possibilities that alternative poles of accumulation and distribution of wealth could crystallize and finally destabilize, even challenge, the capacity of the crown to control the resources of the kingdom seemed practically out of question.

However, the very geographical position of Egypt, at the crossroads of Eastern Africa, the northern Indian Ocean, the Eastern Mediterranean and the Near East implies that changes in the circulation of wealth, the development of new trade routes, the intensification of exchanges and, finally, the emergence of new political and economic actors in the international sphere, had profound effects on the land of the pharaohs, susceptible to alter the balance of power prevailing until then and to challenge the capacity of the monarchy to cope with the new opportunities, but also the new dangers, derived from a changing world (MORENO GARCÍA 2017a; 2018). A detailed analysis of these complex circumstances is beyond the scope of this paper, so

I will focus my research on a particular case study, the rise of Heracleopolis Magna as a major political actor in the very late 3rd millennium BC and the role played by markets and trade in this process (Fig. 1). Finally, a preliminary methodological remark concerns the scarcity of textual and archaeological evidence about markets and their economic role in ancient Egypt, not to speak of the activities and organization of traders (useful summaries in EYRE 1998 and MONROE 2009; a monumental interpretation of Egyptian Bronze Age economy and trade in Warburton 2016). Archives dealing with the everyday activities of merchants, official regulations of their activities issued by kings, dignitaries or cities, as well as archaeological remains of the places in which they operated (stockage centers, harbour areas, shops, *etc.*; compare, for instance, with MONROE 2015; ZACCAGNINI 2018; KRISTIANSEN *et al.* 2018), even of their residences, are practically absent for most of the pharaonic Bronze Age. This means that research is confronted mostly with a handful of sparse and disparate references, such as occasional mentions to markets, traders and trading activities in private letters, royal inscriptions and literary compositions (a recent example: FISCHER-ELFERT 2016), some scenes of markets and market areas in harbours, or the exceptionally rare monuments that belonged to traders (stelae, funerary equipment, *etc.*; a recent example: VALLOGGIA 2018). These limitations are particularly evident for the period under consideration in this study, when documentation became even rarer in a context of political division of the country and of crisis of its administrative institutions. Despite these difficulties, the evidence preserved provides useful ways to explore the role played by Heracleopolis Magna in the trade networks of the final Early Bronze Age.

Foreign trade and circulation of goods prior to 2160 BC

An exclusive royal affair?

The arrival of obsidian from Eritrea and the southern Red Sea into Egypt during the Neolithic is probably the tip of the iceberg of the circulation and exchange of other, perishable commodities between both areas. As it happened in later times, it is quite possible that aromatic plants, perhaps also unguents, metals, *etc.*, were part of this flow of wealth and that, at this early stage, it took place without the intervention of any centralized political power (BOIVIN/FULLER 2009; DUMITRU/HARROWER 2018). The emergence of a unified monarchy around 3100 BC, together with the gradual spread of the use of writing in the last centuries of the 4th millennium BC, have introduced a distorting effect in our comprehension of the exchanges and contacts Egypt held with its neighbors. Monumental inscriptions celebrating the highest deeds of the

kings commemorate the organization of expeditions by land and sea to distant regions in search of precious and prestigious commodities: timber from Lebanon, myrrh from the southern Red Sea, copper and malachite from Sinai, *etc.* (DIEGO ESPINEL 2017). The ideological values conveyed by such texts, together with the powerful imagery associated with them (arrival of tribute, submission of foreigners, centrality of Egypt), converged to assert that kings centralized and organized exchanges with foreign territories, leaving practically no place (in the official record) to private initiatives.

However, such ideological claims are quite probably far from reality. While it is undeniable that kings organized costly expeditions abroad in the 3rd millennium BC and that they provided the logistics indispensable to them (such as the harbors of Ayn Sukhna and Wadi el-Jarf, on the Red Sea coast, the base of Balat in the oasis of Dakhla, perhaps some community of traders in the Eastern Delta – BIETAK 2010 – , *etc.*), private actors were also present. This might explain the importance of a category of traders and guides called *miteru*, attested at Elephantine and Gebelein in southern Egypt around 2685-2500 BC (FIORE MAROCHETTI *et al.* 2003, 246-247, 256). In fact, many seals from the period 2686-2613 BC, recovered at Elephantine, reveal that control over gold was a major concern for the monarchy there, while a fragment of an inscription found in this locality also refers to “the desert which produces gold” (PÄTZNICK 2005; STRUDWICK 2005, 74). So African goods flowed then into Egypt through the mediation of specialists in trade that cannot be assimilated simply to a particular category of officials at the service exclusively of the king. The fact that women were also present in such trade suggests instead that kings used the services of specialists as mediators and that, at the same time, they taxed the wealth they brought into Egypt. This might explain why the counting of gold was occasionally celebrated in the annals of the early kings (“*fourth year: first time for counting gold*”), sometimes together with the assessment of fields (or the countryside) and also on a biannual basis (“*year 13: seventh time for counting gold and fields/countryside*” and “*year 15: eighth time for counting gold and fields/countryside*”) (JURSA/MORENO GARCÍA 2015, 142). Movable wealth and the arrival of precious items into Egypt seem to confirm that kings hardly monopolized trade contacts with other countries and that private traders were also present in these circuits. It is also possible that institutions such as provincial temples also participated in these exchanges and that the wealth they accumulated was subsequently taxed by the kings. A royal decree found at the temple of god Min at Coptos (decree Coptos C) exempted the sanctuary to pay several taxes that, otherwise, were normally delivered to the royal treasure: “*decrees had been sealed for this Upper Egypt, to the effect of the carrying out of required works for the king,*

(whether it be) in the form of every transport or every digging work which is ordered to be done in this Upper Egypt; in the control of (?) the overseer of Upper Egypt: gold, copper, decorative items/jewelry; for the requirements of the House of Life: the annual requirements of rations and animal feed, offerings, ropes and bindings, animal skins; for the 19 ⅔ aouras of land (= 5.4 ha) and the rights of plowing; for all taxes and all works which are due on water and on land, (all this) is what is ordered to be done in this Upper Egypt" (STRUDWICK 2005, 111). The fiscal demands on temples did not only include the provision of workers and selected items as well as the execution of specific tasks, but also the delivery of precious metals, thus revealing their widespread circulation outside the economic circuits controlled by the state and that they could be stocked and subsequently taxed.

As specialists in trade, the role of the caravan leaders from Elephantine appears somewhat ambiguous. In their inscriptions they boasted about their qualities of leadership and the success achieved in their commercial missions, followed by the rewards granted by the king (STRUDWICK 2005, 328-340). In the detailed account of the expeditions they led into Nubia, following different routes (by river and by land, through the route of the oasis), Herkhuf and Heqaib state that they were sent by the king. But, at the same time, Heqaib continues to tell that the king also commanded him with a mission into "the land of the Aamu (=Asiatics)", in this case probably the area around the gulf of Suez, where an official called Ankhi and his armed retinue had been murdered by the Aamu and the Sand-dwellers (=desert nomads) while they were building a boat to travel to the land of Punt, in the southern Red Sea (STRUDWICK 2005, 335). That an official from Elephantine was requested to intervene quite far from his homeland, about 650 km to the north, seems quite striking. None the less, another official, Khui, claimed in an inscription in his tomb that he had traveled several times from Elephantine to Punt and Byblos with two of his superiors (STRUDWICK 2005, 340). It appears then that the scope of action of the leaders of Elephantine was in no way limited to trading expeditions into Nubia but that it also included, indeed, contacts with the Levant (Byblos) and missions in the northern Red Sea, far beyond the area of Aswan where they usually lived. As skilled specialists in foreign trade it seems that they had their own interests, networks and contacts both in Egypt and abroad, thus making them unavoidable agents in commercial expeditions to foreign regions. For instance, archaeological finds suggest that caravan leaders from Elephantine were involved in trading activities with the Levant on a purely private basis from the 23rd century BC onwards (FORSTNER-MÜLLER/RAUE 2008). As for the inscription of Setka of Elephantine, dating to the very late 3rd millennium BC, once the monar-

chy had collapsed, he mentions his role as provider of precious African goods to the northern Heracleopolitan kingdom, that then ruled over areas of Lower and Middle Egypt. Having imported myrrh from Byblos, gold and copper from Punt, incense from Nubia (Yam) as well as precious items like ebony, ivory, and exotic animals from other locations, he shipped them off to Heracleopolis, in the north, across areas nominally controlled by the rival kingdom of Thebes (EDEL 2008, 1743-1744).

From this evidence, two consequences emerge. The first one is that the interests and the scope of action of the caravan leaders from Elephantine encompassed Nubia, Punt and Byblos or, in other words, inner Africa, the southern Red Sea (an area of contact with the northern Indian Ocean) and the coast of the Levant. As for the second one, their trading operations were conducted both in the presence and in the absence of a single ruler on the throne of Egypt, thus revealing that the role of the monarchy was not indispensable in the organization of foreign exchanges. Another aspect to consider is that the leaders of Elephantine were probably not the unique protagonists who benefited from these conditions. The temple of Min at Coptos continued to collect and store metals around 2150 BC, after the unitary monarchy had collapsed. An inscription from this locality shows that a local chief donated an astonishing quantity of precious items to the local temple. They included forty gold and copper vessels, gold and silver pieces, lapis lazuli and turquoise, thirty-six collars decorated with lapis lazuli, and substantial amounts of incense and myrrh (STRUDWICK 2005, 125). It was also in this period that Egyptian jewelry found in tombs at Aniba, in Lower Nubia (230 km south of Elephantine), indicate the profitable activities of traders or mercenaries working for Egyptians (HAFSAAS-TSAKOS 2005, 140). Even officials of modest status managed to accumulate and stock gold and copper around 2100 BC: "[I surpassed everyone who was and] who will exist therein in people, Lower Egyptian grain and emmer, gold, copper, clothing, oil, [honey], ... [cattle], goats, cargo ships and everything" (FISCHER 1968, 160). Definitively, the absence of a unified monarchy in Egypt was no impediment for the circulation and accumulation of precious metals, part of which was even donated to temples, used as a means of payment in exchange for Nubian goods and services or found in possession of private people, as it happens with the beads and amulets of gold and precious metals discovered in several cemeteries of modest people in Middle Egypt (SEIDLMAYER 1987, 176-178).

Logistics and control of trade

The arrival of goods to the Nile Valley and their circulation was possible thanks to two distinctive institutions. On the one hand, a network of productive logistics and supply centers that put at the

disposal of expeditions the means they needed (MORENO GARCÍA 2017a). On the other hand, selected localities in Egypt were defined as “gateways” and trusted to officials in control of foreign goods (usually considered as “tribute”: SOMAGLINO 2010; DIEGO ESPINEL 2015-2016; MORENO GARCÍA 2017a). The implementation of both institutions expanded considerably from 2350 BC onward and this was only possible thanks to the collaboration of local potentates. The political consequences were considerable, as such provincial leaders began to accumulate power and wealth in their own territories and to display it through costly monumental buildings (mainly decorated tombs) that had been until then reserved to the elites buried in Memphis, the capital of the kingdom (MORENO GARCÍA 2018).

The inscription of Herkhuf of Elephantine, a caravan leader that led several expeditions into Nubia about 2270 BC, shows how the network of production and supply centers founded by the crown operated: *“Orders have been brought to the governor(s) of the new localities, the companion(s) and the overseer(s) of priests to command that supplies be furnished from what is under the charge of each from every hwt belonging to a processing centre and from every temple, without doing any exemption”* (STRUDWICK 2005, 131). The role played by the *hwt* in providing the agents of the king with supplies is also exemplified by the inscriptions found at the quarries of Hatnub, which mention the equipment delivered by the local *hwt* to the teams of workers sent there, the organization of the expeditions by an overseer of *hwt*, or the close relationship between this institution and the agricultural domains of the crown, as it was also stated in the autobiography of Herkhuf just quoted (graffiti 1 and 6: ANTHERS 1928) and in a fragmentary inscription from the beginning of the 6th Dynasty. A fragmentary text from the tomb of Ibi, governor of Deir el-Gebrawi, shows that fields of considerable extension (about 50 ha) belonged to a *hwt* which, at the same time, depended on a processing center, as in Herkhuf’s inscription (STRUDWICK 2005, 364-365). A hieratic record from Elephantine, dated about 2000 BC, mentions the deliveries of cereals, dates and cattle made by a governor of a *hwt* to several dignitaries, including one envoy who arrived at Elephantine on a mission for the king, and so confirms the practical functioning of the *hwt*-system (VON PILGRIM 1996, 285-300). Finally, another early 2nd millennium BC administrative document enumerates various kinds of textile items delivered to an overseer of the seal at several places during his journey to the locality of Per-Ikhekh; he received them from a warehouse, a working centre (*hwt*) and a locality or royal centre named *Hwt-hwtj* “The *hwt* of (king) Khety” (SIMPSON 1986, 14, pl. 14). So the *hwt* appears as a crucial link in the geographical tax system implemented by the crown in the late 3rd millennium BC: they were founded in almost every province, they acted

as agricultural centers provided with fields, cattle and workers, they were also local warehouses where agricultural production was stocked and delivered to the royal agents in mission, and they formed, together with the temples, the domains of the crown and the processing installations, a network of royal centers which allowed the collection of taxes and the mobilization of the labor force of the country. In other words, the crown provided the basic logistics for the circulation of wealth across the Nile Valley (MORENO GARCÍA 2007).

As for “gateways” monitoring the entrance to the Nile Valley, pharaohs appointed officials at the “gateways” of the Nile Valley, not only at Elephantine and the borders of the Delta, but also at special sites that served as points of departure and arrival for caravans, like Thinis, Aphroditopolis, and Coptos (SOMAGLINO 2010; MORENO GARCÍA 2013, 134-136; 2017a; DIEGO ESPINEL 2015-2016). Other sources confirm the importance of commodities and valuable items arriving not only by the Nile and by sea but also through desert tracks. Several officials living in the 23rd and 22nd centuries BC bore innovative titles such as *“overseer of the production of every desert”*, *“overseer of every repast of the king that heaven gives and earth creates (and which comes) out of the production of every desert”*, *“one who reckons up the production of the deserts, marshlands and heaven”*, or *“overseer of the repast of the king who reckons up the production of the deserts, marshlands and heaven”* (MORENO GARCÍA in press). Control over foreign tribute and foreign goods thus became more visible in the titles borne by Egyptian officials in the last decades of the unified monarchy, although this activity was practically monopolized by provincial dignitaries from Elephantine and Coptos. The case of Coptos is particularly significant, as this locality was strategically situated close to the gold ores of the Eastern Desert, to a route that ran to the Western Desert and its oases through Hu, and to the route that connected the Nile Valley to the Red Sea, at a time when the port of Mersa/Wadi Gawasis was becoming an important base for trading operations with Punt. It seems that the nobles of Coptos and Elephantine (such as Herkhuf or Heqaib) managed to control the arrival of foreign goods into Egypt in the late Old Kingdom, a role that continued after the collapse of the monarchy. This can be also inferred from the geographical distribution of holders of the title *“one who places the fear of Horus [= the king] in foreign lands”*, held by nine officials in the late Old Kingdom, buried at Elephantine (five cases), the area of Coptos (two cases) and the oasis of Dakhla (two cases). As for the title *“one who brings back the produce/ornaments of foreign lands (to his lord)”* and its variants, it was held by eleven officials, two from the Memphite area, five from Elephantine and two from Coptos. Another title referred more precisely to control over “gateways” into the Nile Valley in Egypt and included several



▲ Fig. 2. Scene from a tomb of Heracleopolis Magna.

variants: “overseer of the northern gateway”, “overseer of the southern gateway”, “overseer of the narrow entrance of the southern land”, etc. (SOMAGLINO 2010; DIEGO ESPINEL 2015-2016; MORENO GARCÍA in press). Its holders during the late Old Kingdom were attested in the area of Memphis (one case), at Elephantine (two cases), Edfu (one case), Hu (one case), Deir el-Gebrawi (two cases) and Heliopolis (two cases). Their geographical distribution reveals that southern and Middle Egypt had become important centers for the control of foreign goods since 2300 BC. However, at the very end of the 3rd millennium BC, in the decades preceding the end of the unitary monarchy and slightly later, the situation changed, and it was then that the leaders of Coptos and Thebes assumed this role: Tjauti of Coptos was “one who fills the heart of the king in the doorway of Upper Egypt”, while Intef of Thebes similarly claimed to be “one who fills the heart of the king in the southern doorway” (SOMAGLINO 2010). The two localities were probably rivals for supremacy in Upper Egypt at a time when the monarchy was on the eve of collapse, as a desert inscription reveals conflicts between them for the control of a desert route leading to Hu, until Thebes finally prevailed (DARNELL 2002, 30-37).

Taking into consideration these three categories of titles, they confirm that control over desert routes, foreign goods, and “gateways” had become an increasingly important activity for officials involved in taxation at the end of the Old Kingdom and, subsequently, for provincial lords. Flows of wealth arriving from Nubia, the Red Sea (through the Coptos/Thebes area), the oases, the Western Desert and Asia (across Wadi Tumilat and Heliopolis) contributed to the strength and social and political importance of localities well placed

to monitor the circulation of foreign goods, especially Elephantine, Coptos/Thebes, and Middle Egypt (MORENO GARCÍA 2017a; 2018; in press). The importance of these trading activities cannot be underestimated. Officials from Elephantine describe proudly in their inscriptions the missions and goods traded in Nubia and the rewards granted by the pharaohs to honor their success. They brought incense, ebony, precious oil, panther and lion skins, elephant tusks, throwsticks, and other goods, including prisoners, and exported in exchange some types of oil/unguent, honey, linens, and faience vessels (STRUDWICK 2005, 328-340). As for Iny, a dignitary who led several maritime commercial missions to Byblos and other localities in the Levant, he brought back silver, lead/tin, some kind of oil and lapis lazuli, as well as Asiatic (*Aamu*) men and women, during the reigns of Pepi I, Merenre and Pepi II (around 2300 BC: MARCOLIN/DIEGO ESPINEL 2011). The administrative texts from Ebla, in northern Syria, mention in fact a foreign commercial partner, the land of Dugurasu, identified by some authors with Egypt (BIGA 2010; BIGA/ROCCATI 2012; cf. however ARCHI 2016). Dugurasu exported elephant tusks, linen, and gold and imported tin, lapis lazuli, and textiles through the mediation of a city identified with Byblos.

To conclude this section, I would like to stress three main points. The first one is the importance of trade with territories situated beyond the Nile valley, following diverse routes, through the desert, the sea (Mediterranean, Red Sea) and the Nile, an importance that continued even after the collapse of the monarchy and the division of Egypt into regional powers fighting for supremacy. Well integrated in the international sphere of exchanges of the final Early Bronze Age and the early Middle Bronze Age, Egypt was an indispensable mediator in providing gold, aromatic plants, ivory and exotic items, as well as (quite probably) textiles (WILKINSON 2014a). The second one is that the monarchy provided the basic logistical infrastructures that made possible these exchanges and the circulation of wealth across Egypt, from harbor facilities (Ayn Sukhna, Mersa Wadi/Gawasis, quite probably also in the area of Tell el-Dab’a) to stock and supply centers along the Nile. The third one is that these exchanges, and the logistical facilities that made them possible needed the collaboration of provincial actors who found there the occasion to consolidate their own power and wealth. This move had deep consequences on the balance of power not only between the royal palace and the provinces but also between the provincial centers themselves, as some of them, strategically situated as nodes of circulation of wealth (“gateways”) thrived and began to follow their own interests and political agendas, that did not depend any more on a king residing in remote Memphis (MORENO GARCÍA 2017a; 2018).

Heracleopolis Magna, a “gateway” in the late 3rd millennium BC

Under these conditions, it is not surprising that the rebellion against the central monarchy that ended with its collapse around 2160 BC began in the area of Coptos/Thebes and Elephantine, or that a new hub of trade with the Mediterranean, centered at Heracleopolis, became a major political power after the collapse of the Old Kingdom (Fig. 2). Contrary to old assumptions about the period 2160-2050 BC, marked by political fragmentation, this was not a time of chaos and misery. Quite the contrary. Towns thrived (Elephantine, Edfu, Dendera, Asyut, *etc.*). People of relatively low status displayed more wealth in their tombs (Fig. 3). A chain of trade and exchange clusters dotted the Nile Valley between Nubia and the Mediterranean (Kerma, Elephantine, Coptos/Thebes, Asyut/Beni Hasan, Heracleopolis), and in the Western margins of the Nile Delta (Kom el-Hisn, Barnugi). Asiatics and Nubians settled in Egypt and were employed as soldiers and traders by the rulers of such clusters. Cities and “citizens” rose for the first time to a prominent role. Inscriptions emphasized private accumulation of wealth. And something that could be defined very loosely as a “middle class” appeared in a context of an increasing use of seals and “contracts” (sealed documents) in private transactions (MORENO GARCÍA 2016; 2018).

Harbors, ships, fluvial trade and value-units

One of the most important innovations of the very late third and early 2nd millennium BC concerned the organization of settlements in Egypt and consisted in the sudden importance of harbors (*dmj*) and quays (*mryt*). A biographical account in the tomb of Sarenput I, governor of the caravan and harbor city of Elephantine around 1950 BC, epitomizes these changes as he evokes among his duties control over river trade, harbors, markets and foreign commodities arriving into Egypt. He was “*overseer of all tribute at the entrance of the foreign countries in the form of royal ornaments, to whom the tribute of the Medya-country was brought as contribution of the rulers of the foreign countries*”, as well as “*one who rejoices over the quay/market-place, the overseer of the great ships of the Royal Domain, who supplies the Double Treasury, the superior of the harbors in the province of Elephantine (so that) what navigates and what moors was under his authority*” (OBSOMER 1995, 482).

The importance of these statements can be measured in the light of the deep changes occurred at the very end of the 3rd millennium BC in the structure of settlement in the Nile Valley. It was then that the *hwt*-centers of the crown virtually disappeared, cities emerged for the first time as nodes of territorial organization, social identity and tax collection, and harbor areas (*dmj*) became distinctive poles of economic activity as markets



▲ Fig. 3. Private funerary stela.

and exchange centers, to the point that the term *dmj* became gradually synonym of “town, city” (*cf.* the transport of a colossal statue to “the harbor (*dmi*) of this town/city (*nwt*)”: SETHE 1935, 48). *Dmj*-cities/harbors even became a major target in the military operations that confronted the regional powers that struggled for supremacy between 2160 and 2050 BC, as it is recorded in the fragmentary biographical inscription from the tomb of Iti-ibi of Asyut (BRUNNER 1937, 18, 29). Finally, another term, *whyt* “village” appeared for the first time in some inscriptions to designate a kind of settlement whose members were bound by kinship ties (in fact, *whyt* also meant “tribe”: SPALINGER 2008, 154-164; MORENO GARCÍA 2017a, 116). Another innovation related to the emergence of cities as territorial and administrative units was that each city controlled now a *w* “district”, thus replacing in this role former *hwt* as centers of a set of villages (SETHE 1927-1930, 729: “the town (*dmj*) of Arqatu together with the villages (*dmj*) which are [in its district]”). Finally, titles and



▲ Fig. 4. Private stela of a woman.

biographical records from this period mention “governors” (*haty-a*) of specific cities. Taken together, these elements reveal that a crucial shift led to the abandonment of a state-organized network of institutional centers in favor of a more organic structure of settlements. Cities apparently assumed functions formerly performed by *hwt*, especially as collecting and supply centers (based in their harbor areas) and as nodes of rural districts under their own authorities. It is also possible that this move towards a decentralization of functions and an increasing autonomy of settlements was accompanied by some form of urban (self?-)government, judging from the title of “member of the council (*qnbt*) of the district (*w*)” dated from the early 2nd millennium BC (QUIRKE 2004, 113-114).

It is then quite probable that the development of cities (and their harbor facilities) made redundant the network of *hwt* as providers of logistical support and supplies along the Nile. That trade and cities flourished indeed *after* the collapse of the monarchy about 2160 BC reveals that the organization of trade activities within and beyond the limits of the Nile Valley was far from being a royal monopoly. In fact, it was then, precisely, when no unified monarchy ruled over Egypt, that city size increased dramatically: Edfu expanded from 8 to 15 ha; a large residential “middle class” neighborhood was built at Dendera and a new neighborhood was also erected at Elephantine. “Middle class” residences provided with storage facilities are also found at Abydos; the relatively small quantities of seals recovered there and the lack of repeated seal designs suggest that they do not represent institutionally connected administrative activities, rather

administration of lower-level household order. Finally, cities thrived in Middle Egypt (Asyut and Bersheh) as well as in the Western Delta (Barnugi, Kom el-Hisn, Abu Ghalib), in this case linked to the trade route that communicated the Mediterranean to Middle Egypt through the western branch of the Nile (BAGH 2002; 2004; MOELLER 2016, 219-248; MORENO GARCÍA 2017a, 113).

Trade, economic prosperity and emergence of cities seem to go hand by hand. At the same time, this was a period in which cities became ideologically relevant as source of legitimization and identity, in the absence of a single monarchy. Thus, the approval of the actions of an official by his city arose as a popular expression in many inscriptions (“one beloved by his city”). Protecting one’s town or enriching it was also a popular motif, and similar epithets remained widely used later in the inscriptions of the elite, especially in the provinces. Even ritual texts from the early 2nd millennium BC incorporated the new role of cities in their descriptions of the household of a deceased, now including his/her relatives and immediate social network as well as *nwtjw* and *dmjw* “fellow-citizens” (lit. people from the *nwt/dmj*-city). City audiences became thus significant for ideological and legitimacy purposes in the early 2nd millennium BC and, in some passages from the *Teaching for Merykara*, demagogues and agitators disturbed the peace of cities through their speeches and swept urban dwellers into rebellion. New terms appeared then like “man-of-the-city” (citizen?) and “living-one-of-the-city” (officer of the city troops), that also point to the growing importance of towns and townsmen as providers of military support to provincial leaders. In fact, it is quite probable that the use of city troops during the troubled times which followed the Old Kingdom implied some kind of recognition towards (and approval of?) urban dwellers, specially in the inscriptions from Hatnub, Siut, *etc.* (MORENO GARCÍA 2011) In this context, economic autonomy and personal initiative became highly priced values, as in the motif of the autonomous individual (*nedjes* “the modest/humble one”), able to earn for his living, to build up a personal patrimony by his own actions, and to transfer it to his descendants, without any royal intervention. That these statements were not purely rhetorical can be inferred from the fact that small gold objects begin to appear in the burials of people of relatively modest condition that, apparently, did not work for the state (MORENO GARCÍA 2016; 2017a; 2018). This was also a period in which archaeology reveals the emergence of a sort of “middle class” of wealthy individuals who displayed their prosperity in their funerary offerings, monuments and dwellings, as if they had obtained their wealth outside the circuits of rewards and remunerations granted by the king and traditionally restricted to officials (RICHARDS 2005; VERMEULEN 2016; MAZÉ 2017). Women also participated in this move (Fig. 4). The new ti-

tle “mistress of the house” designated an adult, independent woman, able to manage the economics of a household – with, or without a male owner, or to be enrolled in some other business enterprise. In fact, the analysis of female seals found in Middle Egypt reveals traces of wear and usage which show that they were not made exclusively for funerary purposes. Seals and sealing became routinely evoked in everyday transactions and contracts between particulars, such as land and houses purchases, hiring specialized priests, *etc.*, and the echoes of this practice can be also found in ritual texts from this period. Thus sealing practices became much more frequent in the *Coffin Texts* (from the very late 3rd millennium BC on) than in the earlier *Pyramid Texts* (Fig. 5). The extent of sealing and the use of sealed documents point to a greater scope of transactions and economic initiative in which formal agreement and authentication were required (MORENO GARCÍA 2016).

In this more decentralized context, an important question emerges: were the *hwt* the nodes from which, at least, some cities emerge? “The-*hwt*-at-the-crossroad-of-Khety” (Khety being a royal name) was a locality in the vicinity of Tell el-Daba, in the Eastern Delta, and it seems plausible that a *hwt* founded by a king at this important strategic area led finally to the consolidation of a city that became one of the major trade hubs of the Eastern Mediterranean in the Middle Bronze Age (GOEDICKE 2002). An early Middle Kingdom administrative document enumerates the various kinds of textile items delivered to an overseer of the seal during his journey to the locality of Per-Ikhekh; he received them from a warehouse, a working centre and a locality or royal centre named “The-*hwt*-of-(king) Khety” (SIMPSON 1986, 14, pl. 14). The names of other Egyptian cities were formed with the element *hwt*, so it seems plausible that some of them developed from an original royal foundation. In any case, if 3rd millennium BC formulaic expressions included the couple *hwt/nwt*, now, from the beginning of the 2nd millennium on, “juridical” expressions composed with the formula “in the city and in the countryside” intended to evoke all the possessions of an individual. Later on, from 1550 onward, formulaic expressions refer to *dmj*, *nwt* and *whyt*-villages as the three main types of settlement in Egypt.

Two final considerations concern ships and exchange-values. The emergence of *dmj* (originally, the designation of the harbor area of a settlement) in the late 3rd millennium BC might be linked to a new rhetorical motif present in many inscriptions from 2200 BC on. According to this motif, individuals boast about having acquired many boats/ships among other sources of wealth (mostly fields, servants and cattle). Ships and boats had always been a mark of status and wealth in the biographical inscriptions of the 3rd millennium BC, usually in expressions like “I made a boat for him who did



▲ Fig. 5. Private seal.

not have a boat” (for example, in STRUDWICK 2005, 291, 300, 302). But towards the end of the millennium privately owned ships were part of the riches accumulated by individuals thanks to their own initiative and work (Fig. 6). One of the earliest examples appears in the inscription of Djadjay from Qasr el-Sayed, in Upper Egypt (c. 2200 BC): “I made twenty boats while doing what the people of my city wanted; I made a *zehyt*-boat with provisions on it” (STRUDWICK 2005, 350). Many other examples might be cited, but one of the most interesting, also from a locality in Upper Egypt (Dendera) mentions the construction and acquisition of boats in a context of transport and delivery of grain: (1) “I gave grain to Dendera to its full extent and its entirety during 56 years, 400 sacks of grain every year regularly (?) at the time of hostility with Abydos. I have constructed [many/big] *mehaw*-boats for [...], every *mehaw*-boat with 46 oars. I made 12 great boats and 8 small boats. I gave bread to the one who came

▼ Fig. 6. Model boat from Sedment.



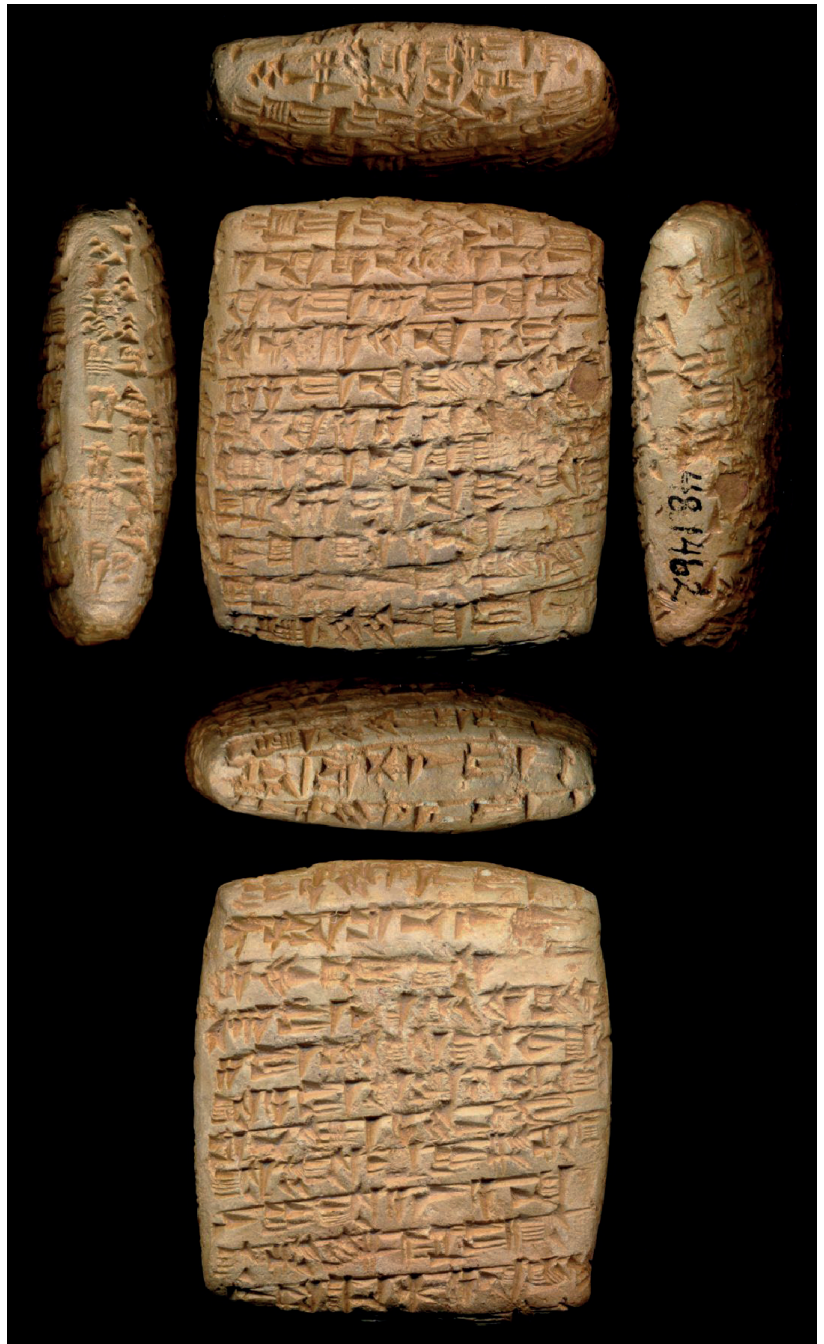
hungry, beer to the one who came thirsty, sandals to the one who came barefoot (?)" (ABDALLA 1993). (2) Nakhtu from Dendera acquired, among other goods, "four im-boats and 5 boats" (FISCHER 1968, 147, 158), while (3) Qedes from Gebelein stated that "I made a boat of 30 (cubits and) a small boat which ferried him who had no boat across during the season of the inundation" (FISCHER 1961, 44-56). (4) As for Iti of Gebelein, he claimed "I made a boat of 50 (cubits) and another boat of 30 (cubits). I gave Upper Egyptian barley to (the localities of) Iuni and Hefat after (the locality of) Imyotru has been nourished, while the Theban province [fared north] and south. I never let Imyotru fare north and south to another province" (LANDGRÁFOVÁ 2011, 69-70). Also from Gebelein, (5) Djemi said that "I built a boat of 50 cubits" (GOEDICKE 1960, 288-291). (6) Treasurer Tjeti said "I constructed a mehaw-boat for the city, a zehyt-boat for every procession: the counting with the great ones and every occasion of leading or dispatching" (LANDGRÁFOVÁ 2011, 12). (7) Heqaib similarly said "I provided this whole city with Upper Egyptian corn for (many) years in order to dispell from it the needs. I gave bread to the hungry and clothes to the naked. I made the great ones famous, I enabled the small ones to live easily, I gave a loan of corn to Upper Egypt and Upper Egyptian corn to Lower Egypt. I gave merehet-oil to El-Kab after my city had been satisfied. I made a boat of 40 and a barge to transport cattle and to ferry the boatless in the inundation season. I appointed a herdsman for 200 cattle and another for the goats and for the donkeys. My people were more numerous and my ships (?) greater than (those of) any of my peers" (POLOTSKY 1930, 194-199). (8) Finally, a passage from the inscription of Ankhtifi of Moalla says as follows: "the south came with its people and the north with its children; they brought finest oil in exchange for the barley which was given to them. My barley went upstream until it reached Lower Nubia and downstream until it reached the province of Abydos. All of Upper Egypt was dying of hunger and people were eating their children, but I did not allow anybody to die of hunger in this province" (SEIDLMAYER 2000, 118). From these examples several questions arise. The first one is that officials owned the ships/boats for practical, not pleasure purposes, mainly for transporting cattle and grain and for accounting. The second point is that a common rhetorical motif in the late 3rd millennium BC depicted prosperous cities and provinces surrounded by starving neighbors, but it may be significant that some of these inscriptions, again, link the supply of foodstuff over considerable distances with the use of ships for transport. Meager as this evidence seems, fluvial transport and private possession of ships became significant in a period in which *dmj*-harbors appeared for the first time as conspicuous features of the landscape and when individuals transported goods and food on their own initiative. Slightly later administrative documents continue to record transport ships being loaded at

specific quays ("*his* quay"), provided in some cases with storing facilities. Letter I, v° 3, from the archive of Heqanakhte, mentions "the *imu*-barge is moored at *your* harbor (*dmj*)" (ALLEN 2002, 16). Similarly, papyrus Reisner II, D (WENTE 1990, 43) records the instructions given by a vizier to several stewards residing at Thinis. Each one should stay "in *his* quay (*dmj*)", prepared to load "the choicest of your stores" on the bank (*mryt*). In papyrus London UC 32201, an administrator sent to the royal Residence a transport *imu*-ship loaded with grain (part thereof being reserved as wages) "that I found at the quay (*dmj*) of (the locality of) Hutnebes" (COLLIER/QUIRKE 2002, 105), while papyrus London UC 32205 mentions the arrival of a boat loaded with 500 gutted fish that were counted at the quay of (the locality of) Per-kheny (COLLIER/QUIRKE 2002, 121).

As for "prices" and exchange values, a new title appeared around the very beginning of the 2nd millennium BC, "overseer of (exchange-)value" (QUIRKE 2004, 68-69), at the same time that the term *sh(en)at*, that designated a unit of value. As Quirke has stated, presumably all commodity transactions required knowledge of relative value in the exchange system, and this title indicates that volume of trade at the palace necessitated an official with this primary duty. Some practical illustrations about how the system operated can be found, for instance, in the correspondence of Heqanakhte (ALLEN 2002, 155), when the prepayment of a new lease was to be settled in oil, copper, cloth, or barley. Since dissimilar commodities were being exchanged, the relative value (*sh(en)at*) of the payment with respect to the land had to be established as part of the agreement (letters I 5-6, II v° 3). The process required the lessee to "collect the value (*shenat*)" of the commodity (letters I 4-5, II v° 3). As Allen has stressed, this kind of valuation was probably done with reference to a commonly accepted standard of equivalences, but letter III shows that one party – in this case, the lessor – could also set the rate of exchange (III 8-v° 1). In some cases the process of valuation may have involved an actual exchange of commodities for some standard medium of "value" (letter I 4-5: "if, however, they will have collected the equivalent value (*shat*) of (lit. value in exchange for) that emmer that is in Perhaa"; letter II v° 3: "but only when you will have collected the value of oil or of anything (else) there"). The nature of this medium is not specified, but it could be copper according to the instructions given by Heqanakht to send "24 copper *deben* for the lease of land" (letter II). However, the metal may have constituted only a portion of the projected payment, with the remainder to be made up from the valuation of "oil or of anything (else)" supplemented if necessary "by cloth, by full barley, [by] anything]" that had been similarly valued (letter II v° 2-3). Administrative documents from Ilahun provide further

examples. Papyrus London UC 32142B records deliveries of fish to the royal Residence and a list of exchange-units (*shenat*), amounting to 20 in each case (COLLIER/QUIRKE 2006, 172-175). As for papyrus London UC 32108B, also in a very fragmentary condition, it seems to be a ship-log recording sailing to and landing at several *dmj*, the amount of goods collected (?), partly referring to grain, the supplies given to the crews and the expression “converted into exchange-units (*shenat*)” (COLLIER/QUIRKE 2006, 208-211).

The expanded use of exchange values like *shenat* at the very beginning of the 2nd millennium BC was not an isolated case, as wages, rations and labor were also expressed in abstract units. Papyrus Reisner I, for instance, reveals that loaves of a specific kind of bread (*terseset*) were used as units of value in order to remunerate the men employed in building projects. Other sources, such as the inscription 61 at Wadi Hammamat, show the use of ration-scales organized according to multipliers (unskilled workers earned half the rations delivered to craftsmen and five times less than treasurers). The differential multipliers marked the importance of the tasks entrusted to a particular group of officials or workers. It seems then that these figures represent, not the quantities of bread and beer actually consumed by the respective member of the expedition, merely the value of the compensation to which he was entitled and which he received in the form of various commodities including, but not restricted to, bread and beer (MUELLER 1975, 259; EZZAMEL 2012, 287-300). Furthermore, Warburton has proposed that the Egyptian word *menu/menet*, first introduced in the early 2nd millennium, derives from the Mesopotamian *mina* (Sumerian *MA.NA*, Akkadian *manûm*), a unit of about 500 g used in Mesopotamia to weigh wool distributed on fixed ratios according to the status of the recipients. In Egypt it came to mean “fixed amount” or “share” and corresponded to the basic wages on which the Egyptian system of compensation rested. In both regions, it was a basic measure used to estimate the value of a certain quantity and quality of labor in terms of a certain quantity of a good (WARBURTON 2018, 63-65). In the case of Mesopotamia, Warburton links this innovation with the massive development of textile industry in the late 3rd millennium BC (WARBURTON 2018, 65-66). His opinion may be supported by the fact that textiles suddenly took an enormous importance in Egypt from the very late 3rd millennium and the early 2nd millennium BC, precisely when *menu/menet* appeared. A dish from Elephantine inscribed with accounts lists standard quantities of grain (50 *heqat* in most cases, or 119.5 liters) delivered to women designated as “weavers” and “carrier” (?); in another list, boys and girls (with no particular “professional” designation) received 3 and 6 *heqat*, irrespective of their sex



(VON PILGRIM 1996, 294-300). The archives from Kanesh/Kültepe, from the early 2nd millennium BC, describe the complex trading networks that supplied Anatolia with Assyrian textiles in exchange for metals (silver, copper) (Fig. 7). In fact, there are possible traces of trade contacts between Anatolia and Egypt in this period, not only because the networks of the Assyrian traders in Anatolia arrived to the Southern Levant, but also because Egyptian (or Egyptian inspired) textiles arrived into Anatolia. Recent evidence also confirms contacts with Syria, as seals of Syrian style dating from about 1800 BC have been recovered at Tell el-Dab'a and wall paintings from Ebla show similarities with motifs found in the ceiling decoration of some tombs of Middle

▲ Fig. 7. Cuneiform tablet from the archive of Kanesh/Kültepe.



▲ Fig. 8. Textile workshop.

Egypt (Hapidjefa of Asyut and Wahka II of Qaw; MORENO GARCÍA 2017a, 115). Middle Egypt elite tombs also provide evidence for international trade in textiles, as foreign textile patterns inspired the decoration of the ceilings of their tombs and of other parts of their monuments, especially in the case of Aegen motifs present in the tombs of Hapidjefa of Asyut, Ukhhotep of Meir and Wahka II of Qaw (KAHL 2016; MORENO GARCÍA 2017a, 115; parallels in other regions of the Near East: WILKINSON 2014a, 225-288; 2014b; BRENQUET 2017).

Finally, the importance of textiles and textile production also explains why new scenes dealing with textile production were incorporated for the first time in the tombs of some Middle Kingdom potentates, especially activities such as spinning, weaving and dyeing. Furthermore, small wood models representing textile workshops have been also found in Middle Egypt (Bersheh, Beni Hasan, Rifeh), Thebes and Saqqara (Fig. 8). In all cases, the figures are exclusively feminine and only women are shown making linen cloth on horizontal looms until 1550 BC (MORENO GARCÍA 2017a, 120). Thus textile production and textile imports became important economic activities in Middle Egypt, to the point of leaving their mark on local fashion. As in other regions of the Near East, textiles became a commodity that fueled international trade and in which Egypt was also involved. Such trading operations provide another clue for the interest of Middle Egypt elites in the Levant, as well as for the diffusion in Egypt of a kind of flat female figurines quite similar to others found then across the main trade routes of the Near and Middle East. At a time in which “contracts” (sealed documents) and seals became common in private transactions, and when women led their own business, textiles may have been exported to the Near East, contributed to fuel trade and exchanges along the Nile and stimulated the development of harbor facilities (MORENO GARCÍA 2017b).

Heracleopolis Magna, an emerging trade hub in a period of changes (2160-2050 BC)

Antef son of Tjefi was an official at the service of Montuhotep II, the king who reunified Egypt around 2050 BC. Among his duties, he was “*overseer of the fortress/work center of the great gateway of the south*” and he claimed too that “*my lord had placed me in the province of Heracleopolis as [overseer of the fortress/work center?] in it and Great Leader on behalf of the king himself, treasure-house of earliest time by gift of the king*” (LANDGRÁFOVÁ 2011, 50). These titles raise two main questions, the existence of a fortress/work-center at Heracleopolis and the fact that this locality was also a “gateway of the south”, a designation that points to its role as a sort of control center for traffic arriving into the Nile Valley from abroad. In fact, both questions are closely linked together.

As for the local presence of a fortress/work center to monitor the movement of peoples and, quite probably, provided with foreigners settled there as workers and soldiers, there is abundant evidence about this role from previous and later centuries. Shedu of Deshasha, in the Fayum area, who lived around 2330 BC, was an “overseer of all fresh vegetation” (a title related to control over pasture land) and “overseer of police” (the term “police” is exceptionally followed by the determinative of the foreign country, thus suggesting that his activities were oriented towards the desert). Quite intriguingly, another official buried at the same necropolis, Inti, was “overseer of royal fortresses” around 2400 BC and his tomb contains one of the extremely rare Old Kingdom depictions of an Egyptian attack on a fortified locality, probably Asiatic judging by the appearance of its inhabitants (MORENO GARCÍA 2015b, 78-79). If his duty consisted of controlling local fortresses (or perhaps more probably watch-towers, as the term “fortress” was sometimes followed by the determinative of the tower in the 3rd millennium BC), this begs the question of where the menaces or the populations to monitor were expected to come from, and the most plausible answer is the Western Desert or from Fayum itself, if pastoral populations settled in enclosures there. In fact, the papyri from Ilahun, in the Fayum area (late 19-early 18th century BC), record Asiatics coming from enclosure-like settlements (called *wenet*) situated in its vicinity (MORENO GARCÍA 2015b, 90). Similarly, a Semitic term (*sgr*) served to designate an enclosure or fortification in the area of Wadi Tumilat (as it appears in papyrus Anastasi V 19, 7) (HOCH 1994, 270-271, n° 385; MORRIS 2005, 422, 823; BIETAK 2015, 21). But the Wilbour papyrus (around 1145 BC) mentions seven *sgr* in the area between Fayum and northern Middle Egypt (one of them was situated near Heracleopolis: GARDINER 1948, 35), while inscriptions from Heracleopolis dating to the early 1st millennium BC mention the local presence of a “great fortress of the Mashauesh” (an example:

PÉREZ-DIE/VERNUS 1992, 42, 44-45). At the same time, foreigners and prisoners of war were settled as warriors in military colonies, as an inscription of Ramesses III (1184-1153 BC) describes in detail: (when he) “*plundered the foreign countries of [Teme-hu], Libu and Meshue<sh>, it was in such a manner that he caused them to cross the rivers, with the result that they were brought to Egypt. They were established as stronghold-garrisons for the victorious king. They learnt the Egyptian language while serving the king. He suppressed their language, and turned over their tongues*” [...] *They were made shield-bearers, chariot-drivers, attendants, fan-bearers in the service of the king*” (KITCHEN 2008, 69-71). The epigraphic record of the late 3rd millennium BC confirms the importance of Asiatic traders and warriors in the kingdom, as several Heracleopolitan officials bore the title of “overseer of the troop of Asiatics (*Aamu*)” (MORENO GARCÍA 2017a, 102-103). In this vein, the importance of trading activities in the Heracleopolitan kingdom may explain why many late 3rd millennium BC burials at Kom el-Hisn display Levantine weapons typical of contemporary “warrior tombs” in the Levant (WENKE *et al.* 2016, 348-350; these weapons were in fact markers of adult masculinity, status and wealth, and were associated with traders and mobile populations: WENGROW 2009; GERNEZ 2011; KLETTER/LEVI 2016). Similar weapons have been also discovered in areas under Heracleopolitan control, like Sheikh Farag (in the Fayum), Helwan and, perhaps, Abydos. Later on, when Thebes conquered the Heracleopolitan kingdom, officials were appointed to monitor the traffic and peoples circulating across Heracleopolis. Antef son of Tjefi was but one of them. Another one was Ip, who became overseer of two provinces of Upper Egypt where Heracleopolis was located and who was buried just across the river, at El-Saff; furthermore, he was overseer of the army, overseer of the Western Desert, overseer of vegetation and marshland and overseer of “*Hwt-of-the-cow*” as well, the locality that served as check-point in the Western Delta for the populations arriving from the west (MORENO GARCÍA 2015b, 79).

So, the justification for the presence of fortresses, check-points and foreigners at Heracleopolis after the collapse of the Memphite monarchy around 2160 BC probably derives from its strategic location, at a crossroads well connected to the Mediterranean, the deserts, the south and Nubia, thus justifying its consideration as a “great gateway of the south.” More precisely, its prosperity and increasing political importance was linked to the development of a western axis of trade that passed through the Western Delta and localities such as Barnugi (an important center of production of natron) and Kom el-Hisn (a sort of check point for peoples from Libya) (MORENO GARCÍA 2015b; 2017a, 103, 113). Myrrh and aromatic plants appear as paramount commodities in this traffic, to the point that Heracleopolitan kings created a specific ad-

ministrative department dealing with this aromatic plant: a dignitary buried at Heracleopolis held the title of “great of the department of myrrh” while another one, Hetepwadjet, was “measurer of the department of unguents” (WILLEMS 2007, 95). Lapis lazuli, gold, turquoise and semi-precious stones discovered in tombs from Barnugi, a settlement that flourished then in the Western Delta, reveal that the Heracleopolitan kingdom was well integrated in the international economic circuits of this period and their flows of wealth. It is possible that copper arriving from Anatolia and the Aegean played also an important role in these exchanges, as contacts between Egypt and Crete developed then and the analysis of sediments in Alexandria has revealed metal imports from Anatolia, Cyprus and the Aegean into the Western Delta during the 3rd millennium BC, in sharp contrast with the Eastern Delta, which imported copper from the Levant (VÉRON *et al.* 2013). The decline of the copper route linking former producing areas in the southern Levant to Egypt, at the end of the 3rd millennium BC (FINKELSTEIN *et al.* 2018), may also explain why many settlements disappeared along the eastern branch of the Nile, in Lower Egypt, in contrast with the prosperity visible in the Western Delta and with the expansion of cities in southern and Middle Egypt. It was from this period that Cyprus became the main supplier of copper for Egypt and the Levant and, considering the conditions of navigation of the Eastern Mediterranean, direct contacts would have been easier from the Aegean to the Western Delta. The inscription of Setka of Elephantine mentions his role as provider of precious African goods to the Heracleopolitan kingdom, as he brought there myrrh from Byblos, gold and copper from Punt, incense from Nubia (Yam) as well as precious items like ebony, ivory and exotic animals from other locations. Then, he shipped them off to Heracleopolis, in the north (EDEL 2008, 1743-1744). A Nubian graffito from around 1938 BC reveals that a group of people from the same household, which included two women from the Western Delta (one from Kom el-Hisn and the other from Sais), left its traces at Wadi Korosko, an important route leading to some gold fields in the Eastern Desert. The men are described as *khenemes*, a term usually translated as “friends” and that does not refer necessarily to soldiers. In fact, neither the leader of the group nor its individual members bear any title at all, be it military or “civil”. The presence of women in the group further reinforces the idea that it comprised only “civilians”, perhaps involved in logistical activities for a royal expedition and/or in trading activities (ŽÁBA 1974, inscriptions n° 27-28, *cf.* also n° 9). Control over goods circulating through the oases of the Western Desert (an alternative route to the Nile) may also explain the presence there of officials whose names were composed with Khety (usual among the Heracleopolitan kings) and that maintained close links with Middle Egypt (BAUD *et al.*

1999, 5-6, 11-12). A scarab found at Heracleopolis, dated from the 13th dynasty, mentions the hall-keeper of the treasury Hotep-Igay, a name formed with the rare desert god Igay (PÉREZ-DIE/VERNUS 1992, 33-34, fig. 15), whereas other names from this locality also include the element "Khety": Khety (LÓPEZ 1975, 61, fig. 12; PRESEDO 1979, 525, fig. 1; PÉREZ-DIE/VERNUS 1992, 33, 80, fig. 6), Khety-wah (LÓPEZ 1975, 61, fig. 13). Another clue about these contacts with the routes of the desert consists in the representation of Nubian soldiers in tombs of Asyut, a locality in Middle Egypt that supported Heracleopolis and that was the arriving point of routes from Nubia through the Western Desert. Finally, the involvement of Heracleopolitan kings in trade with the Eastern Mediterranean probably underlie the foundation of a *hwt*-center bearing the name of a king Khety in the north-eastern Delta, in what would later become Tell el-Dab'a. Their presence is also attested at Heliopolis (ABD EL-GELIL *et al.* 1996), a traditional gateway into Lower Egypt through Wadi Tumilat used by Asiatic populations (the name of an official in charge of this area was also composed with Khety: SOMAGLINO 2015-2016).

Conclusion

Heracleopolis Magna, situated at a crossroads in the Fayum area, played a crucial political and economic role in the late 3rd millennium BC, when it became the center of a regional kingdom, in northern Egypt, once the monarchy that had ruled Egypt for a thousand years collapsed. The reasons underlying its rise to such a prominent position still remain obscure, but epigraphic and archaeological evidence suggests that Heracleopolis exerted some control over foreign trade and the arrival of precious goods into the Nile Valley through the Western Delta, the oases of the Western Desert, Middle Egypt and Nubia. This could explain why Heracleopolis was closely linked, in the late 3rd millennium BC, to localities and regions in these areas that were actively involved in international exchanges, Elephantine and Middle Egypt (Asyut, Bersheh, Beni Hasan) being the most prominent of them. In a context of expanding trade routes across the Eastern Mediterranean and the Near and Middle East, it seems that Heracleopolis played a pivotal role as trading intermediary with the Aegean and Anatolia (source of copper and textiles) as well as with Nubia and the southern Red Sea (from which aromatic plants and exotic items were exported to Heracleopolis). The vitality of this axis of exchanges could also explain why some localities flourished in the Western Delta (Kom el-Hisn, Barnugi) and why Nubians and Asiatics were present in the Heracleopolitan kingdom as soldiers and traders, probably playing some political role as supporters of local leaders in Middle Egypt judging from some

inscriptions from Hatnub and Beni Hasan from the turn of the 3rd to the 2nd millennium BC. In the end, the rise of Heracleopolis was the consequence of deep changes in the balance of power between regions and central authority in Egypt driven by the intensification of trading activities across Eurasia and the northern Indian Ocean in the Early and Middle Bronze Age.

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Address of the author

Juan Carlos Moreno García
CNRS (UMR 8167)
Centre de Recherches Égyptologiques de la Sorbonne - CRES
Sorbonne Université
1 rue Victor Cousin
75230 Paris Cedex 05
France

jcmorenogarcia@hotmail.com

Reference links Fig. 2-8

- Fig. 2: [https://commons.wikimedia.org/wiki/File:Relieve_tumba_Satbahetep_\(M.A.N._Inv.1976-114-A-2080\)_02.jpg](https://commons.wikimedia.org/wiki/File:Relieve_tumba_Satbahetep_(M.A.N._Inv.1976-114-A-2080)_02.jpg)
- Fig. 3: https://commons.wikimedia.org/wiki/File:Funerary_Stela_of_the_Royal_Sealer_Indi_and_His_Wife,_the_Priestess_of_Hathor_Mutmuti_of_Thinis_MET_25.2.3_02.jpg
- Fig. 4: https://commons.wikimedia.org/wiki/File:Egyptian_-_Woman_with_Lotus_-_Walters_2285.jpg
- Fig. 5: https://commons.wikimedia.org/wiki/File:Pyramid-Shaped_Stamp_Seal_Inscribed_With_A_Labyrinth_Design_MET_26.7.42Impression.jpg
- Fig. 6: https://commons.wikimedia.org/wiki/File:Model_boat,_Sedment_el-Gebel,_Egypt,_First_Intermediate_Period,_Dynasty_9,_c._2200_BC,_wood,_gesso,_linen,_pigment_-_Oriental_Institute_Museum,_University_of_Chicago_-_DSC07818.JPG
- Fig. 7: https://commons.wikimedia.org/wiki/File:Itur-ili_-_Business_Letter_-_Walters_481462_-_View_A.jpg
- Fig. 8: https://commons.wikimedia.org/wiki/File:Meketre,_maquette.jpg

Marketplaces in Syro-Mesopotamia in the second millennium BC in the light of new archaeological research

by ADELHEID OTTO

Marketplace, market street, shop, balance weights, capacity measurements, Syro-Mesopotamia, Bronze Age

There have been general doubts, if the concept of a market, market trade, and a marketplace existed in the Ancient Near East. However, cuneiform texts testify that a mahīru(m) existed, which designates commercial activities, the rate, and also an open urban space. The kāru(m) and the sūqu(m) are also clearly defined areas where trade and retail trade took place, the latter one being a street of merchandise. From the texts it appears that markets were regulated and controlled by supervisors, that shops and market houses were associated to the markets, and that these were sometimes situated near a city gate. Only a part of the market trade took place on the marketplaces or streets, other economic processes took place in houses, since the merchant's home was his trading office.

Archaeologically attested examples for a marketplace are rare mainly because few settlement have been excavated on a large scale. This article presents examples of marketplaces in the Syro-Mesopotamian region from the 2nd millennium BC. The investigated marketplaces at Ugarit, Munbaqa/Ekalte, Tall Tuqan and Tall Bazi have certain features in common: they consist of an open space near a city gate, which guarantees good accessibility, or inside domestic areas and vary between 440 and 1200 m². The places are bordered by rooms which served as shops, workshops or store rooms. Also the marketplace itself could be partly covered with shop-like structures, marketstalls, benches and bread ovens. Market activities took also place inside the settlements on and along broad streets. Some of the rooms adjacent to and accessible from the street were shops or offices. Standardized capacity measurements and balance weights are good indicators of market activities.

Marktplätze in Syro-Mesopotamien im 2. Jahrtausend v. Chr.

Marktplatz, Marktstraße, Gewichte, Hohlmaße, Syro-Mesopotamien, Bronzezeit

Es wurde grundsätzlich angezweifelt, ob das Konzept des Marktes, Markthandel und ein Marktplatz im Alten Orient existierten. Allerdings geht aus Keilschrifttexten klar hervor, dass ein mahīru(m) existierte, was Markt im Sinne von Handelsaktivitäten, Tauschkurs und ebenso Marktplatz bedeutet. Zudem sind kāru(m) und sūqu(m) – letzterer eine Straße – klar definierte Bereiche, auf denen Handel und Kleinhandel stattfand. Die Texte lassen darauf schließen, dass Märkte durch Aufseher reguliert und kontrolliert wurden, dass Läden und Markthäuser den Märkten angegliedert waren und dass Märkte bisweilen nahe einem Stadttor lagen. Allerdings wurde nur ein Teil des Handels auf Marktplätzen oder Straßen abgewickelt, manche Handelstätigkeiten fanden in den Häusern statt, da das Haus des Kaufmanns zugleich sein Handelskontor war.

Dass dennoch die Existenz von Marktplätzen bezweifelt wurde, liegt an den angeblich mangelnden archäologischen Belegen dafür. Dies ist darauf zurückzuführen, dass nur wenige Siedlungen großflächig ausgegraben wurden. Hier werden eindeutige Nachweise für Marktplätze in Syro-Mesopotamien im 2. Jahrtausend v. Chr. vorgestellt. Die Marktplätze aus Ugarit, Munbaqa/Ekalte, Tall Tuqan und Tall Bazi teilen bestimmte Eigenschaften: Sie bestehen aus einem offenen Platz nahe einem Stadttor – ideal für leichte Zugänglichkeit – oder inmitten von Wohngebieten und variieren zwischen 440 und 1200 m². Entlang der Plätze liegen bisweilen einzelne Räume, die als Läden, Werkstätten oder Magazine dienten. Auch der Marktplatz selbst konnte teilweise mit ladenartigen Strukturen, Marktbuden, Bänken, Brotöfen und anderen Installationen ausgestattet sein. Markthandel wurde auch auf und entlang von breiten Straßen innerhalb der Siedlungen betrieben. Einige der Räume, die an der Straße lagen und von dieser direkt zugänglich waren, waren Läden oder Marktbüros. Gute Indizien für Marktwesen sind standardisierte Hohlmaße und Gewichtssteine.

Trade and exchange has been one of the main reasons Near Eastern societies flourished for millennia. Sophisticated exchange practices and long-distance trade can be traced back to the Pre-Pottery Neolithic period, appr. 9000 BC. And already in the 3rd millennium BC a full range of economic tools and methods – weights and measures, merchants and market practices – can be observed due to abundant archaeological and written sources (CHARPIN *et al.* 2004).

This paper investigates whether markets and marketplaces existed in Mesopotamia and Syria in the 2nd millennium BC. A complete and exhaustive study of this much discussed topic is certainly impossible in a few pages. The aim of this study is to relate the information from the cuneiform texts and the archaeological record, and to search for possible market spaces in the Ancient Near East – an obvious question, which however has never been systematically explored. Therefore I will limit this contribution to a number of case studies, hoping that they may spur further research on this fascinating issue. After an overview of the information from the Mesopotamian cuneiform sources I will discuss some examples of possible „places for market“ in the archaeological record.

The area under consideration for the archaeological evidence spans from the Syrian Mediterranean coast beyond the Euphrates valley, that is Syria and

Northern Mesopotamia proper; the relevant cuneiform texts cover a slightly larger area including also Babylonia (Fig. 1).

1. General doubts about the existence of a marketplace in the Ancient Near East

There have been general doubts if the concept of a market, market trade, and a marketplace existed in the Ancient Near East. Max WEBER (1922) claimed that Near Eastern cities were no community of citizens and had no market, and that cities were royal strongholds, where the kings owned the market privileges. When Max Weber developed his ideas in the early 1920s, ancient Near Eastern cities with urban structures were not well known, since the earliest large-scale excavations of cities with official and private sectors including housing areas and a road network, the capitals Babylon and Assur, were only published a few years later. The then known Assyrian capital cities Nimrud, Niniveh and Khorsabad gave the false impression that ancient Near Eastern cities consisted of huge, splendidly equipped palaces occupied by the despotic rulers, but were surrounded by a walled empty space, where the army and the slavlike population was to live in encampments (LIVERANI 2000, 87-89).

▼ Fig. 1. Map of the Ancient Near East in the 2nd millennium BC. Places with evidence for markets are underlined (map: C. Fink).



Strangely, this idea was maintained especially among sociologists for a long time. Karl Polanyi wrote still in 1957, when many settlements with a complete range of urban structures had already been excavated and published: „Markets were the rock bottom on which rested with axiomatic assurance the determination of forms of trade, money uses, prices, commercial transactions, profit and loss accounts, insolvency, partnership, in short, the essentials of business life... Babylonia, as a matter of fact, possessed neither market places nor a functioning market system of any description“ (POLANYI 1957, 16). A. L. OPPENHEIM (1967, 17) saw this in a more differentiated way, but was also puzzled by the apparent absence of marketplace: „No agora, forum, market place or city hall provides the city dwellers with a meeting place for an assembly, for litigations, for civic spectacles or whatever purpose“. This quote reveals the main cause for the general doubts of many scholars: the Greek and Roman market was deemed THE model of an ancient market. Yet another reason for the frequent doubts about markets in the Near East lay in the sources. Since most economic texts derived from palace archives and therefore have a very one-dimensional perspective, it was often assumed that mainly palace-based economy and little private trade existed. LIVERANI (1987, 69) claimed that the status of the merchant in the Late Bronze Age was that of a palace dependent. However, arguments in favor of ancient Near Eastern marketplaces have increased since the 1970s. Wolfgang RÖLLIG (1976), Carlo ZACCAGNINI (1990), Dominique CHARPIN *et al.* (2004) and others have assembled many references for markets in the cuneiform sources, which will be summarized briefly in the following.

2. Markets in the cuneiform texts

2.1. *maḥīru(m)*

The Akkadian term *maḥīru(m)* (Sumerian: *ki.lam*) designates the various semantic aspects of market: the commercial activities, the rate, but also the physical entity of an open urban space which might have served as a market(place) (ZACCAGNINI 1990, 421-422). Some texts give precious informations how such a *maḥīrum* looked like. There are several relevant texts from Emar, the most important city along the upper Syrian Euphrates in the 13th century BC. Sale documents describe the location of a house as bordering either another house or a street, a place or a large place (Sumerian: „*silā.dagal*“) (ARNAUD 1991, no. 54:4). Another text reports the story of an attempted coup against the king of Emar named Zu-Aštarti (ADAMTHWAITE 2001, 233-260): A man goes to the king of Emar and warns him, that troops who planned a conspiracy against him assembled on the marketplace („*ana ki.lam*“). The king sent other troops, which seized the ringleaders of the conspiracy from the

marketplace, and punished them. This texts testifies that the marketplace must be inside the city (otherwise there would have been no danger for the king who could simply close the city gates), that the place was large enough that a fair number of people could assemble and that troops were necessary to quell the revolt, and that a marketplace served not only for commercial purposes, but was also the place where people assembled for various reasons.

Trade is also attested at the „market gate“, Akkadian: „*bāb maḥīrim*“, Sumerian: „*ká ki.lam*“. An Old Babylonian letter (AbB I 60:15) mentions that a man gets the order to buy two sacks at the market gate (STOL 2004, 899). A Neo-Assyrian text (7th century BC) states that camels were sold in the market gate („*ina bāb maḥīri*“), and a Neo-Babylonian text (6th century BC) refers to barley which was sold at the market gate (RÖLLIG 1976, 289). In sum, a few texts from all periods make clear that market trade could have taken place near city gates. Unfortunately it is not clear if the market trade was taking place inside or outside the city wall.

The term „*bīt maḥīrim*“ (Akkadian) or „*é ki.lam*“ (Sumerian) means literally „the house of the market“. They were frequently rented (STOL 2004, 899). Possibly this term describes a shop, an exchange office, or another building in direct relation to market trade. An Old Babylonian text from Sippar mentions that 9 SAR (= 324 m²) of these „market houses“ were situated near a city gate (the Šamaš gate), and that also the chief merchant possessed a house there (STOL 2004, 899). Since the sun god Šamaš was responsible for legal procedures and justice, a gate bearing the sun god's name would have been especially appropriate for trading purposes. In this case at least it is clear that shops or other buildings related to the market were situated near a city gate.

There is also evidence that markets were organized, regulated and controlled by a „market supervisor“ (Akkadian: „*rabī maḥīrim*“) (ZACCAGNINI 1990, 422). Market regulation with concrete regulations concerning wages and prizes is also attested in a text from Elam dating to about 1830 BC, which states that Attahušu, the city lord of Susa, erected on the market (*ina maḥīrim*) a stele on which the right prizes for goods were annotated.

For some markets it is attested that they were equipped with special weight stones. „Weight stones of the market(place)“ („*na₄-há maḥīrim*“) are mentioned in texts from Mari (CHAMBON 2011, 148-156).

2.2. *kāru(m)*

There is another Akkadian term, „*kāru(m)*“ (Sumerian „*kar*“), which literally means „embankment, quay-wall“, and designates a merchants quarter, a trade station, or a market-office. It is attested in 2nd millennium Babylonia, Syria, Assyria and Anatolia, and designates an area where the merchants who were involved in medium- and long-

distance trade were living together and acted in various ways (ZACCAGNINI 1990, 421-423; STOL 2004, 898). For more details see the contribution of Stratford (this volume) about the *kārum* in Old Assyrian and Anatolian trade, since the Old Assyrian *kārum* serves as the model for any other *kārum* trading station.

The *kārum* must have been an urban area in- or outside the city where merchants of a certain origin lived together. It is attested in texts for many 2nd millennium cities such as Babylon, Sippar, Mari, Shehna, Emar and others (ZACCAGNINI 1990, 421; STOL 2004, 895-896). Merchants were usually called „*tamkarum*“ („dam.gar“), but some merchants *e. g.* at Mari were called „sons of the *kārum*“ (MICHEL 1996, 415). They were free and independent colleagues, which were organized. The chief of this organization was called the „head of the merchants’ quarter“ („*qaqqad kārīm*“; STOL 2004, 895). Special weight stones of the *kārum* („*na^{mes} ka-a-ri*“) were mentioned in a text from Emar (Emar 87: 8; ZACCAGNINI 2018, 49). Whether this designates weight stones of the (Emar) market or its market-office, is not clear (ZACCAGNINI 2018, 59-60), but we learn from this text that possibly a set of reference weight stones existed in the *kārum*; presumably they must have been kept in a special building or were on display on the marketplace.

2.3. *sūqu(m)*

Finally, a few texts mention retail trade which took place on the streets. The „*sūq šimātīm*“, literally meaning „the street of the merchandise,“ designates probably a trading street (ZACCAGNINI 1990, 422; STEINERT 2011). The *sūq šimātīm* is mentioned in a few omen texts; for example, a Babylonian merchant slaughters a lamb and hires an extispicy specialist who should predict if his sale on the „trading street“ would be profitable: „Will the large bead, which he has bought, be sold with profit in the *sūq šimātīm*?“ (WILCKE 1990, 303). The expected profit was apparently large enough that the merchant paid for the lamb and the specialist. Later texts mention that flour, barley and empty vats were bought from the *sūq šimātīm*. An overseer of the *sūqu* („*ša muḫḫi sūqu*“) is also mentioned in a text (STOL 2004, 898).

This term, of course, raises the question if the ancient *sūqu* resembled the modern oriental *sūq* or *bazār*, where trade takes place to a large extent along a dense network of streets (WIRTH 2000, 67-73). Since the *sūq* or *bazār* streets are often covered with roofs, it makes them ideally suited for commerce and trade in countries with hot climate, since they have the enormous advantage of being shaded areas. In most areas of the Near East, the climate is not suitable for conducting trade during the day on a large open space. At least in the hot period, between May and September, it would have been extremely uncomfortable to conduct sophisticated

trading activities on an open marketplace. Today, open marketplaces outside the cities do exist for the trade of bulky and dirty goods such as animals, vehicles and agricultural products, but they mostly take place in the fresh morning hours.

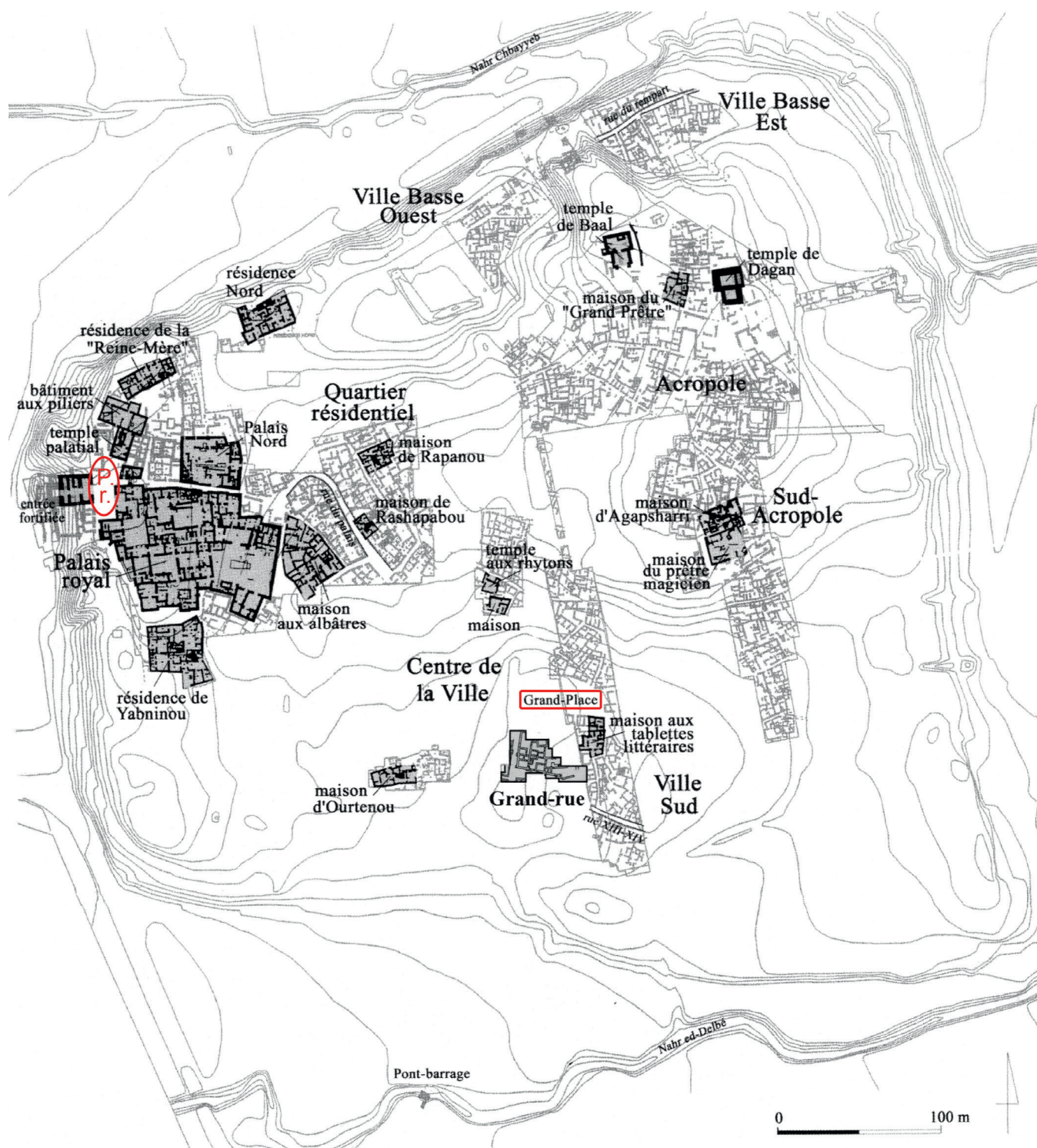
The geographer Eugen Wirth in his monography about the islamic oriental city (WIRTH 2000) defined the oriental „*sūq*“ or „*bazār*“ as the traditional center for trade and commerce, a central business district. On the basis of existant cities such as Isfahan he developed the model of an Islamic city, where the *sūq* is centered along the main streets and has concentrations near the city gates and close to the main mosque (WIRTH 2000, fig. 40-41). He claimed also that business centres like this had not existed before anywhere else, not even in the Ancient Near East (WIRTH 2000, 103): „Damit wäre der *Suq* möglicherweise das einzige grundlegende Abgrenzungskriterium der orientalischen Stadt, das seine Wurzeln nicht schon im Alten Orient hat, und welches damit als eigenständig-islamisches Kulturerbe angesehen werden kann.“ As we shall see in the following pages, this statement seems less convincing in the light of new research on Ancient Near Eastern markets.

3. Archaeological examples for market areas or marketplaces

Before we present some examples for possible marketplaces in the 2nd millennium Syro-Mesopotamian region, it is important to keep in mind that only a few cities and settlements are suitable for permitting insights into the possible existence of marketplaces. Only those settlements which have been excavated on a large scale can be searched for eventual city structures such as markets. However, only very few sites have been excavated completely or at least to a large extent.

3.1 Ugarit

Ugarit was a flourishing harbour town until the Late Bronze Age II (1300-1185 BC), intensively involved in the trade between the Mediterranean world and the Near East. The mound is 26.4 ha large and 8-18 m high, and about one quarter of the Late Bronze Age II settlement has been excavated so far (CALVET/GALLIANO 2004). The westernmost part of the city is occupied by the large royal palace and several elite residences. Two fairly small temple-towers are situated at an elevated place in the north-eastern part of the city. The remaining urban surface seems to have been densely covered by houses, which were built close to each other and structured in quarters. Not much open space existed within the urban tissue: mainly the streets and a few small places. Only two open places are fairly large: one behind the main city gate in the west, and the other in the city center in the quarter „*Ville Sud*“ (Fig. 2).



3.1.1 The Royal Place

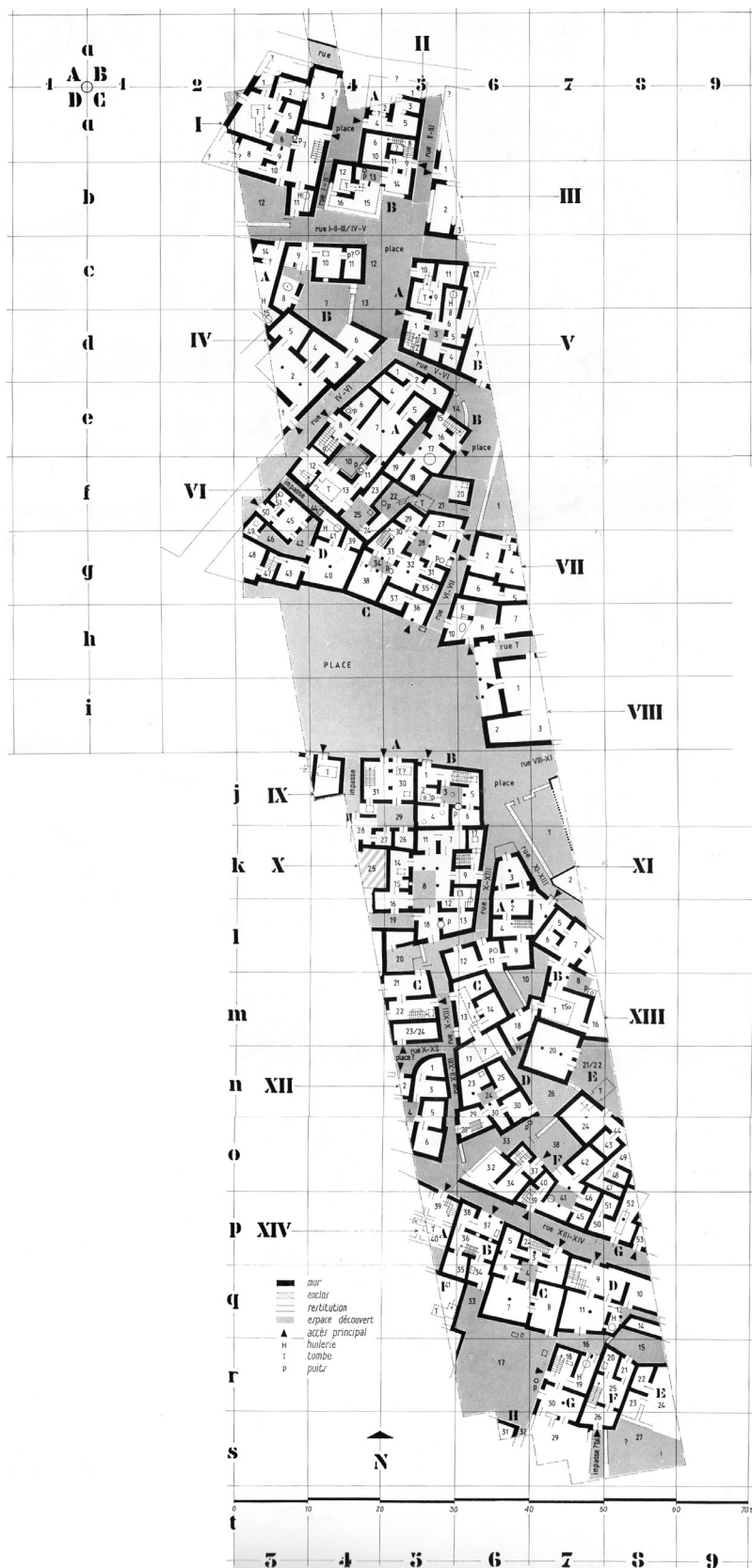
The „Place royale“ measured approximately 500 m² (ca. 35 m by 14 m) and was situated directly behind the main city gate and in front of the entrance to the Royal Palace (CALLOT 1986). On its northern side it gave access to a small palace temple and a pillared building, the function of which is not clear. Possibly it was related to trade which was in Ugarit very much controlled by the king and his elites. The access to this place from the city was

carefully controlled by a double gate. In this way the royal place could be easily segregated from the remaining city and from the outside, if necessary. A hematite weight (RS 15.226), which was found in the eastern archives of the adjacent palace, bears the cuneiform alphabetic inscription “ten” (ʾšr) (BORDREUIL 2004, 135-139). Since the stone is weighing 89.5 g, a weight unit of 8.95 g may be derived from it. It could point to the fact that reference weights were kept in the palace under royal control.

▲ Fig. 2. Ugarit around 1200 BC with the „Grand-Place“ and the „Place royale“ (P. r.) indicated (AL-MAQDISSI/MATOLAN 2008, fig. 2a).

3.1.2 The „Grand-Place“ in the „Ville Sud“

▼ Fig. 3a. The „Grand-Place“ at Ugarit, bordered by shops, plan (CALLOT 1994, fig. 312).



curved or bent. Only some main streets like the „rue du palais“ are broader and widen in places up to 10 m. In this way small places are created along some of the streets. Additionally, there must have been not much sun and air between the houses which had – according to the excavators – an upper storey and were at least 6-7 m high.

But so far only one large place has been known, the „Grand-Place“ or „Large Place“, situated in the „Ville Sud“ (Fig. 3a-b). Only half of it has been excavated, but its surface can be reconstructed as appr. 1000 m² (ca. 20 m x 50 m) due to the geomorphology of the mound. Its floor has completely disappeared, but the terrain was slightly inclined (3-5 %). The „Ville Sud“, a densely built living quarter around this place, has been studied extensively by O. CALLOT (1994). He was able to reconstruct a number of commercial activities with the help of the remaining installations (e. g. oil presses) and objects (e. g. weight stones, cylinder seals, moulds for metalwork). Commercial activities must have taken place to a large extent within the houses, e. g. a few houses near the „Grand-Place“ specialized in oil production (CALLOT 1994, fig. 290). He was also able to identify a few rooms as the workshops of smiths and shops, and several weight stones in the houses point to economic activities of the inhabitants.

Because most streets were quite narrow, it is unlikely that wagons circulated in many streets. Nevertheless, three pommels of wagon yokes in houses, one near the „Grand-Place“ in Ilôt X, r. 23/24 (could this room have served as a garage or workshop for wagons?), indicate the presence of wagons (CALLOT 1986). It must be assumed that the circulation and the transport of most goods must have taken place mainly on donkeys' backs, and that the circulation of wagons was possible only on the main streets. The narrow streets argue against the interpretation of this place as the only and central marketplace at Ugarit for large-scale commerce, because the traffic and the delivery of the goods was restricted. But it could well have served as one marketplace for this urban quarter. Perhaps also the „Grand-rue“, which ran about 50 m south of the „Grand-Place“ and which is broad enough that wagons could pass, supplied the „Grand-Place“ with goods, if it was used as a marketplace. It is also possible that several marketplaces existed in one city; at least one small and one large marketplace (*maḥiri*) were in use at Nuzi according to texts (ZACCAGNINI 1990, 422). More important for circulation were small places at the junctions of the streets, and the large place, which had the size of one insula.

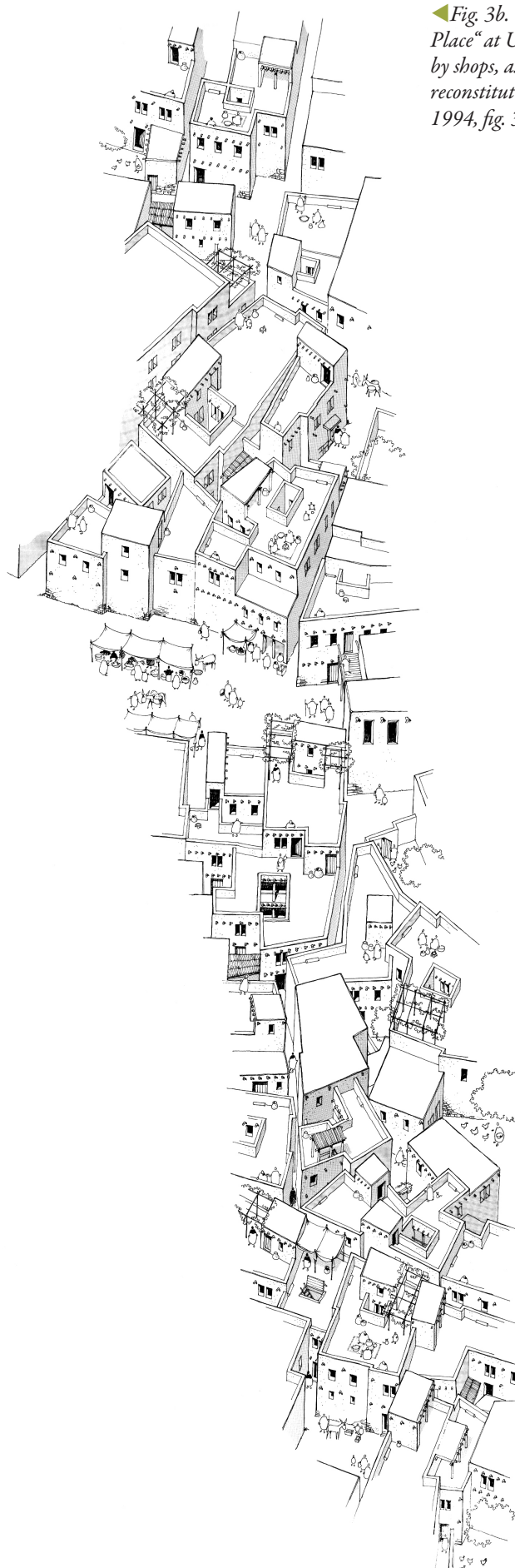
The „Grand-Place“ is surrounded by several rooms which differ from normal houses. Bordering the place at its east side, there is a large building (Ilôt VIII), which, due to his ground plan and its deep foundations, was interpreted by CALLOT (1994) as an exceptional, possibly official building.

House C of Ilôt VI borders the „Grand-Place“ at its northern side. Part of it corresponds to a normal domestic household, but the two Rooms 36 and 37 were separated from the house and were accessible only directly from the „Grand-Place“. Their interpretation as „boutiques“ is thus quite probable. The house at the northeastern corner of the Place was even more clearly used for trade purposes. The room at the corner was directly accessible from two doors, one leading inside from the Place, the other one from Street VI-VII. Since all Ancient Near Eastern private households invested enormous efforts to protect their private sphere and avoid direct access (OTTO 2006, 235-237), the accessibility of Room 10 must have been intentional and indicates that this room was publicly accessible, possibly as a shop. Additional proof is given by three weights which were found there, among which a bronze weight in form of a crouching bull (RS 23.355). It weighs 182 g, corresponding to 20 Ugaritic shekels (M. Yon in CLUZAN 1993, 229, no. 184).

A few cylinder seals, testifying juridic or economic activities, and a few weight stones, the remains of „paying“ with weighed silver, were even found on the „Grand-Place“ itself. Their number is certainly too small to prove the use of the place for trade purposes. On the other hand, why should functioning objects be found at all on open spaces? Even if we suppose that merchants were trading here during daytime, the marketplace was certainly emptied and cleaned in the evening. If an object is found on this place, it must have been discarded because it was broken or had lost its value, or because it had been left behind accidentally. In sum, it is very well possible that this „Grand-Place“ was used as a marketplace.

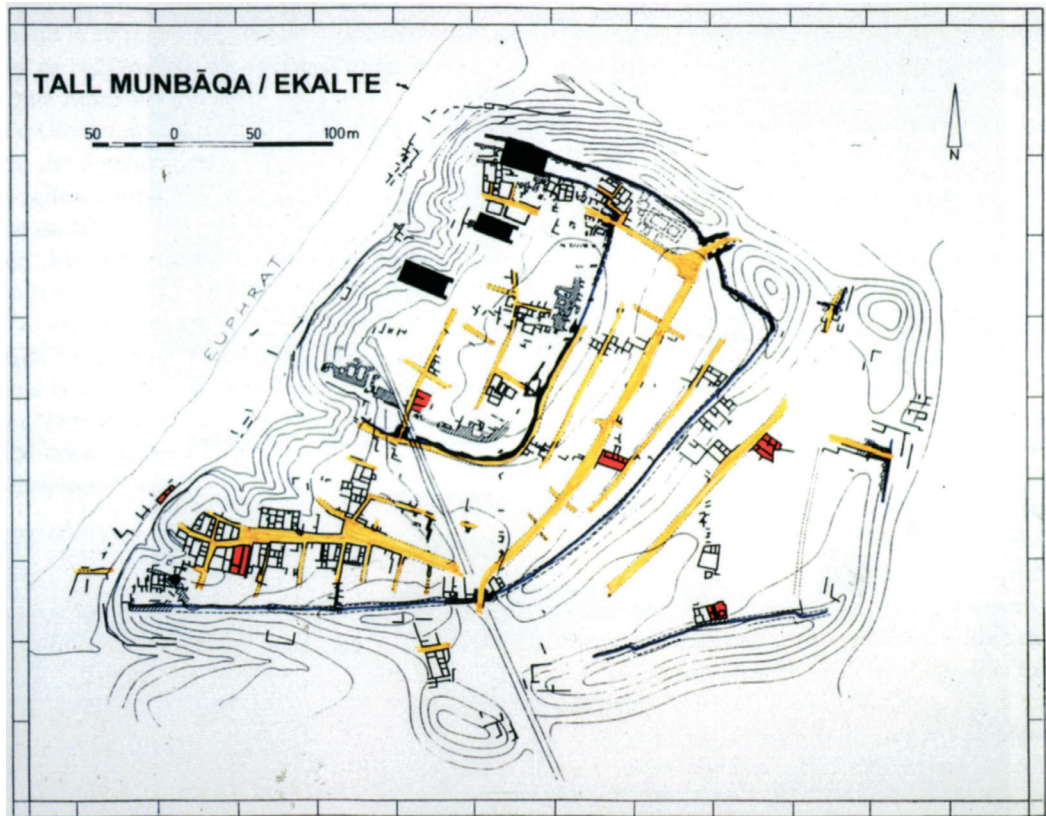
3.2. Munbaqa

Tall Munbaqa, the ancient city Ekalte, is situated on the east bank of the Euphrates. Its city structure from around 1350 BC is well known due to extensive excavations and geophysical prospections (MACHULE 1990; WERNER 1998; BLOCHER/WERNER 2018). The densely built house quarters of the Inner Town were built along a regular street net, which encircles the main mound „Kuppe“ in multiple rings (Fig. 4). The Outer Town and the Inner Town were each fortified by a wall. At least two city gates gave access to the Inner Town. They led directly onto the main street, which made the whole Inner Town accessible. This main street of the Inner Town is 7 m wide in most areas – much wider than the other parallel or vertically running lanes. It widens to 12 m-wide places of triangular shape in at least two areas of the house quarter „Ibrahims Garten“ (WERNER 1998, 54-59; MACHULE/BLOCHER 2013) (Fig. 5). This size of the street cannot be explained by traffic purposes only. Since most of the nearby houses were inhabited by wealthy citizens and traders and many houses were used also for handicraft production, it is not too

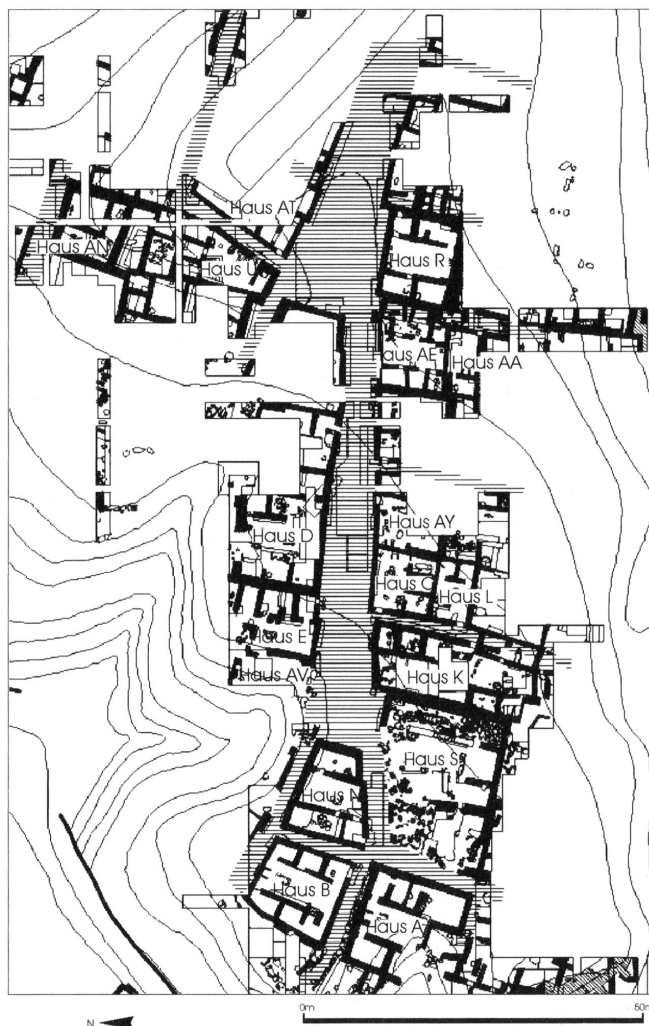


◀ Fig. 3b. The „Grand-Place“ at Ugarit, bordered by shops, axonometric reconstitution (CALLOT 1994, fig. 321).

► Fig. 4. Tall Munbaqa/
Ekalte during the Late
Bronze Age (WERNER
1998, fig. 50).



▼ Fig. 5. The main street
at Ekalte widening to 12 m
large places (MACHULE/
BLOCHER 2013, fig. 181).



far-fetched to interpret these wide open spaces as places for trade. Where the main street ends west of the westernmost place (see Fig. 5), it was split up in two narrow alleys, one of which is equipped with a long bench (WERNER 1998, 55, fig. 48) (Fig. 6). Benches along streets are quite unusual. Therefore we wonder, if this bench could have served either for the benefit of people who came here for trading, or as a counter where goods were displayed.

The main street widened to an even larger place in front of the North Gate (BLOCHER *et al.* 2012, 37) (Fig. 7). This place measured *ca.* 20 m x 22 m, *ca.* 440 m². It was situated immediately behind the Northern City Gate and at the 90° bend of the 8 m wide main street, which led from the city gate and Temple 4 up the hill towards the other temples. A few rooms were excavated at the southeastern and the southwestern side of the place. They were equipped with ovens, pits, benches, platforms paved with pebbles, floors plastered with sherds, and are interpreted as workshops and storerooms (BLOCHER *et al.* 2012, 41-44).

The opposite side of the place was framed by the temenos wall of Temple 4. A bench was built on the place along the temenos wall and until the city gate, inviting for a rest or serving as a postament for goods. Since benches and postaments are usually both shallow installation attached to a wall, their purpose is not immediately apparent, or they could have served multiple purposes. Inside the sacred area there was a stone stela standing midway between the temenos door and the temple entrance. But there was a second stone stela



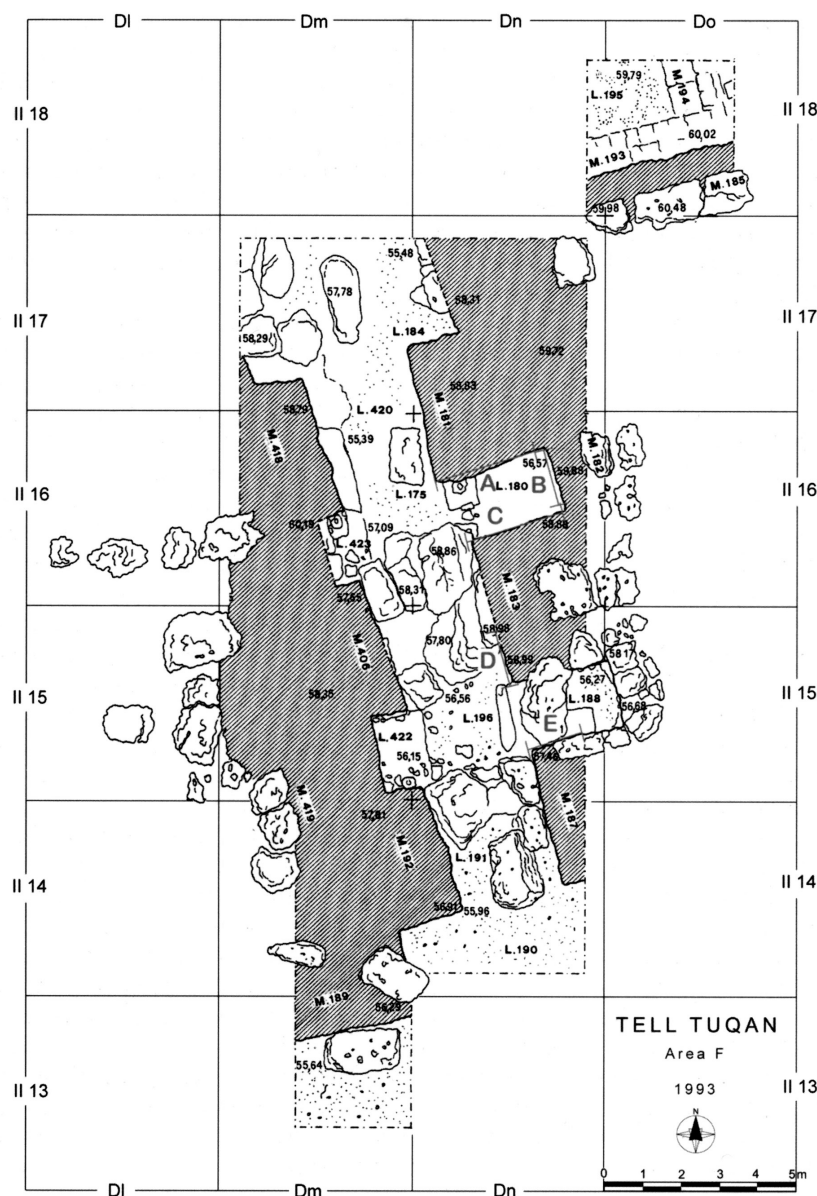
◀ Fig. 6. A narrow lane at Ekalte equipped with benches (WERNER 1998, 55, fig. 48).



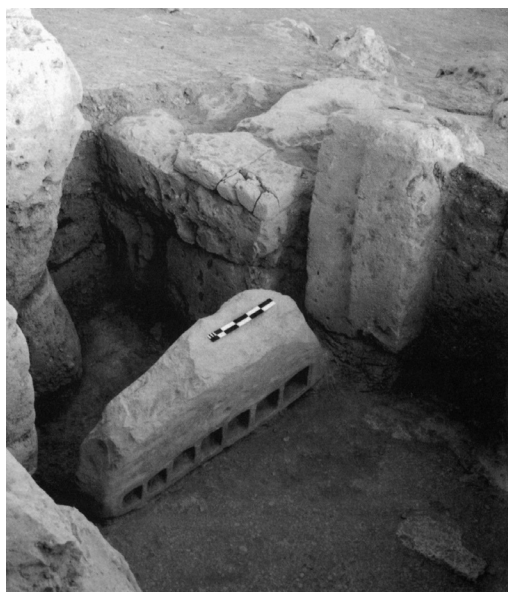
◀ Fig. 7. The „Market Place“ at Ekalte between the city gate and Temple IV (BLOCHER et al. 2012, 37, fig. 2).

outside the temenos wall, standing in the recess of the wall, which had been deliberately built for the stela. These two stelae are so-called „baityloi“, aniconic cult images representing the venerated deity. This second baitylos was clearly installed deliberately outside the segregated sacred space and on the large open space, where the access was not restricted. Is it possible that this cult image stood in direct relation with the transaction which took place on the marketplace, *e. g.* for supervising or guaranteeing them?

Clearly the temples at Munbaqa served not only as centres of worship, but also as the place where legal documents were issued. One sale contract from Munbaqa is especially significant in this respect: the city god and the Elders of the city sell a field to a private person for a certain price in silver, and it is explicitly mentioned that the tablet was written „in the door of the temple“ (MAYER 2001, 80, Taf. 7, RS 26). This is another clear proof that temples were involved in legal and economic activities, and corresponds well to the assumption that temples



▲ Fig. 8a. The city gate at Tall Tuqan where the basalt table was found in L. 188 (BAFFI 2006, 151, fig. 8).



► Fig. 8b. The collapsed basalt table for capacity measurements in the city gate.

were in this region, where most cities had no palaces, the only official buildings (OTTO 2012). To sum up: The so-far largest place inside the city was directly accessible from the city gate and can very well have been used as a marketplace. The association with a temple is clearly not by chance, but the association of the small market with the sacred baitylos can be explained by the role of deities as protectors and guaranters of economic procedures.

3.3. Tell Tuqan

The ancient city at Tall Tuqan near Ebla in Syria was investigated only in limited soundings (BAFFI 2006). However, when the south-eastern city gate in Area F (Middle Bronze Age II, ca. 1800-1600 BC) was excavated, a large basalt table with seven square depressions for measuring capacities came to light within one of the gate chambers (Fig. 8). The depressions of decreasing size hold 500 cl, 700 cl, 1000 cl, 1300 cl, 2000 cl, 3000 cl and 4500 cl (FIORENTINO 2006). The capacity measurements of many agricultural products are well known from the cuneiform texts (POWELL 1990), but the containers themselves have never been found since they consisted of organic material. The only possible depiction of such a standardized container for measuring grain is found on an Akkadian cylinder seal (ca. 2300 BC), where two grain gods are carrying the container to the grain goddess, who sits on a heap of barley (BOEHMER 1965, no. 1266 = pl. XLVI, fig. 541).

The basalt table at Tuqan is so far the only measuring table which has survived. It reminds of a contemporary text from Mari mentioning barley and sesame, which was measured with the „kappu-container used in the market place“ (ARM 13, 100; ZACCAGNINI 1990, 422). Apparently the urban authorities of Tall Tuqan had placed the basalt measuring table in the gate in order to provide the market with a reliable control system for capacities. Since the areas on both sides of the city gate have not been investigated, we do not know if the marketplace was inside or outside the city, or on both sides. But certainly the market must have been nearby.

3.4. Tall Bazi

Tall Bazi is situated in present North Syria, appr. 30 km upstream from Tall Munbaqa/Ekalt, on the eastern side of the Euphrates valley which formed one of the major trade routes. The inhabitants of this city, which existed from 2500-1350 BC, clearly profited of a flourishing economy, and many seem to have been involved in trade and various crafts. The numerous weight stones which we found in many houses all over the city testify that the inhabitants were used to calculating weight according to at least four different weight standards (FINK 2012).

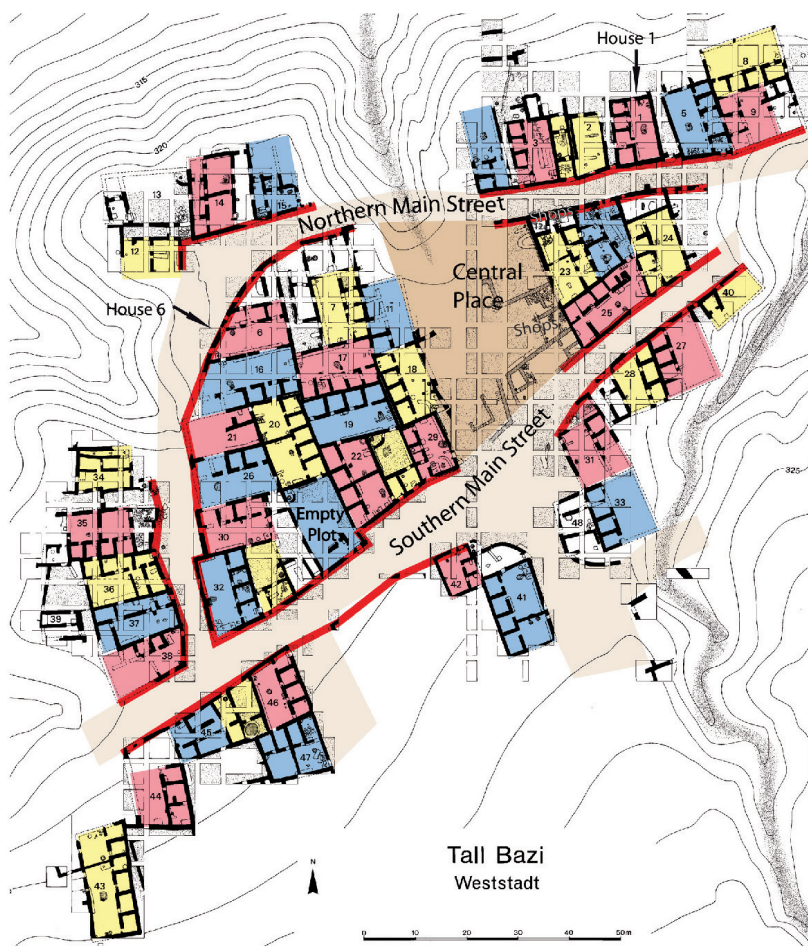
The Western Lower Town („Weststadt“) of Tell Bazi was a short-lived one-level settlement enlarge-

ment which was destroyed around 1350-1325 BC (OTTO 2006; EINWAG/OTTO 2018). It was made up of more than 70 houses which cluster together (Fig. 12). Most of the houses were built next to the other, and only exceptionally narrow lanes separate neighboring houses. Apparently space was extremely scarce, and every plot was covered with a house. More peculiar is the large Central Place in the middle of the densely built house area (Fig. 9). This place and the streets are the only open space which existed in the Weststadt, except for a handful of courtyards between some of the houses. The Central Place measures about 30 m from west to east and 40-45 m from north to south. Additional free space is given by the two main roads which pass by the place in the north and the south. These streets are astonishingly wide in general, at least 6 m, but they widen to more than 20 m next to the Central Place.

While nearly all the houses are carefully built as elongated buildings with one large main room and three to five flanking secondary rooms, the Central Place shows very different features: It consists of a slightly sloping open area, on which steplike terrace walls were built (Fig. 10). Their purpose was to transform the sloping open space into horizontal platforms, which were better suited for trade and other activities. The floor of the Place consists of many superimposed levels, which indicated that the open space was quickly rising. The uppermost floor level of the Central Place and the main streets was about one-half to one meter higher than the floors of the adjacent houses (Fig. 11 shows the neighboring Houses 25 and 23 behind the Place, with much deeper floors).

A few structures and installations were built on the place. These are several shallow, irregularly built walls. They are smaller than the walls of the houses and seem to have been built ad hoc. Since most of them are quite small and irregular, they were probably only shallow walls. Their purpose could have been to divide the area, perhaps in order to create individual market stalls. A few isolated rooms were also built on the place (Fig. 11). Unfortunately not many characteristic objects were found in them, since they were very close to the surface. Worth mentioning are a few working stones, a basalt ringstone, a complete trilobe bottle, and a potter's wheel. The floor of some of them are paved with stones (Fig. 10). Because the rooms differ distinctly from the rooms inside houses, they could have served as small workshops, shops or storage rooms. A small bread oven (tannour) was placed in front of one of these rooms. Another installation on the place is peculiar: a furrow leads into a large open vessel. The exact purpose is unclear, but it must have been connected to some activities with a liquid. Other installations on the place are short benches and a stone trough.

Only a few objects were found at the open area of the Central Place: a small hematite weight stone of 3.9 g, two large weight stones, a few arcularia shells,



▲ Fig. 9. Map of the Weststadt of Tall Bazi with the Central Place and the main streets.



◀ Fig. 10. The marketplace and a broad street with shops in the Weststadt of Bazi (kite photo: 1997, B. Einwag).

pierced limestone disks, the head of a terracotta figurine, some animal bones, and a few beads. Many of these objects seem to be trash which was thrown away here – apparently the open space in the city



▲ Fig. 11. A shop, benches and platforms on the terraced marketplace in the Weststadt.

center was also used as a refuse area. The other objects might be the remains of trading activities. The few workshops or shops point to a frequent market function; but probably the place was not used every day as a marketplace, otherwise one would expect more solid constructions.

However, there were a couple of carefully built rooms, which can be interpreted as shops, near the Central Place. The large House 23 was situated at the junction of the main road 401 and the large Central Square. This house was composed of a row of four separate rooms which were directly accessible from the road and are interpreted as shops (OTTO 2006, 185-189, 261, fig. 172). In Room 12, which was situated directly at the junction, several weight stones were found, which belonged to different weight systems. Due to this fact and the position next to the Central Place we argue that this was a shop or exchange office for traders and merchants. Local and foreign merchants could have come here to use the present weights of different standards for carrying out their trade activities, or they may have taken them as reference weights in order to countercheck their own weight stones (this interpretation was accepted by ZACCAGNINI 2018). Is it possible that Room 12a corresponds to what is mentioned in the texts as the market office? Could the large House 23 have belonged to a chief merchant or to the overseer of the market? We cannot be sure for House 23, but there are good arguments to assume that House 29 at the western edge of the Central Place was the house of a merchant (OTTO 2006, 197-200). Although it is one of the smallest houses of the Weststadt, it contained numerous valuable objects among which many originated from the Levantine coast. Even more striking was the direct access to the main room from the Large Place – exceptional since usually the privacy of the house, especially the main room where the family assembled and the altar for the gods and ancestors was installed, was carefully protected, for example by the indirect access through a secondary room.

4. Conclusions

Archaeologically attested examples for a marketplace are not easy to find. This article presented primary research in its infancy. Presented were a few Middle and Late Bronze Age examples from Ugarit, Tell Tuqan, Tall Munbaqa/Ekalte and Tall Bazi. Nevertheless we are convinced that these examples are good enough evidence that Near Eastern cities of the 2nd millennium had market areas, where trade and retail trade took place. They correspond to what is attested in texts as „*maḥīru(m)*“, „*sūqu(m)*“ or „*kāru(m)*“.

Contrary to earlier claims, archaeological proof for marketplaces can be found in the rare case that a settlement was excavated on a larger scale. These open places were either situated next to the city gate, which provides easy accessibility for the foreigners, or they were situated inside domestic quarters. The latter is linked to the fact that economic processes also took place in private houses: the merchant's home was his trading office. The marketplaces were frequently surrounded by built structures, some of which were used as shops and workshops. This attests to the regularity of the market activities. Also the marketplace itself could have been partly covered with shop-like structures or marketstalls, or it was equipped with benches. Evidently it served not only for trade, but also for gatherings. If the place was situated next to a temple, this could guarantee the rightfulness of transactions. If markets had standardized reference weights and capacity measurements, these were kept in adjacent buildings, either in shops, in the city gate or in the temple. Since the texts mention special weights of the markets, some of the mentioned structures may have been used as market offices, where the reference weights were kept. The size of the examined marketplaces varies between 440, 600, 1000 and 1200 m². The exchanged goods were victuals and local and foreign products such as tools and jewellery. We suggest that these described archaeological structures could be named *maḥīru(m)*.

But market activities also took place on and along broad streets inside the settlements. These market streets were especially wide and sometimes widened to small places. They can be equipped with benches. In several instances, the rooms adjacent to and accessible from the street were shops. These streets on which trade took place may have been named *sūqu(m)* – an early forerunner of actual Sūqs in the Arabic world, which are – as protection from the hot climate – often covered. We do not know if this was already the case in the 2nd millennium BC, but it could explain why the streets are rarely broader than the largest available wooden beams.

So far there seems to be no clear archaeological example for a *kāru(m)*, a separate quarter for for-



eign merchants inside or outside the city outside of Anatolia. But this can change with every new excavation.

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▲ Fig. 12. Tall Bazi, 3D reconstitution of the West-city with the central marketplace and the Citadel.

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Address of the author

Adelheid Otto
Ludwig-Maximilians-Universität München
Institut für Vorderasiatische Archäologie
Geschwister-Scholl-Platz 1
80539 München
Germany

aotto@lmu.de

Markets and marketplaces in Middle Bronze Age Anatolia particularly during the ‘Colony’ period

by EDWARD STRATFORD

Old Assyrian trade, marketplaces, X-Ray Fluorescence, cuneiform, ancient Iraq, ancient Turkey

The Old Assyrian trade (ca. 1900-1760 BCE) is one of the best attested instances of market sensitive economic activity in the ancient world. The Assyrian merchants are best known through the large corpus of written material, though study of the Assyrian trade still grapples with major questions, including the location of marketplaces, and even the location of some of the large Anatolian cities which formed major nodes in the trade networks. This contribution reviews the written sources on the nature of the marketplace, discusses approaches to determining origins of clay tablets through pXRF as a step toward mapping the market cities of the Old Assyrian trade, and shares preliminary analysis of the seasonal fluctuation of economic activity in the Old Assyrian trade over the best-documented thirty years of activity.

Märkte und Marktplätze im mittelbronzezeitlichen Anatolien besonders während der Zeit der “Kolonien”

Altassyrischer Handel, Marktplätze, Röntgenfluoreszenz-Analysen, Keilschrift, bronzezeitlicher Irak, bronzezeitliches Anatolien

Der altassyrische Handel (ca. 1900-1760 v. Chr.) ist eines der am besten dokumentierten Beispiele für markt-empfindliche ökonomische Aktivitäten in der Alten Welt. Während der altassyrische Handel außergewöhnlich gut durch ein großes Korpus an Texten bekannt ist, ringt die Forschung noch mit wesentlichen Fragen, etwa bezüglich der Lokalisierung der Marktplätze. Deren Lokalisierung bleibt selbst in manchen großen anatolischen Städten, die als Warenumschriftsplätze gelten, unklar. In diesem Beitrag wird das Wesen der Marktplätze mittels der schriftlichen Quellen analysiert und Ansätze diskutiert, die den Ursprung der Keilschrifttexte durch Röntgenfluoreszenz klären wollen. Solche Untersuchungen werden als ein wichtiger Schritt nach vorn angesehen, um Städte mit Märkten innerhalb des altassyrischen Handelsnetzwerks kartieren zu können. Vorläufige Ergebnisse zu den jährlichen temporären Fluktuationen der ökonomischen Aktivitäten im altassyrischen Handel werden für die am besten dokumentierte, 30 Jahre andauernde Phase diskutiert.

Introduction

During the Middle Bronze Age, Anatolian city dwellers commercially interacted with merchants from various regions around Anatolia, but most clearly with Assyrian merchants from northern Iraq (GARELLI 1963; LARSEN 1967; 1976; 2015; VEENHOF 1972; 2008b; MICHEL 2001; DERCKSEN 2014). This paper focuses on the ‘colony’ or *kārum* period of the Middle Bronze Age (ca. 2000-1600 BC), with specific focus on the evidence from the Old Assyrian colony at Kültepe/Kanesh. The colony period refers to the period during which the written sources of the Assyrian traders and some native Anatolians provide an extra dimension of evidence on the history of ancient Anatolia. Most of the documentation, more than 23,000 tablets, comes from ca. 1895-1865 BC, and was found at the site of Kültepe, ancient Kanesh, located 20 km east of the modern city of Kayseri. While archaeological excavations have yet to yield clear marketplaces in Middle Bronze Age Anatolia, a picture of market-based activity, including a sense of marketplaces in Anatolia can be sketched from the Old Assyrian documentary record. Following a brief description of the ‘colony’ period, a sense of the marketplace as manifest in the documentary record will be followed by an introduction to two newer approaches to understanding the nature of markets and marketplaces in Anatolia during the Middle Bronze Age: using pXRF to further refine our understanding of the geography of marketplaces, and using documentary evidence to understand the seasonality of activity in marketplaces.

The Old Assyrian trade

The Old Assyrian trade, documented best between ca. 1895-1865 BC, is the clearest indication that market trade was practiced at several levels in the Ancient Near East (GARELLI 1965; VEENHOF 1972; 1988; KULAKOĞLU/KANGAL 2010; DERCKSEN 2014). Assyrian merchants participated in a network of long-distance trade that connected the mountain sources of tin east of Iran with the silver sources in the Aegean in the west (BARJAMOVIC 2011; 2008), accompanied by trade in a range of high-value goods, including carnelian, lapis, gold, and textiles (VEENHOF 1972; MICHEL/VEENHOF 2010). The Assyrian merchants did not travel this entire east-west expanse, but operated one stage in what was certainly a large orbit of goods. As best illustrated in their documents, the merchants purchased tin and textiles in their hometown of Aššur (mod. Qal’at Sherqat) on the Tigris river, in what is now modern Iraq. The goods largely came to Aššur from southern Iraq. Households in Aššur certainly produced textiles; but the majority of textiles shipped to Anatolia certainly came from southern Iraq (MICHEL/VEENHOF 2010). Tin also arrived in Aššur via southern Iraq, though it originated much further to the east, somewhere in the region of the Hindu Kush Mountains, though precise locations are impossible to determine (WEISGERBER/CERNY 2002; DERCKSEN 2005). During one year, disruptions of textiles equally affected tin (STRATFORD 2017).

When they purchased the tin and textiles in their home city, the Assyrian merchants mostly paid in silver, and then worked to push those goods roughly 1000 km west, to Anatolia, as quickly as possible (Fig. 1).

▼ Fig. 1. Settlement Map of Anatolia (according to BARJAMOVIC 2011; courtesy G. Barjamovic).



Large groups of merchants, and sometimes small groups, moved westward, across the Jazira, across the Euphrates, and through the Taurus Mountains (VEENHOF 2008a; BARJAMOVIC 2011, 216-218; 2017; 2018). Some groups could be quite large. Letters from Mari some 100 years after this phase of the trade mention a caravan of 300 donkeys, but certainly caravans of such size must have also travelled during the period 1895-1865 BC (CHARPIN/DURAND 1997, 385-396). When they arrived in Anatolia, most, at least according to our records, stopped in the large city of Kanesh at the site of Kültepe (Fig. 2). There, the palace inspected the imports and levied duties on the goods (LARSEN 1967). Merchants stationed in Kanesh might divide the received goods into smaller bundles and sell them on credit or entrust them as consignments to other merchants. Likewise, the merchandise was put to use by many Assyrian merchants operating across the Anatolian plateau. They could exchange the tin and textiles for wool or copper, both of which were traded in large quantities on the plateau (DERCKSEN 1996; LASSEN 2014). But the ultimate aim was the acquisition of silver. Silver would be shipped back to the home city of Aššur to fund further acquisition of tin and textiles. It appears that greatest supply of silver was available at the western end of the plateau, at the city of Puruṣḫattum, because it was the first city the silver reached from the Aegean (BARJAMOVIC 2011;

VEENHOF 2014). Whatever the precise reason, it is quite clear that silver was more expensive in Aššur than Anatolia, and this price differential fueled the large volume of trade (VEENHOF 1988).

The Assyrian community at home was politically different from cities in southern Mesopotamia, where cities like Isin and Larsa were controlled by a strong monarchical tradition. In Assur, the *waklum*, usually translated as ‘overseer’, acted in a cultic role, and apparently in an executive role in relation to the city assembly (LARSEN 1976). The *waklum*, as representative of the god Aššur, participated in the conclusion of treaties. But the major decisions were made by a plenary assembly, composed of both ‘big’ and ‘small’ men, and sources show the *waklum* acting as an executive agent of the assembly (LARSEN 1976; 2015). The city assembly of Assur negotiated treaties on behalf of its merchants with other cities, of which four copies of treaties with different cities (Apum, Haḫḫum, Kanesh, and one unnamed city apparently in southern Anatolia) survive (GÜNBATTI 2004; VEENHOF 2008b, 183-218; EIDEM 2008). These treaties, none of which survive without some damage, show the protected legal standing of expatriate merchants, the proper handling of caravans and duties, the protection of caravans and merchants, and the assurance of ‘free trade’ (VEENHOF 2013).

The Old Assyrian trade was robust. Assyrian merchants shipped significant amounts of goods

▼ Fig. 2. Aerial photo of the site of Kültepe from northeast, showing tell center-right, lower town to left, and modern village bottom right. The large square structure in the center of the tell is the palace of Waršama. Other royal structures are discernible to the right and upward (photo ca. 2000; courtesy F. Kulakoğlu).



back and forth between Aššur and Anatolia. A narrative reconstruction of merchant activity from the archive of the merchant Pūšu-kēn suggests that in one year, one of his colleagues shipped enough goods to produce revenues in excess of 10 talents of silver: more than a ton of tin, and at least 425 textiles. This analysis, combined with an estimate of how many other merchants can be attested to be active in that same year, leads to a rough estimate of trade scale of around 200

tons of tin and 62,500 textiles sent to Anatolia, representing approximately 33 tons of silver sent to Aššur in return each year (STRATFORD 2017, 291-315). This is larger than other recent estimates, such as 190 tons over 20 years (LARSEN 2015, 190), but not exponentially so. More than a thousand Assyrian merchants probably participated in the Anatolian trade, the majority traveling in Anatolia (BARJAMOVIC *et al.* 2012, 60-63; 2014). The vast majority had to purchase grain and food in Anatolia, and this would have meant a relatively wealthy population with a demand for a range of goods in the markets of the Anatolian cities (MICHEL 1997; DERCKSEN 2008). This same group needed services and sustenance for themselves and their beasts of burden in the cities, towns, and hamlets along the roads between Aššur and Anatolia as well (BARJAMOVIC 2018).

▼ Fig. 3. 'Fat Cross' Photo of an Old Assyrian tablet (Prag I 521) (<https://cdli.ucla.edu>).



Marketplaces as manifest in the Old Assyrian documentation

The Old Assyrian language, as part of the larger Akkadian language, had a word – *maḥīrum* – that encompassed market, market price, and market-place, and it is well attested from the letters and other documents of these merchants. The definition of *maḥīrum* has already been well established and pointed out in relation to ancient trade (VEENHOF 1972, 389-400; RAHMSTORF 2018). Here, I provide a brief review of the term using mostly newly-published examples.

The term *maḥīrum* could refer to a particular place of exchange, but it is worth pointing out first that the kind of exchange was a market exchange as evidenced by its usage to denote the result of the accumulation of transactions, thus a market, as demonstrated by the use of the phrase that is usually translated “according to the market price” (*ina maḥīr izzazzu*, AKT 8 106:8; see also KOUWENBERG 2017, 780 n. 3). The phrase “caravan price” is known (*maḥīr ellitim*, AKT 6d 760:21’ in LARSEN 2014b), as well as the “price of the merchants” (*maḥīr tamkārūtīm*, Kt 94k 651:16; courtesy M. T. Larsen), and the “price of the *bīru* official” (*maḥīr birē*, AKT 6b 464:66 in LARSEN 2013). There were also prices associated with particular places:

Puzur-Aššur said to Amur-ilī, “I paid 1 mina silver to your name in the City. Deduct the City price (*maḥīr alim*) from my goods which you drove up from the City – 14 minas tin – from my remuneration” (Prag I 521:5-9 in HECKER *et al.* 1998) (Fig. 3).

The phrase “the City price” (*maḥīr alim*) clearly meant the exchange value in the City (the city always meant Aššur, hence it is usually capitalized), as 14 minas tin to 1 mina silver was a common exchange price for the goods in Aššur as opposed

to Anatolia. It was useful to designate such prices, as they were different in different places: “Ennam-Adad owes 2 minas of refined silver at the market price in the City (*maḥīr ālim*) ...” (AKT 6c 666:4-7 in LARSEN 2014a). Thus, when a merchant wrote about market price of merchandise, he was referring to the market price in a particular locale. For example, when a merchant wrote to his colleagues, “Buy tin of extra fine quality at market price ...” (*annakam damqam watram maḥīr izzazzū ... ša’mā*, AKT 6d 804:10-14 in LARSEN 2014b), he did not know the exact price in the City, Aššur, where the purchase was intended to occur. The idea of a price for a particular city supports the notion that the aggregate exchanges in that locale became sufficiently known and compared so that there was indeed a market price. This is also seen with several other specific cities in the Old Assyrian trade: The phrases “Durhumit price” (*maḥīr Durhumit*, Kt 91/k 181:16-17), “Hattum price” (*maḥīr Hattim*, Kt c/k 228:31 and Kt c/k 245:34; courtesy J. G. Dercksen) are known, in addition to the “Kanesh price” (VEENHOF 1972, 397).

The term *maḥīrum* could also refer to the particular place where exchanges took place. The ‘gate of the market’ (*bāb maḥīrim*) suggests there was a particular location where significant market activity took place, possibly by one of the city gates. A different argument has been made that the market was in fact located in a building based on two observations: 1) *bābum* is generally used for door as opposed to *bāb abullim* for city gate (at least in Aššur), and 2) some commentary on the Hittite term *hilammar*, used to refer to a marketplace, has been interpreted as a hall (DERCKSEN 2004, 32-33; 2014, 69-70). Whether or not this can eventually be corroborated, there is convincing evidence that the marketplace contained stalls (DERCKSEN 2004, 32). But the review of marketplaces presented in this volume, with archaeological evidence for stalls in open spaces, shows that the use of such spaces does not necessitate an indoor space. Whatever the case, the marketplace was a place where people could be encountered or even confronted. One merchant wrote to a colleague he was trying to track down:

I have heard from multiple sources that Amurru-bāni has arrived in Kanesh, and also that he has acquired at least a few minas silver. My dear brother, seize him and make him pay the money! If he is not seen in the marketplace (*maḥīrim*), then make the secretary of the colony search the house of Šār-Ea, daughter of Suen-dada! (ATHE 34:13-25 in KIENAST 1960; see also VEENHOF 1972, 392; LARSEN 1976, 305).

Another document recounts how two persons of interest were confronted in the marketplace (KUG 14 in HECKER 1966).

And merchants, whether or not they conducted business in their homes, certainly did conduct business in the marketplace. One merchant complained that because the settlement of his father’s estate was still not resolved, he was constantly being harrassed at the gate of the marketplace (Kt 88/k 507b in ÇEÇEN 1995, 53-55). (Again, the association between a particular marketplace and a gate shows up.)

A marketplace office is also attested and has been discussed (VEENHOF 1972; DERCKSEN 2004, 31-33). Three merchants write to a colleague that two of them had acquired ‘checked’ silver, apparently checked in the office of the marketplace (10 *manā kaspam amurram ša bēt maḥīrim*, RA 59 32:6-7 in GARELLI 1965). This suggests that the marketplace office (which should not be equated with colony office) was equipped merchants to check the purity or quality of metals exchanged. It was possible to do this in private contexts as well, but perhaps the *bēt maḥīrim* provided a place for cases where either other (private) options were not immediately available, or the two parties needed a neutral, third party to complete the assay. Given the importance on the control over weights (RAHMSTORF 2010; 2014; Peyronel in this volume), we might also expect that such an office had weights as well. Weights have been found in several private contexts (ÖZGÜÇ 1986). And analysis of those finds has yielded a complex set of different systems present at Kültepe (ASCALONE/PEYRONEL 2006; DERCKSEN 2016), but because neither the market office, nor the colony office, has yet been identified archaeologically, the role either institution played in relation to regulation of weights must remain propositional.

The conduct of the market could be affected by external conditions. One phenomenon called the *sikkātum*, likely something to do with war, disrupted the market, as reported by multiple merchants in letters to their colleagues (BARJAMOVIC 2011, 29-33). In one case, the merchant predicted the situation would change in two days (Prag I 598 in HECKER *et al.* 1998). In another, the merchant blamed his inability to pay off his creditors on the *sikkātum* and reported that the situation had depressed prices in the area, requiring him to send the merchandise elsewhere in hopes of selling it for a better price (CCT 4 10a in LARSEN 2002). In another document, a merchant reports that though the *sikkātum* had departed, neither silver nor gold were available in the market (AKT 2 63:5-7 in BILGIÇ/BAYRAM 1995).

Some oversight over the market or over the merchants is suggested in the title *rabi maḥīrim/maḥīrē* ‘overseer of the market’, for which a number of persons bearing Anatolian names such as Aše’d, Duduli, Dušara, Halkiašu, Hašu’umān, Kaluwa, Parwaliuman, Wašuba are known (VEENHOF 1972, 394-97; 2008b, 221-222). Ušnama can also be added to the list, also acting, like several of

the others, as a witness to a legal act (Kt o/k 53:1 in ALBAYRAK 2005). It is quite likely that he had control and/or responsibility with regard to the market office and that one of his responsibilities would have been to be able to assure smooth functioning of the market exchanges, including the validation of metals used for exchanged (DERCKSEN 2004).

Where were marketplaces in the cities?

Despite the clear sense from the texts that there were marketplaces in Anatolia, it is difficult to locate marketplaces on the ground in the Anatolian topography. (And, as other contributions in this volume show, even when we are a quite certain an area served as a marketplace, the material residue from such marketplaces can be quite sparse.) At Kültepe there are candidates for small places of exchanges in the excavated neighborhood (Fig. 4), but houses as a location of exchange should not be discounted. Assyrian merchants purchased and built homes in Level II and Level Ib of the lower town to the east of the elevated mound of Kültepe.

This lower town is often referred to as the *kārum* or the colony. Problems have been identified with using either of these terms (MICHEL 2014). First, it is well known that the area was not exclusively inhabited by Assyrian merchants; thus the word *kārum*, most basically translated as ‘port,’ should not be interpreted to mean that merchants were cordoned off from the local population. Moreover, within the documents, the *kārum* most directly refers not to a place, but to the corporate institution of merchants of sufficient size in larger Anatolian cities. Second, the usual translation of *kārum* in the Old Assyrian sense, ‘colony,’ risks the connotation of European colonialism or similar power dynamics. It is well understood that the merchants did not practice political hegemony, and in fact were victims of political machinations within Anatolia (GARELLI 1963; ÖZGÜÇ 1986; LARSEN 2015). However, the use of the word colony has persisted, as no good alternatives have gained consensus.

It must be considered likely that not only did the merchants exchange goods in the marketplace, but also in their homes and in the streets. In particular, some Assyrian merchants largely dealt with wholesale transactions (LARSEN 1967;

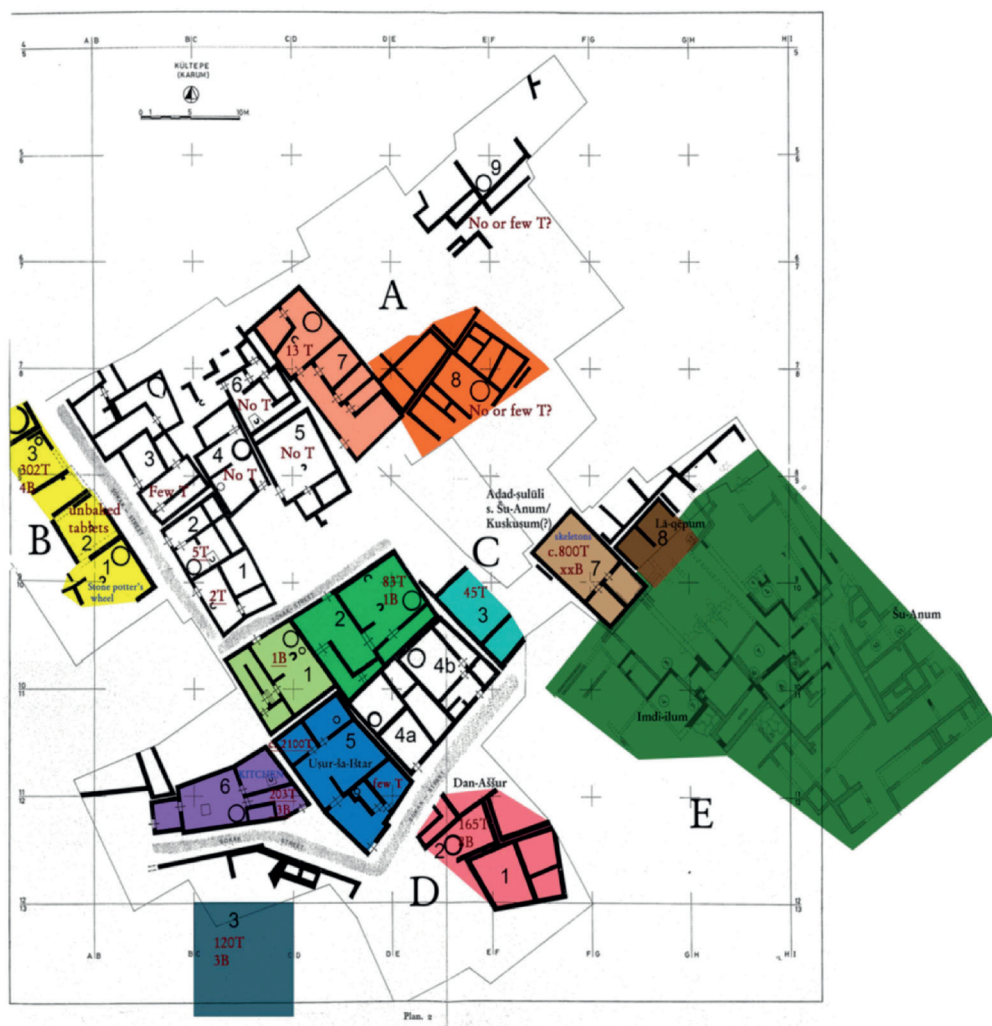
▼ Fig. 4. Reconstructed plan of houses in lower town at Kültepe (HERTEL 2014).

Red houses indicate Assyrian occupants, blue, Anatolian, yellow, unpublished archives, grey, no documents. Total area covered by map is roughly 9 ha.

Kanesh

- Area A, *kārum* level 2 -

- House A7: pre 1995 (not Aššur-emuqil!)
- 13 tablets
- House A8: b/k - 1949
- “few fragments of tablets”
- House B2-3: 84/k
- 302 tablets from Assyrian archive, unbaked tablets, 4 bullae
- House C1: 76/k
- 1 bulla (name: Išim-Su’en s. Šalim-Aššur)
- House C2: t/k - 1968
- 83 tablets, bullae
- House C3:
- 45 tablets
- House C5: n/k 1962: Ušur-ša-Ištar s. Aššur-imitti
- 2100 tablet (archive on 1st floor) (n/k total: 2158 tablets)
- House C6: o/k - 1963
- 203 tablets, 3 bullae
- House C7: a/k - 1948: Adad-šulūli
- ca. 800 tablets, bullae (a/k total: 1497 tablets)
- House C8: a/k - 1948: Lā-qēp
- unknown no. of tablets (a/k total: 1497 tablets)
- House D2: 83/k - Dan-Aššur
- 165 tablets, 8 bullae
- House D3: 86/k (C/13-14)
- 120 tablets, 3 bullae
- Hrozny 1925
- 1035 tablets



2015, 189-201; VEENHOF 1988; DERCKSEN 1996, 157-61). This is the part of the trade best evidenced in the documents. It is quite possible that the wholesale actors would have been well versed in the appropriate prices, not needing to be *in* the marketplace to determine their prices. Moreover, at the wholesale level, the marketplace may have been a difficult place to put large lots of goods to be purchased as is, rather than broken up to be sold individually. Thus, wholesale transactions often took place in the homes of the merchants instead of the marketplace (VEENHOF 1972, 397-99; DERCKSEN 2004, 34; 2014, 69-70). Among these homes, irregular spaces in the streets between could have served as spaces for exchange (HERTEL 2014, fig. 4). However, none currently known seem large enough to have been a proper marketplace where a large enough group of people could gather that would reflect the scale that seems implicit in the textual references to the marketplace.

One reference to a slave being 'brought down from the marketplace' (*ištu mahiri ušēridanni*) has been cited as possible evidence that the marketplace was on the acropolis, above the area where the Assyrian merchants lived (VEENHOF 1972, 391; LARSEN 2015, 181). It was very common to note that goods, after they had gone through the process of assessing import duties, 'came down' from the palace (LARSEN 1967, 155; and see LARSEN 2015, 36-7 for postulation that an excavated area on the mound could be indentified as import assessment procedures). It is possible that in the case of slaves, the market place was at the palace, a likely institution that could produce new slaves for sale through either military or judicial actions. Thus it may be that the directional flow represented by the verb is literal. But in so saying, it is worth considering that the reference need not indicate that there was one and only one marketplace in the city environs. The tin, textiles, and wool that the merchants brought could have been exchanged in different locations within the city topography.

The location of the city gate has frequently been associated with markets, and references to gates frequently occur with the arrival and departure of travelers in the Old Assyrian documents. However, excavation outside of city gates, where theoretically extra space is set aside, is not available. None of the other large excavated large sites in MB or LB Anatolia – Hattusha, Alişar Höyük (14 ha), Karahöyük (39 ha), and Acemhöyük (44 ha) – offer clear evidence of a particular spot in which markets were conducted (VON DER OSTEN/SCHMIDT 1930; 1937; SCHMIDT 1930; 1933; MELLAART 1954; ALP 1962; 1964; 1966; 1967; 1972; 1973; 1974). At Hattusha during the *kārum* period, excavators note that there was an open space of at least 200 m between the Lower City and the slope toward the eventual Hittite citadel (Büyükkale). This open space was built up in the Hittite period, but during

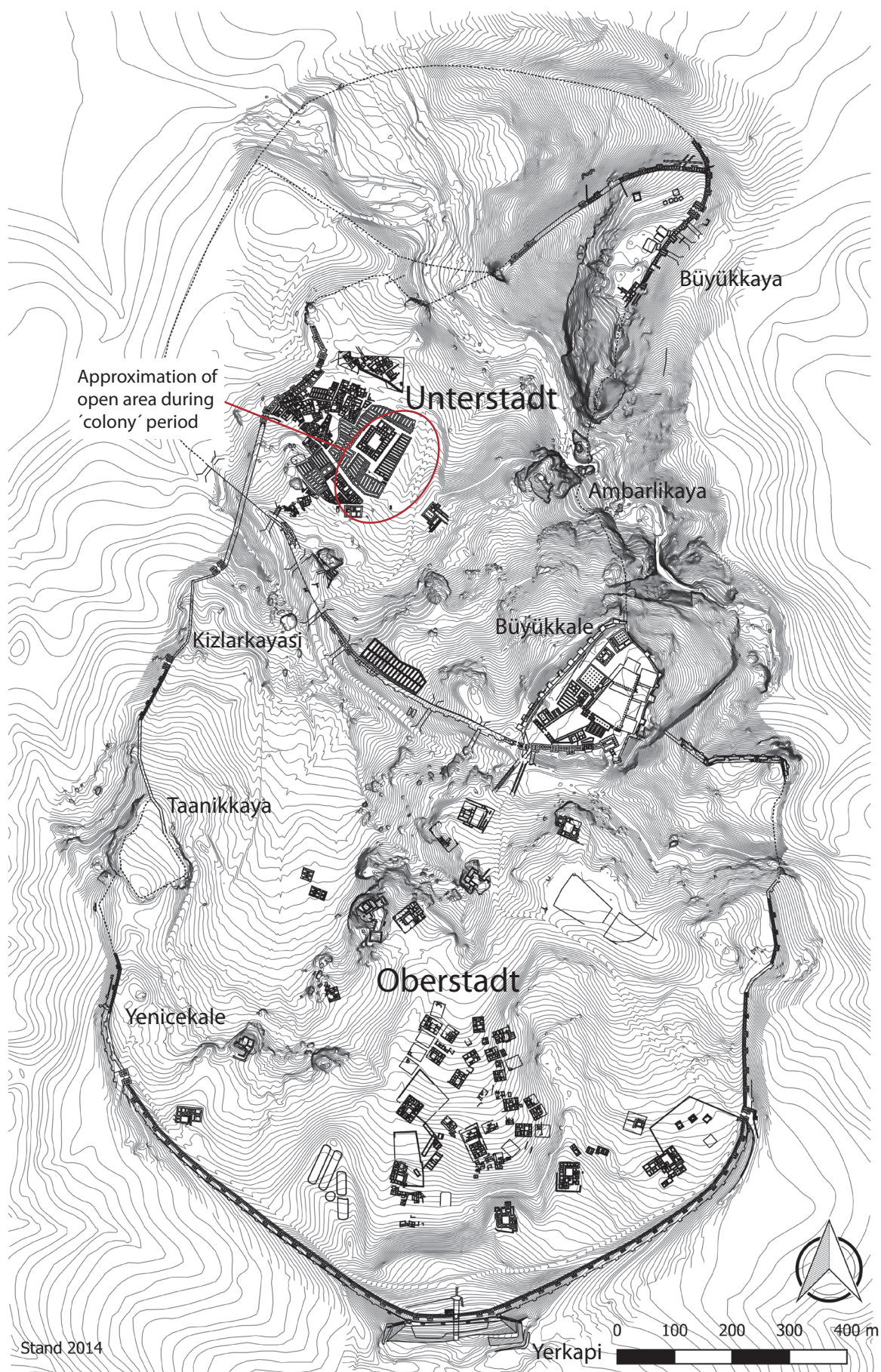
this earlier phase it would have provided a ready spot for the Assyrian merchants to interact with locals, located just outside of the Lower City where irregular shaped houses, similar to those found at Kültepe, existed, with texts showing Assyrian merchants at work (Fig. 5) (SCHACHNER 2006; 2011, 56-68; 2017, 30-31). But no finds identify it as a location for a marketplace. At the other Middle Bronze Age sites listed above, palaces are well known, but the existence of open spaces, and their examination as potential marketplaces have not been an element of publication.

Exploring the economic geography of Anatolia according to the Old Assyrian trade

While excavation reports have not yet yielded clear marketplaces, the intersection of economic and archaeological landscapes has been partially reconstructed from the documentary record. The most comprehensive geography of the orbit of Assyrian merchants and the settlements and resources with which they had interaction stretched the breadth of the Anatolian plateau, from the west end of central Anatolia to at least the southern piedmont of the Pontic Mountains in the north, and across the Taurus Mountains in the southwest. A number of large urban areas which contained markets, regardless of whether we can find the marketplaces themselves, hosted Assyrian colonies, including Kanesh, Waḥšušana, Purušhattum, Durhumit, and several others (VEENHOF 2008a; BARJAMOVIC 2011).

A host of Middle Bronze Age sites in Anatolia are known, but no clear marketplaces have been found. Conversely, though the documentary record suggests that there would have been marketplaces in each of the major cities, only five of the dozens of well-known settlements from the documentation can be identified with a particular archaeological site. Predominating trade routes are apparent in the movements of the merchants (VEENHOF 2008a). Tin and textiles was purchased in the home city of Aššur and brought northwest to Anatolia. Silver came from the west, and copper was most plentiful in the Pontic mines. Based on these regional abundances, and through careful analysis of merchant movements and topographical characteristics mentioned in the Old Assyrian documents, a map of the most likely locations of many of the larger settlements guides has been created (BARJAMOVIC 2011; 2017). Thus silver was available in the markets at Purušhattum, Šalatuwar, and Waḥšušana in the west, while the cheapest copper was in the north, with the largest copper market at Durhumit (DERCKSEN 1996).

Thus far, analysis on the economic geography of the Old Assyrian trade based on the documents has been dependent on explicit mention of place names. Such documents form a rather small subset



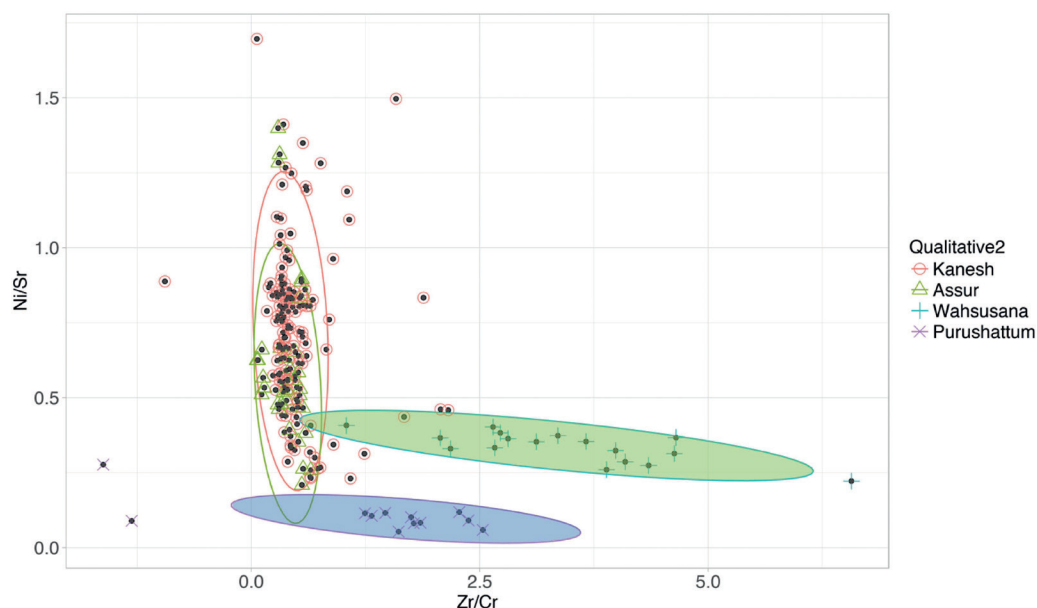
▲ Fig. 5. Plan of Hattuša/Boğazköy, with added approximate position of open area denoted (courtesy A. Schachner, Deutsches Archäologisches Institut).

of the total documentation. Refinement and confirmation of Barjamovic’s model is ongoing (BARJAMOVIC 2017). Significant work has been done on modeling the Anatolian landscape and the landscape between Aššur and Anatolia and subjecting it to calculable models of movement and interaction (PALMISANO 2018). Another ongoing project is the attempt to analyze the physical composition of the clay of tablets through x-ray fluorescence for two purposes: first, to localize the creation of documents without explicit mention of location by clustering compositional similarities; and second, to potentially use the resulting compositional types as guides to evaluate archaeological candidates for proposed settlements. Analysis through x-ray fluorescence offers the possibility of corroborating that certain activities took place in certain cities and their marketplaces, even when the city is not mentioned in the document, thus presenting the opportunity to add further context to information on various marketplaces. I present here some initial findings.

X-Ray Fluorescence, specifically portable X-Ray Fluorescence (pXRF), has been used in a number of ways within the frame of Anatolian archaeology (MILIĆ 2014; STRATFORD/MCILFATRICK 2017). The capacity and best methodology for use of pXRF with archaeological provenance has developed over time (HUNT 2012; BONIZZONI *et al.* 2013; FRAHM/DOONAN 2013; SPEAKMAN/SHACKLEY 2013; HUNT/SPEAKMAN 2015). A number of complexities must be acknowledged with any attempt to use physical composition through pXRF on the Old Assyrian problem of geography. First, any analysis must be non-destructive, limiting options for assay. Second, at least between Aššur and Kanesh, there seems to be the potential for secondary copies of tablets, meaning that the textual indications for the location of com-

position are not an unassailable indication of the creation of the copy. In such cases, the indications from the composition and the material analysis will not align. After the material analysis evidence sufficiently matures, probable copies of documents will be able to be used productively, but at the present level of analysis, material analysis must remain the focus. Third, even after clusters of physical composition are identified, it remains difficult to find appropriate correlates in the archaeological record against which to evaluate whether any one particular archaeological site should be identified with any one particular place name. This process may never yield complete results. Any given workshop that produced tablet clay or tablet blanks could have used multiple sources of clay, making it impossible to link the tablet clay to a particular place in the ground. Likewise, it is possible that different workshops at the same city could result in multiple material signatures for tablet clay associated with the same city.

Despite the challenges mentioned, initial results suggest that it should be possible to establish physical chemistry characteristics and trace element patterns associated with individual locations. Fig. 6 shows both the promise and complexity of the process of distinguishing clusters. The ratio of Ni/Sr is plotted against the ratio of Zr/Cr in tablets which can be identified to have originated in Kültepe, Aššur, Waḥšušana, and Puruṣhattum. While the Ni/Sr ratio is both stable and diagnostic for distinguishing Waḥšušana and Puruṣhattum, and their ranges of the Zr/Cr ratio are sufficiently separable from Aššur and Kanesh, Aššur and Kanesh share the same Zr/Cr ratio, and the same range of Ni/Sr. Most tablets associated with Aššur have a lower Ni/Sr than most associated with Kanesh, but further analysis is necessary to discover other ratios that can distinguish between the two.



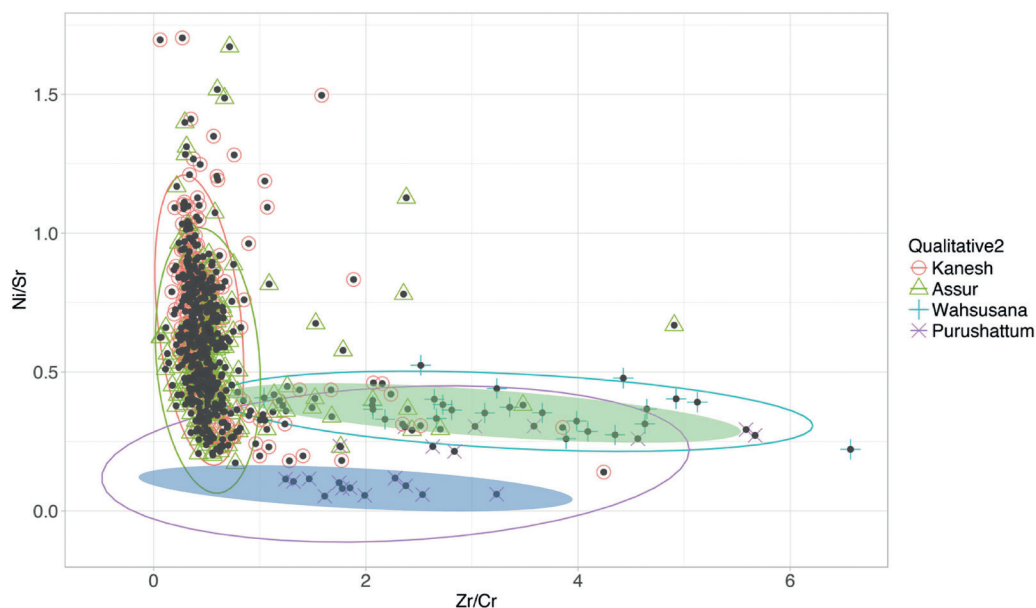
◀ Fig. 6. Relative material distribution of “high confidence” tablets from Kültepe, Aššur, Waḥšušana, and Puruṣhattum.

Fig. 6 plots only “high confidence” tablets – tablets for which the text on the tablet explicitly stated that the actions occurred in a particular place. In these cases the texts were legal in nature and concluded with a statement that the Assyrian ‘colonial’ legal authorities in an Anatolian city (or Aššur) gave legal actors access to the dagger of Aššur (or another element of the state cult) to swear on the resolution of their case (HERTEL 2013, 190-204). Such a text guarantees that the legal action referred to in the text was performed in a specific and identifiable location. But it does not eliminate the possibility that the surviving tablet is not a copy made in another location. However, when one group of tablets manifesting such texts from one city, for example Puruṣḫattum, clearly cluster in distinction from another group of texts from another city, for example Waḥṣuṣāna, then the clustering suggests that those *tablets* which cluster together are most likely indeed from the same location, and that none of those are copies. For example, in Fig. 6 most Puruṣḫattum tablets cluster closely together, but two readings fall far to the left. These may be copies, but the core cluster should be confidently interpreted as tablets that were created in Puruṣḫattum. Unfortunately, the case of differentiating between Aššur and Kanesh is more complex.

This same process can be used to question whether or not tablets that seem to have been written in a particular location, particularly letters, but have few *explicit* textual cues about their geographical provenance, were indeed written in a particular location. Of course, the possibility remains that an individual tablet is a copy, but in the aggregate the clusters suggests they were not. If the tablets were copies then the likelihood they would cluster together (*i. e.* that they were all copied in a location that is not Kanesh but also not the original location) is extremely low.

With the clusters for Puruṣḫattum and Waḥṣuṣāna established, the analysis can move to tablets where the assignment of location is less secure. In Fig. 7 a series of tablets were added to the legal texts and coded according to the proposed place of composition. In the overall results, many tablets seem to cluster with the identification to which they were coded. The confidence ellipse for Waḥṣuṣāna is very similar to the previous graph, essentially congruent. The shaded green ellipse represents the confidence circle from Fig. 7. However, the confidence circle for Puruṣḫattum is much larger in Fig. 7 than in Fig. 6, represented by the difference between the blue circle and the shaded blue ellipse. A number of tablets which were coded to Puruṣḫattum, largely because they mentioned the purchase of silver, which is most strongly associated with Puruṣḫattum, apparently were created in Waḥṣuṣāna. Waḥṣuṣāna is clearly the closest large market to Puruṣḫattum, and according to the documentary evidence, most traffic to Puruṣḫattum passed through Waḥṣuṣāna, and silver was also available in Waḥṣuṣāna. But the fact that a large number of tablets discussing the purchase of silver were created in Waḥṣuṣāna suggests that further analysis may provide fuller data on the relative volume of silver traffic between Puruṣḫattum and Waḥṣuṣāna.

The clustering in Fig. 6 and 7 suggests that no single, or even pair, of element ratios will distinguish all major sites. Fig. 8 and 9 again illustrate this point. In Fig. 8, the ‘high confidence’ tablets for Puruṣḫattum and Waḥṣuṣāna are retained, but with a new set of elements. Specifically, Sr, which is the more distinctive of the Ni/Sr ratio, Zr, and Cr are retained, and Mn is added, and the elemental composition measures are combined in principal component analysis. Here again, Puruṣḫattum and Waḥṣuṣāna are easily distinguishable. But the



► Fig. 7. Relative material distribution of “high confidence” and “medium confidence” tablets from Kültepe, Aššur, Waḥṣuṣāna, and Puruṣḫattum.

addition of two readings from a tablet indicate that this tablet was composed in Šalatuwar, a city best placed between Waḥšušana and Puruḫattum, and seems to share the same physical chemistry with tablets from Waḥšušana. However, in Fig. 9, with the readings from the Puruḫattum tablets removed, and the addition of Ti, it is quite clear that the tablet can be distinguished from the cluster of Waḥšušana tablets. Therefore, no single combination of elements can serve to distinguish all sets.

While this initial description provides no specific information that resolves the location of Waḥšušana or Puruḫattum, it does offer a glimpse into how pXRF assays can provide a new dimension of data that will bolster descriptions of relative activity in different markets in Anatolia during the Middle Bronze Age.

When were the marketplaces busiest?

Kültepe has yet to yield all its secrets, especially about the location of marketplaces in the city itself. And questions about regional markets still outnumber answers. Yet the Old Assyrian corpus has recently become quite important in terms of chronological value. Time is another important dimension of the phenomenology of the trade. The state of Aššur named its years after a high official, called the *limmum*, not unlike the later Roman Republic did after two consuls. Based on later sources and the timing of the choice of the official, the selection may have been done by lot, from an elite group (DERCKSEN 2004, 56-58; LARSEN 2015, 123-125). The sequence of year eponyms is now known through seven mostly overlapping docu-

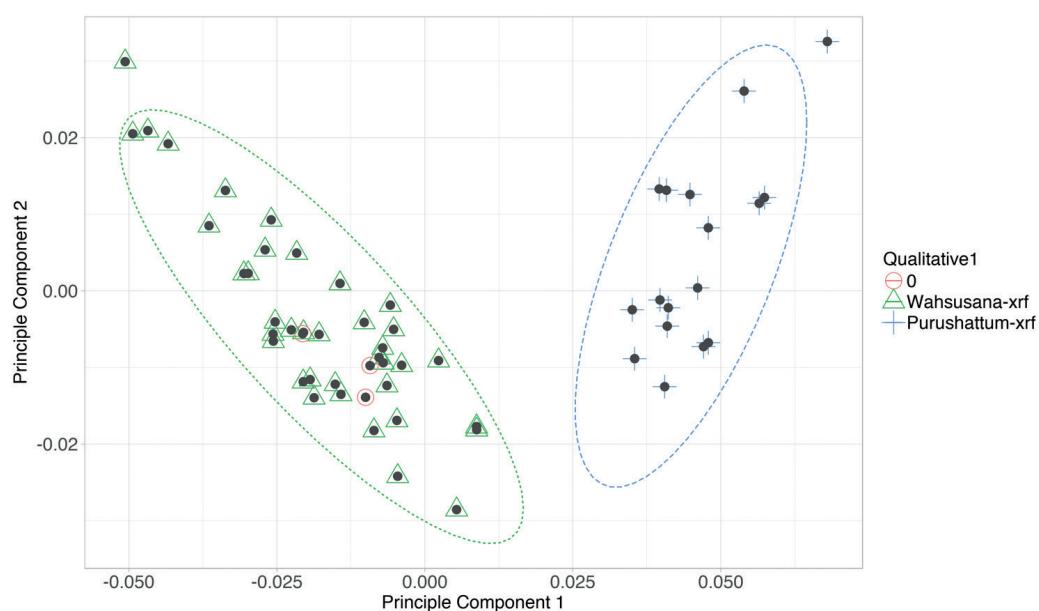


Fig. 8. Principal component analysis of “high confidence” tablets from Šalatuwar, Waḥšušana, and Puruḫattum using Cr, Mn, Sr, Zr.

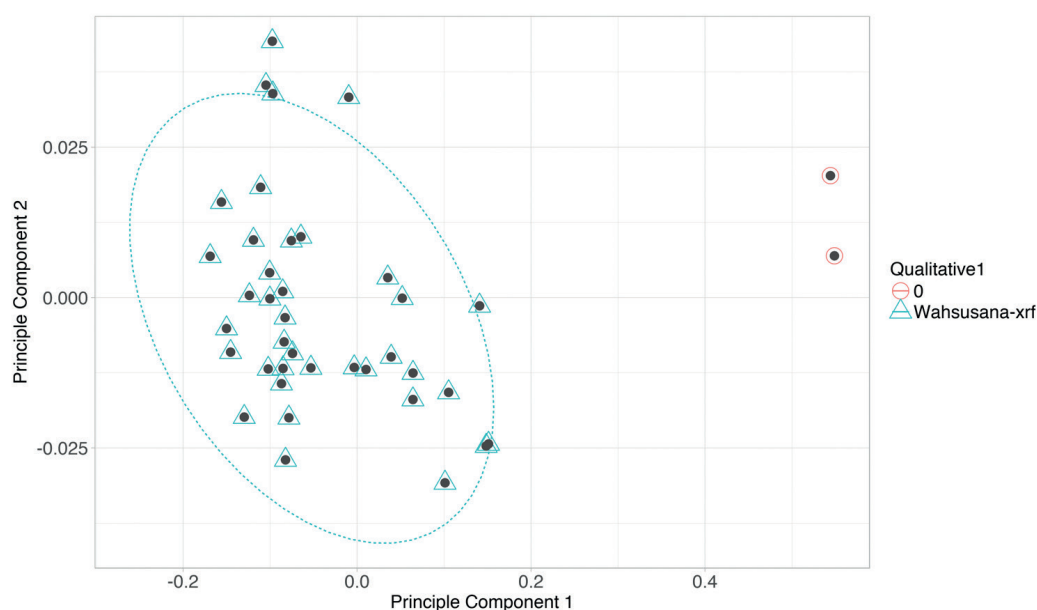


Fig. 9. Principal component analysis of “high confidence” tablets from Šalatuwar and Waḥšušana using Ti, Cr, Mn, Sr, Zr.

mentary witnesses, providing an almost unbroken sequence of roughly 150 years. The resulting numbered series have been called the Kültepe Eponym List (KEL – VEENHOF 2003) and Revised Eponym List (REL – BARJAMOVIC *et al.* 2012), though the two differ by only one year during the best documented period of the Old Assyrian trade. (REL numbering is used here.) The annual chronology of the Old Assyrian trade is now well understood and has become an important dimension of early 2nd millennium chronology for Western Asia (MICHEL/ROCHER 1997; VEENHOF 2000; 2003; 2007; GÜNBATTI 2008; MANNING *et al.* 2017). Though absolute chronology has come to the fore in Old Assyrian studies, a sense of the seasonality of activity within marketplaces is still emerging. Here, we will attempt to begin using the Old Assyrian evidence to flesh out such a sense for Anatolian markets during the Middle Bronze Age.

Some aspects of seasonality are well understood. For example, each winter, the passes of the Taurus Mountains closed, as snows made them impractical to cross. This was so pronounced a disruption that messages from the home city of Aššur could not be communicated to Anatolia until the spring. This is well known specifically, not because it is well described in any one letter, but because of the disruption of communicating information about the name of the new eponym, which was chosen by lot each winter solstice. Communication was still possible in November each year, but by the winter solstice communication had halted, and Assyrians in Anatolia did not learn the new eponym until the first travelers came in the spring. As a result, Assyrian merchants in Anatolia had to date their documents by describing the year as essentially ‘the year after the year of so-and-so.’ Thus we know that the transportation and communication of the trade, at least between Aššur and the Anatolian region, was disrupted for about four months each year (LARSEN 1974; VEENHOF 1996; DERCKSEN 2011). As a result, any strategizing with regard to transporting had to take place within the roughly eight-month period from roughly early April to late November each year.

Despite the chronological importance of the Old Assyrian corpus in absolute chronology of the 2nd millennium, most documents in the corpus were not dated when composed. For example, when writing letters, Old Assyrian merchants did not record a date at the beginning, as is the common practice today. (Recording dates for letters was never a practice in the cuneiform tradition writ large.) The only texts consistently dated in everyday practice were debt notes, but these represent less than 10 % of the published material. Debt note records serve as a proxy for the transactional activity of credit transactions associated with buying and selling merchandise, mostly at the wholesale level. Many of the debt transactions recorded in these notes were associated with either settling accounts

at the arrival of a caravan or transferring lots of merchandise to other merchants transporting it to other cities in Anatolia, and, in turn, converting the merchandise into some other form. We have far less debt note documentation of Assyrian merchants selling tin and textiles to Anatolians through local marketplaces than we do for Assyrians selling goods to other Assyrians at the wholesale level. Thus, the measure of transactions surveyed here must be seen as one aspect of the commercial exchange at market places, rather than a direct measure of all marketplace activity in any specific locale. There was likely some relation between these measures, but how direct the relation is will need to be more thoroughly explored.

Data from debt notes has been used as evidence to resolve other questions. For example, an analysis of the most common term lengths in *hamuštum* weeks provides good evidence that the length of that week was, like the modern week, seven days (VEENHOF 1996). In the present study the dates recorded on debt notes are used as a gross measure of seasonality of the marketplace. In so doing, it must be acknowledged that a number of factors cannot yet be resolved, suggesting caution in interpretation of the intermediate results presented here. The data is not directly representative of Assyrian transactions in several ways. First, any distortion buried in the difference between surviving and lost evidence is difficult to determine, but it is quite clear that what remains is only a tiny fraction of the original volume of documentation. Second, not all recorded dates on dated debt records are sufficiently unambiguous to be useful in this study. Debt records could be dated to month, but could also be dated to an individual week, named after different officials (*hamuštum* officials), the schedule of which is not yet sufficiently understood. Third, a small number of the month attestations, estimated to be about 5% in this data, come from legal documents and letters where the reference is sometimes, but not always, to a debt relationship.

In addition to issues of representation, we must recognize some fuzziness of the data resulting from issues yet unresolved with the Old Assyrian calendar. The Assyrians practiced a lunisolar calendar. It was lunar in that each month was marked by the appearance of a new moon. But unlike the Muslim calendar, the Assyrian months stayed in roughly the same place each year. This was accomplished by the keepers of the Assyrian calendar who inserted an intercalary month during the winter about every three years, re-aligning the lunar months in relation to the solar cycle. None of this is explained in the documentary record, but a residue of the practice is preserved. The decision to intercalate was made ahead of the wintertime new year, connected to the winter solstice. But the decision of the name of the new year was not made until the beginning of the new year. Because of the disruptions during the winter mentioned above, the Assyrians in

Anatolia dated their records in a way that indicated they knew about an intercalary month, but not the name of the new year, thus allowing us to detect this situation. However, the complete schedule of intercalation is unknown, and clearly not every intercalary month is attested. As a result, though a model has been proposed (STRATFORD 2015) and refined (DE JONG 2017), the data here cannot yet be fully coordinated to the solar cycle. For example, in this data, if the fourth month of the Assyrian calendar started around the middle of March one year, it could have ended by the fourth week of March two years later.

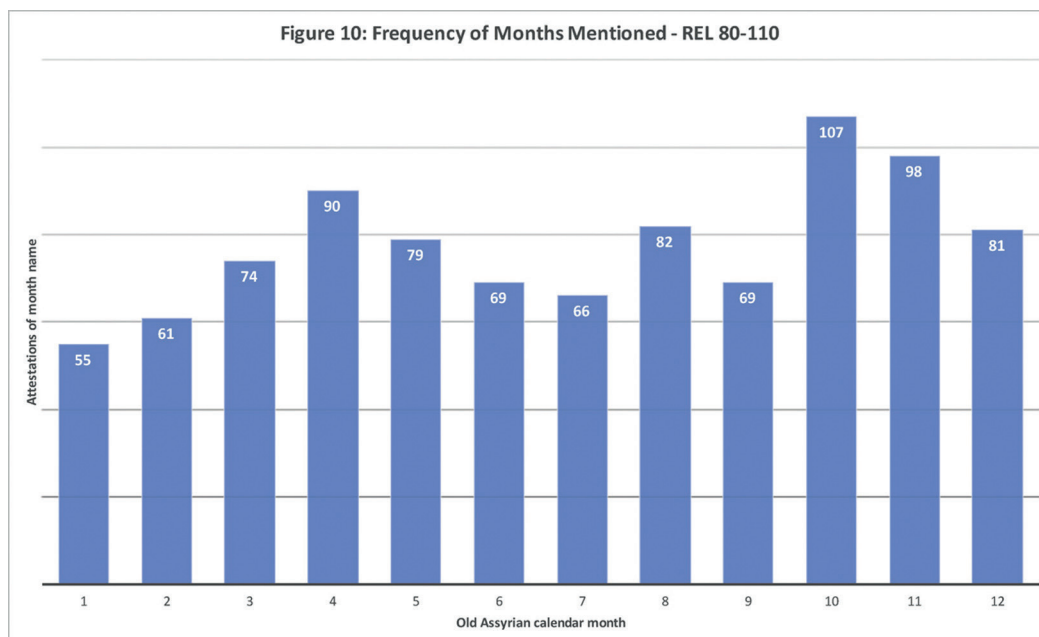
The seasonal ebb and flow of commerce can be discerned by aggregating the dates on documents associated with debt notes. Essentially, we can provide an initial representation of the number of debts recorded in regard to different months in the year. Fig. 10 shows the distribution of months associated with debt engagements. A total of 1199 descriptions of months were indexed from 873 texts out of a database of over 10,000 texts. Of these, 1178 were located in a particular year, and of these, 938 were located in the span between REL 80 and REL 110, with the result that there was an average of 30 descriptions of month-dates per year. This represents the most densely documented period of the trade, though it is clear from the resulting date descriptions that for much of the documentation, an approximate date is the best that can be hoped for. Nonetheless, the aggregate month descriptions offer a gross measure of business activity by month through the year.

With the limitations noted above, fig. 10 shows that the data gathered manifests at least two discernible patterns. The first pattern is expected and corroborates the winter disruption. The number of debts related to the winter months, particular-

ly Old Assyrian months 1 and 2, roughly parallel to January and February, are lower than during the shipping season from April through November. This is consistent with our understanding that the bulk caravans ceased to operate during this period, and this lull in the supply would have affected the number of transactions undertaken during that period.

The months associated with the beginning and end of the shipping season, Old Assyrian months 4 and 11, present the highest number of transactions. This seems to suggest that commencement and secession of the shipping season was accompanied by a heightened number of transactions. This is consistent with recent work on the trade through a narrative lens, wherein merchants most intensively pushed transactions forward at the beginning and hurried to conclude them before the end of the season. Thus Fig. 10 corroborates what has been observed elsewhere.

But the third pattern is more difficult to explain. During the middle of the shipping season, a lull, and then a small spike, occur between Old Assyrian months 7 and 8, the ebb occurring essentially mid-summer. What this pattern means is not yet entirely clear, and a superficial interpretation must be cautiously avoided. It may be that the heat of the summer resulted in fewer shipments arriving, or there are a number of other possibilities which may have created this pattern, either in concert with the heat, or instead of it. However, the lull in the middle of the season is less pronounced if we see the activity level in month vi, for example, as the anomaly, as something that represented volume of activity after the business of the beginning of the season. It is likely that the lull was a result of the timing of the by the grain harvest, which, according to more modern parallels, would have



◀ Fig. 10. Chronological distribution of month dates during the year aggregated for years REL 80-110.

fallen in July and August (VEENHOF 2008b, 240-244). That this was a consistent practice, and that it was sufficient to incentivize merchants to forego entering into credit transactions is a reasonable assertion.

At the same time, fig. 10 provokes questions about the documentation itself which must be addressed in future studies. Specifically, is there a distortion in the data from the nature of the documentary record? The vast majority of recorded credit transactions aggregated in this data arise from one of two types of debt records, which differ by the expression of the conditions for repayment. In Type I debt records, the time at which penalty interest will begin accruing is stipulated by a term length, usually expressed in weeks or months, and less commonly in days or years, and extending from a stated commencement of that period. Some variations of formulae in the Type I debt records explicitly state that if the debt is not paid by the end of the term length, then the debtor will begin to pay the interest, thus clearly framing the interest as penalty interest. There is a consensus that the date of commencement roughly marks the date the transaction was initiated. However, there is not a consensus on interpreting dates in Type II debt records. In Type II debt records, it is simply stated that the debtor will begin paying interest from a stated date, with no other date included. One explanation understands the two different records to represent two entirely different types of loans, in which Type II loans are those in which interest begins at the date the capital is extended to the debtor (ROSEN 1977). A different interpretation holds that demanding different forms represent different types of debt relations manifests an attempt to eliminate temporal ambiguity through language, even though the temporal ambiguity was irrelevant for the original participants. Type II debt records could represent loans with immediately accruing interest, or they could also function to record the same kind of debt relation as Type I records clearly represent, one in which the interest is penalty, as evidenced in select cases described in letters sufficiently detailed to detect this more flexible practice (STRATFORD 2015). In Fig. 10, the data is not sorted by the two debt record types. However, if the majority of debt records relating to the first month of the shipping season, Old Assyrian month 4, are of the Type I debt record, while a majority of the debt records from the end of the season are of Type II debt records, then the pattern could be interpreted to support the second interpretation of Type II debt records. If no such pattern emerges, it may argue against that same interpretation. Whatever patterns can be identified will be of interest. A future study will need to refine this data and attempt to better model intercalation while distinguishing between the two different types of debt records.

Conclusion

While there is not yet satisfying archaeological evidence for marketplaces in Middle Bronze Age Anatolia, the textual record asserts that they were there. Perhaps in time some articulation of the space associated with marketplaces will be afforded by archaeological exploration. In the meantime, work on the Old Assyrian trade will continue to flesh out the scale of the trade, the geographical arrangement of the cities in which the largest of these marketplaces operated, and the rhythms of the season that must have affected the activity of these marketplaces. Work in pXRF and on the chronological cues of the debt records are two strands of research that promise to advance our understanding of Middle Bronze Age marketplaces.

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Address of the author

Edward Stratford
2123 Joseph F. Smith Building
Brigham Young University
Provo, UT 84602
USA

edward_stratford@byu.edu

Marketplaces in Egypt in the first millennium BC: Locating an elusive mode of exchange

by ELSBETH M. VAN DER WILT¹

Marketplaces, ancient Egypt, temples, trade, weights, first millennium BC

In this paper, I argue that identifying a set of characteristics for (physical) marketplaces – in many ways applicable cross-culturally and diachronically as other papers in this volume show – allows me to suggest a hypothesis for locations of physical marketplaces in Egypt during the first millennium BC. As there is a lack of direct evidence, I build up a case by combining a variety of sources: documentary as well as literary references, the limited archaeological remains, weights and coins. I suggest that dromoi in front of temples, and perhaps on occasion the temple terraces, were likely locations for marketplaces (for long-distance trade) where goods could be exchanged that required the security of institutional oversight. Moreover, I argue that the element of institutional oversight by the temples is key. Temples demonstrably are an important interconnecting feature elsewhere in the Mediterranean from the Late Iron Age onwards when they formed a very visible part of the identity of newly established settlements. This hypothesis is further reinforced in my view by examples from the Roman period in Egypt and in the Levant, where much commercial activity took place at temple gates.

Marktplätze in Ägypten im 1. Jahrtausend v. Chr. Zur Lokalisierung einer schwer fassbaren Austauschart

Marktplätze, Altägypten, Tempel, Handel, Gewichte, 1. Jahrtausend v. Chr.

In diesem Beitrag wird argumentiert, dass die Identifizierung einer Anzahl von Charakteristiken für Marktplätze – die in mancher Weise kulturübergreifend und diachron auftreten, wie andere Beiträge in diesem Band zeigen – zu einer physischen Lokalisierung von Marktplätzen im Ägypten des 1. Jahrtausends führen kann. Aufgrund des Mangels an direkten Hinweisen wird hier eine Herangehensweise entwickelt, die verschiedenes Quellenmaterial kombiniert: schriftliche Dokumente, literarische Verweise und die begrenzten archäologischen Reste, einschließlich Gewichte und Münzen. Hier wird vorgeschlagen, dass die dromoi der Tempel, und bei Bedarf auch die Tempelterrassen, die wahrscheinlichen Orte der Marktplätze (für Produkte des Langstreckenhandels) darstellten. Dort konnten Waren ausgetauscht werden, die der Sicherheit einer institutionellen Kontrolle bedurften. Diese institutionelle Kontrolle ist gleichzeitig der Schlüssel zum Verständnis dieser Anlagen. Tempelanlagen sind nachweislich ein bedeutender verbindender Aspekt auch anderswo im Mittelmeerraum von der Späteisenzeit an, seitdem sie einen sehr sichtbarer Bestandteil von neu gegründeten Siedlungen bildeten. Die Hypothese wird durch weitere Beispiele aus der römischen Epoche in Ägypten und der Levante unterstützt. Diese zeigen, dass kommerzielle Aktivitäten an den Ausfalltoren der Tempel stattfanden.

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Introduction

In Egyptological literature, the emphasis has been on temples as the main economic players and consequently, transactions outside this sphere were considered a negligible part of the Egyptian economy. This view is now strongly challenged (JANSSEN 1975a, 539-562; 1975b; 1980, 7; WARBURTON 1998; GARRATY/STARK 2010; CARPENTER *et al.* 2012; JURSA/MORENO GARCÍA 2015, 147). Eyre, for example, argues that the basic economic unit in Egypt was the household, *i. e.* the 'local family-based enterprise' (*e. g.* EYRE 1999, 45-47, 52). Both in ancient history (*e. g.* MONROE 2009, 7-9; BRESSON 2016, 1-27) and Egyptology (KEMP 2006, 302-335; COONEY 2007, 8-16; ZINGARELLI 2010, 113-115; MORENO GARCÍA 2014, 219-222; MUHS 2016, 4-5, esp. n. 11-12) there is a growing understanding that this *substantivist* approach does not satisfactorily explain the reality of life and that there is a need to move beyond this theoretical dichotomy of substantivism vs. formalism. There has been an increased scholarly interest in markets: ZINGARELLI (2010) addresses it directly for the New Kingdom and MUHS (2016) considers them an integral part of the economy from the perspective of New Institutional Economics as markets reduce transaction costs. Moreover, even a redistributive economy with an extensive bureaucracy does not preclude further barter or personal enterprise.

Marketplaces occur on local, regional, and inter-regional scales, and as a physical space can be elusive. Local markets are mostly informal and governed by implicit social rules for which archaeological traces are rare. I concentrate on the regional and inter-regional markets where I assume that for the transactions of high value, a guarantee of some kind – a social contract – to inspire trust would be required. A guarantee would be provided by an institution so that actors would not be cheated and that weights circulating in the marketplace are correct. The idea of a market near a temple is hardly new (*cf.* BIGA 2006), but in view of the paucity of evidence, it is necessary to focus on the role of the Egyptian temple and to use several types of evidence. In particular, I combine the following: (contemporary) written sources such as Herodotus, temple graffiti and (documentary) papyri; oversight by the temple authority; the use of standard weights and measures and coinage; topography; and a physical space for exchange with any associated permanent architecture.

Written or pictorial sources

In his inaugural address as Professor of Egyptology at Leiden University in 1980, Janssen discussed the marketplace on the riverbank in ancient Egypt. He did so by exploring the semantics of the word *mryt* for riverbank, and by surveying

tomb scenes from the Old Kingdom through to the New Kingdom. He regarded the rarity of the depictions as being connected to the social stratum of the tomb owners: only high officials would have been interested in (and had the means to show) such commercial scenes, as they most likely had a professional role to play in the negotiation between the foreign ships and the Egyptian bureaucracy, and by extension the wider population (JANSSEN 1980, 9). Janssen ended his survey at the end of the New Kingdom – the late 2nd millennium BC – and concluded on an apologetic note that there is very little evidence for marketplaces in general. Unfortunately, the situation does not improve in the 1st millennium BC. For this long and turbulent time in Egypt there is a general paucity of evidence compared to the previous phases of Egyptian history: written sources come to focus on religious concerns rather than daily life (JANSEN-WINKELN 2015, 38-39), and the archaeological record in the Nile delta is poorly preserved, destroyed, or locked under the water table. This is especially unfortunate, as this area in the north of the country was the politically dominant part of the country at this time, as well as the grain basket of Egypt.

To my knowledge, Egyptian pictorial evidence for markets is non-existent in the 1st millennium BC. Tomb scenes showing a market such as those from earlier periods in Egypt are completely absent. There are only two depictions of weighing in tombs, but they are examples of weighing metals, not of markets. The first scene is in the Theban tomb of Ibi, royal chancellor of Psamtik I and Chief Steward of Psamtik's daughter, the God's Wife Nitocris, who lived during the early twenty-sixth dynasty and whose tomb decoration is strongly inspired by that of a namesake from the Old Kingdom (DE GARIS DAVIES 1902, 36-40, pl. XXIV; SCHENKEL 1977, 420-421; KUHLMANN/SCHENKEL 1983). The second example is a weighing (of metal) scene in the tomb of one of the most important officials of the 4th century BC: the high priest Petosiris in Tuna el-Gebel (LEFEBVRE 1924, 54-55 inscr. 32, pl. VIII-IX). There are no further depictions in Ptolemaic tombs.

Relations between Egypt and the Levant as evidenced by the archaeological record clearly continued without interruption, waxing and waning continuously throughout the first half of the millennium indicating fluctuations in economic, diplomatic and/or imperialistic connections (MUMFORD 2007). The wealth of data and the presence of objects suggesting trade show that there must have been continued, important diplomatic and commercial ties between Egypt and the Levant (BRUGGE 2017). They do not, however, suffice to say anything about the mode of exchange involved; after all, the difference between a gift and a commodity is in the mind and not inherent in the object (MANNING/HULIN 2005; BACHHUBER 2006, 349-351; MONROE 2009, 8).

Textual references hinting at marketplaces are scarce. The *Tale of Wenamun*, situated in the late New Kingdom, is a rare example of an indigenous text describing, fictionally or not, many aspects of life in Egypt. It details a (likely) fictional long-distance trade voyage where the protagonist travels from Egypt to the Levant (LICHTHEIM 1976, 224-230). He is robbed of the large quantities of gold (5 deben) and silver (31 deben) he brought to *pay* for the timber he was tasked to buy (LEPROHON 2004). This payment is in contrast to the preceding New Kingdom where foreigners bringing goods would be depicted as bringing *tribute* – thus suggesting an unequal power relationship – although it is questionable how accurate (or biased) this reflection of a visit by foreigners actually was². In the tale, the precious metals are intended to be exchanged, and a similar practice of weighing silver is evidenced in contemporaneous Egyptian contracts (JURMAN 2015, 61-63). Furthermore, Wenamun brings gold and *silver* as payment, even though Egypt does not have notable silver sources in Egypt. Silver also seems to grow in importance in the assemblages of the both royal, elite and non-elite burials during the 21-25 Dynasties, *i. e.* the first half of the millennium (JURMAN 2015).

The Egyptian word *mryt* for riverbank or quay, can also have the meaning of a place to disembark, in other words a harbour (Wb II, 109; CERNÝ 1973, 93-97; JANSSEN 1980, 11-17; EYRE 1998, 177 n. 22). The river and boats would be the main artery and mode of transport. As such the riverbank was the natural meeting place and the river itself especially in Egypt a centrifugal force for the state (BROODBANK 2013, 396). The phrase *pr-mryt*, 'domain of the port' as it is often translated, is used in reference to Naukratis and several other sites (GAUTHIER 1925, 86-88; YOYOTTE 1982-1983, 130-132), and probably refers specifically to the economic aspect of a harbour (GAUTHIER 1925, 87; AGUT-LABORDÈRE 2012, 359-360). Naukratis, a mixed Egyptian and Greek settlement on the Canopic branch of the Nile and home to a series of Greek temples, was inhabited from the late 7th century BC onwards. It is called a *pr-mryt* on two nearly identical stelae of Nektanebo I (c. 380 BC). The text on these two stelae is an Egyptian royal

decree about a change in customs taxation streams found in Thonis-Heracleion (SCA 277; VON BOMHARD 2012) and another further upstream in Naukratis on the same Canopic branch of the Nile (JE 34002; ERMAN/WILCKEN 1900; BRUNNER 1965, pl. 23-24; LICHTHEIM 1976; 1980, 86-89). This most western Nile arm was the only point of entry to Egypt allowed for Greek traders according to Herodotus (*Histories* II 179), and an important branch of the Nile for long-distance trade.

The Greek historian Herodotus visited Egypt in the late 5th century BC. In his *Histories* Book II dealing with Egypt there are several passages describing Egyptian markets (II, 35, 39, 138). In *Histories* II 138 he describes the temple of Bubastis, a temple in the eastern Nile Delta, with a paved road (*dromos*) leading to the temple gate, going through the *agora* in Greek, translated here as 'city square' (translation from WATERFIELD 1998, 150-151):

"This is what the sanctuary of Bubastis is like. Only the entrance stops the whole thing being an island, because there are two canals drawing water from the Nile, one flowing around one side of the sanctuary, the other around the other side, and they both end just by the entrance, without joining. [...] A road, which is four plethra wide and paved with stones, starts at the entrance to the sanctuary, and runs for about three stades eastwards through the city square. Here and there along the side of the road, which ends at the sanctuary of Hermes, there are trees growing which seem to touch the sky. Anyway, that is what this sanctuary is like."

An important question concerns the reliability of Herodotus: whether he has embellished situations and stories, and who his sources were (*e. g.* LLOYD 1975; 1976; 1988). In his study on Egyptian market women for example, Eyre believes that Herodotus' descriptions with respect to the place of Egyptian women in the marketplace contain 'gross errors' and were 'written for rhetorical effect', as he draws out the contrast between Greek and Egyptian women (EYRE 1998, 173-174; *cf.* LLOYD 1976, 147). In the passage quoted above, however, Herodotus describes the temple of Bubastis in recognizable detail as known from the archaeological record in Bubastis and from the general tradition for Egyptian temples (LLOYD 1988, 94-97). Thus, it is reasonable to consider the reference to the *dromos*, a paved road, crossing the marketplace (*agora*) as most likely accurate. I will return to this idea of markets close to the temple below.

Written sources from the Ptolemaic period only offer mostly indirect hints of marketplaces with references to boats owned both privately and institutionally that seem to have carried cargo for exchange (VINSON 1998, 72-73 [private ownership], 120-122, 138 [references boats owned by temples]; MUHS 2016, 246).

Greek papyri from the Ptolemaic period found in Saqqara give glimpses of life in the necropolis-town on the desert escarpment, and there are

2 Private and palatial enterprise in the Late Bronze Age may not be mutually exclusive, for a discussion of this question for the Uluburun, see BACHHUBER 2006. Scenes in Theban tombs show Syrians, Nubians, and less often Aegeans bringing items before Egyptian dignitaries, *e. g.* DE GARIS DAVIES/FAULKNER 1947 (Syrians); VERCOUTTER 1956 (Aegeans); PANAGIOTOPOULOS 2001 (on the historicity of the scenes). Care, however, should be applied when studying these scenes and drawing conclusions from them, even if some are records of historical events, as 'hybrids' in depictions of foreigners can be recognized, as well as the possibility of pattern books (and copying) influencing tomb decoration, *cf.* WACHSMANN 1987, 4-26; even in the diplomatic Amarna correspondence of the Late Bronze Age an entrepreneurial mentality with 'keen awareness of value' is visible under the polite veneer, see BROODBANK 2013, 398-399.

references to both shopkeepers and marketplaces. For example, in UPZ 12 (Papyrus Louvre 2364) Apollonius describes a dispute with the sons of the owner of a “bulrush shop attached to the said [Serapeum] shrine”, which he details in two slightly differing drafts on the same papyrus (l. 12-15; WILCKEN 1927, 147-149). According to the text this took place on 23rd July 158 BC. It is possible that the owner of this bulrush shop can be equated to the owner of the bulrush shop mentioned in UPZ 98 (WILCKEN 1927, 426-439), *if* one accepts the demotic version of the Greek name in a different demotic document (REICH 1933, 152-154). If this is indeed the case, the shop was run by a family of priests. Apollonius’ older brother was Ptolemaios son of Glaukias, whose papers were discovered in Saqqara in the 19th century. He was a *katochos* or recluse in the Serapeum in Saqqara. He received, for a while at least, an allowance from the temple, but he also maintained other income streams through trading pieces of linen and a sort of porridge (RAY 2001, 134-135). This snapshot hints at the close relationship between the cultic and commercial activities in this town on the desert plateau.

A cloth merchant, a grain merchant, a baker, a doctor, a dream interpreter and people carrying loads and sacks all appear in Greek papyri from the Serapeum area (OTTO 1905, 283-285). It is clear that much commercial activity took place in the settlement, both in shops and in marketplaces. There is in fact another document from the same archive from Saqqara, in which Ptolemaios son of Glaukias petitions the king on behalf of two women – twin sisters – and in which they describe the house of their father as ‘by the river near the Egyptian agora’ (UPZ 19, 163 BC). It is unclear where the agora, or market, should be located topographically except that it was near the river in an unknown settlement, perhaps an Egyptian market on the bank of the Nile in Memphis, but the specification of an *Egyptian* agora suggests there were at least two different markets or agoras.³ Finally, a *dromos* grain measure is mentioned in Greek grain loans suggesting a standard measure for a market on the *dromos* (OTTO 1905, 284 no. 5-7, 287), and elsewhere in several instances in Greek papyri from the Ptolemaic period in the Fayum (CALDERINI 1924, 106-108). Moreover, this phenomenon is paralleled in demotic grain loans from Saqqara from the late second and first half of the 1st century BC (THOMPSON 1988, 26 n. 101).

In short, the Egyptian word *mryt* means both riverbank and the connotation of economic activity there. This is naturally strengthened by the

dominance of the Nile in the landscape as the main means of transport. The reference in Herodotus specifically describing the temple dromos running through the market (*agora*) is attractive for two reasons. First, there are the slightly later Ptolemaic Greek and demotic sources that mention an Egyptian agora, perhaps a shop owned by a priest, and a standard measure of the dromos. Secondly, on a practical level the wide and paved processional road used for processions would offer a space for the market, as Egyptian settlements are typically characterized by an organic and dense, agglutinating layout of mudbrick buildings. In the remainder of this paper I turn to the ways the temple shaped the activities in its vicinity, for example at its gate and on the dromos.

Organisation and control

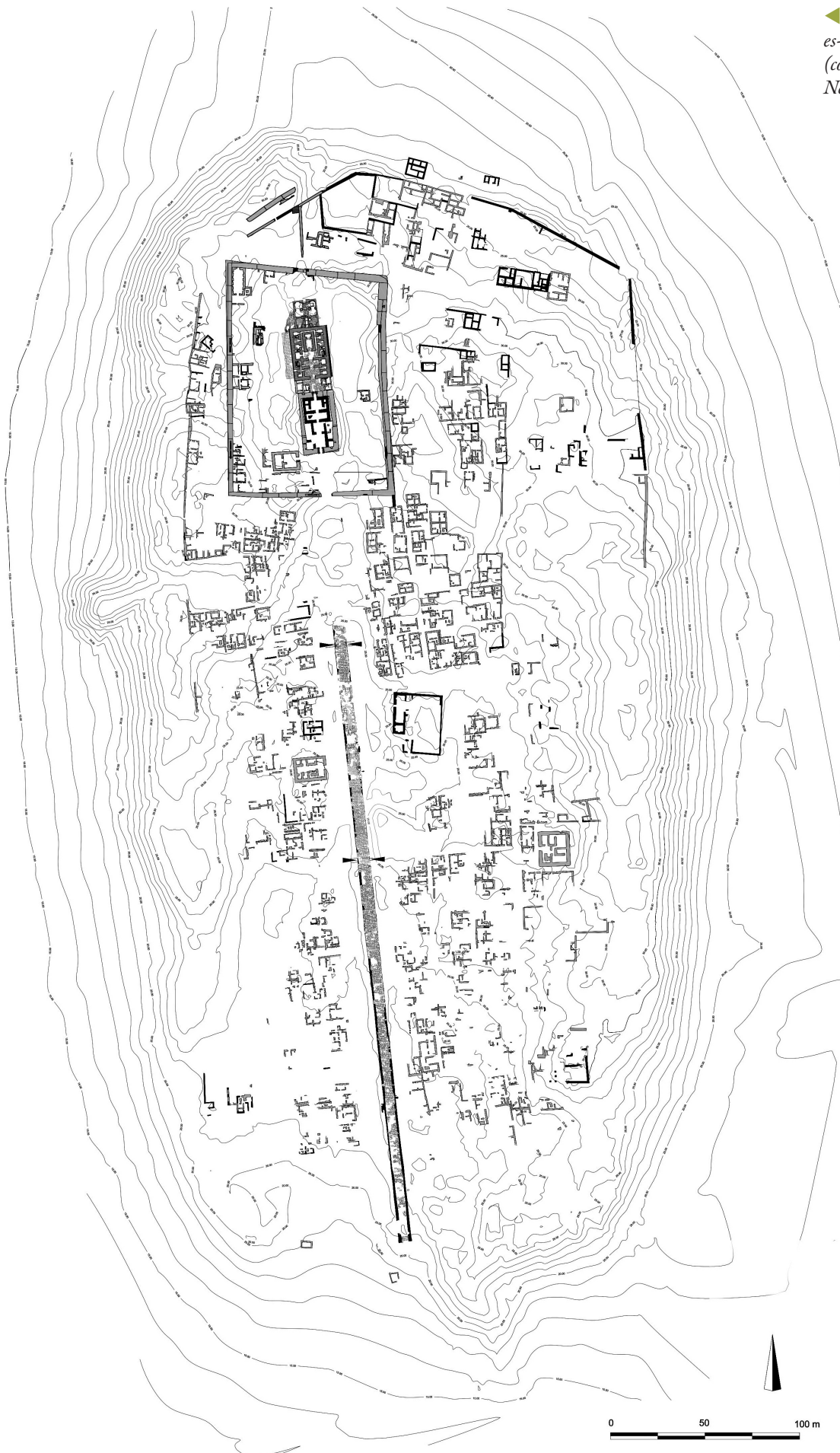
Apart from being a religious institution, Egyptian temples fulfilled an important legislative role. Judicial courts, called *genbet* courts, are associated with temples in the New Kingdom. On the basis of the expressions used, the physical space where justice was administered is located specifically at gates and porticoes at the entrance of the temple, or at open spaces limited by gates from the Old Kingdom onwards (SAUNERON 1954; VAN DEN BOORN 1985, 1-15, esp. 7-8; ALLAM 1991, 110-111 n. 6). This is significant, because Egyptian temple buildings were closed and inaccessible to worshippers, so it seems the area in front of the temple and roads leading from there were important areas for communication between the deity (and temple personnel) and the general populace at festivals for example. The dromos is the paved road, often an extension of the temple axis, leading away from the temple and used for processions. Similar to earlier periods, Egyptian settlements in the 1st millennium lack open space, such as a city square, and in the Fayum (where the layout is better known than elsewhere in Egypt) the residential areas develop around the temple and the dromos (DAVOLI 2005, 226, 231-233; 2010, 363). The map of Soknopaiou Nesos as it is visible on the surface today, shows the dominance of the dromos in the landscape clearly, even though in this particular case it was probably only used as a processional way as access was restricted by raising it 3m above the streets running parallel to it (DAVOLI 2011, 74; for 3D reconstructions, see DAVOLI 2018, 405 fig. 13-14) (Fig. 1).

A *direct* association between a judicial hall – which in earlier periods consisted of elders on a village level, to the vizier and high courtiers on a national level – and the temple (authorities) is not borne out by Late Period evidence, only from later Ptolemaic documents (ALLAM 1991, 117 n. 45, 119-121).

As the front of the temple is often the venue for adjudicating and resolving conflicts, it seems

3 A 3rd century CE Greek papyrus from Herakleopolis (Vienna, Nationalbibliothek G2052, 30 August 246 CE) mentions a Greek agora and agoranomos, see JOHNSON 1936, 276 no. 168; for more instances of the mention of an agora in the (mainly Roman and thus beyond the scope of this paper) papyri, see LITINAS 1997.

◀ Fig. 1. Plan of Dime es-Seba/Soknopaiou Nesos (courtesy of the Soknopaiou Nesos Project 2017).



reasonable to assume that the temples as the religious authority and a major economical player also provided oversight to the transactions in the marketplace using temple-sanctioned weights, similar to the way *agoranomoi* policed the agora in Athens (OLIVER 2012). Janssen also discussed oversight of the marketplace, which is necessary to ensure trust in the transactions taking place. One of the New Kingdom officials, May, carries the title of “overseer of the *mryt* of the southern city,” by which Thebes is meant (JANSSEN 1980, 22 n. 28). Ostrakon O. Gardiner 53, also from the New Kingdom, has a court of four administrators of inside [the village] and four administrators of the *mryt* in a case concerning the death of a loaned donkey and her foal (CERNÝ 1973, 96 n. 10), but this example seems to be an isolated case. In Old Kingdom tomb reliefs, the only indication of oversight is suggested by the depictions of *guenons* on leashes biting an individual (MOUSSA/ALTENMÜLLER 1977, 82 Scene 11.2.24, pl. 27b, for the baboon see Scene 11.2.1; ALTENMÜLLER 1980, 1192), suggesting that the *guenons* were present and used by the authority as a deterrent to frauds and thieves.

Herodotus mentions Greek *prostatai tou emporiou* at the head of the emporion in Naukratis (*Histories* II,178). The earliest hint is found in a foundation stela, provenance unknown, from the reign of Taharqa arranging provisions for a temple of Amun in Memphis (JE 36861; MEEKS 1979; AGUT-LABORDÈRE 2012, 316). It mentions overseers of the *šwtjw*, the Egyptian word for traders, of the port of Memphis, who have to provide the temple with a measure of oil. It is not clear what exactly the responsibilities of the overseers would be, but what is clear that there is hierarchical stratification within the group of traders.

For the following Ptolemaic period, there are several titles that are interesting in terms of temple control, although it is not clear whether those people are (also) controlling the marketplace, or more likely generally the flow of commodities through the temple. QUAEGEBEUR (1979, 721-723, esp. n. 67) discusses the difficulty establishing the exact remit of the royal scribe and his role in relation to the temple clergy, since this seems to overlap. Interesting titles are the *hrj h3j*, overseer of measuring, who, Quaegebeur suggests, may have overseen the measuring of grain – the verb *h3j* used in connection with grain – on the *dromos* (QUAEGEBEUR 1979, 722 n. 70). The title of *mr/irj mh3.t*, overseer/attendant of the balance, is attested in the Ptolemaic period and here, too, holders of the title hold priestly titles (YOYOTTE 1969, 136). Whether there is a connection between these two titles – overseer of measuring and overseer/attendant of the balance – is not clear (QUAEGEBEUR 1979, 722 n. 71). For further illustrations of how the temple organized or regulated transactions, I turn to standard weights and the qualifications of weights in Demotic and Aramaic documents.

Standard measures and measuring

Weights of silver were the standard measure of value in the Late Period and increasingly used as medium of exchange. In the Persian Period (525-404 BC) and the 4th-century battles with the Persians under the final indigenous dynasties until the second Persian domination and the arrival of Alexander the Great I 331 BC, this created “a partial unity of measures of value and media of exchange”, “theoretically allowing imported coins to be treated as abstract tokens” when they are equated with Egyptian weights (MUHS 2015, 93). What this equation means in practice for silver exchange has been the subject of debate. Suggestions range from the control of official weights (VLEEMING 1991, 87-89 n. uu), or stamped ingots (PRÉAUX 1939, 273-274; VARGYAS 2004; MANNING 2010, 131), to the fineness of the (silver) alloy used in transactions all regulated by a temple (MÜLLER-WOLLERMANN 2007), in light of the qualifications of the *deben* ‘of Harsaphes’ and ‘of the Treasury of Thebes’ in abnormal hieratic, and ‘of Ptah’ in Demotic texts.

The grain (volume) measure of the *dromos* occurs in Greek and Demotic documents (see above). An ostrakon from Khargeh Oasis from 407 BC, o.Manâwir 788 rto l.2 mentions “a measure of Harsiese, son of Wenamunheb”, *i. e.* a personal vessel, in relation to measuring barley (*it*) (MENU 1998, 396-399). Perhaps the *dromos* measure was a standard measure that was checked and administered by the temple in the vicinity, but to my knowledge no vessels have been preserved with an inscription connecting the measure itself to a temple or temple treasury (POMMERENING 2005, 390-416).

From the qualifications, already briefly mentioned above, of the *deben* of individual temples it is clear that the temple provided a benchmark or reference kept in the treasury. More detailed studies of the exact phrasing of the equivalency formula in Demotic documents have attempted to identify whether standard weights imply bullion or whether something akin to coins were exchanged. The phrasing changes from ‘*deben x of silver of [insert a reference to a treasury]*’ in abnormal hieratic to ‘*silver, x deben of [insert a reference to a treasury], of refined silver*’ in early Demotic texts, when that language and script replaced abnormal hieratic in Thebes during the twenty-sixth dynasty (664-525 BC). Subsequently, Vleeming argues that the temples must have used official weights, and not checked the alloy (VLEEMING 1991, 88-89). In favour of this argument he cites a parallel in a 5th-century Aramaic text that refers to ‘weights of Ptah’ and a 4th-century elaboration of the formula (see below) to include ‘pieces which are in the Treasury of Ptah’.

Similarly, and contemporaneously with the Demotic sources, an equivalency between a *shekel* and the stater makes its appearance in the Aramaic documentary evidence from the Persian garrison in

Elephantine. Amounts of silver are expressed in the Near Eastern (Persian) units of *mina*, *karsh*, *shekel*, and subdivisions of the *shekel*. I follow P. NASTER (1970) in taking these as weighed metal units, and not as coins, although the lighter units could well have been easy to exchange with coins. In November 408 BC, just 4 years after the first mention of the stater in Ayn Manawir, the stater occurs as the second element in an equivalency with the Persian weight system in a debt acquittal from Elephantine (GRELOT 1972, 86-87 no. 6). The second position (e.g. 1 *karsh* 4 *shekel* = 7 stater), however, should be simply interpreted as an accounting unit and cannot be taken as an indication in itself that Greek staters were physically present (AGUT-LABORDÈRE 2014, 79).

There are two more from Elephantine: a document dating from 402 BC in which the price of a house is expressed in 'Ionian silver' also in the second position of the equivalency (GRELOT 1972, 255-262 no. 53), and another debt acquittal document dating from 400 BC where the stater again appears in the second position of the equivalency (GRELOT 1972, 87-89 no. 7). Weights 'of the treasury of Ptah' occur once in the archive in a loan in one of the oldest documents dating from either 479 or 457 BC (GRELOT 1972, 79-81 no. 3).

Archaeologically, there is some evidence that weighed amounts of silver were carried around in pouches, for example in a hoard find of the twenty-fifth to twenty-sixth dynasty, ca. 750-600 BC, from Elephantine (NOESKE 1991; 1993, 204-205, pl. 38a; JURMAN 2015, 61-63; cf. PORTEN 1968, 64 n. 10). Silver would of course be used for high value transactions and not for barter of foodstuffs in a normal village market. Hoards in general demonstrate a continuous presence of silver, both in *Hacksilber* and over time in coins. The coins, mainly Attic tetradrachms from 480 BC onwards, sport cut marks that suggest that the coins were still weighed and used as bullion at first, and gradually the practice became akin to a countermark (VAN ALFEN 2002, 6-7; 2011, 59 chart 1). It is unclear who is doing checking and monitoring of the silver coins (see below).

Following VLEEMING (1991), I argue that mentions of the 'stones of Ptah' and other temple treasuries strongly suggest that they at different points in time kept official weights to regulate transactions in silver (see below).

Temples and coinage

Consequently, it was perhaps only a small step to start minting coins in the temple. In fact, imitation Attic tetradrachms were plentiful in the 4th century in Egypt and the Levant, as well as in the agora in Athens (VAN ALFEN 2005). The numismatist Buttrey argued that the Egyptian imitations were minted at the temple of Ptah in Memphis (BUTTREY 1982; 1984). From Ayn Manawir comes evidence that also points in this direction. Ostra-

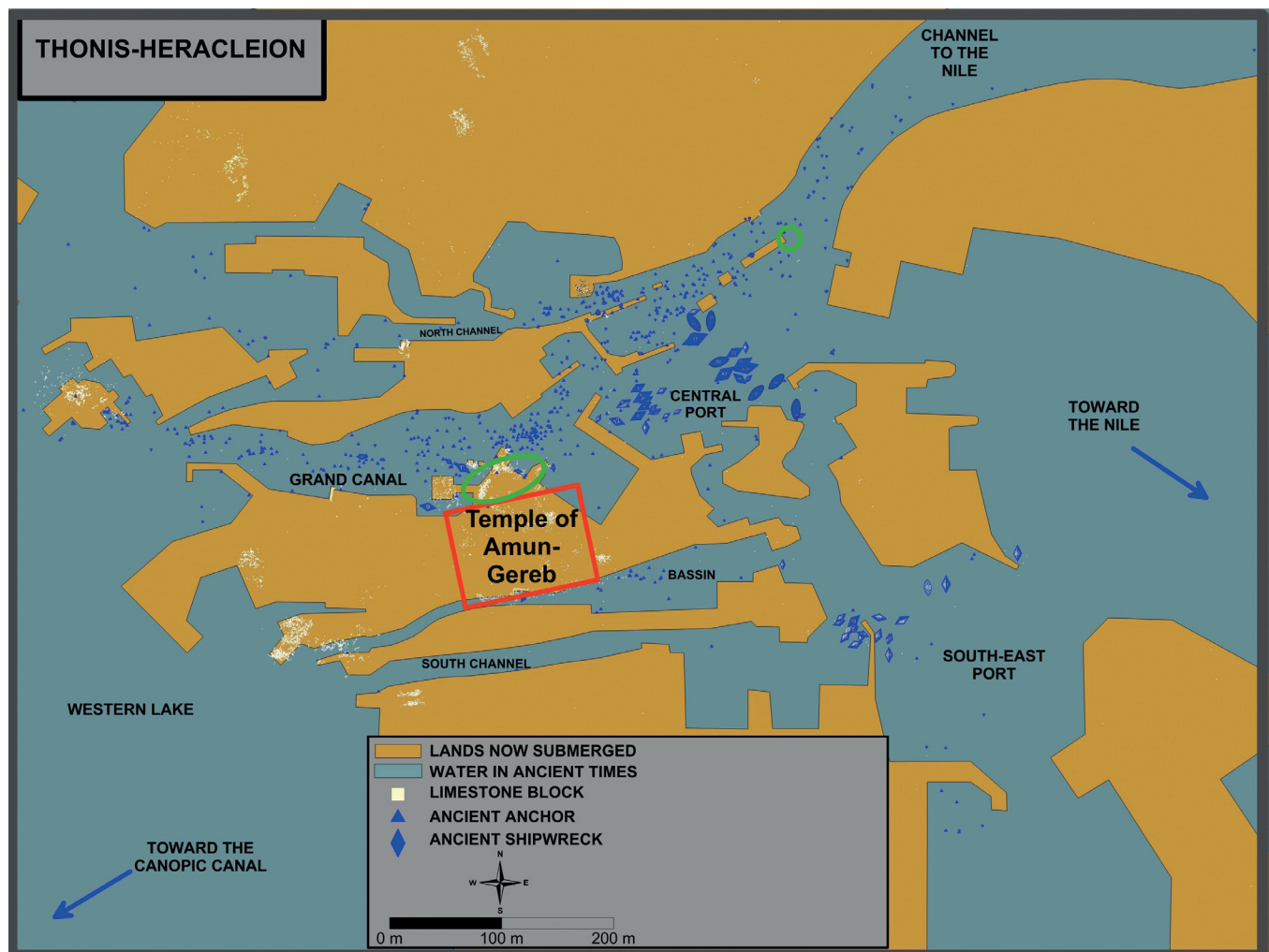
con O.Man.7547 contains the earliest reference to a stater in Egypt and dates to December 412/January 411 (AGUT-LABORDÈRE 2014, 79-80). Intriguingly, in this document the reference to a stater occurs *without* reference to the deben, by which is meant that there is no equivalency stated in the text, but the stater is described as from the 'treasury of Ptah'. The question remains whether this refers to coins actually minted in the temple of Ptah, as Agut-Labordère suggests, or whether this single mention is an example of coins kept in the treasury that are used for checking via weighing, but a discussion of this question without further evidence is futile.

After reviewing evidence for minting in the shape of (possible) coin dies, Meadows argues that based on the current evidence there are several models possible: a number of devolved mints, one central mint, or itinerant 'workshops' (MEADOWS 2011, 110). This overview should make abundantly clear that (successive) important temples were active in controlling weights circulating the Egyptian marketplace and used official weights to do so.

Physical space for a marketplace

The excavations at Thonis-Heracleion offer a rare opportunity to look at the spatial distribution of weights at an Egyptian site, as most weights, even from Petrie's excavations and now in museum collections, are without precise provenance. In Thonis-Heracleion, a new temple complex was built on the central island in the late fifth or early 4th century BC (GODDIO 2015, 19-26) (Fig. 2). The ceramics and coins at the site suggest an abrupt end of activities at the site in the mid-2nd century BC, so this temple was active for around three centuries. The temple was dedicated to Amun-Gereb, whose naos was found *in situ* (GODDIO 2015, 20-21, fig. 1.6-1.7), and the excavations also yielded a stela from the reign of Nektanebo I (r. 380-360) detailing taxation arrangements (VON BOMHARD 2012, 11; 2015) (Fig. 3). Colossal statues of a Ptolemaic king, queen, and the god Hapy were found in fragments in the so-called Grand Canal running east-west to the north of the central island.

As I discuss elsewhere (VAN DER WILT 2015, 168-169), many weights were deposited in areas that show significant ritual activity, such as at the bottom of the Grand Canal and around the islands towards the north channel to the Nile. One counter-stamped weight is particularly relevant: on one side, there is an impression of the reverse of an Athenian tetradrachm; on the opposite side there is a stamp of a ram's head (MEADOWS 2008, 343 cat. no. 367; GODDIO 2015, 22 fig. 1.10a-b) (Fig. 4). Meadows interprets the weight as a conversion piece between the Greek and Persian weight systems. Since the ram is a manifestation of



▲ Fig. 2. Map of Thonis-Heracleion, green circle in the top right indicates the find location of the weight (Fig. 4), and the larger green ellipse north of the temple of Amun indicates the area where there is a concentration of weights (© F. Goddio, Hilti Foundation).

the god Amun, and Amun-Gereb is the main deity of the temple, the stamp on this weight (although unique) is interpreted as a control mark of the temple similar to the control stamps present on some weights from Athens for example (LANG 1964, 21-22). The weight was found in the eastern edge of the East island in the north-east passage to the Nile, at a considerable distance from the temple of Amun-Gereb on the central island. However, it was found in the vicinity of the coin die (MEADOWS 2011, 98-99 map 3-4), and some minting activity may have taken place on this island.

There is a concentration of lighter and uninscribed weights to the north of the temple, north of the location of the stela and around the water's edge (VAN DER WILT 2015). These weights are all 50 g or lighter. Similar small weights are found around the Mediterranean (e. g. TEKIN/MERZECI 2012), but they remain largely unstudied as the post-depositional circumstances in soil causes chemical changes in metal weights, making their current mass unreliable. In the same area, there are also significant concentrations of coins (e. g. MEADOWS 2015, 126-129 fig. 6.8-6.14). It is possible that these concentrations of coins and weights are the result of post-depositional processes, where

wave action and currents cause concentrations of objects. However, not all layers at the site are mobile in that objects can wash around in them, and so I take the concentrations of both weights and coins in the general area around the temple as being deliberately deposited there.

Goddio has proposed that the area to the north of the temple of Amun-Gereb was the location of a temple of Khonsu (GODDIO 2015, 23-25) because a foundation deposit has been found in the area. The remaining stone blocks in the area of the temple are of isolated stretches of wall, making even the axis of the temple debatable. Stelae in Egypt are usually set up in front of the temple or pylon gate in open areas where they could be viewed. In this case, the stela deals with taxation revenue, which would have been collected at the border such as in a 'customs office' like Thonis-Heracleion. I would argue that the naos in the southern part of the area, combined with the stela and the colossal statuary fragments to the north, when they are in fact found in situ (GODDIO 2015, 19-21), suggest that the temple axis was north-south with its entrance oriented towards the Grand Canal as the most important ritual waterway (and not towards the Nile). The presence of another naos (possibly

reused; SCA 456, GODDIO/FABRE 2008, 309 no. 114) and other evidence for cultic practices do not exclude (*cf.* the case of Elephantine below) the possibility of a more open space in this area. *If* this suggestion is accepted, then the area to the north of the location of the Heracleion stela would be a publicly accessible area.

There are also arguments to be made *against* the identification of a terrace in Thonis-Heracleion. Arnold remarks that terraces have not been identified in the north of the country (ARNOLD 1999, 291 tab. 3), which would make Thonis-Heracleion an isolated and unique example in the north. However, relatively little is known about temple building in the Egyptian delta compared to the temples in the Nile valley. JARITZ (1980, 57) argued that cult terraces are a *Roman* development and that earlier instances of similarly shaped architecture, the two late New Kingdom examples but also, for example, the terraces in North Saqqara in front of the Saqqara Animal Necropolis catacombs, served different functions. Since there is no Roman activity at Thonis-Heracleion, this would preclude the area being a cult terrace. At present, the archaeological evidence is inconclusive.

The light weights around the temple are not to be linked to taxation as such, which dealt with larger sums and only samples of goods were weighed while the rest was measured by volume. Instead, I think these weights are to be linked to the established interest the temples showed in regulating weights in exchanges, and perhaps should be taken as indications of a specific marketplace, a currency/bullion conversion or checking office close to the temple.

Physical space for a marketplace: Areas in front of the temple

One of the developments in temple building throughout the 1st millennium BC is the embellishment of the central axis of the temple with entrance porches and kiosks, porticoes, and pronaoi (ARNOLD 1999, 277-304). These structures were built at the entrance of the temple building itself, in an area that would normally be accessible to the general public (DUNAND/ZIVIE-COCHE 1991, 117-119; ASSMANN 1994; BELL 1998, 135-137, 163-172). Another architectural development was the construction of cult terraces in front of the temple gate on the axis of the temple, to become very popular in the early Roman period (ARNOLD 1999, 288-292, esp. 291 tab. 3; *cf.* JARITZ 1980, 57).

The earliest preserved examples of open (square) spaces often bordering on the Nile are from the Late New Kingdom in Thebes, such as the so-called tribune at Karnak and a similar quay at Medinet Habu. At the latter, the quay formed the terminus of the canal between the temple of Ramessess III and the Nile and its axis is in line with the temple



axis. Staircases ran on both sides of the quay down to the water where there was enough room for several boats to moor (HÖLSCHER 1951, 11-13 fig. 10-13, pl. I-II, VI-VII). The stairs presumably

▲ Fig. 3. Thonis-Heracleion stela H.H.1.210, SCA 277 (photo: C. Gerigk; © F. Goddio, Hilti Foundation).



▲Fig. 4. Weight
H.X.9484, SCA 1101
(photo: C. Gerigk; © F.
Goddio, Hilti Foundation).
Scale 1:1.

served to accommodate disembarkation at different heights of the Nile. The quay was accessed from the west in a straight line from the temple gate, surrounded by parapet walls and served, according to Hölscher, not for disembarkation but rather as a place to wait and receive (divine) guests arriving in boats.

At Karnak, the tribune measured 14.00 m x 15.17 m and it was accessed from the east via a ramp directly on the temple axis (LAUFFRAY 1971, 77-95). Again, access is in a straight line from the temple gate. In the middle of the space Lauffray found a fortified foundation area for a barque resting station used during processions (LAUFFRAY 1971, 90-92, 93 fig. 10). In one corner of the tribune an obelisk of Seti II is still preserved and the dromos and ramp are flanked by ram-headed sphinxes. He also notes, comparing Karnak to Medinet Habu, that the parapet wall would have hampered disembarkation and thus a harbour area with ramps (located to the south) was required (LAUFFRAY 1971, 88-89). At this point I want to point out that the area to the north of the Amun temple in Thonis-Heracleion also has a mooring point for boats in the western part. Thonis-Heracleion and East-Canopus were connected via festival processions, for example during the Khoiak festival. A suitable mooring area would be required, and since the axis for Egyptian temples was oriented to where the Nile flows, this would be located in front of the temple.

The passage about Bubastis in Herodotus quoted above describes the dromos running through the marketplace. There is some evidence that the terraces, perhaps only in particular circumstances, could also host markets. The archaeological record in Sais, Egypt's capital in the 26th dynasty and a major centre of power in the 1st millennium, is too destroyed to even establish the basic layout of the temple (Fig. 5). In Naukratis, however, new research collating old research with new fieldwork has identified the bank of the Nile to the west of the temples and the settlement (THOMAS 2015, 249 fig. 13.2, 252). Storage facilities lie along the riverbank clustering around where the temple axis extends from the Egyptian temple gate to the river. However, a dromos has not been identified during the survey work. As Thomas concludes, a 'trade market' likely existed next to the river bank, whose magnetometric features represent (suspected) harbour terraces (THOMAS 2015, 252, 254). Two areas with buildings on the riverbank are indicated on the current map of Naukratis: one group on the Egyptian temple axis, the other to the north in the general area of the Greek temples at the site. Whether this is a reflection of a division between a Greek *emporion* and the Egyptian *pr-mryt* (VILLING 2015, 231-232), or whether exchange at Naukratis took place in the context of both Greek and Egyptian officials is unclear (cf. AGUT-LABORDÈRE 2013, 1006).

The vicinity of sanctuaries was key as a means of promoting trust, which is particularly clear in long-distance trade in the Greek maritime world (KOWALZIG 2010; 2018; DEMETRIOU 2012; VILLING 2015, 232). Furthermore, an agora in the Greek sense of an open space (for assembly) has not been identified in Naukratis (THOMAS 2015, 254-255). Naukratis rather has the typical Egyptian, dense, agglutinating settlement layout (MÜLLER 2010, 231; cf. MOELLER 2016).

Mendes was another *emporion* and riverine harbor in the eastern delta during the 7th through to 4th centuries BC, and thus contemporaneous with Naukratis and Thonis-Heracleion (REDFORD 2010). It presents a slightly different picture. Here, the Temple of the Ram, Banebdjed, had been oriented north since the late New Kingdom. The Butic canal ran east-west across the delta and flowed to the north of the main temple. There was a harbour to the northwest of this temple, and a dromos leading up to the temenos wall (REDFORD 2010, 148-153, 157). Travelers on the Mendesian branch of the Nile (going north-south) would have passed east of the temple. There is a gate in the eastern temenos wall that leads to a big harbour basin with storage rooms along its southern bank and other buildings to the south that could have functioned as official residences and offices (REDFORD 2010, 150-151). Excavations in this area yielded many storage jars for Greek wine and oil from Phoenicia. Everywhere in fact large quantities of ceramics from both Greece (Samos, Thasos, and Cnidus) and Phoenicia were present, indicating significant trade in oils and unguents for which the town was famous (REDFORD 2010, 173). In particular, the "basket-handle" jars – made elsewhere then shipped to Mendes, presumably to transport its famous oil – are ubiquitous in the great eastern harbour but absent in the other basins (REDFORD 2010, 173-176). This hints at specialization: perhaps the oil 'factory' was close to the eastern harbour making it the obvious choice logistically to trade in and then load the amphorae.

In Elephantine in the south, there are early Roman graffiti – one Greek and one Demotic – that strongly suggest that market stalls also occupied the terraces (JARITZ 1980) (Fig. 6). On the south wall of the terrace, on the inner face there is a Greek inscription 'G24', which is a so-called *topos* inscription stating that "this spot belonged to Demetrios and Hermias and their brothers", as members of an association (Maehler in JARITZ 1980, 72-74). The inscription can be dated paleographically to the 1st century CE. A *topos* inscription (ROBERT/ROBERT 1951, 202-203 [p. 234 n. 1]; BERNAND 1975, 193 no. 95) is a place indicator, designating where someone could ply their trade or put a market stall.

The Demotic inscription 'D2' is located more than a meter to the left of the Greek one on the same face of the wall, starting 6cm left of Naos A (Zauzich in JARITZ 1980, 78-79). The reading of

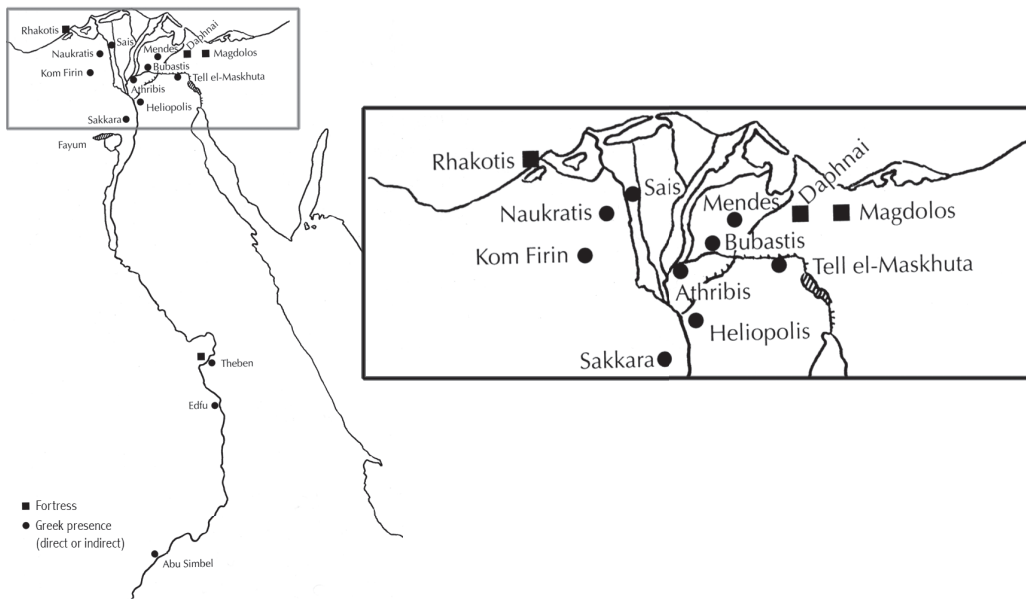


Fig. 5. Map of Egypt with a detail of the delta (VITTMANN 2003, 198 fig. 99; adapted M. H. Jung).

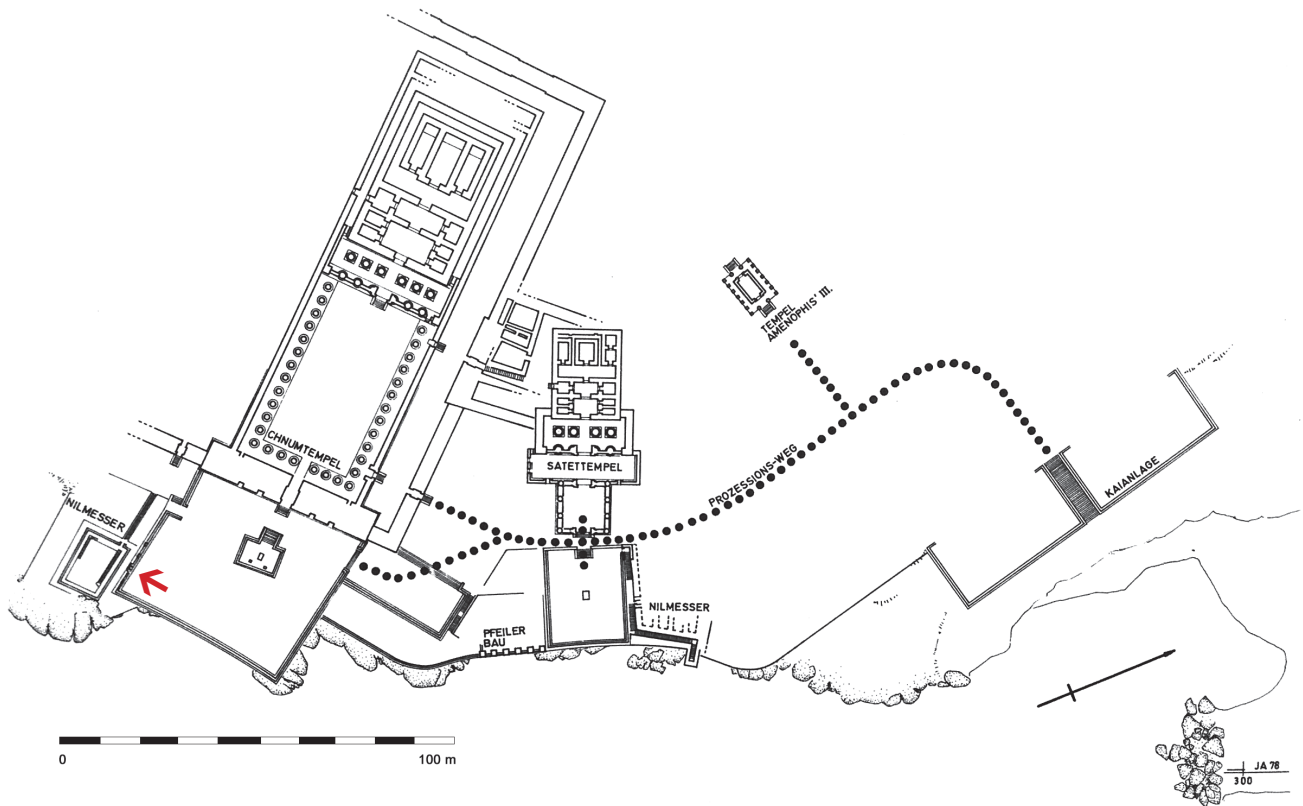


Fig. 6. Terraces in front of the temples of Khnum and Satet on Elephantine island (JARITZ 1980, fig. 1). The red arrow indicates the location of the two inscriptions.

the Demotic script in this inscription is difficult according to the translator and given not without reservations as (here my translation from the German): “beer brewers of Khnum at the place of the banquet (Festmahl) of Khnum, [the] beer brewers”. These are both inscriptions that can be related to private associations, who (both Greek and Egyptian) used gatherings for celebrations, to sacrifice, drink and eat (banquets) (PAGANINI 2017, 143 fig. 7.1, 147). These meetings could be held in

doors and outdoors: on dromoi and in groves and gardens (perhaps surrounding the dromoi) in front of the temple and in cemeteries. The inscriptions indicate that people – members of private associations – offered (sold?) beer to fellow festival participants, and one thinks of merchants who dealt in votive objects to sell to pilgrims during festivals (YEIVIN 1934, 78; Maehler in JARITZ 1980, 73 n. 550). Zauzich (in JARITZ 1980, 79) suggests that the odd repetition in the Demotic inscription may

perhaps be explained as a space indicator for the width of the space for a stall.

As noted in the commentary on the Greek inscription from Elephantine, there are parallels for these particular inscriptions in Roman Egypt. Two fragmentary *topos* inscriptions are known from the south wall of the northern temple of Karanis (BERNAND 1975, no. 95-96, pl. 73), one *topos dipinto* in Narmouthis (Medinet Madi) all in the Fayum oasis (VOGLIANO 1937, 38), and another Roman period *topos* inscription in the south of Egypt in the temple of Kom Ombo, in “the rear section of the outer round passage” meaning the pronaos (CASTIGLIONE 1970, 113 n. 122, 124; for the interpretation see Maehler in JARITZ 1980, 73 n.

547). From Karanis there is a further inscription from the reign of Vespasian identifying a building as a *deipneteria* or dining hall (BERNAND 1975, 181-183 no. 87, esp. 182 n. 117). In Tebtynis in the Fayum oasis, *deipneteria* were built in the Roman period (2nd century CE) that opened onto the dromos (RONDOT 2004, 145-146, 200-201, plan 2) (Fig. 7). Here, according to Greek inscriptions, private associations congregated during festivals to eat and drink (RONDOT 2004, 150-152, 158-159). Elsewhere it has also been suggested that the dromos in Tebtynis specifically in the Ptolemaic and Roman periods, and the dromos in general at the time, was the likely place for a market (RONDOT 2004, 200; DAVOLI 2011, 80-81).

► Fig. 7. Plan of Tebtynis (RONDOT 2004, plan 1).



PAGANINI (2017, 134 n. 6) mentions that private associations had a long Egyptian tradition prior to the Hellenistic period, as well as a history in Greece itself prior to this period, and argues that it is not helpful to try to distinguish between Greek and Egyptian associations. Thus, there is no reason to presume *a priori* that this phenomenon of markets (and market stalls identified through the *topos* inscriptions) on the dromos is new in the Hellenistic period or that it was a Greek influence. In this respect, Herodotus' description of the agora on the dromos surrounded by trees from the late 5th century BC resonates with the picture from the *topos* inscriptions, gatherings on festival days and celebrations of private associations. The dromos-tax mentioned in several Roman period Demotic ostraca from Dendara has been misread, and the word should instead be read as 'chest-tax', thus can be left aside (VLEEMING 1987). The Gnomon Telonikos, a Greek inscription from the reign of Domitian, contains an edict of taxes on trade and traders (not custom duties), but whether this was erected on the dromos because it is a highly visible location or due to practical reasons as the merchants who the edict addresses, were to be found there, or both, can be debated (WAGNER 1972; CABROL 2001, 757-758).

Elsewhere in the Near East (Maehler in JARITZ 1980, 73 no. 547-549), the phenomenon of markets at temple gates is also attested, for example in Miletus and Priene (Maehler in JARITZ 1980, 73 no. 554-556), and Jerusalem where vendors are present in front of the Second Temple (YEIVIN 1934, 78-79, n. 2). A discussion of these, however, is beyond the scope of this contribution.

Conclusions

In sum, the temple *dromos* is the most likely location for marketplaces in Egypt in the 1st millennium BC. In the densely built-up settlements of Egypt, open spaces would have been limited and the dromos, often leading to water so with good transport links, would have been an ideal location. In my view, there is clear evidence for them along the temple dromos from the 5th century BC onwards in Herodotus' description and the presence of weights close to the temple in Thonis-Heracleion.

Proximity to the temple is important. As the main economic institutions in Egypt, documentary evidence shows abundantly that the treasuries of different temples (Harsaphes, Ptah) regulated metals and/or weights in circulation from the start of the millennium. The expression 'stones of Ptah' occurring in the Demotic and Aramaic texts from the late 5th century BC onwards suggests that there were physical manifestations of the role the temple played in managing exchanges, either as official items kept in the temple for reference or as actu-

al temple-sanctioned weights as suggested by the (single) counter-stamped weight from Thonis-Heracleion. By the Roman period, there is evidence in the form of graffiti to suggest that goods were also exchanged on both the dromos and the temple terraces.

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Address of the author

Elsbeth M. van der Wilt
Freie Universität Berlin
TOPOI building Dahlem,
Hittorfstr. 18,
14195 Berlin
Germany

elsbeth.vanderwilt@fu-berlin.de

Markets in the ancient Greek world: An overview

by EDWARD M. HARRIS

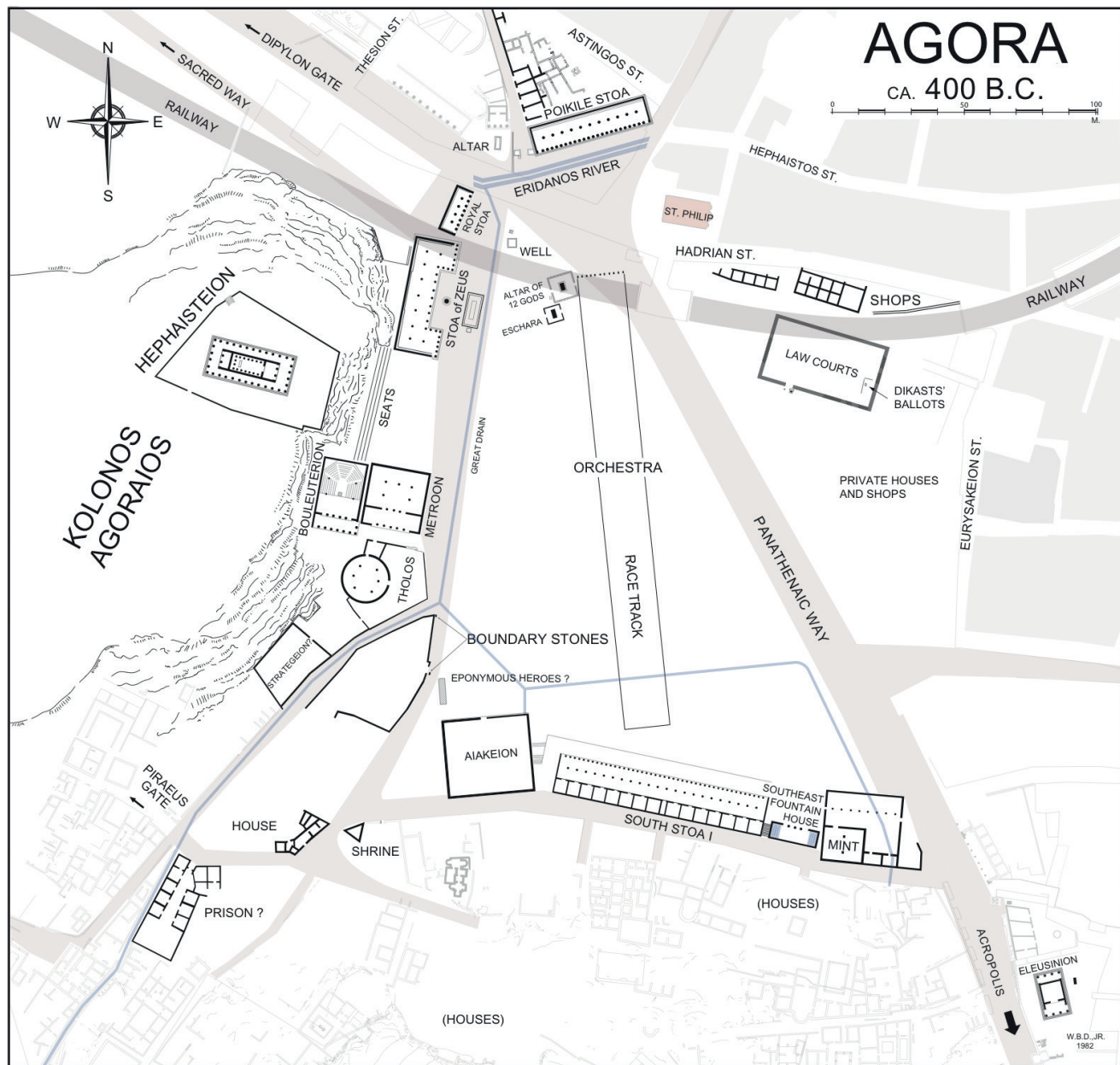
Marketplace, Athens, Thasos, Philippi, Pella, weights and measures, market officials

Agoras were ubiquitous in the Greek world from the Archaic period down to the Roman Conquest. The earliest agoras were an empty space in the middle of the urban settlement, sometimes marked off by boundary stones. During the Classical and Hellenistic periods stoas and other public buildings were built to define the space of agoras. As the religious center of the polis, the agora might contain temples and other shrines. The agora was also the place where honorary decrees and statues were erected to celebrate famous politicians and foreign benefactors. There were public officials such as agoranomoi assigned to keep order and enforce commercial regulations in markets. In the Roman period, there was a tendency to separate commercial from administrative activities in some urban centers.

Märkte in der antiken griechischen Welt: ein Überblick

Marktplatz, Athen, Thasos, Philippi, Pella, Maße und Gewichte, Marktaufseher

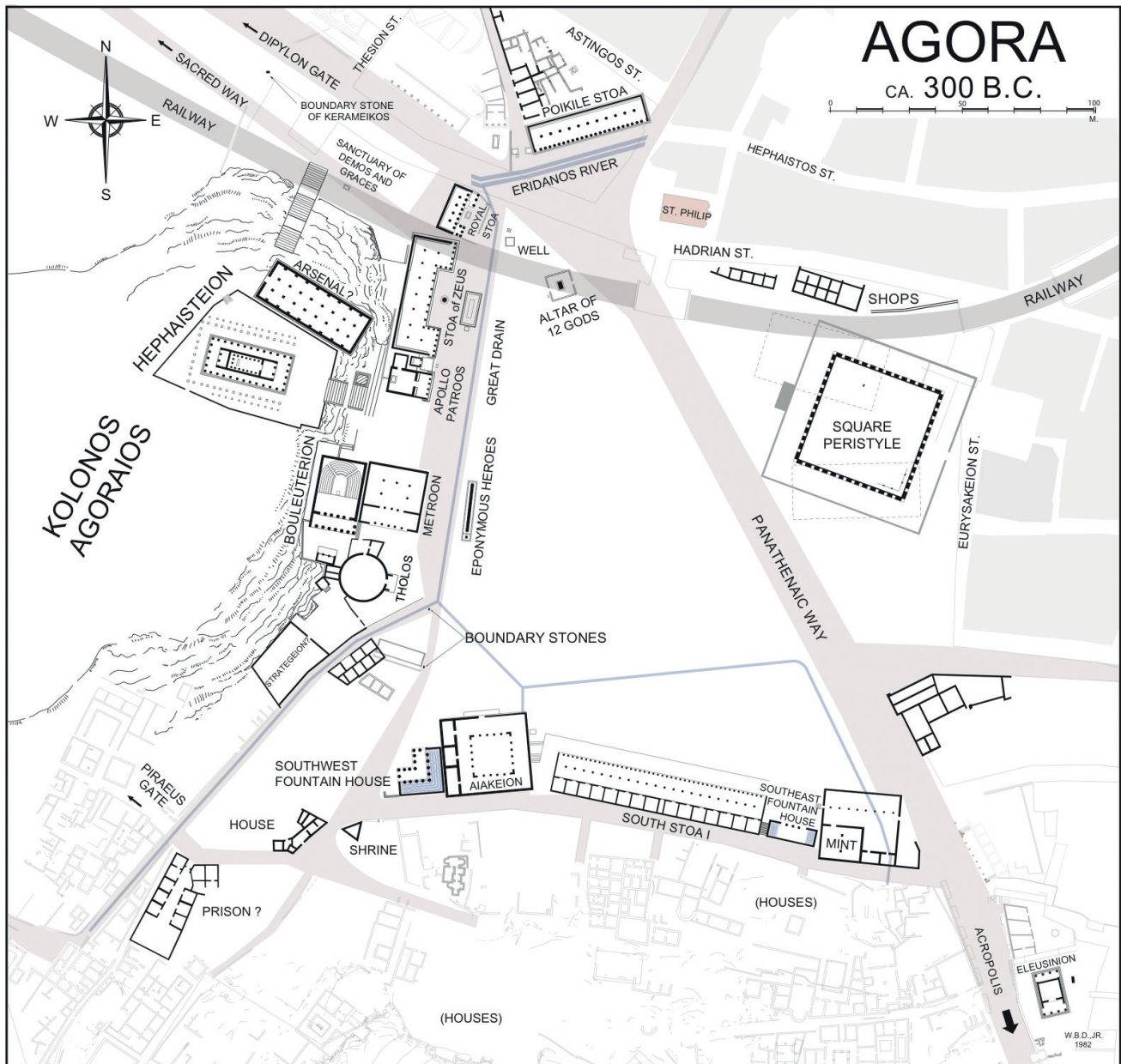
Agoras waren von der archaischen Zeit bis zur römischen Eroberung allgegenwärtig in der griechischen Welt. Die frühesten Agoras waren freie Plätze in der Mitte von urbanen Siedlungen, die manchmal mit Grenzsteinen markiert wurden. Während der klassischen und hellenistischen Epoche wurden Stoen und andere öffentliche Gebäude gebaut, um den Raum der Agoras zu definieren. Zu einer Agora können Tempel und andere Heiligtümer gehören, da sie das religiöse Zentrum einer Polis darstellt. Die Agora war auch der Ort, wo Ehreninschriften und Statuen errichtet wurden, um berühmte Politiker und ausländische Wohltäter zu ehren. Es gab öffentliche Amtsträger wie agoranomoi, die damit beauftragt waren, auf Marktplätzen für Ordnung und für die Einhaltung ökonomischer Regulierungen zu sorgen. Ab der römischen Zeit entwickelte sich in einigen urbanen Zentren die Tendenz, kommerzielle von administrativen Aktivitäten zu separieren.



▲ Fig. 1. Plan of the Athenian agora around 400 BCE (CAMP 2010, 19).

In a famous passage in the first book of Herodotus (1.152-153), the Persian king Cyrus expresses his contempt for the Greeks. The Spartans sent a herald named Lacrines to the king with a message that he should not harm the Greeks in Ionia. If he did, the Spartans would punish him. Cyrus asked the Greeks who were present how many Spartans there were and then replied: "I have never yet feared men who set apart a place in the middle of their city where they commit perjury and cheat each other." Herodotus hastens to explain that the king said this because the Greeks have markets where they buy and sell. The Persians on the other hand did not use markets and in fact have no markets of any kind. The passage is very important for the topic of this volume because it reveals several things. First and most important, it shows that the *agora*, the Greek word for marketplace, was a standard feature of every Greek

community. Second, it places the *agora* not on the outskirts of the city, that is, the urbanized settlement, but right in the middle of the city. The observation of Herodotus is confirmed by the evidence of archaeology. One of the earliest known *agoras* has been found at Megara Hyblaea on Sicily and is dated to the 7th century BCE. This *agora* is located in the middle of an orthogonal grid of streets (VALLET *et al.* 1976). The *agora* of Cyrene in North Africa was placed in the center of the urban settlement and was clearly marked out by a street to the south and several religious and administrative structures by the 5th century BCE if not earlier (STUCCHI 1965; STUCCHI/BACIELLI 1983). The *agora* of Priene was located along one of the central streets and roughly equidistant from the western and eastern walls of the city (RUMSCHEID 1998, 69-85). The *agora* of Messene in the Peloponnese was situated in the middle of the



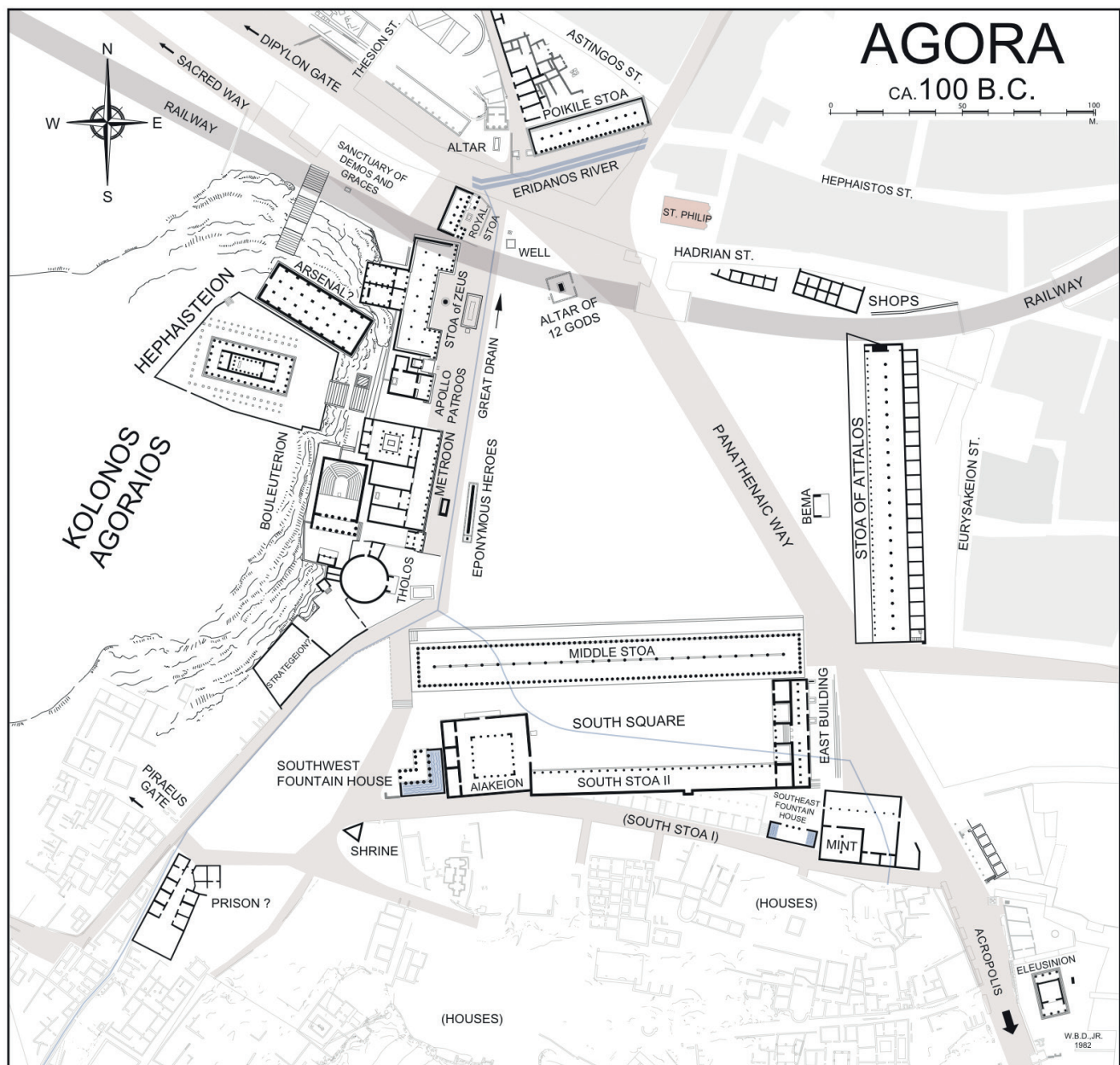
settlement next to the theater and an area called the Asklepion (THEMELIS 2012). The *agoras* of Argos, Megalopolis and Elis were also located in the middle of the urban settlement (DONATI 2015). The *agora* of Athens was located inside the walls of the city along the Panathenaic Way and under the Acropolis, the religious center of Athens (Fig. 1-3). The *agora* of Pella in Macedonia, built around 300 BCE, was placed in the very center of the grid of streets that ordered the space between the city walls (AKAMATIS 2011; 2012). The *agora* of Thasos in the Northern Aegean was built near the port but also along the main street of the city, which linked major shrines including the Artemision and the Herakleion and inside the impressive circuit of walls that protected the urban settlement (see Fig. 4-5) (MARTIN 1951; GRANDJEAN 2009). The *agora* of Elea in Thesprotia was located between three stoas in the center of

the urban settlement (RIGINOS/LAZARI 2012). This also appears to be true for most of the *agoras* in Sicily during the Classical and Hellenistic periods (see below). The *agora* of Kassope in Thesprotia in northwestern Greece, which was laid out in the 4th century BCE, lies on the edge of the town next to the wall. This is clearly an exception to the general rule but is probably due to the unusual location of the settlement on a mountainside.¹ The only other exceptions are *agoras* located on the coast cities like Thasos, Naxos in Sicily and Andros.²

1 HOEPFNER/SCHWANDNER 1994, 124-141. Cf. HOEPFNER 2006, 23: "Die Agora befindet sich nicht in Stadtmitte, denn die einzige größere Fläche, die dafür ohne Aufschüttungen und gewaltige Terrassierungen genutzt werden konnte, war der südöstliche Stadtrand."

2 For Thasos see MARTIN 1951; for Naxos in Sicily see LENTINI/PAKKANEN 2012; for Andros see PALAIOKRASSA-KOPITSA 2012.

▲ Fig. 2. Plan of the Athenian agora around 300 BCE (CAMP 2010, 20).



▲ Fig. 3. Plan of the Athenian agora around 100 BCE (CAMP 2010, 21).

Third, Herodotus associates the *agora* with buying and selling. We will see that the *agora* was much more than just a market-place, but it is crucial to note that Herodotus clearly thinks that this was the characteristic activity that took place in the *agora*. Of course, the contrast drawn by Cyrus between Greece and Persia oversimplifies a complex reality. As other contributions in this volume show, there were many markets in the cities of the Persian Empire. Indeed elsewhere in his work, Herodotus (1.37.2; 197; 2.138.4; 5.101.2; 7.26.3) mentions *agoras* in Lydia, Babylon, Egypt, and Phrygia. Recent research has found that there were indeed market places in Babylon and other cities in the Near East; in Neo-Babylonian the word *suqu* is the standard term for “market place.” (JURSA 2010, 641-44) Yet Herodotus, like many other Greeks, attempts to make the Persians into the barbarian Other, a

group defined not by its actual ethnic characteristics but merely as a foil to the Greeks who use barbarians to articulate their own identity.³ Of course, the confidence of Cyrus is misplaced. The presence of *agoras* in Greek cities leads him to think that the Greeks are not warlike and will be easy to defeat. As the rest of Herodotus’ narrative shows, however, the Persian King had much to fear from the Greeks, who would defeat his forces at Marathon, Salamis, Plataea and Mycale.

The literary sources for ancient Greece from the Archaic period to the Roman conquest contain many references to *agoras* in *poleis* and amply confirm Herodotus’ statement about the ubiquity of markets. App. 1 collects the literary references to *agoras* in Herodotus, Thucydides and Pausani-

3 On Herodotus and the barbarian “Other” see HARTOG 2009.

as. We must bear in mind that the first two writers were not primarily interested in describing the architectural features of Greek *poleis* and mention *agoras* only when they are relevant to the narrative. And they only mention cities through which armies marched during the Persian Wars and Peloponnesian Wars. Yet in both authors we find *agoras* in both the major Greek *poleis* such as Athens, Corinth and Sparta, but also in smaller ones such as Plataea in Boeotia, Melos in the Aegean, and Torone in the Chalcidice. Pausanias was writing in the 2nd century CE, but he describes the buildings in cities constructed several centuries earlier.⁴ Pausanias includes very few areas in his tour of Greece: the ten books of his work cover only Attica, Boeotia and Phocis in Central Greece and the cities of the Peloponnese. His travels did not take him north to Thessaly and Macedonia, to the islands of the Aegean, to Sicily or to Asia Minor. Yet he records the presence of twenty-five *agoras* in the Peloponnese alone. This means that most inhabitants of the Peloponnese would have had an *agora* within a few hours walking distance. And we can add several more to the total from other sources such as one attested at Andania in Messenia.⁵ One should also bear in mind that Pausanias wrote mainly about major cities with remarkable things to see such as temples, statues and other works of art.

In general, Pausanias (10.4.1) clearly thought that the *agora* was a standard feature of the Greek *polis*: when describing the city of Panopeus in Phocis, Pausanias calls the settlement a *polis* but states it does not contain the standard features of a *polis* such as an *agora* and other public buildings such as a theater, offices for magistrates, a gymnasium and a fountain. Finally, we should note the implications of a clause found in an Athenian decree of the late 5th century BCE (*IG* i³ 1453E). The decree imposes regulations on all the cities under the power of the Athenians, requiring them to use Athenian weights, measures and coinage standards or to convert their coins into Athenian coins when making payments of tribute. The decree requires all the allies of Athens to set up a copy of the decree both in front of their mint and in their *agora*, which would imply that every city in the Athenian Empire had an *agora*. According to the standard work on the Athenian Empire, there were hundreds of cities around the Aegean and on Mainland Greece affected by this decree (MEIGGS 1972).

There is more evidence for *agoras* in Sicily and Magna Graecia during the Hellenistic period. Cicero (2 *Verr.* 4. 43. 94) and Livy (26.40) mention a *forum*, the Roman equivalent for *agora*, in Agrigento, which appears to have been located near the Coun-

cil-house (*bouleuterion*) and Assembly-place (*ekklesiasterion*) in the center of the city (WILSON 2012, 246-248). There was an *agora* at the intersection of the main roads at Megara Hyblaea in the Archaic period, and there was a smaller *agora* around 50 m by 10 m when the city was reduced in size during the Hellenistic period (WILSON 2012, 248-249). One of the largest *agoras* from the Hellenistic period has been excavated at Morgantina, which was bounded by stoas on three sides (WILSON 2012, 249-250). Other *agoras* have been identified at Helorus, Akrai and Messana in eastern Sicily, and at Solumtum, Halaesa, Thermae Himeraeae and Segesta in Western Sicily. Recent excavations have uncovered an impressive stoa of two stories at Segesta, which had 35 columns on the facade and nine columns on each of the wings. This faced an open square measuring 36.5 m by 82.0 m.⁶ Naxos on Sicily was destroyed by Dionysius of Syracuse in 403 BCE (D.S. 14.15.2), but had an *agora* located on the northern side of the city next to shipsheds and on the coast. Lentini and Pakkanen estimate its size as 12,500 m² (LENTINI/PAKKANEN 2012). There were also numerous *agoras* in Magna Graecia, some as early as the Archaic period. They have been located at Cumae, Tarentum, Sybaris, Croton, Metapontum and Poseidonia (LONGO 2012). It is important to stress the ubiquity of the *agora* because several scholars have tended to downplay the importance of *agora* and market-exchange in their accounts of the economy of ancient Greece. In his Sather lectures M. I. Finley made almost no mention of the role of the *agora* in the Greek *polis*.⁷ In their book *The Corrupting Sea*, Horden and Purcell discuss the circulation of goods but devote no space to a discussion of markets. In fact, one cannot find the term *agora* in the index to the book.⁸ In his book *The Rise and Fall of Classical Greece*, J. OBER (2015) hardly mentions the importance of the development of the *agora*.

The *agora* as a basic feature of the Greek *polis* went hand in hand with the development of Greek urbanization. The word *agora* is found in the *Iliad* (18.497) and the *Odyssey* (2.10, 37; 24.420), but in these works the term refers only to a meeting place where people met from time to time to discuss matters affecting community or to a meeting of a large group of people.⁹ These works are now generally dated to around 700 BCE and depict the social practices of this period that predated the growth of urbanization that followed in the late 7th and 6th centuries BCE.¹⁰ In this period there were

6 See the essays of AMPOLO/PARRA 2012; TACCOLA 2012; FACELLA/OLIVITO 2012; ABATE/CANNISTRACI 2012.

7 See FINLEY 1973 with the critique of HARRIS/LEWIS 2016, 3-5.

8 See HORDEN/PURCELL 2000 with the critique of HARRIS/LEWIS 2016, 7.

9 On the meaning of the term *agora* in the Homeric poems see SCHULLER 2006.

10 For the date of the world of Homer see CRIELAARD 1995.

4 On Pausanias and his interests see HABICHT 1998 and HUTTON 2005.

5 *IG* V,1 1390, lines 99-103. DONATI (2015, 184), using the inventory of Greek *poleis* of HANSEN/NIELSEN (2004), finds almost twenty *agoras* in the Peloponnese in roughly 130 cities in the Peloponnese during the Archaic and Classical periods.

no permanent markets because the level of production and demand were not high enough to foster the growth of such centers of exchange. Many craftsmen were itinerant because demand was not sufficient to allow them to stay in one place; doctors, carpenters, seers, and poets travelled in search of customers (*Od.* 17.382-7).

A famous passage in the *Odyssey* (15.415-416, 455-456) mentions Phoenician traders who came to a Greek city with a ship full of goods and stayed there for a year until their goods were sold and then departed. This is what we could call an occasional market. In fact, much of the trade between Greece and the Near East in the Homeric poems is in the hands of Phoenician merchants. They sell silver vases (*Il.* 23.744-775), jewelry (*Od.* 415, 459), and slaves (*Od.* 14.297; 15.481-482) and buy many things in return (*Od.* 15.455-456). In this period Phoenician traders ranged very widely: they sail to Egypt (*Od.* 14.290), Libya by way of Crete (*Od.* 14.295, 300), Pylos or Elis (*Od.* 13.272-275), Ithaca (*Od.* 15.481), and Lemnos in the Northern Aegean (*Il.* 23.745).

Herodotus takes us into the late Archaic period, that is, roughly 550 BCE to the Persian Wars in 490-479 BCE when the *agora*, that is, the permanent market place was clearly a standard feature of the Greek *polis*. In this period it is very difficult to trace *agoras* in the archaeological record because the *agora* was an empty space in the middle of the urban settlement. We can identify *agoras* mainly by the public buildings that surrounded this space. We know that the *agora* was in the center of Athens in the late 6th century BCE because several *horoi*, that is, boundary stones, have been found with inscriptions indicating that the stone marks the boundary of the *agora* (*IG* i³ 1087-1090). These can be dated by the letter forms from 500 to 450 BCE. There is still much debate about the location of the *agora* in the early Archaic period, but most would place it to the east of the Acropolis.¹¹ In the early 5th century BCE the *agora* is an empty space bounded on the west by the old *bouleuterion*, that is, the meeting place of the Council, the Stoa of Zeus Eleutherios, the Stoa Basileios, which was the office of the *basileus*, one the nine archons, and on the east by the Panathenaic way (Fig. 1-2) (CAMP 1986). By the middle of the 2nd century BCE the *agora* was surrounded by buildings on four sides – by the Middle Stoa on the south, the Stoa of Attalus on the east, the Stoa Poikile and the Stoa of Herms on the north, and various public buildings on the west. This loose grouping of buildings around an open space was what Pausanias (6.42.2) described as the older form of the *agora* such as found at Elis with “stoas separated from each other with streets through them.” Pausanias contrasts this style of *agora* with the later form found in the cities of Ionia and those near Ionia. The fully developed form

is described by Vitruvius (5.1): “The Greeks plan the form in a square shape with very ample double colonnades and close-set columns. They ornament them with stone or marble architraves, and above they make promenades on the boarded floors.”

We can see this form of the *agora* at Pella, which was probably constructed in the late 4th century BCE and was destroyed by an earthquake early in the 1st century BCE (AKAMATIS 2011; 2012). It is the earliest known *agora* surrounded by stoas on all four sides. The town of Pella is organized on a grid plan and occupies an area of 70,000 m². The buildings of the *agora* form a colonnaded courtyard bounded by stoas with rooms for shops. On the north side there were two stories; the lower parts of the walls were made from local stone with the higher parts made of brick. There was a large street 15 m wide dividing the *agora*. Various activities have been traced in different parts of the buildings surrounding the square. In the southern part of the east stoa there were shops for potters. In the northern section of this area there was found evidence for terracotta manufacture in the form of figurines, moulds, and processed clay. The southern part of the complex contained shops for butchers, fishmongers and sellers of liquid goods. The northwest section was for perfumes and other scents. On the west side there were shops for pottery and lamps and for metal-working. Remains of fused lead monoxide revealed the presence of cupellation, a method of refining silver. The stoa on the north however housed different kinds of activities. The middle of this stoa appears to have contained the offices of local officials such as *politarchs*, who are mentioned in an inscription found in the area. At the southwest edge of the *agora* there is a two-story building which the excavators have identified as the city archives. A set of Doric columns surrounded a central courtyard with Ionic columns on the upper story. The building contained dozens of clay seals with inscriptions pertaining to the city's officials. This complex therefore combines both commercial and administrative activities, a feature, which can be seen in other *agoras*.

We can see an evolution from the earlier form of the *agora* to the later form on Thasos (Fig. 4-5). The location of the *agora* on Thasos is assured by the architectural features and by an inscription in a sanctuary in the central square for “Zeus of the *agora* of Thasos” (*IG* xii, 8 361).¹² The sanctuary is dated to the early 4th century BCE. In this period this area was flanked on the northeast by a building which had eight rooms facing the *agora* (Fig. 4.4). Three of the rooms appear to have been banqueting rooms with off-center doorways. The room at the northwest corner has a larger doorway and two interior columns and appears to have contained a hearth, which would make it a good candidate for

11 See DICKENSON 2015 for the debate about the location of the Archaic *agora*.

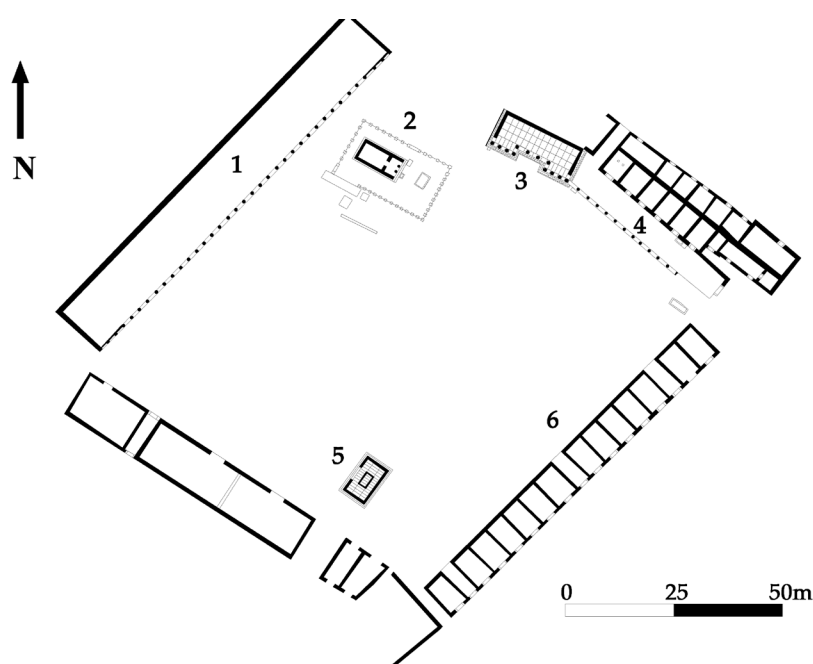
12 On the sanctuary of Zeus *Agoraios* at Thasos see GRANDJEAN/SALVIAT 2000, 76-77.

the *prytaneion* of the city.¹³ Another room contained official measures and dedications by officials to various deities (GRANDJEAN 1988, 293-297). On the other side of these offices is found a set of seven shops facing an adjoining street leading to the port. Later in the 4th century BCE a stoa (the “Paraskenia building”) with projecting wings, each containing four Doric columns, and separated by a central part with four more Doric columns (MARTIN 1959, 59-92) (Fig. 4,3). On the back wall was a list of *archons*, local magistrates. Letters from Roman officials and emperors were later displayed here, which would indicate it was an important public building. Around 300 BCE an impressive stoa was built on the northwest side of the *agora*, which measured 97.42 m x 13.98 m and had 35 columns *in antis*, each 5.18 m tall and 0.73 at the base (Fig. 4,1) (MARTIN 1959, 9-54). This marked a major step forward in the monumentalization of the space. By 300 BCE therefore the central square was surrounded by buildings on three sides, but these were not connected stoas as at Pella. During the 1st century BCE or the 1st century CE, two additional stoas were built on the southwest and southeast with another built in front of the administrative offices on the northeast (Fig. 5,6.10.14), which almost completely surrounded the entire square with colonnades (GRANDJEAN/SALVIAT 2000, 68-72). Two monumental gateways provided access at two points. During the Imperial period the entire square was paved with marble slabs, and there were channels for drainage in front of the main stoas. The final plan of the *agora* of Thasos was therefore the product of a slow evolution from the 5th century BCE down to the early Roman Empire.

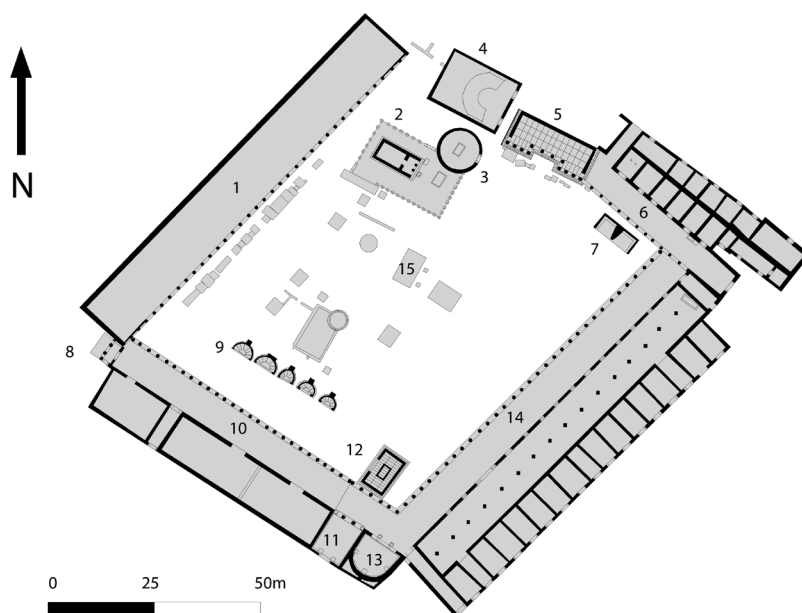
During the late Hellenistic period and the Roman Empire it became normal for the *agora* to be surrounded on all four sides by colonnades with one or more monumental entrances. One of the best examples is the so-called Roman *agora* at Athens, which was roughly one hundred meters from the old *agora* (see Fig. 6) (HOFF 1988; SOURLAS 2012; DICKENSON 2017, 237-252). The building of the Roman *agora* was supervised by two Athenians, but the funds were supplied by Julius Caesar and Augustus.¹⁴ The Roman *agora* enclosed a space of 5700 m² with one hundred and twelve Ionic columns and covered a total area of roughly 11,000 m². It had its own fountain on the south side and fifteen shops behind the colonnade on the west wide, but did not contain any office for public officials. The administrative buildings on the old *agora* such as the *Tholos*, the *bouleuterion* and the Royal Stoa continued to function as before. The Roman *agora* was therefore purely a commercial area, separate from the administrative center of Athens.

13 For the *prytaneion* of the city containing a hearth see MILLER 1978, 25-37; for the *prytaneion* of Thasos see DUCHÊNE 1992, 101-104.

14 For the dedicatory inscription see *IG ii²* 3175 with HOFF 1988, 99-115.

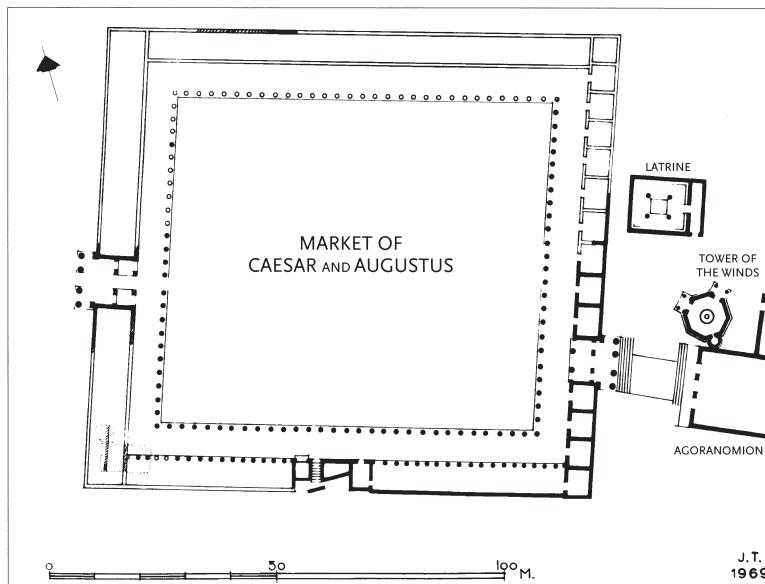


▲ Fig. 4. The agora of Thasos at the beginning of the Hellenistic period (DICKENSON 2017, 78).



▲ Fig. 5. The agora of Thasos in the 2nd century AD (DICKENSON 2017, 190).

This separation of the commercial market from the administrative center can also be seen at Philippi in Northern Greece (Fig. 7-8) (SÈVE/WEBER 2012; DICKENSON 2017, 343-350). The city was founded by the people of Thasos around 360/359 BCE, but taken over by Philip II of Macedon in 357 BCE and renamed Philippi. After the defeat of Brutus and Cassius in 42 BCE, Augustus and Antony founded a Roman colony at the site. The center of the city was rebuilt in the 2nd century CE



▲ Fig. 6. The Roman Market at Athens (CAMP 2001, 192).

during the reign of Marcus Aurelius. In the new arrangement religious, administrative and commercial areas were separated. Above the forum area there was an upper terrace with at least three temples overlooking the site. The forum was accessed by two staircases and was surrounded by a colonnade on three sides. Behind the eastern and western colonnades there were offices, and in one corner the *curia* or building for the main administrative body of the colony. There were shops facing a street south of the *forum* area, but they did not have direct access to the *forum* (Fig. 7.7). The market was in a separate space south of this street and was much smaller than the *forum* (Fig. 7.32).

On the other hand, we must distinguish between two senses of the term *agora* (DE SAINTE CROIX 1972, 267-284). The first denotes the formal center of the main urban settlement of a *polis*, which we will see contained both public offices and religious shrines. The second denotes the larger area in which economic exchange took place. The *agora* in this sense at Athens was very extensive and divided into different sections. Pollux (9.47-48) mentions a place where books are sold and others in which garlic, onions, incense and perfume were on sale. There was also a special place for women's items (Pollux 10.19). Pollux (7.11) mentions a separate area where slaves were sold. The comic poet Alexis mentions a section called the rings where utensils were sold. The market at Sparta was also large enough that it had a separate section devoted to metal items such as knives, swords, spits, axes, hatchets and sickles (Xenophon *Hellenica* 3.3.5-7).¹⁵

Not all buying and selling took place in the formal *agora* of a city. Thucydides (8.95.4-7) relates how the Athenians sent a fleet to Eretria, a city in their Empire, in 411 BCE. In cooperation with the

Spartans, the people of Eretria did not offer to sell food to the Athenian sailors in their marketplace, but contrived to have them acquire supplies in houses at the edge of town so that they could not return to their ships in time to face the Spartan fleet. The incident is revealing because it shows that Greek might sell goods from their houses without taking produce to the *agora*. There is archaeological evidence for this practice. At Olynthus the standard house had one entrance on the south side, which enters onto a courtyard, then a covered space called a *pastas*. In the north part, there is a series of two or more rooms, usually identified as kitchens or workshops. In the southeast corner there is usually an *andron*, that is, a place for male social activities.¹⁶ In twenty-nine houses (out of almost a hundred studied), however, there is a room, often in the southwest corner, which may or may not be connected to the rest of the house but has a door opening to the street.¹⁷ Excavators have identified these rooms as shops, which could either be used to sell items made in the rest of the house or rented out to non-family members as workshops or places for retail sale. Most of these shops face onto the broad main streets (*plateiai*) of the town and not onto the narrow side-streets (*stenopoi*) intersecting the blocks of houses.¹⁸ In most of these shops there was no evidence for domestic activities such as were found in the northern rooms. On the other hand, most of the houses containing such rooms at Olynthus are located closer to the *agora* than other houses without such rooms.

Excavations have tended to focus on the main urban centers of the *polis* and not on the countryside and smaller settlements outside these centers. As a result, we do not know much about places of exchange in the countryside for many Greek *poleis*. But the evidence for Attica is suggestive. There is evidence for *agoras* in Besa, Decleia, Eleusis, Erchia, Sounion, north of Sounion, and at Halai Aixonides. These are spread out all over Attica. In addition to the *agora* in the centre of Athens, there were also *agoras* in the city demes of Kollytus, Kydathenaion, Skambonidai and Melite (HARRIS/LEWIS 2016, 12-13 with references). Excavations in other deme centers in Attica may identify more *agoras* as they have at Halai Aixonides and Sounion. In Laconia Pausanias (3.21.7-8) locates *agoras* at Geronthrai and Gytheum in addition to the one in Sparta.

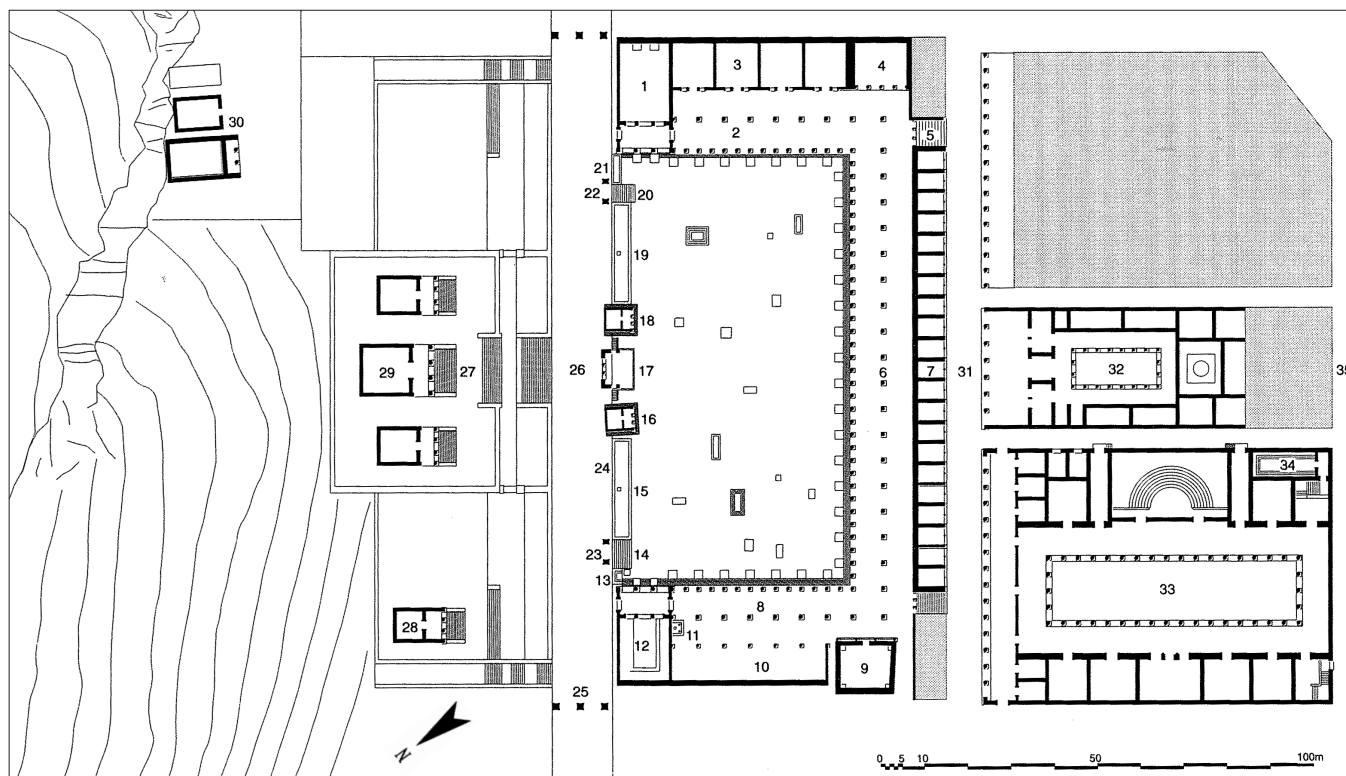
The *agora* was not just the place where economic exchange took place – it was also the civic and religious center of the city. One of the earliest public buildings associated with the *agora* is the *prytaneion*, which contained the hearth of the city – the *hestia* in Greek – and space for meals pro-

16 For the standard form of a house at Olynthus see CAHILL 2002, 75-82.

17 For shops attached to houses see CAHILL 2002, *passim* but esp. 273-276.

18 For the distinction between wide and narrow streets see CAHILL 2002, 5, 16, 21.

15 For attempts to locate the *agora* at Sparta see GRECO 2011.



▲ Fig. 7. Philippi, map of the center of the city in the 2nd century CE. 1. Temple of the Emperors and the Genius of the colony. 2, 6, and 8. Stoa. 3. Building whose function has not yet been identified. 4. Library. 5, 14 and 20. Access ramps. 7. Shops. 9. Tabularium. 10. Basilica, place for judicial business. 11. Statue of the Fortune of the colony. 12. Curia. 13. Monumental base. 15 and 19. Fountains. 16 and 18 Temples. 17. Tribune. 21. Base for priestesses of Livia. 22, 23 and 25. Monumental arches. 24. Large retaining wall. 26. Via Egnatia. 27. Upper terrace. 28. Building with podium. 29. Temples. 30. Rupestral sanctuaries. 31. Street. 32. Market. 33. Palaestra. 34. Latrine. 35. Street (P. Weber, EFA, 2013).

vided to officials, to ambassadors from abroad and to citizens enjoying special honors. The presence of *prytaneia* is attested in numerous inscriptions, but when S. Miller published his book on the topic in 1978 there were very few that were identified in the archaeological record with any certainty (MILLER 1978). This still remains the case. At Athens near the *agora* there was also the *Bouleuterion*, the meeting place of the Council, and the *tholos*, or round building where the *prytaneis* were on duty (Fig. 1-2) (CAMP 1986). By the 4th century there also appear to have been several lawcourts around the *agora*. Another very significant monument in the Athenian *agora* was the Monument of the Eponymous Heroes, where important public notices were posted such as proposals for laws and decrees in the Assembly, formal accusations in lawsuits, and lists of men required to serve on military campaigns (SHEAR 1970). At Thasos there appears to have been several major public buildings lining the *agora* such as the *bouleuterion*, the *Paraskenia* building, and an office for magistrates (Fig. 4,3-4) (GRANDJEAN/SALVIAT 2000). Pausanias lists several public buildings in the *agora* of Sparta such as the office of the Ephors and the Council. The small *agora* at Cassope was bordered on one side by a

building identified as a *prytaneion* and on the other side by the *bouleuterion* – on the north side there is a stoa, and behind this stoa a building which has been called a *katagogeion*, or a kind of hostel, but which must be a set of offices for officials because public weights have been found in some of the rooms. Aristotle (*Politics* 1331a-1331b4; cf. Plato *Laws* 738d, 753b) states that there are two *agoras* in Thessaly, one for buying and selling and another called the “free *agora*,” but such a separation of activities appears to have been rare or non-existent in the Classical period though Dickenson has argued that one can see this separation starting in the Hellenistic period.¹⁹ In general, Greek *poleis* had just one *agora*, but Delos had several *agoras*, no doubt as a result of its role as a commercial center of the Aegean. It has been claimed that one of these *agoras*, the *agora* of the Italians was a slave market, but most scholars now reject this view. Moretti, Fincker and Chankowski have placed a slave market in another part of the town (MORETTI *et al.* 2012).

The *agora* was also a religious center of the city and might contain altars and temples (DICKENSON 2017, 97-109, 271-287). In the late 6th cen-

¹⁹ DICKENSON 2017, 130-152. No such pair of *agoras* has yet been found in Thessaly.



▲ Fig. 8. Philippi's center of the city seen from the acropolis from northeast (https://upload.wikimedia.org/wikipedia/commons/5/5c/Philippi_city_center.jpg).

There was an altar of the Twelve Gods in the Athenian *agora*. Gods could be given the epithet *agoraios*.²⁰ There was an altar of the Twelve Gods in the *agora* of Athens already in 522 BCE (Herodotus 2.7; 6.108.1-6; Thucydides 6.54; *IG* ii² 2640). There was also a temple of Apollo Patroos (Pausanias 1.3.4). In the *agora* of Argos the temple of Apollo Lykeios was probably in the *agora*.²¹ According to Pausanias (4.31.6) in the *agora* at Messene there were shrines of Zeus *Soter*, Poseidon, Aphrodite, the Mother of the Gods (Kybele), a temple of Eileithyia, and images of the Dioskouroi. Excavations have identified temples of Poseidon, Zeus *Soter*, Aphrodite and the Mother of the Gods (THEMELIS 2012, 44). In the *agora* of Thasos there was a shrine with a temple of Zeus Agoraios. There was also a shrine to the athlete Theagenes, who enjoyed heroic honors after his death. In the *agora* at Sparta there were temples of Earth, Zeus of the *Agora*, Athena of the *Agora*, Poseidon the Protector, Apollo and Hera (Pausanias 3.11.9). The *agora* at Elis contained several altars and temples of Apollo, the Graces, Silenus, and Aphrodite (Pausanias 6.24.6-25.1). The *agora* at Pella appears to have had only commercial and administrative buildings, but there

was a sanctuary dedicated to Aphrodite and the Mother of the Gods just north of the *agora* (DICKENSON 2017, 61).

Because the *agora* was the place in the city most frequented by citizens and foreigners, it was an excellent place to erect honorary statues and steles with honorary decrees for public service (LIDDEL 2003). At Athens the two tyrannicides Harmodius and Aristogeiton who were executed after killing Hipparchus, the brother of the tyrant Hippias, received the honor of statues in the *agora* in the late sixth or early 5th century after the overthrow of the tyranny (AZOULAY 2014). The first living Athenian to receive this honor was the general Conon, who was awarded a statue in 393 BCE for his naval victory over the Spartans the year before (Demosthenes 20.69-70; Isocrates 9.57) (OLIVER 2007). After this other successful generals were given the honor of a statue in the *agora*: Chabrias (*IG* ii² 3207), Iphicrates (Dem. 23.130), and Timotheus (Aeschines 3.243). The politicians Lycurgus and Demosthenes were honored with statues after their deaths (*IG* ii² 3776; [Plutarch] *Lives of the Ten Orators* 850f-851c). Foreign monarchs who supported Athens might also be rewarded with statues in the *agora*; the Bosporan kings Pairisades, Satyrus, and Gorgippus received this honor (Dinarchus 1.43) as did Philip II, Alexander of Macedon, Lysimachus (Pausanias 1.9.4), and Pyrrhus (Pausanias

20 For Hermes agoraios see Ar. *Eq.* 297. Cf. *IPE* 12.128; *IG* XII 8, 67 (Thasos); Pausanias 2.9.8 (Sicyon). I owe these references to Alain Bresson.

21 See Thuc. 5.47.11 with MARCHETTI/RIZAKIS 1995.

1.11.1). The practice spread to many other cities in the Greek world in the 3rd century BCE. There is evidence for honorary statues in the *agoras* of Thasos, Eretria, Erythrai, Messene, Mantinea, Andros, Eresos, and Akraiphia (MA 2013, 75-79).

Heroes and famous leaders could receive the honor of burial in the *agora*. According to Herodotus (5.66.2-69.1), there was a hero-shrine (*heroön*) for Adrastus in the *agora* of Sicyon. In the 6th century BCE the tyrant Cleisthenes wished to diminish the prestige of Adrastus and had a shrine for Melesippus constructed in the *prytaneion*. In the late 5th century the people of Amphipolis had the Spartan general Brasidas buried at the entrance to the *agora* and placed an enclosure around his monument (Thucydides 5.11). They did this to celebrate his role as founder (*oikistes*) and savior (*sotera*) of the city. After his death in 365 BCE, the city of Sicyon buried their leader Euphron in the *agora* because they considered him a founder (*archegetes*) of the city (Xenophon *Hellenika* 7.3.12). At Mantinea one could see a hero-shrine of Podares, who died fighting at the battle near the city in 362 BCE (Pausanias 8.9.9-10).²² Arrian (*An.* 1.17.11) reports that there was a tomb of the liberator Heropythos in the *agora* of Ephesus (FRÖHLICH 2013, 243-244). There may also have been a hero-shrine in the *agora* of Iasos in Asia Minor (FRÖHLICH 2013, 244). In the 3rd century BCE the general Aratus received the honor of burial in the *agora* of Sicyon (Pausanias 2.9.6) (FRÖHLICH 2013, 251-254). The general Philopoemen received this honor at Megalopolis in the early 2nd century BCE (Diodorus Siculus 29.21 with *Syll.*³ 624, lines 2-10).²³ In each of these cases the person honored received commemorative sacrifices. The practice continued in mainland Greece and Asia Minor under the Roman Empire.²⁴

It is often hard to discern why an *agora* was constructed where it was located within the city walls, but one factor that may have played an important role was the proximity to a good source of water. There was a fountain of Arsinoe near the *agora* of Messene (Pausanias 4.31.6 with THEMELIS 2012). At the edge of the *agora* in Athens there was the southeast fountain house and the *enneakrounos* fountain, which was supplied by an aqueduct.²⁵ The spring of Peirene was famous at Corinth and located near the Roman *agora* (ROBINSON 2011). There were two fountains as one exited the *agora* of Thasos through the passageway of the *Theoroi* (GRANDJEAN/SALVIAT 2000, 88).

One must not think of the society of the Greek *polis* divided into a wealthy elite, which used the market mainly to purchase luxury goods, and a

mass of farmers living on isolated farmsteads in the countryside at the level of subsistence and with little involvement in the market. The level of demand in Athens was so high that there are over two hundred different occupations attested (see App. 2). The number of those working in non-agriculture occupations may have been as much as half of the population. The evidence of the confiscations of estates belonging to those convicted of impiety in 415 BCE provide good evidence for the kinds of goods kept in the households of the wealthy and families of average wealth (*IG* i³ 421-430). One household of Adeimantus on Thasos had over 6000 l of wine in storage, an amount too large for household consumption and obviously produced for sale on the market. Other records reveal households with large stockpiles of goods “particularly ceramic goods and textiles, but also furniture, slaves tools, livestock, building materials, weapons and other miscellaneous items.” (HARRIS/LEWIS 2016, 19) D. M. Lewis has collected the evidence for commodities sold on the market in Classical Athens and discovered a vast array of different items being bought and sold.²⁶ Though some clothing was produced at home, it was normal for the average Athenian to buy his shoes in the *agora* (Theophrastus *Characters* 22.11). The normal family needed a large number of ceramic goods for cooking: pots, pans, braziers, crockery, wine jugs, storage jars, knives, ladles and strainers. Most households needed charcoal for heating and cooking, and potters needed charcoal for their furnaces (OLSON 1991). Certain kinds of fish were expensive, but salt fish (*tarichos*) and sprats were cheap and affordable by the average Athenian. Theophrastus (*Characters* 4.15) describes the rustic (*agroikos*) who goes into town and “asks anyone he meets about the price of hides and salt fish, and whether today is the first of the month, and he says right away that when he reaches town he wants to get a haircut, do some singing at the baths, hammer some nails into his shoes, and while he’s going in that direction, pick up some fish at Archias’s shop” (trans. Rusten with one change). Many of the items bought by the average Athenian were imported from abroad. Aristophanes (*Acharnians* 874-890) has one of his characters wax eloquent about goods imported from Boeotia: marjoram, penny-royal, rush-mats, lamp-wicks, ducks, jackdaws, francolins, coots, wrens, dabchicks and a variety of other small animals. The Old Oligarch ([Xenophon] *Constitution of the Athenians* 2.7) describes how the Athenians imported goods from Sicily, Italy, Cyprus, Egypt, the Black Sea regions and the Peloponnese (VAN ALFEN 2016). Those who had enough money to be called up as hoplites (about half the male citizens and some metics) needed to provide their own armor, which included a helmet, spears, swords, a breastplate, and greaves, all from the market. Lysias (12.19) mentions one

22 See also *IG* V 2, 321, 2a with the discussion in FRÖHLICH 2013, 242-243.

23 On *heroons* in *agoras* see KENZLER 1999, 184-195.

24 See DICKENSON 2016, 132-142 with the bibliography cited there, esp. SCHÖRNER 2007.

25 On the southeast fountain house see PAGA 2015. On wells and fountains in the Athenian *agora* see LANG 1968.

26 For what follows see HARRIS/LEWIS 2016, 21-22 and Lewis in HARRIS *et al.* 2016, 381-398.

workshop employing over a hundred slaves working to produce armor. Another workshop reported by Demosthenes (36.11) contained around sixty or seventy slaves producing shields.²⁷ The need for military equipment therefore generated a large demand for items sold on the market.

The question inevitably arises, how typical was Athens? The problem is that there is plenty of literary, archaeological and epigraphic evidence for Athens, but relatively little for other *poleis*. But the excavations at Olynthus have revealed several households specializing in the production of metals, agricultural products such as oil, textiles, terracottas and pottery (CAHILL 2002). The island of Delos had dozens, if not hundred of workshops producing goods for local consumption and export. Karvoni has identified workshops producing glass, oil, clothes, glass, pottery, metal goods, musical instruments, and milling barley and grain (KARVONIS 2008). And we know that every Greek city, even the smallest, had an army of soldiers (MA 2000). By the Hellenistic period hundreds of cities required their citizens to do service as ephebes, which meant that they would have to buy armour for themselves (CHANKOWSKI 2010). That is not to mention the skills required to build all the temples, theatres, stoas and other buildings that adorned Greek cities. More work needs to be done, but the existence of permanent market-places in most Greek cities would indicate that the level of demand was substantial and that Greeks did not exchange just agricultural goods. There needs to be more analysis of the assemblages found in households to determine what the average person was both producing for market and purchasing from the market.

So far I have examined places called *agoras*, but there is another term, *emporion*, which can also be used to designate a marketplace. This term is rather protean and can be used in several senses. One must not view every *emporion* as an example of Polanyi's concept of a port of trade, that is, a place which is marginal and very circumscribed where exchange is carefully controlled between natives and foreigners to avoid the disruption of traditional patterns of exchange in the rest of the country.²⁸ This concept is relevant only to the *emporion* of Naukratis in Egypt, which was given to Greek merchants from Amasis to Psammetichus (Hdt. 2.112). Greeks who wished to trade had to do their business here and could not trade in other areas. A similar arrangement existed for Phoenicians at Memphis. In the Greek world, however, the *emporion* usually meant one of two things. First, an *emporion* might be the port of the city located in a harbor. At Athens there was a distinction between the *agora*, which was several miles

away from the coast, and the *emporion* in the Piraeus on the shore, which had its own *agora*. Each place specialized in different kinds of exchange to some extent. The Piraeus was where *emporoi*, that is merchants who shipped commodities between city-states, usually overseas, came to dispose of their cargos in the wholesale market.²⁹ There was a special part of the Piraeus known as the *deigma* or sample market (Demosthenes 35.29). Here a merchant with a large cargo would provide a sample of his goods to prospective sellers, who would then ship their purchases to the *agora* in Athens or one of the *agoras* in Attica for retail sales. We do not know how many cities had this same division between wholesale purchases in an *emporion* and retail sales in an *agora*. It is possible that Athens because of its large size and role as a commercial hub may have been unusual. We know that there were several markets in Delos, and there may have been a similar division of function among them. On the other hand, Olynthus, which was the main city of the Chalcidian League between 432 and its destruction by Philip in 348, was an inland settlement, but controlled several *emporia* from which it drew revenues in the form of import-export taxes.³⁰ The king of Thrace also controlled several *emporia* along the coast of the Northern Aegean and drew revenues from them (Dem. 23.110), and the Kings of the Bosphorus exercised control over several *emporia* which exported grain to Athens and other Greek cities.

The second type of *emporion* was a small settlement established on the coast that would trade with the natives of the interior. One such settlement was Tartessos on the coast of the Iberian peninsula, which played a major role in exchanges between native tribes and the Greek East. These were not city-states in the normal sense because they lacked the civic institutions associated with the *polis* but merely communities of traders and craftsmen. There is some debate about the status of the settlements called *emporia* in the Archaic and Classical periods. Bresson believes that there were *emporia* which were not *poleis* (city-states), while Hansen claims that there were no *emporia* which were not *poleis* until the Hellenistic period (BRESSON 1993; HANSEN 2006).

In addition to permanent markets there were also periodic markets, which were often associated with festivals and *panegyreis*. A letter sent probably by Antiochus II in the middle of the 3rd century BCE about a sanctuary at Baetocaece in Syria mentions fairs held every month on the fifteenth and the thirtieth.³¹ These periodic markets at short intervals should be distinguished from markets occurring at longer intervals. Polybius (5.8.5) mentions a

27 For metal-working and the production of armour see AC-TON 2014, 116-147.

28 Against Polanyi's idea of the port of trade in the Greek world see FIGUEIRA 1984.

29 On the Piraeus there is the general account of GARLAND 1987.

30 On the history of Olynthus see PSOMA 2001.

31 *IGLS* VII.4028 B and C (= WELLES 1934, no. 70). For the date see RIGSBY 1980.

market at Thermon for the Thermika, which took place once a year, and Pausanias (10.32.15) reports a market taking place twice a year at Tithorea. At this market traders made temporary stalls of reeds or other material and sold more expensive items like slaves, cattle, clothes, gold and silver. Strabo (10.5.4) called *panegyreis* “commercial activities in a way.” Unlike the permanent markets in which items were sold in permanent shops, the periodic markets at fairs attracted itinerant merchants (DE LIGT/DE NEEVE 1988; DE LIGT 1993; CHANDEZON 2000). Different cities might coordinate the schedules of these periodic markets to allow merchants to travel from one to another (NOLLÉ 1982, 21-28).

There is no reason to doubt that the *agora* was also a market in the abstract sense, that is, a place where prices were determined by the forces of supply and demand (HARRIS/LEWIS 2016, 1-2, 16 with references). After the rise of coinage in the 6th century, the vast majority of exchanges were made in cash.³² From the very beginning Greek city-states minted a range of coins in many denominations, ranging from very small to rather large (tetradrachmas), mostly in silver from the late 6th through the 4th centuries. In the late 5th century, many city-states started to issue bronze coins in even smaller denominations (GRANDJEAN/MOUSTAKA 2013). This would indicate that coinage was not just for occasional large-scale purchases and the payment of mercenaries and major fines, but for everyday purchases by average citizens and foreigners (KIM 2002).

When discussing markets in the abstract sense, one should distinguish among local markets, regional markets and inter-regional markets (HARRIS/LEWIS 2016, 12-16). Some items such as fresh vegetables and fresh fish did not travel far, but other items such as grain, wine, pottery and salted fish might travel several hundred miles. For instance, we know that the island of Thasos shipped vast quantities of wine to inner Thrace and cities along the north coast of the Black Sea (TZOICHEV 2016). The Athenians and some other Greek cities in the Aegean transported grain from distant areas such as the Black Sea (Demosthenes 20.29-35), Egypt (Demosthenes 56.3-5) and Sicily (Demosthenes 56.9).

The activities of the *agora* were regulated by various public officials. At Athens there were several boards of officials supervising economic transactions. First, there were the *agoranomoi* (“market-controllers”) who were assigned the task of ensuring that all items bought and sold were “pure and unadulterated” and that seller did not attempt to cheat buyers (Aristotle *Constitution of the Athenians* 50.1).³³ These officials may have been responsible for enforcing the law about latent defects in

slaves (Hyperides *Against Athenogenes* 15). A decree dated to 320/319 BCE (*IG* ii² 380) gives additional information about their duties: they were to keep the streets and market-place open and clean for religious processions and to force those who had thrown refuse in the street and market-place to pick it up.

Because grain was the main source of food for most Athenians, there were *sitophylakes* (“grain-wardens”) who supervised the sale of grain (BRESSON 2015, 393-415). Their task was so important that the number of *sitophylakes* was increased from five to twenty in the city of Athens and from five to fifteen in the Piraeus during the 4th century BCE (Aristotle *Constitution of the Athenians* 51.3). These officials supervised the price of grain and ensured that millers did not charge too much for barley-flour and that bakers did not sell their bread at a price much higher than the cost of the grain used to produce the loaves. The Athenians also appointed by lot ten *epimeletai tou emporiou* (“supervisors of the port”) who policed the harbor and required merchants to bring two thirds of imported grain to the city (Aristotle *Constitution of the Athenians* 51.4). This was probably done to prevent the sale in the Piraeus of grain to foreign merchants for export abroad.

One of the most important duties of market-officials was to enforce the use of standard weights and measures. The Aristotelian *Constitution of the Athenians* (51.1) mentions the *metronomoi* (“controllers of measures”) and reports that there were five appointed by lot in the city of Athens and five in the Piraeus, but does not go into further detail about their responsibilities. An inscription dated to the 2nd century BCE however records a law about the use of weights and measures and probably contains many traditional rules (*IG* ii² 1013).³⁴ According to the law’s provisions, the officials responsible for enforcing the law are to make sample measures for wet and dry goods and to compel buyers and sellers to use them (lines 7-9). The law covers all those selling in the *agora*, in workshops, in retail shops, in wine shops and in storehouses (line 9). The officials cannot make larger or smaller than the official weights; there is a penalty of 1000 drachmas for infractions (lines 10-13). The Council of Six Hundred has general supervision for the measure (lines 16-18). If merchants use containers smaller than the official ones, the magistrate is to sell the contents at auction and destroy the container (lines 27-29).

The duties carried out by the *agoranomoi*, *sitophylakes* and the *metronomoi* were often carried out by a single *agoranomos* or a small board of *agoranomoi* in less populous cities. For instance, there was only one *agoranomos* on the island of Astypalaea (*IG* XII 3, 169-170). In general, market officials did not control the prices of goods except in special circumstances (MIGEOTTE 1997). A law from

32 For an overview of Greek coinage in the Archaic and Classical periods see KRAAY 1976.

33 On the *agoranomoi* at Athens see OLIVER 2012.

34 For a new text of this law see DOYEN 2016.

Andania about the Mysteries forbids the *agoranomoi* to set prices during the festival, which may indicate that they had the power to do so in other circumstances.³⁵ On the other hand, a series of inscriptions from Ephesos sets prices for certain types of bread during *panegyreis*.³⁶ An inscription from Cyzicus dated to 38 CE instructs officials to help the *agoranomoi* keep prices below the “established price” (*enestôse time*) (Syll.³ 799, lines 18-21). A document from the Piraeus dated to the 1st century BCE gives prices for various commodities, but it is impossible to tell if these are mandatory prices or maximum prices (BRESSON 2000, 151-182; DESCAT 2012). A well-known law from Delos dated to the end of the 3rd century BCE requires merchants to declare the price of charcoal and not to change it and grants the *agoranomoi* the power to enforce the law.³⁷ In other cases, *agoranomoi* or other officials might be given funds from the state to purchase grain and to distribute this grain or to sell it at low prices (MIGEOTTE 1994; 2005). The forces of the market were a powerful motor of economic growth in ancient Greece, but the Greeks knew very well that these forces needed to be regulated and supplemented by the institutions of the state to ensure social stability.

To sum up, *agoras* were found in urban settlements throughout the Greek world. The *agora* formed the centre of the city in many senses. This space contained the main administrative buildings, religious shrines, and commercial activities. Some cities built shops in or around the *agora* to promote crafts and trade. In the Archaic period the *agora* was usually only an empty space surrounded by temples or civic buildings. By the Hellenistic period *agoras* were often surrounded by stoas on three or four sides with monumental entrances to control traffic. The *agora* was also a space to display civic honours. In the Archaic period, founders might be buried in the *agora*. During the Hellenistic period, the *agoras* of Greece were filled with honorific decrees and statues. But from the Archaic to the Classical period, the *agora* was also the market-place, the place in which market-exchange took place.³⁸

Appendix 1 – *Agoras* mentioned in Herodotus, Thucydides and Pausanias.

Agoras in Herodotus – Selinus (5.46.2), Siphnos (3.57.4), Sparta (6.58.3), Miletus (1.21.2), Sardis (1.37.2), Babylon (1.197.1), Samos (3.42.2; 6.14.3), Sardis (5.101.2), Bubastis in Egypt (2.138.4), India (3.104.1), Metapontum (4.15.4), Sicyon (5.67.1), Athens (1.59.4; 5.89.3), Celaenae on the Meander (7.26.3).

Agoras in Thucydides – Plataea (2.2.4, 71.2), Corcyra (3.72.3), Torone (4.111.2, 113.2), Melos (5.115.4), Rhegium (6.44.3), Messene in Sicily (6.50.1), Athens (1.67.4, 139.1; 6.54.6), Amphipolis (5.11.1), Magnesia in Asia (1.138.5), Mantinea (5.47.11), Greek cities in Southern Italy (6.44.2).

Agoras in Pausanias – Aegium in Achaea (3.12.7; 7.23.9, 24.1), Ambrossus (10.36.4), Argos (2.21.1, 4, 5), Geronthrai in Laconia (3.22.7), Gythion in Laconia (3.21.8), Elaea in Asia Minor (9.5.14), Elateia in Phocis (10.34.6), Elis (6.24.1-26.1), Thasos (6.11.2-3), Thelpusa (8.25.3), Thespieae in Boeotia (9.27.5), Thebes (9.12.3), Corinth (2.2.6-3.6), Coroneia in Boeotia (9.34.3), Corone in Messenia (4.34.6), Cynaetha in Arcadia (8.19.1), Sparta (3.11.2-4.9, 12.1, 10), Lilaea in Phocis (10.33.4), Lykosoura in Arcadia (8.38.8), Mantinea in Arcadia (8.9.9), Megalopolis (8.30.2, 3.8, 41.9), Megara (1.43.8), Methana (2.34.1), Messene (4.31.6), Orchomenus in Arcadia (8.13.2), Patrae (7.20.3-7, 21.6), Pellene in Achaea (7.27.4), Pyrrhichus (3.25.3), Sicyon (2.7.6-7), Tegea (8.48.1-49.1), Tithorea (10.32.10), Troizen (2.31.1, 7), Hyampolis in Phocis (10.35.6), Pharae (7.22-2-3), Phigaleia (8.40.1, 41.1), Phlius (2.13.5-7), Charadra in Phocis (10.33.6). Twenty-five are attested in the Peloponnese alone.

Appendix 2 – Occupations Attested in Classical Athens (in alphabetical order of Greek transliterated terms) (compiled by A. Esu from HARRIS 2002; HARRIS/LEWIS 2016; for references to sources see those works).

Ancient Greek	English
<i>agalmatopoiōs</i>	statue-maker
<i>aggeiourgōs</i>	jar-maker
<i>aipolōs</i>	goatherd
<i>akestria</i>	seamstress
<i>aleiptria</i>	masseuse
<i>alieus</i> see (h) <i>alieus</i>	
<i>allantopoles</i> , <i>allantopoiōs</i>	sausage-seller, sausage-maker
<i>alopolis</i> see (h) <i>alopolis</i>	
<i>alphitamoibos/alphitopoles</i>	barley-dealer
<i>amorgantinos</i>	wool-worker
<i>ampelourgōs</i>	vine-dresser
<i>amphoreaphoros</i> or <i>-poiōs</i>	amphora-carrier or -maker
<i>andrapodokapelōs</i>	slave-dealer
<i>andriantopoiōs</i>	statue-maker
<i>anthrakeus</i>	charcoal-maker
<i>anthrakopoles</i>	charcoal-seller

35 Syll.³ 736, lines 100-101. For discussion see GAWLINSKI 2012, 215-219.

36 I. Ephesos 910, 923, 925a, 929, 934, 938, 3010 with SCHULTE 1994.

37 For a text and French translation of the law see DOYEN 2016.

38 I would like to thank Lorenz Rahmstorf for inviting me to the conference on markets at Göttingen and the other participants for lively and helpful discussion. I especially value Edward Stratford's reminder that “the Greeks did not invent everything.” Finally, I am grateful to Alain Bresson, Alberto Esu, Sylvian Fachard and an anonymous reviewer for reading over a draft of this essay and offering very useful suggestions.

<i>architekton</i>	architect	(<i>h</i>) <i>eduoinoi</i>	dealers in sweet wine
<i>arguramoibos</i>	money-changer	(<i>h</i>) <i>eniopoieion</i>	bridle-maker
<i>argurokopos</i>	minter	(<i>h</i>) <i>etaira</i>	call-girl
<i>argurokopeion</i>	silver-smith shop	(<i>h</i>) <i>imatiopolis</i>	clothes-seller
<i>artokopos</i>	baker	(<i>h</i>) <i>ippikos</i>	riding-trainer
<i>artopoios</i>	baker	(<i>h</i>) <i>o . . . sminuas poion</i>	maker of mattocks
<i>artopoles/artopolis</i>	bread-seller	(<i>h</i>) <i>oi pelophorountes</i>	carriers of clay or mortar
<i>askopoios</i> or <i>-phoros</i>	wineskin-carrier or -maker	(<i>h</i>) <i>olmopoios</i>	through-maker
<i>aspidopegos</i>	shield-maker	(<i>h</i>) <i>ulophoros</i>	wood-carrier
<i>aphnopolis</i>	laurel-seller	(<i>h</i>) <i>ulotomos</i>	woodcutter
<i>auletes/auletris</i>	flute-player	(<i>h</i>) <i>uperetes</i>	assistant to architect
<i>aulopoios</i>	flute-maker	(<i>h</i>) <i>upogrammateus</i>	undersecretary (assistant to architect)
<i>aulotrupes</i>	flute-borer		
<i>balaneus</i>	bathhouse-keeper	(<i>h</i>) <i>upodematopoios</i>	sandal-maker (for the distinction between <i>hupodema</i> and <i>hupodema koilon</i> see LSJ s. v.)
<i>bapheus</i>	dyer		
<i>belonopoles</i>	needle-seller		
<i>bibliopoles</i>	bookseller		
<i>boukolos/bouphorbos</i>	cowherd	(<i>h</i>) <i>upodidaskalos</i>	assistant teacher
<i>bursodepses</i>	tanner	(<i>h</i>) <i>upokrites</i>	reciter, declaimer
<i>bursopoles</i>	leather-seller	(<i>h</i>) <i>uphantikos</i>	weaver
<i>chalkeus</i>	smith	<i>iatros</i>	doctor
<i>charitopolis</i>	charm-seller	<i>ichthuopoles</i>	fish-seller
<i>chidropoles</i>	wheat-groat seller	<i>imatiopolis</i>	see (<i>h</i>) <i>imatiopolis</i>
<i>choiropoles</i>	pig-seller	<i>ippikos</i>	see (<i>h</i>) <i>ippikos</i>
<i>chorodidaskalos</i>	chorus-trainer	<i>ischadopoles</i>	dried-fig seller
<i>chremastistes</i>	business-man	<i>kanabiourgos</i>	maker of <i>kanaboi</i> (frame-works, 'stick-figures')
<i>chrusochoos</i>	goldsmith		
<i>chrusopoles</i>	gold-seller	<i>kapelos/kapelis</i>	retail-salesperson
<i>chrusotes/chrusotria</i>	gilder	<i>kapelos aspidon</i>	shield-seller
<i>daktuliogluphos</i>	gem-engraver	<i>karuo(-)</i>	nut-seller
<i>daktuliopoios/daktyliourgos</i>	ring-maker	<i>keleustes</i>	rowing-master
<i>deipnopoios</i>	caterer	<i>keporos</i>	gardener
<i>didaskalos</i>	teacher	<i>kerameus</i>	potter
<i>diphtheropoles,</i>	leather-seller, but must be the same as <i>bursopoles</i>	<i>keroplastes</i>	wax-worker
		<i>kerux</i>	auctioneer or crier
<i>doidukopoios</i>	pestle-maker	<i>kitharistes</i>	<i>kithara</i> -player
<i>doruxos</i>	spear-maker	<i>kitharodos</i>	one who plays the <i>kithara</i> and sings
<i>drepanourgos</i>	sickle/pruning knife-maker		
<i>egkautes encaustic</i>	painter	<i>klinopoios</i>	furniture-maker
<i>eiropokos</i>	wool-weaver	<i>kollepsos</i>	glue-boiler
<i>elaiologos/elaiokomos</i>	olive-picker or -tender	<i>kommotria</i>	hairdresser
<i>elaiopoles</i>	olive-seller	<i>koprologos</i>	dung-collector
<i>emporos</i>	merchant	<i>koskinopoios</i>	sieve-maker
<i>enkridopoles</i>	cake-seller	<i>koskinopoles</i>	sieve-seller
<i>epitropos</i>	overseer	<i>koroplathos</i>	image-seller
<i>ergolabos</i>	contractor	<i>koureus</i>	barber
<i>eriopoles</i>	wool-seller	<i>kranopoios</i>	helmet-maker
<i>erithos</i>	wool-worker	<i>kreopoles</i>	butcher
<i>etaira</i> see (<i>h</i>) <i>etaira</i>		<i>krommuopoles</i>	onion-seller
<i>gelgopoles</i>	garlic-seller	<i>kubernetes</i>	helmsman
<i>geometres</i>	surveyor/geometer	<i>kuminopoles</i>	cumin-seller
<i>georgos</i>	farmer	<i>kurebiopoles</i>	bran-seller
<i>gnapheus</i>	fuller	<i>lekithopoles</i>	pulse-seller
<i>gnaphallouphantes</i>	flock-weaver	<i>libanotopoles</i>	incense-seller
<i>grammateus</i>	secretary (not a public office)	<i>linourgos</i>	flax/linen-worker
		<i>lithokopos</i>	stone-cutter
<i>grammatistes</i>	elementary schoolteacher	<i>lithologos</i>	mason
<i>grapheus</i>	painter	<i>lithourgos</i>	stone-worker
(<i>h</i>) <i>alieus</i>	fisherman	<i>logographos</i>	speech-writer
(<i>h</i>) <i>alopolis</i>	salt-seller	<i>lophopoios</i>	maker of crests for helmets
(<i>h</i>) <i>amaxourgos</i>	cartwright	<i>luchnopoios</i>	lamp-maker

<i>luchnopoulos</i>	lamp-seller	<i>siderourgos</i>	iron-worker or -seller
<i>luropoios</i>	lyre-maker	<i>sindonopoles</i>	seller of fine cloth
<i>machairopoios</i>	knife-maker	<i>sitopoios</i>	baker
<i>mageiros</i>	cook	<i>sitopoles</i>	grain-dealer
<i>maia</i>	midwife	<i>skapheus</i>	digger
<i>mechanopoios</i>	engineer	<i>skenites</i>	one who keeps a stall or tentmaker
<i>melitopoles</i>	honey-seller	<i>skenographos</i>	painter of scenery
<i>membradopoles</i>	sardine-seller – a sub-specialization of <i>ichthuopoles</i>	<i>skeupoios</i>	maker of equipment
<i>metalleutes</i>	miner	<i>skeuopoles</i>	seller of equipment
<i>misthotos</i>	manual-labourer	<i>skoinoplokos</i>	rope-maker
<i>molubdokopos</i>	lead-cutter	<i>skulodepses</i>	tanner of hides
<i>mulokopos</i>	mill-stone cutter	<i>skutotomos</i>	leather-worker
<i>mulothros</i>	miller	<i>soropegos / soropoios</i>	funeral urn-maker
<i>muropsos</i>	perfume-boiler	<i>spermatopoles</i>	seed-seller
<i>muropoles</i>	perfume-seller	<i>stephanopoios</i>	wreath/crown-maker
<i>mustriopoles</i>	spoon-seller	<i>stephanopolis</i>	wreath-seller
<i>naukleros</i>	ship-owner	<i>stuppeiopoles</i>	oakum, tow, hemp, flax-seller
<i>naupegos</i>	ship-builder		er
<i>nautes</i>	ferryman	<i>subotes</i>	swineherd
<i>neurorrhaphos</i>	cobbler	<i>survingopoios</i>	maker of pipes
<i>obeliskopoios</i>	skewer-maker	<i>surmaiopoles</i>	seller of emetics
<i>obolostates</i>	lender of small amounts	<i>tainiopolis</i>	ribbon-seller
<i>oikodomos</i>	housebuilder	<i>talasiourgos</i>	wool-worker
<i>oinopoles</i>	wine-seller	<i>tamias</i>	keeper of stores on estate
<i>onokomos</i>	ass-keeper		
<i>onelates</i>	ass-driver	<i>tarichopoles</i>	dealer in salt-fish
<i>orchestris</i>	dancing girl	<i>tektion</i>	craftsman, joiner
<i>oreokomos</i>	muleteer	<i>thorakopoios</i>	maker of breastplates
<i>ornitheutes</i>	fowler/bird-catcher	<i>thuropoios</i>	door-maker
<i>ortygothoras</i>	quail-catcher	<i>titthe</i>	wet-nurse
<i>ortygotrophos</i>	quail-rearer	<i>tokistes</i>	lender or usurer
<i>opsopoios</i>	cook (of fine foods)	<i>toxopoios</i>	bowyer
<i>ospriopoles</i>	pulse-seller	<i>torneutes</i>	turner (lathe)
<i>paidotribes</i>	physical-trainer	<i>trapezites</i>	banker
<i>pandokeus/pandokeutria</i>	inn-keeper	<i>trapezopoios</i>	table attendant, one who lays out the table
<i>persikopoios</i>	maker of slippers		
<i>pharmakopoles</i>	druggist	<i>triaeraules</i>	flute-player for a trireme
<i>pharmakotribes</i>	colour-grinder	<i>trochopoios</i>	wheel-maker, wheelwright
<i>phortegos</i>	trader	<i>trophos</i>	nurse
<i>phreorychos</i>	well-digger	<i>trugetria</i>	one who gathers fruit
<i>plinthophoros</i>	brick-carrier	<i>tuluphantes</i>	weaver of cushion-covers
<i>plinthourgios</i>	brick-maker	<i>turopoles</i>	cheese-seller
<i>pluntes/pluneus pluntria</i>	clothes-cleaner	<i>uperetes</i>	see (<i>h</i>) <i>uperetes</i>
<i>poikiltes</i>	embroiderer	<i>xylourgios</i>	carpenter
<i>poimen</i>	shepherd	<i>xiphourgios</i>	swordsmith
<i>polodamnes</i>	horse-breaker	<i>upodematopoios</i>	see (<i>h</i>) <i>upodematopoios</i>
<i>porthmeus</i>	ferryman	<i>upodidaskalos</i>	see (<i>h</i>) <i>upodidaskalos</i>
<i>pornoboskos</i>	brothel-keeper	<i>upogrammateus</i>	see (<i>h</i>) <i>upogrammateus</i>
<i>pornos/porne</i>	whore	<i>upokrites</i>	see (<i>h</i>) <i>upokrites</i>
<i>pristes</i>	sawyer	<i>zeugotrophos</i>	teamster
<i>probatopoles/probatokapelos</i>	sheep-seller	<i>zogrophos</i>	painter, artist
<i>prometretes</i>	surveyor	<i>zygopoios</i>	yoke-maker
<i>proreus</i>	keeper of stores on ships		
<i>psaltria</i>	harp-player		
<i>rhaptēs</i>	clothes-mender		
<i>rhizopoles</i>	dealer in roots (medicinal)		
<i>rhizotomos</i>	one who gathers medicinal roots		
<i>sakchuphantes</i>	sack-maker		
<i>sesamopoles</i>	sesame-seller		

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Address of the author

Edward Harris
Department of Classics and Ancient History
Durham University
Durham DH1 3EU
UK
edward.harris@durham.ac.uk

Medieval marketplaces in northern Europe – an overview with an emphasis on merchant seafaring

by FELIX RÖSCH

Medieval archaeology, marketplaces, medieval trade, ports and harbours, merchant seafaring, northern Europe

For a long time, marketplaces were an underrepresented field of research in medieval archaeology. Numerous urban excavations and re-evaluations of evidence from older excavations, however, have significantly increased our level of knowledge over the last three decades. This paper summarises the main findings and uses historical sources to outline the development of medieval markets. Particular focus is laid on the trading space of ports, which underwent their own development due to the specific conditions of merchant seafaring. This progress can now be understood in a more differentiated way for the first time. Beside markets and other places of trade, backgrounds and actors involved are discussed.

The development of the marketplaces is presented chronologically in three time periods. For the Early Middle Ages, a brief overview over the sources of the Carolingian and Ottonian market policies come first accompanied by archaeological examples of early inland marketplaces. This is followed by the emporia and other trading ports in the North Sea and the Baltic, from which beach and harbour markets as well as other infrastructure are known. The professionalism and mechanisms of early medieval trade are also discussed.

While in the High Middle Ages the number of inland marketplaces increased continuously, an commercial optimisation can be registered at the waterfronts, which is strongly linked to the professionalisation of merchant seafaring. On the one hand, public harbour markets were established in the ports, while on the other hand, private and individually developed commercial properties appeared. From the late 12th century onwards, we can discern both a change and a diversification. The harbours lost their market function, while long-distance trade shifted to the houses of the merchants inside the town. Furthermore, central marketplaces were established to ensure the supply of the local population. At the same time, the inner-city markets became more diverse, which is expressed by the construction of warehouses, booths and other structures.

Mittelalterliche Marktplätze in Nordeuropa – ein Überblick mit Fokus auf dem Seehandel

Mittelalterarchäologie, Marktplätze, mittelalterlicher Handel, Häfen, Handelsschifffahrt, Nordeuropa

Marktplätze stellten lange Zeit ein unterrepräsentiertes Forschungsfeld in der Archäologie des Mittelalters dar. Seit den 1990er Jahren konnte durch zahlreiche Stadtkerngrabungen sowie der Auswertung von Altgrabungen der Kenntnisstand jedoch wesentlich erhöht werden. Der Artikel fasst die wesentlichen Ergebnisse zusammen und zieht historische Quellen heran, um auf dieser Grundlage einen Überblick über die Entwicklung mittelalterlicher Märkte zu skizzieren. Dabei liegt das Hauptaugenmerk auf den Märkten und Häfen der Seestädte, die durch die spezifischen Bedingungen des schiffsgestützten Handels eine eigene Entwicklung durchmachten, die sich wiederum nun erstmals differenzierter nachvollziehen lässt. Neben den Marktplätzen und anderen Räumen des Handels werden wesentliche Hintergründe und involvierte Akteure diskutiert.

Die Entwicklung der Marktplätze wird anhand von drei Zeitabschnitten dargestellt. Für das Frühmittelalter werden zunächst die Quellen zur karolingisch-ottonischen Marktpolitik vorgestellt, bevor archäologische Beispiele früher städtischer Marktplätze herangezogen werden. Es folgen die emporia und Seehandelsplätze in Nord- und Ostsee, die Ufer- und Hafenmärkte sowie weitere Infrastrukturen aufweisen. Darüber hinaus werden die Professionalität und Mechanismen des frühmittelalterlichen Handels analysiert.

Während im Hochmittelalter die Zahl der Marktplätze im Binnenland kontinuierlich zunimmt, lässt sich in den Hafenvierteln eine wirtschaftliche Optimierung verzeichnen. Diese äußert sich einerseits in öffentlichen Hafenmärkten und andererseits in privaten und individuell entwickelten Handelsgrundstücken – ein Prozess, der stark mit der Professionalisierung der Handelsschifffahrt verknüpft ist.

Ab dem späten 12. Jahrhundert sind ein erneuter Wandel sowie eine Differenzierung erkennbar. Die Häfen verlieren ihre Marktfunktion, während der Fernhandel in Häuser der Kaufleute verlagert wird – der Markt wird verhäuslicht. Parallel dazu entstehen zentrale Marktplätze, die die Versorgung der lokalen Bevölkerung sicherstellen. Zur gleichen Zeit werden die innerstädtischen Märkte vielfältiger, was sich in der Errichtung von Buden, Kaufhäusern und weiteren Einrichtungen äußert.

Introduction

This paper provides an overview of medieval markets and their context in northern Europe. The treatment will put particular focus on marketplace development and change over the centuries with an emphasis on the markets linked to seaborne trade. Besides the market as a physical *place*, the actors involved and the actions undertaken will also be discussed. Here, the written sources play an important role to understand the multiple facets given as an idea of the complexity of a market as *space* (cf. LÖW 2012).

A major problem in the archaeology of marketplaces is the lack of material evidence or, more precise, the difficulty of their interpretation in terms of exchange, communication and setting. When no physical area can be identified on the ground, finds interpreted as trade goods (or imported goods), coins, weights and scales are usually the only remnants. Even though they can give us information on contacts and interactions, as well as institutionalised systems of exchange and control, their significance on how and where the actions took place and by whom is rather limited. The first German introduction to medieval archaeology by G. FEHRING (1987) underlines this, as it does not contain any topic on markets. Driven by an increasing number of marketplace excavations in medieval towns since the 1990s, this deficit has been revised by several works on markets (KENZLER 2001, 208-209; RÖBER 2006; HÖLTKEN 2008, 579; SCHOLZ 2015, 108-111) and was recently reconsidered in SCHOLKMANN *et al.*'s (2016) introduction to German medieval archaeology. Even though the chapter on trade and exchange remains still rather short, it must be considered as representative for medieval archaeology in general (cf. GRAHAM-CAMPBELL 2007).

By contrast, “trading site”, “assembly site”, “*Marktort*” (market site) or just “market” are frequent attributions for many early medieval sites with finds pointing towards long-distance trade and exchange. The same is true when it comes to the common terms “traders” and “merchants”, which are often quoted without discussing the background of these actors (e. g. GAUT 2015, 144-145; RÖSCH 2018b, 340-342). This becomes particularly apparent when the numerous approaches based on W. CHRISTALLER's (1933) central-place theory are tested, where evidence of “trade and exchange” is usually an essential criterion (e. g. STEUER 2007; LUDOWICI *et al.* 2010; GRINGMUTH-DALLMER 2011). Despite several advantages, however, the theory has its shortcomings for long-distance trade (SINDBÆK 2007, 128; NAKOINZ 2009, 372-373; 2012, 218). In some places, interpreting an archaeological site as a central place or trading site is merely based on a higher amount of metal finds (HILBERG/LEMM 2018).

Such characterisations are generally linked to the undoubted importance of markets in the medieval period, which are quite apparent in the written sources. The establishment and legal regulation of such sites (often in combination with mints and taxation rights) is a major issue discussed in conjunction with urbanisation (SCHLESINGER 1973; BRACHMANN 1991; NICHOLAS 1997, 100-101; SCHOFIELD/VINCE 2003, 58-62) and the professionalisation of trade (POSTAN 1952, 155-156; PERSSON 2010; AYERS 2016, 147-148).

In short, the term “trading site” or “market” is stressed frequently in the general archaeological literature to highlight the importance of a certain place. But archaeological research on marketplaces in general – and their spatial development in particular – is insufficiently considered. This is especially true for the Early Medieval Period and the ports developing during that period (cf. KALMRING 2010a, 448-449, n. 210; ILVES 2012a, 29-32; SCHOLZ 2015, 169-170; WOUTERS *et al.* 2017, 49).

In the following treatment, three periods in the Middle Ages, each of which represent certain market types, are discussed in terms of topography, development and background: (1) a general overview of the differing and dynamic aspects of the Early Middle Ages, (2) a period of commercial optimisation in the High Middle Ages with is strongly linked to the professionalisation of merchant seafaring and (3) a culminating phase of transformation and diversification.

By contrast, seasonal markets, except for their occurrence during the initial period, and the fairs which rapidly grew throughout the Late Medieval Period are not included in this analysis. Beside the problem of archaeological evidence, which is naturally hard to trace (ARTHUR 2000), this topic is also treated in this volume from a historic perspective (Dijkman in this issue).

Marketplaces during the Early Middle Ages

Market politics and early inland marketplaces

For the Merovingian period, we know of a few written sources which are limited to the area of the former Roman Empire. They give the idea that at least some markets in the *civitates* (proto-urban places with no legal distinction from the hinterland) were continued from Antiquity. Long-distance trade was of moderate extent (SCHLESINGER 1973, 262-264).

The increasing economic prosperity during the Carolingian period led to the reactivation of several markets in the *civitates*. Moreover, the sources mention markets at bishops' sees, monasteries, and royal courtyards. These official markets (*mercata publica* or *legitima*) belonged to the king or were managed and protected by him or his representatives. For security and for control of the transactions, a toll had to be paid (*theloneum*). But it is uncertain

how this was enforced. Besides the official markets, there were specialised food markets, which are not mentioned in the sources, as well as markets without 'legitimation.' It can be assumed that the market right could not be implemented everywhere in the Carolingian period. In the territories east of the Rhine the mechanisms of trade are uncertain, but the Diederhofer Kapitular mentions, amongst others, Bardowick and Magdeburg as trading sites in 805 AD, while Hamburg, Bremen and eventually Emden had a marketplace. The people involved in transactions are known to have been privileged groups of individuals, including women, who were excluded from paying taxes at most places in the empire (SCHLESINGER 1973, 265-269).

Later, during the 10th and 11th centuries, the Ottonian and Salian kings were more successful in establishing a broadly validated market right than their Carolingian predecessors, who basically aimed for permanent trading settlements rather than temporary markets. By granting minting rights to Corvey in 833 AD, followed by the bishoprics of Hamburg (834 AD) and Bremen (888 AD), Carolingians had already established a powerful tool for transaction control east of the Rhine. Merchants were forced to use the local currency while in return security assurances were granted for the route to and from the market. It is striking that the recipients of market and minting rights in that period were first and foremost ecclesiastical institutions, which was a result of the nature of the royal economic policy. From the 10th century the granting of market rights often went hand in hand with the definition of a certain area, the so-called *Bannbezirk*. In 965/975 AD, merchants in Magdeburg were given legal capacity through their own parish (*ecclesia mercatorum*) for the first time. This market right (*ius mercatorum*) became exemplary for a wide range of subsequently established markets (SCHLESINGER 1973, 271-280; BRACHMANN 1991).

In contrast to the written sources of the 9th and 10th centuries, which provide an image of the legal situation and economic policy, archaeological sources are rare. To date, just three excavated marketplaces from the Ottonian period are known in Germany¹: Cologne, Ulm and Quedlinburg (GÄRTNER 2017, 27). The earliest phase (Markt 1) of today's Heumarkt in Cologne goes back to 957 AD or shortly thereafter, and correlates therefore with the earliest written source from 992 AD. Probably on the initiative of Archbishop Bruno (925-965 AD) a whole neighbourhood of sunken floor huts, cesspits and wells was levelled and covered with a 2 cm thick pavement of gravel, limestone and tuff mixed with roman bricks and other artefacts. In addition, some possible indications of temporary booths could be documented. Even though an area of more than 5000 m² has been excavated, the origi-



▲ Fig. 1. Quedlinburg. The oldest pavement of the marketplace (GÄRTNER 2017, fig. 9).

inal extent of the marketplace remains unknown (HÖLTKE 2008, 582-588; in this issue). In Ulm the extent of the earliest marketplace, which has been built before 997/1000 AD, is known: a rectangular square measuring 20 m x 35 m and paved with pebble stones (DUMITRACHE *et al.* 2009, 438-439). In Quedlinburg, a market was discovered under today's marketplace in 2012/2013 (Fig. 1). The square of unknown total extent, also dates to the late 10th century and was paved with rubble of lime- and sandstone, pebbles from the River Bode, as well as animal bones (GÄRTNER 2017, 16-18). It seems likely that the establishment of the marketplace correlates to the granting of the market right in 994 AD, which refers directly to the mentioned *ius mercatorum* of Magdeburg, but also to Cologne and Mainz and contains a passage that other markets were forbidden within a certain range. Quedlinburg is not the only example but part of a larger campaign by Otto III which not only granted this legal advantage to many places but has been characterised "as the actual breakthrough of the market development" (BRACHMANN 1991, 124; transl. by the author).

Overall, Carolingian and Ottonian kings first granted privileges to ecclesiastical institutions who organised the long-distance trade. By the 10th century, the earliest archaeological recorded establishment of paved marketplaces, which seem to stay in place until today, took place, while markets, mint and toll rights appeared already in the 8th/9th century. Even though it is most likely that paved areas and other infrastructure existed in market settlements before the 10th century, there seems to be a correlation between institutionalised promotion of trading activities and the establishment of an improved mercantile infrastructure.

Marketplaces in emporia and other trading ports

The *emporium* along the North Sea coast, which also appeared in Britain, Scandinavia and the Baltic, played a different role in the long-distance trade

1 The marketplace of Hedeby goes back to the 9th century but will be discussed later, as it is a specific type of market connected to the seaborne trade.

networks and market organisation in the Carolingian realm. According to R. HODGES' (1982) widely recognised model, *emporia* functioned as gateway communities between the developed realm and the peripheral regions of England and Scandinavia. This was due to their location, bordering cultural and political systems, thus giving different actors, such as merchants, travellers, missionaries *etc.*, the opportunity to interact and exchange by guaranteeing security and providing space, infrastructure, and access to navigable waters. It is widely accepted that *emporia* were economically independent from their hinterland. Two major theories concerning their origin in the early 8th century have been discussed extensively: 1) a top down approach, where rich and powerful local elites, especially in England and Scandinavia, founded trading places to establish a constant supply of prestigious goods; or 2) a bottom up approach, where well-organised groups of merchants were responsible for the development of *emporia* (HODGES 1989, 52-56; MORELAND 2001; CALLMER 2007, 240-241). When studying the Carolingian *emporia*, a strong linkage to the king, nobility and church becomes apparent, but their role is also disputed. J. CALLMER (2007, 240) states that, "...their [the political elites] role was rather one of passive profiteers", while HODGES (2000, 120) is convinced that they were the driving forces behind these *emporia*. The *emporia* and *vici* Quentovic and Dorestad for the Carolingian realm were quite important. Not only are there many contemporaneous sources, but several groups of merchants (from Straßbourg and Aachen for instance) were granted exemption from paying tolls everywhere except these places (and the Alp passes; SCHLESINGER 1973, 266; COUPLAND 2002, 210-211).

Dorestad was part of the toll or custom territory of Utrecht, which may have covered the whole Rhine Delta. *Procuratores rei publice* are known from both Dorestad and Quentovic in 815 AD, and were in charge of collecting the royal tolls for merchandise. Moreover, Louis the Pious granted a *decima* to the church of Utrecht, which has been interpreted as a ten percent share of the royal tax revenue (*cf.* MIDDLETON 2005, 325-326). It is uncertain where the toll was collected in Dorestad and where the market operated. VAN ES/VERWERS (1980; 2002, 298-299) discuss a model that a market space might have been established in front of the extinct fort between the rivers Lek and Rhine. With settlement activities starting during the 7th century at the River Kromme Rijn in the north, there may have been a transition to a beach market arrangement. The Hoogstraat excavations revealed parallel plots, 9 m wide and 36-47 m long, and built up with houses on the beach wall. From the late 7th century onwards, the plots were constantly developed as platform-like structures into the river bed for a period of 150 years, reaching lengths up to 200 m while the Kromme Rijn gradually retreated. The platforms were initially interpreted as har-

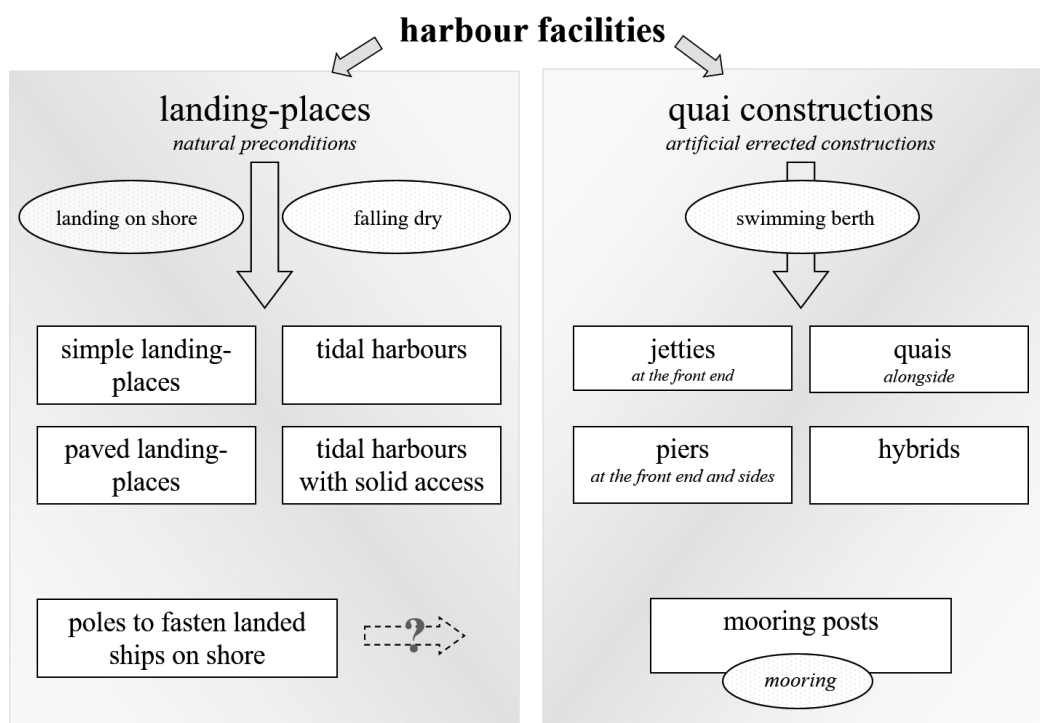
bour facilities, which provided secure access to the beached ships (VAN ES/VERWERS 1980). Later, the excavators preferred to see the prospering harbour driving land reclamation and building activities and suggested that there were structures and buildings on the platforms in front of the plots (VAN ES/VERWERS 2002; 2009). In return, S. KALMRING (2010b) doubted this revised view and argued to continue interpreting the harbour facilities primarily as paved landing-places (*cf.* Fig. 2). Although a clear interpretation cannot be made, the high amount of imported ceramics, the great numbers of coins as well as boathooks undoubtedly point towards a connection with seaborne long-distance trade (COUPLAND 2002; VAN ES/VERWERS 2002, 294). It is therefore likely that certain activities took place on and in front of the platforms. This is indirectly supported by written sources mentioning plots that were used by merchants dependent to the king or the church, and foreign merchants. The latter probably had personal connections to the locals, who were also hosted on those plots and were allowed to store their goods there (ELLMERS 1984, 179, 197; HENDERIKX 1986, 544-546). Market peace and control in Dorestad and other Carolingian border towns was dependent on *missi* or prefects, both representatives of the king (TIMME 1964, 126-127).

N. MIDDLETON'S (2005, 320) statement that "[...] ports were by definition markets and one would expect that similar rules applied to them", is supported by several written sources. There are two Carolingian charters for St. Denis from the mid-9th century. One mentions harbours (*portis*) beneath regular markets (*reliquis mercatibus*), the other a market integrated into the harbour (KALMRING 2010a, 449). Lothar I commanded merchants in Frankish Italy to trade outside public or legally recognised sea ports (*portura legitima*) in 823 AD (McCORMICK 2005, 909, R381). The rule was understood to be an ancient custom (MIDDLETON 2005, 321).

The information on early medieval marketplaces beyond the Carolingian realm is also sparse, which is not only true for the *emporia* but also for comparable sites, like *wic*-places (HILL/COWIE 2001), or the *Seehandelsplätze* (KLEINGÄRTNER 2014) on the Southern Baltic coast.

At Lundenwic outside the Roman walls of London, a "trading shore" located on the south bank of the Thames was mentioned as early as 672 AD (MILNE 2003, 32). After the Viking attacks of the 9th century, the *emporium* was largely abandoned while the town within the walls, Lundenburg, was re-established in 886 AD under the rule of Alfred the Great. Lundenburg also strengthened its involvement in trade, which becomes apparent through the subsequent infrastructural improvements. From the 890s onwards, Æthelred's hithe (today's Queenhithe at the Bull Wharf excavation) is recorded to have the earliest known medieval waterfront structures of London: gangplank tres-

◀ Fig. 2. Types of harbour facilities according to the way of ship berthing (modified after KALMRING 2010a, fig. 5).



tles and associated gravel banks at the foreshore between the Thames and walls. Artificial embankments followed from the mid-10th century onwards. At first the structures were made of brushwood, clay and gravel. From the late 10th century they were built as stable plank revetments. Their function is not to be understood as jetties. They were rather built to provide spaces to gain easy access to the tidal zone of the river. Many finds from culturally distinct areas including the Rhineland, the Meuse/Maas region, Frisia and Denmark, as well as a range of coins and balance components have been recovered from Æthelred's hithe (MILNE 2003, 42-47; AYRE/WROE-BROWN 2015b, 164-165, 183). This paints a picture of a beach market arrangement that was vastly improved after the late 9th century.

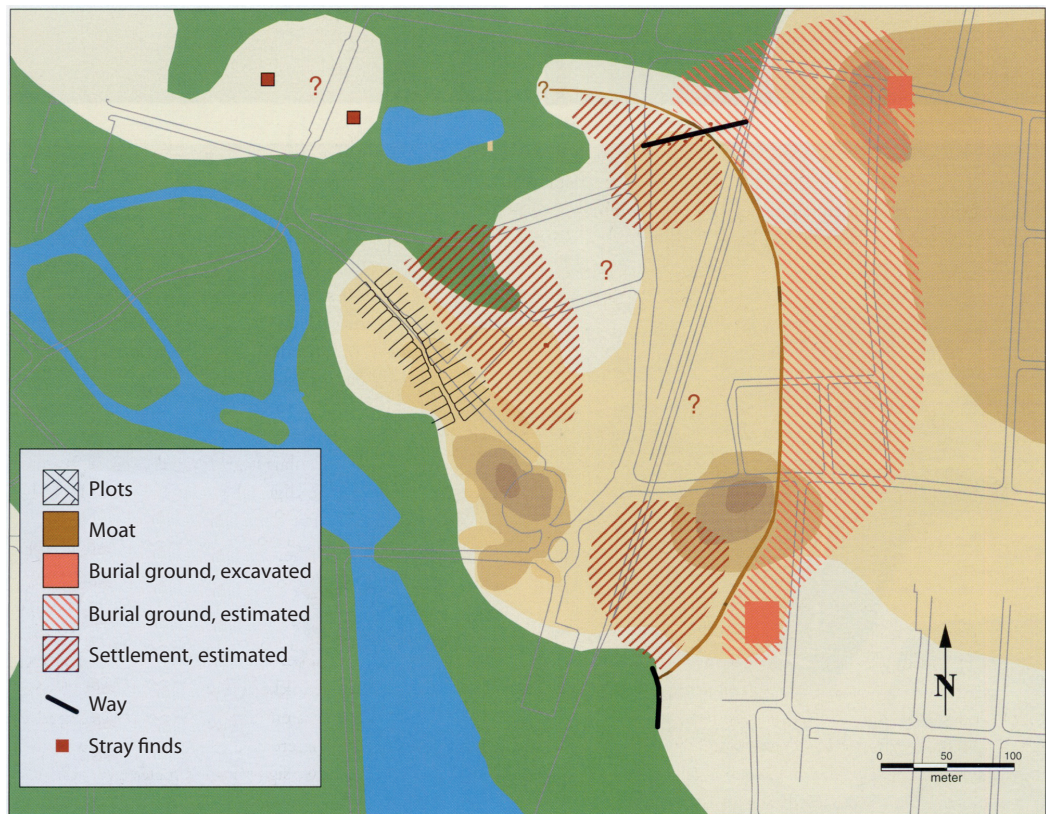
Another famous example that should be mentioned is Ribe. Here, excavations revealed the development from a seasonal market to a continuously inhabited *emporium*. Probably emerging out of an agrarian settlement, a seasonal marketplace was established north of the Ribe Å around 705 AD. Irregular ditches and early craftwork activities suggest such an interpretation. Just a few years later, an area of approximately 50 m x 200 m was subdivided in 25 to 30 m rectangular plots, delimited by ditches and wattle fences on each side of a central road. The plots were slightly developed, with pit houses, wind-shields, tents and similar structures, and showed traces of different craftwork. By the end of the 8th century, houses had been built on the plots, which changed the temporary marketplace into a permanent settled area with a main focus on craftwork and trade. There was also a year-round settlement and burial ground in the vicinity. In the

early 9th century, the area was surrounded by a small ditch, which suggests a legal demarcation rather than a defensive structure (Fig. 3) (FEVEILLE 2006, 25-35, 43-45). Could this have been an early influence of the *Bannbezirk* practice known from the Frankish realm (cf. above)?

A comparable development can be traced in Kaupang, Vestfold, although it took place 100 years later. Around 800 AD, a seasonal marketplace was established by the layout of plots at a sheltered bay. Five to ten years later, the seasonal marketplace was succeeded by a permanent occupation of the plots that was accompanied by an increase of craftwork remains and artefacts pointing towards long-distance trade relations. As the plots pointed directly towards the bay, one can assume a beach market arrangement. Moreover the shore was developed with rectangular stone constructions which facilitated access to the soggy beach zone, and probably wooden jetties (Fig. 2) that could be identified from piles (PILØ 2007).

The most detailed and convincing investigation of a marketplace in the maritime sphere, however, stems from Hedeby. S. KALMRING (2010a) was able to meticulously sketch the development from a beach market to a stage that he calls a harbour market. Starting before 817 AD, a beach market was established and characterised by developing the backwater Haddebyer Noor shore with plots. This was followed initially by a paved landing-place and, later in the 9th century, by jetties, thus enabling ships to moor while still floating (Fig. 2). Thereafter the gaps between the single facilities were connected to a continuous platform while some of the jetties extended further into the water. The mercantile activities were

► Fig. 3. Ribe in the 9th century (FEVEILE 2006, fig. 20).



moved from the shore onto the platform, which then functioned as harbour facility as well as marketplace independent from the water level and the conditions of the shore. Thriving trade activities are indicated by the high amount of coins found below the installations, balances and scales, and imported goods. The platform remained in use until the first half of the 11th century (KALMRING 2010a, 443-450).

Even though the origins of Hedeby are still disputed, we know about the strong relation Danish kings had to the place from written sources. In 808 AD, just before the harbour and market were about to emerge, King Göttrik ransacked the *emporium* Reric/Groß Strömkendorf in the Wismar bay and forced the merchants to relocate to *portum, quod Sliesthorp dicitur* (= Hedeby). This information from the *Annales Regni Francorum* is also the earliest source of active trade policies by a ruler in the Baltic (ADAM 1996, 172; MÜLLER-BOYSEN 2007, 181). Since the 9th century, there was also an agent of the king in Hedeby, a *Wikgraf*, who was responsible for collecting taxes and maintaining peace (MÜLLER-BOYSEN 1990, 96).

When we take a glance at the *Seehandelsplätze* at the Southern Baltic coast, it becomes apparent that to date there are no marketplaces known from these areas. This could be due to the limited research undertaken at most sites. But it could also be due to the nature of exchange, which, keeping the above mentioned examples in mind, happened most likely also at the shore or at a harbour. Even when taking the latest fieldwork into consideration, no serious harbour facilities could be identified at any

Seehandelsplatz so far (cf. MESSAL 2017). Only the origin and variety of finds gives an impression of the economic importance of the harbour as a trading place (KLEINGÄRTNER 2014, 91).

The same is true, albeit on a smaller scale, in the south-eastern North Sea area, where some sites, interpreted as (seasonal) trading places and beach markets, are known since the Roman period. The main arguments for categorising such sites as trading places or beach markets lie in the imported finds, evidence for specialised craftwork, and locations at favourable spots in the natural environment. Besides workshops and minor waterfront installations, like shore revetments, no features connected to mercantile activities have been revealed so far (SIEGMÜLLER/JÖNS 2012). It is estimated, that such places developed at “transit-points” (cf. WESTERDAHL 1992), where traffic routes met and transportation methods and vessels changed.

Actors at early medieval trading shores

Most places of market activities remain rather blurry in earlier centuries. So do the people behind them. As already mentioned, who originated trading places remains uncertain and theories favour either elites, often with the argument that only high-ranked actors had the necessary resources, or self-organised merchants. That the king and local grandees profited from their foundation is beyond question. At last, in the 9th century, Scandinavian rulers made use of active trade policies, while in the Carolingian *emporium* their involvement is apparent from the start.

The importance of the church for mercantile policies on the continent has already been highlighted several times. The same is also true for England. For instance, toll exemptions for bishops and abbesses operating trading vessels on the Watsum and Thames to London are known from the 8th century onwards (MIDDLETON 2005, 339). Even in 9th and 10th century Scandinavia, the influence of the church should not be underestimated. Besides the frequently cited importance of Birka, Hedeby and Ribe for the mission, B. GAUT (2015) was able to point out that ecclesiastical institutions must have participated in mercantile activities at Scandinavian trading places, too. Not by chance, several Scandinavian *emporía* became bishoprics in the late 10th century.

One important question, crucial for the understanding of marketplaces, has been already touched on, but not yet discussed: what were professional and independent merchants like in early medieval northern Europe? Unfortunately, the sources about organisation and actors in long-distance trade are rare and anything but clear. M. MCCORMICK (2005, 617) states that the only thing really known about the merchants in the Carolingian Empire is “where the merchants were”. Here, differentiations between peddlers designated as *mercatores* and a group of persons called *negotiatores*, who lived chiefly from trade and were dependent on or connected to ecclesiastical or secular dignitaries, can be made. However this doesn’t allow precise statements on their social position (MCCORMICK 2005, 614–617). Instead, traders were distinguished by their ethnicity or home town. Most prominent and often referred to are the Frisians, who are mentioned frequently in documents related to seaborne trade and who are broadly accepted as the main bearers of economic exchange in Early Medieval northern Europe (LEBECQ 1983; MCCORMICK 2005, 670–674). Besides their importance, role and specific position remain unclear from the 7th century onwards. R HODGES (1989, 87–94 esp. 94) even raises the question if the role of the Frisians might be overrated, as the contemporary chroniclers had a tendency to write about and highlight the unusual.

For Scandinavia, the situation is rated differently. On the one hand, there were part-time, rather than professional, merchants who belonged to the household of a wealthy landowner (ENGLERT 2015, 39–41). On the other hand, there is reliable evidence that professional merchants took an active part in trade. This can be deduced from written sources beginning in the early 9th century and onwards (MÜLLER-BOYSEN 2007), as well as from the existence of *emporía* and similar places. S. SINDBÆK (2007), in his network-theory based conceptualization of Viking Age urbanism, as well as J. CALLMER (2007, 240–241), even understood the establishment of the *emporía* as initiated by well-organised merchants, as those places functioned within large exchange networks rather

than in dependence to their hinterland. Nevertheless, it is still debatable how free and independent the merchants really were. The continental as well as the Scandinavian sources from the High Middle Ages (*cf.* below) paint a picture of people in dependency and relation to elites and church. To summarise, there were most likely different types of merchants active in Scandinavia, even though their profiles are difficult to identify.

Interim conclusion

What can be said about marketplaces, their actors and organisation, across the large number of comparable sites in northern Europe mentioned above? While the genesis of trading ports is uncertain and also dependent to the local situation, some general trends and mechanisms become apparent. First, there was a development from seasonal and simple beach markets to more complex installations and permanent sites. For instance, seasonal markets have been revealed at Ribe and Kaupang and are discussed for Dorestad and the *Seehandelsplätze* on the southern Baltic coast (*cf.* also HODGES 2000, 121; KLEINGÄRTNER 2014, 35). These early configurations are usually characterised by a regular plot layout lacking larger buildings, lesser find material and/or the absence of burial grounds.

The permanent stage following these seasonal markets is also characterised by plots, with the distinction that they developed stable buildings and other structures, and yield an increased amount of finds. The plots are in alignment with the shore and/or on both sides of a street, which is often characterised as “main” street (*e. g.* Ribe, Hedeby, Sigtuna). The question where exactly the exchange took place, however, remains unanswered. While the excavators of Ribe call the whole area subdivided by plots and the street a marketplace, the excavators of the comparable situations at Dorestad, Kaupang and Hedeby do not directly describe them in those terms. At those sites, the excavators favour “beach market”, but it remains uncertain if it includes the built-up area as part of the market area, or if it is just limited to the beach.

More precise statements can be made about the later waterfront developments unearthed in Hedeby, London and probably Dorestad. The dam-like structures in Dorestad allowed easy access to the shore and could have served as platforms for exchange activities. At the shore of the River Thames, artificial embankments and landing facilities were built to improve the beach market. The same is true for Hedeby, where single jetties were connected to a continuous platform. These harbour markets seem to be the most developed stage of marketplaces at sites connected with the seaborne trade in the Early Middle Ages. The Carolingian written sources mentioned earlier are strong evidence that the harbour was simultaneously also the market, and that it was provided with a certain legal regulation. The situation was probably not much different in

Period	Shipowner	Cargo owner	Vessel type	Activity	Carried out by	Maritime law
Viking Age	Enterprising landowner		General purpose ship	Occasional trading voyage or viking raid	Landowner and his household	Family business, no regulations needed
Late Viking Age/ High Middle Ages	One or several merchants		Cargo ship	Regular trading voyage	(Dependent) Merchants and their servants	Municipal law of Schleswig, Bjärkö Law <i>etc.</i>
Hanseatic period	Skipper or shipping partnership	Several merchants	Cargo ship	Regular trading voyage	Skipper and hired crew, possibly accompanied by agents	Rôles d'Oléron, Municipal law of Hamburg, Lübeck <i>etc.</i>

▲ *Tab. 1. The growing specialisation of merchant seafaring from the Viking Age towards the Hanseatic period with regard to ship owners, cargo owners, vessel types, crews and maritime law (modified after ENGLERT 2015, 44, tab. 3.1).*

England, where royal legislation had parallels to Carolingian models (MIDDLETON 2005, 320), which have also been seen as exemplary for Scandinavian places (KALMRING 2010a, 449).

Commercial optimisation of the waterfront – the 11th and 12th centuries

Changing conditions

There is an abundance of archaeological evidence for High Medieval marketplaces in the Holy Roman Empire, and discussing the evidence in total would go beyond the scope of this article (*cf.* KENZLER 2001, 208-218; SCHOLZ 2015, 108-111, fig. 65 for a summary). It is apparent that during this period the central and open marketplaces became one of the defining topographical features of the European medieval town, and are still emblematic today (NICHOLAS 1997, 100-102; BAE-RISWYL 2003, 24-34; SCHOFIELD/VINCE 2003, 26-27; PIEKALSKI 2014, 64-65). At the same time, there has been a noticeable change regarding the denomination of marketplaces in written sources. In the 10th century, the term *forum* was used to describe the central marketplace itself, just as in Antiquity. The term gradually replaced the formerly used *mercatus* by the 12th century. Furthermore, market rights were increasingly granted by regional rulers because the kings' power was in decline (SCHLESINGER 1973, 283-284).

This development is also seen in the archaeological record from the 10th century onwards, as revealed in Cologne, Ulm and Quedlinburg (*cf.* above). But this process did not reach the North Sea area and the Baltic rim before the late 12th century (ANDRÉN 1985, 90-91; SCHOFIELD/VINCE 2003, 58-59; HYBEL/POULSEN 2007, 241). This obvious discrepancy cannot really, if at all, be explained by a staggered development in peripheral regions. Instead, major changes in the seaborne long-distance trade mechanisms caused the delay, which in turn had a major impact on the harbour markets and waterfront topography.

From the late 10th century onwards, a professionalisation of trade mechanisms can be detected in different records. Focusing on Scandinavia, A. ENGLERT (2015, 39-40) has defined several aspects of an increasingly professional merchant seafaring: large and specialised cargo vessels, an increase in trading volume, multiple ownerships of ships and

cargo, written maritime law, and new towns on the shores of navigable waters (Tab. 1). The first aspect manifests itself through several ship finds such as Hedeby Wreck 3. This 22.10 m long and 6.25 m wide vessel, which was built around 1025 AD in Nordic tradition, and had a carrying capacity of almost 60 tons (CRUMLIN-PEDERSEN 1999; BILL 2003). The increase in trading volume must be considered more as an educated guess, as the actual amount is, naturally, hard to quantify. Meanwhile, different written sources, including rune stones, reveal multiple ownerships of ships and cargo as well as written maritime law. For instance, a chapter in the miracle book of St. Thomas mentions an event taken place in 12th century Schleswig, where a rich merchant and the king collaborate to finance a large ship (*cf.* JAHNKE 2008; JAHNKE/ENGLERT 2015; RÖSCH 2018a, 224-226).

Commercial waterfront design: Schleswig as a blueprint

One of the places where a new and different style of waterfront topography appears is Schleswig, the medieval successor of Viking Age Hedeby. The town was, according to the latest research (HILBERG 2016; MÜLLER 2016; HILBERG *et al.* 2017; RÖSCH 2018a), not established before the second half of the 11th century. It therefore represents an unusually late and singular phenomenon in Scandinavian urbanism. The first towns (in contrast to the proto-urban *emporía* of the Viking Age) emerged already in the decades around 1000 AD (RÖSCH 2018a, 277-281). While many places were continuously developing over decades and even centuries – for instance, many newly laid out plots in 11th/12th century Bergen remained unused for over 100 years (HANSEN 2005, 145-146, 226-227) – a downright building-boom seems to have taken place in early Schleswig. This is especially true for the waterfront. Starting in the 1070s plots and a systematic street network were set up on the bank of the old town peninsula. In addition, plots of different sizes can be identified, arranged parallel to each other, at right angles to the Schlei fjord, and bounded by wattle-wood fences. In front of these parcels lay a public street with elevated tread, which allowed access to the plots even at high water levels, while another street connected the shore with the town centre. This laid the foundation for almost 25 years of rapid development. Beginning in 1080 AD, there was an initial phase of reinforcement, in-



crease, and development of the plots. But already by 1087 AD, these installations were insufficient and the systematic development of the shallow water dam-like constructions began. These dams were created as U-shaped bulkheads made of split-wood planks which were lagged with brushwood, manure and soil, and extended into the water following the layout of the plots. Extended to over 50 m, these dams occupied the entire shallow water in front of the old town at a width of 300 m, thus covering an area of over one hectare at the beginning of the 12th century. On top of those platforms, houses, wells, pits, fences, pens and workplaces were erected, with one exception – the marketplace. The market was located on a double-sized, 20 m wide dam which shows traces of different gangs being involved in the construction by remaining almost undeveloped. Just a small building, the function of which has been discussed as a custom house, stood at the side of the square neighbouring one of the main causeways to the Schlei. The small building is distinctive in a number of ways. It differed in construction from the typical Schleswig houses, placed directly on posts in the shallow water and not on top of a dam. Moreover, the greatest amount of spherical-zone weights found in Schleswig to date were found at the marketplace, while the ceramics from this area had a degree of fragmentation twice as high as from the other dams (RÖSCH 2018a,

227-228). Generally, the amount of imported ware at the Schleswig waterfront was high. While 14 % are of Rhenish origin and even 22 % are Baltic ware/Slavonic ware which exceeds the amount found at excavations in the town centre by four times (LÜDTKE 1985, 25, 48; MEYER 1996).

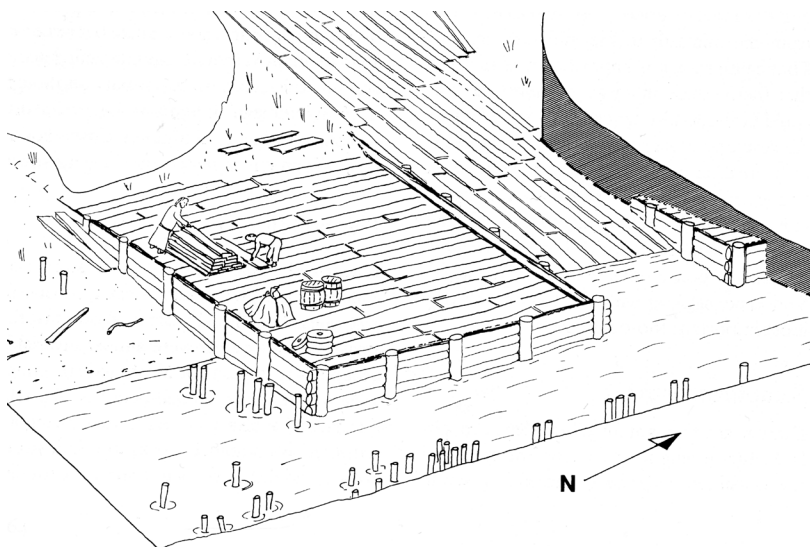
The situation outlined is a waterfront that was entirely suited to the needs of the professional merchant seafarer. The public marketplace provided a space that guaranteed control and security for transactions as well as room for spontaneous interaction. The streets were public but privately maintained and ran from the shore to the centre as well as parallel to the water, thus enabling the efficient movement of people and goods. The smaller dams were built individually and functioned as private properties for actors involved in the long-distance trade, which yielded them a number of locational advantages. These dams provided space for household and storage facilities, served as harbour installations for transport vessels, were a convenient interface between land and water, and last but not least, put the merchant in a highly attractive position for establishing contacts with potential business partners. This becomes strikingly apparent when a closer look at the construction stages of the single dams is taken – the long-distance trade spurred competitive neighbours in Schleswig to get ahead of each other at any cost (Fig. 4).

▲ Fig. 4. Schleswig. The waterfront in 1100 (graphics: F. Lorenz/J. Stuhmann, Illustrato, Hamburg).

Comparable waterfront configurations

Like Schleswig, London developed in complexity, emerging from the waterfront topography sketched above. By the late 10th or early 11th century, Bull Wharf provides the first clear evidence for the division of the embanked riverside into properties in post-Roman London. Slightly later, similar plots are known from Billingsgate and New Fresh Wharf. During the course of the 11th and 12th centuries, extensive measures were undertaken to develop the embankments. Starting with simple reinforcements made of wattle-wood or small spars, later waterfronts became generally more substantial, with well-built timber constructions in various styles: stave, notched sill beams and post-and-plank. Waterfronts led to a remarkable amount of land reclamation, as individual embankments advanced southward into the riverbed. At Bull Wharf, for instance, the gain amounts to 40 m. It is suggested that the embankments were divided up for single owners and/or tenants to use and develop, apparent not only by the large number of individual extensions but also by buildings placed on top of the embankments, which were frequently altered or rebuilt, suggesting that each plot was distinct in character. While the first houses were made of timber; stone was used for secular buildings from the late 11th century onwards (STEEDMAN *et al.* 1992, 29-48, 118-119; AYRE/WROE-BROWN 2015a, 253-263; 2015b, 162-165, 184-186). While tide and flood protection and providing harbour facilities certainly played a role, AYRE/WROE-BROWN (2015a, 256) conclude, that “extending and improving valuable riverside commercial property appears to have been the main aim”. By the 12th century, the entire bank from Queenhithe to Billingsgate, a strip of 850 m, had been fully reclaimed. London developed into the most powerful market town in northern Europe, in part, because of the creation, throughout the Middle Ages, of a total of 680 plots between Blackfriars in the west and the Tower of London in the east (DYSON 1989).

▼ Fig. 5. Trondheim. Waterfront structure 388. Reconstruction of the dam development during the second half of the 12th century (CHRISTOPHERSEN/NORDEIDE 1994, fig. 62).



Before the private plots set the pattern for waterfront tenements throughout the medieval period, embankments were mainly regarded as common facilities where a wide range of activities from every day exchange to commercial trade were conducted. After the reorganisation, which restricted the access to rivers via private properties, common access was still granted by smaller inlets between the embankments which later became lanes (MILNE 2003, 46-47; AYRE/WROE-BROWN 2015a, 256-257). Besides private and common areas, a third type of embankment was established in this period – public markets with controlled access. In total, three such waterfront markets are known from the written sources, at Queenhithe, Billingsgate and St Botolph's Wharf. The last one was unearthed during the Billingsgate Lorry Park excavation. Two embankments that were formerly separated by a small inlet were connected to an open 20 m wide platform, which was twice as wide as the private plots. The area was suited for loading and unloading vessels at high tide and served as a place to collect customs duties. This is evidenced by a mid-13th century written note describing an attempt by local authorities to limit long-distance trade to the three public harbours/market squares. For Billingsgate there is also a law of Æthelred II from the first half of the 11th century, which mentions individual tolls for different classes of ships (STEEDMAN *et al.* 1992, 48-49, 75, 137).

A marketplace located at the waterfront of early Lübeck has also been discussed (ELLMERS 1990). From 1143 AD onwards, new streets branched off from the main street running from North to South across the old town peninsula down to the harbour at the Trave. The areas in-between were divided into plots suited for commercial needs, many of which still exist today (RIEGER/JAHNKE 2018, 233). By 1157, after the construction of a bank reinforcement, a harbour market is likely to have existed at the Trave. This is suggested by smaller structures and find material, which includes evidence of ship repair and fishing. But as only a small area was investigated, the situation remains uncertain (SCHALIES 2014, 170-171). Nevertheless, a marketplace in Lübeck is mentioned as early as 1147 AD (MÜHRENBURG 1993, 84).

Facilities from Trondheim from the late 11th and the 12th centuries, which were built into the River Nidelva, show a significant similarity to the Schleswig dams. Horizontal timbers combined with massive vertical logs form bulkheads, which were filled with sand, gravel, rocks and organic material (Fig. 5). These dams extended plots from the bank into the shallow water and were steadily improved. Unlike the other ports, they are interpreted as jetties (Fig. 2), whose extensions were associated with increasing ship sizes while exchange is said to have taken place mostly on both sides of a central street, still known as *Kaupmannastretet* (merchants street; CHRISTOPHERSEN/NORDEIDE 1994, 84-85).

Between the late 10th and early 12th centuries, dam-like facilities were also erected in Tiel, one of the successors of Dorestad. Starting as facilities strengthened with wattle-wood, they were stabilised by planks and ship-timbers filled with soil during the later phases. From the late 11th century onwards, houses were built on top of the dams. Those dams that followed a plot layout on the shore have been described as harbour facilities (SARFATIJ 1999; DIJKSTRA 2002, 202).

Last but not least, examples of waterfront structures are available from Wolin. In the Garden Quarter, a dam construction strengthened with post, planks and anchor-beams and filled with brush wood and small timbers from around 1000 AD was revealed. Recent excavations, undertaken during the construction of a new yachting harbour, unearthed three dams filled with soil and encased with timbers from the 10th century. Buildings stood on at least one of these dams as well as on the structures from the garden quarter (JANOWSKI 2013, 49-55; FILIPOWIAK/FILIPOWIAK 2014).

Actors at high medieval ports

As in the earlier centuries, merchants were generally referred to by their place of origin, and their origin was usually associated with certain privileges or tied to specific laws. As mentioned above, they were initially bound to external authorities and to part of their household, but over time their organisation became more professional. While cooperative merchant seafaring in northern Europe can be traced back to the 7th century, many sources from 11th century onwards paint a more detailed image of part-time commercial communities (Tab. 1). The merchant seafarers operated and defended their ships together, shared cargo capacities and supported each other at foreign trading places (MÜLLER-BOYSEN 1990, 62-63, 136-137; ENGLERT 2015, 42-45). During the course of the High Middle Ages, the ties to authorities were released, apparent in the formation of guilds, tangibly present in the Scandinavian sources from the 12th century onwards. The oldest guild law is handed down from Flensburg around 1200 AD, while evidence of the Schleswig *Knudsgilde* goes back to the early 12th century. Apart from material support in distress and spiritual intercession beyond death, the benefits of the community lay particularly in the legal statutes. The members were obliged to assist each other in critical situations (MÜLLER-BOYSEN 1990, 66-78).

Although individually designed, local authorities, which in Scandinavia was usually the king provided the initiative behind developing the commercial waterfront topography (ANDRÉN 1989, 587). For example, the Norwegian king Olav Trygvason is said to have provided plots in Bergen and Trondheim (TESCH 2001, 734-735). Already Carolingian sources inform us that plots were given to abiders, subordinates or foreigners, to encourage commercial activities (cf. GAUT 2015, 149). The

oldest municipal law from Schleswig (SLSTR I), which was codified around 1200 AD but relies on considerably older rules, denominated the Schlei as a “royal body of water” (§ 68). Anyone who wanted to build there required the permission of the king or his deputy.

In contrast to Viking Age *emporium*, the clergy appeared architecturally in high medieval sites. Churches and cathedrals dominated the skyline in most Scandinavian ports. In Schleswig, a St. Nikolai church, the patronage of merchants and seafarers, was probably erected by the late 11th century directly on the shore (RÖSCH 2018a, 265). In London, four churches located at the waterfront are known. One of them, All Hallows the Great, was even denominated as *Semannescyrce* (seafarer’s church) in 1100/1107 AD (SCHOFIELD *et al.* 2018, 51). Even though it is uncertain which came first, the harbour markets or the parishes, SCHOFIELD/VINCE (2003, 68) highlight their significance by developing the formula “public landing area + church + early reclamation = important place in the network of communications and business within the town”.

Interim conclusion: Trading space at high medieval ports

Although, there is so far no direct archaeological evidence for marketplaces at several sites just discussed, general patterns of a commercial waterfront topography become increasingly apparent in the High Middle Ages. Dams or platforms extended into the bodies of water were set up in many ports. Almost everywhere they were built individually, thus continuing an already existing pattern of neighbouring plots, and were developed with houses and other structures. Their function is usually assessed as harbour facility without taking historic water levels, commercial practices, or social aspects into consideration (cf. critically RÖSCH 2018a, 239-240, esp. 252-255; ILVES 2012b). Where excavations have been subject to systematic analysis, the image of the waterfront becomes more faceted, as the situations in 11th and 12th centuries especially in Schleswig and London show. Subdivided into public, semi-public and private space, those harbours were not just safe places for suitable ship management but served a wide range of needs from all sorts of different actors. This becomes apparent when the written records are consulted – at least five different places where trade and trade-related activities took place crystallise (RÖSCH 2018a, 213-217):

1. public spaces: *e. g.* squares, streets, beaches and platforms,
2. private space: *e. g.* plots and tenements,
3. semi-public space: guests hosted on private property and commercial hostels,
4. semi-public space: ships,
5. semi-public space: shops and booths.

Even when the marketplace is not apparent in the archaeological record, they are strongly implied by sources highlighting the importance of public spaces. Laws demanding publicity and the presence of eye-witnesses as major preconditions for transactions to guarantee security for seller and buyer, as well as control by authorities, suggest a place of market. This practice can be traced back to Late Antiquity (MIDDLETON 2005, 320).

Private plots, embankments and dams were used by the crown, secular, and ecclesiastical landowners and their agents who themselves were involved in trade, as well as members of the household. The material remains on the Schleswig dams highlight both housing and trading. These private properties could also have been a place for transactions. There is no written evidence of this practice, but there are indicators such as concentrations of coins and standardised weights found in the rear area of many plots in medieval Sigtuna that have been interpreted in this way (ROSLUND 1993/1994). An approach based on finds distribution undertaken by P. CARELLI (1999) for medieval Lund points in the same direction.

When guests were hosted, the private property transformed into a semi-public space. As early as the 7th century, the hosting of foreigners by locals is known from the Carolingian realm and London and later also from medieval Scandinavia. The hosts guaranteed security and took responsibility but in turn profited from advantages (ELLMERS 1984, 179; MIDDLETON 2005, 336-337, 350). The Swedish BJÄRKÖARÄTT for instance (§ 8) dictated that the one who comes with his ship to a harbour has to bring his goods into a house for safekeeping first. After that, he was to inform the bailiff and warrant him a pre-emption right within three days. The Schleswig municipal law contained a clause (SLSTR I, § 31) in which King Svend III Grathe (1146/1147-57 AD) permitted citizens to receive merchants in their homes and to bring them to Schleswig. Another clause (§ 46) contains the information that it is common to keep foreign goods as one's own. While it is unlikely that large transactions took place on private properties, they definitely occurred in commercial hostels (MIDDLETON 2005, 350). Such hostels can also be traced back to the Early Middle Ages and eventually developed into institutions such as the well-known *Kontore* of the Hanseatic League, which were fitted with extensive privileges and guarantees (cf. SCHUBERT 2002).

By the High Medieval Period, selling goods directly from a trading vessel appears to have fallen out of common practice. While the practice is still known for London in 1130 AD (ELLMERS 1984, 169; MILNE 2003, 75), several Scandinavian sources such as the oldest municipal law of Stockholm prohibited or restricted it to certain goods such as herring (VARENIUS 1999, 183-184).

Foreign merchants could rent a booth at such places, as known from the written sources since

the 13th century, and this development is probably linked to the emergence of central marketplaces (DEGGIM 2005, 57-58, 301). Material evidence for such booths dates back to the 10th/11th centuries. Several mobile and static booths belonging to the third phase of Cologne's *Heumarkt*, which dates to the 1080s, have been unearthed. Mobile installations may be traced in the archaeological record through smaller wooden posts that supported the ceiling. As these posts sometimes broke under pressure, the post remains were preserved in the soil. Static booths are documented by a clay floor of at least 5.2 m x 2.0 m, containing a hearth and a wall made of split-wood planks and posts (HÖLTKEN 2008, 592-597). On Schleswig's harbour market some small wattle-wood fences demarcating two to three compartments of 5 m x 3 m that might have been used for temporary installations are known (RÖSCH 2018a, 255-256). Booths on private properties are, for example, known from Trondheim and Sigtuna, where they linked the public space of the major street with private facilities in the back of the plots (CHRISTOPHERSEN/NORDEIDE 1994; ROSLUND 1993/1994).

Public space on squares and banks were crucial for market exchange at the waterfront. But there is also some evidence for transactions taking place in other semi-public places. Private properties primarily served the need for housing local actors involved in the long-distance trade and storing their goods, but also served as accommodations and safe spaces for foreign merchants. This situation is underlined by a source from 11th century London, where aside from some privileged groups, foreigners had to stay within the legal boundaries of the harbour (*i. e.* the market; MIDDLETON 2005, 335-337).

Transformation and diversification – the 13th century

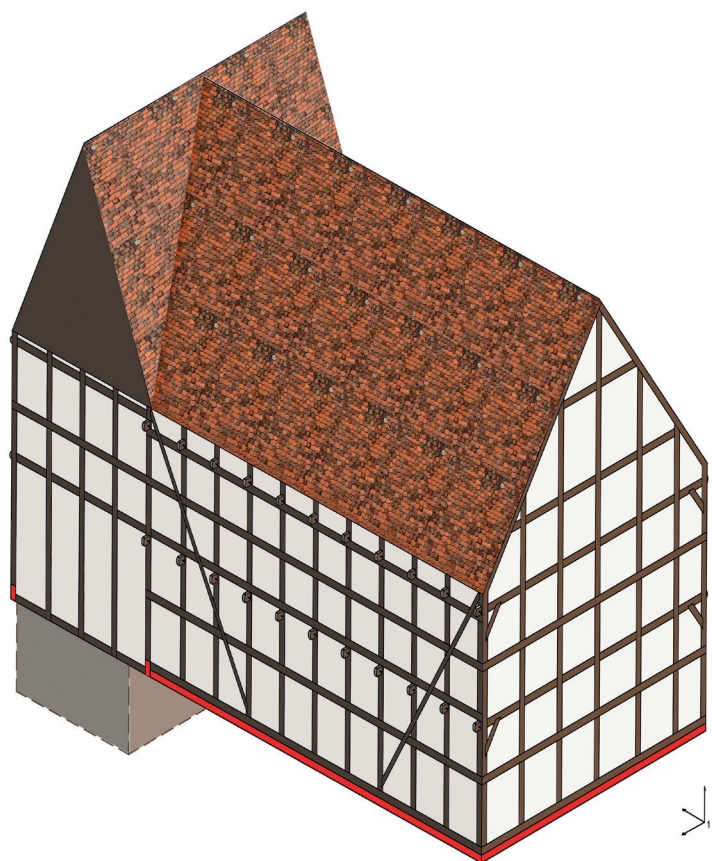
Transformation and adaption of the port topography

Beginning in the late 12th century the port topography in northern Europe underwent major changes (cf. BILL/CLAUSEN 1999). In Lübeck, parallel to the harbour market, possible mercantile activities are perceptible under today's marketplace, dated to the second half of the 12th century. Further measures followed in the first half of the 13th century, including a wooden pavement and refuse pits (MÜHRENBURG 1993). Even though the exact time span is highly debated and therefore uncertain (cf. KALMRING 2010a, 447-448 for a summary), it can be stated that a central marketplace existed in Lübeck by the 13th century at the latest. At the same time, the waterfront underwent major changes. In 1180 AD, the shore was advanced into the Trave and reinforced by a stable bulkhead. In 1216 AD, the Holstenbridge was erected, which divided the harbour into an area for long-distance trade in

the north and an inland harbour in the south. This kind of development is also known from London and Boston and undoubtedly spurred economic prosperity (MILNE 1999, 146; 2003, 55-56, 81-82). One year later, in 1217 AD, a new town wall was built in Lübeck, just five metres away from the water. This completely changed the situation at the shore, as it drastically reduced space in the harbour market, which probably lost its function (ELLMERS 1990, 104; SCHALIES 2014). Already in the late 12th century, major activities can also be recognised on the formerly established plots. The extensive excavations in the so-called *Gründungsviertel* during the last decade have revealed that the properties were developed with large buildings, with floor areas up to 180 m² and large cellars. Both the buildings, some of which rose to seven metres in height, and the cellars were built in a framework technique that was highly standardised and could easily be adapted to the builders' capacities and needs. The houses had large halls and steep roofs and were suited for storing bulk goods such as grain, for which there is evidence found in the archaeological layers (Fig. 6). The design and location between harbour and market made the buildings a perfect fit for long-distance traders (RIEGER/JAHNKE 2018, 233-235).

Schleswig's prosperity proceeded throughout the 12th century. The waterfront grew further into the Schlei, while the town's splendour became particularly apparent in the written record and through the existence of seven parishes (RÖSCH 2018a, 209-213). Restructuring began in the first half of the 13th century. A graveyard in the town centre, which had been in use since the 1080s AD, was abandoned and the related church was relocated to make space for a central marketplace, the so-called *Rathausmarkt*, which is still in use today (LÜDTKE 1997; VOGEL 1999, 194-196). The royal palace, which bordered the new marketplace, was converted into a Franciscan monastery by 1210 AD, while a Dominican monastery was erected in 1237/1238 AD at the former waterfront. Related town reorganisation measures are evident through the construction of a town moat, which was discovered in excavations in the southern area of the old town peninsula and cut through all the earlier waterfront structures from 1100 AD and the early 12th century. During the time of construction, which took place no earlier than the late 12th century, the waterfront facilities would certainly no longer have been in use (RÖSCH 2018a, 186-189, 270-281). Furthermore, the ducal castle, placed on an island in front of the harbour, was relocated to the Schlossinsel far from the town (where it later became Gottorf castle; RÖSCH *et al.* 2014). A change in architectural style towards the kind of larger merchant's buildings found in Lübeck, however, has not yet been identified.

What happened in Lübeck in the decades around 1200 AD and in Schleswig in the 13th century is a pre-stage of and/or an adaption of a new



▲ Fig. 6. Lübeck. Reconstruction of a two-storey merchant hall house including a wooden cellar (graphics: D. Rieger).

type of port topography, which becomes especially apparent at the so-called *Gründungsstädten* on the southern Baltic coast (even though they often emerged from earlier settlements or trading places). A crucial precondition was the implementation of the Lübeck municipal law, the *Lübisches Recht*, in 1225 AD, which cut the ties with the noble town lord and allowed the inhabitants to decree laws and define regulations and thus actively pursue town planning (HOLST 2004). Implementing the law was an important stage along the way to independent burghers and free merchants and doubtlessly spurred economic prosperity. The same applies to ongoing changes in merchant seafaring which became even further specialised. Besides new vessel-types, which provided more cargo capacity at lower costs (BILL 2003; ENGLERT 2015, 261-290), a growing separation of the commercial and nautical functions also took place onboard the ships. Whereas the ships had previously been operated by the co-operating merchants, skipper, who could also be the owner, now began hiring the crew and carried the responsibility for navigational decisions and cargo. Merchants simply paid for the cargo capacity and often sent agents to trade on their behalf. These and other arrangements were regulated in the *Rôles d'Oléron* from 1224 AD and the maritime laws from Hamburg and Lübeck from around 1300 AD (Tab. 1) (ENGLERT 2015, 42-45).

A major change took place at the harbours. The harbours lost their function as marketplaces and were now completely restricted to loading and unloading vessels and servicing ships. Besides jetties, also piers, quays, and cranes were erected to handle the constantly increasing ship size and traffic. The unloaded goods were brought into the town, which was now also protected by walls along the seaside, via so-called *Hafenstegstraßen*, a street in the extension of a jetty or pier. On both sides of the streets plots lay side by side, densely built-up with houses that formed a continuous front. Wood, the main building material, was gradually replaced by stone and especially brick through the late 13th century. The so-called *Dielenhaus* (hall house), succeeded the large framework merchant house mentioned above to the extent that they became emblematic of the newly arranged towns. Stone cellars and large multi-storied attics equipped with windlasses provided extensive storage room, voluminous *Dielen* (halls) served for transactions, while impressive stepped gables represented distinctive individual houses. The long-distance trade had moved to the private facilities of the merchants, a process described as the *Verhäuslichung* of the market (MÜLLER 2011, 15-19). Still, although its function had changed, the marketplace itself did not vanish but was instead yet to be found at central locations in the town, as it had already been in inland towns where its primary function was to supply the local population.

In the light of the above review, it is clear that profound measures took place in 13th century Schleswig, which should be understood as an attempt to fit the changing needs of long-distance traders. It is very likely that the harbour market was also abandoned as the town moat was dug and the central market established. However, this effort could not prevent the decline of the town's significance in trade throughout the 13th century (JAHNKE 2006; RADTKE 2009).

The towns of north-western Europe also felt the impact that increasing commercial activities left on their urban topography, though the outcome differed (cf. AYERS 2016, 147-180). In the prospering Flemish towns, merchant houses comparable to the *Dielenhaus* existed, as well as central marketplaces. And sometimes the harbours had been moved to more favourable spots, such as the so-called inland outports of Bruges. These ports often held staple rights for certain goods like wine (cf. TRACHET *et al.* 2017). One hundred fifty years after the first measures taken in Bergen, the commercial centre was relocated to the Vågen bay, where from the 1120s onwards a vibrant waterfront developed. Double plots placed on wooden caissons, built with houses and intersected by streets, were extended into the bay. Many of these facilities known as Bryggen became the location of a *Kontor* of the Hanseatic League by the 14th century (SCHUBERT 2002, 27-37; HANSEN 2005). In London, the pub-

lic markets at the waterfront were in use throughout the whole Middle Ages. Many mercantile activities still took place on street markets rather than central squares. Nonetheless, the city grew rapidly, mirrored in the number of parishes that reached a total of 120 as early as the 1170s (SCHOFIELD/VINCE 2003, 59; AYRE/WROE-BROWN 2015b, 199; SCHOFIELD *et al.* 2018, 144-145).

Diversification of marketplaces

As the long-distance trade in the ports moved to private merchant houses, a diversification of the local marketplaces can also be observed by the 13th century. This topic becomes rather complex throughout the Late Middle Ages, due to an increasing amount of sources. Therefore just a brief overview shall be given here. As towns grew, most of them established various marketplaces serving different neighbourhoods or reserved for certain commodities, the arrangements of which are still present today in many place names. London, for instance, had four grain markets by 1300 AD. Central markets were also subdivided into different areas for different goods. Streets branching off the market sometimes bore the names of a certain product, so it can be assumed that some marketplaces extended out along those streets (SCHOFIELD/VINCE 2003, 58-60; SCHOLZ 2015, 26-27). Again, the example of Lübeck can be given, where extensive written sources demonstrate the location of different sellers on the marketplace (Fig. 7). By 1288 AD for instance, the butchers had their area in the *Schrangen*, a street whose name is Low German for table or counter (MÜHRENBURG 1993).

At the edges of these marketplaces, facilities such as booths, arcades, halls and warehouses, can also be recorded from this period. Warehouses are known from many principal towns from the 13th century onwards: London, Paris, Bruges, Mainz, Krakow and many Hanseatic towns. Such warehouses were considerable pieces of architecture which were often named after a commodity (NAGEL 1971; SCHOFIELD/VINCE 2003, 59-61; PIEKALSKI 2014, 129-130). That some warehouses go back to the 12th century has recently been proven archaeologically: the oldest warehouse north of the Alps stems from the town of Hanseatic town of Stendal, which was erected in 1178 AD, just 28 years after the granting of the market rights. The building, which was mentioned by 1188 AD as *domus mercatorum* for the first time, is also among the earliest secular brick-stone buildings in northern Europe. It had a size 50.0 m x 9.2 m and consisted of two rows of 15 quadratric rooms, each of which had a side length of 3.4 m. These windowless compartments had a hearth each and are interpreted as stores, providing storage and recreation space. The buying and selling is said to have taken place on counters in front of these rooms. On top of the single stores, a second floor existed, which was reserved for luxury goods such as cloth

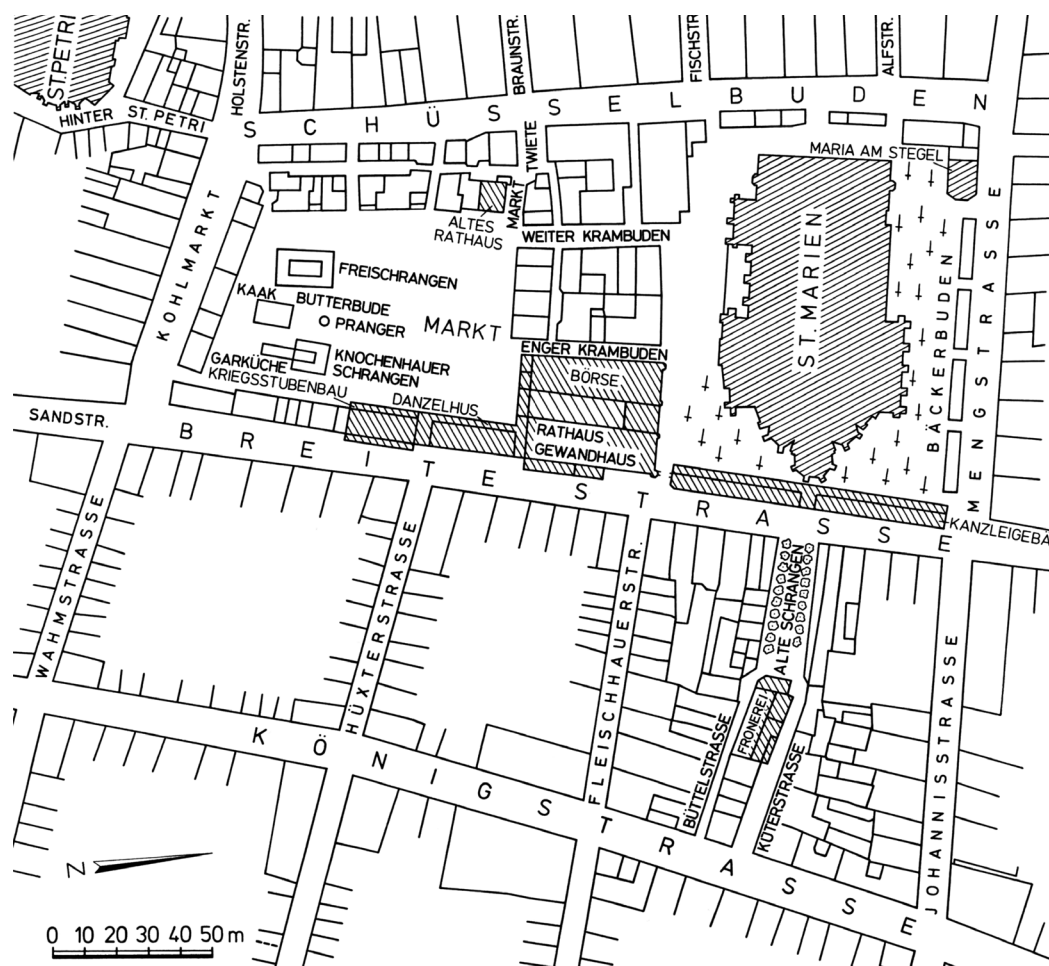


Fig. 7. Lübeck. The central marketplace before 1830 (ERDMANN 1980, fig. 41).

and fur (BÖHME *et al.* 2018). Other marketplaces experienced major changes. The marketplace of Ulm, for example, was broadened several times by tearing down pit houses and removing cellar entrances. Finally a guild house was transformed into a warehouse, the so-called *Gräth*, with staple rights and a public scale in the late 14th century (DUMITRACHE *et al.* 2009, 439–441).

Archaeological traces of booths have been unearthed at several places in northern Germany, in Ueckermünde and Demmin for instance. In the Hanseatic town of Demmin booths existed from the first half of the 13th century onwards in the southern part of the marketplace. Excavations revealed two parallel, 24 m long rows of sill beams, with a distance of 1.8 m between each other. The beams were connected by planks and showed notches and openings on the upper side. The booths were therefore interpreted as solid framework installations (WIECZOREK 2001). In the above mentioned Lübeck butcher's street, the *Schranken*, archaeological excavations unearthed the remains of 18 booths constructed with earth-fast post or sill-beams. Two constructions could be completely reconstructed with a length of 2.9 m and a breadth of 1.1–1.2 m (ERDMANN 1980; KENZLER 2001, 212 for a summary).

Conclusion

The evidence presented in this paper has shown that different types of medieval marketplaces are known from northern Europe, and that they underwent significant developments over the centuries. In addition to major trends that become apparent for both, inland markets and waterfront sites, many individual and local characteristics could be identified.

Street or beach markets are the most common type of early marketplaces known but are notoriously difficult to prove through archaeological evidence alone. Economic policies are known as early as the Frankish Realm, but it was not until the emergence of the Ottonian kings that they were established on a continuing basis for the first time. Market rights in this period were granted foremost to ecclesiastical institutions. The economic measures are complemented in the archaeological record by the establishment of marketplaces in towns in the 10th century. These places of exchange were located at the crossroads of or along major traffic routes. During the High Middle Ages, they continuously developed: markets were often extended by tearing down neighbouring facilities and were fitted with stable booths, counters or warehouses.

	Early Middle Ages Viking Age		High Middle Ages	Late Middle Ages
	500	1000	1250	1500
Dominating harbour structures	Simple landing-places	Paved landing-places Jetties	Jetties Piers	Piers Quai walls
Places of trade	Beach markets	Beach markets Harbour markets	Harbour markets Properties of trade	Central marketplaces Merchant houses

▲Fig. 8. The development of harbours and markets in northern European ports during the Middle Ages (graphics: F. Rösch/A. Heitmann).

The situation is more complex for trading ports. Even though distinct sources are rare, a number of indicators suggest that the harbour was also a marketplace in the Early Middle Ages. Starting as (seasonal) beach markets, there is a clear development towards a long-distance trade taking place in private merchant houses and central marketplaces supplying everyday local products. While this process has already been discussed by a number of scholars (cf. ELLMERS 1990; STEUER 2004, 33; KALMRING 2010a, 448-450; MÜLLER 2011, 15-19), several intermediate stages have been articulated here, presenting a more differentiated process than previously described.

Taking the latest results from the analysis of major waterfront excavations into account (esp. London, Hedeby and Schleswig), it seems likely that harbour markets, *i. e.* transactions taking place on harbour facilities, can be found from the 9th/10th century onwards. By the 11th century, individual groups of actors involved in long-distance trade can be directly traced in such harbours through individually developed waterfront plots on embankments, dams or platforms in the tidal zone or the shallow water area. From the second half of 12th century onwards, there was a gradual shift towards spacious and representative hall houses inside the town defences, while the harbour lost most of its trading function (Fig. 8).

The reasons for this development are complex and manifold. Besides the general prosperity in the High Middle Ages, changing worldviews, an increasing demand for certain commodities, commercialisation and specialisation, and strengthened networks all played a role. The major material outcomes were new cargo vessels with higher capacities and an adapted build environment. The development was driven by the commercial interests of different actors. On the one hand, secular elites and ecclesiastical institutions expedited the establishment of markets. On the other hand, different groups of (self-organised) merchants, who became constantly more independent and professional throughout the Middle Ages, were also involved in the development.

An increasing number of archaeological investigations at medieval marketplaces as well as reassessments of old excavation documentation make it possible to outline the space of mercantile activities. In so doing, often imprecise terms like

“trading site” or *Marktort* attain a more tangible meaning. Nonetheless, many *desiderata* remain. Early medieval markets, especially in the Carolingian and parallel periods, have seldom been revealed archaeologically. We hardly know anything about the spatial organisation of those markets. For later periods, one can rely on more comprehensive data, but central questions persist: which practices were performed and by whom? Or, more precisely, how did the market function?

New approaches to the topic, such as the study by U. SCHOLZ (2015) analysing the medieval market of Tulln (Austria) via a sociology of space, are scarce. The same is true for natural sciences. For instance, micromorphology, which has been practiced since the late 1980s, has only seldom been applied to marketplaces but has already shown great potential. Research conducted in Magdeburg or Lier (Belgium) was able to unveil the genesis and micro-scale levelling of the places as well as activities such as livestock handling, which are not at all or very under-represented in the archaeological record (MACPHAIL *et al.* 2007; WOUTERS *et al.* 2017). But even consequent sieving of stratified soil and the analysis of botanical remains would achieve valuable data.

If we want to understand marketplaces as more than just the physical location of trade, a “high-definition archaeology” (cf. GOWLETT 1997; last RAJA/SINDBÆK 2018) becomes necessary. Future excavations of marketplaces and other trade-related areas should therefore consider applying such methods. Meanwhile sociological concepts of human behaviour can offer valuable avenues for understanding the market as *space* (cf. CHRISTOPHERSEN 2015; MÜLLER 2017).

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Address of the author

Felix Rösch
Georg-August-Universität Göttingen
Seminar für Ur- und Frühgeschichte
Nikolausberger Weg 15
37073 Göttingen
Germany

felixlennart.roesch@uni-goettingen.de

Excavations on medieval marketplaces in Cologne

von THOMAS HÖLTKEN

Cologne, medieval markets, medieval archaeology, medieval crafts

The genesis of early medieval markets in Cologne is closely linked with the topography of the late Roman city. Recent excavations, together with written records, show that Cologne progressed through the transition from Roman to Frankish rule as an urban, religious and political centre. The archaeological evidence of early medieval crafts and trade is particularly dense to the east of the Roman wall, in the so-called Rheinvorstadt (Rhine suburb). Here the evidence of an early medieval settlement is found. In the middle of the 10th century the early medieval artisan village was removed and replaced by a free market. At that time, Archbishop Brun of Cologne (953-965), the brother of Emperor Otto I, was the absolute ruler of the city, and it is supposed that the founding of the market is due to the order of the Archbishop. The Heumarkt excavation revealed a total of six medieval and post-medieval market layers. In the large-scale deposition layers between the market-layers numerous objects made of metal, glass, bone and other materials were recovered, including objects of everyday life. A number of lead weights can be directly linked to the market business. The market foundations of the 11th and 12th century, such as the Waidmarkt and the Neumarkt, away from the bank of the Rhine, have also been the target of archaeological excavations in recent years. However, they never reached the supraregional importance of the markets next to the Rhine-harbor.

Ausgrabungen mittelalterlicher Marktplätze in Köln

Köln, mittelalterliche Märkte, mittelalterliche Archäologie, mittelalterliches Handwerk

Die Entstehung der frühmittelalterlichen Märkte in Köln ist eng verbunden mit der Topographie der spätrömischen Stadt. Ausgrabungen der letzten Jahre und die schriftliche Überlieferung zeigen, wie sich Köln während des Übergangs von römischer zu fränkischer Herrschaft als ein urbanes, religiöses und politisches Zentrum entwickelt hat. Die archäologischen Daten verdeutlichen, dass das frühmittelalterliche Handwerk und der Handel besonders ausgeprägt östlich der römischen Umfassungsmauer war, in der sogenannten Rheinvorstadt. Hier befinden sich die Reste einer frühmittelalterlichen Siedlung. In der Mitte des 10. Jahrhunderts wurde das Handwerkerviertel verlegt und durch einen freien Markt ersetzt. Zu dieser Zeit war der Erzbischof Bruno von Köln (953-965), der Bruder von Kaiser Otto I., absoluter Herrscher über die Stadt. Es wird angenommen, dass die Gründung des Marktes auf eine Anweisung des Erzbischofs zurückgeht. Die Ausgrabungen auf dem Heumarkt erbrachten sechs mittelalterliche und nachmittelalterliche Schichten. In den großflächigen Auffüllschichten zwischen den Marktschichten wurden zahlreiche Objekte aus Metall, Glas, Knochen und anderen Materialien gefunden, einschließlich Objekte des täglichen Lebens. Eine Reihe von Bleigewichten kann direkt mit Handel auf dem Markt verbunden werden. Die Marktgründungen des 11. und 12. Jahrhunderts, wie der Waidmarkt und der Neumarkt, die sich etwas vom Ufer des Rheins entfernt befinden, sind Gegenstand der archäologischen Untersuchungen der letzten Jahre. Diese Märkte haben allerdings nie die überregionale Bedeutung erreicht, welche die Märkte am Rheinhafen besaßen.

Introduction

It is not surprising that Cologne, one of the largest medieval cities (HIRSCHMANN 2012, 73-77), was lavishly interspersed with marketplaces. This is impressively documented by the Mercator Plan of 1571 (Fig. 1). Within the city, which at that time had a population of around 40,000 (KEUSSEN 1910 vol. 1, 197*), it shows numerous smaller and larger squares and square-like street extensions. As not all squares can be treated here, the focus will be on those examples that could be archaeologically investigated in recent years: this concerns the large markets Heumarkt, Alter Markt, Neumarkt and Waidmarkt. The opportunity is thus favourable to formulate an archaeologically founded summary of medieval marketplaces in Cologne.

The historical sources are excellent. Cologne has medieval land registers – the so-called shrine books – some of which date back to the 12th century (MILITZER 2015). Thanks to these directories, it is possible to link individual excavation features with historical persons or plots/buildings (KEUSSEN 1910). As the written sources in Cologne before the 12th and 13th centuries are sparse, and in the early Middle Ages even – as everywhere – almost completely suspended, medieval archaeology is gaining immensely in importance. The results of the most recent excavations in Cologne, which are currently only partly published, shed light not only

on the medieval square genesis, but also on the general topographical development of the city after the end of the Roman period.

Before the respective excavation results are dealt with, the early history of the city should be presented briefly (TRIER 2002; 2006; HÖLTKEN/TRIER 2012). In the centre of today's old town was the ancient CCAA, the *Colonia Claudia Ara Agrippinensium*. As the capital of the Roman province *Germania inferior* (later *Germania secunda*) and headquarters of the administration of the Lower Germanic army, Cologne had all the attributes necessary for our modern understanding of a city: administration, fortifications, cultic and public buildings as well as residential and commercial quarters. The city was founded on a tributary of the Rhine, which silted up in the 2nd century and was raised and added to the urban area together with the offshore island. At the time of Emperor Constantine (306-337), a bridge was built over the Rhine and the bridgehead on the right bank of the Rhine was fortified with a military camp – the Divitia fort.

The most important market of Roman Cologne – and at the same time the largest square – was located on the Forum, which was centrally located at the intersection of the ancient main traffic axes. The first market was therefore created by the Roman administration, *i. e.* by the Roman military. The military was undoubtedly the backbone of the ancient city and secured its existence for four

▼ Fig. 1. Bird's eye view of Cologne from Arnold Mercator, 1571 (*Rheinisches Bildarchiv*).



centuries. Shortly after 400 the regular troops were withdrawn from Cologne and the defence was left to federated Germanic (mainly Franconian) units. The last building measures of the Roman administration in Cologne date to this time. By 455 at the latest, the Germanic mercenaries must have finally turned away from their ally. The Franks apparently took over the city peacefully and largely intact, together with the remaining Romanesque population.

The mapping of the sites from the Merovingian period in the Cologne city area provides an approximate picture of the settlement (Fig. 2) (RIEMER 2006, fig. 1; HÖLTKEN/TRIER 2012, fig. 7). It was mainly the zone east of the main north-south axis – the former Roman *cardo maximus* – which was used. West of this axis, with the exception of a few settlement islands, the land remained unused and deteriorated. The economic focus of the city of the Merovingian period was now on the banks of the Rhine in the so-called *Rheinvorstadt* (Rhine suburb). Here – close to the jetty – the harbour area has been located since late Roman time.

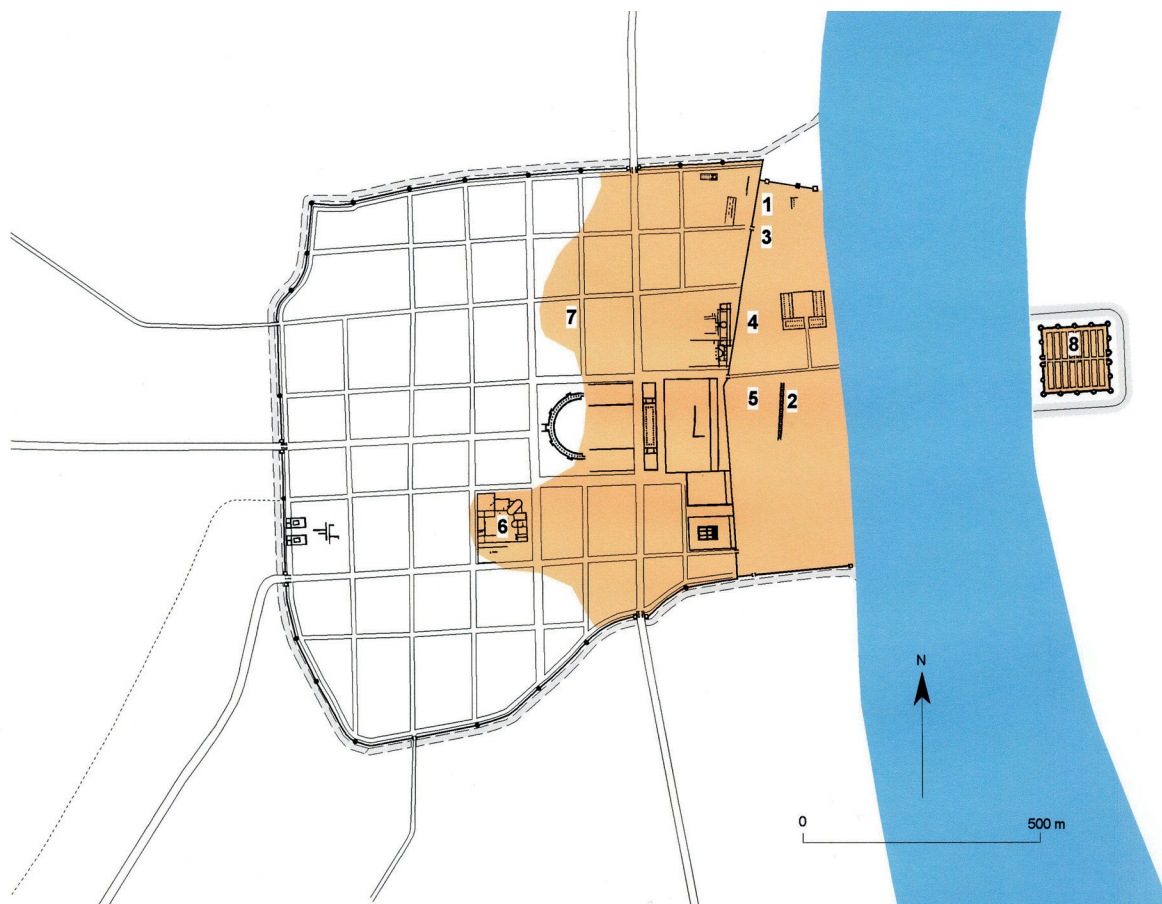
In the following centuries of the Carolingian and Ottonian periods, historical and archaeological sources suggest a steady growth (HÖLTKEN/TRIER 2012, 176-181). However, much of the western part of the city remained unused for a long time. In 1106, the town area was extended with a rampart moat and thereby protected important mon-

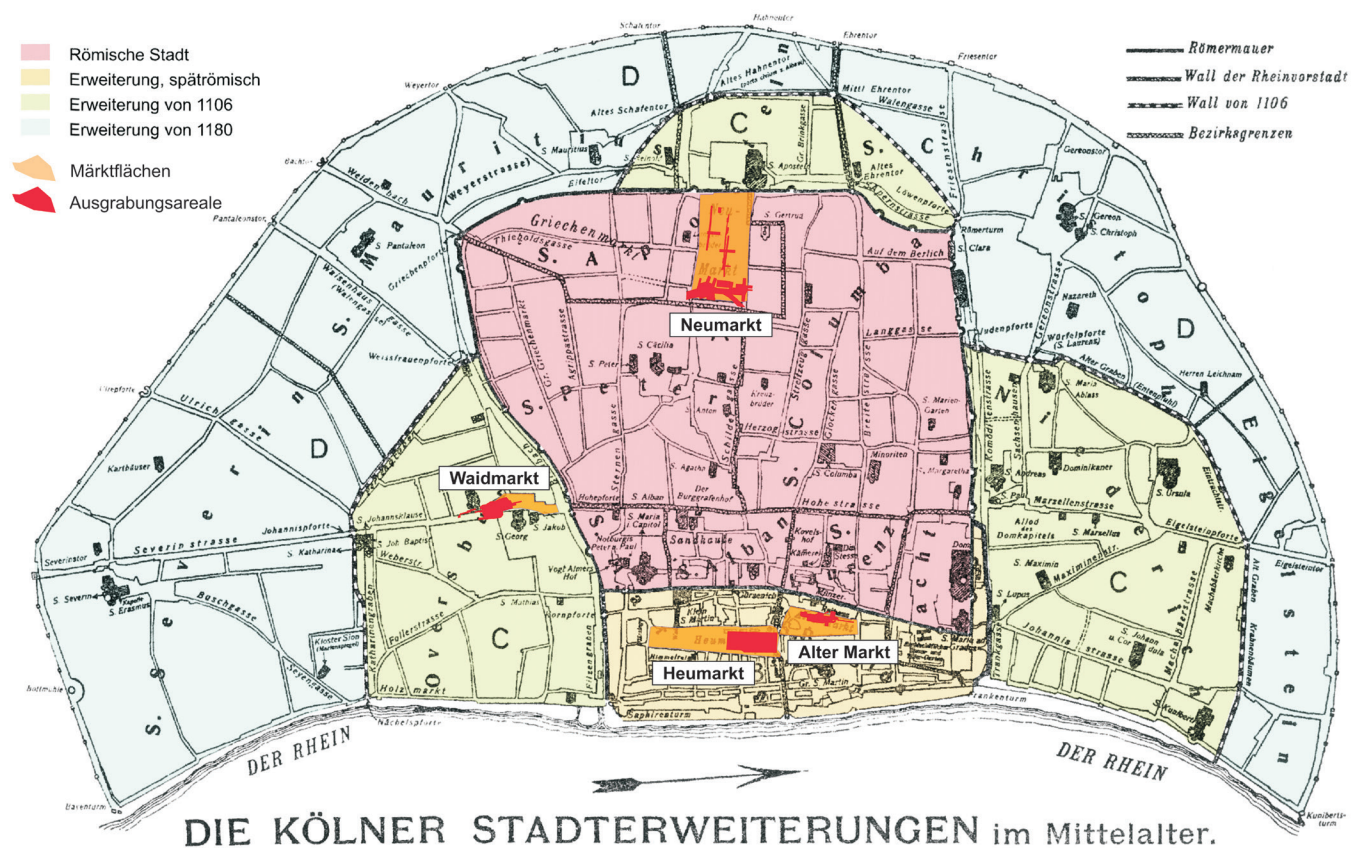
asteries (Fig. 3). From 1180 the construction of the 8 km long city wall began, which formed the city boundary until the 19th century. At that time, the urban area had grown to 387 ha. The population is estimated at around 20,000 inhabitants (ENNEN 1975, 117-118).

At present it is hardly possible to determine the number of medieval squares. For the earlier centuries – the time before the first pictorial representations of the 16th century – historical and archaeological sources must be evaluated topographically. In this context, the main evidence for marketplaces is documentary. The location and form of marketplaces were subject to historical development, and some markets have lost all market character in the course of time. The Cologne *Buttermarkt* (butter market), located directly on the Rhine, is merely a narrow alley today; only the name indicates that it used to be an open market. Needless to say, butter was not the only good negotiated at the Buttermarkt. And of course butter was also sold elsewhere in the city. And last but not least, the points of sale for butter in the 10th century are not identical to those of the 15th century, for example (KUSKE 1913, 76-77). The subject matter is undoubtedly complex and must be evaluated from all historical angles in order to be able to reliably trace the development.

Numerous small ancillary markets in Cologne mainly fell under the immunities of churches and

▼ Fig. 2. Cologne in the early Middle Ages, settlement area marked orange (1 Bischofsgartenstraße; 2 Heumarkt; 3 Kurt-Hackenberg-Platz; 4 Alter Markt; 5 Martinstraße; 6 Josef-Haubrich-Hof; 7 St. Kolumba; 8 Kastell Deutz) (DIETMAR/TRIER 2011, fig. 146).





▲ Fig. 3. Cologne city expansions with the marketplaces Alter Markt, Heumarkt, Neumarkt and Waidmarkt (orange) and the associated excavation areas (red) (KEUSSEN 1910, modified).

monasteries as well as in squares at the city gates. Both uses were regularly fought against by Cologne city council, because the city treasury lost income through trade in the tax-exempt immunities. In addition, the small markets at the gates had to be controlled with high personnel costs. The market administration therefore tried to prevent any uncontrolled growth (KUSKE 1913, 120-121).

Heumarkt

Of particular importance are the excavations on the *Heumarkt* (hay market), where in the 1990s excavations were carried out on an area of around 6000 m² of large sections of the former dockland (Fig. 4). Today's Heumarkt is located on a former Rhine island, which in ancient times was connected to the left bank of the Rhine by earth deposit. In the early Middle Ages, a black, humus layer up to 60 cm thick was deposited over the youngest Roman horizon, which is a concentration of municipal waste and livestock manure, interspersed with animal bones and small finds of ceramics, metal, glass, stone, bones and wood. Man and animal apparently lived close together here (KNÖRZER 2001, 898). Within the black layer about 200 early medieval features – mainly pits – could be found. Among the findings seven Merovingian pit-houses are to be emphasized, grouped to the west and east of a large ancient building, possibly a kind of storehouse. The buildings were between 3 and 3 ½ m

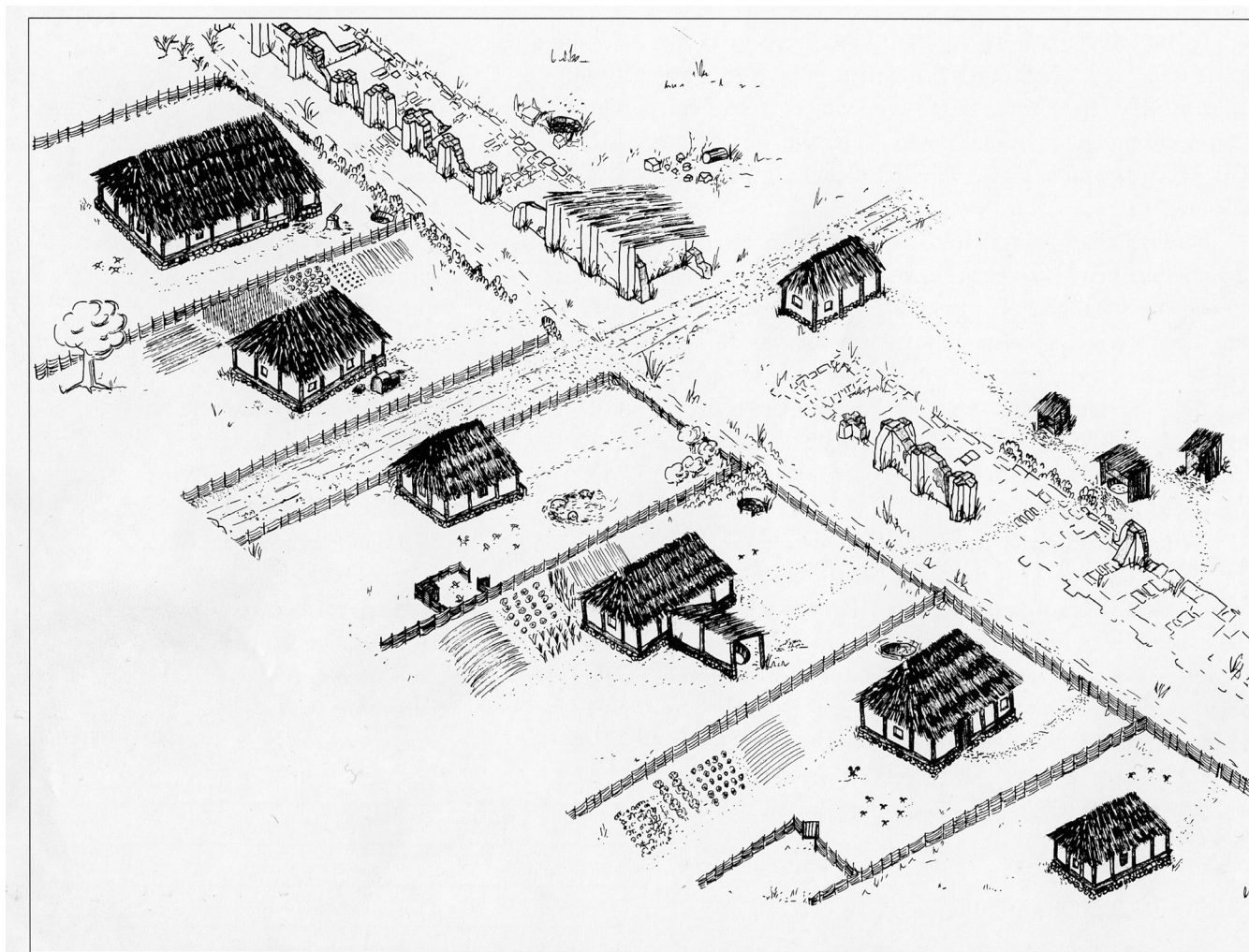
long, dug into the ground, and reached via a staircase. While the pit-houses were used for handcraft and storage, the craftsmen probably lived in neighbouring Roman buildings. Still in Merovingian times, an east-west road with gravel pavement was laid, which intersected the large Roman building.

Numerous finds provide information about the objects that were produced here. These include melted glass remains, melting pots, remains of vessels, beads, window glass and pendants or spin whorls. In this context remains of furnaces were also found (ATEN *et al.* 1998, 494-502; HÖLTKEN 2013). The long-expressed assumption that the Roman glass processing of the CCAA was also continued in the early Middle Ages can obviously be proven here archaeologically (HÖLTKEN/TRIER 2016, 158-159). Other tool finds, remains of furnace walls, and non-ferrous metal slag prove that objects made of metal and bone were also produced (KEMPEN 2001, 741-747).

To where the glass, metal and bone goods produced here were exported has not yet been clarified in detail. Two gold coins found on the Heumarkt give initial indications. One coin came from Andernach and was minted around 580, another from Bannasac in the Rhone region and dates back to the 7th century (ATEN *et al.* 1998, 494-495). Of course, it is not possible to comprehensively reconstruct Cologne's trade connections with the two coins alone, but they can be seen as an indication that craftsmen and merchants with far-reaching commercial relations were active here. Pottery finds from the



▲ Fig. 4. Bird's eye view of the excavations on the Heumarkt in spring 1998 (Römisch-Germanisches Museum).



▲ Fig. 5. Reconstruction of the Heumarkt settlement in Carolingian-Ottonian times (C. Claus, Th. Höltken).

pit-houses show that the area was continuously used from the 5th to the 7th century (KEMPKEN 2001, 702-723). Many metallic small finds indicate the ethnic origin of the early medieval inhabitants. These are accordingly Franks, but some finds also point to immigration from the Elbe Germanic area (ROTH/TRIER 2001, 762-769; TRIER 2011).

The remains of the Merovingian period settlement are seamlessly followed by Carolingian features. The loosely scattered pit-houses are abandoned and replaced by larger ground-level buildings (Fig. 5). These are wooden or half-timber houses up to 12 m long, which have been placed on a stone base. The supporting woods were often based on large, Roman, partly very high-quality, spolia (ATEN 2001, 669-676; HÖLTKEN 2006). Apparently several antique buildings were demolished and recycled. From Carolingian contexts numerous products of metal processing were found on the Heumarkt, among them several forming pins of disc brooches and non-ferrous metal slag. Outside the houses were wells, ovens and probably roofed latrines. Eight settlement or courtyard areas can be reconstructed which run parallel to the large Roman building; ruins of the large building demonstrably stood until the 10th century.

Similar settlement areas have meanwhile been archaeologically identified in several places along the Rhine. Bustling activity took place mainly in the dockland and at the foot of the episcopal church. From Cologne, international trade was conducted via the Rhine with important trading sites such as Haithabu and Dorestad. However England and Scandinavia were also involved. Cologne's economic importance must have been considerable during this period. The local market attracted a wide range of buyers. It is possible that the craftsmen's settlement stretched over the entire Rhine front. Terms such as *Kaufmannswiek* or dockland would be appropriate in this context – in one way or another. The local craftsmen and merchants probably lived on the king's ground in the early days, working under his protection and perhaps also on his behalf. In Carolingian-Ottonian times, a mixture of craftsmen, merchants and royal or episcopal servants is to be assumed (HÖLTKEN/TRIER 2016, 160-161).

In 957 or shortly after, according to dendro-chronological and numismatic data, the settlement was quickly and completely demolished. The site was levelled and a uniform market area of gravel was created (Fig. 6). The first medieval



Heumarkt – in the sense of an open square – was created (market 1) (ATEN *et al.* 1998, 511-514; HÖLTKE 2008a, 582-588). The archaeological dating comes close to the first documentary mention of a market – the *mercatus colonie* – in 992. This systematic and far-reaching urban development operation must have taken place under sovereign order. It was most likely Archbishop Brun (953-965), the brother of Emperor Otto I, who ordered the demolition of the settlement as town lord. As Duke of Lorraine, Brun was the first German prince-bishop. Under him the position of the archbishop of Cologne was considerably strengthened; he was supreme lord in the city. Under his episcopate the city gained further importance, which was also reflected in an ever-growing population. Therefore, in the Vita of St. Maurinus, written shortly after Brun's death (965), Cologne is described as a densely populated city (*populosa civitas*).

Despite high expectations, the archaeological finds from the first market were rather disappointing. In Ottonian times it was ensured that no waste accumulated on the market area; it was "well-swept" (HÖLTKE 2008a, 581). There are hardly any archaeological findings, for it was certainly profitable to comb the square at the end of an eventful market day in search of lost coins and other valuables. Therefore the archaeological finds can only provide a faint shadow of the significance of the Heumarkt, which can be read from

the historical sources¹. Apparently there was only a small number of permanently installed booths and buildings. In addition to some drainage trenches, remains of a few post constructions were found on the eastern side.

Repeatedly in the following centuries the surface of the market was renewed. The result is a layer package of around 3 m in height. It is worth emphasizing the good preservation in these layers; even small pieces of wood could be recovered from the oxygen-poor soil, which provided a series of dendrochronological data. The individual market layers can therefore often be dated to exact years and linked with those archbishops who were responsible for the respective market renewals. For the 11th and 12th centuries several market stalls were documented, all located at the edge of the Heumarkt (market 3 and 4). These are small covered structures with walls of boards or wickerwork, which had a simple floor of rammed clay and occasionally small fireplaces (Fig. 7) (HÖLTKE 2008a, 588-591). According to dendrochronological data, in 1082 a 7.0-7.5 m wide gravel road was constructed in a north-south direction (HÖLTKE 2008a, 593-594).

Together with the surface of the 4th market (Fig. 8), a careful underground sewage disposal system was constructed in 1104. In the northwest a new massive stone building was built: the archbishop's

▲ Fig. 6. Oldest market pavement from the Heumarkt, 10th century (Römisch-Germanisches Museum).

¹ To the abundant historical sources of medieval Cologne merchandise see: KUSKE 1917.



▲ Fig. 7. Wooden frame from a late 11th century market stall from the Heumarkt (Römisch-Germanisches Museum).

mint (ATEN *et al.* 1998, 528-540). The mint (*moneta*) was first mentioned in Cologne between 1142 and 1156. The minters exercised the archbishop's coinage prerogative. An estimated one to two million silver coins are said to have been minted annually in Cologne in the 12th century.

In the second half of the 13th century the 5th market area was built. For the first time, careful basalt paving has been discovered in some areas. Also new are remains of stone-buildings. In general, the archaeological evidence of market stalls is rather sparse. This seems well-explained by two observations: On the one hand, the surface structure of closely grouted basalt prevented wooden posts from being rammed in. On the other hand, the market supervisors tried to prevent any fixed installations on the market area; the historical sources of the late Middle Ages note several times the order to dismantle the market stalls every evening (KUSKE

1917 vol. 2, 327). Two public wells were sunk. The wastewater was discharged through several stone canals, the so-called *Aduchte*.

Market 5 dates to after 1266 according to numismatic data, shortly after an important event in the city's history (HÖLTKEN 2008a, 614): In 1258, in a dispute between the citizens and the Archbishop of Cologne, Konrad von Hochstaden, parts of the right to mint coins, jurisdiction and also market law were transferred to the city². Of particular economic importance was the staple right granted to the citizens by Archbishop Konrad in 1259 (KUSKE 1937, 304). This said that merchants were not allowed to drive past Cologne with their goods without unloading them in Cologne and offering them for sale to the citizens for a while. The staple right gave the merchants considerable commercial advantages. It is therefore quite possible that the above-mentioned renewal of the Heumarkt (market 5), which had been quite costly, can be traced back to the new balance of power and the will of the citizens to represent it.

Finally a brief look at the archaeological material. Most of the more than 150,000 finds that were recovered from the layers originate from the artificial fills for the following market level. It is therefore primarily relocated material that had been brought in from other Cologne sites and cannot directly be linked to the trade (HÖLTKEN 2008a, 581).

More interesting are finds that were tread into or lodged in the pavement of gravel, bricks and boulders. These include mainly ceramic fragments and animal bones, rarer glass or metal objects. Parts of clothing are often found, such as buckles; fittings of knife sheaths; rings made of silver and bronze. Less common are brooches, beads, combs made of bone, stirrups and fragments of several folding scales. A whole series of lead weights were also used for weighing (Fig. 9). Their weights usually correspond to a partial quantity of the medieval Cologne pound. On the pavement of Market 3 also a coin weight was found on the upper side of which the imprint of a high medieval Cologne mint stamp Sancta Colonia Agrippina („S / [CO]LON[I] / A“) can be seen. It corresponds to the nominal weight of 12 Cologne pfennigs or denarii (HÖLTKEN 2008a, 616). Indeed, the weights are likely to be directly related to market activities. This may also apply to production waste from a pearl workshop. The bone blanks and semi-finished products were found in a stall built after 1176 ± 5 according to dendrochronological data. The beads were shaped out of the metacarpal and metatarsal bones of cattle and horses with a bow drill. They were threaded and served as a prayer chain, with which the “Lord's Prayer”, and later also the Rosary, was observed (HÖLTKEN 2008a, 604). The production of pearls is archaeologically proven in several places in Cologne, twice in the immediate vicinity of the

2 30 years later – in 1288 – Cologne effectively became a free imperial city.

cathedral. However, the finds from the Heumarkt occupy a special position, as they date much earlier than the oldest written sources, which do not mention the prayer chain with certainty until the middle of the 13th century (HÖLTKE 2008b, 188).

With the early modern period, the archaeological sources dry up, as the uppermost layers of the site were comprehensively disturbed. At the same time, however, the historical tradition increases and the first detailed picture sources can be consulted (ATEN *et al.* 1998, 358-369). Thus, the historical sources of the Late Middle Ages and the early modern period allow a rather exact reconstruction of the locations of the respective product groups offered (KEUSSEN 1910 vol. 1, Taf. 2).

Alter Markt

Just north of the Heumarkt is the area of the Alter Markt (old market). Excavations were also carried out here between 2004 and 2012 in connection with the construction of the North-South urban railway. The findings on the Heumarkt are reproduced in a remarkable way on the Alter Markt (CARRUBA/WIRTZ 2012; CARRUBA 2016).

Above a Roman filling horizon of the ancient branch of the Rhine, the black layer of the early Middle Ages is encountered again. Here, too, Carolingian-Ottonian half-timbered buildings on stone bases and evidence of local craftsmanship can be found. Possibly at the same time as the settlement on the Heumarkt, *i. e.* in 957 or shortly afterwards, the buildings on the Alter Markt were demolished. This is followed by a 2 m thick package of market paving made of gravel from the period between the 10th and 13th centuries. In the investigation area, substructures and wood remains of temporary and possibly permanently installed 12th century stalls were found several times. In the Renaissance at the latest, the surface of the Alter Markt must have reached the approximate present level.

There is much evidence to suggest that the Heumarkt and Alter Markt were part of a much larger market area in the early days (KEUSSEN 1910 vol. 1, 158*). The modern separation was mainly brought about by the construction of the above mentioned mint and its division into two parish districts. But also the former ancient ramp to the Constantinian Rhine bridge acted as a dividing element.

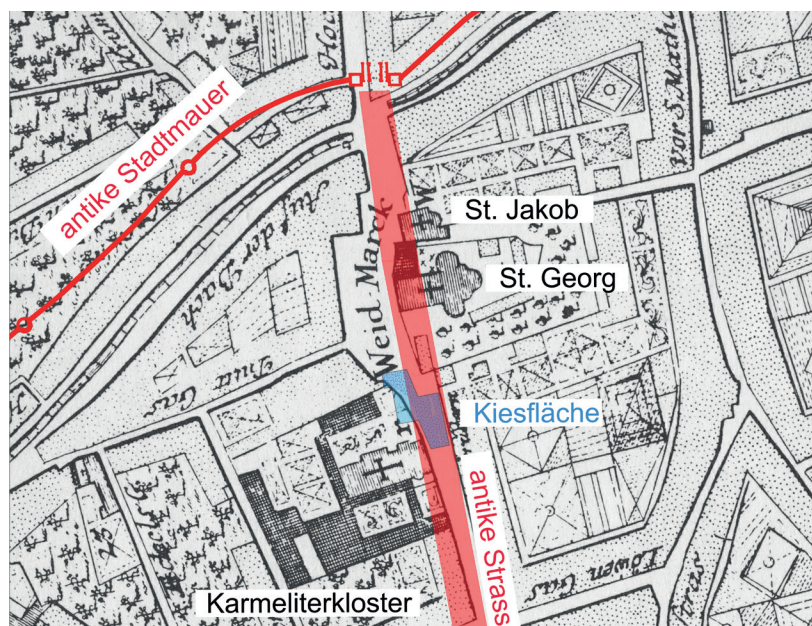
It is currently not possible to provide more precise information on the size and expansion of the early market. This square may well be pictured as a continuous gravel surface, which was interspersed by smaller buildings or groups of buildings and which possibly reached as far as the Rhine harbour. In the course of further development the buildings became denser, so that the first streets were built in the 12th century at the latest. Historically, it has long been considered that the streets Buttermarkt, Thurnmarkt and Fischmarkt once belonged to the



▲ Fig. 8. 12th century pavement from the Heumarkt (M. Wiesehöfer).



▲ Fig. 9. Medieval and post medieval lead weights from the Heumarkt. Scale ca. 2:1 (Römisch-Germanisches Museum/Rheinisches Bildarchiv, A. Wegner).



▲ Fig. 10. The Waidmarkt. Excerpt from the plan of J. V. Reinhardt, 1752. The Roman city wall and Limesstrasse (red) and the excavated medieval gravel area of the market (blue) (Rheinisches Bildarchiv, modified).

mercatus colonie and were cordoned off over time (KEUSSEN 1910 vol. 1, 158*; KUSKE 1913, 76). Construction-historical investigations in cellars of building on the Alter Markt allow the reconstruction of the condition in individual cases up to the 12th century (WIEDENAU-MICHALSKI 2010), older parts of buildings have not been determined. However, this is probably mainly due to the fact that the two-storey basements of the peripheral buildings profoundly destroyed older features already in the Middle Ages and the early modern period.

Neumarkt

The Neumarkt is about 900 m from the medieval banks of the Rhine (Fig. 3). The almost 3 ha large square is located in the western part of the ancient city, directly at the Roman city wall and north of a main road leading to the west, the former Roman *decumanus maximus*.

The Neumarkt was first mentioned in 1076 as *novo mercato* – a new market, in contrast to the Alter Markt (old market). However, when exactly it was founded is unknown. Early sources of the 11th and 12th centuries on the Neumarkt are comparatively rare. The shrine books hardly record any real estate transactions during this time. It appears, therefore, that the establishment of the market was not very successful (KEUSSEN 1910 vol. 1, 16*, 37*; KUSKE 1913, 76, 118–119). The market was used almost exclusively for the sale of livestock; apart from that it was the venue for festivals and used as a parade ground. In 1374 a watering trough for the livestock was built. Certain types of wood and grain were also sold here. The unfavourable location away from the Rhine harbour, however, meant that the market played only a minor economic role for Cologne.

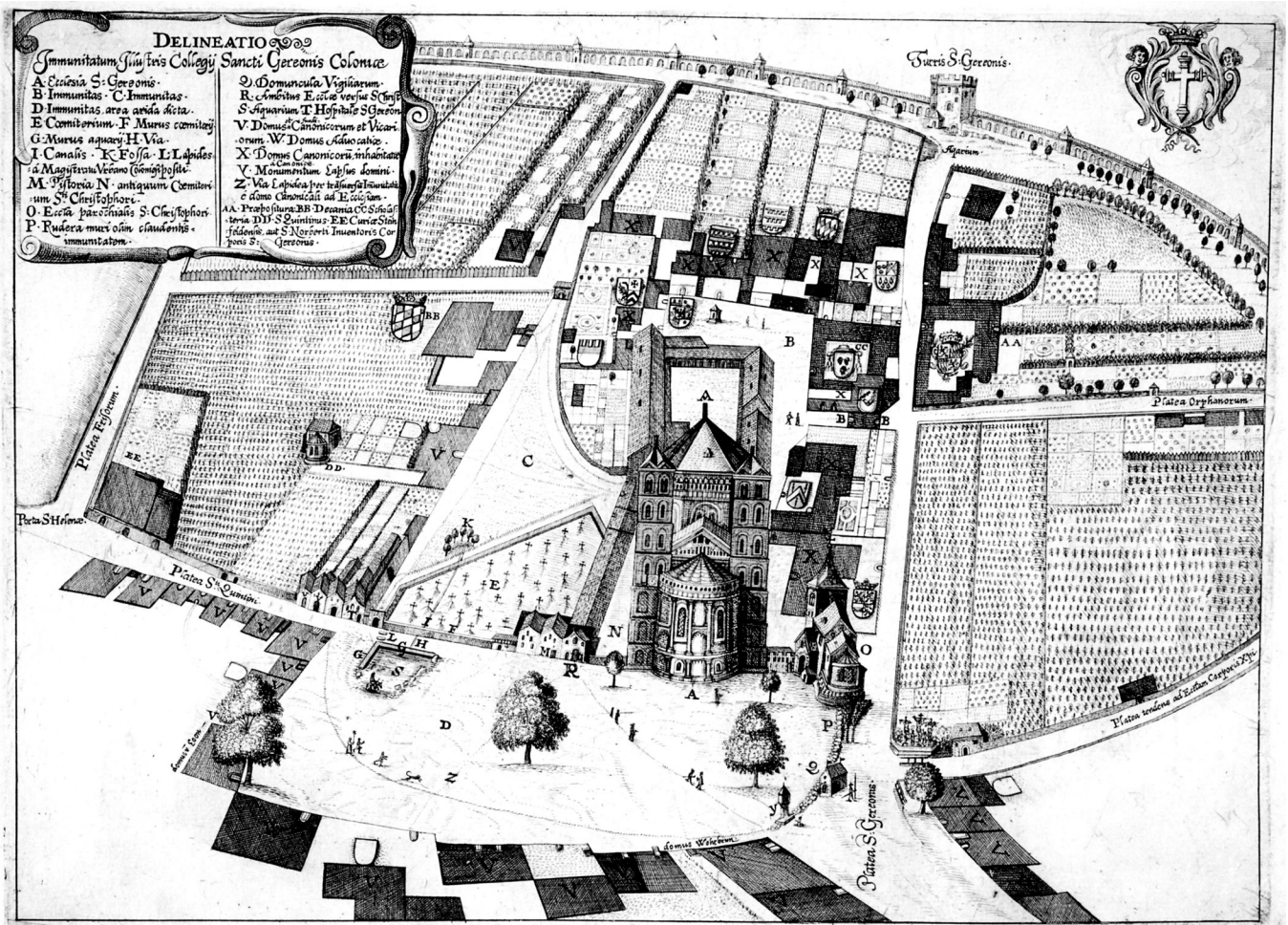
Archaeologically, the Neumarkt has hardly been researched so far. When a subway station was built in 1967/68, only Roman walls and “modern disturbances” were noted (Fundbericht 1967.011). 50 years earlier, in 1927, two “gravel layers” were observed in minor investigations, which were addressed as medieval market surfaces (Fundbericht 1927.014). In this context, the round, 2 m thick foundation of a windmill built in 1392, which is also shown on the Mercator Plan of 1571 (Fig. 1), was also exposed. The landside windmills in Cologne were used when the Rhine mills could not be operated. The mill on the Neumarkt had six floors and was converted into a prison tower in 1596. In the late Middle Ages, the square also served as a place for execution and tournaments.

Waidmarkt

The Waidmarkt (woad market) lies in the south of the city, a few metres south of the ancient city wall. This square is also closely linked to one of the old main traffic axes; the Roman Limes Road ran through here, accompanied on both sides by buildings and tombs (Fig. 10). With the end of antiquity, the area was abandoned. Between the 5th and 10th centuries there is no historical or archaeological evidence that the area was inhabited. It was not until the 11th century that Archbishop Anno II founded the monastery St. Georg with the neighbouring parish church St. Jakob. The west choir of the collegiate church towered upward from far into the axis of the old Roman road and was already visible to travellers and pilgrims from afar. The square, which was still called *Breitestraße* in 1232, probably dates back to a widening of the Roman Limes road (KEUSSEN 1910 vol. 1, 160*; KUSKE 1913, 116). Around 1300 the name Waidmarkt appears for the first time.

The cultivation of woad mainly took place on the left bank of the Rhine. From there it went through the hands of the Cologne merchants into long-distance trade as far away as England, from where it often returned to Cologne as dyed cloth. The dye-works, which were heavily dependent on running water, had settled along the Duffesbach, which flowed immediately south of the old Roman city wall (HÖLTKEN 2011). In the first half of the 14th century, the Cologne woad merchants formed a woad guild, which belonged to the most distinguished societies of the city. A little later, at the end of the 14th century, the Waidmarkt began to decline, as other dyes such as indigo gained in importance.

The comparatively short period of prosperity of the Waidmarkt is also reflected in the excavation findings: archaeological investigations were carried out on the site between 2004 and 2006 as part of the construction of the North-South urban railway. In the process, small remnants of the oldest medieval gravel pavement, dating back to the 11th or



▲ Fig. 11. St. Gereon, monastery district. Copper engraving by Emanuel von Wehrbrun from 1642 (Rheinisches Bildarchiv).

12th century, were found above the Roman military road. A continuous and extensive market pavement – consisting of gravel, bricks and rubble – could only be proven for the 13th century. Above this was another late medieval gravel pavement. The most recent surface – also made of gravel – dates back to the 16th or 17th century (FRASHERI 2009).

Wedge between the St. Georg monastery and the parish church of St. Jakob on the right and the Carmelite monastery on the left as well as the Duffesbach in the north, there was little room for further development. Apart from the woad trade, the market was not able to expand its economic importance.

Cathedral – monasterien – convents

Mercator's bird's eye view (Fig. 1) shows many squares in the areas of the monasteries and convents – around 240 are historically known (HÖLTEN 2014, 261). Historical data on the immunities/immunity districts (Latin: *immunitas localis*, an autonomous zone) in Cologne, however, are comparatively scarce, since they were excluded from the shrine jurisdiction (KEUSSEN 1910 vol. 1, 144*). The important monasteries such as St. Ursula and St. Gereon – Cologne's holy places – attract-

ed large numbers of pilgrims, who in turn fed the wealth of the churches through endowments. The monasteries developed into independent economic centres. Their squares were not only used for processions and pilgrims' prayers, but also for business away from the public markets, over which the city administration could hardly exert any influence (KUSKE 1913, 120; GECHTER 1983, 226–228).

It was also quite customary to rent private apartments in the immunities (KÜHN 1913, 7). A copper engraving of Gereon's basilica by Emanuel von Wehrbrun from 1642 shows several squares around which buildings with family coats of arms of the inhabitants are grouped (Fig. 11). Such arrangements in immunities led to legal conflicts, and friction between city council and the clergy arose consistently. In 1644, for example, when the city sent workers to maintain a road leading to the square in front of St. Gereon, they met with fierce resistance from the monastery chapter. The chapter expelled the workers from the square, which in their opinion was not a "via publica". The Council finally let the military drive the clergymen off the square (KÜHN 1913, 6).

The square south of the cathedral, the Domhof (cathedral courtyard), was particularly large. Here, between the archbishop's palace and the bishop's church, the high court chaired by the burgrave met three times a year in the High Middle Ages. After

the archbishops moved their residence outside Cologne, the Domhof lost essential aspects of its representative character. The written tradition testifies that already in the 14th century the area became a popular location of the merchants (HÖLTKEN 2008b, 200). Items for sale included knives, bags, gloves, pots and forged goods. Money changers also offered their services (KEUSSEN 1910 vol. 1, 160*). In 1419 the city complained that spiritual places were rented out in the cathedral and its immunity. The city tried several times to pursue legal proceedings against the stalls in the cathedral immunity to protect its own economic interests. Archaeological evidence is poor, as the medieval layers are largely unobserved in the vicinity of the cathedral because they were cleared away in the 19th century (DOPPELFELD 1952).

Summary

Even if only a fraction of Cologne's abundant medieval market areas have been archaeologically examined and evaluated, the results of the excavation findings readily confirm and supplement the historical state of knowledge. In summary, the following can be stated: At the end of Roman rule, the oldest market, the ancient forum, was abandoned. Trade continued in the Merovingian period, especially at the Roman port. Here – demonstrably at the Heumarkt – intensive trade and handcraft with glass and metal processing was carried out from the 5th century on. In Carolingian times, a densely built-up settlement strip with courtyard-like building complexes developed along the Rhine, in the immediate vicinity of which trade continued to operate. It must have been a proper dockland.

Shortly after 957, the dockland was probably demolished by order of Archbishop Brun of Cologne and a uniform gravel area built, the first medieval market, which was mentioned in documents as a *mercatus colonie* shortly after in 992. The new market surface was not only limited to today's Heumarkt, it is also archaeologically apparent on the Alter Markt.

The foundation of the Neumarkt in the 11th century on the western edge of the city was intended to support trade along rural and main roads. However, success fell short of expectations due to the dominating Rhine trade. Archaeological and historical sources show that little activity took place here. The same applies to the Waidmarkt, which only experienced a short period of prosperity in the late Middle Ages. Both markets played a subordinate role and offered little incentive for settlement.

Presumably all Cologne markets were founded between the 10th and 12th centuries by order of the archbishop – the autonomous town lord. Market rights were probably granted to Archbishop Brun by his brother Emperor Otto I in the middle of

the 10th century. It was not until 300 years later, in 1258, that market rights came into the hands of the citizens of Cologne. However, there did not seem to have been a subsequent wave of new foundations at that time.

In the 12th century, the wealthy patricians increasingly succeeded in asserting their interests. The first craftsmen guilds, the merchant guild, and the *Richerzeche* (a brotherhood of rich patrician and merchant families) were all founded during this period. Between 1114 and 1119 the first town seal was created. Twenty years later (1135-1139) a town house (*domus civium*) is mentioned for the first time, the predecessor of the later town hall.

There is still much to do to determine the Cologne features within the framework of regional, national and international market research (MITTERAUER 1980; RÖBER 2006). One observation seems certain: Market and square form an almost indivisible unit in Cologne. As soon as a square arose, it attracted shopkeepers and merchants. The city administration fought a constant battle for control. Therefore, squares in the immunities of the churches were also popular, since the powers of city officials were limited there. Cologne's marketplaces can not only be understood topographically. Their emergence and development was particularly subject to the respective economic and political trends.

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Address of the author

Thomas Höltken
Römisch-Germanisches Museum
Amt für Archäologische Bodendenkmalpflege der
Stadt Köln
Roncalliplatz 4
50667 Köln
Germany

thomas.hoeltken@stadt-koeln.de

Markets in late medieval northwestern Europe: The organization of exchange in a commercializing world

by JESSICA DIJKMAN

Middle Ages, markets, fairs, transaction costs, weights, measures

The development of a dense network of formal markets authorized and supervised by central or local authorities in late medieval northwestern Europe is closely related to the commercialization that characterized the region in this era. Seen from the perspective of New Institutional Economics, these markets facilitated exchange by reducing transaction costs in more than one way. Firstly, they lowered search costs by attracting concentrations of buyers and sellers. Secondly, they reduced the security costs: as controlled environments for exchange they offered protection to the person and property of buyers and sellers. The legal status of fairs in particular facilitated contract enforcement, promoted a speedy adjudication of commercial conflicts and provided immunity from arbitrary arrests. Finally, markets lowered information costs. They offered systems to promote the transparency of price formation, varying from the regulation of food prices to prohibitions on speculation and auctioning systems; they also allowed for better supervision of product quality, especially of perishable foodstuffs; and they acted as focal points for systems for the control of weights and measures. Thus, late medieval markets answered to what buyers and sellers required: they provided the basic conditions for accessible, transparent and equitable exchange.

Märkte im spätmittelalterlichen Nordwesteuropa. Die Organisation von Austausch in einer sich kommerzialisierenden Welt

Mittelalter, Märkte, Messen, Transaktionskosten, Gewichte, Maße

Die Entstehung von dichten Netzwerken formaler Märkte, die durch zentrale und lokale Autoritäten genehmigt und überwacht wurden, ist im spätmittelalterlichen Nordwesteuropa eng verbunden mit der Kommerzialisierung, welche die Region während dieser Epoche charakterisierte. Aus der Perspektive der New Institutional Economics ermöglichten diese Märkte den Austausch bei einer Reduzierung der Transaktionskosten und dies nicht nur auf eine Art und Weise. Erstens verringerten sie die Suchkosten durch die Konzentration von Käufern und Verkäufern. Zweitens reduzierten sie die Sicherheitskosten: durch das kontrollierte Umfeld des Austauschortes boten sie Sicherheit für einzelne Personen wie auch für den Besitz der Käufer und Verkäufer. Der rechtliche Status der Märkte ermöglichte im besonderen Maße die Durchsetzung von Verträgen, eine schnelle Klärung von kommerziellen Konflikten und die Immunität vor willkürlichen Verhaftungen. Schließlich gewährleisteten Märkte auch die Reduzierung von Informationskosten. Sie boten Systeme an, welche eine transparente Preisbildung förderten. Dies reichte von der Regulierung von Lebensmittelpreisen bis zum Verbot von Spekulation und Auktionssystemen. Sie ermöglichten auch die bessere Überwachung der Produktqualität, besonders bei verderblichen Lebensmitteln. Und sie dienten als Kristallisationspunkt von Kontrollsystemen zu Maßen und Gewichten. Somit stellten spätmittelalterliche Märkte das bereit, was Käufer und Verkäufer grundsätzlich benötigten: Bedingungen für einen offenen, transparenten und fairen Austausch.

Introduction

The commercialization of northwestern Europe between the 11th and the 15th centuries was accompanied by the development of a dense network of formal markets: weekly markets and annual fairs held at a specific place and time, supervised by kings, lords or local authorities. Cause and effect are difficult to disentangle. The rise of markets can be seen as the consequence of interrelated processes of urbanization, specialization, and commercialization. It can also be argued, however, that the existence of such organized arrangements for exchange acted as stimuli: they promoted trade, encouraged specialized production, and nurtured the growth of towns (BRITNELL/CAMPBELL 1995; HATCHER/BAILEY 2001, 121-173). This contribution focuses on the second part of this reciprocal relation: the way in which late medieval markets in northwestern Europe – England, the Low Countries and northern France – affected the feasibility and efficiency of exchange. Northwestern Europe witnessed rapid and intense commercialization in this period, which makes it an interesting region for an examination of this subject. Moreover, especially for England, Brabant and Flanders, Holland, and Normandy a wealth of detailed historical research is available (amongst others: BAUTIER 1953; VAN DER WEE 1963; MUSSET 1976; BRITNELL 1993; MASSCHAELE 1997; STABEL 2001; THEILLER 2009; DIJKMAN 2011; DAVIS 2012; GELDERBLOM 2013).

The theoretical starting point of this contribution is derived from New Institutional Economics (NIE). Markets, in the perspective of NIE, can be seen as bundles of institutions: rules, practices and customs that influence the behavior of individuals, in this case their decisions to engage in exchange or to refrain from doing so. They do so by affecting transaction costs: the costs – in the widest sense of the word – of exchanging goods (NORTH 1991). Medieval markets are credited with three main contributions towards lowering transaction costs. Firstly, the concentration of exchange in time and place made it easier for buyers and sellers to meet, thus lowering search costs. Secondly, markets reduced what can be summarized as security costs. Because markets were public places supervised by the authorities, they offered, at least partially, protection of the person and property of buyers and sellers. Visitors to the market enjoyed the advantages of trading under fair and equitable conditions, legal enforcement of contracts, and freedom from arbitrary arrests (ARNOUX 2010, 32-33). Finally, medieval markets also reduced information costs. Partly this was because concentration of trade allowed for a better comparison of the quality and value of goods. In addition to this, however, supervised markets also provided systems for regulating weighing and measuring, price formation, and product quality: aspects that engendered trust between buyers and sellers (DAVIS 2011, 81).

Obviously, this does not mean that all trade was conducted through the marketplace: in fact, the majority of transactions probably took place elsewhere. Large-scale transactions between producers and merchants frequently bypassed formal markets, as did peddling or exchange of daily necessities between neighbors. In cases like this the benefits of markets were outweighed by disadvantages such as distance or the constraints imposed by regulation (BRITNELL 2006, 112-114). Nevertheless, the contribution of supervised, formal markets to commercialization in the medieval period was substantial. The next section first outlines the development of the network of weekly markets and annual fairs in medieval northwestern Europe in the late Middle Ages that helped to reduce search costs. Subsequently the contribution of these markets to the other two types of transaction costs mentioned above – security costs and information costs – will be discussed in two consecutive sections. Conclusions follow.

A network of markets

In many parts of Europe the high and late Middle Ages witnessed a marked increase of the number of markets and fairs. Some of these trade venues had important roles in the international trade in luxury products. In the late 12th and early 13th centuries the cycle of consecutive fairs in the Champagne region dominated the long-distance trade in Flemish textiles to markets in Italy (BAUTIER 1953, 105). Similar international fairs existed in the English Midlands (WEDEMEYER MOORE 1985) and in Flanders (VERLINDEN 1963, 134-137). Although the fairs of the Champagne region declined in the 14th century, new international fairs emerged elsewhere, for instance in Chalon, Geneva, Lyons and Frankfurt (VERLINDEN 1963, 137-143). The late Middle Ages also witnessed the rise of many smaller fairs that formed important nodes in the rising interregional trade in specialized agrarian and industrial products such as livestock, dairy products, and various textiles (EPSTEIN 1994). Other late medieval fairs catered for private consumers, providing them with products that were normally not available locally. In the middle of the 15th century the small town of Brielle in Holland, for example, had a fair where consumer items such as shoes, mercery, jewelry, leather belts, plates, and furniture were sold (DIJKMAN 2011, 52).

Weekly markets providing urban consumers with various foodstuffs and locally produced manufactures were common in even the smallest towns. In large cities such retailing markets were held more than once a week, with specific times, or specific spaces, devoted to the trade in specific commodities (STABEL 2001, 808-809). Urban markets also served as central points for the trade in raw materials from producers to local manufacturers. In

Exeter, for instance, a significant part of the sales of hides and skins by butchers and tanners to the town's leather craftsmen took place at the weekly market (KOWALESKI 1995, 306). Some specialized urban markets developed into permanent trade venues for the wholesale trade between local producers and merchants, such as the cloth halls in the Flemish towns. A few cities developed as veritable commercial nodes in international trade: 14th and 15th century Bruges, frequented by merchants from all over Europe, is a prime example of that last category (MURRAY 2005, 216-258).

Until the 12th century, in northwestern Europe fairs and markets were often informal gatherings of people, for instance near churches (SAWYER 1986, 670). From the 12th century onward, however, they increasingly came to be seen as formal, public institutions that required the authorization of the ruler. Reviving Carolingian precedents, sovereigns claimed the right to install markets and fairs as a royal prerogative. The license to actually hold the market or fair and enjoy any revenues it might generate – market tolls, fines, levies on weighing and measuring – could be exercised by the king himself, but in many cases was granted to a lord or local community (BRITNELL 1993, 15-19; ARNOUX 2010, 34-35).

The procedure to initiate the issuing of a market license as it evolved over time usually started with a request by the prospective holder of the license, but, at least in England and Normandy, also came to include a formal investigation to prevent new markets and fairs from damaging existing ones. The main factor taken into account was the distance to other markets held on the same day, which should

be at least six miles; another was the expected capacity of the new market to generate new trade. Holders of pre-existing market licenses who felt their interests were not sufficiently protected could take their case to court (MASSCHAELE 1997, 59-67; THEILLER 2005).

Based on information from accounts, charters, and court rolls, historians have been able to trace the formation of a network of markets and fairs in northwestern Europe in the high and late Middle Ages. This network gradually filled out as more and more markets and fairs emerged. The process appears to have been a general one: it has been recorded for England (LETTERS 2013) but also for Normandy (MUSSET 1976; THEILLER 2009), Luxembourg (PAULY 1996), Holland (DIJKMAN 2011, 42-48) and Guelders, in the east of the present-day Netherlands (BENDERS 2001). Pace and timing, however, varied. Options for interregional comparison are largely restricted to fairs, as for this type of trade venue reliable quantitative data are more widely available than for weekly markets. Fig. 1 presents the numbers of fairs first recorded between 1100 and 1500 in three regions: East Anglia in England, and Holland and Guelders in the northern Low Countries.

The rise of fairs took off in East Anglia earlier than it did in Holland or Guelders: in fact, most parts of England witnessed a veritable explosion of new markets and fairs early on, between 1200 and 1350 (BRITNELL 1981). In Holland the entire 14th century was the period when most fairs made their first appearance, while in Guelders the pace of their emergence appears stable throughout the Middle Ages.

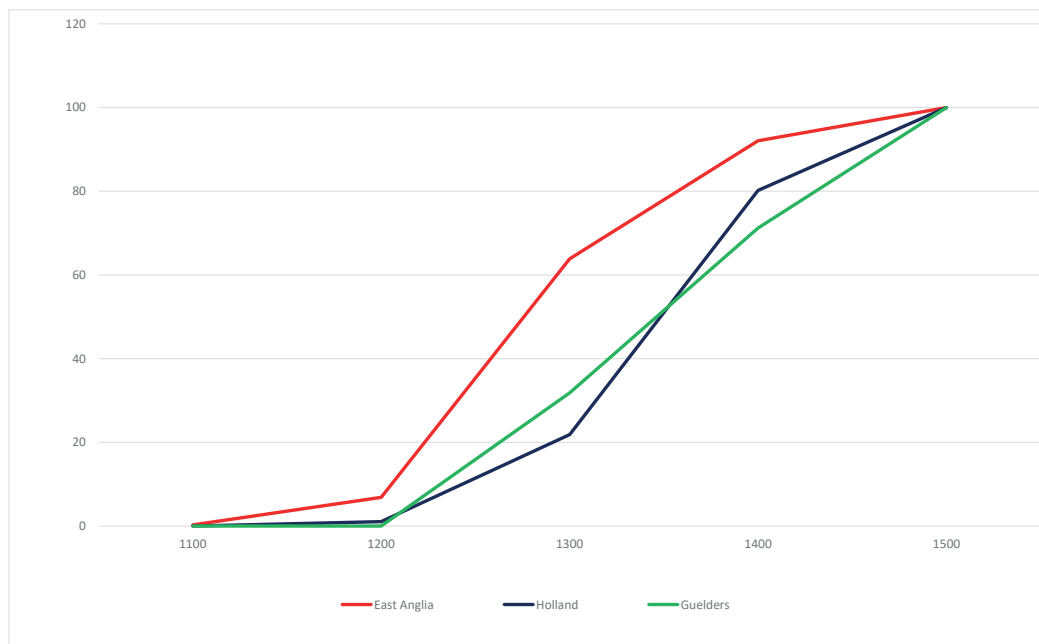


Fig. 1. Numbers of fairs first recorded between 1100 and 1500 in East Anglia, Holland and Guelders (index figures, year 1500 = 100) (BENDERS 2001, 664-666; DIJKMAN 2011, 43; LETTERS 2013, tab. 1).

Three interrelated caveats apply. Firstly, the historical sources are usually more reliable for the late than for the high Middle Ages, not only because the quality of registration improved with time but also because the oldest markets and fairs emerged in an era when formal authorization was not a prerequisite. Secondly, variations between regions may not always indicate differences in the level of commercialization but can also reflect different political and social structures. The early peak in the granting of market licenses in England, for instance, is at least partly explained by the fact that here royal jurisdiction over markets and fairs was firmly established at an earlier date than elsewhere. Finally, many medieval markets and fairs, especially those that were established relatively late in time, were short-lived, falling into decay within a few decades or even years after their emergence. Recordings of newly founded markets and fairs therefore have only limited value if their continuity cannot be established, which is not always easy (MASSCHAELE 1994; 1997, 167-173).

Towards the end of the Middle Ages in some regions a point of saturation may have been reached; in England the market network – although not necessarily total trade volumes – even showed signs of contraction (BRITNELL 1993, 156-160). In Normandy, after 1400 new market licenses were only granted to trade venues that demonstrably filled a gap in long-distance trade routes (THEILLER 2009, 41-42; 2017, 23). The specialized, regional fairs of the late Middle Ages mentioned earlier fall into the same category: they, too, fulfilled a role in new lines of interregional trade. At the same time, the late Middle Ages saw a marked rise of trade venues other than formal markets: retailing in shops or private houses, catering of travelers at crossroads, or wholesale trade in inns or at quays (DYER 1992; BRITNELL 2006). Although formal markets by no means ceased to exist, the era of their greatest growth had come to an end. But what was it, besides their mitigating effect on search costs, that had made them so popular and successful in the first place?

Security costs

An important element in the explanation is closely related to the status of markets as public institutions that offered the protection of the authorities to buyers and sellers. Here, the ‘peace of the market’ reigned, symbolized by the market cross present in the marketplace (HUVELIN 1897, 345-352). Fairs in particular enjoyed the advantages of a specific legal status that guaranteed the safety of all visitors. This included protection from theft and robbery, but also from a variety of legal setbacks that put the person and property of foreigners at risk. In medieval Europe

the legal position of foreigners was usually weaker than that of locals. In English towns, for instance, foreign merchants encountered various obstacles: they might be forced to sell part of their goods to locals, faced restrictions regarding the duration of their stay, and needed pledges to vouch for their respectability (DAVIS 2012, 159). In addition, merchants faced the consequences of what in the academic literature has been termed a community responsibility system (GREIF 2006, 318-338). Although scholarly opinions differ on the exact role of this system and its relation to individual liability, there is general agreement that under certain conditions merchants could be held responsible for fellow guildsmen or townsmen that did not honor their obligations or pay their debts (BÖRNER/RITSCHL 2002).

The legal regime of the fair solved these problems in two ways. First, fairs formed islands of immunity: the sovereign guaranteed fairgoers freedom from harassment and encumbrances, including arrests and confiscations because of previously contracted debts, for the duration of the fair and the time it took to reach it and return home again. A case in point is 13th century England, where the king frequently provided royal safe-conducts to foreign merchants visiting the international fairs of that country (WEDEMEYER MOORE 1985, 159-160). Such privileges were not restricted to international fairs: visitors of less important fairs enjoyed them as well. To which extent they also applied to weekly markets, however, is less clear. In principle, weekly markets were also public institutions that enjoyed the sovereign’s protection (HUVELIN 1897, 338-345). It has been claimed that freedom from confiscation for previously contracted debts was restricted to fairs alone (VAN HOUTTE 1953, 180), but some weekly markets – those of ‘s Hertogenbosch (Brabant) and Amsterdam among them – were also advertised as being ‘free’: they too offered immunity from arbitrary arrests (DIJKMAN 2011, 39).

The actual keeping of law and order was usually left to the license holders: the lords or communities that organized the fair. They used various means to this end. The bishop of Winchester, for instance, employed guards to maintain order at the fair grounds and to watch over a wooded stretch of the road from London, while the count of the Champagne region refused subjects of neighboring lords who did not protect the safety of passing merchants access to his fairs (WEDEMEYER MOORE 1985, 160, 286-287). The urban authorities of the cities in the southern Low Countries used a similar strategy; they relied on the pressure exerted on local lords by merchant communities faced with the prospect of exclusion from the fairs of Bruges or Antwerp (GELDERBLUM 2013, 143).

Secondly, fairs also offered adjudication of justice in a manner suited to the needs of buyers and sellers. Both at the Champagne fairs and at

footing with citizens (BARRON 2004, 93). However, anti-alien feelings resurfaced from the late 14th century onward, fueled by animosity over the export of English wool, culminating in the hosting laws of the late 1430s that assigned all foreign merchants to an English merchant who was to keep a close eye on their commercial activities. Only the Germans Hanse and a few other privileged groups under the king's protection were exempted (BOLTON 2017).

The most marked development of new modes of accommodating the needs of foreign merchants on a permanent basis took place in the large international trade centers of the southern Low Countries. In the 13th century, the count of Flanders offered privileges to merchant communities frequenting Bruges, including protection from confiscation of their goods. In the 14th century hostellers offered a variety of services to alien merchants: besides offering lodgings, they provided storage capacity and brokerage services, and stood surety for their guests. When in the 15th century foreign merchants settled permanently in Bruges, some merchant communities (or 'nations') were allowed to establish their own compound in that city. They were also given the legal privilege to adjudicate commercial conflicts between community members themselves, based on the laws and customs of their home country. Consuls appointed for this purpose by the merchants or their ruler served as judges in lawsuits, but also performed services such as recording contracts. In 15th and 16th century Antwerp similar facilities were made available; in fact, the duke of Brabant and the city authorities made deliberate attempts to lure the merchants of the German Hansa, the English Merchant Adventurers and merchants from various Italian cities away from Bruges by offering them privileges that reinforced their legal position (GELDERBLOM 2013, 22-23, 49-51, 109-117).

Under certain conditions the immunity offered by periodic fairs and markets continued to be of value. In the late 15th and early 16th centuries, many towns and villages in Holland experienced serious financial problems. As a result, travelers from indebted communities risked arrest for the debts of their town or village. This in turn gave rise to the issuance of a series of explicit safe conducts of visitors to fairs and also to weekly markets (DIJKMAN 2011, 40-41). Admittedly, these were extraordinary circumstances. On the whole, on the issue of security the advantages of formal markets – certainly of fairs, and perhaps also of weekly markets – over alternative trade venues diminished as at the end of the Middle Ages new mechanisms for the protection of the person and property of buyers and sellers developed. What, then, about that other contribution markets made to lowering transaction costs: their impact on the costs of obtaining reliable information on quality, quantity and price?

Information costs

In part, late medieval markets – and in fact modern markets as well, at least until very recently – owed their information advantage to the concentration of buyers and sellers in one place. The congregation of customers and traders in a busy market place made it easier for both parties to inspect and compare the wares on offer, assess their value and perhaps also the trustworthiness of the other party, and settle on a suitable price to be paid or asked. Price formation in particular was a function of formal markets that also benefited informal trade outside the marketplace (BLONDÉ *et al.* 2006, 15). Medieval markets, however, also contributed to lowering information costs in another way, which was, again, related to their position as controlled trade environments: they offered mechanisms for price regulation, quality control, and reliable systems of weighing and measuring.

Price regulation and product quality

Prices were only rarely set at fixed levels in the absolute sense of the word. Not just merchants, but also the general public and even medieval theologians acknowledged and accepted that prices moved up and down with demand and supply (DAVIS 2012, 223-224). In various ways, however, authorities attempted to restrict profiteering and mitigate price extremes, especially of basic food stuffs. Very common were regulations aimed at preventing regular price formation mechanisms being thwarted or corrupted: prohibitions on actions such as intercepting goods on their way to the market (a form of collusion between buyer and seller), or buying with the intention to resell at a higher price, can be found in many parts of medieval Europe (DAVIS 2018). Other rules focused on stabilizing market prices throughout the day or week. In the towns and cities of 14th and 15th century England, local officials set prices for grain and fish when the market opened, perhaps after negotiations with the traders of these products. The price they arrived at was binding for the remainder of the day (BRITNELL 1996). Similarly, in Leiden and Delft (Holland) grain merchants were obliged to sell their grain during the week for the price it had fetched on the Saturday market (UNGER 1916, 59-60).

Over time, new arrangements developed that gave a wider berth to free price formation on the condition that this happened in public and in a controlled environment. A good example is provided by the sea fish auctions that emerged in the coastal towns and villages of medieval Holland and Flanders in the late Middle Ages. Regulations from 15th century Brielle – the fair of this small fishing town in Holland has already been mentioned – specify the procedures for the auctioning of her- ring, salted and packed in barrels at sea, in some detail. The auctioning system used was a descending

price auction: the price was lowered in steps until one of the bidders claimed the transaction by calling out 'mine!' Fishermen were expected to publicly auction at least half of the catch. All sales were registered, and selling at a lower price than the value determined at the auction was not allowed (DE JAGER 1901, 160-166). This suggests the interests of fishermen and shipowners prevailed over those of their customers. In contrast, in England the auctioning of fish was seen as opposed to the goals of a public policy aimed at protecting consumers (BRITNELL 1996, 11).

Another aspect of the role of markets in reducing information costs was their contribution to quality control. For industrial products, especially in export industries, guilds were instrumental in reducing the considerable information asymmetry between producers and buyers in distant places by setting and maintaining quality standards, often in the shape of urban trademarks. These trademarks were enforced through inspections of workshops but also of the finished products offered for sale (PFISTER 2008, 26). The buyers of perishable foodstuffs and prepared food were usually locals, but they too were in need of reliable information on the products they bought. One point of concern was the possibility of fraud: there were many ways in which goods of inferior quality could be offered as first choice products to unsuspecting buyers. A second concern regarded foodstuffs that presented health risks, with fresh fish and meat as main suspects. Urban authorities tried to tackle such risks by setting rules, but that alone was insufficient: actual supervision and enforcement were needed. This, of course, was much easier to organize when trade was concentrated in one place. In late 14th and early 15th century Exeter, for instance, the meat trade was concentrated at a designated market place, the Fleshfold. Its two wardens, elected every year together with the other urban officials, supervised slaughtering and carried out inspections of butchers' shops and of the meat offered for sale. Offenses – and there appear to have been quite a few – were brought before the local court (KOWALESKI 1995, 188).

Weighing and measuring

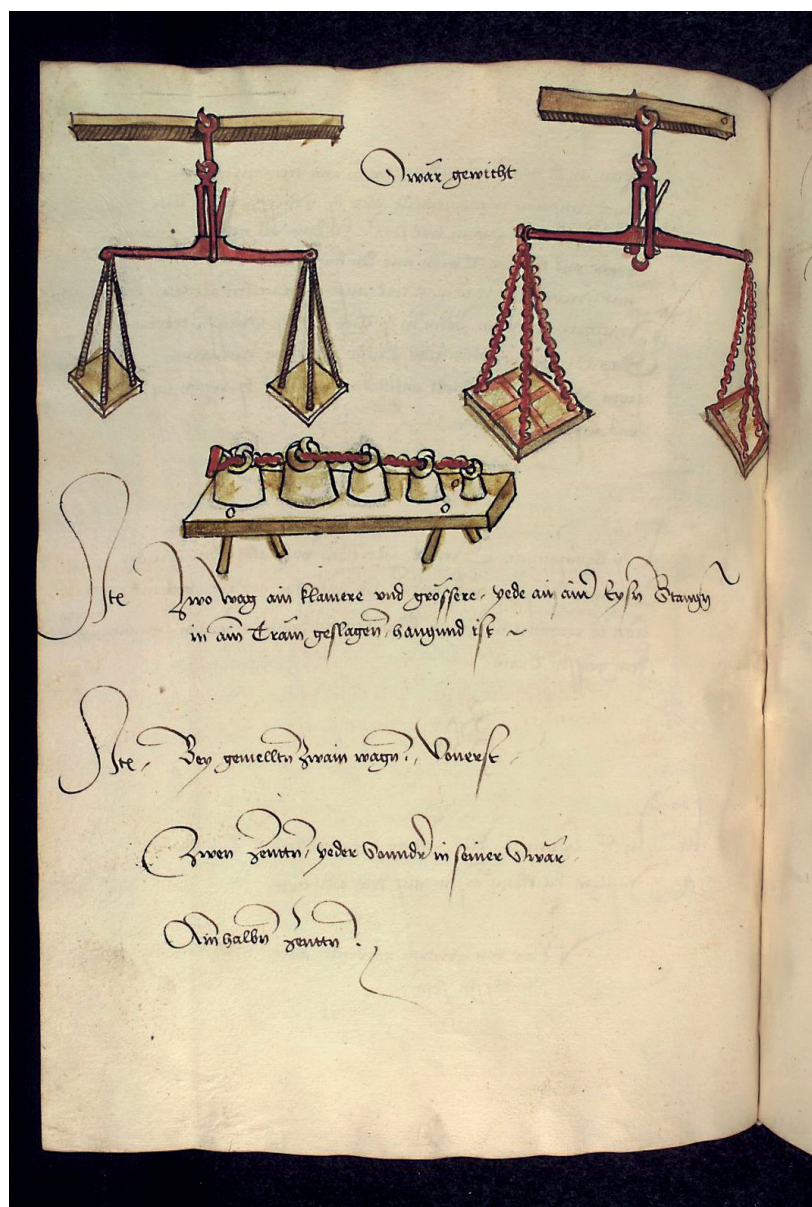
Perhaps the most conspicuous element of medieval trade regulation was the control exerted over weighing and measuring. Dependable systems of weighing and measuring ensured reliable information on quantities sold and purchased and were thus able to create trust between buyers and sellers. It is hardly surprising, then, that various aspects of metrological control stand out in the medieval sources. It should be added that regulation of weights and measures was not exclusively linked to formal markets: standards, once set, applied everywhere, at least theoretically. For the daily operation of markets, however, metrological control was of great importance.



Just as the right to establish fairs and markets, the right to set and enforce weights and measures was considered to be a royal prerogative. Again, however, the ability of sovereigns to actually exert this right depended to a significant extent on power. In the early Middle Ages both the Carolingian rulers on the continent and their Anglo-Saxon counterparts in England had promulgated laws prescribing the use of uniform, well-defined weights in their lands, but in both cases it is unlikely these laws were generally observed (KULA 1986, 161-163; BRITNELL 1993, 25). Sources from the 11th and 12th centuries suggest that by then local customary measures were commonly used: grain purchases made in Norwich and Abingdon by officials of the king of England in the late 12th century, for instance, were expressed in the local measures of these towns instead of in the national measures (BRITNELL 1993, 25).

In most parts of Europe renewed attempts to install central control and harmonize weights and measures only took place in the 15th and 16th centuries, and even then their success was limited (KULA 1986, 116-117). Common, however, was the voluntary adoption of the weights and measures used in important commercial centers (DIJKMAN 2011, 218-219). In the late medieval towns of Brabant, for instance, weights based on the Cologne mark, and later also the mark of Troy (or Paris), were widely used (VAN DER WEE 1963, 72-74) and in Holland

▲ Fig. 3. *The sale of mutton, late 14th century* (*Tacuinum sanitatis*, Bibliotheca Casanatense Ms. 4182, f. 138).



▲ Fig. 4. Balances and weights, Germany, 1485 (*Zeughausinventar von Landshut* (U. Besznitzer), Heidelberg University Library, *Cod. Pal. germ.* 130, p. 057v - CC-BY-SA 3.0).

many towns adopted the grain measures of either Delft or Amsterdam, both important grain trade centers, for the wholesale trade in grain (DIJKMAN 2011, 213). Only in Angevin England national standards for weights and measures were introduced from the early 13th century onward, bearing testimony to the early rise of a strong central state. Yet even here the introduction was a complicated and time-consuming process, taking the better part of two centuries. Moreover, even in England uniformity remained incomplete, as is demonstrated by the fact that in Exeter and in Winchester grain bushels were in use that were significantly larger than the statutory bushel (BEVERIDGE 1928, 526; 1965, 12-17).

Whether weights and measures were set locally or nationally, their enforcement was to a significant extent a local responsibility. Even in England royal officials shared this task with lords or boroughs (DAVIS 2012, 193). As standard weights and measures

applied everywhere, their enforcement, too, was not restricted to the formal market – even though, as will be shown, the local marketplace does appear to have acted as a focal point. Enforcement relied on a combination of mechanisms. The first step was the availability of reliable prototypes. In England, from the late 13th century onward standard weights and measures marked with the king's seal were distributed over the country to serve as benchmarks (DAVIS 2012, 191-193). On the continent, providing prototypes was the responsibility of the local authorities. In Antwerp, the city had copper weights fabricated in 1400-1401, probably to replace the stone weights used previously. In 1441 a specimen of the urban grain measure was displayed in public in front of town hall: not coincidentally also the location of the city's main marketplace (VAN DER WEE 1963, 67).

The next stage was the regular inspection of all weights and measures used by traders. Weights and measures that conformed to the standards were marked as such by stamping or sealing them; the ones that were found lacking were confiscated and destroyed. In Dordrecht (Holland) the first reference to such an inspection dates from the late 13th century (DIJKMAN 2011, 227). English sources explain the proceedings in more detail. The local courts of 14th and 15th century Clare and Newmarket, two small market towns in Suffolk, frequently discussed cases related to the use of false or unsealed weights or measures. The owners were usually fined only modestly, although serious offenses received a less lenient treatment (DAVIS 2012, 331-334).

Even if weights and measures themselves were in good order, more was needed to ensure the reliability of the information on quantities bought and sold. In several cases additional instructions were given regarding the procedures of weighing and measuring. In Amsterdam, for instance, urban ordinances of the early 15th century provide detailed instructions on the measuring of salt. The salt measure had to be placed firmly on a horizontal surface, once it was filled it had to be leveled with a strickle (the straightness of which had to be checked on a daily basis), and subsequently it had to be emptied by turning it upside down carefully and completely (BREEN 1902, 19-20; DIJKMAN 2011, 201, 225). Weighing techniques also required special attention. The use of the *auncel*, a one-legged weighing instrument comparable to the Roman *statera*, was frowned upon as it could easily be tampered with. In England the *auncel* was officially banned in the middle of the 14th century, although some traders apparently continued to use it for small goods even in the 15th century (DAVIS 2012, 195, 334).

This takes us to the next step in the series of efforts made to guarantee the reliability of weighing and measuring: the introduction of public facilities and officials. Public balances were gradually installed in towns everywhere in northwestern Europe, usually on or near the marketplace. In England, this



was reinforced by national legislation: from 1429 onwards a public balance was compulsory for all towns, boroughs and cities (DAVIS 2012, 192). On the continent the initiative lay with the local authorities, but they do not appear to have been negligent or backward in this respect: in Holland, at least, even small towns such as Monnickendam and IJsselstein had a public balance by the end of the fourteenth or the beginning of the 15th century (VAN MIERIS 1753, 390; FRUIN 1892, 38-40).

In continental towns and cities, balances were usually operated by urban officials. Many towns also employed sworn officials for measuring, at least for important sectors of wholesale trade. The measuring of salt in 15th century Amsterdam, mentioned earlier, was done by sworn measurers, as was the measuring of grain. The Amsterdam measurers were united in a guild that participated in the responsibility of maintaining and verifying standards (DIJKMAN 2011, 228). In English towns, urban weighers and measurers are not as much in evidence, possibly because of the greater role of royal officials, certainly in port towns (ZUPKO 1977, 59-64). Urban measurers for corn and salt did operate in early 14th century London, however; around that time the city moreover acquired the right to appoint the officials handling the king's balances (ZUPKO 1977, 62-63; BARRON 2004, 39).

As with security, the advantages of formal markets regarding metrological control faded over time as general mechanisms for the supervision of weights and measures took shape. The market, however, did serve as focal point: at the marketplace prototypes were displayed and facilities such as a public balance were established.

Conclusions

Between the eleventh and the 15th century, northwestern Europe witnessed the emergence of an increasingly dense network of formal markets: places that formed supervised, controlled environments for exchange of commodities. By no means all trade was conducted through these formal markets: expressed in volumes or monetary value, exchange in others settings must have been at least as important. Nevertheless formal markets fulfilled an important role in the process of commercialization that characterized medieval northwestern Europe. They not only lowered the costs of finding interested buyers or sellers, but also helped to reduce transaction costs in two other ways.

Firstly, formal markets, exactly because they were public, supervised places, reduced security costs by offering protection to the person and property of

▲ Fig. 5. *Auncel being used for weighing wool*, 1547 (*Der furnembsten, notwendigsten, den ganzen Architectur* (Walther Hermann Ryff), *Sächsische Landesbibliothek, Staats- und Universitätsbibliothek Dresden, Optica.31, f. 333r. Deutsche Fotothek record ID 88960212*).

all who did business there. This is especially clear in the case of fairs; however, the special legal status of fairs became less important as towards the end of the Middle Ages alternative mechanisms for contract enforcement and the adjudication of foreign traders developed.

Secondly, formal markets, again based on their character as controlled environments for exchange, lowered information costs by providing arrangements for the control of prices, product quality, and weights and measures. While for quality and price control the formal market appears to have retained its central position, it partly lost that role for metrological control. Partly, since important elements such as the display of prototypes and the location of the public balance remained connected to the marketplace. It was what medieval buyers and sellers expected: markets were, after all, supposed to be controlled places of exchange, supervised by the authorities in the interest of the general public.

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Address of the author

Jessica Dijkman
Utrecht University, Department of History and
Art History
Drift 6
3512 BS UTRECHT
The Netherlands

j.dijkman@uu.nl

Finding the marketplaces in prehispanic Mesoamerica: A review

by STEPHEN A. KOWALEWSKI

Archaeology, Maya, Oaxaca, market exchange, ancient economy

Mesoamerica was an urbanized world by 300 BC. Marketplaces were central to its social life, as attested by 16th century native and Spanish documentary evidence and well-developed archaeological methods for studying market systems. In comparison to preindustrial China, Europe, and the Mediterranean, Mesoamerican marketplaces were closely spaced and at least as numerous. Most marketplaces were located at well-connected nodes in cities and towns, usually proximate to political and religious buildings. Mesoamerica had regional and inter-regional systems of markets. Border marketplaces operated in special circumstances. Specialized production of common and luxury goods is well documented and was typically carried out at the household scale. The scholarly consensus today is that Mesoamerica had a large-scale commercial, if not market, economy, in the absence of coinage.

Archaeological evidence on specific marketplaces exists, but these cases are limited in number and restricted in the kinds of different evidence brought to bear. More could be learned from specifically designed archaeological studies. There remain unresolved issues regarding commercial exchange outside the marketplace, such as in shops or by ambulatory vendors. Apart from goods markets, we know little about factor markets, that is institutionalized trade in labor, land, and capital, or whether production factors could be readily exchanged or converted. Research in Mesoamerica might push forward on several outstanding problems, among others the social and material nature of transactions, standardized measures of volume (weights were not used), problems of money, liquidity, debt, and accumulation, and the origins of market exchange.

Marktplätze im vorspanischen Mittelamerika: ein Überblick

Archäologie, Maya, Oaxaca, Markthandel, frühe Ökonomie

Ab ca. 300 v. Chr. kann man Mittelamerika als eine urbanisierte Welt bezeichnen. Ein zentraler Teil des sozialen Lebens fand auf Marktplätzen statt, die seit dem 16. Jahrhundert durch einheimische und spanische Dokumente sowie durch eine fortgeschrittene archäologische Methodik nachgewiesen wurden. Im Vergleich zum vorindustriellen China, Europa und dem mediterranen Raum waren die mittelamerikanischen Marktplätze nahe beieinanderliegend und mindestens genauso zahlreich wie in den genannten Regionen. Die meisten Marktplätze befanden sich an gut angebundenen Knotenpunkten in Städten und Kleinstädten, in der Regel nahe bei politischen und religiösen Gebäuden. In Mittelamerika gab es regionale und überregionale Marktsysteme. Marktplätze an Grenzsituationen funktionierten unter besonderen Bedingungen. Spezialisierte Produktion von Alltags- und Luxus-Gütern ist gut dokumentiert und wurde üblicherweise in Haushalten organisiert. Nach der communis opinio hatte Mittelamerika eine großräumige kommerzielle Ökonomie, wenn nicht gar eine Marktwirtschaft, allerdings ohne Verwendung von Münzgeld.

Archäologische Evidenz zu spezifischen Marktplätzen existiert, aber diese Beispiele sind in ihrer Anzahl und in der Art der spezifischen Belege begrenzt. Einen Wissensgewinn würden präzise auf diese Problematik ausgerichtete archäologische Forschungsprojekte erbringen. Bislang gibt es ungeklärte Fragen zum kommerziellen Austausch jenseits von Marktplätzen, wie etwa in Geschäften oder durch umherziehende Verkäufer. Neben den Gütermärkten wissen wir wenig zu Faktormärkten, d. h. institutionalisiertem Handel von Arbeitskraft, Land und Kapital, also ob Produktionsfaktoren leicht getauscht und umgewandelt werden konnten. Es wäre wünschenswert, wenn die Forschung zum frühen Mittelamerika sich einigen ungeklärten Problemen zuwenden könnte, darunter etwa der Frage nach der sozialen und materiellen Art der Transaktionen, der Standardisierung von Volumen (Gewichte sind nicht verwendet worden), den Problemen der Geldverwendung, der Liquidität, der Schulden und der Thesaurierung sowie schließlich der Frage nach dem Ursprung des Handels auf Marktplätzen.

This chapter describes new findings regarding marketplaces and market exchange in prehispanic Mesoamerica. Advances in the study of the ancient Mesoamerican economy have been made recently by ethnohistorians, archaeologists, epigraphers, art historians, linguists, and economic anthropologists. The geographical scope of this chapter is non-Aztec Mesoamerica, and the temporal span is 300 BC to AD 1600.

Recent research on ancient economies, including the chapters in this book, provides an opportunity to broaden the range of human experience we use to theorize economic institutions. The perspectives afforded by this wider sample of societies permits a better understanding of present-day economic institutions as one historically manifest cultural system in an arc of possibilities. Current economic practice is no more natural, singularly right, or universally true, in the same sense that classical music is not the highest or most perfect musical form. Well-documented economic behavior in other societies should challenge us to come up with more broadly applicable concepts and to build more general theory.

One should read this chapter in tandem with Kenneth Hirth's contribution, as we have divided the coverage of Mesoamerica between the Aztec world (his chapter) and other places in Mesoamerica for which there has been substantial recent work, chiefly Oaxaca, the Maya area, and Veracruz. Throughout its history Mesoamerica was a single social and economic system, in spite of differences between its cultural/geographical regions and unevenness in the availability of information, much as the ancient Mediterranean or early modern Europe were large-scale social systems with cultural differences and some places better known to history than others.

Mesoamerica extends from Nayarit on the Pacific coast of Mexico to western El Salvador, a distance of 1900 km, which for comparison is about the distance from Marseilles to the Bosphorus, or from the head of the Persian Gulf to Ankara. It became an urbanized social system during the Late and Terminal Formative period, roughly 300 BC-AD 300. This is when cities of several tens of thousands of inhabitants were established in multiple places. By Classic times (AD 300-900) urbanization was the norm, and some regions, especially the Maya lowlands, were at their demographic maxima. The Early Postclassic (AD 900-1200) saw collapse and reorganization in many regions, including central Mexico (what later became the core of the Aztec development), Oaxaca, Veracruz, and the Maya lowlands. Most regions grew again in the Late Postclassic (AD 1200-1521), many to all-time high levels. For the Classic and Postclassic, the largest cities had a hundred or two hundred thousand inhabitants, but most had populations in the 10,000-80,000 range.

In the Classic and Late Postclassic Mesoamerica's total population was several tens of millions. Politically it was divided among several hundred territo-

rially small, but demographically dense states. This was city-state culture comparable to Greek *polei* and early modern city-states in Europe (HANSEN 2000; KOWALEWSKI 2019a), yet its people spoke more than a hundred languages from six different major language families.

The history of research on markets in Mesoamerica shares trends in scholarly approaches with those of the Old World. Some of the explorers who reported the "lost cities" of the ancient Maya (*c.* 1900) had the mental template of the Greek agora and they applied that name to ruins they thought looked like the Classical agora (or at Chichén Itzá, *mercado*) as they did with the term acropolis (BECKER 2015). Agora fell out of favor, acropolis is still in use.

Archaeological and ethnohistoric studies were dominated for decades by a substantivist theory of absolute political rule and economic redistribution. In the 1970s RATHJE took a contrarian, mercantilist tack (*e. g.* 1972), which Freidel and other Maya archaeologists such as Masson were to follow, as discussed below (I should say that I also studied with Rathje). More attention to market exchange came with processual archaeologists, for example in a book edited by HIRTH (1984). Recent volumes by TOWELL/ATOLLINI LECÓN (2009) and GARRATY/STARK (2010) provide a sampling from many regions of Mesoamerica using ethnohistory and archaeology, respectively. Today it is generally accepted that marketplaces were ubiquitous and commercial exchange predominated, although some studies do emphasize gifting, patron-client relationships, and political-ritual embeddedness (WELLS/DAVIS-SALAZAR 2007; MCANANY 2013).

A distinctive aspect of market studies in Mesoamerica has been the persistence of its peasant market systems from prehispanic times to the present, despite the Conquest and the demographic disaster of the early Colonial period. Ethnographic studies of 20th century market systems have influenced archaeological methods and interpretations (*e. g.*, WEST 1948; MALINOWSKI/DE LA FUENTE 1957; BEALS 1973; 1975; SMITH 1976).

Another emphasis in research on prehispanic market systems has been on measuring market exchange by analyzing household consumption patterns. An early example of this was by FRY (1979), who used quantitative analysis of pottery in domestic contexts at the Classic Maya city of Tikal to argue that the wide distribution of vessels was best explained by an economy in which specialists produced for marketplaces and consumers obtained their pots from marketplaces. For more on the contexts, methods, and results of what Hirth has called the "distributional" approach, see STARK/GARRATY (2010); STARK/OSSA (2010), and Hirth's chapter in this volume. Further, using household inventories OSSA (2013) has proposed a method for distinguishing the goods obtained from market exchange from those obtained through other social networks, such as gifting.

Definition

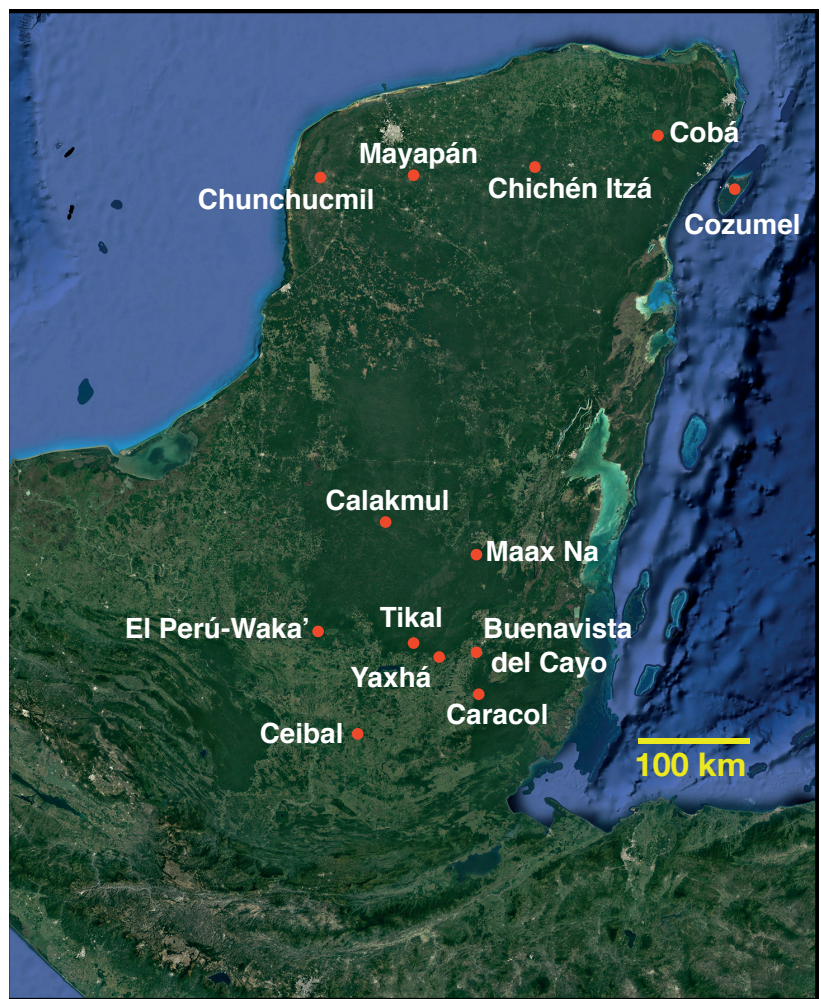
The operational definition is that marketplaces are large, open, easily accessed, public space for buyers and sellers of a wide variety of goods. These are goods markets. We assume from abundant and varied ethnohistoric and archaeological studies that marketplaces existed in all the city-state capitals and in many subordinate towns and cities at least since the Classic period AD 300.

For highland Oaxaca, the Mixtec word for marketplace is *yahui* (cost, price) (TERRACIANO 2001), in Zapotec *li'iya* (NELLIS/GOODNER DE NELLIS 1983), and in Chocholteco (ngiwa) it is *ndaadē* (JIMÉNEZ GARCÍA 2004). Using the above definition and other evidence, studies have tentatively identified scores of marketplaces. Their density in prehispanic times would have been on the order of 1 per 40 km² or one per 2000-4000 persons (APPEL 1986; PLUCKHAHN/KOWALEWSKI 2003; HEREDIA ESPINOZA/CHAMBLEE 2013). Distributional studies show that ordinary households produced for and consumed by means of market exchange (FEINMAN/NICHOLAS 2010). Analyses of pottery from towns and villages may suggest that wealth, consumer choices, and product differentiation varied by market access or place in the regional market systems (KOWALEWSKI 2003; HEREDIA ESPINOZA 2007).

Maya marketplaces have received a flurry of attention in the last decade. The terms for market and marketplace in Tzeltal Maya are *chiuich*, and *chihuichighibal* (TOKOVININE/BELIAEV 2013), perhaps **kaaybal* **k'iwik* in proto Maya (SPEAL 2014). Considerable information on the economy is found in the basic 16th-century Spanish chronicles of Bishop Landa (TOZZER 1941) and Fray Bartolomé DE LAS CASAS (1958, esp. 353). KEPECS (2015) gives an overview and context for the ethnohistorical sources. Local archives offer additional, often untapped information. It should be noted that by the 1540s the Maya economy had already been severely disrupted.

SHAW (2012), MASSON/FREIDEL (2013), and KING (2015) review archaeological methods used in identifying marketplaces and market exchange in the Maya area. Marketplaces were present in all the leading cities and probably the larger towns in Classic and Postclassic times. Densities of marketplaces still cannot be reliably estimated (but see Caracol, below).

Distributional studies consistently are in line with expectations of market exchange for goods consumed in commoner households. For example, MASSON/FREIDEL (2012; see also MASSON *et al.* 2016) compare Classic Tikal and Postclassic Mayapán (Fig. 1). Both of these sites have large bodies of excavated data for a range of artifactual materials. At the Classic-period city of Chunchucmil, HUTSON *et al.* (2010) showed that obsidian was generally distributed among the inhabitants instead of being restricted to political elites. All

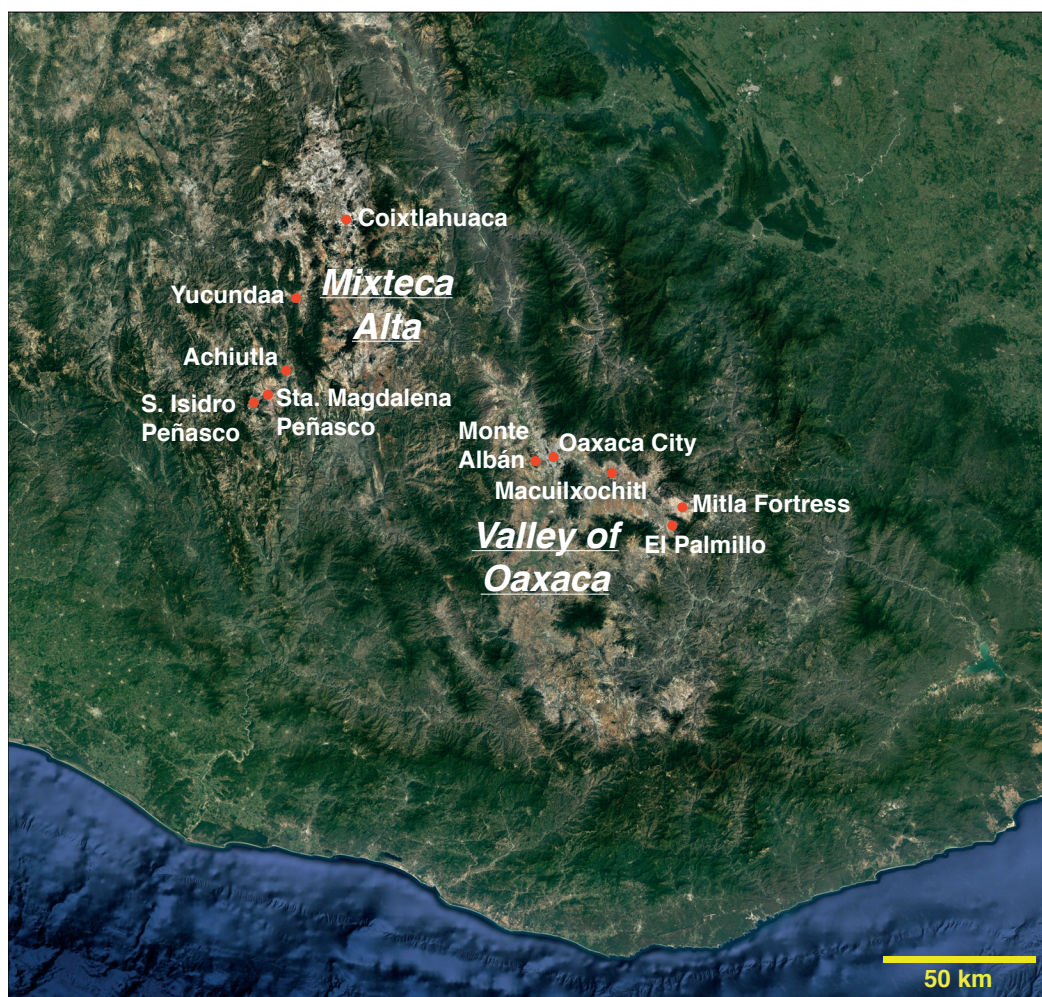


three of these large cities have plazas identified as markets. At El Perú-Waka', a smaller town west of Tikal, a marketplace identification is uncertain (there are three candidates), but the ceramic distributions suggest market exchange and the investigators make a strong theoretical argument for a market economy, concluding that "...the varied, decentralized, networked economy mirrored the varied, decentralized, networked political system..." (EPPICH/FREIDEL 2015, 222).

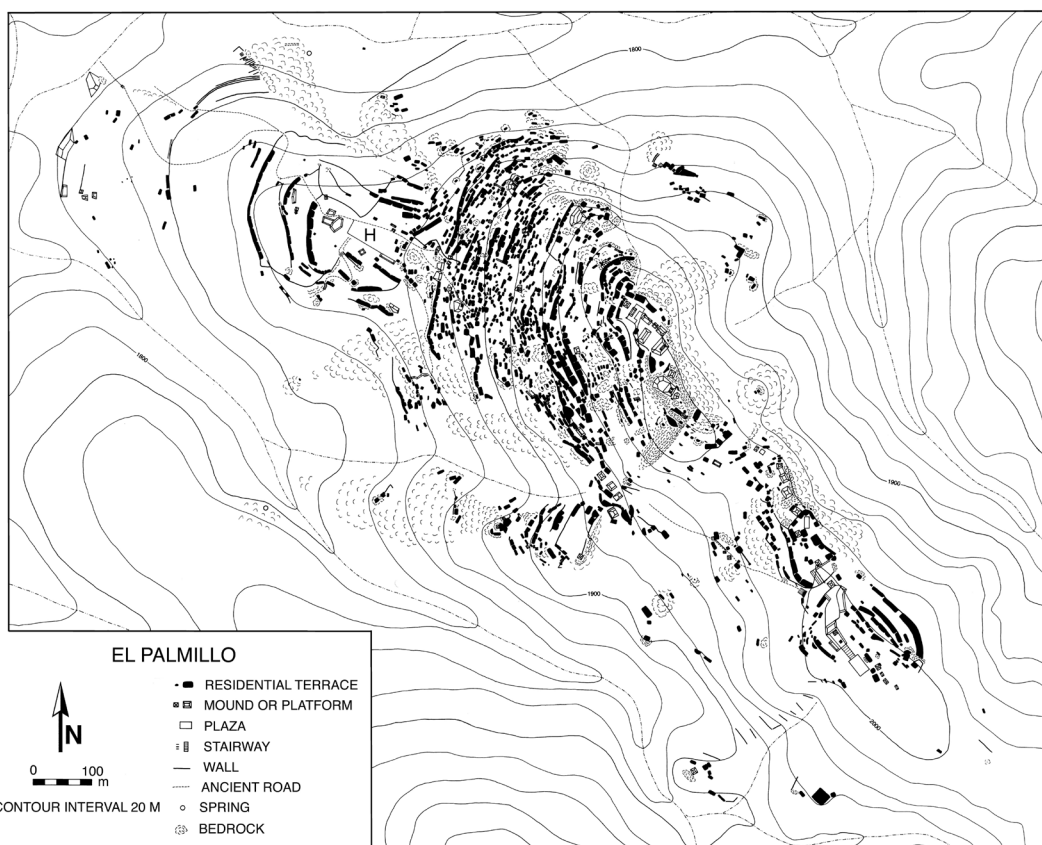
▲ Fig. 1. The Maya area, showing the locations of places mentioned in the text (background image: Google Earth).

Location

In highland Oaxaca market plazas were sometimes located within the city but near its edge, as at Monte Albán (BLANTON 1978), El Palmillo (FEINMAN/NICHOLAS 2004), the Mitla Fortress town (FEINMAN/NICHOLAS 2004), and probably Coixtlahuaca (KOWALEWSKI *et al.* 2011) (Fig. 2). These places are connected to the rest of the city by roads and would have allowed access to buyers and sellers coming from other places (Fig. 3-4). In many smaller cities and towns marketplaces were near the center of the settlement (PLUCKHAHN/KOWALEWSKI 2003; KOWALEWSKI *et al.* 2009), for example at the Postclassic Pueblo Viejo of San Isidro Peñasco (Fig. 5).



► Fig. 2. Highland Oaxaca, showing the locations of places mentioned in the text (Background image: Google Earth).



► Fig. 3. The probable marketplace (marked as Plaza H) at the Classic-period city of El Palmillo, Oaxaca (FEINMAN/NICHOLAS 2004; courtesy of G. Feinman and L. Nicholas). The plaza is easily accessed by roads and the area just above it has ample evidence of specialized craft production.

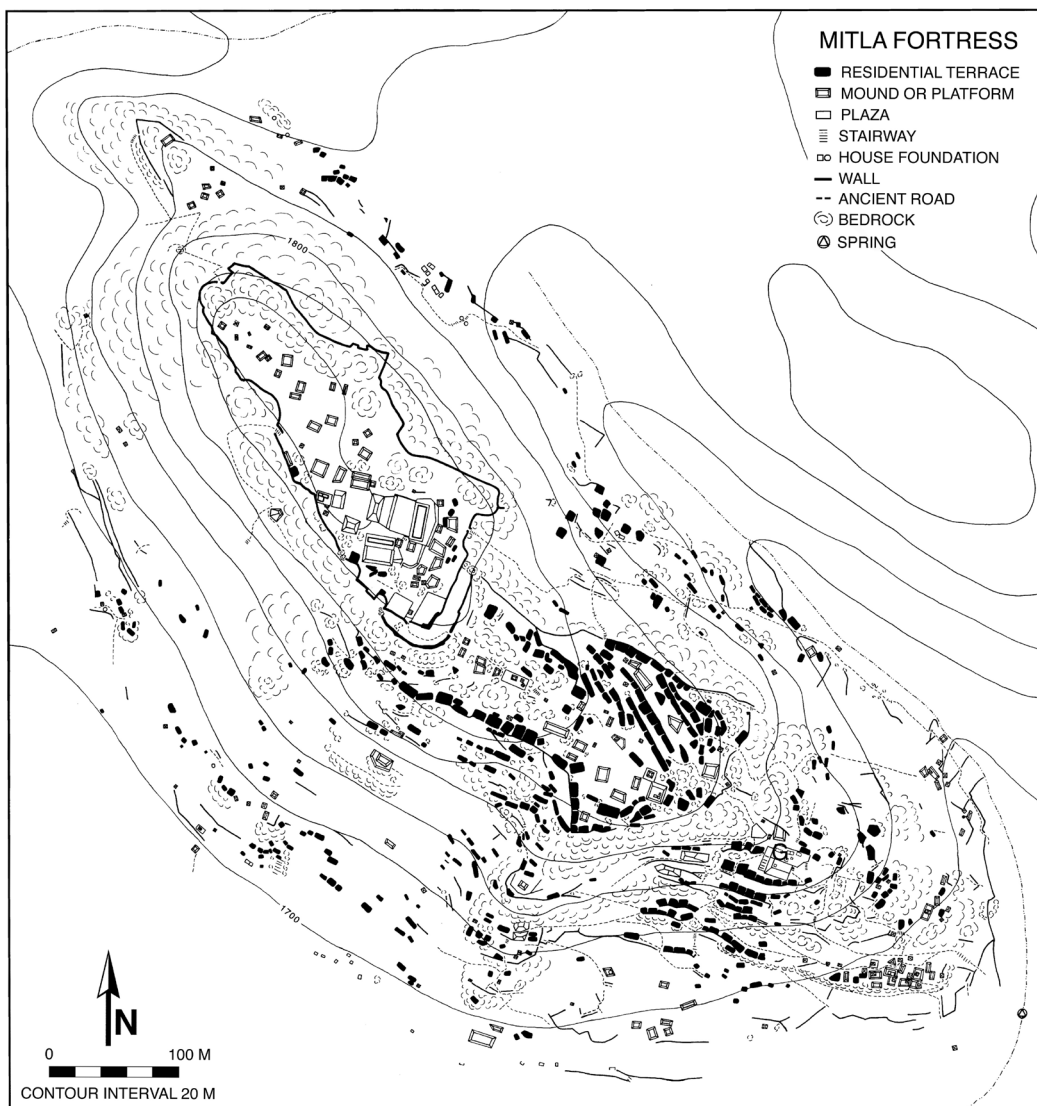
A border market phenomenon has been described for a few places in the mountainous Mixteca Alta, where in the historic period markets would be held on neutral ground at the edges of polities, on routes or passes, perhaps because of hostilities between communities (POHL *et al.* 1997).

Access seems to have been an important criterion, in terms of the local physical situation and the regional pattern. There is little evidence that long-distance routes determined market location. APPEL (1986) found that Valley of Oaxaca market placement conformed more to the Christallerian k-3 rural-retail model rather than the k-4 transport or k-7 administrative models. Even in the mountainous Mixteca Alta there is evidence that city and market placement was “contagious,” meaning that proximity to other market centers (rather than dispersal) was a factor (HEREDIA/CHAMBLEE 2013; KOWALEWSKI 2016).

In highland Oaxaca the mid-20th century market plazas at district centers measured about 0.3 ha and tertiary villages had market plazas as small as 0.03 ha (Fig. 6). The Oaxaca City metropolitan

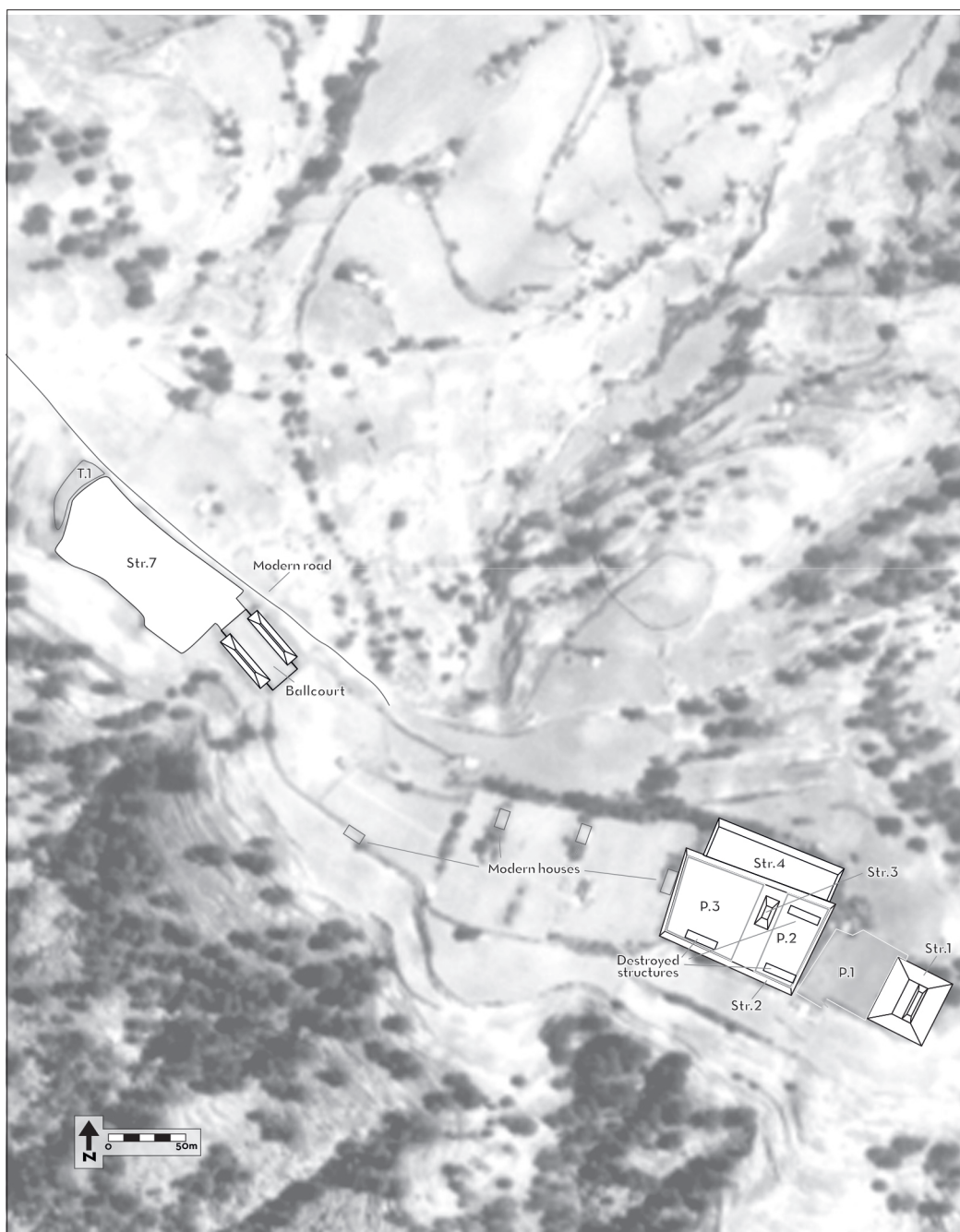
area, now with a population over 600,000, has a central market extending over 24 ha, much of which is covered, plus 2 dozen neighborhood markets, most occupying 0.5-2.0 ha. The sizes of archaeologically identified market plazas vary with the population size of the settlement. Local markets range between 0.03-0.60 ha with a median 0.1 ha. Urban market plazas usually measure 0.7-1.0 ha or larger. However, the sample may be biased toward upland situations in which the prehistoric plaza is still visible, as opposed to valley floor situations where plowing or alluviation has obscured the plaza (PLUCKHAHN/KOWALEWSKI 2003).

The known market plazas in the Maya area are located near the centers of cities and towns, sometimes adjacent but physically separate from royal court complexes, for example Chunchucmil (HUTSON 2017) and Mayapán (Fig. 7) (MASSON/FREIDEL 2013). Major markets are at the intersection of formal roads or causeways (*sacbeob*). Smaller markets may be located at the outer termini of causeways radiating from a city center, as has been proposed for the large city of Caracol (Fig. 8) (CHASE



◀ Fig. 4. The most likely marketplace (marked as Plaza G) at the town of the Mitla Fortress, Oaxaca (FEINMAN/NICHOLAS 2004; courtesy of G. Feinman and L. Nicholas). The plaza is accessed by four roads. It measures 476 m², slightly larger than the Ayutla ethnographic case shown in Fig. 6.

► Fig. 5. The civil-ritual center of the Pueblo Viejo, San Isidro Peñasco, Oaxaca, a Late Postclassic city-state capital (KOWALEWSKI *et al.* 2009). The public architecture is situated on the crest of a ridge and the residences were located on terraces on the slopes. The market plaza may have been the flat platform designated Structure 7, adjacent to the ballcourt.



▼ Fig. 6. Market day (Sunday) in Ayutla, district capital in the Mixe region in Oaxaca, in 1980. This is the same plaza and market building described by Ralph Beals, who did an ethnographic study here in 1933 (BEALS 1973, fig. 7). The plaza, simply a widened main street, measures about 0.3 ha. Note the fashion in dress: straw hats for the men and rebozos (shawls) for the women, both items made in Oaxaca. The languages used here are Mixe and Spanish.



et al. 2015). General access for buyers and sellers was apparently important. Major markets served urban and adjacent rural areas and were nodes in long-distance trade. The current understanding is that inland marketplaces were not placed along prior trade routes. However, older and recent studies have shown that “ports of trade” (BERDAN 1978), or simply ports, were key nodes for regional and long-distance trade, probably along all of Mesoamerica’s coasts (*e. g.* DEMEREST *et al.* 2014; SIERA SOSA *et al.* 2014; GUERNSEY 2016).

Soil chemistry has been used to investigate activities in proposed markets in the Maya area. Such studies could distinguish plazas that were mainly for ritual from those where marketing took place. Studies of soils from known activity areas in re-

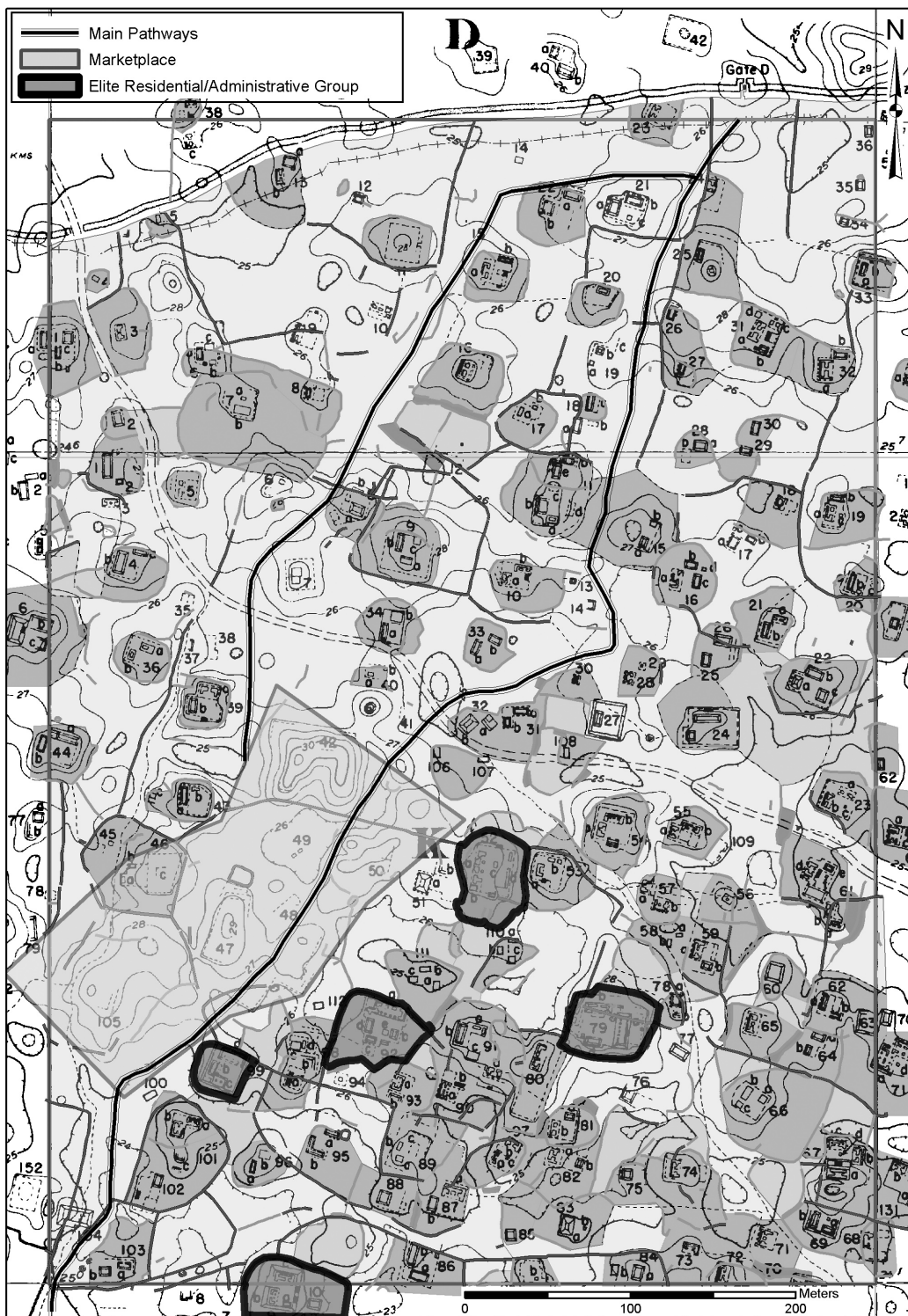
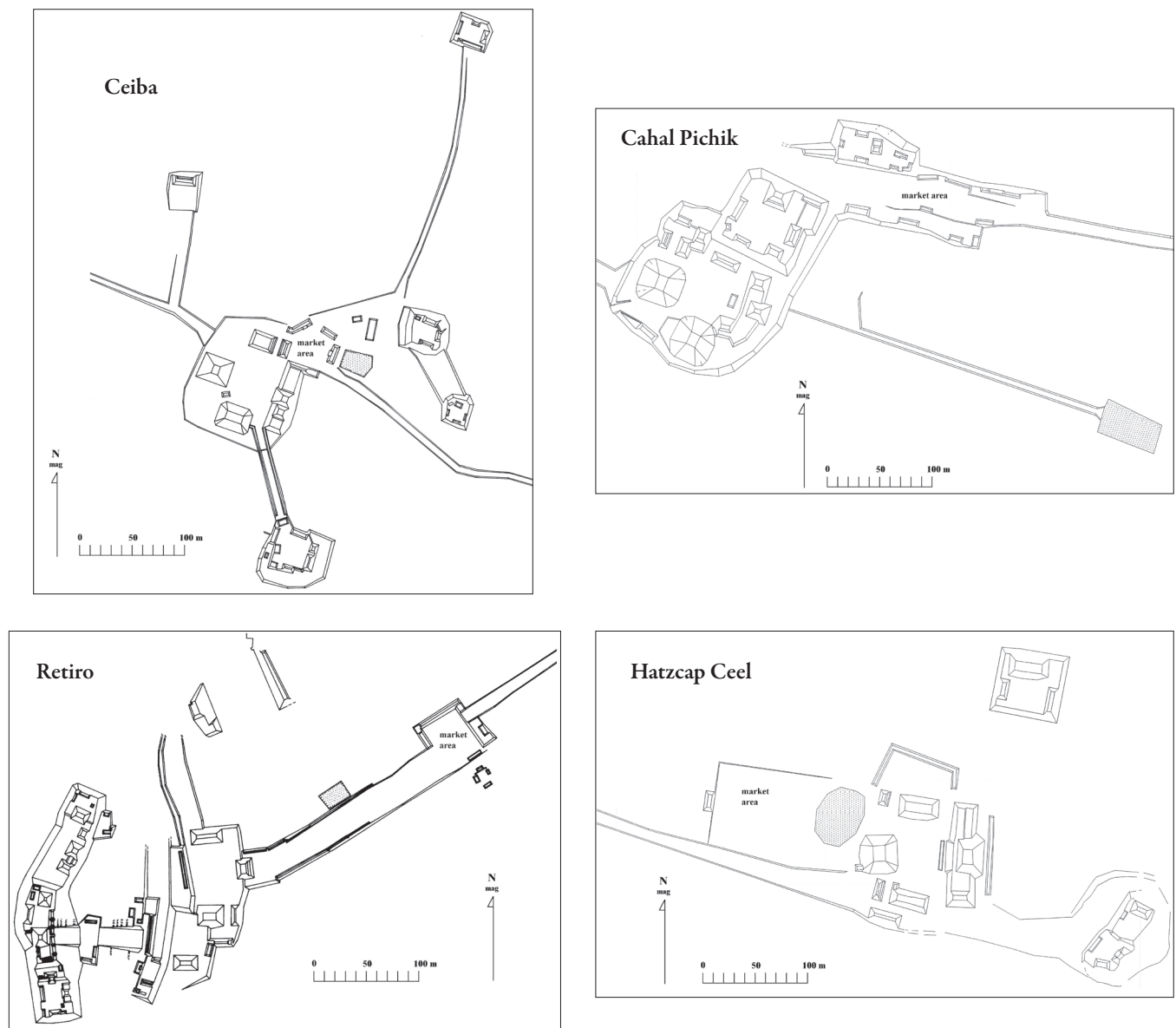


Fig. 7. The probable market plaza at the Late Post-classic city of Mayapán, Yucatán (MASSON/FRIEDEL 2013, MASSON *et al.* 2016; map by T. S. Hare; courtesy of M. Masson. The market was located in a residential area a half kilometer away from the civil-ritual center of the city and it was serviced by major roads.

cent peasant markets provide initial expectations. Results with some degree of promise are reported from Cobá, Chunchucmil, Buenavista del Cayo, Maax Na, and a half-dozen other sites (DAHLIN *et al.* 2010; CAP 2015; CORONEL *et al.* 2015; SHAW/KING 2015; TERRY *et al.* 2015). Differential amounts of F, Zn, and P are suggested to indicate places where food was handled, and micro-debitage suggests final stage lithic reduction. Fuller batteries of tests and more attention to comparative samples are warranted.

Maya market plazas range in size from 0.3 to 3.0 ha (DAHLIN *et al.* 2010). Main markets of major cities such as Tikal and Mayapán fall at the larger end of this distribution. Secondary markets and the minor markets of smaller cities and towns were smaller, as for example Maax Na (SHAW/KING 2015). Plaza size generally varies with settlement population size in Mesoamerica, whether the plaza was designed primarily as a market or whether it was multipurpose (OSSA *et al.* 2017).



▲ Fig. 8. Four examples of secondary marketplaces, some with stalls, at termini or nodes of causeways in the immediate hinterland of Caracol (CHASE/CHASE 2015; 2017; CHASE 2016; courtesy of A. Chase). Caracol is a well-documented example of a Classic-period system of secondary markets connected to a major urban capital by a radial network of roads.

How many people could occupy a plaza at one time? For a study in which the problem was the number of people that could watch the ballgame, STARK/STONER (2017) used two packing densities, 0.5 and 2.0 persons per m^2 . With those densities plazas could accommodate thousands or tens of thousands of people. One might say that market activity requires free circulation and space to display merchandise, and thus these densities are too high. But markets around the world today can become very congested on a prime market day (Fig. 6).

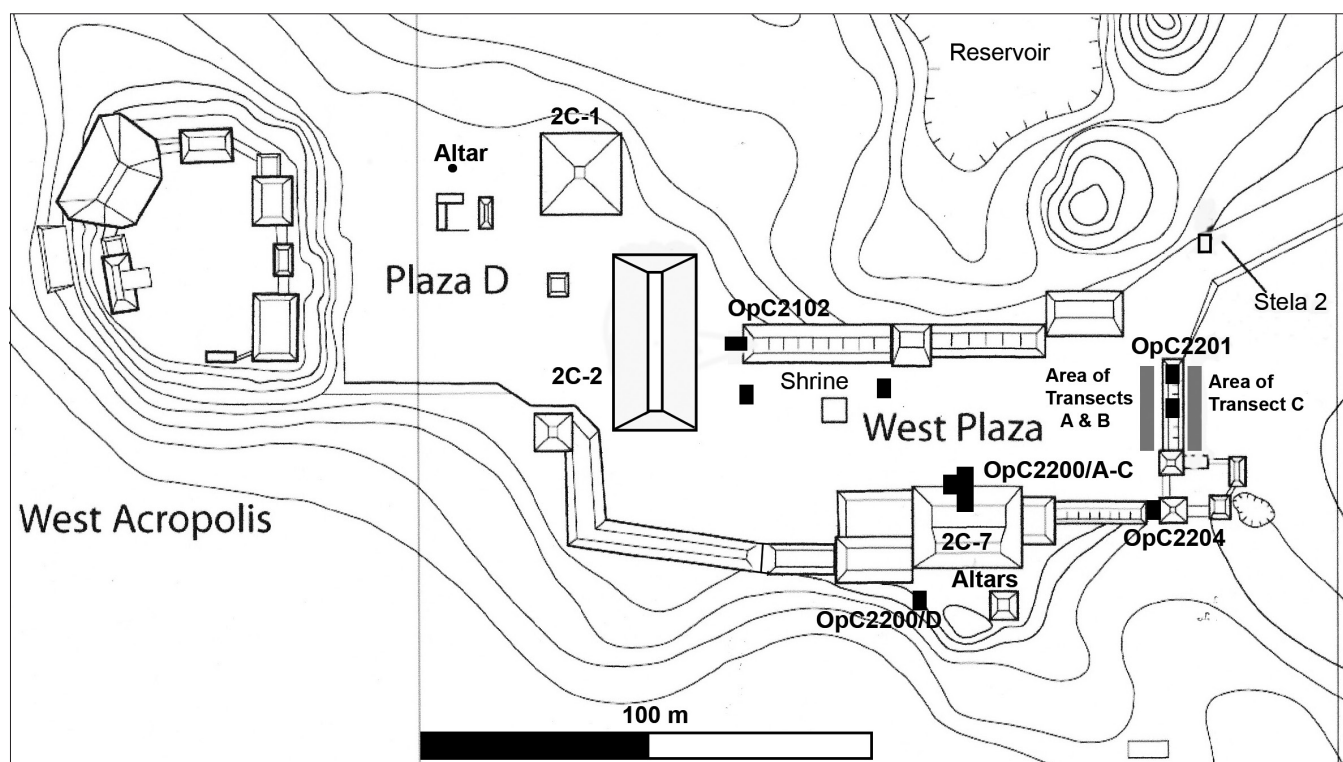
Structures and built features

In Oaxaca no market-associated buildings have been identified. Marketplace plazas are more open and accessible than the spaces enclosed by administrative-ritual structures. Market plazas typically have one or several relatively small buildings (elevated on platforms) that may have been temples,

but that is uncertain. For examples see Macuilxochitl (KOWALEWSKI *et al.* 1989, 1086-1087, plazas associated with Structures 13, 59), El Gallo subdivision of Monte Albán (BLANTON 1978, app. VII, N8E4, Terraces 120 and 139), and San Isidro Peñasco (Fig. 5) (KOWALEWSKI *et al.* 2009, 239-243, st. 7).

Craft working may have taken place not on but adjacent to market plazas. Ground stone, local chipped stone, obsidian, and ceramic manufacturing debris has been observed next to the market plazas at Monte Albán, the Mitla Fortress, Macuilxochitl, El Palmillo, and other sites. However, crafting was not limited to market vicinities. There has been no reported excavation of workshop areas adjacent to market plazas – these are known only from surface survey.

It is in the Maya area that we have the best evidence for structures associated with markets. Structures that may have been stalls for vendors have been observed at nine Classic-period sites (MASON/FREIDEL 2013).



Tikal's main market was situated on the East Plaza at the juncture of two major causeways (JONES 1996, 2015). At the market area's center is a quadrangle formed by low range structures divided into rooms smaller and unlike any palace room or domestic space. There are more range structures in the open area formed by the quadrangle, and several long ones outside, facing the plaza. There is a ballcourt and several temples nearby. Jones's excavations show that these facilities had a long history.

Chunchucmil was a large city in Yucatán. Here investigators identified as a market plaza a 1.5 ha area at the intersection of several roads, near but not part of the main administrative precinct. The plaza was originally leveled in the Late Preclassic. In this space are rows of low rock alignments interpreted as the foundations for stalls. Extrapolating from the better-preserved features the investigators thought there may have been as many as 590 stalls (DAHLIN *et al.* 2007; HUTSON 2017).

The smaller town Maax Na also has architecture interpreted as space to display goods (SHAW/KING 2015). There were about 25 of these rooms measuring 3 by 2.5 m, all facing the plaza (Fig. 9).

At Caracol similar features were found along causeways (Fig. 8). The interior of one excavated structure had three low benches or steps, each 1 m deep, making the room awkward for habitation but good for display (CHASE *et al.* 2015).

The cases just mentioned are Classic in date. Mayapán is Late Postclassic, and it too had a large market plaza with low building that may be stalls or shops (MASSON/FREIDEL 2013).

As BECKER (2015) notes, there is open space used for markets and there are built markets. Clearly the Maya had built markets: architectural elements including paved plaza, street access, and specially constructed shops or stalls of uniformly small size. Marketplace architecture and perhaps markets as institutions transcended the particular city-state. JONES (1996, 86) pointed out that structures similar to Tikal's East Plaza market can be seen at Ceibal and Yaxhá.

A ballcourt and several temples are typically found near the large, urban markets, but ballcourts are not integrated into the market's architectural space. Whether temples were normally part of the market institution is not clear – at Calakmul there may have been a temple within the market area (CARRASCO VARGAS *et al.* 2009), but at Tikal the likely temples are extramural but adjacent (JONES 1996).

The exchanged goods

The working assumption (until proven otherwise) is that if Mesoamericans used something, they could get it in the market. Raw and cooked food (STALLER/CARRASCO 2010), fuel, fiber, dyes, pigments, medicines, tools, salt, containers – all the things that people in urban and rural settings made and used – would have been available. Much of this is attested in 16th century ethnohistoric sources and there is often direct or indirect archaeological evidence for many of these items. Some were world-system goods in common use: cotton cloth, cacao, obsidian, and perhaps semi-precious stones,

▲ Fig. 9. Excavations, chemical testing, artifacts, and architectural mapping indicate that the West Plaza at Maax Na was a marketplace (SHAW/KING 2015; drawing by L. Shaw, C. King, and E. King, courtesy of E. King).

salt, and cochineal dye. Luxury goods including colored feathers, rubber, high-end cotton and rabbit-fur textiles, and copper were also available in markets in some places. Where particular goods were sold has not yet been investigated systematically in Oaxaca or the Maya area.

Most goods were made by specialists. This statement can be usefully applied not just to luxuries but to food and other agricultural products as well, because of the wide breadth of the Mesoamerican diet and because agricultural products, including maize, were highly differentiated. Specialized production was organized at the household level. Excavations often have evidence for several different crafts being carried out in the same household.

Several classes of goods are known to have moved great distances – on the order of 1000 km – from their place of production to the point of consumption. These include obsidian, stylistically distinctive pottery, marine shell, jade, turquoise, and metals. Other lowland products such as raw cotton, cacao, rubber, and quetzal feathers were regularly transported to the highlands. Mesoamerica-wide market exchange of obsidian can be traced from quarrying (*e. g.* HEALAN 1997) through long-distance trade networks (GOLITKO/FEINMAN 2015) to end users (*e. g.* MASSON *et al.* 2016).

The actors involved

Market participation was universal and not limited by class or gender. Ethnohistoric and linguistic sources indicate that there were producer-sellers, professional sellers, and merchants who operated between marketplaces. Our concepts of actors are heavily influenced by our knowledge of peasant market behavior in Mexico and Guatemala today.

A description closer to real life would be that given by the participants themselves, and we have just a small slice of that in Classic-period murals from Calakmul (CARRASCO VARGAS *et al.* 2009; TOKOVININE/BELIAEV 2013; GARCÍA BARRIOS 2017). These brightly colored paintings were done on the exterior surfaces of a building conspicuously located in the center of the main marketplace. This placement is unusual because most of the known murals are on the interior walls of restricted access houses, tombs, or palaces. The subject matter is different, too. There are more women than in other murals, plus men, children, and elderly. Dress is not as sumptuous as in the royal court murals but neither is it meager or without style, color, and variation. Sellers, usually women, are prominently shown with their wares and potential buyers, with text captions that read “atole (maize drink) person,” “*tamale* person,” “maize grain person,” “salt person,” tobacco person,” and “clay vessel person.” Using the concept of *cosmopolitanism* HALPERIN (2017) links the art in figurines, murals, marketplaces, travel, to everyday women’s practice in culinary and clothing style.

Control and organisation

Ethnohistoric information on market regulation is limited and spotty. Rulers may have had the capacity to establish marketplaces, provide judges, and tax. Almost nothing is known about the organizations of vendors and merchants or the relationship between market people and vendors outside the marketplace (*e. g.* KING/SHAW 2015). Many market plazas were situated near rulers’ palaces but were architecturally and spatially separate facilities. But others were situated near the edge of the settlement and removed by a kilometer or more from the rulers’ seat of power. Archaeological evidence of markers or specifically delineated marketplace boundaries is sparse. Market plazas in Oaxaca may easily have served as gathering places for many other activities, integrative or conflictive. But since among the Maya there were some specifically designed marketplaces and structures that appear to be shops or stalls, in the future it may be possible to find facilities for oversight, management, or adjudication.

The exchange processes and a short excursion into goods monies

As we extend back time from the recent market systems to the archival information of the 16th century and farther into the prehispanic epoch, our knowledge of Mesoamerican market exchange becomes much more obscure and indistinct. Surviving texts written prior to the 16th century do not contain ledgers, accounts, transactions, fiscal records, disputes, or descriptions of credit, debt, or finance.

It is generally accepted that Mesoamerica used goods monies, including but not limited to standard textiles, greenstone beads, shells, cacao beans, salt, textiles, thin copper axes, and tubes of gold dust. Bone counting-sticks and shell tokens might be added to this list (FREIDEL *et al.* 2017). We also have native language terms for buying, selling, credit, and debt (TOKOVININE/BELIAEV 2013; SPEAL 2014). Many archaeologists agree that this was a large-scale commercial economy in which households produced for the market and consumed from it. Market exchanges were not barter, which is fraught with uncertainty, inconvenience, and even hostility (see GRAEBER 2011 for a critique the myth of barter), but regularized exchange with a high volume of transactions and well-understood prices. EPPICH/FREIDEL (2015, 195) asked, “How hard would it have been to buy an ear of corn at Tikal?” Probably not hard at all for a Tikal inhabitant – we are the ones who do not know how.

Mesoamericans did not have weight standards. They counted things, tied them up into bundles of standard count, and counted the bundles. The items, or samples of them, had to have been available for public inspection to assure quality according to convention. BARON (2018) has proposed that

cotton thread standardization in Classic times was associated with using cotton textiles as currency.

Value has currency, as currency has value. Local understandings of value do not require standard measure, as in the idiosyncratic Palauan stone money *rai* described by FITZPATRICK (2018), where each stone had its well-known social history. But with wider market integration the material object's public ledger is more difficult for all participants to see and assess. How do people expand the sphere of common agreement or trust about the value of things? The problem for market expansion takes place at the edges of conventional understandings, where the value of a good is not yet known. At the margin of the market the price has not yet been determined (by supply and demand), in part because information is incomplete.

There are several solutions to this problem of public agreement. These are non-exclusive – society can have multiple currencies. One is fiat money – the state designates a currency and claims sole authority over it. That did not happen in Mesoamerica, as far as we know. A second solution is “folk” tokens that are international, that is, they are currency that transcends polity boundaries (*e. g.* California shell money – BETTINGER 2015; GAMBLE 2018). An empirical problem for Mesoamerican archaeologists is that the candidates proposed for money of this kind (votive copper axes, greenstone beads, shell) may not have circulated widely enough or in sufficient volume to be useful in most transactions.

A third solution to the problem of how to expand the convention of value to a wider public would be to use as media of exchange and standard of value goods that are not rare at all, but common, universally understood, and already in wide circulation. This might apply to cacao, salt, textiles, and potentially many other things, including maize. Unlike tokens, coins, and crypto-currencies, common goods monies retain their use value. The object's value in terms of labor and other inputs would be comprehensible.

Do we know other instances in which common goods monies actually have worked? Yes, but not at the scale of urbanized Mesoamerica. A hundred years ago in the Trobriand Islands, MALINOWSKI (1935; 1961) saw the institution called *gimwale*, which was trade in common commodities without the use of money. This was a society with considerable village specialization in marine, agricultural, and craft manufacture. Trobrianders kept *gimwale* separate from the exchange of storied *kula* valuables. *Gimwale* trade was in common goods – yams, fish, bundles of betel nut, 12 coconuts for a basket or a lime pot. Buyers and sellers did not have to be kin or trading partners, they could be socially anonymous, as in market exchange, and it was regular exchange, where the prices were expressed in goods equivalences. But the Trobriand case is an order of magnitude smaller than Mesoamerica in demographic scale and urbanization.



I think that in the Trobriands and Mesoamerica prices were set along the supply-demand curve as the aggregate of calculations made by deal-seeking individuals who had good information. Trobrianders and Mesoamericans assessed the quality of common goods with their experience and their senses (Fig. 10). Inspection and count were sufficient – neither Trobrianders nor Mesoamericans used weights to facilitate their transactions.

One might ask whether common goods monies could ever be an incentive for people to increase their production. Why should I grow more agave if all I get for it is maize? To answer, maize for agave might be a pretty good incentive, depending on the demand, which the actors know very well. But further, with specialization and product differentiation there is plenty of reason for people to work hard, specialize more, sometimes innovate, or trade in hopes of getting equivalent value plus a little something extra. MALINOWSKI (1935) saw that the people in the Trobriands were always busy either in the yam gardens or in the village making things for exchange. The underlying assumption is simply that people wish to consume (KOWALEWSKI 2012).

Marketplaces and places of worship

Buildings that archaeologists call temples are commonly found adjacent to marketplaces. For example, at Monte Albán, the hypothesized marketplace on Terrace 938 has two platforms with small top areas facing each other and a probable *adoratorio* or altar between them (BLANTON 1978, app. VII,N5E8). Other structures near proposed marketplaces in Oaxaca are ambiguous and require excavation to determine function (*e. g.* TCH-MAC-1 at Macuilxochitl, KOWALEWSKI *et al.* 1989; SMP-4 at Santa Magdalena Peñasco, KOWALEWSKI *et al.* 2009).

▲ Fig. 10. Potential buyers inspecting piles of dried fish, shrimp, and chiles in the market at Miahuatlán, where Monday is market day, in 1995. This market serves its own district and is also a transit point for trade between the highlands and the coast. In the photograph there are three different sellers, each offering similar products displayed in the same way. Zapotec and Spanish are used here.

At Tikal, Structures 5D-43 and 5E-38 situated adjacent to the main market, have the familiar form of two-room temples (JONES 1996). At Chunchucmil a small structure that may be a shrine is located just across the *sacbe* (road) from the main market (HUTSON 2017, 257).

Temples or shrines thus are often but not always associated with marketplaces. Yet most temples and the largest are located elsewhere, either in close association with rulers' precincts or else set apart on their own plazas. I think that compared to political institutions, markets in Mesoamerica look rather secular.

A personage often glossed as "God L," sometimes with black body paint, smoking a cigar, and carrying a cargo of goods on a tumpline, is considered the patron deity of merchants (TOKOVININE/BELIAEV 2013). In the Late Postclassic on the island of Cozumel there was a shrine to the female deity Ix Chel that attracted pilgrims and merchants (SABLOFF/RATHJE 1975).

In Oaxaca and elsewhere the earliest Christian churches in the 16th century were often built on or adjacent to plazas that had been marketplaces, for example at Achiutla (KOWALEWSKI *et al.* 2009), and Yucundaa (STIVER WALSH 2014).

Regularity and duration

Pre-conquest markets were on a five-day cycle. Spanish authorities decreed their seven-day cycle but were resisted (TERRACIANO 2001, 248-249). Recent peasant market systems are regionally integrated with a staggered seven-day cycle. Urban markets are every day but activity peaks on the designated day (*e. g.* BEALS 1975).

Historic and economic setting

Market exchange and regular places for it probably originated in the Formative period when the settlement pattern of head town and satellite villages was established. Market exchange and specific marketplaces have been proposed for Oaxaca in the Late Formative when urbanization and specialization increased dramatically (FEINMAN *et al.* 1984). A corresponding development may have occurred in the Maya area at about the same time (SHAW/KING 2015).

Economic growth and inter-regional market integration took place during times of demographic increase, generally Late Preclassic, Classic, and Late Postclassic. Likewise weak economic performance is linked to times of poor market integration between localities and regions and population decline, especially in the Early Postclassic (FEINMAN/NICHOLAS 2010; KOWALEWSKI 2012; 2016; GOLITKO/FEINMAN 2015).

Apart from markets, Mesoamerican states had a major role in shaping the economy. The main in-

fluences were revenue by taxes and tribute, security for the movement of traders, warfare that disrupted trade, royal houses or courts as economic actors, expenditures for construction and public ritual, and regulation of market institutions.

Mesoamericans early on had a religious calendar with twenty-day months, each having rituals, festivals, and sometimes pilgrimages. These were occasions of considerable expenditure and consumption financed by states, communities, and families. The ritual cycle was thus an important institution that stimulated the economy, and it involved both market and non-market mechanisms.

Archaeological identification

In sum, Mesoamerican market exchange is inferred archaeologically from a wide variety of distributional studies. But relatively little is known about how transactions and finance worked. Marketplaces are identified archaeologically in Mesoamerica using the following criteria, listed from more commonly used and reliable to less frequently applied and less understood:

- plaza, a flat, open, space greater than 300 m² in extent
- on one or more local roads
- artifacts from final production stages of some crafts
- stalls or shops, *i. e.* rows of small non-domestic structures
- micro-remains and residues
- standard marketplace architecture, regularities in nearby structures
- characteristic middens?
- geophysical prospection anomalies?
- shops outside the marketplace?
- measures, tokens, and monies?

Significance

Weights help establish value and thus facilitate transactions – but not everywhere. Prehispanic Mesoamerica was as densely populated, urbanized, and market-dependent as the societies in the Old World that had used weights for a long time. The per-capita volume of exchange was probably not dissimilar (we do not know about the volume of goods in the largest transactions, which may not have been as sizeable in the New World). Economic specialization was well developed in both. One difference is that at times in the last two or three millennia some societies Europe and Asia allowed for considerable capital accumulation, more so than in Mesoamerica (KOWALEWSKI 2019b). Old and New World marketplaces resemble each other in all sorts of material ways, including numbers, size, placement, relationship to states and re-

ligious institutions, *etc.* Yet in spite of these broad similarities, weights and balances never entered the Mesoamerican market until after the Spanish conquest.

In Mesoamerica buyers and sellers established value by inspecting quality. Trust was not placed in physical standards kept in the palace or the temple. Buyers and sellers were not kin and in many cases probably did not know each other apart from the occasions they bought and sold. We assume they had ways of maintaining sufficient trust and keeping transaction costs down, although we do not know much about such institutions. The currency, locally and inter-regionally, rested on understandings of trust and value in the goods themselves instead of a more abstract representation in token, coin, or weight.

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Address of the author

Stephen A. Kowalewski
Department of Anthropology
Baldwin Hall 250
University of Georgia
Athens, GA 30602
USA
skowalew@uga.edu

Aztec markets and their archaeological signatures

by KENNETH HIRTH

Aztec marketplaces, market systems, Aztec economy, pre-Columbian economy, distributional approach

The Aztec markets of Central Mexico compare favorably in both size and complexity to some of the largest marketplaces of the ancient world. This paper explores three important themes. First it describes the size, organization, and operation of Aztec period markets and market systems as they are described from the first hand descriptions of Spanish conquistadors and Early Colonial writers in Mexico during the early 16th century. This is followed by a discussion of the conditions that favored the development of marketplaces as a central feature of the pre-Columbian economy. Goods in Central Mexico were largely transported by human porters and the high cost of transportation actually appears to have been a factor that favored the development of marketplaces rather than restricting them. Finally the paper discusses four approaches that researchers have used to identify the presence of marketplaces in archaeological contexts. While all approaches are useful the most productive for wider cross-cultural application is a Distributional Approach that examines the effects that provisioning through the marketplace has on the material assemblages of the consumers who use it.

Aztekische Märkte und ihr archäologischer Nachweis

Aztekische Marktplätze, Marktsystem, aztekische Wirtschaft, vorkolumbianische Wirtschaft, distributional approach

Die aztekischen Märkte Zentralmexikos lassen sich gut in ihrer Größe und Komplexität mit einigen der größten Marktplätze der Alten Welt vergleichen. In dem vorliegenden Beitrag werden drei wichtige Themen untersucht. Zunächst werden die Größe, die Organisation und der Betrieb von aztekischen periodischen Märkten und Marktsystemen beschrieben, so wie sie in den ersten Handschriften der spanischen Konquistadoren und der Autoren der frühen Kolonialzeit während des frühen 16. Jahrhunderts erscheinen. Darauf folgt eine Diskussion der Bedingungen, welche die Entwicklung von Marktplätzen als ein zentraler Bestandteil der vorkolumbianischen Wirtschaft förderten. In Zentralmexiko wurden Güter vornehmlich durch menschliche Träger transportiert und die hohen Transportkosten scheinen tatsächlich ein Faktor gewesen zu sein, der die Entstehung von Marktplätzen eher begünstigte als sie einschränkte. Schließlich werden in dem Beitrag vier Ansätze diskutiert, die verwendet werden, um die Präsenz von Marktplätzen in der archäologischen Überlieferung zu identifizieren. Während alle Ansätze brauchbar sind, ist für eine kulturvergleichende Betrachtung der sogenannte Distributional Approach derjenige, der den meisten Nutzen bringt. Dabei werden die Effekte untersucht, welche die Versorgung durch Marktplätze für die materiellen Fundkontexte der Konsumenten nach sich zieht.

If there was one aspect of Mesoamerican society that significantly impressed the Spanish Conquistadors in 1521 AD it was the size and organization of the marketplaces that they encountered in the Basin of Mexico where Mexico City is located today. This was the heartland of the Aztec empire and the location of the Aztec capital of Tenochtitlan. The Spanish were impressed by Mesoamerican marketplaces because they were larger than any they were familiar with across continental Europe. Aztec marketplaces were some of the largest found in the New World, and while size matters, the principles of operation were the same for all marketplaces across Mesoamerica (e.g. see KOWALEWSKI, this volume). They were places where individuals bought and sold goods using both barter and commodity money.

The marketplace was the center of the Aztec's strong commercial economy (BERDAN 1982; EARLE/SMITH 2011; SMITH 2012; HIRTH 2016). What makes the Mesoamerican marketplace a fascinating feature of the ancient economy is that it flourished within a society with one of the most restrictive transportation systems in the ancient world. Most goods across the Mexican highlands were transported within and between regions on the backs of human porters (Fig. 1). Some goods were transported long distances by canoe along the Atlantic and Pacific coasts and the rivers that drained their coastal plains. But few navigable rivers penetrated the highlands where the large highland civilizations of Teotihuacan, Monte Alban, Tula, Cho-

lula, and Aztec-Tenochtitlan were located. Comparative analysis suggests that the market systems of highland Mesoamerica were on par with, and perhaps more efficient than, the most developed market systems of the ancient world (HIRTH 2016). If fact, the marketplaces in Central Mexico did not develop *in spite* of its underdeveloped transportation system, but as a *response* to providing populations with access to resources in a transportation poor environment.

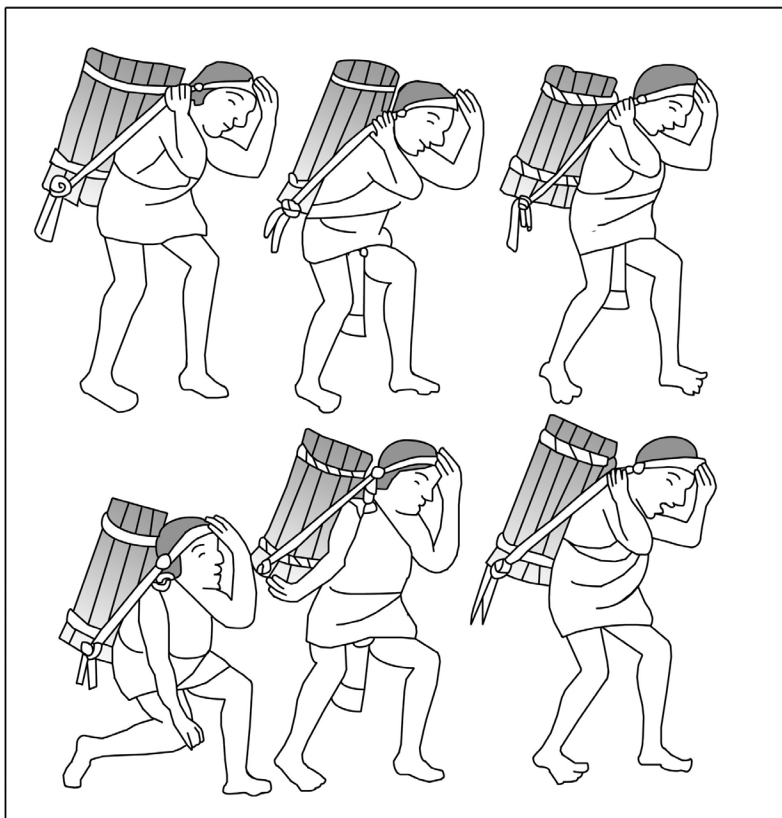
The marketplace was the central integrative feature of Mesoamerican society and appears to have a long history of development within this region. Marketplaces were a fundamental feature of urban centers in all the early Mesoamerican states. They were present at least as early as 500 BC, fully two millennia before the Spanish conquest (BLANTON *et al.* 1993, 28-30, 75). Nevertheless, the possibility exists that they originated earlier with central authority in chiefdom societies. Unlike Europe and other areas of the Old World, Mesoamerica did not use writing to record contracts and inventory goods, nor did they mint currencies or promote the formation of economic associations like craft guilds that might leave visible records or traces of economic activity. Instead, our understanding of precolumbian Mesoamerica markets relies on the ethnohistoric descriptions of Spanish Conquistadors who described them in the early 16th century and archaeological research that looks for indications of market behavior in the patterning of material culture.

This paper examines three topics. First, it describes the basic structure, size, and organization of Aztec markets as they existed at the moment of Spanish contact. Much of this information comes from the firsthand descriptions of Spanish chroniclers who saw them in operation. This is followed by a discussion of the conditions that favored market development in Mesoamerica and the functions they provided for the precolumbian societies where they were found. Essential here is understanding who used the marketplace and the principles on which it operated. Finally, the paper identifies four approaches commonly used by archaeologists to identify marketplaces in Mesoamerica. Important among these is the use of what I have called the Distributional Approach (HIRTH 1998), which identifies the effects that markets have on the material assemblages of the consumption contexts provisioned by them. This approach is broadly applicable to archaeological assemblages for any society where markets were an important feature of the past economy.

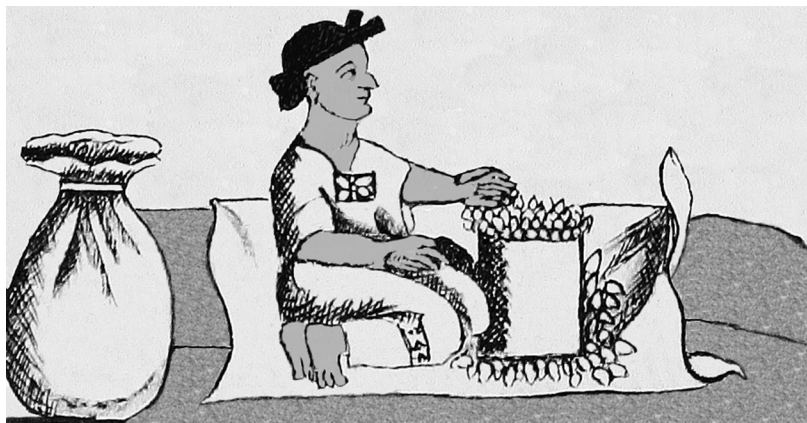
The structure of Aztec markets

The Spanish conquistadors were impressed by the size and complexity of the marketplaces in and around the Aztec capital. They were especially impressed with the marketplace at Tlatelolco which was located on the northwest side of the island

▼ Fig. 1. Human porters carrying loads with tumplines (illustration by K. Dennison and M. Vinciguerra redrawn from DE SAHAGÚN 2008, 1317).



► Fig. 3. Photograph of a *tlatamachihualoni* dry measure now referred to as an *almud*. The *almud* volume is one liter and measures 10 cm x 10 cm x 10 cm (the Photograph is used with the permission of the Museo de Artesanías, Tlaxcala, Mexico).



▲ Fig. 4. An indigenous woman selling maize in the marketplace by volume and dry measure (modified by the author from DE SAHAGÚN 2008, 1604).

ciple merchants were charged with overseeing the operation of the market. They ensured the use of honest measures and warriors patrolled the aisles to enforce policy and arrest law breakers. Judges were located in the marketplace to provide immediate rulings on wrongdoers and to demonstrate publicly what happens to those who broke the law.

A central concern of this volume is the role of weights and measures in market transactions. The answer to that question is simple: they were not used in Mesoamerica. The Spanish were struck by their absence in Aztec market transactions. Hernando Cortés is very clear on this when he says, “All is sold by number and measure, but up till now no weighting by balance has been observed” (CORTÉS 1962, 89). Items in Mesoamerican markets were sold by count, volume, and standardized size. Items like grain were sold by volume (FARRERAS 1972). The *tlatamachihualoni* (Fig. 3) was one such measure (DE MOLINA 1977), which after conquest was merged with, or renamed as, the *almud* of about 7.6 liters, which was the measure that the Spanish used and were familiar with. Fig. 4 shows a woman in indigenous dress selling maize by dry volume. The items that were sold by weight are post-contact Spanish imports sold by individuals illustrated in Spanish dress along with a scale (Fig. 5).

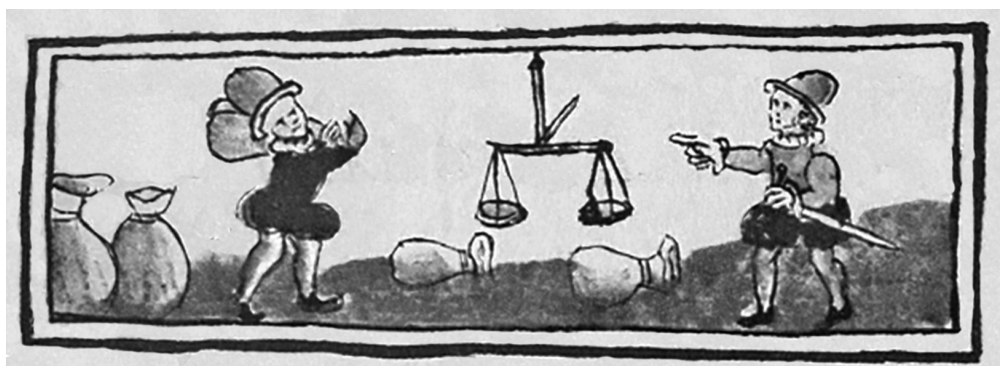
The conditions and principles of marketplace operation

Several conditions influenced the development of marketplaces and market systems across the highlands of Mesoamerica. The first was a highly dissected environment that placed areas of different elevations in close proximity to one another. Differences in elevation created a patchy environment of tropical ecozones across Mesoamerica with a rich array of different resources available for exploitation. Environmental mapping has shown that nearly every location across the central and southern Mexican highlands was within 30 km, or one day’s walk or less, from an environmental zone with a different array of resources (Fig. 6-7). This diversity fostered economic interaction. Resource procurement and small scale trade between households was possible even where resource transportation relied on human porters. Interregional and long distance trade was a feature of the Mesoamerican landscape with the inception of settled village life (FLANNERY 1968; PIRES-FERREIRA 1976; BOKSENBAUM *et al.* 1987; HIRTH *et al.* 2013; GARCÍA GÓMEZ 2018). It was this early mosaic of interaction that provided the framework for the development of marketplaces.

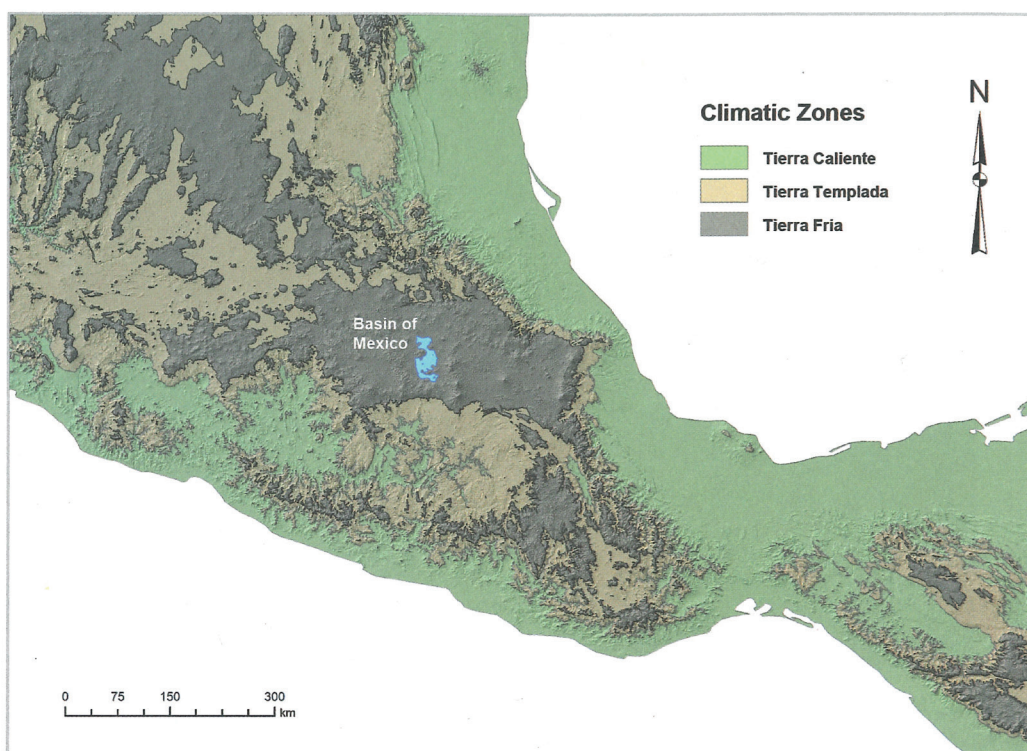
Without question Mesoamerica had the least developed transportation technology in the ancient world. Goods were moved by porters using a carrying frame and a tumpline strap that transferred the weight of the cargo onto the porter’s forehead (Fig. 1). This was an effective way to carry weight, but it limited the maximum load that a porter could carry to about 90-100 kg¹. While transportation technology is considered to be an important variable in *determining* the level of trade in the Old World (BRAUDEL 1973; MEIJER/VAN NIJF 1992; SILVER 1995; NORTH 1997), it was not an impediment to the development of marketplaces in Mesoamerica. The reason is that Mesoamerican marketplaces, like markets found in rural China and elsewhere, were structured to meet household consumption needs.

Consumer markets, as opposed to wholesale or speciality markets, have as their primary function the provisioning of commoner households with the goods that they require. They do that by bringing consumables together in a central location for exchange and sale. As such they often create a repository of resources that are mobilized from the fields, workshops, and/or storage facilities of the individuals offering them for sale. Marketplaces *minimized* the costs of resource procurement to households by centralizing distribution. Individuals could bring products to sell or barter to a central location and exchange them for an array of goods that they wanted or needed. Markets allowed households to manage their time budgets more efficiently by com-

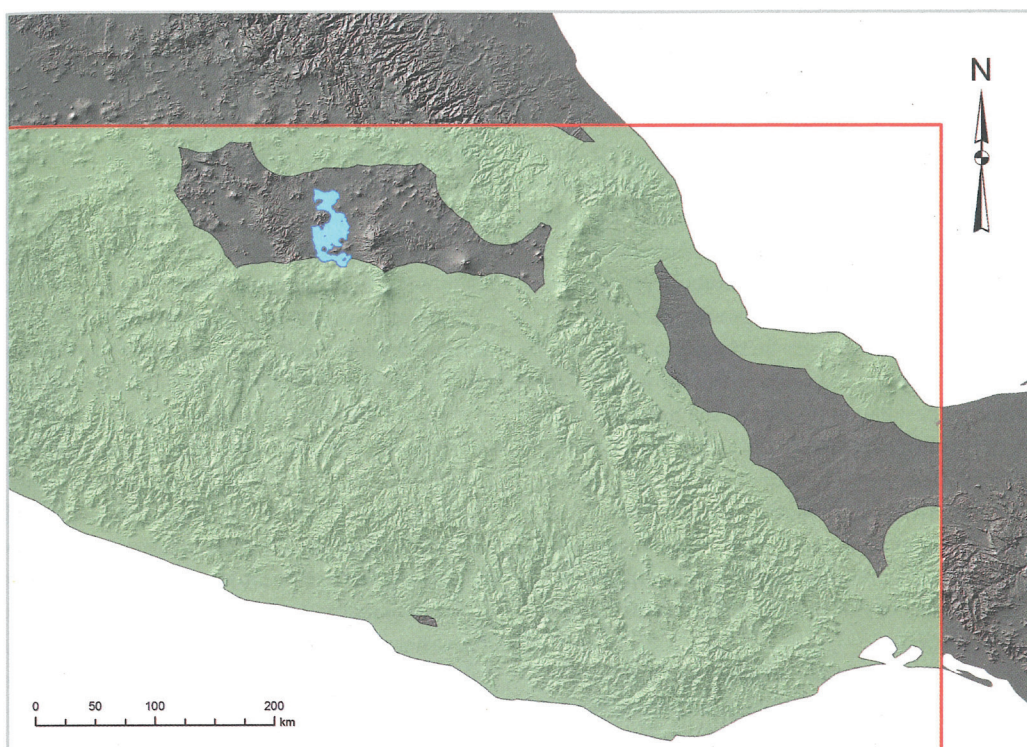
¹ The debate over weight of loads that Mesoamerican porters carried is discussed in HIRTH (2016, 239-241, tab. 8.1).



◀ Fig. 5. Selling wheat in the marketplace by weight using a scale. Notice that the buyers and sellers are depicted in Spanish rather than indigenous dress (modified by the author from DE SAHAGÚN 2008).



◀ Fig. 6. The primary climatic zones and resource zones of Mesoamerica: The Pacific and Gulf Coasts, Tierra Caliente 0-1000 msl, Tierra Templada 1000-2000 msl, Tierra Fria above 2000 msl (HIRTH 2013, fig. 4.9).



◀ Fig. 7. Areas of the Mexican highlands within 30 km of another climatic/resource zone (HIRTH 2013, fig. 4.10).

binning multiple provisioning needs in a single trip. It was this mono-focal aspect of the marketplace that Cortés was referring in the previously cited passage that all the goods sold in the land could be found in the marketplace. Costs of transporting goods for sale were absorbed by the seller, and the costs of procuring different items by consumers were minimized by being able to procure multiple items in a single trip to the marketplace.

Individual household-to-household trade was widely practiced throughout Mesoamerica prior to the emergence of marketplaces. The emergence of the marketplace increased the frequency and efficiency of exchanges and lowered overall transportation costs by centralizing them in a single location. The location of marketplaces at the intersection of key transportation routes, at break-bulk locations, or at the interface between different environmental zones or political systems resulted in the formation of border markets of various types (SMITH 1976; WALTHER 2009). In addition to being efficient locales for exchange, additional increases in efficiency were obtained when markets were spaced closer together, were held more frequently, or were convened in more locations across the landscape.

Mapping of Aztec period marketplaces in the Basin of Mexico and the adjacent areas of Morelos reveal that markets in large and small communities were spaced an average of 8-12 km apart (HIRTH 2016, 290). This provided households with easy access to marketplaces and the ability to visit them and return home within a single day. It also provided households with an increased opportunity to sell the goods they produced including a range of craft items that they produced at home. This helped to diversify subsistence activities within the domestic economy at the same time that it fostered the development of part-time craft production. One of the ways market coverage and accessibility was extended was to rotate the location of marketplaces on a regular timetable. This both increased the efficiency of household resource provisioning and enabled merchants to move goods for sale from marketplace to marketplace on a fixed schedule.

The marketplace was the place where resources were converted into alternative goods and storable wealth through a variety of means of exchange. This conversion function of the marketplace was important at multiple levels of society. Households could convert agricultural production or craft goods into a range of usable resources. Elite could convert the surplus food produced on their prebendal and hereditary estates into wealth goods and sumptuary consumables. The Aztec state did the same but in reverse. Tribute entering the Aztec state primarily as high value wealth goods was converted into food and other goods as needed for large scale festivals throughout the year. The result was that the marketplace served as the nexus between commoner and elite worlds and the state tribute empire and consumption needs in the Aztec capital.

As a rule, exchanges in the marketplace were negotiated, balanced, and immediate. They were negotiated in the sense that value was established through some amount of discussion or haggling. They were balanced in that the individuals involved in transactions operated as equals irrespective of differences in ethnic affiliation or social status. They were immediate in the sense that transactions did not require a prior social relationship for the transmittal of goods. While credit could be extended between interacting parties on the basis of prior arrangements this was not a usual way of doing business.

Two motivations or incentives appear to have governed transactions within the marketplace. The first was basic provisioning which operated both at the level of the individual households just as it did for the state. The second motivation was exchange for profit. This certainly was the motivation behind merchant activity, but it also existed as a potential operating principle for all individuals who sold goods in the marketplace as a regular part of their subsistence livelihood.

That the concept of trade for gain was a prehispanic concept is clear from the etymology of the Aztec word for profit (*tlaxitlapana*). The Aztecs spoke *nahuatl* which added elements to words to refine or add meaning. The word *tlaxitlapana* is composed of *tlax*, meaning something, *ix* from *ixtli* meaning face, and *tlapana*, meaning to split or divide something (DE MOLINA 1977). Placing all of those elements together creates the concept of splitting or dividing something through face to face interaction and negotiation. The idea of profitable increase is expressed in the idea of dividing something into more items (HIRTH 2016, 96-97).

Because markets were commercial locales it is useful to also look at the Aztec view of who qualified as a merchant. Here we are fortunate to have a specific definition provided by the merchants of Tlatelolco. In their words,

“The merchant is a seller, a merchandiser, a retailer; [he is] one who profits, who gains; who has reached an agreement on prices; who secures increase, who multiplies [his possessions]. The good merchant [is] a follower of the routes, a traveler [with merchandise; he is] one who sets correct prices, who gives equal value” (DE SAHAGÚN 1961, 42-43).

The attributes of a merchant are evident in this passage. The merchant is an agent of trade who follows routes, sets prices, makes decisions, and gives equal value in a morally correct way. Whatever form the merchant takes as a seller, a merchandiser or a retailer, the goal is the same: to make a profit. *Nahuatl* is a gender neutral language and the illustrations accompanying de Sahagún's narrative of the marketplace often show women in the role of commercial vendors.

Recognizing the role of profit seeking in Aztec society, the marketplace is important because it underscores the commercial role the market in-

stitution played in the lives of these precolumbian people. Moreover, profit and the wealth that it produced was seen as a respectable goal for its own sake. This is clear in another passage from de Sahagún's Tlatelolco merchant informants where they describe how long distance *pochteca* merchants, viewed the acquisition of wealth.

"[S]omewhere some of the wealth of the master, our lord, hath been shown me. Somewhere I shall make use of it; I shall cast it into the water; I shall reap a *profit*. With this you are content" (DE SAHAGÚN 1959, 55).

What is important here is that all wealth was perceived to be the property of the gods and to accumulate it was seen as a personal blessing. Wealth accumulation, however, was risky and if done in a morally incorrect way could have negative consequences for unscrupulous merchants.

Commercial dealings operated largely on moral principles both inside and outside of the marketplace. Examples of fraud such as counterfeiting cacao currencies (see below) and using false measures certainly occurred and when discovered were punished immediately and severely. Pictographic writing was used for record keeping but did not extend to the construction of written contracts. Witnesses validated contractual relationships and judged the fairness of their fulfilment, but as far as we can tell, oaths were not formally taken before a god to guarantee compliance with a contract. The emphasis on honesty was so strong that there are recorded instances of merchants leaving cargos of goods unattended in anticipation of their being offered for sale in an upcoming marketplace. Loans often required a surety of some form and when this was absent, could involve pledging the labor of the borrower or that of a child if not repaid. Indebtedness was one way that labor slavery could occur.

Minted currencies did not exist in Mesoamerica, but several forms of commodity money facilitated exchange. The two most important of these were cacao beans and plain cotton textiles known as *quaxtli*. They both were used as a medium of exchange and a unit of account. Cacao beans imported from lowland production areas were used to make a highly desirable chocolate beverage consumed by all members of Aztec society who could afford to do so. One particular form of cacao was used as currency. It was the small fractional currency used in the marketplace to buy individual items. The presence of exchange agents (money changers) in the marketplace suggests that individuals exchanged goods for cacao that they used in turn to make other purchases. The widespread success of cacao as a medium of exchange continued well into the 16th century because of the scarcity of minted currency and the ease with which it facilitated exchange. The price of goods was still set in terms of cacao well into the 16th century. In Tlaxcala, for example, the going price for a ripe avocado in 1545 was only two cacao (ANDERSON *et al.* 1976).



Quaxtli were plain cotton textiles that functioned as a higher unit of currency and valued in terms of differing amounts of cacao based on size and quality. Textiles were highly valued items throughout Mesoamerica, with different values based on texture, color, dye patterns, the material they were made from in addition to cotton, and the type and level of embroidery and decoration. *Quaxtli* were undecorated white cotton textiles that came in three sizes or denominations worth 65, 80, or 100 cacao (DE SAHAGÚN 1959, 48). *Quaxtli* like all textiles were manufactured by enterprising women. Raw cotton could be purchased in the marketplace and then spun into thread and woven in the appropriate sizes by women in their households as time permitted. Fig. 8 illustrates the purchase of a male and female slave in the marketplace by two individuals using *quaxtli*. The *quaxtli* are depicted as a bundle of square cotton clothes under the outstretched and pointing arms of each of the purchasers.

Other more expensive wealth goods also served as money. Two such items included feather quills filed with gold dust and thin copper sheets referred to as axe money (<https://www.moneymuseum.com/en/coins?&id=2318>) because of their general shape (ROJAS 1995, 244-245). Elaborately decorated cotton textiles, featherwork, jade and gold adornments also served as stored wealth. These goods could be converted into cacao beans or *quaxtli* as needed but their value was not standardized and would have been negotiated individually.

▲ Fig. 8. Buying and selling slaves in the marketplace with *quaxtli*. A round altar is portrayed at the center of the marketplace (illustration by K. Dennison and M. Vinciguerra redrawn from DURAN 1971, pl. 29).

Operators in the marketplace

A good deal can be learned about the organization and complexity of Aztec commercial society by examining who were the primary sellers or operators within it. We know that markets were organized internally into aisles by the class of goods sold. Individual vendors apparently displayed their wares on mats under awnings to protect themselves and their clients from rain and the hot sun. There is nothing, however, to suggest that shops or other permanent installations were constructed within the marketplace. This makes sense since all markets except for a few daily ones met on a rotating basis. The *nahuatl* language, together with the account provided by indigenous informants and Spanish descriptions, provide a fairly complete description of the general categories of vendors found in the marketplace. Six general types of vendors can be identified: producer-sellers, retailers, peddlers, exchange dealers, commercial agents, and professional long distance merchants. The degree to which they specialized in one product or multiple products varied from vendor to vendor.

The most numerous class of vendors in the marketplace were part-time producer-sellers who sold what they grew (farmers), collected (fowlers, fishermen), processed (food vendors), manufactured (artisans), or offered personal skills or abilities (physicians, prostitutes). Research has identified 124 different types of producer-sellers who marketed goods in the marketplace. Who these producer-sellers were is summarized in Tab. 1. Food and natural resources are important. Fifteen producer-sellers are food producers who sold staples such as maize, beans, fruit and vegetables, while another 14 sold cooked food and beverages. The category of foragers and collectors represent individuals who hunted and fished for deer, fowl, fish, insects, and a wide range of other animals to supply protein for the Mesoamerican diet that lacked large animal domesticates. Also included in this category are those individuals who collected natural resources and processed them into products for sale that included resin, dye, glue, and lime. Likewise, there are twelve service providers that include barbers, porters, solicitors, physicians, singers, and others who sold their skills to those who wanted them.

► Tab. 1. *The Types of Producer-Sellers Found in Central Mexican Marketplaces* (HIRTH 2016, tab. 5.5).

Types of Producer-Vendors	Number	Percent
Food Producers	15	12.1
Processed Food Vendors	14	11.3
Foragers and Collectors	20	16.1
Craftsmen	56	45.2
Service Providers	12	9.7
Colonial Specializations	7	5.6
Total Number of Producer-Vendors	124	100.0

The most numerous category of producer-sellers are artisans (n=56) that constitute nearly one-half of all producer-sellers offering goods for sale in the marketplace (Tab. 1). The vast majority of all craft goods produced in Aztec society were manufactured by artisans who worked in their homes. The *nahuatl* language makes it easy to identify artisans who were involved in the direct marketing of their products. They can be identified in the literary sources by the agentive suffix *-chiuhqui* which translates loosely as “maker of”. A artisan who made reed mats (*petlatl*) for sale would be called a *petlachiuhqui*. Based on market accounts it is clear that artisans producing craft goods were a central aspect of commercial activity within the marketplace. Archaeological investigations have shown that full-time craft production was relatively rare in ancient Mesoamerica. Instead many artisans worked part-time, combining craft activities with agriculture to augment household subsistence. Crafting was only a full-time pursuit under special circumstances, such as when artisans could combine production for sale with producing goods for the state. One way that fuller involvement in craft activities occurred was when artisans engaged multiple complementary craft activities often referred to as multi-crafting (HIRTH 2009a; 2009b; 2009c; SHIMADA 2007).

Another very prominent group of merchants in the marketplace was the retailers. As in our society today, retailers are resellers. What distinguished them as a group was that they bought goods from producers or from other merchant intermediaries to resell at a profit. Retail merchants can be identified in the sources when they are referred to by the specific *nahuatl* word *tlanecuilo*. In other cases retail activity is simply listed under the term *tlanamacac*, which refers to a general category of seller (DE MOLINA 1977). When terms like *petlachiuhqui* and *petlanamacac* are used together in the same sources we can infer that the latter is a retailer of reed mats. Also included within this category are those individuals operating as wholesalers and importers (*tlauixtiani*). Finally, retail functions can often be inferred when vendors in the marketplace are selling imported goods from multiple distant areas beyond what a producer-seller would normally travel.

Thirty-six types of retailers can be identified in 16th century documents for Aztec marketplaces. Retailers dealt in both high and low value goods that can be divided into five broad categories based on the type of goods sold. There are nine food retailers, who deal both in specialty food items and large bulk purchases of local staples. There are eight textile suppliers, which is logical given the importance of textiles and the role of women in their production. These suppliers sold finished garments and footwear in addition to spun thread, dyes, and weaving supplies. The importance of textiles as a form of wealth made it possible for some women to specialize in different aspects of the production

process as a component of their livelihoods. Seven retailers can be identified that sold high value items that included slaves, featherwork, high value textiles, and goods made of jade, gold, shell, and other precious materials. There are four vendors who sold sundries like tobacco, indigenous paper, rubber, and musical instruments as well as four others who sold staple medicines, gourds, salt and wood products. Most of these categories reflect pre-contact commercial activity with the exception of four tradesmen, the wool and silk cloth dealers, the hat seller, and the wheat trader. These four vendors specialized in selling post-contact products from Europe.

Three other types of economic practitioners also were important in the Aztec economy. One of these was a class of individuals referred to above as exchange dealers (*tlapatlac*) that fulfilled the equivalent role of money changers in the Old World. They appear to have been wealthy merchants who were located in the marketplace and accepted an array of different goods in exchange for cacao so people could then make the purchases they needed. While their general function is clear these exchange dealers must have specialized to some degree in different kinds of goods (maize, food, baskets, types of textiles, clothing, etc) that individuals wanted to exchange for cacao or *quaxtli*. These dealers would have accepted these goods at discount rates and most likely served as wholesalers providing additional resources for retailers (*tlanecuilo*) to sell within their specialties.

Another group of commercial specialists were the solicitors and purchasing agents (*tlaciuitiani*, *tlaciuiti*) who were important suppliers of goods to retailers. Among the Aztecs it was forbidden to purchase goods outside the marketplace (ALBA 1949, 48). This ensured fair trade and equitable pricing, but it did not mean that goods could not be contracted before hand by an intermediary and paid for upon delivery in the marketplace. It is likely that these agents would have preferred to buy in larger rather than smaller lots of merchandise, and may have been the main conduit through which the larger rural estates of elites who could convert excess staple grains into durable wealth or luxury goods.

There also was a broad class of itinerant pedlars (*tlacôcoalnamac*) that operated outside the marketplace (DURÁN 1971, 276). Even though markets were regularly held in towns spaced in close proximity to one another, there were areas with low population densities that lacked them. These areas were serviced and supplied by itinerant pedlars. Like pedlars world-wide, they operated as mobile retailers who brought goods to households in areas without ready access to marketplaces as well as mobilizing resources from them that they could resell in regional marketplaces or to other consumers they encountered on their cyclical rounds.

Finally, there were the professional long distance merchants known as the *pochteca*. These merchants are well known from their involvement in long dis-

tance trade of exotic goods which included operating as trade agents with investments for the Aztec king and other elite (BITTMANN SIMONS/SULLIVAN 1978). The *pochteca* were involved in the governance of the marketplace as well as wholesale and retail activity (ACOSTA SAIGNES 1945; CARRASCO 1978; BERDAN 1989). They were the primary purveyors of elaborate imported textiles, slaves, feathers, jade, amber, shell, cacao, imported jewelry, and a wide array of natural resources used by craftsmen to manufacture an array of local products. The result of this trade is that they grew wealthy. Rather than their wealth allowing them to move into the elite class, *pochteca* in Aztec society remained as commoners. Despite their prominence, *pochteca* merchants are classified here as only one of the more than 160 different vendors selling goods in the marketplace.

Archaeological approaches used to identify marketplaces

Archaeologists working in the Old and New Worlds have used a variety of approaches to infer or identify the present of marketplaces in the recent and remote past. They vary in specificity and accuracy based on whether historic, surface, or stratigraphic information is used. Four approaches have been used in Mesoamerica that are described here. Like those used elsewhere they vary in accuracy and specificity. While Mesoamerica had many marketplaces, the fact that they were held periodically on rotating schedules means that their installations were somewhat ephemeral compared to permanent daily markets. The result is that archaeologists need to be cautious, use well contextualized data, and employ multiple approaches when identifying the operation of past marketplaces. The four investigative approaches described here are referred to as the configurational, contextual, functional-spatial, and distributional approaches (HIRTH 1998).

The configurational approach

This approach attempts to identify markets from the features mentioned in historic and ethnohistoric descriptions of indigenous marketplaces (DIAZ DEL CASTILLO 1956; CORTÉS 1962; FELDMAN 1978; DE SAHAGÚN 1979). It includes descriptions of traditional indigenous markets and assumes a degree of ethnographic continuity in market behavior with the past (BEALS 1975; COOK/DISKIN 1976; SMITH 1983). In Mesoamerica this approach has often been focused on architectural aspects of the marketplace. We know that prehispanic markets were regularly held in the main public plaza of towns adjacent to important administrative and religious buildings. Location in the town or city center instead of on its outskirts, brought the market under the patronage of both the gods and the ruler who together were seen as supervising commercial activi-

ties. The presence of a marketplace brought revenue to the city and prestige to its ruler where it was held. The marketplace in the large city of Texcoco was located adjacent to the ruler's palace who considered the marketplace to be the outermost plaza in his palace complex where all the people could assemble.

Two important architectural features associated with marketplaces include their central location and their formal architectural design. Since markets were central to household provisioning they had to be easily accessible to the broader population for both the assembly and distribution of resources. It is expected, therefore, that marketplaces would be located along key transportation arteries and connected to the broader hinterlands by roads where they exist. Paved roads are rare in Mesoamerica because carts were not used to transport goods. Nevertheless where roads were built around main centers they lead into marketplaces and plazas that could have served that purpose. Other features associated with marketplaces include a central administrative building or portico where magistrates supervised its operation and cases of crimes could be judged (CORTÉS 1962, 89), and an altar or shrine (*momoztli*) where offerings of things sold could be made to the god of the marketplace (DURÁN 1971, 276) (Fig. 8). One of the most salient features of all markets is that vendors selling goods were organized in rows (CORTÉS 1962, 87-89; FELDMAN 1978). Permanent installations resembling shops were rare except in the largest daily markets where barbers, stove makers, and apothecaries had their locations (DÍAZ DEL CASTILLO 1956, 217). The problem with most of the architectural criteria (plazas, altars, roads, administrative buildings) is that they are multi-purpose features that also had administrative and religious functions. Only the orderly organization of vendors into aisles and streets is a characteristic only associated with market activities (see below).

The contextual approach

This approach is the weakest of all the approaches listed in Mesoamerica, and while fairly widely used, is based more on logic and theory than fact. Its working assumption is that markets were common in highland Mesoamerica and that all large communities had them. This certainly is true for the Basin of Mexico at the moment of Spanish contact. The issue, of course, is how far back this pattern can be extended into the prehispanic past without direct confirmation.

Three rationales are used to argue for marketplaces using this approach. The first is that markets were associated with large cities to meet urban food needs (*e. g.* APPLEBY 1976; GÓMEZ CHÁVEZ/GAZZOLA 2004). The logic here is that the marketplace provided the provisioning needs of populations either as a result of agricultural intensification (BLANTON 1983), or to provision urban residents with food that they could not produce themselves.

This approach has been used to infer the existence of marketplaces in large centers such as Monte Alban (BLANTON 1978; BLANTON *et al.* 1993) and Teotihuacan (MILLON 1973; KURTZ 1987; WIDMER 1996) as early as 2000 years before Spanish contact. The market was an important provisioning mechanism for Mesoamerican cities, but not in the same way that they were in the Old World. The reason is that even the largest Mesoamerican cities were composed primarily of urban farmers with access to agricultural land to support themselves (SANDERS 1965, 157-159; MILLON 1973; SANDERS *et al.* 1976, 1979, 393). Elite families had lands cultivated for them using corvée labor while commoners walked out to their fields surrounding both small and large communities. There was no sharp distinction between rural and urban residents (HIRTH 2008) in terms of their access to land or the importance of farming as an important component of household subsistence even among craftpersons (HIRTH 2016). The marketplace was a commercial hub for all households, which allowed them to convert the resources they produced into alternative products that they either wanted or needed.

A second rationale is that markets existed in towns where large scale craft production was practiced. The logic here is an economic one, namely that the livelihood of full-time artisans depended on having access to a ready market to sell their goods. This is a good theoretical argument for how markets support the development of craft specialization, but it overlooks two fundamental features of how craft activities were organized within Mesoamerica: 1) full-time craft specialization was rare in Mesoamerica with most artisans operating as multi-crafters (HIRTH 2009a), or part-time/intermittent producers combining crafting with farming (HIRTH 2009c), and 2) some crafts such as obsidian blade production used for cutting tools was practiced by itinerant artisans who moved from place to place. Markets facilitated the development of craft production, but the presence of craft production does not by itself confirm the existence of marketplaces either in Mesoamerican or elsewhere around the world (*e. g.* CLARK/PARRY 1990).

The third and final rationale is a political one, namely that marketplaces were developed by elites as a means to extract a 20 % market tax as a significant component of their income and support (BLANTON 1996, 82). This view is attractive to archaeologists who favor a top-down view of the economy and is loosely based on three unconnected references to market taxation: 1) CORTÉS (1962, 93) said that guards extracted a tax in kind on goods entering the city, 2) LÓPEZ DE GOMARA² (1966, 163) reported that vendors paid the king "something" for their right to sell, and 3) according to DURÁN (1994, 262) the Aztecs assessed a 20 % tax on goods in the

2 Lópe de Gomara was Cortés personal secretary but he was never in Mexico so his reporting is a second hand account from Cortés once he returned to Spain.

Tlatelolco marketplace. There is actually little evidence to support the assertion that a 20 % market tax was a regular feature of the Mesoamerican commercial landscape, or that the marketplace provided a primary income stream for elite (HIRTH 2016, 76-79). The available information on market taxes from the Coyoacan marketplace indicates that market taxes were very low and probably paid collectively once a year by market vendors (ANDERSON *et al.* 1976; BERDAN 1988, 646; HIRTH 2016, tab. 3.2). Moreover, the money collected was miniscule, and amounted to less than 1 % (0.7 %) of the lord of Coyoacan's total yearly income when compared to income accruing to him from the in-kind taxation from his indigenous subjects³.

The Aztecs did assessed a 20 % tax on goods in the Tlatelolco marketplace, but it was not a market tax; it was a tribute levy imposed on the Tlatelolco population after its conquest in AD 1471 in the wake of their attempted assassination of the Aztec king (DURAN 1994, 258-262). Even on the face of it, a 20 % market tax on goods as they entered the marketplace as described by CORTÉS (1962, 93) makes no economic sense. Markets were held on a rotating basis, and a 20 % tax at five consecutive marketplaces would have reduced a merchant's stock by 67 % in as many days. This would have been excessive and would have eliminated all merchant activity in short order. As a rule, market taxes were generally low and oriented toward covering the cost of operation and cleanup rather than elite support. Market taxes may even have been absent in areas of the Mixteca and the Valley of Oaxaca (TERRACIANO 2001, 249). The testimonies of two market supervisors from Coyoacan indicate that market taxes were paid voluntarily and were so small as to be a token payment (HIRTH 2016, 303, n. 14).

The functional-spatial approach

This approach looks at identifying market activity from behavioral activities carried out *within* the marketplace. It asks the question, what behavioral signatures were associated with market activities that can be detected archaeologically and do they produce recognizable spatial patterns of artifact patterning? Several authors in this volume (Otto, Rahmstorf, Stratford) productively use this approach to infer the location of marketplaces from the distribution of weights and scales in contexts that help to define commercial areas within sites. Three aspects of market behavior translate into dis-

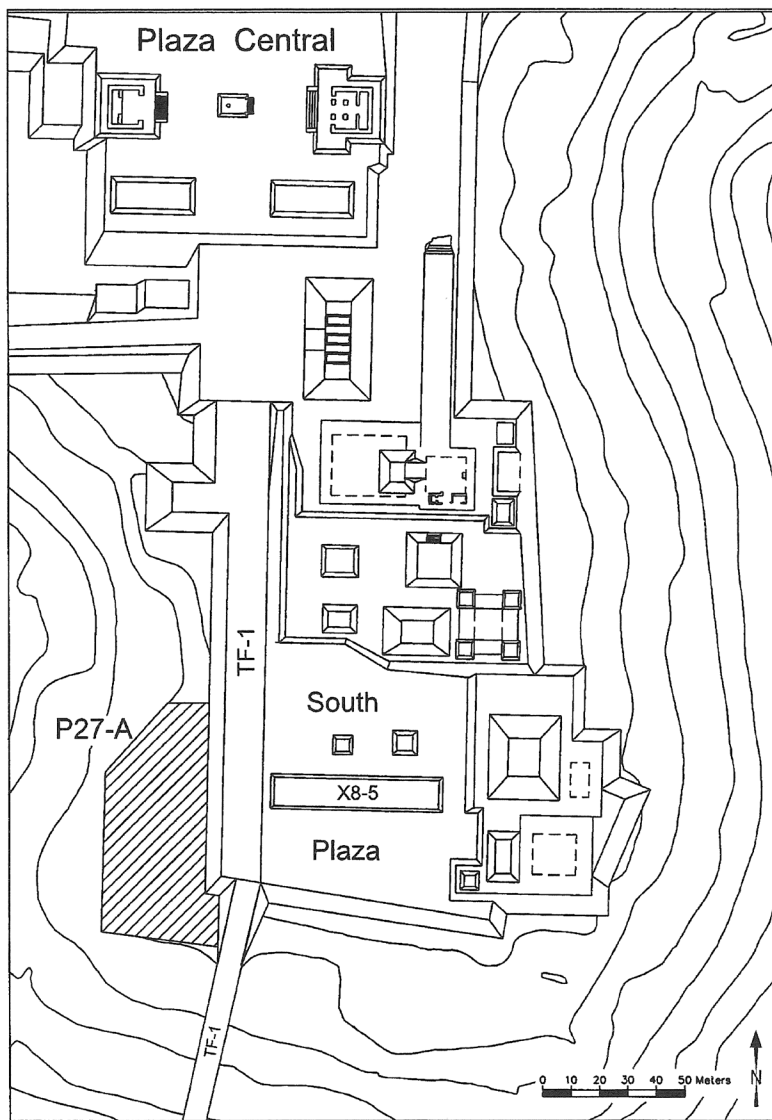
cernable patterns available for archaeological study. Colin RENFREW (1975; 1977) suggested that marketplaces would distribute goods more widely and would produce regionally distinctive fall-off rates for goods different from other forms of distribution and exchange. While difficult to apply in regional context because of the type of data required (but see STARK/GARRATY 2010; STARK/OSSA 2010), there is merit in exploring this approach more fully in the future because of the known effects that marketplaces have in increasing the distribution of goods over space.

More common are studies that focus on activities within the plaza spaces where markets were convened. One potentially productive approach is to use the orderly organization of vendors into regularized rows to look for regular patterning of artifact residues in linear patterns within plazas that conform to the aisles and sectors where goods were sold. A second approach is to look for concentrations of waste and waste residues within market plazas. If there is one thing that marketplaces do, it is to create waste that normally is cleaned up after they close. Market planners recognized this fact and often designed market spaces with dirt or gravel surfaces because they absorb liquid waste more readily than do cement or stucco floors. Stratigraphic excavations in both of the suspected marketplaces at Xochicalco, Morelos and the Ciudadela at Teotihuacan, Mexico both have dirt/gravel floors that conform to this pattern (HIRTH 2009b; RATTRAY 2001). Archaeologists have been successful in identifying the concentration of organic wastes from market activities in plazas across the Maya area through the analysis of phosphates and other residual soil chemicals (BARBA 1986; WELLS 2004; DAHLIN *et al.* 2007; 2010; CORONEL *et al.* 2015). While chemical analysis can detect concentrations of earlier organic refuse, it is difficult to identify the source of these wastes or date them using available chronometric techniques. Another approach is to look for waste from craft activities carried out in the marketplace. One such activity was the production of obsidian blades by itinerant lithic artisans (DE SAHAGÚN 1961, 148; CLARK 1989). The production of small lithic debris from this activity is easily embedded in dirt floors and helped identify a market area adjacent to the South Plaza (Fig. 9), at the ancient site of Xochicalco (HIRTH 2006; 2009b).

The distributional approach

The distributional approach measures the presence of market behavior from the effects that it has on consumer consumption patterns. This approach studies market behavior outside of the confines of the marketplace by studying the composition of artifact assemblages of the individuals who used them. It is based on the observation that different forms of centralized and decentralized distribution have shaped household assemblages in different

3 The market tax income was 9 pesos, 4 ½ tomines compared to 1.386 pesos, 6 tomines paid by the indigenous Coyoacan population to their indigenous lord over the course of the year. The 9 pesos, 4 ½ tomines in market tax would have been sufficient to purchase 897 kg of maize, which would have been barely sufficient to support a family of five for a single year (HIRTH 2016, 78-79). The percentage of the market tax would have been an even lower portion of total income for pre-contact periods before the indigenous population was significantly reduced.



▲ Fig. 9. Excavated market area at the site of Xochicalco, Morelos. It is likely that this area was part of the larger South Plaza marketplace (HIRTH 2006, fig. 7.4).

ways (HIRTH 1998; 2010). Decentralized forms of distribution like those carried out in household-to-household exchange networks create greater heterogeneity in the composition of domestic assemblages because in the aggregate, the network of household interaction allows them to access multiple independent channels of supply (PIRES-FERREIRA/FLANNERY 1976). In contrast, centralized forms of distribution can provide greater homogeneity in consumer assemblages if they all have access to the same types of goods. Marketplaces are centralized distribution centers where a great variety of goods are assembled for sale and distribution. Where the distribution and consumption of goods is governed by price, households and other consumption units will have access to goods in direct proportion to their overall purchasing power. Where goods are distributed through social and political networks this will not be the case and goods will tend to flow down and through socially defined interaction networks which will produce heterogeneity between households of different statuses.

The distributional approach attempts to identify different forms of exchange (household reciprocity, gift exchange, redistribution, marketplace exchange) from the differential distribution of materials in the consumption contexts where they are found (HIRTH 1998, 455; 2010, 240). Since retail markets are geared toward household provisioning, a comparison of domestic assemblages provides insight into whether marketplaces provided the provisioning framework to supply them with the goods that they consumed. Households provision themselves independently of one another. But since they all have equal access to resources sold in the marketplace they have the potential to all possess the same types of goods *in proportion to their ability to purchase them*. This means that both elite and commoner households can have the same types of utilitarian commodities and staple goods because they are equally available to all. Expensive goods may still be confined to the wealthy but commoner households are not necessarily excluded from having them on the basis of social restrictions or channels of access. The result is that the marketplace should produce greater conformity or homogeneity between domestic assemblages than when other forms of distribution dominate systems of economic procurement. Research has documented both the existence of a marketplace at the Epiclassic site of Xochicalco, Mexico (HIRTH 2009b) and consumption patterns that conform to the expectations of the market behavior as predicted by the distributional approach (HIRTH 1998). The advantage of this approach is that it can be applied anywhere in the world where good comparative assemblages exist from contemporary domestic contexts.

Conclusions

Highland Mesoamerica had a highly developed market system at the moment of Spanish contact. The marketplace was the central social and economic institution in Aztec society. The marketplace was where individuals heard the news of the day, socialized with friends, and where social justice was dispensed in a publically visible way. Its economic importance revolved around the role of the marketplace as the point of resource provisioning for all domestic households in society. It was where every household could sell or exchange the goods that it produced for the resources that its members desired or needed. It was where local and imported resources of all kinds were massed and available for sale. The marketplace was where food could be converted and stored as imperishables, wealth goods could be converted into utilitarian commodities, and the state could convert its vast array of tribute goods into items that they used in public festivals and to run the government. The profit motive was alive and well in Mesoamerica and was important for those individuals who relied on commercial

ventures for their livelihoods. The multi-faceted nature of household subsistence practices could make even a small or intermittent involvement in market activities an important contributor to household economic support.

If there is one important lesson that Aztec marketplaces can contribute to the broader study of ancient comparative economy it is that marketplaces are *not* a function of transportation technology or good transportation systems. Mesoamerica relied upon one of the simplest and most expensive forms of transportation in the ancient world: human porters. From an energetic perspective this was one of the most expensive way of moving goods, especially bulk goods, over space. For this reason specialized merchants like the *pochteca* primarily trafficked in light weight, high value goods in long distance trade. But the mobilization and trade in staple goods was another matter. Environmental diversity made a range of different resources available within a day or so travel to most households across the central and southern highlands. I believe that this fostered household and community level interaction from an early date that eventually led to the development of marketplaces along natural transportation corridors. If anything, the development of the marketplace was a response to high costs of transportation that reduced the number of provisioning trips that individual households were forced to make.

The market was designed for household provisioning and the result in the Basin of Mexico and adjacent areas was the emergence of a system of rotating marketplaces in communities spaced 8-12 km apart. Marketplaces were closely spaced in Central Mexico and as a commercial landscape provided service to households at least as good, if not better, than can be found in Europe during the 16th century. In comparison to the Old World, the development of Aztec commercial practices are something of a paradox. Commercial relationships were transacted using forms of commodity money rather than minted currencies, without formal business contracts, lacking full-time specialists in most of the craft industries, and relying primarily on human porters to move goods to points of sale for consumers to purchase. The solution was a great deal of part-time involvement by a wide spectrum of the population in commercial activities. If there ever was a place where the saying “many hands make light work” for a past commercial environment, it is Mesoamerica.

Despite the importance of marketplaces in Mesoamerica, they are illusive and challenging for archaeologists to identify. Markets were convened on a periodic basis within town plazas that were used more often for social, political, and religious functions than they were for economic ones. Few durable architectural or other material culture signatures specifically indicate market activity. Transactions were conducted in terms of the lengths and volume of the goods sold instead of weight,

so standardized weights and balances are absent from the archaeological record. Likewise, vendors and producer-sellers moved from marketplace to marketplace instead of operating out of permanent shops as they did in urban centers and market towns in Europe. If there is one facet of ancient commerce that was directly affected by the simpler transportation systems in Mesoamerica it is the absence of large scale production centers for certain specialized goods like ceramics found with the concentrated industries such as those producing Roman terra sigillata wares (PEACOCK 1982; POBLOME 1999). The evidence for economic transactions and its supporting institutions is more ephemeral and requires a multi-dimensional approach to address.

Four approaches have been used to identify marketplaces in Mesoamerica with differing degrees of success. The configurational approach relies on architectural elements of the marketplace and by itself is unreliable because of the reasons mentioned above. Arguments based on theory and logic alone (the contextual approach) obviously can not be used to *identify* the operation of prehispanic marketplaces. As a result the exploration of marketplaces in Mesoamerica has focused more on identifying the *patterns of behavior* expected and associated with market operation instead of focusing solely on identifying their *physical location and configuration*. The two behavior-focused methods discussed here are the functional-spatial and distributional approaches. The functional-spatial approach deals to a large extent on artifact patterns related to behaviors that were carried out within the marketplace. Conversely, the distributional approach examines the effects that retail markets have on consumption patterns at the household level. Of these four approaches, the distributional approach remains a uniquely Mesoamerican contribution to the study of ancient marketplaces that is worthy of testing using archaeological and material remains in other areas of the ancient and premodern world. In all cases, however, the best methodology is one that uses multiple approaches and data sets in the exploration of an archaeological problem.

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Address of the author

Kenneth Hirth
Professor of Anthropology
115 Carpenter Building
University Park
PA 16802
USA
kgh2@psu.edu

Political unification, economic synchronization, and demographic growth: Long-term settlement pattern shifts in eastern Shandong

by GARY M. FEINMAN, FANG HUI & LINDA M. NICHOLAS

Market, empire, archaeological survey, Qin, Han, Zhou

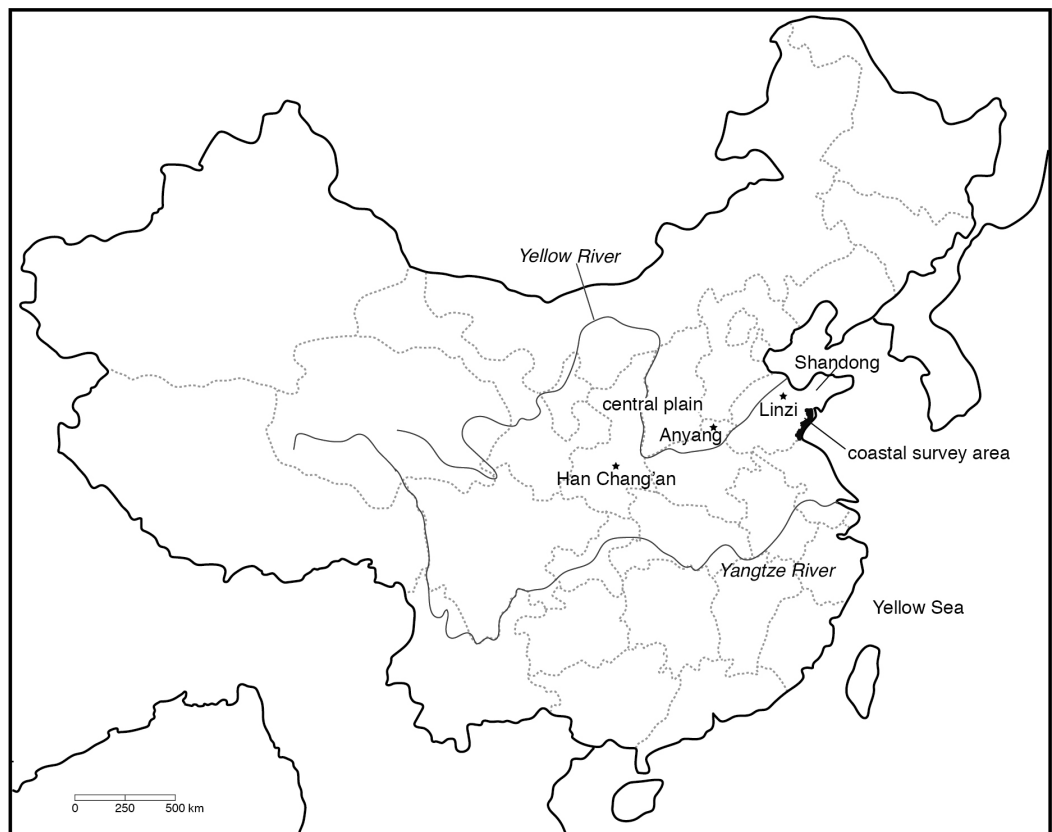
Dramatic settlement pattern transitions and demographic growth mark the Qin-Han era in coastal Shandong, China. This episode of rapid population expansion was set off by political unification under China's first emperor and politically motivated in-migration as well as marked shifts in economic practices. Specifically, this growth episode clearly was fostered by specific strategies to unify currency and mechanisms of measurement, build roads, and promote interregional communication. The interplay of these political and economic shifts that led to this era of dynamic population expansion across China, and particularly in eastern Shandong, is documented through a multiscalar analysis that integrates regional settlement pattern investigations, excavation findings, and the examination of available documentary records.

*Politische Vereinigung, ökonomischer Gleichlauf und demographisches Wachstum.
Langfristige Änderungen in Siedlungsmustern im östlichen Shandong*

Markt, Reich, archäologische Feldbegehung, Qin, Han, Zhou

Deutlicher Wandel in den Siedlungsmustern und demographisches Wachstum zeichnen die Qin-Han Epoche im küstennahen Gebiet der Provinz Shandong an der chinesischen Ostküste aus. Ein rapides Populationswachstum war durch die politische Vereinigung Chinas unter dem ersten Kaiser ausgelöst worden. Die Migration in diesen vereinigten Raum wurde politisch befördert. Dazu gehörten auch einschneidende Veränderungen in ökonomischen Handlungsweisen. In besonderem Maße wurden in dieser Wachstumsphase spezielle Strategien unterstützt, um die Währung und die Mechanismen des Messens zu vereinheitlichen, um Straßen zu bauen und um die überregionale Kommunikation zu verbessern. Das Zusammenspiel dieser politischen und ökonomischen Veränderungen, die während dieser Epoche zu einer dynamischen Bevölkerungssteigerung in ganz China, aber besonders im östlichen Shandong, führte, wird durch eine multiskalare Analyse, die sich auf Untersuchungen zu regionalen Siedlungsmustern, auf Ausgrabungsergebnisse und auf schriftliche Dokumente stützt, dokumentiert.

► Fig. 1. Map of China with places mentioned in text.



In the global, historical examination of regional marketing networks, there are few studies more renowned than those of G. William Skinner focused on Late Imperial China (*e. g.*, SKINNER 1964; 1977). Yet the temporally deeper roots of Chinese exchange systems, especially prior to the Tang Dynasty (TWITCHETT 1966) have been less amply described. How much is known about economic connectivity and shifting systems of distribution as China transitioned from diverse Neolithic traditions to a politically unified imperial realm? In part, the informational lacuna reflects the sketchiness and unevenness of documentary and other empirical records as examinations probe farther back in time. Yet, it also may be a consequence of the preeminence of anti-market conceptual frames (COOK, S. 1966; BLANTON 1983; FEINMAN/GARRATY 2010) that, until recently, were brought to the study of ancient history, particularly in non-Western contexts.

Here, we do not endeavor to explore the beginnings of marketplace exchange in China, nor is our focus the development of the earliest regional exchange networks. Rather, we examine the expansion of macro- or national-scale marketplace exchange networks (MOLLOY 2016, 5) in China during the last millennia BC. Our scalar focus is two-fold. On the one hand, we review historical and archaeological findings pertinent to national- or imperial-scale processes and developments. At the same time, we assess the specific regional-scale archaeological settlement pattern results derived from a systematic research program implemented in coastal Shandong Province (Fig. 1). By interdigitating these

two analytical scales, we aim to understand both broad shifts in practices and policies as well as their on-the-ground impacts in one region. Because the documentary information on merchants and markets for this era is not ample, we also draw on several classes of relevant proxy information for exchange systems, which extend from archaeology to weights and measures and from currencies to calendrics.

Following this brief introduction, we focus on broad-scale historical processes across China, with emphasis on exchange and marketplace transfers. Here, in the absence of in-depth documentary evidence, consideration of systems of currencies, measures, and weights are significant as they provide a foundation for economic transfers across intercommunity networks. “Only with such ingredients in a given society could stable and continuous trade relations be established with neighboring societies” (RAHMSTORF 2010, 101). Distributions of measurement systems and money across broad landscapes yield potential clues into the modes of economic transfer and communication that were in place. After considerations at the broader spatial scale, we examine settlement change in eastern, coastal Shandong as a basis to assess temporal shifts at a regional scale. As SKINNER (1985, 281) outlined for Imperial China, a key aspect of long-term Chinese history was the continuous political economic dynamic between processes at the macro- or dynastic scale and more regional and local effects on settlement, production, and exchange. Specifically, we argue that a dynamic growth and extended connectivity of marketplace exchange networks was fueled during Eastern Zhou times (Tab. 1), and

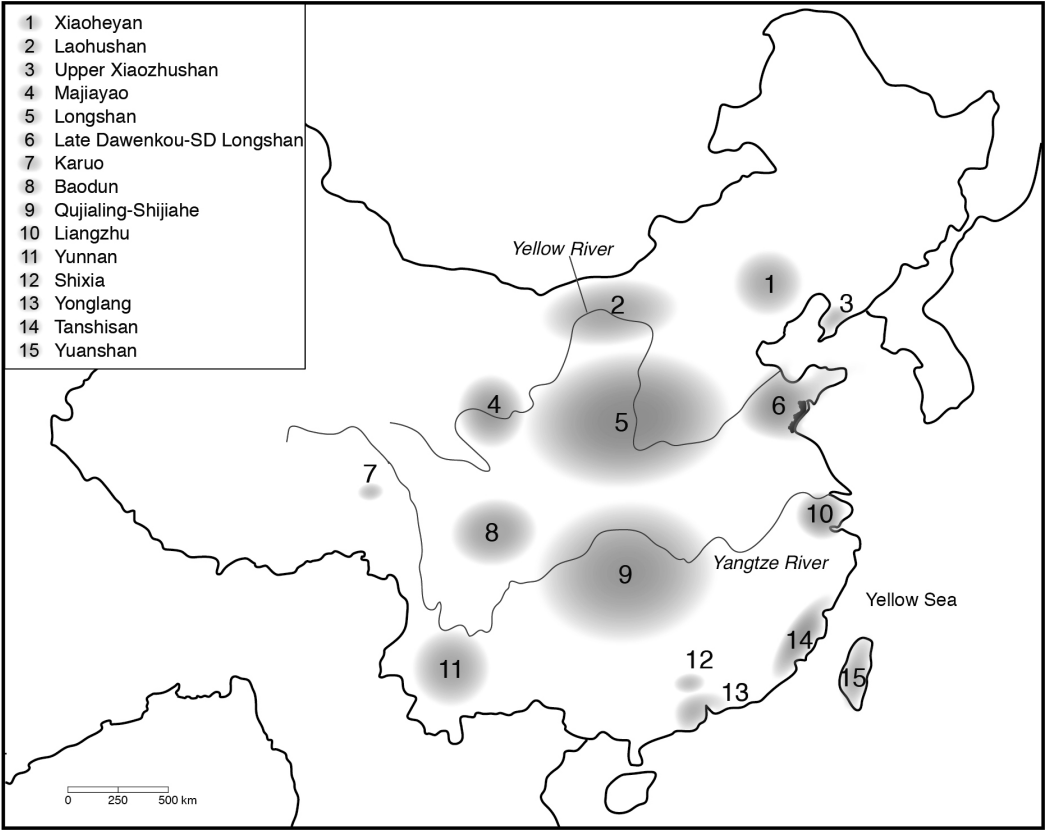


Fig. 2. Chinese Neolithic Traditions.

that this economic shift was synergistically tied to a governance transition in which bureaucracy and the provisioning of public goods was expanded and to technological innovations that included iron. In contrast to the perspective that market system competition and expansion thrives when disembedded from strong states, in China the spread and development of an interconnected macroscale market system was integrally linked to the expansion of strong bureaucratic states (*e. g.*, FEINMAN/GARRATY 2010; BLANTON 2013), a dynamic that was most clearly evidenced during China's first empires, Qin and Han.

Economic transfers and interaction prior to eastern Zhou

Over more than three millennia (Tab. 1) beginning in the Neolithic through the Bronze Age to imperial unification under the Qin in 221 BC, the number of autonomous political entities in China declined while the overall population and the size of the largest polities markedly increased. Of course, the specific path of change varied region to region. As time passed, the diverse cultural traditions of the Neolithic were linked and interconnected into more expansive political and economic networks that culminated in the establishment of China's first empires (Qin and Han). For the areas and temporal segments of this era absent written texts, we know disappointingly little about the modes and means of exchange, either within local settlement systems or between regions.

AD 500	China	Eastern Shandong
	Han	Qin/Han
AD 1		
500 BC	Qin	
	Eastern Zhou	Eastern Zhou
1000 BC	Western Zhou	Early Bronze Age (Shang/Western Zhou)
	Shang	
	Early Bronze Age	
1500 BC		
2000 BC		Middle/Late Longshan
2500 BC	Neolithic	Early Longshan
		Late Dawenkou
3000 BC		
8000 BC		

Tab. 1. Chronology for China and Coastal Shandong.

During the Neolithic (Fig. 2), there was great diversity across China along fundamental dimensions of socioeconomic life, including staple foods, village layouts, residential construction, and modes of cooperation and leadership (LIU 2004;

SHELACH-LAVI 2015; FEINMAN *et al.* 2018). From at least the later Neolithic, both specialized craft production for exchange and networks of interaction were in place (*e. g.*, UNDERHILL 1991; LIU 2003; SHELACH-LAVI 2015). For the most part, precious and ritually important goods were those that were transferred over great distances. In the absence of texts, it is generally argued that these long-distance exchange processes basically were exclusionary (BLANTON *et al.* 1996), mostly centered on emergent leaders and people of higher status. Without texts, however, relatively little consideration has been given to more localized exchange spheres and the sustenance of regional centers, which were 2–3 km² in extent and likely inhabited by thousands of people late in the Neolithic (LIU 2009; HE 2013; FANG *et al.* 2015). Although most current interpretations emphasize the importance of attached specialists and the economic agency of elites in spheres of interaction (*e. g.*, LIU 2003), more investigation seems necessary, especially as information is gathered to probe domestic economies across Neolithic China.

For much of the early Bronze Age (2nd millennium BC), the archaeological indicators for intensified craft production are more firmly evidenced across China, especially for China's central plain, the heartlands of the Shang and Western Zhou Dynasties (*e. g.*, UNDERHILL/FANG 2004). Intensive production of bronze vessels as well as bone objects, pottery, and other goods has been documented at a number of early urban centers (UNDERHILL/FANG 2004; LIU 2006; CAMPBELL *et al.* 2011; SHELACH-LAVI 2015). Bronze production involved a highly complex process, which necessitated marked divisions of labor (LI 2007; STOLTMAN *et al.* 2018). At the largest settlements, the evidence for craft production activities tends to be found adjacent to temple-palace complexes, which has been interpreted to indicate high degrees of political control over production and centralized redistributive networks of exchange (UNDERHILL/FANG 2004; LIU 2006; SHELACH-LAVI 2015). But, in reality, most archaeological excavations have focused on high-status contexts in the largest aggregations, and where more wide-ranging investigations have been implemented, craft production activities in other site sectors and neighborhoods have been recorded (*e. g.*, JING *et al.* 2013, 357).

Framed by long-standing conceptual perspectives on ancient economies (*e. g.*, POLANYI *et al.* 1957; SERVICE 1975, 302), an archaeological record focused on urban cores, and scanty texts that largely reflect the activities of regal courts and their associates, most scholars emphasize top-down governmental control of production and redistribution; they see little basis for the role of markets in the Shang and later Western Zhou economies. Nevertheless, despite the steep challenge of defining marketplace exchange in the absence of robust textual accounts (*e. g.*, FEINMAN/GARRATY 2010;

STARK/GARRATY 2010), there is an evidential basis that local market-based transactions also were important in these realms. To begin with, cross-cultural comparative analyses of historical states have repeatedly found that markets were almost universally present, albeit their importance varied greatly (CLAESSEN 1978, tab. 2; BLANTON/FARGHER 2010; FEINMAN/GARRATY 2010). More specifically, the detailed analysis of the large Tiesanlu bone workshop at Anyang raises issues regarding economic distribution and consumption. The workshop was situated at the core of the Shang capital, and the cattle bones that were processed likely came from ritual sacrifices, but researchers (CAMPBELL *et al.* 2011, 1295; CAMPBELL 2014, 139) estimate that millions of objects were produced. Most of these artifacts were quotidian points, pins, awls, and arrowheads that were distributed at Anyang and beyond. From the perspective of consumption, it seems unlikely that economic distribution was handled through redistribution or some other politically centralized process alone.

Cowrie shells provide another line of evidence. By most accounts, these marine resources from the south were moved over considerable distances to reach central China. They first appeared late in the Neolithic, were plentiful at some late Shang settlements, and remained highly valued in China for centuries thereafter (YANG 2011). These shells were replicated in bronze (and other materials) during the Shang era, and the copies of cowries became even more common during Zhou Dynasty times (PENG/ZHU 1995; LI 2006; YANG 2011). By Eastern Zhou, mid-first millennium BC, cowries are widely recognized as having served as a commodity currency (LI 2006; YANG 2011; HASELGROVE/KRMNICEK 2012, 239–240), although that role declined in later Qin and Han with the advent of more formal metal coinage. The role of cowrie shells in Shang and Western Zhou is debated (UNDERHILL/FANG 2004; LI 2006; YANG 2011), but these shells are most abundant in archaeological contexts far from their source, in places where they would have been rare, but also in densely inhabited north-central China. During Shang, their value is evident, as they are found in high-status burials and mentioned in texts in which bronzes were commissioned. They also were gifted as royal tokens of appreciation (UNDERHILL/FANG 2004, 138).

Even those who are skeptical that cowries served as currency (*e. g.*, COOK, C. 1997; LI 2006) grant that the shells provided a standard of value, a key criterion of currencies. Given their distribution in densely settled parts of China where local marketplace exchange was most apt to develop and multiple textual accounts that identify cowries in transfers and transactions (BAGLEY 1987, 522), we propose that they also served as a medium of exchange, another feature of currency. Here, it is worth considering that the spatially widespread and highly elaborate market system of the Aztec

in prehispanic central Mexico thrived without coinage or formal money, but rather commodities such as cacao seeds, cloth bolts, and copper axes served as media of exchange (FEINMAN/GARRATTY 2010; HIRTH 2016). It is no longer productive to view market-based economic transfers and associated currencies as an oversimplified “market/no-market dichotomy” (WILK 1996, 3-14), rather economic systems vary along multiple dimensions and diverse modes of transfer may coexist (FEINMAN/GARRATTY 2010).

During Western Zhou times, aristocratic estates, attached specialization (COSTIN 1991), and elite exclusionary networks remained central to economic transfers, local and beyond (BARBIERI-LOW 2007, 41; CAMPBELL 2009; KHAYUTINA 2014). Yet there is little empirical basis for the flat assertion that markets and currencies did not exist (VON GLAHN 2016). Artisans are noted in Shang and Western Zhou texts, and it is unlikely even in those eras that they were entirely engaged in palace-related craft activities (BARBIERI-LOW 2007, 34-36). Furthermore, land transfers in exchange for commodities at that time are recorded, and even though royal officials reviewed such transactions, that aspect in itself does not rule out the alienability of the land itself (FENG 2003). After all, even today in the United States, for example, most real estate transfers are overseen by the state, which may take a small economic slice as a transaction cost. Significantly, subsequent Eastern Zhou was characterized by formal coinage and textual evidence for large marketplaces in certain cities (*e. g.*, TAO 1999; SHEN 2003; VON FALKENHAUSEN 2018), and it seems unlikely that these institutions arose completely without historical antecedents.

Eastern Zhou: Governance, markets, money, and urbanization

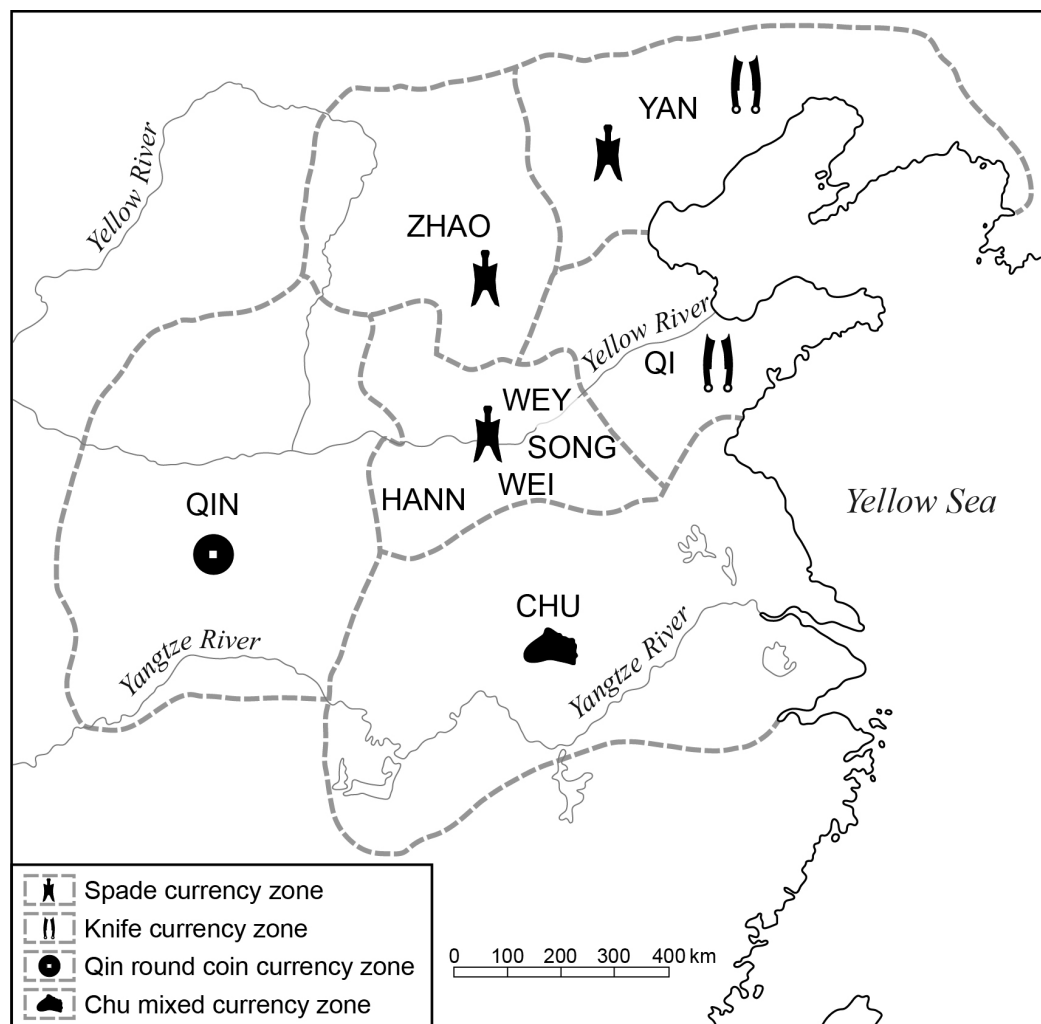
Significant political economic transitions during Eastern Zhou ushered in centuries of change that had a long-lasting impact in China (BARBIERI-LOW 2007; VON FALKENHAUSEN 2008; 2018; FANG *et al.* 2015; SHELACH-LAVI 2015; VON GLAHN 2016). Not only did marked increases in polity size occur, which culminated in the 3rd century BC Qin unification of China under the first emperor, but during Eastern Zhou, the policies and practices of governance shifted from the highly patrimonial, elite-driven political economies of the Shang and Western Zhou eras to more bureaucratic governance regimes. Whereas the Western Zhou ruling elite derived wealth principally from courtly gifts, lordly estates, attached craft industries, and exchange with other aristocratic families, during Eastern Zhou governmental revenue sources began to shift toward a greater reliance on broader-based agrarian taxation and the drafting of domestic labor (HSU 1999; BARBIERI-LOW 2007, 40-41;

VON GLAHN 2016, 54). For example, during the 5th century BC, the prime minister of the Wei state (Li Kui) encouraged the planting of multiple crops per year as well as the use of marginal lands for secondary resources, like mulberry. In general, this era was marked by labor-intensified agrarian production (LEWIS 2015, 284). Governmental policies were implemented to even out harvest oscillations and pricing spikes. At the same time, a law code was instituted that advocated that only modest tax levies be imposed on farming households. Regulations were placed on extravagant consumption, price manipulations, and sumptuary excesses. Although this code did not survive, it is thought to have served as the foundation for the later law codes of the Qin and Han (LEWIS 1999, 605; VON GLAHN 2016, 54-55).

By the 5th century BC, agrarian production was enhanced by the widening dissemination of cast iron implements, which facilitated forest clearance and greater returns per unit of land (SHELACH-LAVI 2015, 291-292). But the loosening of top-down economic practices and the quest for new revenues that broadened the tax base coincided with and facilitated this technological transition. The principals of competing polities and their ministers encouraged the production and distribution of iron implements and directed the earliest centrally initiated irrigation projects, thereby expanding the potential pool of tax-paying peasant households (LEWIS 1999, 605; BARBIERI-LOW 2007, 116-117; VON GLAHN 2016, 54-55).

During Eastern Zhou, artisanal production geared for broader-based consumption intensified (VON GLAHN 2016; VON FALKENHAUSEN 2018, 163-164), which in turn was tied to the growth and increasing connectivity of marketplace exchange networks. Bronze coins first were used at the outset of the 6th century BC (SHELACH-LAVI 2015, 298; VON GLAHN 2016, 62-64; VON FALKENHAUSEN 2018, 165-166). Initially, they were not exclusively minted by overarching governmental authorities. Later, their manufacture generally was subsumed by more central governmental institutions, although different metal coins, cast in different forms, were produced by the competing states of this era (Fig. 3). Four basic forms were employed, a small spade, a knife, miniaturized cowries, and a rounded sphere with a square void in its center. Some coins had value that could be used widely, while others served only within specific political realms (VON FALKENHAUSEN 2018, 167). These distributional patterns are indicative of still largely discrete regional market networks that during the Warring States period (475-221 BC) were separated (to varying degrees) by political and topographic barriers (VON FALKENHAUSEN 2006, 214-215; VON GLAHN 2016). Even governmental specifications on the layout of marketplaces varied to a degree from one polity to another (VON GLAHN 2016, 73). These regional economic systems may have

► Fig. 3. Warring states and their currencies.



had independent beginnings during the Bronze Age or even before. SKINNER (1964, 10-16) noted that, many centuries after China's first unification, different temporal market cycles based on entirely diverse bases for marking time remained in use across China, which again may signal long-discrete roots for China's earliest periodic market networks. By the mid-Warring States period, the Chinese word for market was used to define urban marketplaces. However, earlier during the Eastern Zhou period, the same character referenced public gathering places, festival sites, and places for public gatherings (VON GLAHN 2016, 73). Marketplace exchange in China may have its roots in such less formal venues (see BLANTON 2013 for parallel examples from other global settings).

Political and economic shifts fomented a rapid episode of Eastern Zhou period growth characterized at the macroscale (for China as a whole), and in many regions. These demographic shifts included the emergence of larger cities than ever existed previously in China. Linzi, the capital of the Qi state in Shandong Province, encompassed roughly a half-million inhabitants (Fig. 4). Rapid population increases occurred despite the persistent and large-scale warfare of the Warring States era (VON

FALKENHAUSEN 2006, 9). In many regions, cities also were more densely packed and increasingly closely spaced compared to earlier times (VON FALKENHAUSEN 2008; 2018, 162-163); they were linked in economic/market networks that fostered domestic and community interdependence. Market transactions became another key means for funding governance (VON GLAHN 2016, 73). Coins, tallies, sealings, and ceramic inscriptions flourished at this time, a consequence of the greater use of writing in economic transactions (VON FALKENHAUSEN 2018, 167-168). All of these patterns were intensified in the Qin-Han empires, which followed political unification.

China's political unification: Economic implications

Following the Warring States military campaigns, which culminated with political unification under the Qin, many of the fiscal policies and public investments in road building and irrigation facilities that had begun earlier were amplified and spatially extended (*e.g.*, BODDE 1986; YATES 2001; KISER/CAI 2003; SHELACH 2014; FANG

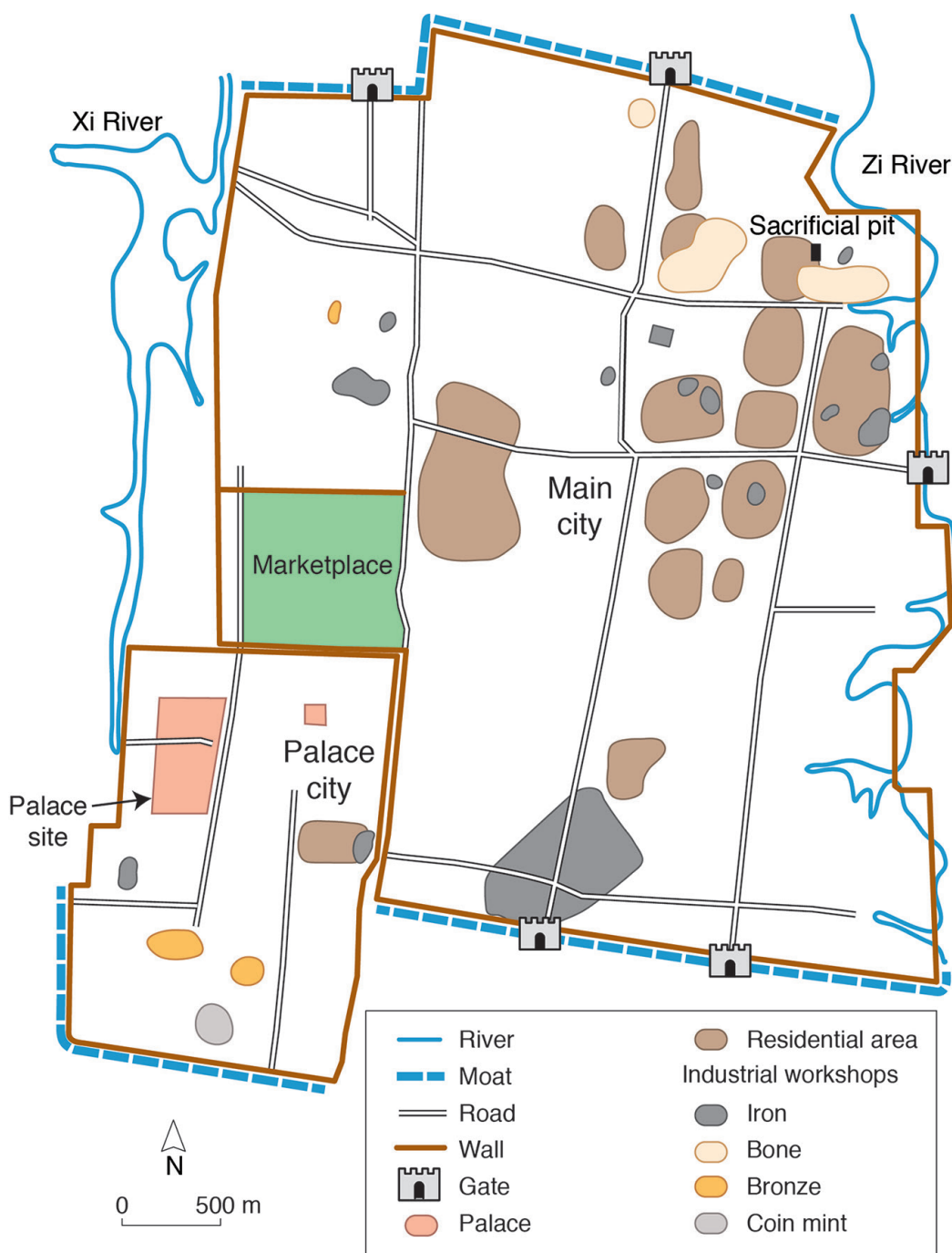


Fig. 4. Archaeological reconstruction of Linzi, capital of the Qi state, showing location of the marketplace and other features (adapted from VON GLAHN 2016, fig. 21).

et al. 2015). The Qin built 6800 km of imperial highways (BODDE 1986, 61; SANFT 2014). Defensive walls constructed to fortify the warring states were breached (SHELACH-LAVI 2015, 312), and populations were encouraged to move into the shatter zones that buffered previously belligerent neighbors (FEINMAN *et al.* 2010). Governmental fiscal foundations continued to rest largely on taxes exacted from an expanded number of agrarian households. Rates were kept relatively low (LEWIS 2015, 284-298).

At the same time, connectivity across China was fostered by specific measures taken to standardize

money, the written script, weights (SANFT 2014, 58-76), and other gauges, including those for time. As with the infrastructural investments, these shifts had significant economic implications. For the most part, the units imposed on the empire were based on those employed by the pre-imperial Qin state. For example, the variable forms of coinage that were used during the Warring States period were abolished with only forms and values based on earlier Qin coins allowed. In 336 BC, even before unification, the Qin polity released the banliang, a coin that asserted their economic autonomy, while the ruling authorities endeavored to replace other



▲ Fig. 5. *Qin iron weight from Henan, with inscriptions of Qin Shihuang's edicts on the unification of weights and measures (weight approximately 30 kg) (wikimedia commons, <https://creativecommons.org/licenses/by-sa/3.0/deed.en>).*

extant monetary forms minted elsewhere. These policies were intensified following unification, and although the efficacy of this standardization effort had short-term successes and setbacks, even the fall of the short-lived Qin Dynasty in 202 BC did not lead to a replacement of the banliang by the subsequent Han empire's dynasts. In fact, the circular form of the Qin banliang with a square hole in the center remained the standard appearance of Chinese coinage throughout the imperial era (WANG 2007; SHELACH-LAVI 2015, 314; VON GLAHN 2016, 99-100).

The formalization of one Chinese written script also was undertaken as a means to integrate governance and facilitate tax collection across the empire. In 221 BC, following political unification, edicts were presented that laid out the standards

for state documents and all communications with the emperor (LOEWE 2007). The script was promulgated across the empire (LEWIS 2007, 53). As with monetary change, the enduring political economic impact was significant. Another edict specified that standardized units for weights and volumes should be employed throughout the empire (SHELACH-LAVI 2015, 314-315). A scoop-shaped, rectangular, bronze container that is inscribed with the name of a political principal of the Qin state and the date 344 BC provides unequivocal documentation that the units used in the First Emperor's mandate followed those of the pre-unification Qin polity. An added text is carved into the base of the vessel, dated 221 BC, and quotes the edict of the First Emperor that proclaims the receptacle a measure of standard volumes (BODDE 1986, 59-60). Numerous Qin measuring vessels for both weights and volumes have been recovered from across China (Fig. 5-6). These are made from a diversity of materials, including ceramic, bronze, and iron. Many are stamped or inscribed with official texts designating their official use, prior to firing. Clearly, these objects were mass-produced and widely dispersed, indications of the intense governmental effort devoted to standardization and economic integration.

These universal standards intensified broad-scale economic connectivity by facilitating transfers across space. A tight web of statutes and oversight regulated official marketplaces, so that even price tags were required for goods more expensive than a single banliang. The number of merchants and the size of marketplaces grew. Qin-Han city sizes increased markedly, and the largest cities had enormous, official marketplaces (see Fig. 4) (BARBIERI-LOW 2007, 118-131). During the 2nd century BC, Han Chang'an (the former Qin capital of Xianyang) had two adjacent market sectors, which together spread over an area of 750,000 m². Smaller markets were arrayed out from central urban hubs, so that these local markets and numerous periodic fairs linked urban areas with rural hinterlands



► Fig. 6. *Qin scoop-shaped measure from Shandong (wikimedia commons, <https://creativecommons.org/licenses/by-sa/4.0/deed.en>).*

(BARBIERI-LOW 2007, 114). Market expansion, likely accompanied by better systems of economic distribution, fostered a growth of the rural populace in addition to the earlier initiated expansion of cities (VON GLAHN 2016, 153).

Even during the 3rd century BC, different calendric reckonings were employed across China (LOEWE 1999, 1014). Both at unification by the Qin and later during Han, key steps were taken to formalize the calendar system (CULLEN 1993; LEWIS 2007, 64-66; MAYHEW 2012, 409) and remove ambiguities that could distort the consistent accounting of time. Although textual accounts enlist ritual and political rationales for these efforts to formalize time over imperial space, the reforms also would have had the effect of synchronizing (*e.g.*, BROMLEY *et al.* 1975; SMITH, R. 1979) periodic market cycles across previously autonomous polities. Since market periodicity was linked to ritual and festival cycles, the formalization of time enhanced and regularized economic participation. By the Han era, governmental officials signaled the opening and closing of marketplaces by striking a great drum situated at the center of the transaction space (VON GLAHN 2016, 152).

At the macroscale, the millennia between the later Neolithic and the Qin-Han empires saw the construction of China as a political entity (FANG *et al.* 2015), one that has endured off and on for much of the last two millennia. Unification was underpinned by significant economic shifts that in turn were rooted in changes in tax policies, public expenditures, the tools of production, and the institutions that facilitated broad-scale exchange and communication. In the subsequent section, we amplify and assess these textual accounts, which mostly are focused on the heartland and totality of China, by narrowing our lens to a region, far from the dynastic capitals, the eastern coast of Shandong Province. Given the scanty record of relevant texts for this coastal area, we rely heavily on the findings from a long-term systematic archaeological survey (UNDERHILL *et al.* 1998; 2008; FEINMAN *et al.* 2010; FANG *et al.* 2015). Although this regional archaeological perspective lacks the detail that often can be derived from ancient documents, it does provide a kind of “grounded record” of the region’s settlement history, the rise and fall of communities (large and small), unfettered by the historical biases of those who won or clung to power and hence commanded the written accounts.

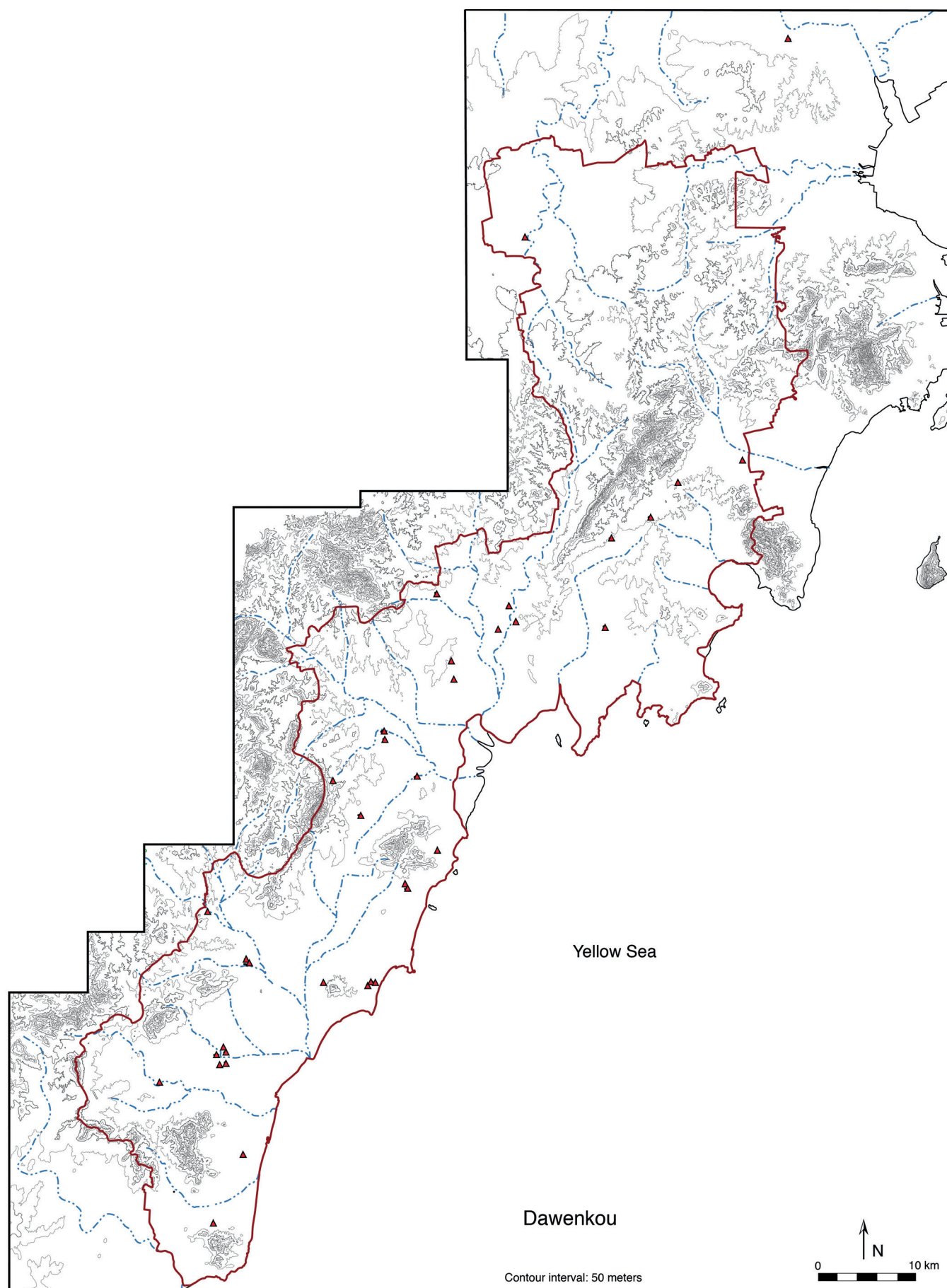
Coastal Shandong: The long durée

The diachronic discussion of settlement shifts in coastal Shandong draws directly on the findings of a collaborative, international settlement pattern project that has systematically walked over an area larger than 2800 km². Although these results have been presented elsewhere (UNDERHILL *et*

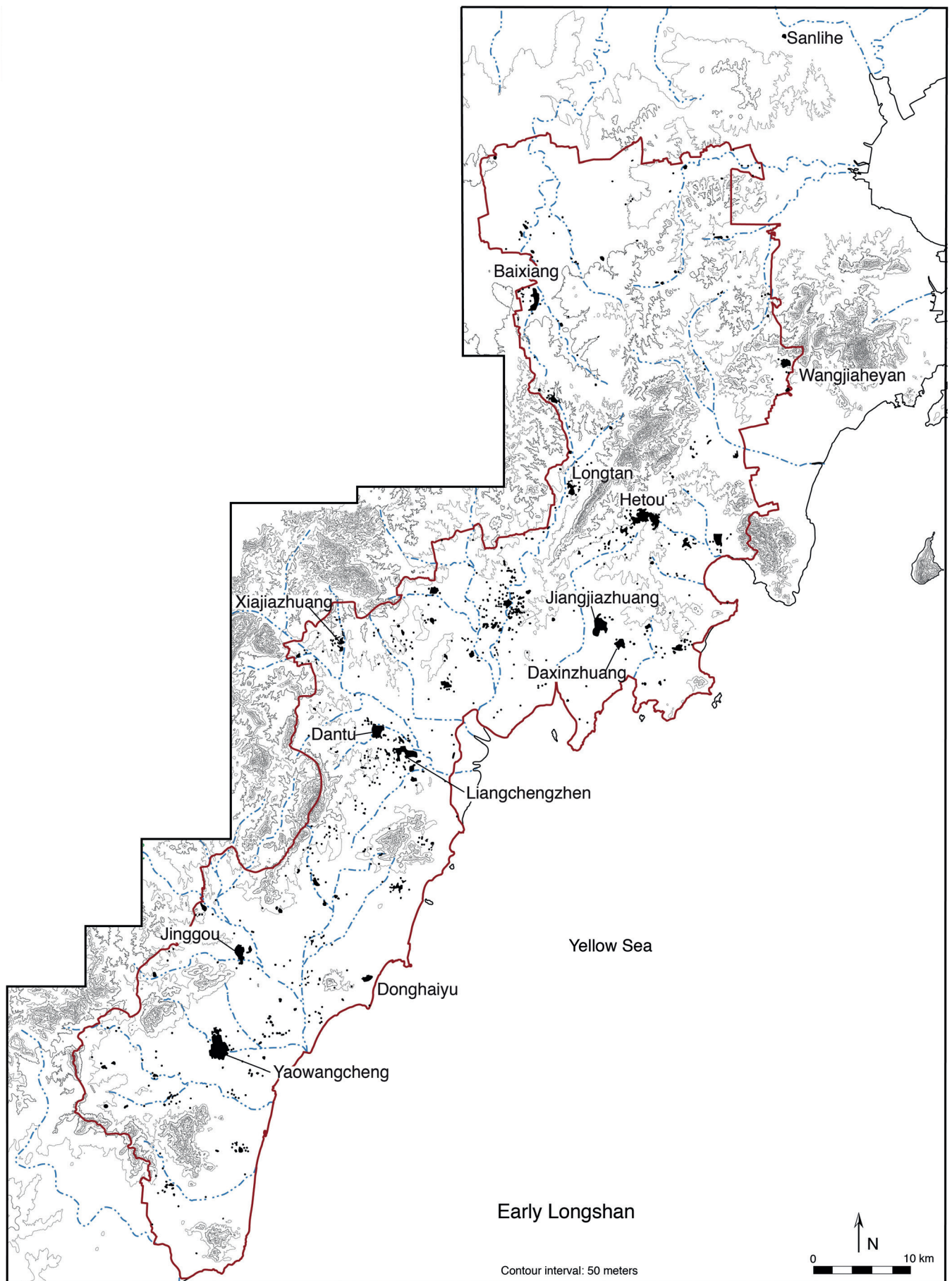
al. 1998; 2008; FEINMAN *et al.* 2010; FANG *et al.* 2015), they are updated here as the study region has been expanded since our previous publications. In addition, slight chronological adjustments have been made to the regional chronology (Tab. 1), which reflects new comprehensive analyses of radiocarbon assays from sites in our study domain and adjacent areas in eastern Shandong (WAGNER *et al.* 2009; LONG *et al.* 2017). We discuss our results in six sequential chronological blocks that are temporally and ceramically distinguishable on the Shandong coast and that roughly correspond to the temporal eras presented in previous sections for the national scale.

Prior to the late Neolithic (3000-2600 BC), coastal Shandong was barely inhabited. Then, during Late Dawenkou (Fig. 7; Tab. 1), farming populations with a suite of domesticated resources and an extant village lifeway inhabited the region and rapidly established a network of communities across this well-watered coastal basin. Over the whole of Shandong Province, this period was a time of rapid demographic growth and spatial expansion (WAGNER *et al.* 2013; HOSNER *et al.* 2016). The spread and growth of sedentary coastal settlement may have been facilitated by lowering sea levels (STANLEY *et al.* 1998; GUO *et al.* 2013) and by existing socioeconomic mechanisms for people to cooperate, likely on a co-residential basis that enabled communities to circumvent hazards such as water-logging and periodic flooding. In our study region, the population grew rapidly from the outset of Late Dawenkou through Early Longshan (Fig. 8), and major centers developed, along with satellite communities of varying sizes that tended to cluster around the large centers (FANG *et al.* 2015).

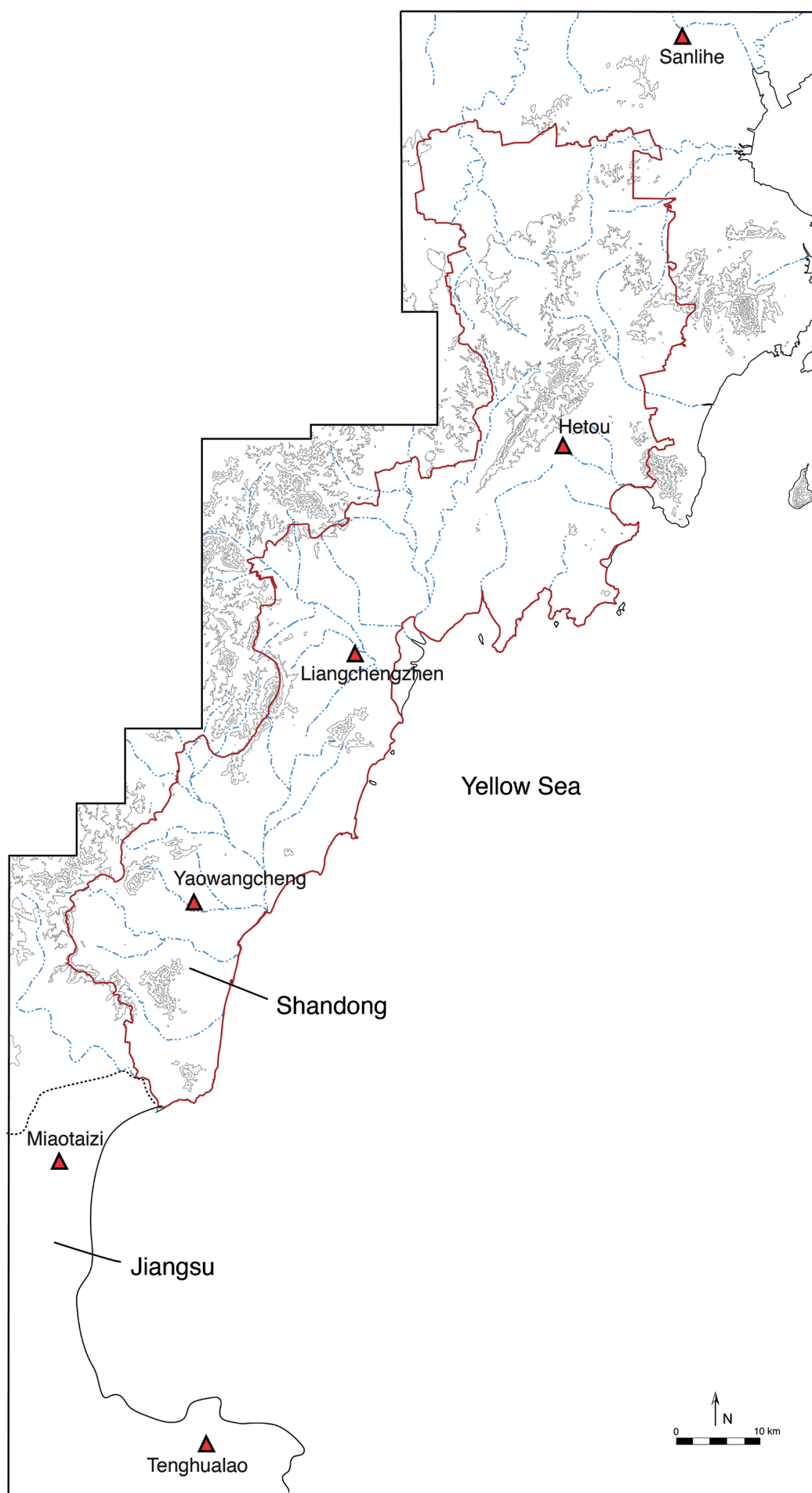
In the investigated area, by Early Longshan, three key central places were established, each roughly 40 km apart. Based on other archaeological findings, there was a linear array of larger settlements (all but the northernmost were evenly spaced), with the southernmost two extending into northern Jiangsu Province (Fig. 9). These communities were central places, part of a coastal tradition largely politically autonomous from other regions of China. During Late Dawenkou and Early Longshan, coastal Shandong was interconnected to other Neolithic coastal regions to the north and south through high-status interaction networks that shared basic elements of jade working and exchange (LIU 2003). In the subsequent Middle Longshan period (Fig. 10), the northern part of our study region was almost abandoned. The center in this sector (Hetou) declined markedly in size, and a kind of low-density buffer zone was created between the Shandong Peninsula (north of our study region) and the southern two-thirds of the investigated coastal basin. Liangchengzhen actually grew significantly in size, and although much of the northern sector was depopulated, the overall Middle Longshan settlement area (a proxy for population) remained close to



▲ Fig. 7. Late Dawenkou settlement patterns in coastal Shandong.



▲ Fig. 8. Early Longshan settlement patterns in coastal Shandong.



► Fig. 9. Map of six Early Longshan centers in coastal Shandong and Jiangsu provinces.

what the Early Longshan settlement area had been. A long-enduring border zone that lasted for more than a millennium was created in the northern part of our study region, and the interaction network along the coast (at least going north) was severed. By the end of Middle Longshan, the directionality of interaction began to shift as links to the west from coastal Shandong increased (LIU 2003). For the first time, jade and white pottery (associated with coastal spheres of interaction) were found in greater abundances on China's Central Plain.

Neither the Shang nor Western Zhou Dynasties directly conquered or had a significant political presence in the coastal basins that we studied (FEINMAN *et al.* 2010; JAFFE *et al.* 2017). We recovered little Shang pottery and the Western Zhou ceramics that we find were almost entirely locally made, more friable than wares produced to the west at that time. Nevertheless, the rise of these large polities and their elite-dominated exchange networks from west to east did coincide with the seeming breakdown of the coastal settlement systems in our region. Both the area's major centers (*e. g.*, Liangchengzhen and Yaowangcheng) and overall regional settlement declined significantly during the Early Bronze Age. Although many Longshan communities were abandoned or decreased in size, new Shang/Western Zhou settlements were established in raised locations at the west side of our investigated area, seemingly overlooking passes into the region from the west. These sites outline (Fig. 11) the more populated part of our area in a protective periphery.

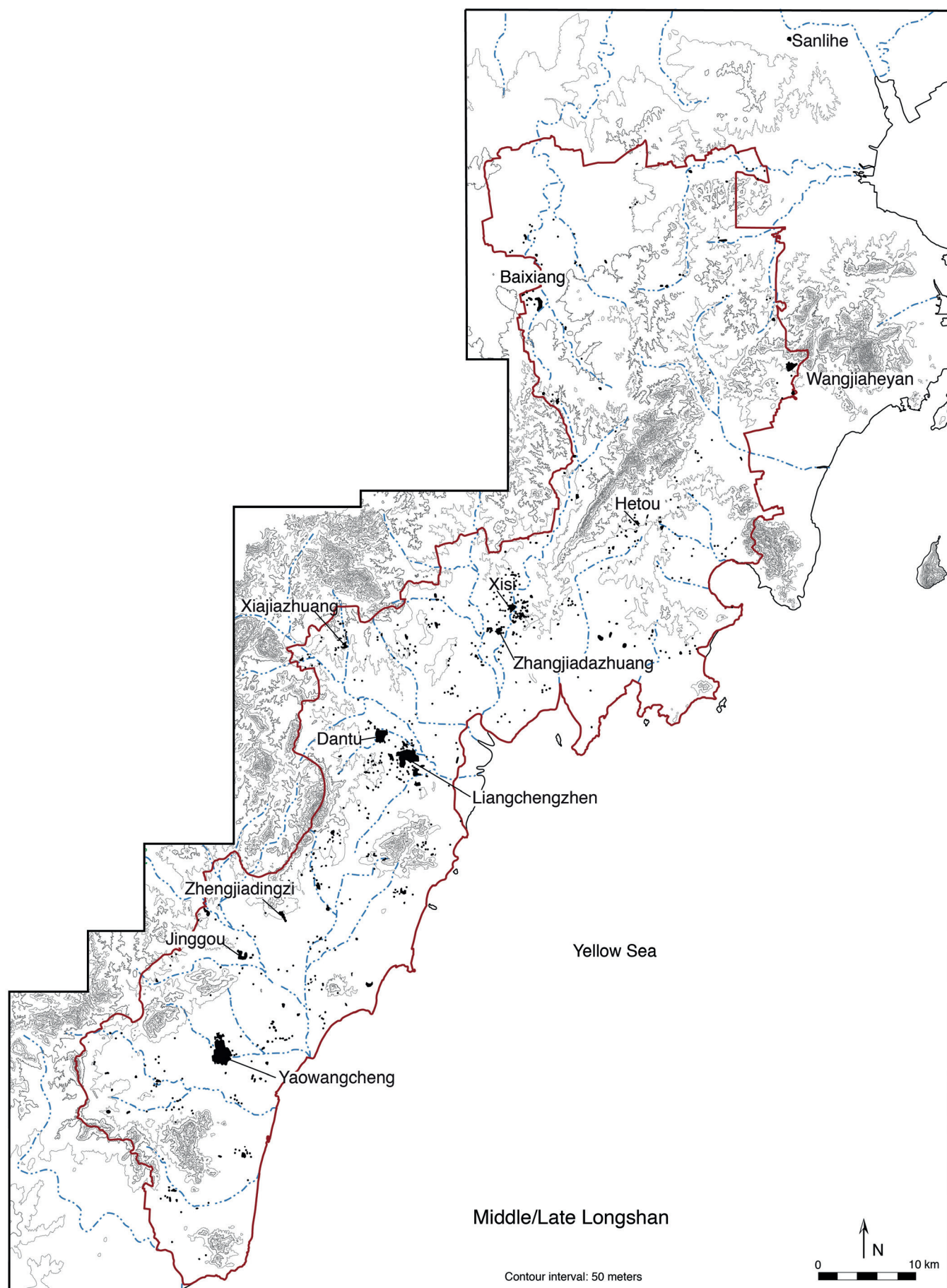
The northern sector of the study region was almost depopulated, even to a greater degree than it had been in Middle Longshan. Yet at the extreme northwestern edge of the current surveyed region, we have in the last few survey seasons recovered and mapped a few Shang/Western Zhou sites (north of the shatter zone) that have pottery more typical of western Shandong Province. These sites, which are on the most direct route (with few mountains) from the Central Plain to the Shandong Peninsula (Fig. 12), may have had more active relations with larger polities that formed to the west. They also would seem to be at the southern edge of a larger polity, whose capital was north of the area we surveyed.

By Eastern Zhou, major settlement shifts again occurred in the coastal study region (Fig. 13). For the first time, it seems that the entire area was engulfed in larger states whose centers were outside the investigated region (FANG *et al.* 2015). In fact, we suspect that while the northern third of our area was incorporated into the Qi state, the southern two-thirds was part of other polities with more fluid boundaries. A significant buffer area, largely unoccupied, continued to be located between the two. Sometime between 770 and 476 BC, the Qi state built a great wall across this shatter zone all the way to the coast, marking its southern boundary. Overall, the Qi wall traversed more

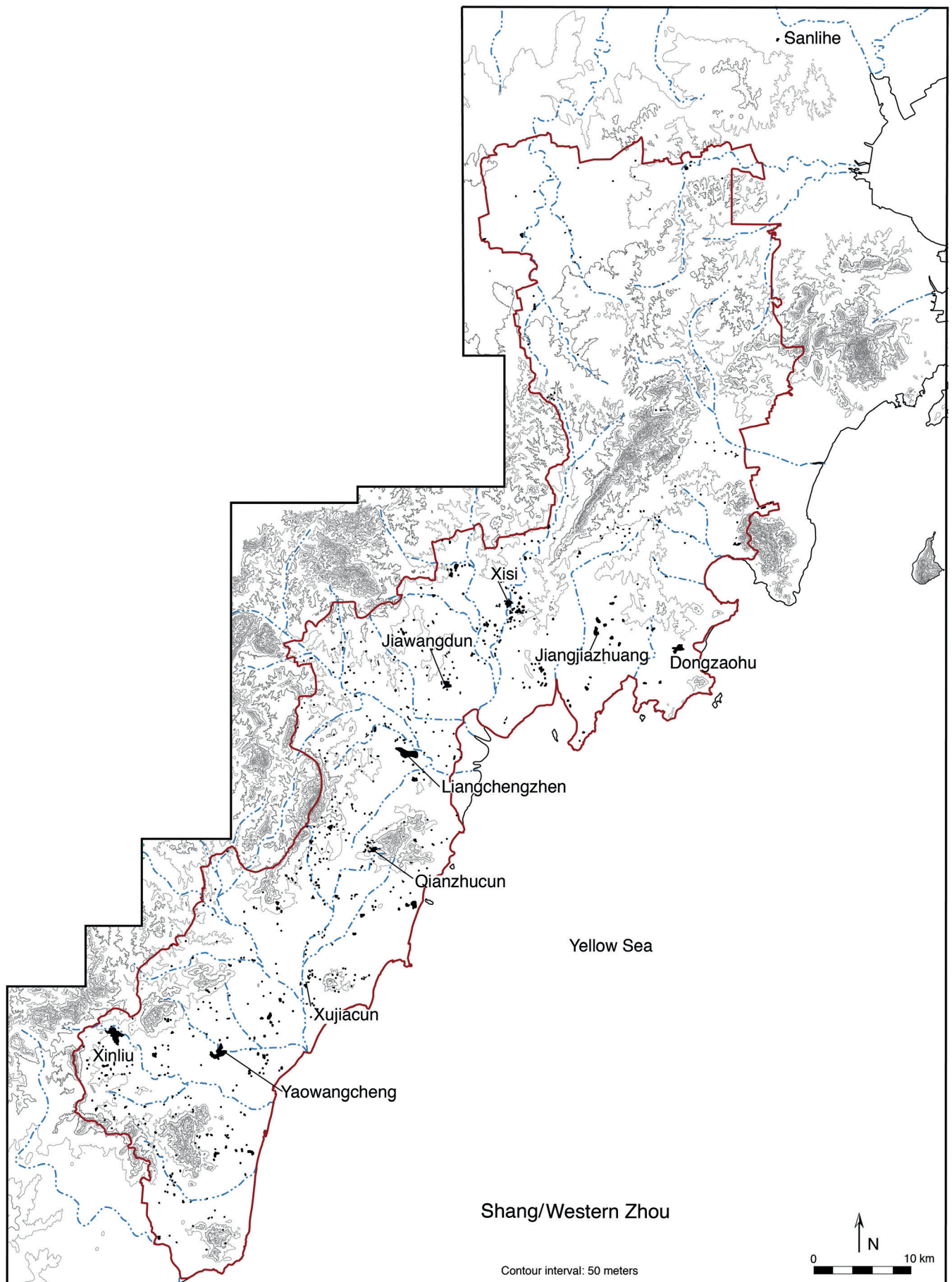
than 600 km and, based on its placement, it clearly was built to block the passage of large armies, characteristic of Warring States era conflagrations (FANG *et al.* 2015). These findings at a microscale conform to the macroscale indications that polity sizes were growing in China, in large part through military conquest, and that regions that formerly were politically autonomous were administratively engulfed by ever-larger polities (LEWIS 1999). In addition, despite the largely empty buffer zone and battle casualties, just as the national population of China as a whole grew during this era, so did the number of sites (and the overall size of occupied settlement) increase in the study region between Western and Eastern Zhou times. The greater number of mid-sized settlement compared to Shang/Western Zhou may reflect the increasing importance of commercial activities across China.

The Qi state was the last Qin conquest in the political unification of China. Soon thereafter, the First Emperor (Qinshihuang) visited the coast, passing through our study area, where he erected a stele to proclaim his rule (BODDE 1986; KERN 2007; FEINMAN *et al.* 2010). Qinshihuang relocated 30,000 families to Langyatai, near the coast and adjacent to the sparsely settled boundary area that had been largely unoccupied for 1000 years. The movement of people to fill an area that had been a cultural, demographic, and political-economic divide was in accord with other programs undertaken by the Qin that were geared toward the integration of this coastal province, and a unified China more generally. They rapidly politically integrated this coastal realm into the Qin administrative sphere, conducting a census and instituting new organizational schemes that were aimed at replacing local with national allegiances (PINES *et al.* 2014, 305, n. 33). An official iron weight, inscribed on year 26 of the First Emperor's reign, was recovered on the Shandong Peninsula north of the surveyed region, a further indication that the former Qi realm was tied into the empire (JIANG/WU 1974).

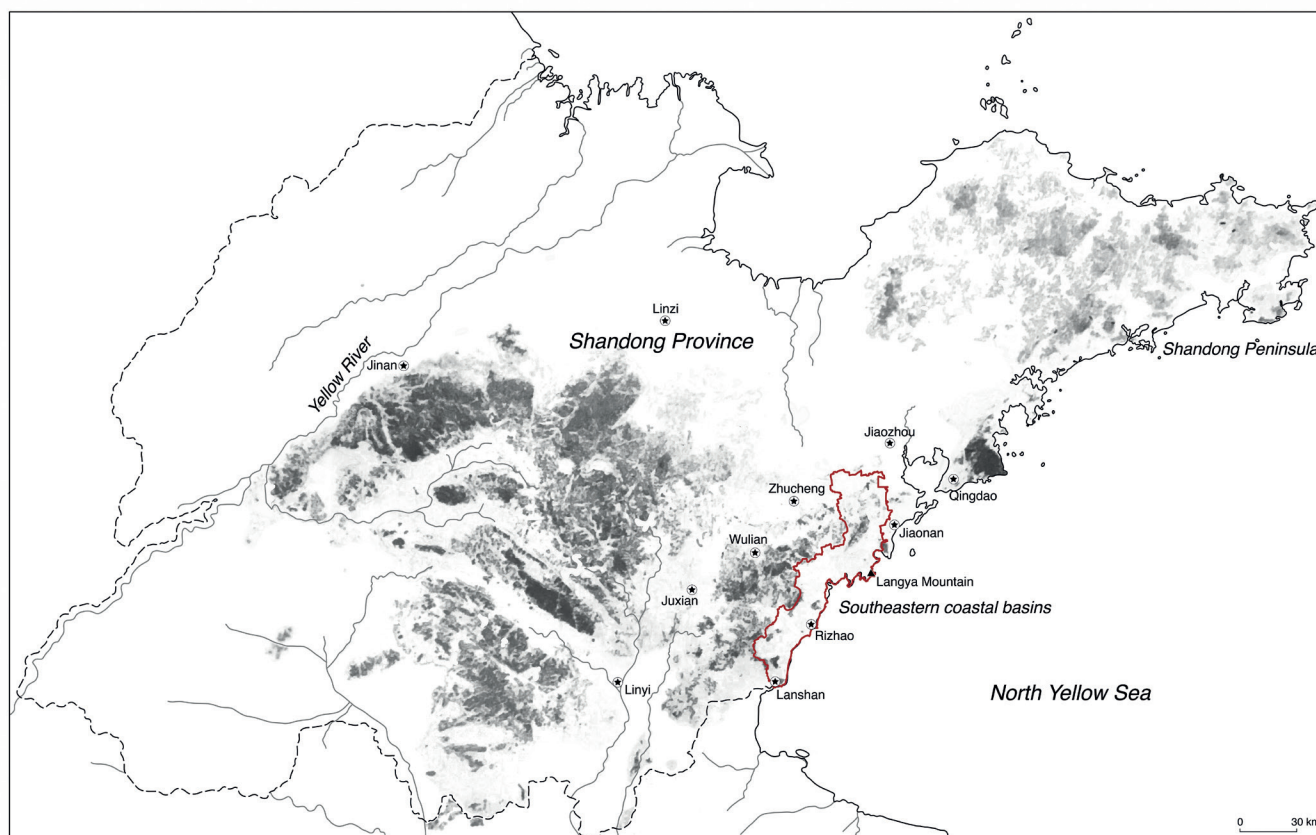
These governmental practices along with the building of roads, the standardization of measures, the script, and currency, and the extension of the market system had a marked demographic impact across our coastal study region (and especially in the former shatter zone) during Qin/Han (Fig. 14). The northern part of this region became the most densely settled, while overall the population grew significantly to much higher levels than at any time previously. Langyatai at this time was 24 km² in extent, and we estimate that it had a population over 160,000 people (FEINMAN *et al.* 2010). A number of towns grew up along natural routes and passes to the west. These second-tier settlements likely served as nodal communities that linked the coast to more inland areas during an era of increasing socioeconomic integration and communication. As at the national scale, the political changes instituted during the late 1st millennium



▲ Fig. 10. Middle/Late Longshan settlement patterns in coastal Shandong.



▲ Fig. 11. Shang/Western Zhou settlement patterns in coastal Shandong.



▲ *Fig. 12. Shandong province with topographic features.*

BC in conjunction with the spread of markets, the advent of iron, and new systems of measurement and communication fomented an unprecedented episode of demographic increase and urbanization in coastal Shandong.

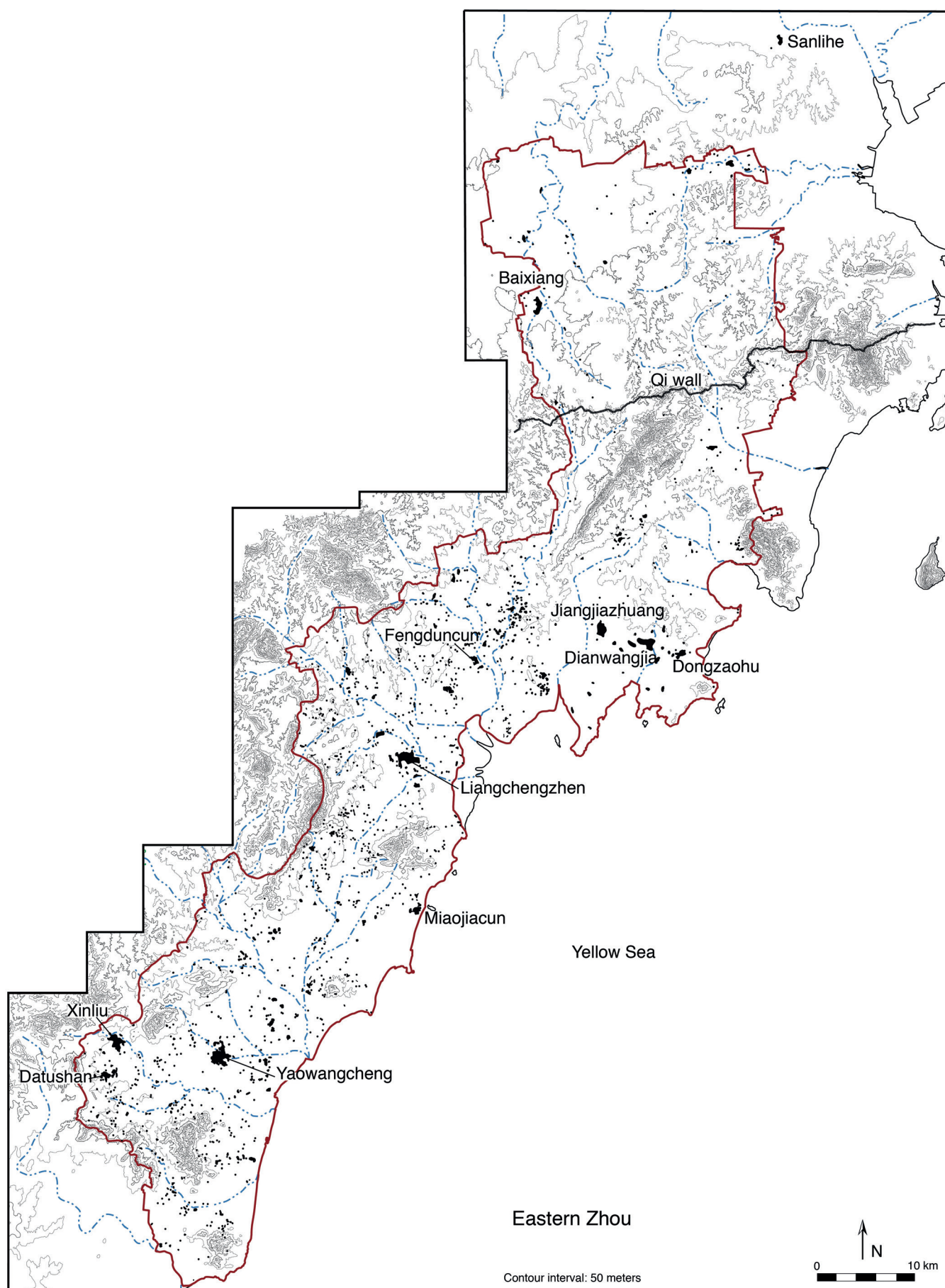
Market expansion and governance: Preliminary observations

In closing, we offer a few observations concerning the coincidence of market system expansion with political unification in early imperial China. In general, when the emergence or expansion of market exchange networks have been considered, traditional vantages (HODDER 1965, 97-98; BLANTON 1983, 55-56; FEINMAN/GARRATY 2010) have dichotomized models that operate either from the top-down (*e. g.*, changes in political factors, long-distance exchange systems) or the bottom-up (*e. g.*, shifts in agrarian production or the “natural” tendency for people to truck and barter). Likewise, often models of ancient economies tend to see state power and level of commercialization as inverse forces (SMITH, M. 2004, 93).

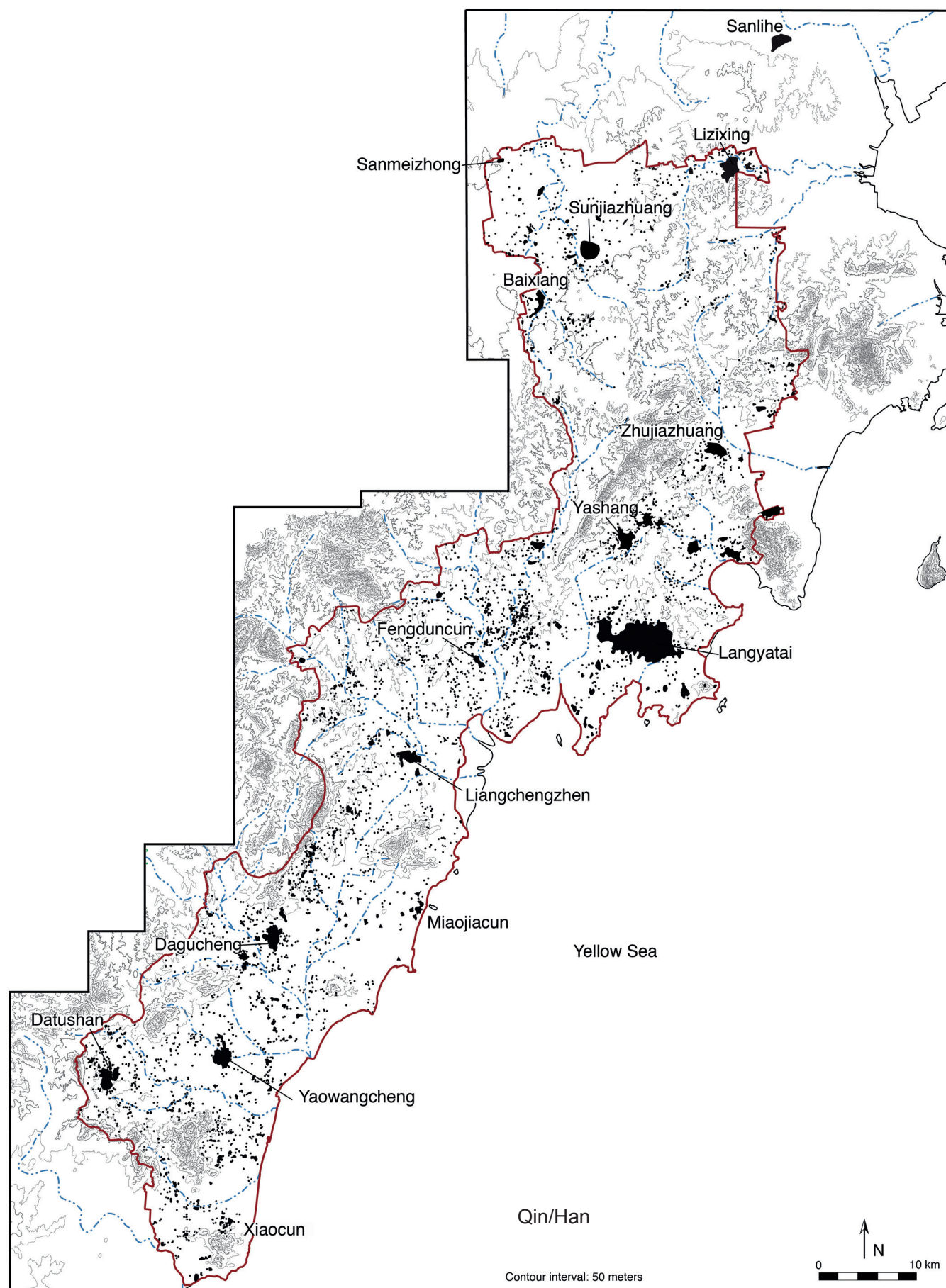
For this episode in ancient China, not only did governmental policies promote market expansion and commercialization, but both top-down, and perhaps to a lesser degree, bottom-up factors were integrally involved. More than 30 years ago, Richard BLANTON (1983, 59-60) outlined policies and

conditions that states could employ to promote the expansion of market systems. Drawing on classic syntheses by other scholars (EISENSTADT 1969; MEILLASSOUX 1971), he proposed that (1) the weakening of ties between agrarian peasants and local patrimonial regimes, (2) the promotion of new marketplaces and fairs under governmental oversight, (3) the establishment of uniform currency, and (4) the breaking down of internal political boundaries were administrative steps that could foster or expand exchange. As described above, beginning during the time of Eastern Zhou, but especially under Qin and Han rule, each of these policies and practices was implemented by ruling authorities, and marketplaces exchange systems expanded and became increasingly important across most of China. Nevertheless, the advent and spread of iron implements, which had a role in increasing yields per unit of land and in expanding the landscape across which cultivation could be practiced, also had a role in this episode of significant commercial expansion.

This era of processual transition was provoked by neither entirely top-down nor bottom-up factors; rather, through a series of administrative steps, new avenues for economic connectivity were opened for householders, and the impacts on economy and demography at local scales and even more widely were dramatic and (to degrees) enduring. Our findings support and extend deeper in time SKINNER's (1985) observations concerning later Imperial Chi-



▲ Fig. 13. Eastern Zhou settlement patterns in coastal Shandong.



▲ Fig. 14. Qin/Han settlement patterns in coastal Shandong.

na that governance and commercial processes were intertwined, and that administrative investment and actions that broadly benefit a population's opportunity to make a living facilitate economic growth (see also BLANTON/FARGHER 2016, 248-249). "[I]n the course of the dynastic era the state manifests systematic changes in military power and effectiveness, in administrative efficiency, and in fiscal strength and stability. When the Chinese state was performing well on these fronts, it was in effect providing an environment that favored economic growth" (SKINNER 1985, 281).

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Addresses of the authors

Gary M. Feinman
Integrative Research Center
Field Museum of Natural History
1400 South Lake Shore Drive
Chicago, IL 60605
USA
gfeinman@fieldmuseum.org

Fang Hui
Institute for Cultural Heritage of Shandong Province
Shandong University
Jinan, Shandong Province
China
fangh@sdu.edu.cn

Linda M. Nicholas
Integrative Research Center
Field Museum of Natural History
1400 South Lake Shore Drive
Chicago, IL 60605
USA
lnicholas@fieldmuseum.org

Rural markets in West Africa. An ethnographic and phenomenological approach

by HANS PETER HAHN

Regional markets, ethnography, market activities, commodification, gender

In West Africa, markets are among the oldest and most widespread institutions of society. At the same time, they are very popular institutions because, in addition to their function as a place of trade, they also have a high social significance. Markets are embedded in society, but still maintain their autonomy. Within this dynamic, market traders defend themselves against state regulation and develop their own spatial and temporal arrangements. This article presents some data on market practices in West Africa, based on ethnography, and describes the roles of market participants. Michel Callon's theory of the market provides the theoretical framework of this study, focusing on the actions of market participants. In fact, in Africa it is possible to distinguish between long-distance markets with mainly professional traders and local markets. In addition, there is a clear differentiation of gender roles: Local markets are dominated by women as traders, whereas men are more likely to act as consumers. The materiality of the markets is not very significant. Many market stalls are of rather provisional character, some of are only used temporarily. A clearly visible expression of the markets is the network of paths whose structure clearly refers to the central locations, i. e. the markets. Even if ethnographic data indicates that the markets are embedded in the sense of Polanyi's theory, a well-balanced presentation also requires reference to their autonomy, especially because of the ability of retailers to decide on times, product ranges and prices.

Ländliche Märkte in Westafrika.

Welche Kriterien sind für eine angemessene Beschreibung erforderlich?

Regionale Märkte, Ethnographie, Markthandeln, Kommodifizierung, Gender

In Westafrika gehören Märkte zu den alten und weit verbreiteten Institutionen der Gesellschaft. Zugleich sind sie sehr populäre Einrichtungen, da sie neben der Funktion als Ort des Erwerbs von Gütern auch eine hohe soziale Bedeutung haben. Märkte sind zugleich in der Gesellschaft verankert, behaupten aber dennoch ihre Autonomie. So wehren sich die Markthändler gegen staatliche Regulierung und entwickeln ihre eigene räumliche und zeitliche Ordnung. Der vorliegende Beitrag entwirft ein ethnographisch fundiertes Bild der Marktpraktiken und beschreibt die Rollen der Marktteilnehmer. Den theoretischen Rahmen dieser Studie bildet Michel Callons Theorie des Marktes, die auf das Handeln der Marktteilnehmer abhebt. Tatsächlich ist es in Afrika möglich, zwischen den Fernhandelsmärkten mit ihren professionellen Händlern und den lokalen Märkten zu unterscheiden. Zusätzlich ergibt sich eine klare Differenzierung der Geschlechterrollen: Lokale Märkte werden von Frauen als Händlerinnen dominiert, wohingegen die Männer eher als Konsumenten auftreten. Die Materialität der Märkte ist von wenig dauerhafter Natur. Viele Marktstände sind provisorisch erbaut und werden zum Teil nur temporär genutzt. Ein deutlich sichtbarer Ausdruck der Märkte ist hingegen das Wegenetz, dessen Struktur deutlich auf die zentralen Orte, also die Märkte verweist. Auch wenn es Indizien für die Einbettung der Märkte im Sinne Polanyis gibt, verlangt eine umfassende Darstellung auch den Hinweis auf deren Autonomie, insbesondere wegen der Möglichkeiten der Händler, über Zeiten, Warenangebot und Preise zu entscheiden.

Introduction

What is a market? Whenever the concept of market is at work, we are dealing with a bundle of phenomena, ideals and norms that are often loosely linked or even contradictory. Looking at the history of this concept, it is obvious that it has an expansive moment (CARRIER 1997). Talk of the 'market as actor' or the 'market as a fundamental structure' is spreading. It takes hold of new areas of society almost every moment. Simultaneously, however, this expansion is viewed critically. Critique is not only directed at new uses of the word, but also at the question of whether behind current usage, there is an idealizing and purifying, but problematic image of symmetrical exchange and relations of equivalence between market participants. The ever-increasing relevance of the concept of the market and the tendency to consider 'market' as something universal makes it difficult to understand its specificity in the present and with its focus on Western societies (FRIEDLAND/ROBERTSON 1990). Therefore, it is appropriate to investigate the role of markets in societies where 'market', at least in its central function, *i. e.* the economy, plays a much less prominent role.

By strategically adopting a perspective from the margins, *i. e.* the perspective of an economically marginalized society, this contribution seeks to question and better contour some common sensual assumptions about fundamental phenomena of the market. It deliberately does not focus on economic functions. Rather, this chapter presents a critical appraisal of current market theories in the light of some of empirical findings from the author's ethnographic field research in Burkina Faso between 1993 and 2003.

However, the starting point chosen here for observing concrete market activities in West Africa also brings along certain problems and uncertainties. Which actions can be reliably attributed to the market? What other events take place at the market without the function of the market being included? The problem of inadequately demarcating functions is an issue for much of the available ethnographic observations.

For the purpose of ethnography in this article, space shall be placed at the centre. The observable is given priority, without meaning thereby, that this is the only possible approach to markets. In this line, this contribution follows the anthropological tradition presented by Kirsten ENDRES (2018) in an overview article. According to Endres, ethnographic approaches to the market are often based on the documentation of events observable in space and time. There is no such thing as the 'ideal type' of the market, but one always has to deal with specific social, cultural and political contexts (ENDRES 2018, 3).

What does a market do with the people involved? How do markets change society and what limits

can a society permanently set for the market? These are the questions that are intensively discussed in the more recent literature from cultural studies with regard to markets. The work of anthropologist and network theorist Michel CALLON (1998; 2016; 2017; CALLON/MUNIESA 2005) forms an important basis for any ethnographic approach to the market, and especially for the observations presented in this contribution. According to Callon, the market is first and foremost an institution that has a sustained impact on the actors involved by assigning them very specific roles and actions. This approach, informed by practice theory, is a highly appropriate basis for the purpose of ethnography, because it does not use any abstract relationship (*i. e.*, economy, profit, equivalence), but focuses on the activities that can actually be observed. In this framework, observation is easily considered as the key to description. When members of a society participate in the market, they are given specific roles. Each of these roles is associated with a set of habitual activities, competencies and demands. This applies equally to consumers as potential buyers, to retailers as potential sellers and finally to market supervisors. Each of these roles is associated with special skills and a specific interest in the market.¹ Alongside these social and professional roles, the transformation of goods into commodities is another relevant topic. What happens at the moment when an artefact or foodstuff becomes a commodity on the market?²

On the basis of the ethnographic data presented in the following sections these questions can only be partially answered. Considering the limitations of ethnographical findings, it is obvious how much more difficult it is to find empirically founded answers to such questions in the field of archaeology. Nonetheless, these questions are an important contribution, when the target is to move away from a purely functional approach to market phenomena. They enable the observer to leave aside questions about ideology, efficiency and performance and, for the purpose of the ethnographic analysis, to perceive the market first and predominantly as a place of certain habitual forms of action.

This approach therefore refrains from searching for universal market rules. Instead, in the sense of a phenomenology, an attempt is made to go 'back to the things themselves' (HUSSERL 1901). This means, the

1 The assignment of roles to the market players is also part of Clifford GEERTZ (1978) conceptual framework. When he deals with the 'bazaar economy' as an ideal type (GEERTZ 1978, 29), he is rather critical: the market participants are - according to his concept - antagonistic players who intent to prevent the flow of information. The less the individual knows, the greater his willingness to respond to the conditions set by his counterpart.

2 In addition to the thoroughly convincing theory of Callon ('An object becomes a commodity after it has been divided into uniform portions. A market takes place by creating lists of these portions of goods', *cf.* CALLON/MUNIESA 2005, 1231), one could also refer here to the history of consumption.

goal is to identify as many observable facts as possible and to provide interpretations that respect the coherence between the different observations.

Thus, this article aims to show how traders and consumers on the markets in West Africa understand this institution as part of their life-world. The regional historical background is only briefly touched upon. Instead, the focus will be on the relevance to everyday life and the social embedding of the market. The aim of this approach is to understand markets as part of local cultures, whereby the question about the possible meanings of 'embedding' is given special attention. The actions resulting from the role assignments are in the foreground, not their normative or social-structural classification. This last aspect would in any case be a controversial topic in an ethnographic study: it would probably hardly be possible to obtain unanimous views from all participants on the appropriate evaluation of the market.

Markets in West Africa

The following section gives some basic information about the history and the current forms of markets in the sub-region, *i. e.* West Africa. In this area, including the west African savannah from Senegal to Cameroon and from the Gulf of Guinea to the Sahel, the centrality of markets as a social institution is undisputed. It is an institution that has been established in this region since many centuries.

The anthropologist and economic historian Mahir Saul, one of the best experts of markets in West Africa, has presented different forms of markets in various publications (SAUL 1986; 1995; 2018). Some of his observations are surprising: In West Africa, for example, there is no direct connection between city formation and markets for long-distance trade. As SAUL (2018, 140) describes, there were already such markets at considerable distance from settlements in the Middle Ages. To this day, this special type of market resides in places that have few permanent inhabitants. In addition, there are also local markets, which are almost always closely linked to localities, to villages or to cities. Mahir Saul has repeatedly pointed out the fundamental differences in the region between the long-distance trade markets on the one hand, and, local markets on the other. It should be noted that, by looking only at merchandise, a sharp separation is impossible. At least today, certain long-distance goods, especially cattle for slaughter and specific field products (rice, yams), are also bought and sold on the local markets. Due to zonal differences in the West African climate, the area of production is often many hundreds of kilometres away from the place of consumption. Slaughter cattle are usually traded from north to south, while yams are traded in the opposite direction (SKINNER 1962; BREUSERS 1999).

The distinction between large markets for long-distance trade and smaller markets dedicated to the provision for everyday needs can be found in one of the oldest publications on markets in Africa. The overview by Willy FRÖHLICH (1940) rightly draws attention to a peculiarity that has been confirmed ethnographically many times and that is of particular importance for a praxeological approach: While the local markets are dominated by women, the large markets of long-distance trade are reserved for men (FRÖHLICH 1940, 242). This holds true in the light of ethnographic observation, although – as will be shown in this contribution – it needs further differentiation.

According to Mahir Saul, the old tradition of markets in West Africa is not linked to the logic of capital accumulation. His central argument amounts to the linking of price-forming markets on the one hand and political control on the other. Markets, whether for long-distance trade or local, can only exist if local authorities protect the places, the people and their belongings. In precolonial times, political control could be exercised by a *Naba*, a ruler of the Mossi (Burkina Faso), or by a warlord, for example the *Tchokossi* in today's Togo or the *Zaberma* (Northern Ghana). Without such protection, long-distance traders with their caravans would not have had any realistic chance to bring their goods to the destination.³ Markets or caravan bases (*Zongos*) are dispersed in the landscape like knots in a network, although with quite unequally wide meshes. The camel caravans as well as caravans with men as carriers had only a limited range, depending on regular provisioning. Therefore, they required a sufficient number of bases for a rest and eventually the changing of the carrying animals. The spatial distribution of such bases (*Zongos*) or markets was already investigated and documented by geographers since the 1970s (HETZEL 1974; MAHN 1980). In this context one can describe the distribution of these important points of reference also as a spatial network (HAHN 2018, 13).

The 'local markets' can be clearly distinguished from the long-distance trade markets. Their clientele comes from within a maximum radius of 25 km. These rural markets are not so much dedicated to valuables, but rather to everyday supplies. Farmers bring their products to obtain money, which in turn is needed for school, medicine or taxes. Retailers bring goods they have bought on the larger markets. It is on these small local markets that the focus shall be in the following ethnographic description. Although it is based exclusively on observations made in the central south of the Republic of Burkina Faso, this kind of market is a widespread phenomenon in the region. Similar markets can be found everywhere in West Africa between the Senegal and Cameroon.

3 The Wangara are considered to be the oldest historically documented group of traders in West Africa. This name has been associated with long-distance trade since the 11th century (MASSING 2000). See also LABAZÉE (1993).

A rhythm of three or four days applies to these markets (HIRSCHBERG 1929). This rhythm coheres to a system of rotation so that neighbouring markets always take place on different days. Some craftsmen and retailers visit several such markets one after the other to promote their products.

The framework of my ethnographic research

The following section shortly describes some of the core issues of the research carried out in Burkina Faso, and especially the focus that enabled me to deal with markets. My research is dedicated to economic conditions in rural areas; and markets initially played a marginal role. The starting point was rather the domestic economy: collecting annual budgets of farming families and analyzing the work invested in maintaining houses and fields (HAHN 1997; 2000; 2003; 2005). Secondly, crafts were examined (HAHN 1999). Then, the study was oriented towards the economic exchange relations within kinship groups and, fourthly, the significance of labour migration (HAHN 2004; HAHN/KLUTE 2007). Only towards the end of the 8-year research period did markets become a focus of research.

The marginalization of the market activity has been a rule throughout the history of anthropology. The reason for this probably is a prejudice, deeply embedded in the tradition of ethnographic research in West Africa. Polly HILL (1968) has addressed this problem with her studies in Northern Nigeria. Generally, ethnographers assumed that in an agricultural region there are basically equal production conditions in all households. The hypothesis is that the careful study of one or a few 'production units' provides the essential information about a settlement or a region as a whole. Markets seemed to be of no relevance in such a system. This assumption turned out to be a mistake, as markets play a considerable role also among farmers.

As explained here with reference to M. Saul, the importance of markets in West Africa is deeply rooted in the history of the region. In the context of subsistence farming, which dominates in rural areas, these markets' economic role is marginal. In case of economic crisis, one's own production is regarded as basic support for everyday needs; visiting markets is not regarded as an indispensable economic activity (HEERMANN 1981). In addition to the households' own production, neighbourly help and the direct purchases of handicrafts from the producer are regarded as important alternatives to become a buyer in the market. In anthropology, the coexistence of market and subsistence triggered debates early on, starting with Paul BOHANNAN (1955; 1959), who emphasized the destructive role of money (and the market). He was convinced that markets are a threat to subsistence production. In more recent critiques of Bohannan's thesis, it was repeatedly emphasized that there is a longstanding

coexistence of commodities (= consumption) and subsistence (ELWERT/WONG 1979; KNISSEL-WEBER 1989). M. Saul's position also assumes a fairly stable coexistence of different economic structures in the region.

Going to the market: Perspectives on commodities and money

This section reports some ethnographic observations from markets and links these findings to the existing literature. Special attention is given to the evaluation of the market participants, *i. e.* 'consumers'. However, the term is not appropriate here. As will be shown, those who come to the market to buy, are usually also selling something. Consumption is much less an everyday routine than one might expect from a European background.

When it comes to registering a child for school, when a family member falls ill and needs medicine, or when preparing for a trip to the next bigger city, farmers go to the market to 'buy money'. Usually, they then bring along chickens, goats or cattle from their own livestock. Sometimes they also bring a bag of corn or millet in order to sell it.⁴ At first glance, 'buying money' may be perceived as an articulation of a contradictory or incomplete view of the functions of money. As a matter of fact, among farmers in the region, there is a deep-seated mistrust of coined money, which in early colonial times - partly with the help of coercive measures - displaced older forms of money such as cowry shells or iron rods (LEMARCHAND 1989; SAUL 2004a; 2004b).

Being the owner of cash money is considered as a risky status, if only because of the subsidiary relations in the network of neighbourhood and kinship obligation for mutual support. The 'illiquidity preference' described by Marin TRENK (1991, 513) for West Africa emphasizes the avoidance of money possession among the rural population. It is considered better to keep assets in the form of livestock, because it is not lendable. Instead of owning money, it is better to lend money that is currently available, because, as a creditor, one can fall back on the services of the borrower.

Distance and mistrust towards money influence the decision to sell field products or just to do without commercializing them. There are clear rules about what can be a 'cash-crop' with regard to the products of the fields and especially the so-called house fields (HAHN 1997). In a more pragmatic sense, the preference not to own money is also articulated in the immediate spending of available money. This can mean going to the pharmacy

⁴ The following descriptions are a summary of the ethnographic observations in southern Burkina Faso, Tiébélé in 1997-2003. The observations are based on regular market visits, pre- and post-market conversations in the neighbourhood and the mapping of two marketplaces.

immediately after visiting the market in order to buy the medicine, or to go to the school teacher in order to pay the school fees immediately. It is not uncommon that people spend available money on the very same day they get it. Consuming alcoholic beverages and prepared food on the market are other widespread practices that make people empty their pockets before returning home. Furthermore, such practices contribute to the stimulation of the markets especially in the afternoons.

Another reason for the low acceptance of the functional dimension of coined money and banknotes is related to the transition from local forms of money to governmental money. This had been enforced by the colonial administration in the first half of the 20th century (SAUL 2004b). Older local forms of money still play a role today. The cowry already mentioned are kept in almost all households, handed over in the context of bride price payments (together with money) and are regarded as an appropriate mode of storing wealth. Nevertheless, money has assumed parallel functions in many areas, including its importance at funerals or, in perforated form, as paraphernalia (PALLAVER 2015).

Despite scepticism about money, the appreciation of market activities can also be seen in the widespread exchange practices in rural regions of West Africa. It is not uncommon for women to bring along millet in order to exchange it against important ingredients of the daily cuisine, like small amounts of salt or palm oil. Usually there are fixed volume ratios: four times the volume units of millet for one unit of oil, ten times the quantity of millet exchanges against one unit of salt. While the mostly urban female traders know that they make a considerable profit with these exchange ratios as soon as they sell the millet they have acquired, in rural areas they especially attract those customers who neither come to the market with money nor want to 'buy money'. If these women had money – even if only for a short time – they would be afraid of being approached by neighbours, friends or relatives and asked for a loan.

In addition, mistrust of money is indicated by the places where it is kept. Those who have money on the market use at least two different places for keeping it: one of them is a purse, or simply a knot in the piece of cloth worn as a skirt. The other place is an additional cloth bag, which is carried under the underwear. In order to keep the possession of money out of the eyes of the market visitors, some beer sellers have the habit of tossing larger coins into the 40-l pot filled with beer. The yet unsold commodity hides the money they earn and makes it invisible to other market visitors. No one should know if and how much money the seller has earned.

The 'invisibility' of money has further unintended consequences for every single purchase or sale. The problem of a lack of change money regularly arises in these small markets. Too many participants come to the market without any cash and

expect the trading partner to bring suitable coins for change.

In summary, it can be said that 'money' plays a rather minor role in these markets. This goes hand in hand with at least an ambivalent evaluation (one mistrusts money) and avoidance strategies: Going to the market without money is just as common as returning from the market without money. Bartering and the 'hiding' of money (*i. e.* in the huge beer pot) are observations in support of this interpretation.

Gender: Men and women as sellers and buyers

For practically all products available on the markets, selling and buying is normatively allocated to men or women. Men sell and buy animals, especially poultry (chickens, guinea fowls), they are dealers in bicycle parts, flashlights, batteries and other technical equipment. Professional male traders sell salt, tobacco and cola nuts, as well as the already mentioned cowries. However, men as sellers and buyers represent a minority among the market visitors. Only in the afternoon, when the social aspects are in the focus, the share of male visitors becomes dominant. Many come in the hope of getting some alcoholic beverages for free. Only men visit the market without any intentions to buy or sell, because they have the social dimension in the foreground.

Women as traders dominate the central areas of the market. This is the area where you find pavilions, protective roofs made of corrugated iron or straw standing on posts. The ladies usually spread out their goods on the floor, which has been carefully cleaned beforehand, by arranging the goods into small piles on mats or cloths that they have brought with them.⁵ Women predominantly sell loose, unpackaged food, especially sauce ingredients like dried fish, *Maggi cube*, beans, Bambara groundnut (*Voandzea*), cereals and other crops. Grains and field crops are brought to the market in bags or large flat enamelled tin bowls and left at the market stall. For measuring the units of sale, there are containers, mostly calabash bowls or others, made of plastic. The tradeswomen bring along the appropriate bowls, according to the volume units customary on the market. Wholesale in cereals is dominated by women, who hire lorries for such goods and visit markets during the harvest time in order to buy millet (*Sorghum* and *Pennisetum*), rice and maize in large quantities (Fig. 1).

In addition, women sell prepared food, bean cakes, peanut oil, peanut paste delicacies and fermented locust beans (*Parkia biglobosa*). Women

⁵ The scenery of carefully piled onions, tomatoes or other sauce ingredients is closely corresponding to Callon's abstract description presented in the initial section of this chapter. As a matter of fact, making stuff accountable is the basic activity in order to transform it into a commodity.



▲Fig. 1. Female cereal trader. At particular moments in the year, women join the small rural markets in order to buy large quantities of millet.

also offer soap and other body care and beauty products. Similar to bulk food, soap and other household products (cosmetics, sponges, washing powder in small bags) are stacked in an orderly and appealing way. The customers for such goods are also women. In addition, women sell beer brewed from sorghum. In accordance with the gendered divisions within the market, women (as sellers) and men (as buyers) engage in transactions only in very specific constellations, for example selling and consuming beer. Conversely, women occasionally buy goods from men, who offer bicycle parts or the blacksmith who sells self-made knives.

In addition, some women in West Africa are craftspeople. They sell the homemade ceramics, like bowls and pots and other items of everyday use, such as mats and brooms, but also self-produced charcoal and firewood. The latter, however, are sold at the edge of the market. All these products are considered marginal commodities in terms of the prices demanded and the small profits to be made.

Geraldine SCHMITZ (2018) highlighted the special role of women in the internal organisation of markets. On the basis of her ethnographic research in Tamale (Northern Ghana), she identified a dual structure that is at work on most local markets in the region: on the one hand, there are the state and local authorities, who represent both the administrative control and the ritual activities on the market. These tasks are mainly executed by men. On the other hand, there are the highly respected market-women, who are responsible for the spatial arrangement of the stalls, the times of sale and selection of goods, and – to a limited extent – the prices. These self-conscious women point out that – without their impact on the organisation – the market would not function. Finally, activities on local markets, whether as a beer seller or a trader in foodstuff, is a way for women to achieve a certain level of prosperity.

In summary, it can be said that the market is structured by gender roles which are heavily influenced by the option to act as retail salesperson.

Especially for women, it is a social field of relative autonomy that also provides economic advantages (McMILLAN 1987). While men tend to associate the market with consumption opportunities, women's participation in the market, whether as traders or buyers, is associated with prestige. Going to the market is a question of social recognition.

Local markets with regard to time and space

Adding on what has been described with regard to money, commodities, and the gendered structure of the market, the following section will deal with further market phenomena. In accordance with the existing literature, the rhythm of markets and the related spatial structures are described.

Writing on the Yoruba in Nigeria, Walter HIRSCHBERG (1929) explains in detail the close connection between the local calendar and the previously discussed order of the market days. Markets in the region rotate in a rhythm of three or four days (Fig. 2). Market days are considered as not appropriate for important other activities, especially working in the fields, construction *etc.* Thus, markets structure the flow of time, independent of the seven-day week imposed by the global monotheistic religions (Christianity and Islam alike).

Furthermore, there is an internal structure of market days that organises the daily routines. This begins with the roads, streets, and pathways that are taken in the morning on the way to the market, and back in the afternoon or evening of the same day. Walking distances of one to three hours are not uncommon, and it is often women in particular, who cover such distances with heavy goods as payloads. For some of them, in order to reach the market at 10 a.m., it is necessary to leave at dawn in the morning.

While livestock is mainly sold before noon, the general market activity usually reaches its peak at midday. Later, from 3 p.m. onward, many women leave the market again. In the late afternoon consuming beverages and social gathering are the most important activities for men. Those who visit a market only in the afternoon are the subject of contemptuous talk: Serious market visitors should have come earlier to do their purchases or sales. Those who come late give priority to drinks and sociality.

Apart from the weekly and daily routines, the most important parameter for the rhythm of the market is that of the year. Depending on the season, the market has a completely different shape. During the rainy season, in the months from May to September, markets are hardly busy at all. In sharp contrast to this, plenty of people visit the markets during the harvest time (Oct.-Dec.), because the farmers then sell part of their harvest. At this time, local and long-distance trade mix in a specific way. On the one hand, cereal traders come with their trucks to buy millet grains (Pennisetum and Sor-



▲ Fig. 2. Distribution of rural markets in the vicinity of Tiébélé. In the map markets are indicated by a 'M'. The rhythm defines that every third day is a market day. Lô and Tangassoko are the first day, Guenon and Kaya the second day and Tiébélé and Boungou on the third day.

ghum) alongside other crops; on the other hand, traders come with industrially produced consumer goods that are rarely seen on these small markets during other times of the year. Bicycles are on sale, as are enamels and printed fabrics.⁶ Jewellery in various price ranges is temporarily in the range of offered goods, such as bottled beer, shoes and many other household goods, which buyers in the rural areas are only able to buy a few weeks a year. During these months, the market also becomes the place where news circulates.

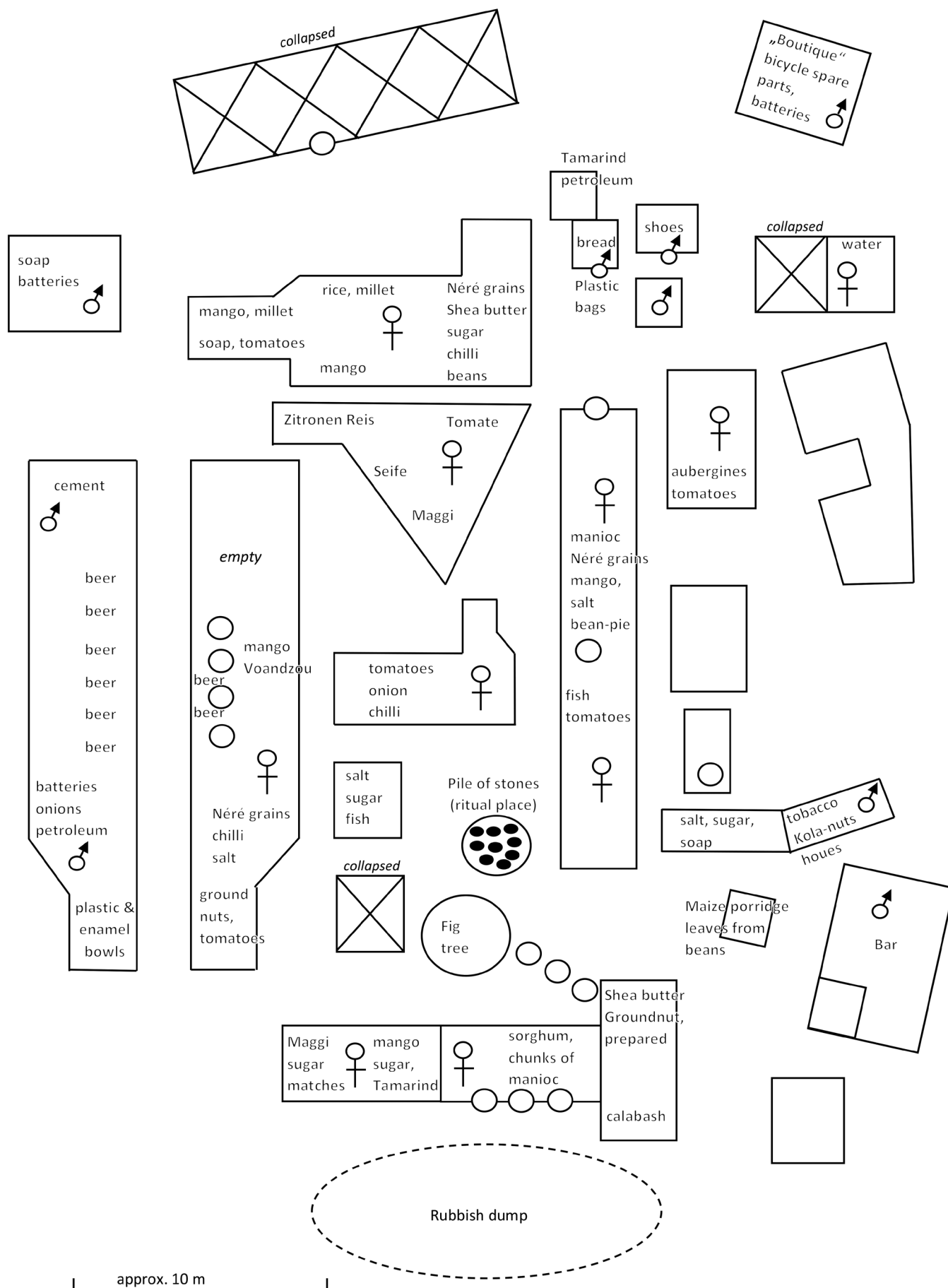
After the harvest, when the fields are bare, the dry wind from the North (Harmattan) gradually transforms the landscape. The period from January to April is dominated by the highly popular commemorative funerals, which can be evaluated as the most important social events in local society. Preparations for these festivals include market activities, for example because animals need to be bought for slaughter. People buy fabrics for their individual festive clothing. As the people in the villages explained repeatedly to me, "the market is

depending on the funerals". If such a festival falls on the market day, only few people will attend the market. (People say: "The market has been eaten by the funeral".) But if the market day is shortly before the funeral, it will certainly be crowded by numerous visitors.

Similar to the general market activity, sales of various kinds of craft products heavily depend on the season. For some products, limitations of the availability of raw material apply. Thus, pottery women can find clay and burning material only during the dry season. The same applies for the special grasses needed for the fabrication of mats (*Andropogon purpureum*). This can only be found in December and January. By contrast, the blacksmith is at the peak of his activities shortly before the agricultural season begins, *i. e.* in April to June, because charcoal is cheapest then and the demand for agricultural tools is high.

The period from January to April is also the moment when young people return from work in the plantations and big cities in the South. As a rule, they take advantage of a visit to the market to boast themselves and the goods brought along. Only upon posing with their new possessions do they confirm their status of a 'successful return migrant' (HAHN 2007). Thus, the market is not only a cen-

⁶ In a historical perspective, consumers in Africa have always shown a high interest in novelties. If there is any constant in the 'African consumer behaviour', then this is about the persistent curiosity and the readiness to appropriate innovative products (HAHN 2008).



▲ Fig. 3. Plan of the market of Tangassoko (as of Feb. 2001).

tre of economic and social activities, it also serves as a platform for communicating individual status changes.

In matters of spatial order, there is a shrine at the centre of most markets in West Africa, dedicated to the market itself (Fig. 3). The above-mentioned gender order is expressed in such a way that men are responsible for the regular sacrifices in this place. In order to prepare for this, they have to collect small shares of every commodity from the predominantly female sellers. Therefore, sacrifices for the market shrine usually consist of small portions of the foods sold. Suppliers of non-food items or beauty products give money instead. If a conflict has occurred in the market, eventually even with violence and injury, a greater sacrifice is needed in order to restore market order. The animal required for this greater sacrifice will be bought with the money collected and saved. This can take the form of a few chickens, a goat or a sheep. The market shrine is considered to be the seat of a local spirit that watches over the integrity of the market. It also ensures sufficient turnover and profits, as well as harmonious interaction between retailers and their customers.

Quite frequently the market is protected by trees that provide shadow and shelter against heat and rain. In some cases, one of these market trees is associated with the shrine, and the well-being of this tree is considered as an indicator or the spirits good surveillance of the market. Typical market trees are Neem (*Azadirachta indica*) and Fig (*Ficus spec.*), but other species also occur.

The spatial centrality of a market in the landscape can be seen very clearly from aerial photographs: numerous routes lead from all directions to the market (or away from it). While other central locations, such as houses of political officials, or 'palaces' of traditional leaders, are characterised by protected areas and follow the double logic of accessibility (*e. g.* in a reception room) and hermetic isolation, rural markets are always fully accessible. There are no restricted areas; even the central sectors in which women dominate are open to all visitors.

However, the centrality of a market outlined here is primarily visible in the network of roads and pathways leading to and from the market, and secondarily in the complete permeability of different areas. In sharp contrast to this, the architecture of the facilities, the pavilions mentioned above, have nothing special or outstanding. They are not particularly durable, so that some women – in the morning of a market day – have to look for a helper in order to rebuild, repair or stabilise their shelter. All in all, such pavilions range broadly in size: Some smaller structures offer a shady place only for 1-2 dealers; other large ones can accommodate up to 20 market stalls (Fig. 4).

The role of the state can also be seen here. As a result of 'market development' programs, many rural markets have received well-built pavilions with steel girders and corrugated sheet metal roofs. However, it is not uncommon for women to avoid



the usage of these installations. They prefer to use the self-maintained pavilions made of wood and thatched roofs rather than move and then pay a market tax. Therefore, the state administration's access in the form of a market tax can at best be described as 'incomplete'. As pointed out in the last section, women rely more on their ability to organise themselves and try to bypass or overrule the influence of the regional administration.

With regard to society as a whole, markets undoubtedly constitute central institutions. This centrality can not only be seen in the spatial arrangement of the related pathways; it is also expressed in the self-confident resistance to attempts at control or structural change.

Conclusion: Are markets in West Africa 'embedded institutions'?

The spectrum of everyday routines, as well as the debate about the implementation of social roles, are indicators of the deep embedding in the local society. Markets are – well beyond their economic function – part of society. Beyond buying and selling, markets encompass a whole range of socially acknowledged practices. This starts with the gender order (who buys or sells what?) and can also be seen in the daily routines: When do which activities dominate the market?

The notions of prestige and economic profit through participation in the market are expressions of a specific cultural orientation. Several and also some important roles are clearly assigned to women, especially on the rural markets of West Africa. In contrast, market control is a contested field in which the male-dominated political sphere meets the female sphere of self-organization. Another important dimension is the religious embedding of markets. Each market has its own protective spirits and sacrificial places, which entail various regular activities. In this field the cooperation of all

▲ Fig. 4. Stall for plastic and enamel pots, dishes and bowls. The pavilions are simultaneously places for trade activities, shelter against the sun and places to gather and to exchange about news.

participants, the market organisation as well as the saleswomen is required. It is safe to conclude that specific fields of activities do exist on these markets. However, it would be a problematic oversimplification to assume – following Geertz – that these roles are always of antagonistic character.

Spatial organization is an obvious aspect of embedding. One of the most stable material and spatial phenomena is the system of roads and pathways, each of which has a market at its centre. The market itself, on the other hand, is variable in its size. Its structural features, *i. e.* the pavilions, are at least partly non-durable. Some parts of the market, in particular the areas for the sale of livestock and handicrafts, have no structure at all. Moreover, in addition to stable elements (pavilions with concrete foundations and corrugated iron roofs), there are also many quite short-lived structures: sales tables, simple racks for the presentation of fabrics, pavilions with thatched roofs. Within months, the appearance of a market can change fundamentally.

Buying and selling practices do constitute a domain with quite a few phenomena that are exclusively associated with. The range of goods on offer changes several times a year. New goods – for example beauty products or technical equipment (bike parts, radios, mobile phones *etc.*) – are easily introduced into the market and quickly receive their place in the gender order. The constant change in the range of goods on offer is accompanied by a low visibility of trading activities. Coined money and, in pre-colonial times, money in the form of cowry certainly was and is of central importance. But it is not visible. A tendency to hide it, to not let the property be recognized, or to avoid it altogether, can be described as an attitude typical for these markets.

Following Callon's basic definition of the market as a practice to establish standardized 'units', the dominant mode of measuring goods in West Africa is the use of bowls with a fixed volume. Alternatively, such 'units' are determined by counting (*e. g.* for soap, for sauce ingredients, but not for cereals). The devices to measure are cups or calabash bowls. These items are also used in everyday life, and therefore the dedicated use on the market cannot be recognized without observation in context. It can thus be said that the economic function provides hardly any visible phenomena. The visibility of the market is linked to its social role more than to any other domain.

At first glance, these characteristics make the markets appear to be typical examples of the 'embedded markets' as defined by Karl POLANYI (1944; 1957). Social and political control is high, market access and trading activities are limited. Similar to what MÜTZEL (2009) noted for the effects of 'talking about market' in Europe in the 21st century, one can also assume for the rural markets in West Africa: the discourses on the features of the market have more defining power than the actual trading activities.

At the same time, however, it should be noted that Mahir Saul, being the best expert on the history of these markets in the region, vehemently resists the paradigm of the 'Great Transformation' and rejects the application of Karl Polanyi's concept for West African markets. Saul justifies this, as already mentioned at the beginning of this chapter, with the historically long-lasting, stable coexistence of very different market forms. Polanyi's basically evolutionary notion of a gradual and irreversible 'Great Transformation' of economic activities fits badly with the historical findings. Thus, we have to ask once again: Are the markets embedded or are they not?

In addition to Saul's (predominantly historic) argument, two ethnographic observations speak against the concept of an original embedding and the irreversible evolution towards 'price-defining markets':

1. The market actors obviously defend a certain autonomy. This applies especially for the women, who claim to define the structure of the markets and at least partially evade from the administration's influence.
2. The coexistence of barter and the use of money refers to a particular disdain for coined money. It is not true that people do not have knowledge about money. They rather reject it, because it has no advantages for them. There is no linear development towards a more intensive use of money; the heterogeneity of the forms of trade seems to be an adaptation to the values of the local population.

Consequently, providing a coherent interpretation for the market in West Africa confronts the anthropologist with a paradoxical finding: on the one hand, there is control and, thus, there are also indicators of embedding. On the other hand, there is an autonomy of the market, which, contrary to Polanyi's hypothesis, has prevented the implementation of capitalist principles. The markets in West Africa should therefore be seen as hybrid institutions. On the one hand, they are social and cultural institutions; but, on the other hand, they also defend their autonomy from society, and follow a specific social and economic rationality.

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Address of the author

Hans Peter Hahn
Institut für Ethnologie
Goethe-Universität Frankfurt
Norbert-Wollheim-Platz 1
60323 Frankfurt am Main
Germany

hans.hahn@em.uni-frankfurt.de

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- abstract, *ca.* 200-300 words (German and English)
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- authors' names and full postal contact/affiliation details and an email address

Layout – basic information

- The text should be submitted in an MS Word file (.doc or .docx), OpenOffice file or Rich text file (.rtf)
- Times New Roman 12 pt, 1.5 line spacing, left-justified, words should not be divided by syllables, no page numbers, no paragraph formatting (*i. e.* no indentations)
- authors' names for citations in proper SMALL CAPS, *italics* for emphasis or Latin expressions, super-/subscript numbers for chemical formulas *etc.*
- in-text cross-references for own figures in brackets, *e. g.* (Fig. 12,7.10)
- dashes and hyphens: short dashes (-) to connect compound words (*e. g.* Saale-Eiszeit) and to signify „from ... to ...“ (*e. g.* 50-60 m); long hyphens (–) for inserted thoughts and to signify distances (*e. g.* Göttingen–Kassel)
- Headings remain unformatted; please note their hierarchy with <<HL1>>, <<HL2>>
- Avoid footnotes. Exceptions are, for example, acknowledgements *etc.* When footnotes are included, they should be used as follows: if a footnote refers to a single word or group

of related words, the superscript numeral should be placed directly after the last word (*i. e.* before a potentially following punctuation mark). If the footnote refers to a complete sentence, or a part of a sentence that is enclosed by punctuation marks (*e. g.* full stop, comma or semicolon), the superscript numeral should always be placed after the last punctuation mark

Abbreviations in the text

Abbreviations in the text should, if possible, be avoided. In tables, for example, established abbreviations should be used. We would ask you to adhere to the following abbreviations (especially at sources):

app.	=	appendix – exception: cross-references (App. 1)
BC, AD	=	before/after Christ (no full stops)
<i>c.</i>	=	cum
<i>ca.</i>	=	circa
<i>cf.</i>	=	confer
<i>e. g.</i>	=	exempli gratia (with space)
<i>et al.</i>	=	et alii
<i>etc.</i>	=	et cetera
fig.	=	figure/figures – exception: cross-references (Fig. 1)
<i>i. e.</i>	=	id est (with space)
n.	=	note/notes
no.	=	number/numbers
pl.	=	plate/plates – exception: cross-references (Pl. 1)
tab.	=	table/tables – exception: cross-references (Tab. 1)
vol.	=	volume

Units of measurements are also abbreviated (5.00-6.70 m; 15 %; 25 g; 12.80 m², 16,000 km²), have a space after the last digit, with the exception of „x“ (5.00 m x 7.80 m) and should be used consistently (the pit is 5.00 m long, 4.70 m wide and 0.05 m deep); the measurements should be expressed with the same number of decimal places.

Fractions should be expressed as special character (*e. g.* ½ or ¼). Complex fractions (*e. g.* 7/8) could be converted by the editor ⁷/₈. Please mark these.

Citations, references and illustration credits

Literature references should appear in the running text.

Short titles consist of authors' surnames and year of publication, page numbers, figure or table numbers (if applicable) – separated by commas:

(BÄRENFÄNGER/ZIMMERMANN 2012, 6, 17, 20, fig. 25,8, pl. 40,7, 25,3.5-8.27, 30,4.7.10-14)

If multiple authors are cited they should be separated by a semicolon, ordered by year of publication in ascending order; multiple publications of the same author in one citations only require the year of the next publication after the semicolon:

(BÄRENFÄNGER 2012, 14-17; 2014, 300, fig. 25; 2018, 25-30; MELLER 2016, 60, fig. 20,8-10, 22,9.12, pl. 20,7)

(DUNAND/ZIVIE-COCHE 1991, 117-119; ASSMANN 1994; BELL 1998, 135-137, 163-172, fig. 85,7-10.12.15-28)

Page numbers should always be given in full (MÖLLERS 1999, 506-532).

Short titles are given in full in the bibliography.

Bibliography

The bibliography should only contain publications cited in the text.

Format and punctuation should follow the examples provided below.

The bibliography should be organised in alphabetical order; multiple publications of the same author in the same year should be differentiated with lowercase letters; name affixes (van, de ...) are not included in the alphabetical order:

RAHMSTORF 2016a

Rahmstorf, L., From 'value ascription' to coinage: A sketch of monetary developments in Western Eurasia from the Stone to the Iron Age. In: S. Krmnicek/C. Haselgrove (eds.), *The Archaeology of Money. Proceedings of the 'Archaeology of Money', University of Tübingen, October 2013. Leicester Archaeological Monographs 24* (Oxford 2016) 19-42.

RAHMSTORF 2016b

Rahmstorf, L., Die Rahmenbedingungen des bronzezeitlichen Handels in Europa und im Alten Orient einschließlich Ägyptens. In: U. Dietz/A. Jockenhövel (eds.), *50 Jahre „Prähistorische Bronzefunde“ – Bilanz und Perspektiven. Internationales Kolloquium, 24. bis 26. September 2014. Prähistorische Bronzefunde XX, 14* (Stuttgart 2016) 291-310.

VAN DRIEL/VAN DRIEL-MURRAY 1979

van Driel, G., van Driel-Murray, C., *Jebel Aruda 1977-78. Akkadica 12*, 1979, 2-28.

For publications with multiple authors their names are separated by: a slash without spaces in the short title (more than 3 authors: *et al.*); a comma in the full citation:

VRDOLJAK/STAŠO 1995

Vrdoljak, S., Stašo, F., *Bronze-casting and organization of production at Kalnik-Igrišće (Croatia). Antiquity 70*, 1995, 49-91.

WANG *et al.* 2016

Wang, Q., Strekopytov, S., Roberts, B. W., Wilkin, N., *Tin ingots from a probable Bronze Age shipwreck of the coast of Salcombe, Devon: Composition and microstructure. Journal of Archaeological Science 67*, 2016, 80-92.

Journal titles and series are not abbreviated.

„In:“ is followed by the name of the editor; multiple editors should be separated by a slash without space and marked (eds.) (or (ed.)).

Generally, care should be taken to ensure the completeness of citations (journals and line numbers).

Capitalisation rules for references in English language should follow these guidelines (compare University of Oxford Style Guide): https://www.ox.ac.uk/sites/files/oxford/media_wysiwyg/University%20of%20Oxford%20Style%20Guide.pdf

1. Sentence capitalization for all book section, article, conference paper, lecture, conference session titles
2. Headline capitalization for books, journals and book series, conferences
3. Within category 1, the following things are capitalized: broadly-recognized proper nouns: Central Asia, Middle East, North Africa – but eastern Mediterranean, northern Syrian, ancient Near East

Page ranges should be expressed entirely in numbers (*e. g.* 200-265) and not with f. or ff.

The place of publication should be given in the language of the publication; only the first place of publication should be named:

BASS 1991

Bass, G., Evidence of trade from Bronze Age shipwrecks. In: N. Gale (ed.), *Bronze Age Trade in the Mediterranean. Studies in Mediterranean Archaeology 90* (Gothenburg 1991) 69-82.

BROGAN 2006

Brogan, T., Tipping the scales: Evidence for weight measurement from the wider Neopalatial community at Mochlos. In: M. Alberti/E. Ascalone/L. Peyronel (eds.), *Weights in Context: Bronze Age Weighing Systems of Eastern Mediterranean: Chronology, Typology, Material and Archaeological Contexts: Proceedings of the International Colloquium, Rome 22nd-24th November 2004. Studi e materiali 13* (Rome 2006) 265-292.

RIST 2002

Rist, C., A new look at Old World money. *Discover Magazine 23*, 2002, 42.

ROBSON 2007

Robson, E., Mathematics, metrology, and professional numeracy. In: G. Leick (ed.), *The Babylonian*

World. The Routledge Worlds (New York 2007) 414-427.

Unpublished Master/Magister thesis or PhD dissertations should be noted in brackets:

HAHNER 1984

Hahner, A., Altenritte – eine hallstatt- und latènezeitliche Siedlung in Nordhessen. Untersuchungen zu den Befunden und Funden der Ausgrabung von 1932 (Magisterarbeit Universität Göttingen 1984).

SMITH 1999

Smith, C., The market place and the market's place in London, c. 1660-1840 (PhD dissertation University London 1999).

Digital media can only be cited if they have a URN of the Deutsche Bibliothek (www.ddb.de) or an alternative Persistent Identifier (*e. g.* DOI), which guarantees a persistent URL; the date when the medium was last accessed (...) should be given before the full stop:

SCHMALFUß 2007

Schmalfuß, G., Das Gräberfeld Battaune, Kr. Delitzsch in Sachsen. Ein jüngstbronzezeitliches Gräberfeld der Lausitzer Kultur – die Ergebnisse der Grabungen von 1974/75. Leipziger online-Beiträge zur Ur- und Frühgeschichtlichen Archäologie 29, https://www.gko.uni-leipzig.de/fileadmin/user_upload/historisches_seminar/02urundfruehgeschichte/Online_Beitraege/OnlBei29.pdf (accessed 24.06.2018).

TOWELL/ATOLLINI LECÓN 2009

Towell, J. L., Atollini Lecón, A. (eds.), Caminos y Mercados de México (México D. F. 2009). Available online, <http://www.historicas.unam.mx/publicaciones/publicadigital/libros/caminosymercados/mercados.html> (accessed 24.06.2018).

Copyright permissions to use and reproduce images/data have to be obtained by the authors; the table of figures should list the names of the creators of drawings and photographs.

All maps, plans and artefact illustrations must contain a scale; When a calculated scale is used and the image has been formatted in relation to the abovementioned width, the scale can be provided in the caption. Maps and plans should further include a North arrow.

Captions

Figure captions should usually be in the following format:

Fig. with continuous numbering. Information about the figure (Source: short title without from, after, source *etc.*; People with abbreviated first and last name, (if applicable) institution).

Fig. 6. Rectangular weights. Typology and distribution. 1-9: bronze; 10: lead; 11-15: stone.

Fig. 7. Types of goods sold in the marketplace. Note the circle glyph for the marketplace in the lower left corner (modified after SAHAGÚN 2008, 1336).

Fig. 8. The primary climatic zones and resource zones of Mesoamerica: The Pacific and Gulf Coasts, Tierra Caliente 0-1,000 msl, Tierra Templada 1,000-2,000 msl, Tierra Fria above 2,000 msl (HIRTH 2013, fig. 4,9).

Fig. 9. Aerial photo of the site of Kultepe from north-east (photo c. 1988; courtesy F. Kulakoğlu, Ankara University).

Figures and tables

General information

Figures are all drawings, photographs, maps, plans, tables and diagrams that are included in the text.

Tables should be submitted as individually numbered Word files (as Excel files cannot be formatted).

Maximum print space is 176 mm x 252 mm. Possible widths for figures and tables are: 36 mm, 67 mm, 107 mm, 138 mm and 178 mm (Fig. 1).

Figures specifications

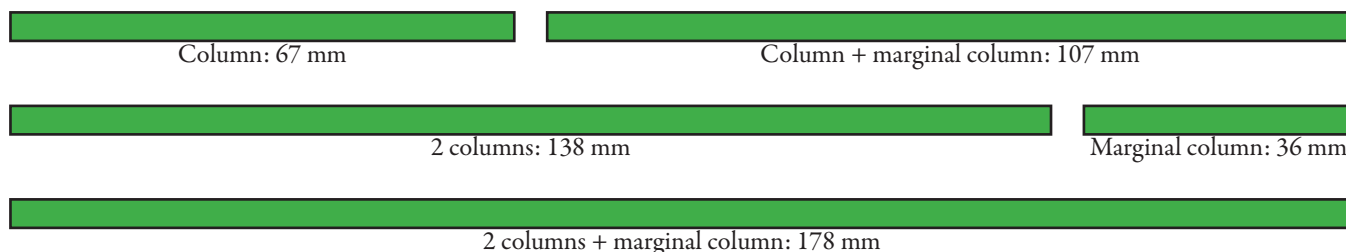
Text in figures should be kept as brief as possible (annotations and legends can be included in the caption) and should be uniform for all figures.

Artefact illustrations on plates should be aligned horizontally and vertically to the frame.

All files have to be compatible with InDesign, Photoshop or Illustrator.

Please submit digital images (raster images) as .tif, .bmp, .psd, .eps or .pdf files; avoid .jpeg or .gif; vector graphics should be submitted as .pdf or .ai files.

▼ Fig. 1. Possible widths for figures and tables.



For scans at the scale of 1:1 a minimum resolution of 300 dpi (for the intended reproduction size!) is required for photographs (colour and BW).

For clear line drawings, *e. g.* AutoCAD plans, a scan as BW line drawing at a scale of 1:1 with a minimum of 1200 dpi is recommended; for drawings with different coloured gradation, *e. g.* artefacts, a scan in grey scale with a minimum of 600 dpi (800 dpi is better).

Proofs

After an initial review you will normally receive a pdf file with technical corrections as well as comments to solve any questions the editor may have.

When the layout is finished, you will receive a pdf file containing the thus created pages to correct any printing error. Changes to the text or figures can then no longer be made.

Contact

Lorenz Rahmstorf
Seminar für Ur- und Frühgeschichte
Georg-August-Universität Göttingen
Nikolausberger Weg 15
37073 Göttingen
Germany

E-Mail:
lorenz.rahmstorf@uni-goettingen.de