

INTERNATIONAL NUMISMATIC COUNCIL

SURVEY OF NUMISMATIC RESEARCH 2014–2020

VOLUME I & II

General Editors

Michael Alram – Jarosław Bodzek – Aleksander Bursche

Sub-editors

Roger Bland, Jarosław Bodzek, Mateusz Bogucki,
Arianna D'Ottone Rambach, Jérôme Jambu, Dorota Malarczyk,
Tuukka Talvio, Peter van Alfen, Helen Wang



**2022
WARSAW
POLAND**

Warsaw–Krakow–Winterthur 2022

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ABBREVIATIONS

CACCAMO CALTABIANO (2017)	CACCAMO CALTABIANO, M. et al. (eds), <i>XV International Numismatic Congress. Taormina 2015. Proceedings</i> , vol. I-II (Rome–Messina, 2017).
S	SELLWOOD, D., <i>An Introduction to the Coinage of Parthia</i> , 2 nd revised edition (London, 1980)
SCBI	<i>Sylloge of Coins of the British Isles</i>
SNP	<i>Sylloge Nummorum Parthorum</i> series (sylloge.org)
AAAD	Antichità Altoadriatiche
AAC	Acta Archaeologica Carpathica
AAL	Acta Archaeologica Lodziensia
ACM	Acta Classica Mediterranea
ACSS	Ancient Civilizations from Scythia to Syberia
ADSO	Archäologie und Denkmalpflege im Kanton Solothurn
ADSV	Античная древность и средние века / Antiquity and the Middle Age
AEAS	Археология Евразийских степей / Archaeology of the Eurasian Steppes
AMA	Античный мир и археология / Ancient World and Archaeology
AMSMG	Atti e Memorie della Società Magna Grecia
ANJ	Armenian Numismatic Journal
Annales du GNP	Annales du Groupe Numismatique de Provence
Annales GNCP	Annales du Groupe Numismatique du Comtat et de Provence
Annales SBNH	Annales de la Société Bretonne de Numismatique et d'Histoire
ArchVesti	Археологические Вести / Archaeological News
ARG	Археология русского города / Archeology of the Russian City
ARWH	Asian Review of World Histories
AS	Archäologie Schweiz
ASNP	Annali della Scuola Normale Superiore di Pisa
BAI	Bulletin of the Asia Institute
BAMM	Bulletin de l'Association des Amis du Musée monétaire cantonale
BBPN	Beiträge zur Brandenburgisch/Preussischen Numismatik
BCNVDs	Bulletin du Cercle Numismatique Val de Salm
BdN online, Materiali	Bollettino di Numismatica Online
BHA	Bulletin of the History of Archaeology
BICS	Bulletin of the Institute of Classical Studies
BN	Biuletyn Numizmatyczny
BospIssl	Боспорские Исследования / Bosporan Studies
BSNL	Bulletin de la Société Numismatique du Limousin
BUCEMA	Bulletin du Centre d'Études Médiévales d'Auxerre
BVBl.	Bayerische Vorgeschichtsblätter
CAB	The Australasian Coin & Banknote Magazine
Cahiers des thèmes transversaux ArScAn	Cahiers des Thèmes Transversaux, Archéologies et Sciences de l'Antiquité
CAJ	Central Asiatic Journal
CAR	Cahiers d'Archéologie Romande
CAUN	Cuadernos de Arqueología de la Universidad de Navarra
CCCHBulg	Coin Collections and Coin Hoards From Bulgaria
CCEC	Cahiers du Centre d'Études Chypriotes
ChersSbor	Херсонесского сборника / Chersonesus Journal
CHMH	Curs d'Història Monetària Hispànica

CMCS	Cambrian Medieval Celtic
CN	Cercetări Numismatice
CNL	The Colonial Newsletter
CNRS Transactions	Canadian Numismatic Research Society's Transactions
CPMS	Canadian Paper Money Society Journal
CRMH	Cahiers de Recherches Médiévales et Humanistes
CollAn	Colloquium Anatolicum
CSA	Current Swedish Archaeology
DHA	Dialogues d'Histoire Ancienne
DHNAS Magazine	Dorset Natural History and Archaeological Society Magazine
DNH	Dresdner Numismatische Hefte
DNum	Dialoghi di Numismatica
EJARS	Egyptian Journal of Archaeological and Restoration Studies
ENH	Études de Numismatique et d'Histoire Monétaire
ETF/II	Espacio, Tiempo y Forma. Serie II. Historia Antigua
FAEM	Filologia Antica e Moderna
FAN-Post	Mitteilungsblatt des Freundeskreises für Archäologie in Niedersachsen e.V.
FN	Folia Numismatica
FOLD&R	Journal of Fasti Online Documents & Research
FrMb	Freiberger Münzblätter
GE	Государственный Эрмитаж / State Hermitage Museum
GIM	Государственный исторический музей / State Historical Museum
GN	Geldgeschichtliche Nachrichten
GS	Gandhāran Studies
GZN	Gdańskie Zeszyty Numizmatyczne
IBNS Journal	International Bank Note Society Journal
IHR	Indian Historical Review
IJJ	Indo-Iranian Journal
IJAS	Iranian Journal of Archaeological Studies
IJCP	International Journal of Cultural Property
INeN	International Numismatic e-Newsletter
ITMS	Inventaire des Trouvailles Monétaires Suisses
JAAH	Journal of Archaeology and Ancient History
JAEN	Journal of Early American Numismatics
JAH	Journal of African History
JAHA	Journal of Ancient History and Archaeology
JAN	Journal of Archaeological Numismatics
JARCS	Journal of Archaeological Studies
JBA	Journal of Bengal Art
JbAK	Jahresberichte aus Augst und Kaiseraugst
JbAS	Jahrbuch Archäologie Schweiz
JEGMP	Jaarboek van het Europees Genootschap voor Munt- en Penningkunde
JEMAHS	Journal of Eastern Mediterranean Archaeology and Heritage Studies
JIAA	Journal of Inner Asian Art and Archaeology
JINCE	Journal of Islamic Numismatic Center – Egypt
JLA	Journal of Late Antiquity
JMIS	Journal of Medieval Iberian Studies
JNAA	Journal of the Numismatic Association of Australia
JNR	Journal of Numismatic Research

JPU	Journal of Peking University
JRJ	The John Reich Journal
JRMES	Journal of Roman Military Equipment Studies
JSEAS	Journal of Southeast Asian Studies
JSJ	Journal for the Study of Judaism
JSRS	Judea and Samaria Research Studies
KSIA	Краткие сообщения Института археологии / Brief Communications of the Institute of Archaeology
LAMAS	London and Middlesex Archaeological Society Transactions
MAA	Mediterranean Archaeology and Archaeometry
MAIASK	Материалы по археологии и истории античного и средневекового Причерноморья / Proceedings in Archaeology and History of Ancient and Medieval Black Sea Region
MAIET	Материалы по археологии, истории и этнографии Таврии / Materials in Archaeology, History and Ethnography of Tauria
MCSEE	Monedă și Comerț în Sud-Estul Europei
MFRP	Münzfunde aus Rheinland-Pfalz
MING	Mitteilungsblatt des Instituts für Numismatik und Geldgeschichte der Universität Wien
MitV	Mitalitaiteen Vuosikirja
MNO	Московское нумизматическое общество / Moscow Society of Numismatists
NASG	Neues Archiv für Sächsische Geschichte
NCh GIM	Нумизматические чтения Государственного Исторического музея / Numismatic Readings at the State Historical Museum
NGÖ	Netzwerk Geschichte Österreichs
NI Bulletin	Numismatics International Bulletin
NNB	Numismatisches Nachrichtenblatt
NNF-Nytt	Norsk Numismatisk Tidsskrift NNF-Nytt
NN-ZN	Notae Numismaticae–Zapiski Numizmatyczne
NSb	Numismatický Sborník
NumSfraEpi	Нумизматика, сфрагистика и эпиграфика / Numizmatika, Sfragistika i Epigrafika
NE	Нумизматика и эпиграфика / The Numismatics and Epigraphy
NZO	Нумизматика Золотой Орды / Golden Horde Numismatics
OZeAN	Online Zeitschrift zur Antiken Numismatik
PAM	Polish Archaeology in the Mediterranean
PCA	European Journal of Post-Classical Archaeologies
PK	Петербургский Коллекционер / Petersburg Collector
PrIsFiKu	Проблемы истории, филологии, культуры / Journal of Historical, Philological and Cultural Studies
PN	Przegląd Numizmatyczny
PovArkh	Поволжская археология / The Volga River Region Archaeology
RAE	Revue Archéologique de l'Est
RAL	Revue Archéologique du Loiret
RAN	Revue Archéologique de Narbonnaise
RAP	Revista d'Arqueologia de Ponent
RassAPiomb	Rassegna di Archeologia. Associazione Archeologica Piombinese
RCAN	Revista de Cercetări Arheologice Și Numismatice
REArm	Revue des Études Arméniennes
RLO	Русь, Литва, Орда в памятниках нумизматики и сфрагистики / Rus, Lithuania, the Horde in the Monuments of Numismatics and Sphragistics
RNA	Revue de Numismatique Asiatique

RPA	Revista Portuguesa de Arqueologia
RTA	Revue Tunisienne de l'Archéologie
RTSENA	Recherches et Travaux de la Société d'études Numismatiques et Archéologiques
RZN	Radomskie Zapiski Numizmatyczne
SAAC	Studies in Ancient Art and Civilization
SCI	Scripta Classica Israelica
SHN	Studia Historica Nitriensia
SKAS	Suomen Keskiajan Arkeologian Seura
SPAAA	Selected Papers on Ancient Art and Architecture
SN	Slovenská Numizmatika
SSN	Schweizer Studien zur Numismatik
SNT	Svensk Numismatisk Tidskrift
SNVE	Средневековая нумизматика восточной Европы / Medieval Numismatics of Eastern Europe
TCS Bulletin	The Token Corresponding Society Bulletin
TM	Trésors Monétaires
TNDB	Türk Nüsmistik Derneği, Bülten / Turkish Numismatic Society Bulletin
TSHM	Труды Государственного Эрмитажа / Transactions of the State Hermitage Museum
TÜBA-AR	Türkiye Bilimler Akademisi Arkeoloji Dergisi / Turkish Academy of Sciences Journal of Archaeology
TÜBA-KED	Türkiye Bilimler Akademisi Kültür Envanteri Dergisi / Turkish Academy of Sciences Journal of Cultural Inventory
VAHD	Vjesnik za arheologiju i historiju dalmatinsku / Bulletin d'Archéologie et d'Histoire Dalmate
VAMZ	Vjesnik Arheološkog Muzeja u Zagrebu / Journal of the Zagreb Archaeological Museum
VEEE	Международная нумизматическая конференция „Эпоха викингов в Восточной Европе в памятниках нумизматики VIII–XI вв.“ / The Viking Era in Eastern Europe in Numismatic Objects of the 8th–11th Centuries
VILI	Вестник истории, литературы, искусства / Bulletin of History, Literature, Art
VIN	Veröffentlichungen des Instituts für Numismatik und Geldgeschichte der Universität Wien
VNJ	Victorian Numismatic Journal
VNK	Всероссийская нумизматическая конференция. Тезисы / All-Russian Numismatic Conference. Abstracts
WPN	Warszawski Pamiętnik Numizmatyczny
WZN	Wrocławskie Zapiski Numizmatyczne
ZAAK	Zeitschrift für Archäologie Außereuropäischer Kulturen
ZAM	Zeitschrift für Archäologie des Mittelalters
ZGQB	Zhongguo Qianbi 中国钱币 / China Numismatics
ZHF	Zeitschrift für Historische Forschung

GENERAL INTRODUCTION

Michael Alram, Jarosław Bodzek and Aleksander Bursche

We herewith present to readers a *Survey of Numismatic Research* prepared for the XVI International Numismatic Congress Warsaw 2022.

The Survey was created under very different conditions to earlier volumes owing to two key factors: the SARS pandemic and rapid developments in the use of digital tools.

Taking us all by surprise in the spring of 2020, the pandemic resulted in a prolonged and inconvenient lockdown, restrictions on movement, and – the most important factor from our perspective – the need to postpone by a year the XVI International Numismatic Congress, from September 2021 to September 2022. Most libraries were closed for lengthy periods, and only a few made part of their resources available online. In practice, this made it impossible for the authors of the Survey to include any studies of numismatic literature published since 2014. In this situation the Committee of the International Numismatic Council (INC), with the support of the sub-editors, took the only practicable decision, namely to extend work by a year. As a consequence, the time period covered by individual studies was increased to seven years (2014–2020). This alone not only considerably increased the workload of the authors and sub-editors but also substantially expanded the volume of the Survey.

The second factor that significantly influenced the shape of the present Survey was the progressing digital revolution, with the introduction of diverse new IT tools to assist the humanities, including extensive and specialized digital and bibliographic database repositories. An additional element to be taken into consideration was the growing cost of printing and distribution, and not least customs dues when sending books abroad.

Interestingly, a survey conducted among MA and PhD numismatics students in several EU countries revealed that almost none of them had ever held a physical copy of the Survey in their hands. They had, however on many occasions used texts they needed from the Survey available online, on Academia.edu, or other digital repositories. The INC has also taken this trend into

account and, with the help of The Newman Numismatic Portal, made all the volumes of the Survey accessible online on its website (INC cin (inc-cin.org)).

With this in mind, at a joint meeting of the INC Committee and sub-editors it was decided to prioritize the prompt publication in digital form of all the texts included in the new Survey, at the very latest by the first day of the Congress, 11 September 2022. Participants who will take a part in the congress in person will also find them on pen-drives distributed along with the congress materials. For libraries and scholars interested in the traditional paper format we have provided and will continue to provide the “print on demand” option. This will avoid the necessity of carrying heavy volumes while traveling, thereby incurring excess baggage charges, and also avoid shipping costs and possible customs duties. The publication will have a uniform appearance in every country and will be far cheaper than if ordered in its traditional form.

In this way we hope, as we say in Polish, that “the wolf is full and the sheep is whole” or as the English saying has it, “to have our cake and eat it”. As in the case of previous editions, the INC Committee established the group of sub-editors of the Survey, and together with the latter carefully selected the group of authors of individual texts from among the foremost specialists in a given subject. Very few of the scholars approached declined, indicating that the Survey continues to enjoy great prestige and popularity within our numismatic community.

For the first time ever, the Congress is being held in a country which lies outside the region traditionally regarded as Western Europe. For many of those attending the Congress this will also be their first visit to this part of Europe. Because of this, the present Survey accords more space than usual to the numismatics of East-Central Europe and Asia.

The task of covering seven years of numismatic research represents a huge challenge, and we were unable to achieve all that we had originally intended. In total the new Survey comprises 15,713 references. This

represents an increase of over 3,300 citations since the last Survey. While the general outline of the new Survey mostly follows the proven model, a number of new chapters have been introduced into **Section 1, General Numismatics**. “Archaeology and Anthropology” by Fleur Kemmers addresses those studies that aim at combining archaeological and anthropological methods in particular within the context of coin finds. The overview focuses on major research issues including the social embeddedness of coinage, coins as material culture and coinage in cult and ritual. Likewise new is Nathan Elkins’s chapter on “Provenance and Legal Issues”. Increasing numbers of coins are becoming the focus of the illicit art trade, treasure hunting and looting, and this chapter attempts to bring together a representative variety of perspectives and voices dealing with this sensitive topic. It is an important addition to the series about *Law and practice regarding coin finds* in the *Compte Rendu* which was started by the INC in the 1990s. The study of ancient weight systems is inextricably linked to coinage, and it is therefore quite remarkable that as yet a chapter on weights and metrological studies has been missing in the Survey. The chapter on “Ancient and Byzantine Weights” by Charles Doyen closes this gap, and demonstrates the impressive developments in this field in terms of new reference works, new analytical methods and new material from the archaeological context.

The digital world has now fully arrived in numismatics. Digital databases of collections, finds, hoards and archival records have not only become an indispensable tool for numismatic research but have also helped to define and answer new research questions. Moreover, it is an important tool for bringing numismatic research to a wider audience. Existing digital projects have been continued and expanded, and numerous new ones added. One of the most important achievements was the inception of Nomisma.org, strongly supported by the INC, which aims at enabling the interoperability of numismatic databases. One very positive trend over the past few years has been the increasing amount of national and international collaboration in the digital field. The chapter on “Numismatics, Computers, and the Internet” summarizes the latest developments.

In order to put the latest developments in numismatic research into perspective it is also necessary to be aware of the history of research in the field. The international FINA project (*Fontes Inediti Numismaticae Antiquae*) studying the history of numismatic research before 1800 has made good progress, and the history of

research in the 20th century is also the focus of increasing interest.

Within the framework of **Section 2, The Greek World**, it is generally observed that coins from excavations are increasingly becoming the focus of scholarly research. Contextualized numismatic information is essential for answering questions about circulation patterns, trade flows, volumes of production and the monetization of ancient economies, and recent research has increasingly addressed these issues. Nonetheless, it should be noted that the vast majority of coin finds lack an archaeological context, a painful demonstration of how much knowledge is lost as a result. Another trend that has become more prominent in recent years are die studies, which provide insight into production processes and are complemented by technological and metallurgical analyses. There is also increased discussion about the role of bronze coins in the local economies, an area that has sometimes received too little attention in the past. A further remarkable development is the increased electronic availability of museum collections and thematic online databases which have meanwhile become indispensable research tools. In addition, the traditional printed museum catalog is still alive and remains an important documentation tool, especially for smaller collections or local museums.

Among the fifteen chapters of the Greek section “Balkanraum und nördliches Schwarzmeergebiet” stands out simply because of the large body of literature collected (850); compared to the last Survey the citations here have almost tripled. In this context reference should be made to the research project *Corpus Nummorum Online* (<https://www.corpus-nummorum.eu/>) which has had a noticeably stimulating effect. This is an open access numismatic web portal that aims to collect and present Greek and Roman provincial coinage from Moesia inferior, Thrace, Mysia and Troas.

The chapter on Asia Minor is second in place with 398 entries. The manifold research on electrum coinage deserves special mention here. It has changed our knowledge significantly, and has shown, among other things, that electrum coinage continued to flourish even in the early Classical period. Research on Seleucid coinage has also been particularly active. The references have more than doubled and cover a wide range of issues such as excavation coins, hoards, die studies, economic and monetary policies, the role and purpose of coinage and numerous other aspects. The focus of the investigations lies in the west of the Seleucid empire, while the east is less well documented. This is also reflected in the state of

research on the coinage of the Graeco-Bactrian and Indo-Greek kings, which, with only 32 entries, still has great research potential that has hitherto been insufficiently exploited.

Section 3 is devoted to *Celtic and Roman Coinages*. The major research trends are summarized by Roger Bland in his introduction. Celtic numismatics has produced numerous new findings over the past seven years. These result primarily from new coin finds that have brought new types and variants to light and show how limited our knowledge remains. Questions relating to money production, metrology, chronology, the identification of mints and the ethnic attribution of imitation series were also the focus of research interest. In addition, the monetization and Romanization of northern Gaul, the role of money in rural settings and the function of market places within the Celtic economies were examined. The emergence of money among the Gauls and its development over the centuries is a fascinating topic that has been made accessible for a broader audience. Here the new digital research tool *Iron Age Coins in Britain* (<https://iacb.arch.ox.ac.uk/>) deserves special mention.

A particular focus of research in recent years has been the coinage of the Roman Republic, resulting in new handbooks and articles in handbooks, as well as in specialized studies dealing with the technical aspects of monetary activities. Recent coin finds and hoards shed new light on chronological questions and give an insight into the supply of Roman coins to provincial territories. The new findings make it clear that the RRC, the previous standard citation work, is in need of fundamental revision.

There has been an enormous increase in research into the coinage of the early Principate, with citations nearly tripling to a total of 480. In general, the breadth of research topics published from the time of Augustus to Late Antiquity is impressive, and digital resources have assumed great importance. Period studies, studies of specific coin types and their target audiences, mints and their organization, the role of metal resources and monetary policy, the role of imitations produced outside the Empire, as well as die studies and metallurgical analyses have refined our image of Roman Imperial coin production in many respects. Likewise, intensified research into individual coin finds, hoards, coin supply, hoarding patterns, and coins in rural and funerary contexts has provided new insights into coin circulation and coin use inside and outside the Roman Empire. A further positive aspect is that in addition to the numerous catalogs and

detailed studies, the numismatic results are also placed in a broader historical, economic and social context. This is all the more important since there are frequent instances of single coins being detached from their numismatic context and thereby misappropriated by other disciplines.

The international RPC project (*Roman Provincial Coinage*) also made great progress during the reporting period: new volumes and supplementary volumes were published, and the material has also been made available online (RPC — Home (ox.ac.uk)).

Section 4, *Medieval and Modern Coinages*, also shows a notable increase in citations compared to the last Survey volume (up from 4,385 to 6,121). In line with research traditions, activities are usually concentrated in the individual countries and regions. This results not least in some articles being published in less well-known and less easily accessible journals. Their inclusion in the Survey is therefore of particular importance.

The general research tendencies already identified in relation to the numismatics of antiquity can also be observed in medieval and modern numismatics. In this section, too, numerous authors have pointed out the sharp rise in the number of coin finds and hoards, which they attribute to the increased prevalence of people using metal detectors. On the one hand, these new finds show us how incomplete our knowledge of the material still is. They give us the opportunity to close typological gaps, to recognize new connections and thus to rewrite individual chapters of our monetary history. On the other hand, they sometimes present us with legal problems, since searching with metal detectors is prohibited in many countries. However, the re-publication of old hoards based on current methods has also led to considerable new insights. One direction of focus has been on the documentation and evaluation of coin finds in European churches, which has shed light on religious practices and the devotional use of coins. In addition to the publications on coin corpora of individual mints, research is increasingly concentrating on contiguous currency areas that extend far beyond territorial borders. In regard to the coinages of medieval Europe (c. 400–1500), the MEC project (*Medieval European Coinage*) deserves special mention. Two volumes were published in the reporting period (*12. Italy. I: Northern Italy*; *8: Britain and Ireland*) with the result that five of the 20 volumes planned have been published so far. The project brings together highly renowned scholars from various countries to create up-to-date handbooks which are indispensable for any further research. In putting together the most recent results and findings and

placing them in a broad historical and economic context MEC is creating a new picture of the monetary development in the different regions of Europe.

The growth in written sources in the Middle Ages and modern times has also made this type of source the subject of increasing research. Contemporary written sources on coin production, mint organization, legal issues, prices and wages, payment methods, tax issues and other topics related to economic and administrative history give a vivid picture of the world of money. In combination with the systematic analysis of the numismatic sources, this results in exciting new insights and interpretations of economic developments and decision-making processes.

It should also be noted that par anumismatica such as tokens, tickets, stamps, counters, seals and devotional objects are no longer disregarded by research.

Numerous numismatic exhibitions were also held during the reporting period which shed light on a wide variety of aspects of monetary history and thus brought numismatics to the attention of a wider audience.

The number of publications collected for *Asian and Islamic Coinages* has remained almost the same as in the last Survey (1,657 as compared to 1,612). This section also summarizes the contributions to research on the Sasanians, Kushans, Guptas and “Iranian” Huns, the study of which has made considerable progress.

With 713 citations, the clear focus in this section is, unsurprisingly, on the field of Islamic numismatics, although a decrease in citations compared to the last Survey volume can be noticed (down from 1,149 to 713). Despite the undisputed importance of this field of research today, it should be noted that curatorial posts for Islamic numismatics in many museums and coin cabinets are either completely absent or not filled again when they fall vacant. In general, the focus here is also on the recording and mapping of coin finds, as well as on mint and area studies. The research on the Caucasus region, the circulation of Islamic coins in Eastern Europe during the Viking period, and the study of Golden Horde coinage deserves special mention. Two volumes of the main reference work *SNAT (Sylloge Nummorum Arabicorum Tübingen)* were published during the reporting period.

Overviews of China, Japan, Cambodia, as well as Malaysia with the Indonesian islands and the Philippines complete the picture (*East and South East Asia*).

Section 5 is dedicated to *Medals* and summarizes research from 15 European countries as well as the USA and Canada (the citations declined from 2,153 to 1,625).

As Tuukka Talvio pointed out in his Introduction it can be observed that curatorial positions at museums are no longer being filled. This is all the more regrettable since the medal, as an important cultural-historical phenomenon, opens up a wide field of research, as underscored by the numerous studies on medal production in certain regions, landscapes and cities, its historical context and use as propaganda, and its clients and recipients published in this reporting period. Another focus is on monographic studies on the life and work of individual artists, mint masters and engravers. In addition, medals always constitute an important element in cultural and art-historical exhibitions. In 2018 medals played a major role in numerous exhibitions commemorating the centenary of the First World War.

The art of the medal is still very much alive. The catalogs accompanying the biennials of the international medal society FIDEM in Sofia in 2014, Ghent and Namur in 2016, and Ottawa in 2018 provide an insight into contemporary medal art.

Finally, we would like to thank everyone who made the publication of the new Survey possible. First and foremost, thanks are due to the authors, who summarized and commented on seven years of numismatic research under the most difficult of conditions. We also owe a great deal of thanks to the sub-editors, who were in constant contact with their authors, wrote the appropriate introductions and edited the individual sections. We also thank our colleagues on the INC Board, who made language corrections where necessary. Last but not least we warmly thank our Polish colleagues who carried out the final editing and prepared the manuscript for publication, first of all Barbara Zając and Dariusz F. Jasek.

ANCIENT AND BYZANTINE WEIGHTS

Charles Doyen

For the first time, the *Survey of Numismatic Research* has devoted a specific section to ancient and Byzantine weights. The INC committee's decision reflects the impressive development the field has undergone in the last decades. However, in line with the editorial policy of the *Survey*, this chapter will not include publications prior to 2014, except for a few corpora and reference works. Even so, we have to cover an extensive timeframe, from the Bronze Age to Byzantine times, and thereby a large geographical area, which roughly corresponds to the Imperium Romanum at its largest extent. Our selection highlights the publication of new reference works, new analytical methods — including archaeometry — and new material — especially the weights discovered in an archaeological context.

Collective projects

Several large-scale projects used an anthropological approach to study weights and measures in ancient and medieval civilisations. The ERC-funded project “Weight and Value” (2015–2021) has been investigating the invention of scales and weights in Bronze Age Western Eurasia (RAHMSTORF AND STRATFORD [228]), while the “Archeo-metrologia” project focused on weights and measures from the ancient Near East, in their economic and cultural contexts (CHAMBON [49]; CHAMBON AND MARTI [50]). The Berlin Excellence Cluster Topoi II project “From Technology to Science (D5)” (2012–2019) included a side project on the emergence and development of the “Roman steelyard” (the unequal-arm balance) and its associated counterweight: see BÜTTNER AND RENN (37); see also the database (9). For the “Pondera Online” project, see DOYEN (84, 86), DOYEN AND WILLOCX (87), and the database (10).

Public and private collections

OLIVIER ET AL. (191) describe the collection of Greek weights in the National Library of France (BnF) and present the projects of digitalization; for the collection of Byzantine glass weights, see SCHIBILLE, MEEK, TOBIAS, ENTWISTLE ET AL. (248). CAMPAGNOLO AND WEBER (43) publish the Late Roman and Byzantine copper-alloyed weights from the Art and History Museum of Geneva; see also CAMPAGNOLO (40). The publication of Late Roman and Byzantine weights of the British Museum has been a desideratum for a long time; see already ENTWISTLE (95), ENTWISTLE AND MEEK (97), SCHIBILLE, MEEK, TOBIAS, ENTWISTLE ET AL. (248). TOBIAS (281) publishes three beams, four sets of chains and six counterweights from Roman and Late Roman steelyards, as well as two weights, that belong to the Badisches Landesmuseum in Karlsruhe (all of these artefacts, but one, used to belong to the Zacos Collection).

Several Italian museum collections of Roman weights have been described or published: the National Archaeological Museum of Naples and the Archaeological Museum of Bologna (221); the Roman Theatre Archaeological Museum of Verona (36); the National Archaeological Museum of Aquileia (255); the Civic Museum of History and Art of Trieste (174), and the Antonio Salinas Regional Archaeological Museum of Palermo (77).

JOVANOVIĆ (148) publishes seven weights from the Archaeological Museum in Split. LAZARENKO (165) publishes seven other weights from the Varna Museum of Archaeology. CHEKHOVYCH (55) presents a part of the Anokhin Collection, which is now conserved at the Institute of Archaeology of the National Academy of Sciences of Ukraine. GURULEVA (129) publishes the Late Roman and Byzantine weights in the State Hermitage.

TEKİN continues to publish ancient and medieval weights conserved in Turkish museum and private collections, in the framework of the *Corpus Ponderum Antiquorum et Islamicorum (CPAI)*. After the Klima Plus Collection in Silifke Museum (278) [161 weights], the Istanbul Archaeological Museums (276) [455 weights], and the ancient weights in the Suna and İnan Kıraç Foundation Collection at the Pera Museum (257) [635 weights], TEKİN has devoted a volume to Late Roman and Byzantine weights in the Pera Museum (263) [742 weights]. Smaller collections are published in separate papers (258, 260, 264, 265, 267, 268). Over 50 weights from private and museum collections, many of which are unedited, were displayed in an exhibition held in Antalya (2018–2019): see TEKİN (274). The collection of the Hâlûk Perk Museum (Istanbul) is presented by PERK (202).

GATIER (119) publishes the collection of inscribed weights in the National Museum of Beirut [12 weights and a mould].

KORSHENKO (157) publishes a part of his own collection of small Byzantine weights. WEBER (290, 291) publishes small Byzantine weights conserved in several private collections. Many weights have been auctioned in the last seven years, e.g. the Fischer Collection (Dr. Busso Peus Nachfolger, Auctions 419 and 421). An increasing number of ancient and Byzantine weights is appearing on the antiques market, in particular at Classical Numismatic Group (CNG), Gorny & Mosch Giessener Münzhandlung, Leu Numismatik, and Roma Numismatics Limited.

Online resources

The *Antike Bronzen in Berlin* database (1) contains 129 weights from the Antikensammlung, including objects that were lost or destroyed during the Second World War. These objects are also available on the *Online-Datenbank der Sammlungen* (2).

The online catalogue *Médailles et Antiques* of the French national Library contains 138 weights (3). The Louvre recently launched an online database of its collections containing 1,373 weights (4), 149 of which belong to the *Département des Antiquités égyptiennes*, 112 to the *Département des Antiquités grecques, étrusques et romaines*, 1,047 to the *Département des Antiquités orientales*, and 58 to the *Département des Arts de l'Islam*.

The British Museum online catalogue contains 12,491 weights from several cultures and periods (5), of which 1,669 belong to the category “Classical world” (including Late Roman and Byzantine weights). The Petrie Museum conserves 6,040 Egyptian weights, from the Bronze Age through the Islamic period (6). The *Portable Antiquities Scheme* records archaeological objects found in England and Wales, including many weights (7).

The *Artefacts* database (8) focuses on small archaeological finds, including weights and balances. The Topoi II research project “Between knowledge and innovation” has collected over 1,000 ancient and early medieval steelyards, almost half of which are available in open access on the *Ancient Steelyards* database (9). The *Pondera Online* database (10) aims to collect and describe ancient and medieval weights conserved in public and private collections. By the end of 2020, the project involved an international network of around 30 scholars and the database contained over 14,000 weights. Thanks to a systematic investigation of unpublished museum collections, scientific archives, archaeological publications and auction catalogues, the database has considerably augmented existing corpora: e.g. Athens (+145%), Asia Minor (+49%), or Near East (+83%).

Historical metrology

The study of ancient and Byzantine weights first-hand is likely to completely change traditional approaches to historical metrology, since most metrological studies have focused on defining modern equivalents of ancient units (e.g. GYLLENBOK [131]): see DE CALLATAÏ (39), PETRUSO (205), and NEAL (186). The importance of this material for analysing weight standards is obvious. In the same way, the structure of the weight systems is linked to the structure of the contemporaneous monetary systems: see e.g. DOYEN (81). Weight and monetary standards should therefore be studied in parallel, since they may undergo similar developments or changes, motivated by economic, military, institutional or hegemonic reasons: see DUYRAT (92) and PSOMA (220).

On the one hand, weights must be examined in the broader context of weighing operations. Several balance scales or parts of balance scales (pans, beam, or chains) have been published recently: see e.g. (36), (48), (184), (187), (223), (252), and (253). However, most publications focus on “Roman steelyards” and their counterweight. Even if steelyards do not require the use of weights per se, they were used in the same contexts as pan scales and provide information about the quantities and nature of the weighed goods. BÜTTNER AND RENN (37) examine the history of weighing technologies and, more specifically, the development of unequal-arm balances from the perspective of a theory of innovation. The *Ancient Steelyards* database (9) includes over 400 steelyards, with an archaeological description and sometimes photographs and 3D models. ROHMANN (240) investigates the terminology used to describe different types of weighing scales. He shows (a) that the term *statera* does not refer to a steelyard, but rather to small or precise scales; (b) that the term *charistio(n)* refers to a steelyard from the 2nd century CE onwards at the latest; (c) that the Late Antique term *campana/kampanon* is often associated with larger scales. For publication or re-examination of Etruscan, Roman, Late Roman and Byzantine steelyards, see e.g. (26), (36), (38), (48), (56), (57), (62), (63), (64), (65), (130), (171), (187), (199), (223), (252), (253), (281), (285), (287), (288), and (289). For their counterweights, see e.g. (13), (36), (46), (48), (52), (56), (57), (100), (114), (141), (170), (171), (185), (239), (256), and (281).

On the other hand, weights cannot be totally separated from measures designed for dry and liquid volumes. A single commodity can be measured differently, depending on the context. For instance, cereals are usually measured by volume, but can be weighed to check their density and their quality. DESCAT (76) analyses the use of different measures for buying and selling wine or grain, and reconstructs the procedure for weighing cereals in the Athenian grain tax law of 374/373 BCE (*SEG* 48.96, 60.137). Studying the graffiti mentioning masses on Northern Italian amphoras (tare, net weight, gross weight), CORTI (61) analyses the weighing procedures, especially for trading large quantities of low-cost products in standardised containers. CIOFFI (59) provides an overview of the measuring tables to calculate capacity — which are often called *mensae ponderariae* or *sekomata*. She emphasises the necessity of contrasting textual and archaeological sources. Several artefacts identified as measuring tables have been published or re-examined recently, both in the *pars orientalis* and in the *pars occidentalis* of the ancient Mediterranean: Delos (51), Naxos (58), Philippi (250), North-Western Pontic city-states (155, 183), Priene (249); Rome and Latium (164), Ostia (33), Iguvium (177), Nora (98), Bregenz (189), and Roman Algeria (230). LANGE (163) investigates two bronze measures conserved in Dresden and Naples, which claim to be the famous “Congius Vespasianus” (75 CE), once conserved in the Farnese collection. ROTHENHÖFER (241, 242) studies a bronze sextarium of the *Legio III*, which cannot be earlier than the 3rd century CE. He also proposes new readings of the inscriptions on a 4th-century sextarium from Naissus (Niš) and on a sextarium from Cyrene. ROTHENHÖFER (243) publishes a bronze sextarium for weighing 24 uncias, which bears an inscription with the names of the three co-emperors Arcadius, Honorius, and Theodosius II (402–408 CE), and has a handle depicting the busts of the emperors. He identifies this artefact as a *sextarium trisaugustum*, similar to the ξ(έσται) χάλκεοι β' ἔχοντες τρισαυγούστια mentioned in the Andriake inscription (388–392 CE); see also CUVIGNY (67).

BARATTA (29) gathers archaeological and epigraphical evidence concerning the premises where official weights and measures were conserved in Roman cities (*ponderaria*), both in Italy and in Western provinces. Public figures or wealthy freedmen funded the construction or restoration of such premises, and their equipment. STANCO (254) studies the *ponderarium* of *Lucus Feroniae* in Etruria.

AMPOLO (18) publishes 28 studies devoted to Greek agoras, with a focus on Sicily. Special attention is given to the magistrates of the agora and legal aspects: see FANTASIA (103) and ERDAS (99). CAPDETREY AND HASENOHR (44) edit 16 papers on Greek *agoranomoi* and Roman *aediles*, who are among other things responsible for controlling weights and measures; see especially ARCHIBALD (20), BERRENDONNER (34), CAPDETREY AND HASENOHR (45), DAGUET-GAGEY (69, 70), DESCAT (75), FANTASIA (104), FINKIELSZTEJN (107), IVANTCHIK (147), OLIVER (190), and ROUBINEAU (244). In her book on the Roman *aedilitas*, DAGUET-GAGEY (71) describes and comments on the attributions of *aediles*, in particular the *cura annonae* and the control of weights and measures. PAILLER (194) studies the attributions of the Gaulish *dannos/dannus*, who is in charge of certifying both the quantity (weights and measures) and the quality of products.

Finally, several studies explore ancient and Byzantine legislation on weights and measures. For the 5th-century BCE Athenian standards decree (*IG I³ 1453*), see HATZOPOULOS (138), WEISER (293), and KROLL (158). For the 2nd-century BCE Athenian agoranomic decree (*IG II² 1013*), see DOYEN (82, 83, 85) and RIZZI (232, 233, 236, 237). For the broader context of market regulations in Athens, see RIZZI (234). RIZZI (235) comments on Mela's interpretation of the case of a third party who knowingly lent the buyer weights that were too heavy (*maiora ... pondera*), which deceives the seller (*Digest* 47.2.52.22). RIZZI (238) studies the legislation on falsification (including false weights and measures) during the Early Imperial period. For a presentation and discussion of Late Roman and Byzantine legislation on weights and measures, see CAMPAGNOLO AND WEBER (43), and CHARREY (53). For the reproduction of official weights and measures in the Andriake inscription (388–392 CE), see RIZOS (231), CUVIGNY (67), and ROTHENHÖFER (243).

Epigraphic corpora

For a long time, inscribed weights have also aroused the interest of epigraphists. New material and publications are regularly reported and commented on in the usual bibliographic tools, such as the *Bulletin épigraphique* (*BE*), the *Année épigraphique* (*AE*), and the *Supplementum epigraphicum Graecum* (*SEG*). COJOCARU (60) compiles a retrospective and thematic bibliography of the Northern Black Sea coast until 2013.

The *Neue Inschriften von Olympia* (251) includes 239 Olympian bronze weights (*NIO*, 228–245). Volume VI/2 of the *Inscriptiones Scythiae Minoris Graecae et Latinae* (28), devoted to Tomis, contains 132 weights and a mould

(*IScM* VI/2, P1–P25); see also AVRAM (27). The first volumes of the *Corpus Inscriptionum Iudaeae/Palaestinae* (66, 15, 16, 17) contain inscribed Hellenistic, Roman, Late Roman and Byzantine weights from Jerusalem (*CIIP* I, 658–692), Caesarea (*CIIP* II, 1725–1751), Dora/Dor (*CIIP* II, 2132–2136), Sycamina (*CIIP* II, 2153), Ioppe (*CIIP* III, 2257–2261), Iamnia (*CIIP* III, 2271–2272), Azotus (*CIIP* III, 2298–2300), Ascalon (*CIIP* III, 2358–2366), Beit Lahiya (*CIIP* III, 2438), South coast, unknown provenance (*CIIP* III, 2580–2648), Kh. el-Thahiriya (*CIIP* IV, 2691), Gezer (*CIIP* IV, 2783–2785), Khan el-Ahmar (*CIIP* IV, 3134), ‘Ein Feshkha (*CIIP* IV, 3279), H. Alim (*CIIP* IV, 3426), Eleutheropolis (*CIIP* IV, 3496), Marisa (*CIIP* IV, 3671–3686), and Hebron (*CIIP* IV, 3833).

Bronze Age and Iron Age

A detailed presentation of recent research on balances, weights, and metrology during the Bronze Age and the Iron Age would certainly go beyond the scope of the *Survey of Numismatic Research*. Nevertheless, it seems worthwhile to summarise new trends, since the ERC-funded project “Weight and Value” and other major research projects have revived this field of research.

Reviewing archaeological evidence from Tepe Gawra, HAFFORD (135) argues that weight systems could have developed in Mesopotamia as early as the Ubaid period, at the end of the 5th millennium BCE, at least a thousand years earlier than previously thought. ASCALONE (21, 22) identifies stone weights from Shahr-i Sokhta dated to the second half of the 3rd millennium BCE. He demonstrates that the Helmand valley served as an interface between Mesopotamia and the Harappan cultures. For Harappan weights, see RAHMSTORF (227) and RUIKAR ET AL. (245). RAHMSTORF (225) shows that sealing and weighing processes became increasingly important in Aegean and Western Anatolia all through the 3rd-millennium BCE. These strategies played a part in the development of the economic organisation of Early Bronze Age societies. ALBERTI (14) establishes a connection between the modification of trade circuits and the development of new “glocal” weight systems in the Southern Aegean from the Early Bronze Age to the Early Iron Age.

RAHMSTORF (224) presents the results of a comprehensive study on ca. 400 3rd-millennium BCE weights from nearly 30 sites in Mesopotamia and Syria. PEYRONEL (206) investigates weights possibly linked to the wool systems and weaving tools from Royal Palace G in Ebla during the Early Syrian Period. More broadly, PEYRONEL (208) studies economic activities of Royal Palace G that are attested by written documents, seals and weights. HOREJS (140) publishes five stone weights from Çukuriçi Höyük (Western Anatolia) and discusses the connection between new metrological systems, metallurgy and socio-political frameworks. IALONGO, VACCA AND VANZETTI (146) challenge the idea that the use of weighed metal as “commodity currency” during the 3rd and 2nd millennia BCE resulted in the adoption of shared standards. They argue that the normalisation of the quantities to be exchanged may have occurred without unifying metrological systems.

MARTI AND CHAMBON (179) examine records of weighed metals in 2nd-millennium BCE cuneiform texts from Mari and Assyria. They show that these textual sources reflect administrative practices rather than weighing processes as such. On the other hand, by means of a close examination of silver hoards and assemblages of balance weights, PEYRONEL (209) makes new suggestions on actual weighing of silver during the Middle Bronze Age, especially in Ebla; see also IALONGO, VACCA AND PEYRONEL (145). DERCKSEN (73) and KULAKOĞLU (161) discuss archaeological and textual evidence about the weights used by Assyrian merchants settled in Kanesh (Kültepe). MICHAILIDOU (181) studies archaeological and textual evidence on weighing processes in the Bronze Age Aegean and Near East. She reviews the commodities that were standardised by weight and might serve as a means of payment (copper, silver, gold, lead, and wool). IALONGO AND RAHMSTORF (143) propose a methodology for identifying weights in Bronze Age Europe, excluding the Aegean area. They establish a typology based on a sample of 566 potential balance weights, and analyse their chronology, distribution and metrology. On the same topic, see also IALONGO (142). RAHMSTORF (226) identifies the first-known Bronze Age weights and weight-regulated gold artefacts from Britain, Ireland and Atlantic France. In 2019, POIGT defended a still unpublished PhD dissertation on weighing instruments in Western Europe, from the 14th to the 3rd centuries BCE, with a special interest in 3D volumetric reconstruction: see already POIGT (213, 214, 216, 219). POIGT (218) studies weighing technologies in Final Bronze Age Continental Europe and Iron Age Iberian Peninsula. After emphasizing the different contexts of weighing and the technical limitations for calibrating metal with weights and balances, he questions the link between the progressive standardisation of metal artefacts and the development of trade. See also POIGT (217).

PEYRONEL (207) studies the Neo-Assyrian weights from of the North-West Palace in Nimrud. Inscribed weights

refer either to a “heavy” or to a “light” mina, while written sources attest to a “mina of the king”, a “mina of the land”, and a “mina of the merchant”. So far, 39 weights discovered in the palace have been published: eighteen bronze lion weights, one bronze duck weight, sixteen stone duck weights, two bronze truncated spheres and two bronze cubes with an inlaid winged scarab. FALES (102) reconsiders the fifteen inscribed lion weights from the throneroom and suggests the existence of two distinct weight standards: the pre-existing standard “of the king” and the additional standard “of the land”.

IALONGO ET AL. (144) introduce both a mathematical and an archaeological approach to the study of protohistoric weight series and test this method on Sardinian Early Iron Age bronze hoards. DERIU (74) studies the 141 Phoenician “lead weights” discovered in Sinis (Sardinia). GALLO (116) presents two lead weights with a bronze handle discovered in Motya (Sicily) that provide insight into 5th-century BCE weight systems.

MAGGIANI (171) presents archaeological and iconographical data for weighing practices in Etruria from the 6th to the 2nd centuries BCE (balance scales and weights; steelyards and counterweights). Based on available evidence (one weight from a private collection, two from Chianciano, one from Caere), he argues that the Etruscan reference unit (“libra”) weighs either 145 g or 290 g. He also proposes a new interpretation of a vase showing Talnithe (Palamedes) holding a balance and Turms (Hermes). Finally, he reexamines two inscribed artefacts: a weight from a private collection and a counterweight from Caere. For this famous *aequipondium* from Caere, see also AGOSTINIANI (13). CAPPUCCINI (46) studies two bronze artefacts from Sassi Grossi (Roselle) dating back to the end of the 8th century BCE, which are interpreted as counterweights, and draws conclusions on the origin of the Etruscan weight system. MAGGIANI (172) presents stone weights from Vetulonia. PULCINELLI (222) publishes four stone weights from the territory of ancient Vulci, whose standard seems to correspond to the Roman libra.

Several studies attempt to establish the origin of Iberian Iron Age weight standards. PAPPÀ (198) argues that Atlantic Iberian pre-Roman metrological systems derive from Phoenician standards used between the 7th and the 5th centuries BCE. MORENO PULIDO AND ARÉVALO GONZÁLEZ (182) suggest that the metrological systems used in Gadir (Cádiz) between the 5th and the 3rd centuries BCE originate in Bronze Age Ugarit. In examining a set of five bronze weights from Villanueva de la Jara (Cuenca), MARTÍNEZ CHICO AND GONZÁLEZ GARCÍA (180) conclude that Iberian weights share a common unit weighing 2.1 g, which would originate from Attic weight and monetary standards. On the other hand, POIGT (212) suggests focusing on the structure of Iberian weight systems rather than looking for their supposed origin. He proposes an arithmetic reconstruction for a set of ten copper-alloyed weights discovered in El Cigarrelejo (Tomb 200), based on a standard unit of *ca.* 20–21 g. In another paper, POIGT (215) shows that the production of Iberian weights requires a high level of technical sophistication. Since metrological standards vary from one site to another, Iberian weights were not necessarily used for calibrating premonetary currency. DELANAYE AND POIGT (72) use 3D volumetric reconstruction for analysing 33 Iberian weights from ten different sites, whose mass was modified by adding or withdrawing metal. BARRIOS RODRÍGUEZ AND GONZÁLEZ HERNÁNDEZ (30) present seven artefacts (three weights, three ingots, and a hook from a balance) discovered in El Raso de Candeleda (Ávila).

Greek weights

General studies

TEKİN (266) publishes a very useful handbook on Classical and Hellenistic weights from the Aegean world, with an introduction to the manufacture of the weights, their typology (symbols and legends), and their metrological standards. This handbook contains a detailed description of 384 weights produced by 31 city-states from Greece, Thrace, and Asia Minor. It must be stressed that this inventory does not include a detailed description of the enormous corpora of Athens (*ca.* 900 weights) and Olympia (*ca.* 500 weights), neither does it cover the Black Sea or the Near East. For a short overview of the weights from Asia Minor, see also TEKİN (269).

In her book on the official symbols of the Greek states (*parasema*), KILLEN (151) considers fourteen different contexts of use for *parasema*, amongst which commercial weights play an important role. *Parasema* appears on weights from Greece, Thrace, the Black Sea, and Asia Minor, during the Classical and the Hellenistic period, with a peak during the 3rd century BCE. The most important corpora are Olympia (89 weights) in mainland Greece; Istrus (27 weights) and Callatis (24 weights) in the Black Sea; Cyzicus (71 weights), Lysimachaea (32 weights) and Alexandria Troas (20 weights) in Asia Minor. However, this uneven distribution is partly due to the random conservation of the ancient weights and to the overrepresentation of several corpora in museum collections and published

works. The book describes the weights produced by 39 city-states and confederations (Catalogue), and by 9 unidentified states (Appendix 1); 18 weights appear in the *incerta* (Appendix 2). In total, KILLEN records 446 weights showing a *parasemon*.

The two aforementioned books were prepared independently of one another. Together, they cover over 700 weights, many of which are published for the first time. In each case, the authors have studied most of the material firsthand. TEKIN (266) and KILLEN (151) have indeed contributed greatly to the study of ancient Greek weights.

KILLEN (154) challenges the idea that bronze weights (vs. lead weights) are always standard weights. Based on the Athenian corpus, she defines six additional criteria that help to identify standard weights (global aspect, inscriptions, manufacture, checking of the mass, absence of countermarks, and findspot). Six bronze weights from Athens (out of a total of 31) are probably standard weights. However, none of the bronze weights from Cyzicus (5 weights) and Istrus (3 weights) can surely be identified as a standard weight. This is not the case either for Olympia (498 weights) and Olbia (24 weights), where almost all the preserved weights are made of bronze.

CARÈ (47) studies the natural-sized, astragalus-shaped bronze ingots that are traditionally interpreted as weights. An investigation of the archaeological evidence shows that the production of such ingots originates in ritual contexts. CARÈ emphasizes that these artefacts have a votive rather than a functional purpose.

KROLL AND STEFANAKI (160) study the “mastoid” stone weights originating from Cnidus, Rhodes, and about fifteen other sites of the Aegean Greece, over a hundred of which are currently known. Archaeological evidence, as well as the conformity with the Roman standard, shows that these weights were produced from the late 2nd century BCE down into the Roman Imperial era. The breast depicted on these weights shows a strong connection with women’s domestic and private sphere. KROLL AND STEFANAKI demonstrate very convincingly that these weights were used for weighing wool. New “mastoid” weights have been excavated notably in Smyrna (101) and Ephesus (279, no. MI 8; 229, nos. MI 26–27).

In two complementary papers given during the same conference (246), GATIER (118) and FINKIELSZTEJN (108) provide an overall presentation of the weights from the Near East, from the late 4th century BCE to the 3rd century CE. GATIER (118) describes the production and the daily use of weights, and demonstrates the importance of this neglected material for studying the Hellenistic and Roman Near East. In another paper, GATIER AND OLIVIER (121) describe Greek and Roman weights from Near Eastern city-states conserved in the National Library of France. FINKIELSZTEJN (108) shows that Syria, Phoenicia and Southern Levant constitute three coherent subregions during the Hellenistic period, with common features such as the use of symbols, legends and metrological standards. In two subsequent papers, he focuses on Hellenistic weights from Syria (109) and from Phoenicia (110).

Southern Italy and Sicilia

ANZALONE (19) presents 32 weights and ingots from ancient Himera (19 are made of bronze; 13 are made of lead), dating from the early 6th to the late 5th centuries BCE. He identifies four different standards: the “Chalcidian”, the “Euboean-Attic”, the “Phoenician”, and the “Sicilian” standards.

Epirus and Acarnania

KILLEN (151) lists three weights from Ambracia showing Agyieus as the main symbol.

PLIAKOU (211) publishes a set of six lead weights found during the excavations of a farmstead complex in the locality of Episkopi, in the southern part of the Ioannina basin. These weights, to be dated between the mid-2nd and the mid-1st centuries BCE, seem to refer to the Attic 105-drachma mina (2 minas, 1 mina, ½ mina, ⅓ mina, ¼ mina). The inscriptions incised on five of them suggest a connection with the sanctuary of Apollo Actius and/or the city-state of Anactorium.

Peloponnese

The 239 weights that came to light in Olympia after 1896 are included in SIEWERT AND TAEUBER (251). Siewert’s low chronology is adopted: the third quarter of 5th century BCE for astragali and “Stempelgewichte” (100-drachma mina); the last third of 5th century BCE for Klasse A (100-drachma mina) and Klasse B (105-drachma mina); the first half of 4th century BCE for Klasse C (probably 112- rather than 110-drachma mina) and “Sternengewichte” (standard of 388 g). Most of these standardised ingots were probably used as votive offerings rather than balance weights *stricto sensu*. For the astragalus-shaped weights, see CARÈ (47). KILLEN (151) identifies three different *parasema* on Olympian weights: a flying eagle, with a snake in its claws (6 weights); a standing eagle, without snake in its claws

(3 weights); and a thunderbolt (80 weights). Most of the Olympian weights do not have a *parasemon*. Except for one silver weight, all the Olympian weights are made of bronze: see KILLEN (154).

Only one lead weight from Sicyon is documented, with the dove as *parasemon* (*Pondera*, #12474): see KILLEN (151).

TEKIN (266) records nine bronze and lead weights from Corinth, from the Classical to the Late Hellenistic periods. None of them bears the *parasemon* of Corinth (Pegasus).

Central Greece

One lead weight from Aegosthena shows the goat as *parasemon* (*Pondera*, #1883): see KILLEN (151).

WILLOCX (301) presents an overview of the corpus of Athens, which includes over 800 weights. Most of these weights that were discovered during the second half of the 19th century are conserved in European and American museum collections; 79 Athenian weights came to light during the American excavations of the Athenian Agora. JOVANOVIĆ (148) presents seven Athenian lead weights conserved in Split. VAN DER WILT (302) presents six Athenian weights (3 staters, 2 staters, ½ stater, ⅓ stater, ¼ stater, ⅛ stater) based on the 112-drachma mina and dated to the second half of the 4th century BCE that were discovered in Thonis-Heraclion (Egypt). More than 600 weights show a symbol linked to the denomination. Athenian *parasema* do not appear on commercial weights, except on countermarks: see KILLEN (151). KROLL (159) re-examines the chronology of early Athenian trade standards: the 100-drachma mina was replaced by a 105-drachma mina (the so-called “Solonian” standard) in the 470s BCE; the 112-drachma mina was adopted in the 380s or 370s BCE. TRABUCCO (283) argues that the change of standard had the effect of counterbalancing the rise in prices during difficult periods. KILLEN (154) identifies six Athenian bronze weights dating from the 5th century BCE as standard weights. HATZOPOULOS (138) edits two Aphytis fragments of the Athenian standards decree (*IG I³ 1453*) and compares the text with the other copies of the same decree from Hamaxitus, Cos, Syme, “Smyrna”, Siphnos, and “Odessa”. He dates the decree to 425/424 BCE. The consequences of this decree on the production of weights (and coins) of Athens’ allies have been interpreted in radically different ways: compare e.g. WEISER (293) and KROLL (158). DOYEN (82, 83) re-edits the Athenian agoranomic decree (*IG II² 1013*) that documents the adoption of the 150-drachma mina at the end of the 2nd century BCE. Independently, RIZZI (236) provides an extensive commentary on the same decree; see also RIZZI (232, 233, 237). DOYEN (85) shows that the modification of the commercial mina and the definition of new fruit measures in this text do not necessarily mean that Athens adopted Roman weights and measures as early as the end of the 2nd century BCE. RIZZI (234) proposes an Italian translation and an in-depth institutional and legal commentary on three Athenian decrees related to commercial activities and, therefore, measurement: the agoranomic inscription of Piraeus (*SEG 47.196*), Hadrian’s letter on fish prices (*IG II² 1103 = AE 2015, 1385*), and Hadrian’s law on olive oil (*IG II² 1100 = AE 2008, 1281*). For the agoranomic inscription of Piraeus, see also DESCAT (75).

KILLEN (151) attributes one lead weight showing a Boiotian shield to the Boiotian Koinon, and one bronze weight with the head of a bull to the Phokidian Koinon.

Aegean islands

PAPADOPOULOU (196) publishes a lead weight discovered in Delos, with an inscription equating to a Greek denomination (μναῖ | ἐρίων | γ’, “3 minas of wool”) and a Roman one (λίτραι ζ’, “6 litras”). The reference commercial mina thus weighs 150 Attic drachmas, equalling two Roman libras. See KROLL AND STEFANAKI (160), who date the weight to ca. 100 BCE.

Macedonia and Chalkidike

VOUVOULIS (286) examines five bronze weights found in the Agora of Pella and its surroundings. He analyses their metrological standards and their findspots.

For a short overview of the weights discovered in Olynthus, see TEKIN (266).

Thrace

TEKIN (266) and KILLEN (151) record the two first known lead weights from Thasos, which show the bow and the club of Heracles, as well as the legend ΘΑΣΙΟΝ.

TEKIN (266) publishes the six first known lead weights from Maroneia, with a four-spoke wheel and the letters M–A–P–Ω between the spokes.

TEKIN (266) publishes two bronze weights from Ainos, with a herm on a throne.

Bronze and lead weights from Lysimachaea usually show a lion, the legend ΛΥΣΙ, and an abbreviated denomination. KILLEN (150, 151) identifies 32 weights, 15 of which were published for the first time. Independently, TEKİN (258, 266) lists 39 weights, mainly conserved in Turkish museums and private collections. LAZARENKO (165) adds seven other weights conserved in the Varna Museum of Archaeology. Finally, TEKİN (272) enumerates 72 weights, but suggests twice as many weights remain unpublished. This important corpus was produced within one and a half centuries (between 309 and 144 BCE). Therefore, it provides a useful benchmark for early Hellenistic metrology.

TEKİN (266) records only one weight from Bisanthe (*Pondera*, #12472).

TEKİN (266) and KILLEN (151) collect 11 lead weights from Byzantium, with a dolphin and the legend ΠΥ(ZAN) or BY(Z).

NANKOV (184) publishes a bronze weight, four balance pans, a balance beam and four suspension chains found during the excavations of Seuthopolis. He also provides a table with 18 cylinder weights comparable to the Seuthopolis specimen, from Cabyle (one weight), Torone (one weight), Olynthus (seven weights), Athens (two weights), and Ashkelon (seven weights).

Moesia

BEKOV (32) describes four lead weights from Odessus (one of them is published for the first time) showing the Great God reclining on a dining couch. These weights seem to follow Athenian standards (105-, 126-, and 150-drachma minas). MARIN (178, p. 326) attributes another weight to Odessus, even if its aspect rather evokes the mint of Callatis.

DRAGANOV (88, p. 145), publishes a weight showing on the obverse the laureate head of Apollo I. and the legend ΕΥ, on the reverse a lyre and the legend ΦΙΛΟΞΕ | ΔΙΟΝΥ. MARIN (178, pp. 328–329), attributes to Dionysopolis a circular weight with the legend ΤΕ unearthed in Krapets, Shabla district (Bulgaria), as well as a square weight with the same legend from the antiquities trade. Considering its findspot, the first one can probably be assigned to a Moesian mint, but the second one originates more probably from Asia Minor (see e.g. *CPAI* III/1, nos. 204–218). Another weight excavated in Krapets, showing the head of Dionysos I. and the legend ΗΡΑ | ΟΓΔΟ certainly belongs to Dionysopolis, as suggested in the *editio princeps*: see MARIN (178, pp. 327–328).

KILLEN (151) records two different *parasema* for Callatis: in one case, a club and a bow in a gorytos (18 weights); in the other case, a club and a bow without the gorytos (6 weights).

In his catalogue of the weights attributed to Tomis, AVRAM (27, 28) identifies two series of Greek weights, whose main symbol is respectively a Dioscurus (*IScM* VI/2, P1–P3) and Hermes (P4–P15). The head of Dioscurus is the *parasemon* of the city-state: see KILLEN (151). According to Ocheșeanu's typology and chronology, AVRAM dates the first series to the 2nd century BCE (138-drachma mina), and the second series to the late 2nd / 1st centuries BCE (150-drachma mina).

Bronze and lead weights from Istrus usually show on the obverse the head of Hermes, the name of the city-state and the denomination, and on the reverse the *parasemon* of the city-state (a sea-eagle attacking a dolphin) and the name of a magistrate. For the two variants of the *parasemon*, see KILLEN (151) (27 weights). For the bronze weights, see KILLEN (154). After a recapitulation of the history of publications, GRAMATICU (127) presents a corpus of 37 weights. She correlates the evolution of both weight and monetary standards. In her view, the commercial mina should always equal 100 monetary drachmas. Therefore, she proposes a revised chronology based on the metrology: [1] a standard of 840 g between 480/475 and 413/410 BCE; [2] a standard of 700–680 g between 410 and ca. 360–350 BCE; [3] a standard of 680–600 g between ca. 380 and 330 BCE; [4] a standard of 580 g between 330 and 300 BCE; [5] a standard of 480 g between 300 and ca. 255 BCE; [6] a standard of 436 g between ca. 255 BCE and the beginning of the 1st century CE. She also suggests that five weights (nos. 18–22) were produced in Istrus but were actually used in Tomis. GRAMATICU (128) publishes another weight from Istrus, very similar to no. 26 in her previous paper (same mould?). DABÎCA AND ANGELESCU (68) publish five weights excavated in modern Histria, two of which are Greek weights from ancient Istrus.

FERENCZ (106) publishes a leaf-shaped mina discovered in Ardeu (Hunedoara County).

Scythia

KILLEN (151) records 14 weights from Olbia with the *parasemon* of the city-state (dolphin). All these weights are made of bronze: see KILLEN (154). CHEKHOVYCH (55) studies 147 lead weights from the Anokhin Collection, which

were discovered in Olbia and the surrounding area. She publishes 76 weights belonging to 11 different metrological standards.

Tauris and Cimmerian Bosphorus

MARIN (178, pp. 324–327), assigns to Chersonesos two weights formerly attributed to Callatis. On the second weight, the symbol interpreted as a modius with three ears of wheat is more probably a knife stuck in a three-legged block which also appears on weights from Istrus.

SAPRYKIN (247) publishes a lead weight discovered near Theodosia. The weight bears on one side the names of three agoranomoi, and on the other side a thyrsus, a vine with a bunch of grapes, and a monogram interpreted as ΠΑ. SAPRYKIN attributes this weight and a similar weight found in Nymphaeum to Panticapaeum, and draws conclusions on the agoranomia in Bosphorus. FEDOSEEV (105) refutes his arguments. He underlines the analogies of these two weights with a third one, showing the head of Pan and the names of three agoranomoi, and attributes the weights to Sinope. He dates the weights from Panticapaeum showing the names of two agoranomoi to the 3rd century CE.

ZHURAVLEV AND ZAKHAROV (303) publish a 2nd-century BCE lead weight from Golubitskaya 2 (Taman peninsula), with four countermarks with a bow in a gorytos.

Two stone weights (1,518 g and 5,730 g) were found in an archaeological excavation in Gorgippia (*Pondera*, #14343–14344): see NOVICHKIN (188), who attributes the second one to Panticapaeum.

Bithynia

KILLEN (151, 152) studies five weights from Heraclea Pontica, three of which are published for the first time. The weights show the head of Heracles on the obverse, a club and a quiver on the reverse, and the name of a magistrate stamped on the four sides. Two weights were probably cast in the same mould. She dates this corpus to ca. 350–250 BCE.

TEKIN (266) records only one weight for Chalcedon, with a caduceus and the legend KAΛΧ (*Pondera*, #536). Another weight was auctioned in 2017 (*Pondera*, #11501).

Mysia

KROLL (158) attributes to Cyzicus two lead quarter-minas showing the Athenian owl, the tuna fish and the retrograde legend πό(λεως) (*Pondera*, #13472, #13474). He suggests these weights were produced in the context of the late 5th-century BCE Athenian decree on silver coinage, weights and measures (ca. 414 BCE), but see WEISER (293). TEKIN (266) records 135 Hellenistic weights from Cyzicus, and KILLEN (151) identifies 71 weights with a *parasemon* (either a tuna fish or a torch). See also PERK (204). Other symbols are attested, such as a caduceus, a dolphin, a fish, an amphora or a thunderbolt. The vast majority of weights are made of lead, but a few bronze weights also exist: see KILLEN (154). Weights from Cyzicus typically bear a legend above and below the symbol, with the legend KYZ(I) and the denomination. These weights are built on the multiples and fractions (3, 2, 1, ½, ⅓, ¼) of the mina and multiples and fractions (6, 4, 3, 2, 1, ½, ¼) of the stater. Weights showing a (tuna?) fish arranged diagonally, without any legend, probably do not originate from Cyzicus. Even so, the corpus available to date exceeds 150 weights, since many weights from Cyzicus have been auctioned in the last years: see *Pondera*, s.v.

Only one weight from Proconnesus (lost to date) is documented (*Pondera*, #13281), with an oenochoe as *parasemon*: see KILLEN (151).

TEKIN (259, 266) and KILLEN (151) record 23 weights from Lampsacus, ten of which were previously unpublished. The *parasemon* is a winged horse protome: see TEKIN (271), KILLEN (153). A few other weights have been auctioned recently: see *Pondera*, s.v.

TEKIN (266) attributes six weights to Abydos. The *parasemon* is an eagle: see KILLEN (151). Two other weights with an eagle must now be added to the corpus: see *Pondera*, s.v. One could also attribute to Abydos bronze weights with the monogram AB (*Pondera*, #11835, #11837, #13411).

Troas

The weights from Ilium bear the legend ΙΑΙ. Three main symbols are documented: a crested helmet, head of Athena three-quarter facing r., head of Athena r. See TEKIN (266) and KILLEN (151).

TEKIN (266) attributes to Gentinos a lead weight showing a bee and the letter Γ (*Pondera*, #13321), while KILLEN (151) attributes it to Ephesus.

Up to now, only one weight from Scepsis has been preserved, with a fir tree and the legend ΣΚΗ (*Pondera*,

#13055). See TEKİN (266) and KILLEN (151).

TEKİN (266) and KILLEN (151) record five weights from Tenedus, showing the double axe and the legend TENEΔΙΩΝ.

TEKİN (266) and KILLEN (151) record 25 Hellenistic weights from Alexandria Troas, whose *parasemon* is a grazing horse. See also TEKİN (261), PERK (203). Five other weights have been auctioned or published since: see *Pondera*, s.v. These weights bear the legend ΑΛΕ and the denomination. The most frequent denominations are the mina and its fractions (1 mina, ½ mina, ¼ mina, ⅛ mina). A weight of 5 minas is also documented. One could maybe attribute to Alexandria Troas three weights showing a lyre and a bow, as well as the legends ΑΛΕΞ (1 mina) and ΑΛΕΞΑΝ (2 minas): *Pondera*, #2862 [attributed to Delos by KILLEN (151)], #11465, and #13231 [attributed to Alabanda by TEKİN (266)].

KILLEN (151) publishes the first known weight of Assus, with a griffin lying r. (*Pondera*, #13280).

Aeolis

TEKİN (275) publishes the first two known weights from Gryneium, whose *parasemon* is a *pinna nobilis* (*Pondera*, #13404–13405).

TEKİN (266, 273) and KILLEN (151) record 25 weights from Myrina, nine of which are published for the first time. A few other weights may be attributed to Myrina as well: see *Pondera*, s.v. These weights show a volute krater and the legend MY. Two weights attributed to Myrina by TEKİN (266, 273) more probably belong to Chios (*Pondera*, #13245–13246), since their symbol is an amphora.

TEKİN (266) presents 14 weights from Cyme, nine of which are published for the first time. Almost all the weights bear the legend KY. The symbol is usually a single-handled vase, which is one of the *parasema* of the city-state: see KILLEN (151). At least one weight shows an astragalos with the legend KY (*Pondera*, #1830).

Ionia

Out of the 19 weights from Smyrna dated from the late Classical and Hellenistic periods, eleven show a tripod and the legend ZMY(P): see TEKİN (266) and KILLEN (151). The eight others do not bear a *parasemon*, but only an inscription. They could be dated to the late Hellenistic and early Imperial periods.

TEKİN (274) publishes the first known bronze weight from Clazomenae, with a winged boar protome and the legend ΚΑΑ (*Pondera*, #13178). Another bronze weight from Clazomenae, with the name of the city-state but without the *parasemon*, was auctioned in 2015 (*Pondera*, #892).

TEKİN (266) and KILLEN (151) record 23 weights from Chios. Two *parasema* are listed: a sphinx sitting on an amphora (13 weights), and an amphora alone (13 weights). The most frequent denominations are: 5 minas, 2 minas, 1 mina, ½ mina, and ¼ mina.

TEKİN (274) publishes a lead weight with a griffin walking r., probably to be attributed to Teos (*Pondera*, #13177). Another lead weight with the same symbol could also belong to Teos (*Pondera*, #13249).

TEKİN (266) and KILLEN (151) record 23 weights from Colophon, all of them unpublished. A few others have appeared in the antiquities trade, see *Pondera*, s.v. For the *parasemon* (a lyre), see especially DOĞAN GÜRBÜZER (79).

TEKİN (266) and KILLEN (151) record 28 weights from Ephesus, but the attribution of three weights is questionable (*Pondera*, #1761, #2115–2116). The bee is the most frequent *parasemon* (26 weights, including *Pondera*, #13212 and #13322), but the stag is also documented (*Pondera*, #1843, #13997–13998, and maybe #2424 and #13900).

Four commercial weights from Priene showing the legend ΠΙΠΗ(ΝΕΩΝ) and a trident have been documented since the beginning of the 20th century: see TEKİN (266) and KILLEN (151).

KILLEN (151) publishes the first known weight from Samos, showing the prow of a *samaina* and the legend Ἡρης.

The 32 weights from Miletus bear the monogram MI, sometimes MIA or MIAH: see TEKİN (266), KILLEN (151), as well as *Pondera*, #13401 and #13941. A bronze weight brings together the monogram ΜΙ(λησίων), the symbol of the bee (*parasemon* of Ephesus), and the dotted legend ιερά Ἀπόλ(λωνος) Διδυμ[έως] (*Pondera*, #13383): see TEKİN (270). Another weight from Miletus is countermarked with the symbol of the bee (*Pondera*, #13383). Finally, a bronze weight shows a fish and the incised legend ΜΙ|ΑΗ (*Pondera*, #11476); its attribution to Miletus is uncertain.

TEKİN (266) attributes to Heraclea ad Latmum a heavy lead weight (2,515 g) showing a club and a cornucopia, with the retrograd legend Ἡρα(κλέων) (?) (*Pondera*, #13409).

Caria

KILLEN (151) publishes the first known weight from Iasus, with a dolphin r. and the legend Ἰα(σέων) (*Pondera*, #13407).

KARLSSON ET AL. (149) present a lead weight discovered during the 2012 and 2013 excavation campaigns in Labraunda; GOUSSARD ET AL. (126) publish another lead weight, discovered in 2017, that bears a double axe.

Only one weight, with a fish and the legend Φυσ|κέων, can be attributed to Phycus (*Pondera*, #13408): see TEKİN (266).

Dodecanese Islands

TEKİN (266) and KILLEN (151) record four weights from Rhodes, which show the Rhodian rose as *parasemon*. Only one weight, with a crab as *parasemon*, can be attributed to Cos (*Pondera*, #13416): see KILLEN (151).

Cilicia

WEISS (297) publishes the first known weight from Aegae (*Pondera*, #11544).

Syria

FINKIELSZTEJN (109) studies Syrian metrological standards. His corpus (58 weights) includes 42 weights from Antioch, Seleucia Pieria, Heraclea ad Mare, Laodicea ad Mare, and Demetrias ad Mare (uncertain location); seven royal weights showing the name of a Seleucid king; five weights without the name of the city-state; four weights referring to a double standard (both mina and sheqel). Many other Syrian weights have been studied (e.g. Henri Seyrig archives and the collection of the Geneva Art and History Museum) or auctioned in the last few years: see *Pondera*, s.v. These weights usually bear a Seleucid symbol (e.g. elephant, horse, bull, anchor, ship) or a common market symbol (e.g. cornucopia, caduceus). On the reverse, many weights show a lattice pattern, probably to prevent people from removing metal from the surface. Very often, the Greek legend names the king or the city-state, the denomination, the date in reference to the Seleucid era, and/or the *agoranomos*. The weights refer to a Greek mina whose mass is increasing over time, from *ca.* 460 g to *ca.* 840 g. The most frequent standards are *ca.* 510 g, *ca.* 550 g, *ca.* 600 g, and *ca.* 650 g. Independently, DOYEN (81) demonstrates that the weight system used in Syria during the first half of the 2nd century BCE refers to a mina of 128 Attic drachmas (*ca.* 555 g). Antiochus IV's reorganisation of the monetary system shows strong connections with the Seleucid weight system, since new silver and bronze denominations are organised according to a binary scale, similar to the weights. GATIER AND OLIVIER (122) publish a mina from Laodicea ad Mare (20/19 BCE) (*Pondera*, #3616) that was cast from the same mould as another weight (*Pondera*, #3615).

Phoenicia

FINKIELSZTEJN (110) studies Phoenician metrological standards. His corpus (156 weights) includes 56 weights from Aradus; 46 weights from Marathus; seven weights from Byblus; six weights attributed to Herodes (99/98 BCE); two weights with the legend ΙΙΤ^Ϛ; six weights from Berytus; a mould from Sidon; 28 weights from Tyre; three unclassified weights. See the updates on *Pondera*, s.v. (e.g. the 95 weights now documented for Aradus). The impressive corpus of weights from Aradus and Marathus shows a Phoenician inscription with the monogram of the city, as well as a denomination based on the sheqel (*ca.* 9.4 g). Other weights bear common market symbols or *parasema* (e.g. Berytus, Byblus) and a Greek inscription. The weights refer to different standards, especially “minas” weighing *ca.* 520 g, *ca.* 560 g, *ca.* 630 g, and *ca.* 650 g.

Southern Levant

GALILI ET AL. (115) publish seven assemblages of metal artefacts and bronze coins recovered from the northern bay of 'Atlit. Assemblages 2 and 4 include respectively two and four square lead weights, which could come from the same shipwreck. Three of the six weights are dated to 118/117 BCE, 117/116 BCE (rather than 116/115 BCE), and 109/108 BCE. Five weights seem to originate from the Southern Levant, while the sixth one differs from the others in both its aspect and its metrological standard. GITLER AND FINKIELSZTEJN (125) present a copper-alloyed circular weight with an incised Greek legend mentioning the *demos* of Ascalon, the year (150/149 BCE), and the name of an *astynomos*. Two metal analyses show that (a) the weight was not a reused Ptolemaic coin, and (b) the weight and the inscription are genuine. FINKIELSZTEJN (112) presents inscribed *instrumenta* contemporaneous with the Hasmonean dynasty in Judea (Rhodian amphora stamps, weights and measures, Judean stamps, coins, bullae and seals). For other weights dating to the Hellenistic period, see the *CIIP* (66, 15, 16, 17).

Egypt

VAN DER WILT (302) describes the weights discovered in Thonis-Heracleum (154 lead and bronze weights, only two stone weights). The site was in activity between the 8th and the 2nd centuries BCE, with a peak between the 4th and the 2nd centuries BCE. The corpus consists of 26 Greek-style decorated and inscribed weights (including 14 Athenian weights), 92 Greek-style uninscribed weights, and 38 Egyptian-style weights. The spatial distribution of Greek and Egyptian weights probably reflects the commercial life of Thonis-Heracleum, while deposits of Athenian weights could rather be viewed as ritual offerings.

ASHOUR (23) offers new insights into the weight standards of Ptolemaic and Roman Egypt, based on a corpus of 921 weights (including 365 unpublished weights from the Alexandria Greco-Roman Museum). Based on archaeological and literary evidence, he identifies four different standards referring to a Greek mina and to the Ptolemaic stater, namely: [1] the “Egyptian-Attic standard” (32-stater mina = 457 g); [2] the “Royal Ptolemaic standard” (36-stater mina = 523 g); [3] the “Alexandrian standard” (38-stater mina = 552 g); and [4] the “Ptolemaic commercial and monetary standard” (25-stater mina = 357 g, equivalent to the monetary mina of 100 Ptolemaic drachmas). Another standard refers to Roman units (*libra*, *uncia*, etc.) that serve as a reference for Roman, Late Roman and Byzantine weights.

HAZZARD AND HUSTON (139) publish a circular bronze weight that may come from a hoard along with large bronzes of Ptolemy IV. The weight shows the sign = (δουβόλοι) on one side, and μ´ (40, scil. χαλκοῦ δραχμαί) on the other side. Therefore, it implies a rate of exchange of 500 copper drachmas to a silver stater (tetradrachm equaling 25 obols), instead of 16 copper drachmas to 5½ obols. During his reign (222–205/204 BCE), Ptolemy IV reduced the copper drachm from 68 g to *ca.* 2 g. It was the main cause of the price inflation between the late 3rd and the early 2nd centuries BCE.

Roman weights

Rome

MANCUSI, MENNELLA AND DEL SOLDATO (176) publish a new weight [*exactum*] *ad Articul(e)ianum*). They list 19 occurrences of this expression: eleven from Rome, two from Herculaneum, one from Fidenae, one from Praeneste, one from an unidentified locality of Regio I, one from Luni, one from Thibursicum Bure (Africa), and one from the antiquities market. In 47 CE, a reform or a verification of weights and measures was ordered by the emperor Claudius and carried out by the aediles. The word *Articuleianum* derives from the gentilicium *Articuleius* and could refer to the name of an aedile in charge of this metrological revision. BERG (33, no. 13) also publishes a 10-libra stone weight with the inscription *exacta (ad) Art(icule)ianum*), from Ostia. See also DAGUET-GAGEY (71, pp. 487–492, 545–547).

LUCIANI AND LUCHELLI (169) examine the weights with the inscription *exactum ad Castoris* that guarantees the conformity to standards conserved in the Temple of Castor and Pollux, in the *Forum Romanum*. All these weights are made of bronze: 22 truncated spheres, one astragalus, and 21 nested-cup weights. Their study also includes 21 anepigraphic nested-cup weights that are similar to the inscribed ones. The truncated spheres circulated mainly in Central and Northern Italy, while the nested-cup weights were distributed all along the *limes*, from Gaul to Dacia, with a concentration in the Rhine, Alpine Danubian and Venetian territories. These weights should probably be dated to the 2nd century CE. See also DAGUET-GAGEY (71, pp. 543–545).

HAMROUNI AND NADDARI (136) publish a new weight produced by Q. Iunius Rusticus, *praefectus Vrbi* during the joint reign of Marcus Aurelius and Lucius Verus (163–167 CE). This series comprises 28 weights, which were discovered in Italy (Florence, Perugia, Rome, Naples), Sicily, Cisalpine Gaul, Spain, and Africa. See also DAGUET-GAGEY (71, pp. 493–498, 548–550).

Latium and Campania

BERG (33) presents an overview of the material evidence from Ostia for weighing and measuring operations (archaeological artefacts, iconography, and inscriptions).

NICOSIA (187) publishes weighing instruments discovered in Aquinum: the beam of small balance scales, the beam of a small steelyard, nine Roman stone weights, three lead loom weights, and six Late Roman and Byzantine copper-alloyed weights. He also publishes two lead loom weights, two Roman stone weights, and nine Late Roman and Byzantine copper-alloyed weights from the site of *Interamna Lirenas*.

PUGLIESE (220) has studied 87 weights and counterweights conserved at the National Archaeological Museum of Naples. Most of them were apparently discovered in Pompeii and therefore should be dated to the 1st century CE.

Balance weights are usually stone, lead or bronze truncated spheres, elliptic cylinders or truncated double cones. Other shapes are also found: five large trapezoidal lead weights and three zoomorphic bronze weights filled with lead (two goats and one pig). The metrological analysis of these weights reveals a constant reference to the Roman libra, even if six stone weights are remarkably heavier.

Etruria

LUCIANI (168) publishes four stone weights (4 libras, 20 libras, 100 libras, and maybe 100 libras) that were discovered during the 2016 and 2017 excavation campaigns of the “Domus del mitreo” (Tarquinia). Based on their typology and the stratigraphy, these weights must be dated between the 1st century BCE and the 3rd century CE.

Aemilia

CORTI (63) publishes five stone weights (two of them fragmented), five bronze counterweights and a scale pan found during the excavations in the Novi Sad Park (Modena). Their dating ranges from the 1st to the 4th centuries CE.

PUGLIESE (220) presents the collection of 129 weights and counterweights in the Archaeological Museum of Bologna. Stone weights (mostly truncated spheres) represent two thirds of the collection. Bronze weights are usually truncated double cones, cylinders or truncated spheres. The collection includes one lead weight and one iron weight. The metrological analysis shows that several small weights (multiples of the *scripulus*) are much heavier than their theoretical denomination.

Liguria

MANCUSI, MENNELLA AND DEL SOLDATO (176) publish a 20-libra weight discovered in 2012 in Luni. The weight is made of stone (Iherzolite), with a missing iron handle. It is part of the series of weights *exacta ad Articuleianum* (47 CE).

Venetia and Histria

BOLLA (36) presents several artefacts related to Roman weights and measures (parts of balance scales and steel-yards, counterweights, weights, and capacity measures) on display during a temporary exhibition at the Roman Theatre Archaeological Museum (Verona).

DOBREVA AND SUTTO (78) publish a 10-libra stone weight discovered in 2009 during the excavations in the central *domus* of the former Cossar property at Aquileia. Titus Macer, whose name is carved on the weight, probably belongs to the *gens Vettia*, a powerful family settled in the eastern part of the *Regio X*.

SUTTO (255) has studied the collection of weights of the National Archaeological Museum of Aquileia, which has 84 metal weights and 336 stone weights, 100 of which are inscribed. She presents 42 inscribed weights and analyses the type of inscription: the denomination (31 weights), the abbreviated name of the owner (8 weights), what is thought to be a serial number (1 weight), and the certification of the standard (2 weights).

MAINARDIS (174) publishes the Roman weights conserved in the Civic Museum of History and Art of Trieste: 17 lead weights, 15 bronze weights, and 84 stone weights (71 made of limestone, 13 made of basalt). There is a catalogue of the 24 inscribed weights.

Sicily

DIMARTINO (77) publishes 16 Roman weights made of basalt that are conserved in the Antonio Salinas Regional Archaeological Museum (Palermo). The truncated spheres are the most frequent shape (thirteen weights, five of which are inscribed); the three other weights are truncated ellipsoids (one of which is inscribed).

Gaul

LEMOINE AND ROCA (166) list 26 stone weights discovered in the Var department, France. GALTIER ET AL. (117) publish several sets of weights discovered in Augustonemetum (Clermont-Ferrand). HARTMANN (137) presents two stone weights (161.64 g; 6.65 g) found in Eschenz, Switzerland, in 2000; the heavier one is a semis. FRANKEN (114) publishes a new study on balances and counterweights in the Treasure of Bavay. Weights and balances discovered in Gaul (and beyond) are regularly published in the *Artefacts* database (8) and in the bulletin *Instrumentum*. For the Gaulish magistrate in charge with weights and measures (*dannos/dannus*), see PAILLER (194).

Britannia

TOMLIN (282) regularly publishes inscribed Roman weights discovered in Britain: a stamped lead weight (148.6 g) from Kintbury (282: [2018], no. 4); a lead 8-uncia weight from a withheld findspot in Cheshire (282: [2014], no. 12); a lead weight (432.6 g) from Grappenhall and Thelwall (282: [2019], no. 8); two lead semisses (154 g; 179 g)

from Vindolanda (282: [2013], no. 29; [2014], no. 50); a lead 4-uncia weight (108 g) from Airth (282: [2017], no. 58); a lead 2-uncia weight in Thornhill, Scotland (282: [2014], no. 64). See also (7). SMITHER (252, 253) has collected 134 balances, 193 weights and 47 counterweights from Roman London. The distribution of weights and counterweights across London shows a detailed picture of economic activities. The fact that equal and dual balances are more common in London than elsewhere in Britannia, where steelyards are more frequent, suggests that the economy of London was based around smaller quantities and/or more valuable commodities.

Hispania

ERICE LACABE (100) presents a bronze, lead-filled counterweight probably representing Attis (2.4 kg) that was discovered in Sofuentes. RODRÍGUEZ MARTORELL AND RUIZ DE ARBULO BAYONA (239) present another counterweight depicting Aequitas (38 kg), found in the port of Tarragona. This is by far the heaviest *aequipondium* hitherto known in the Roman world, which could weigh loads up to 1,500 kg. CEBRIÁN FERNÁNDEZ AND HORTELANO UCEDA (48) examine the weighing equipment from Segobriga and its surroundings (balance scales and weights, steelyards and counterweights), dating from the 1st century BCE to the end of the 3rd century CE. BARRIOS RODRÍGUEZ (31) lists Roman and Late Roman weights discovered in Lusitania.

Africa

HAMROUNI AND NADDARI (136) publish a 10-libra stone weight from Mactaris that bears the name of Q. Iunius Rusticus (163–167 CE). They suggest that the *ponderarium* of Mactaris was located in the *macellum*.

Epirus

HAENSCH AND SHEHI (132) publish three inscribed stone weights excavated in Durrës in 2002 and 2010 (20.2 kg; 4.4 kg; 5.4 kg). Inscribed denominations (50 libras; 12 libras; 25 libras) do not correspond to the actual masses of these three weights, if the monetary libra is assumed to be the weight standard.

Thracia

Several weights of Perinthus have been auctioned in recent years: see *Pondera*, s.v. This corpus now includes 15 weights (denominations: 5 libras, 2 libras, 1 libra, ½ libra, 1 uncia).

Moesia Inferior

AVRAM (27, 28) also follows Ocheșeanu's typology and chronology for describing the Roman weights attributed to Tomis. Ten weights seem to refer to a Greek mina: a 20-uncia mina dated to the first half of the 1st century CE (*IScM* VI/2, P16–P21), a 16-uncia mina from the second half of the 1st to the beginning of the 3rd centuries CE (P22–P23), and an 18-uncia mina from the 3rd century CE (P24–P25). However, the huge majority of the weights produced between the 1st and 3rd centuries CE (106 weights and a mould for casting eight different denominations) refer to the Roman libra and uncia (P26–P132). Two recently auctioned weights (*Pondera*, #11469, #13133) should now be added to the kantharos series (P31–P43). The mina with the names of Septimius Severus, Caracalla and Geta (P23; *Pondera*, #13768) shows strong similarities with the weights from Tium (see e.g. *Pondera*, #13915); therefore, its symbol is probably the bell of an agoranomos, rather than a pileus. In most cases, the absence of a symbol or the name of the city-state makes it difficult to distinguish between the weights from Tomis and weights produced in other Moesian, or even Thracian mints.

PARASCHIV (200) presents an uninscribed lead weight from Aegyssus (3 uncias?), which could date to the Roman period.

Chersonesus Taurica

LYSENKO AND MASYAKIN (170) publish a figured counterweight shaped as a Roman emperor that was found in the sanctuary of Eklizi-Burun (Southern Crimea). They identify the emperor as Nero and suggest that this counterweight and its steelyard were captured by (Scytho-)Taurians during the Roman-Bosporan War (45–49 CE) and then offered to the sanctuary.

Pontus et Bithynia

ATASOY AND YILDIRIM (26) describe a counterweight, four lead weights with vertical strokes, and one lead weight identified as a ἡμίλειτρον ἰταλικόν that were discovered in three shipwrecks off the coast of Tium in 2013. They also present a dozen typical lead weights from Tium, six of which were found on the bank of the Billaios River in 2009 and 2012.

HAENSCH AND WEISS (133) republish three weights from Nicomedia: a libra dated to the 17th year of an unnamed

emperor, who must be Marcus Aurelius (176/177 CE) (*Pondera*, #1764); a litra of the 2nd year of Elagabalus (218/219 CE) (*Pondera*, #2401); a hemilitron of the 4th year of Aurelian (272/273 or 273/274 CE) (*Pondera*, #2395). The three weights refer to the commercial libra (λείτρα ἀγοραία), which is significantly heavier than the monetary libra (λείτρα ἱταλική), also attested in Nicomedia. Based on the available corpus (23 weights), HAENSCH AND WEISS draw conclusions on the position of governorship of Pontus et Bithynia in the consular career, the function of *curator rei publicae Nicomediae* held by some governors, the production of weights and coins in connection with military activities, the organisation of the agoranomia in Nicomedia, and the date of Decius' *dies imperii*. They also provide an overview table of the governors of Pontus et Bithynia. ÖZTÜRK (192) publishes a litra of the 5th year of Philip the Arab and Philip II (247/248 CE) (*Pondera*, #12213). The *editio princeps* was amended by ADAK (12), HAENSCH AND WEISS (134), and by ÖZTÜRK himself (193). Two other weights were auctioned in 2020: a hemilitron of the 4th year of Elagabalus (220 CE) (*Pondera*, #13358), and a hemilitron of the 4th year of Gordian III (240/241 CE) (*Pondera*, #12842). This brings to 26 the number of published weights from Nicomedia.

A lead 5-litra weight from Nicaea dated to the 5th year of Antoninus Pius (141/142 CE) was auctioned in 2014 (*Pondera*, #13144). A litra, dated to the same reign, was already documented (*Pondera*, #13145). WEISS (300) compares the different ways Nicomedia and Nicaea represented themselves on weights and coins.

Asia

The attribution of imperial-era weights is difficult, since the *parasemon* and the name of the city-state disappear, even if the legend regularly mentions the name of the agoranomos or another magistrate. Weights from Western Asia Minor have a very similar aspect, especially in Ionian city-states (Smyrna, Ephesus, Colophon, Magnesia ad Maeandrum, Metropolis, Miletus and maybe Samos), but also in Pergamon (Mysia) and in Hypaepa (Lydia). Roman lead weights and stone moulds have been discovered in Smyrna (101) and in Ephesus (229, no. B 346; 223, nos. G 63–67).

WEISS (294) studies the weights that were produced and controlled by magistrates other than the agoranomoi: *panegyriarchai* (unknown city-states), *eirenarchoi* (Colophon), *paraphylakes* (unknown city-states, and maybe Ephesus), and *hipparchoi* (Smyrna and maybe other city-states). A weight signed by the *hipparchos* Claudius Sellius Sulla should probably be assigned to Philadelphia rather than Smyrna: see WEISS (296). For another weight of an *eirenarchos* in Colophon and addenda to the weights produced by *hipparchoi*, see WEISS (298). WEISS (294) also presents two unusual situations: the city-state mentioned as the agoranomos, and a bronze weight offered by the agoranomos to the city-state (*Pondera*, #13913; see also #13056, #13912, and #14422). A weight from Smyrna bears the name of a strategos: see WEISS (299).

WEISS (295) observes that the circular countermarks on West Asian weights are similar in size and aspect to coin types. He suggests that the seals were produced by the specialised workshops that struck the provincial coins for several city-states. In some cases, the main deity of the city-state serves as a *parasemon*: Ephesus (Artemis Ephesia, bee, doe), Magnesia ad Maeandrum (Artemis Leukophryene), Colophon (Apollon Clarius), and Sardis (Artemis Sardiane / Kore).

Cyprus

TWARDECKI (284) publishes a lead weight discovered during the excavations of the Agora of Nea Paphos, but leaves open the question of its provenance. The weight is dated to the year 251, is signed by the agoranomos Seleucus, and shows the legend ἐσικώθη “it was calibrated” (*Pondera*, #14503). These elements point to a well-documented series of ten weights from Seleucia Pieria (see *Pondera*, s.v.).

Palestina

FINKIELSZTEJN (111) recapitulates the weights standards of the Hellenistic Near East, before analysing the Roman period, with a focus on Southern Levant: stone weights from Jerusalem; lead weights of Herodian rulers and Roman emperors; weights in the name of Hadrian and Bar Kokhba; weights from Gaza and Ascalon; weights from Roman Syria. KLETTER (156) re-examines the 168 limestone weights from the Jewish Quarter in Jerusalem and calculates a weight standard of ca. 375 g. FINKIELSZTEJN (113) offers an overview of coins, amphoras, weights and measures dating to the Herodian rulers. DONCEEL-VOÛTE (80) studies the stone weights from Jerusalem with the legend “Year 5 of the king” (probably Agrippa I, i.e. 40/41 CE). GATIER (120) re-publishes a weight from Antiochia ad Chrysorhoam, i.e. Gerasa (107/108 CE) (*Pondera*, #3584). For other weights dating to the Imperial period, see the *CIIP* (66, 15, 16, 17).

ABU-BAKER, AL SEKHANEH ET AL. (11) analyse the composition and corrosion of five allegedly Roman weights discovered in Qasr Ar-Rabbah (Jordan), by means of SEM-EDX and XRD. Analyses show that these weights were cast from relatively pure lead.

Late Roman and Byzantine weights

General studies

Three major museum collections of Late Roman and Byzantine weights have been published in recent years. TEKİN (263) presents the collection of the Pera Museum (Istanbul) [742 weights], which includes 64 truncated spheres (nos. 4–67), 433 square weights (nos. 68–156, 201–544), 121 circular weights (nos. 157–197, 545–624), and 11 octagonal weights (nos. 198–200, 625–632). These mostly copper-alloyed weights are described either as “commercial weights” (fractions and multiples of the libra or the uncia) [197 weights], and “monetary weights” (fractions and multiples of the nomisma) [432 weights]. Other sections present 27 coins transformed into weights (nos. 633–659), 17 anepigraphic circular weights and three Late Byzantine coin weights (nos. 660–680), 24 nested-cup weights (nos. 681–704), and 38 glass weights described by TOBIAS (nos. 705–742). CAMPAGNOLO AND WEBER (43) publish the rich collection of Late Roman and Byzantine copper-alloyed weights of the Art and History Museum (Geneva) [488 weights], with an original introduction and a detailed commentary. The catalogue ranges the weights from the heaviest (3 libras) to the lightest (2 siliquas?), regardless of their different shapes (truncated spheres, square and circular weights, *exagia solidi*), their legend, or their decoration. Nevertheless, the authors propose a classification into six categories (I–VI) and eight families (A–H), and pay special attention to the profile of the weights. CAMPAGNOLO (41, 42) further develops this typology. For a broader presentation of the collection of the Art and History Museum that also includes steelyards, counterweights, and glass *exagia*, see CAMPAGNOLO (40). GURULEVA (129) publishes the collection of Late Roman and Byzantine weights in the State Hermitage (Saint Petersburg) [284 weights]: 139 glass *exagia* (nos. 1–139), eight copper-alloyed *exagia* and eight Late Byzantine coin weights (nos. 140–155), four truncated spheres (nos. 225–228), 74 square weights (nos. 156–194, 229–263), three octagonal weights (nos. 195–196, 264), 46 circular weights (197–224, 265–282), and two nested-cup weights (nos. 283–284).

PASSERA (201) re-examines a copper-alloyed inlaid *tessera* probably discovered in Moimacco (Udine). The artefact shows a monogram on one side, and the letters VC (i.e. *vir clarissimus*) on the other side. It dates from the second half of the 5th to the first half of the 6th centuries CE. PASSERA discusses the status of the artefact (weight or *tessera*) and draws up a list of 28 comparanda from Africa Proconsularis and Italy. Independently, KULIKOWSKI (162) presents a catalogue of 36 similar copper-alloyed inlaid *tesserae* showing the names of the emperor(s), the *praefectus Vrbi* or the *praefectus praetorio*. He considers the possible functions of these artefacts and rejects the metrological interpretation. This question is a subject of lively debate among specialists.

WEBER (290) analyses 468 copper-alloyed 1-nomisma weights, mainly from private collections. He studies their metrology, their different shapes, their typology, their metal composition, their production and their decoration. WEBER (291) gathers 182 copper-alloyed coins transformed into weights (mainly 1-nomisma). This phenomenon mainly occurred with coins struck between the mid-3rd and the mid-4th centuries CE, and during the 6th century CE. KORSHENKO (157) presents 91 small weights (multiples of the *siliqua* and the *scripulum*) from his own collection.

WEBER (292) publishes a Late Roman truncated sphere that still shows a sprue and studies the evolution of copper-alloyed truncated spheres from Roman times to Islamic Middle Ages.

GIACALONE (123) studies the evolution of the iconography of copper-alloyed weights linked to gold coinage: not only *exagia solidi*, but also square and circular weights. PITRAKIS (210) analyses public measuring instruments in the context of the visual and material culture of marketplaces in Constantinople. CHARREY (54) analyses the production of Byzantine weights on both a technological and an iconological level. Based on three case studies (the *exagia solidi*, the “imperial” weights, and the weight with the inscription Θεοῦ χάρις), he emphasizes the triple function of symbols and legends on weights (homologation, propitiation, and ostentation). For a semiotic perspective on Late Roman and Byzantine anthropomorphic counterweights, see CHARREY (52).

CHARREY (53) questions the identification of “standard weights” or “official weights” among the corpus of Byzantine weights. He shows that these anachronistic designations obliterate the multiplicity of control and standardisation practices. For the production of wheat measures and weights according to official standards sent by the *praefectus praetorio* in Myra (388–392 CE), see RIZOS (231), CUVIGNY (67), and ROTHENHÖFER (243).

For an overview of Byzantine weights, see TOBIAS (280) and ENTWISTLE (95, 96). For the analogy between copper-alloyed *exagia* and lead bullae, see ASOLATI (25) and CHARREY (54); for the analogy between glass *exagia* and amphora stamps, see PAPANIKOLAOU (197).

Commercial and monetary weights

According to CUVIGNY (67), weights representing three co-emperors (scil. Valentinian II, Theodosius I, and Arcadius) might be called τρισανγούστια in an inscription from Myra (Andriake), dated to 388–392 CE, but ROTHENHÖFER (243) shows that this epithet characterises capacity measures. Amongst unpublished bronzes from the Archaeological Museum of Verona, BOLLA (35) presents a 1-libra copper-alloyed weight decorated with the incised busts of two emperors. She suggests identifying Arcadius and Honorius (395–408 CE). PAPADOPOULOU (195) publishes a 6-uncia copper-alloyed weight with silver inlay representing two emperors and a female figure standing, which was unearthed at the Kastritsa hill, near Ioannina. The female figure is interpreted as Tyche or Moneta, and the two emperors as Arcadius and Honorius or Valentinian II and Gratian. This discovery might prove that Kastritsa was an administrative center in the Late Roman period.

ENTWISTLE (94) re-examines the Early Byzantine weights discovered in Kunszentmárton (Hungary) in the early 1930s. The assemblage includes five copper-alloyed weights and four glass weights (*exagia*). The quite unusual association of square and circular copper-alloyed weights and the presence of glass weights point to a date in the first half of the 7th century CE. ENTWISTLE provides an updated catalogue of the weights and a list of the finds of Byzantine weights in Central and South-Eastern Europe.

PARASCHIV (200) publishes two copper-alloyed square weights from Argamum in Scythia Minor (1 nomisma and maybe 1 tremissis).

MAIKO (173) examines over 50 square, octagonal, circular and nested-cup weights from Sugdaia (Sudak) in Taurica, a majority of which were discovered underwater in the bay of Sugdaia, without an archaeological context. Since the peak of the port activity occurred between the second half of the 10th and the 13th centuries CE, most of the finds can be dated from this period. Finds dated from the last quarter of the 7th to the first half of the 10th centuries CE are scarcer. However, Byzantine weights are older: it is assumed they circulated for a long time. MANAEV ET AL. (175) publish a copper-alloyed 2-uncia circular weight from Gorzoubitai (Gurzuf). DUSHENKO (90, 91) presents five square and two circular copper-alloyed weights excavated at Doros (Mangup).

PÜLZ (223) publishes balance scales and weights, steelyards and counterweights excavated in Ephesus (nos. G1–G43), in particular three truncated spheres (nos. G34–G36), one square weight (no. G33), and six circular weights (nos. G29–G32, G37–G38), all of which are made of copper-alloy.

GATIER (118) documents rare early Byzantine weights produced by Near Eastern city-states (Tyre, Iamnia, and maybe Gaza), under the responsibility of ephoroi (*curatores civitatis*). Other weights, often made of lead, which might be attributed to city-states, reflect the persistence of a certain autonomy. GITLER AND CHARREY (124) publish eight copper-alloyed circular weights reportedly found in Israel. Based on the stylistic and iconographic similarities, the state of preservation, and a homogenous chemical composition, GITLER AND CHARREY assume that these weights form a set that was produced in the same workshop. EISENBERG ET AL. (93) propose an XRF analysis of a copper-alloyed square 6-uncia weight from Antiochia Hippos (Sussita). This highly elaborate Byzantine weight, discovered in a church destroyed in 749 CE, was still in use during the Umayyad period. LESTER (167) publishes three circular and three square copper-alloyed weights dated to Byzantine and Early Islamic periods excavated northwest of Tel Lod.

For Late Roman and Byzantine copper-alloyed weights discovered in Italy, see PASSERA (201) and NICOSIA (187).

Exagia solidi

DROST (89) presents two copper-alloyed *exagia solidi* produced in the name of Julian (363 CE), in Constantinople and probably in Rome. Therefore, this new control procedure for gold coinage was not limited to Antioch during the end of the reign of Julian, but had already spread to Western mints. ASOLATI (25) compares a lead seal from Altino with copper-alloyed *exagia solidi* attributed to the joint reign of Arcadius, Honorius and Theodosius II (403–408 CE). TEKİN AND EROL-ÖZDİZBAY (277) publish an *exagium* attributed to Theodosius II and Valentinian (425–450 CE) that was found during the excavations in Alliano; see also TEKİN (262). For the iconography of copper-alloyed *exagia solidi*, see GIACALONE (123).

ASOLATI (24) discusses three glass *exagia* dated to the 6th century CE discovered in Tyana in Cappadocia. These

artefacts show the importance of the site of Tyana in early Byzantine times, which is compared to the archaeological structures and the material found in the Gymnasium of Sardis. ASOLATI also analyses the distribution of 163+ glass *exagia* in the Byzantine Empire: Italy (14 weights), Balkans and Central Europe (28 weights), Greece (12 weights), Asia Minor (56 weights), Near East (37 weights), Asia (6 weights), Egypt and North Africa (10+ weights). PAPANIKOLAOU (197) makes a connection between amphora stamps and glass *exagia* produced in the name of the *praefecti* Ptolemaeus and Innocentius, between the second quarter and the middle of the 7th century CE. ENTWISTLE AND MEEK (97) present a selection of 44 glass *exagia* from the British Museum's collection (180 pieces), which is organised in four categories: "imperial" weights; weights with the bust of an eparch and an inscription; weights with a box or cruciform monogram; "Arab-Byzantine" weights. These weights range from *ca.* 500 CE to the mid-7th century CE. Scanning electron microscopy with energy dispersive X-ray analysis distributes these weights into six compositional types. Tentative conclusions may be drawn from these analyses concerning the links between typology, colour, dating, supposed provenance, and compositional type. SCHIBILLE, MEEK, TOBIAS, ENTWISTLE ET AL. (248) analyse 275 glass *exagia* from the British Museum and the French National Library's collections by means of LA-ICP-MS. This sample represents about 20% of all known specimens (*ca.* 1,300 in total). Glass weights are dated to the 6th and 7th centuries CE and belong to six compositional types. The two main types of glass used during the 6th century CE probably originate from Egypt. A new type, also with an Egyptian origin, emerged towards the second half of the 6th century CE. The Levantine I type was used during the late 6th and the early 7th centuries CE. The distribution shows (a) a large-scale, centralised production of the weights, and (b) the co-existence of alternative sources of supply for a same emission of weights.

Counterweights

Several Late Roman and Byzantine counterweights have been published recently. TOBIAS (281) presents five copper-alloyed counterweights representing a female bust and a lead spherical counterweight that used to belong to the Zacos Collection (now in the Badisches Landesmuseum in Karlsruhe). ŞİRİN (256) publishes a copper-alloyed counterweight representing Athena conserved in the Samsun Museum. NANKOV (185) publishes a spherical counterweight discovered in Parthicopolis (Macedonia), with a puzzling Greek inscription. The archaeological context and the paleography of the inscription point to the 6th century CE. HRISTOV (141) publishes a copper-alloyed counterweight representing an empress from Hrisosotira (Chernomorets) and gathers other similar artefacts conserved in Bulgaria. A steel-yard and two copper-alloyed counterweights representing an empress were found off the coast of Aléria (Corsica, France): see CIBECCHINI (56; 57, no. 54).

CHARREY (52) questions the widespread use of bust counterweights representing two feminine standardised stereotypes ("Athena" or the "Empress") between the 4th and the 7th centuries CE. These representations are part of early Byzantine visual culture: the empress represents the authority, the sacredness and the stability of the state, while Athena refers to ancient pagan female deities and allegories that are reinterpreted in the context of a Christian empire.

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