

*International Numismatic Conference*

*Third Academia Belgica – Francqui Foundation Conference*

*Quantifying Monetary Supplies in Greco-Roman times*

(Rome, September 29<sup>th</sup> and 30<sup>th</sup>, 2008)

**ABSTRACTS**

**POLITIQUE SCIENTIFIQUE FEDERALE**



**FEDERAAL WETENSCHAPSBELEID**

**Monday, September 29<sup>th</sup>**

**François de Callatay** (Brussels, Royal Library of Belgium, EPHE)

*Quantifying monetary production in Greco-Roman times: a general frame*

It has long been a dream of historians to quantify monetary issues struck throughout ancient history. Through the implementation of specific statistical formulas, this dream materialized into actual hope in the 1970's and 1980's. The aim of this paper is to first summarize what has been achieved in accordance with this dream and of the hopes that have followed. A salutary dose of skepticism, which was sometimes expressed in a radical manner, helped the debate to evolve over time. With many nuances included, a general trend among numismatists is to pay increasing attention to quantification. Apart from a classical status quaestionis, this paper aims at putting this issue into broader historical and intellectual perspectives. It deals with how our (imperfect) knowledge about the quantities of coins produced may modify more general ideas and concepts about finances and societies overall. The manner in which recent numismatic developments may find their place in modern trends in ancient history is also addressed herein.

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**Elio Lo Cascio** (Roma, Università La Sapienza)

*Quantifying monetary supplies in Greco-Roman time: the role of the credit*

Recent important papers by W.V. Harris have proposed “a revisionist view of Roman money”, not only by stressing more forcefully than in the past the paramount importance of credit in the monetary economy of Rome, but arguing moreover that credit must have greatly contributed to the whole money supply. If one accepts the plausibility of this view, the whole issue of quantification of coin production must be set in a different way. Above all the most intriguing questions about the relationship between coin output and the general economic scenario and its changing shape over time (coin output and GDP; coin output and monetization; coin output and monetary policy by the issuing authority) must be answered in radically new ways. And that inevitably means that all the statistically sophisticated attempts at quantification of coin output which have been made in the last decades and have raised so fierce a methodological debate among numismatists and ancient economic historians are less important after all. In the paper I will argue that the crucial question to answer is whether the existence and the paramount role of credit in the economic life, by itself, was such as to “create” money and whether this “creation” was such as to have a multiplier effect. In other terms the crucial question is to what the extent, if any, credit, by itself, created effective “negotiable instruments” and to what extent these negotiable instruments effectively circulated, that is, changed hands many times. Several passages in the literary sources seem to suggest, in any case, that variation in coin output and in coin circulation was thought to be decisive in shaping the development of the economy as a whole.

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**Warren Esty** (University of Montana)

*Statistical methods for checking the validity of statistical methods in numismatics*

Are the point estimators and associated confidence intervals for the number of dies and the coverage of a sample likely to yield good estimates? This paper presents some methods for evaluating estimators. One method is use data, such as the famous Crepusius denarius data, to compare estimates to known values. Also, we can predict what should be seen when a second sample obtained and compare the predictions to what is actually observed. Another way to evaluate estimators is to use Monte Carlo methods on sub-samples of issues where the true value is approximately known because the original sample is large. Still another is to see if data actually fit the model from which the estimator was derived. This paper presents the relevant mathematics and statistics for comparing theoretical quantities to observed quantities in order to see if the theory reflects reality. It applies the methods to actual numismatic data to evaluate well-known numismatic estimators.

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**Clive Stannard** (Rome)

*Evaluating the monetary supply: were dies reproduced mechanically in antiquity?*

The possibility that Greek, Roman and Celtic mints used hubs to reproduce dies has been hotly debated for nearly a century. In theory, the perfect mechanical reproduction of dies, by hubbing or another method, such as casting, could bring uncertainty into die-studies and attempts to quantify monetary supply. It could also bear on our understanding of the work structures and technologies of ancient mints. There has been little analytical rigour in the uses of terms. I shall try to provide a clear and articulated set of concepts that could help move the discussion forward, in particular distinguishing between hubs carrying major or whole-design elements, and piece punches, for minor elements, and drawing the consequences. The discussion has also been parochial, in not looking as well at the undoubted use of piece punches in mediaeval coinage, of whole-element hubs, in, for example, British Elizabethan coinage, and of near complete design punches from about the 17th century on. This can help unravel the reasons for hubbing and the technological challenges that had to be overcome, so as to apply this understanding to probable practice in the ancient world. In considering ancient mints, it is also important to distinguish between official mints and unofficial and forgers' mints, where various ways of mechanically reproducing dies were used. That forgers used such technologies does not automatically lend credence to their use in official mints, as they had other reasons for doing so. Unofficial mints on the periphery of the Roman world may have used similar techniques, for similar reasons. A number of coins will be presented and analysed to support the discussion. At the time of preparing this abstract, I have found nothing that convinces me that Greek and Roman mints hubbed dies, but one probable case of a cast die for official Macedonian tetradrachms of the 2nd century BC. The spectre of large groups of undistinguishable dies bringing die-studies into disrepute need not frighten us.

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**Benedetto Carroccio** (Cosenza, Università della Calabria)

*Parallel striking reconstruction and chronological numismatic interpretation*

Several reconstructions of die-sequence postulate that a specification of original or effective number of dies is sufficient to determine mechanically the duration of a coinage, but numbers need of historical interpretations with a not modern look. Many scholars have reconstructed many complex and crossed graphical reconstructions of die-linkages (for example for the Brettian silver coinages), and inferred the use of one die per time for the obverse, casually coupled with a lot of reverse dies available. This interpretation is not logic: the analytical study of die-sequences of many Syracusan issues of Archaic, Classical or Hellenistic ages, or of Sybarite coins, combined with analysis of symbols and letters, demonstrate a frequent, non-rhythmic, contemporaneous use of several anvils for coinages concentrated in time, issued only in case of necessity for public expenses.

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**Thomas Faucher** (Paris, Sorbonne/Paris IV and EPHE)

*Productivité des coins et taux de survie du monnayage grec*

L'estimation de la productivité des coins monétaires pendant la période grecque a été la source de vifs débats il y a quelques années. Il semble que la majorité des spécialistes accepte dorénavant, avec prudence, un chiffre de production qui se situe autour de 20 000 monnaies pour un coin de droit. L'organisation du colloque *Quantifying monetary supplies in Greco-Roman times* par F. de Callatay est l'occasion de remettre sur l'ouvrage cette question qui anima les discussions. La publication des deux *Recueils quantitatifs des émissions monétaires* offre un outil unique pour comprendre et analyser le comportement des coins et le devenir de leur production. De nouvelles approches, dont l'archéologie expérimentale fait partie, permettent d'envisager le problème de la quantification en numismatique sous des angles différents. Peut-être ne faut-il pas chercher combien un coin de droit frappait de monnaies *en moyenne* mais comment, à partir des échantillons de monnaies qui nous sont parvenus, peut-on connaître le nombre originel de monnaies frappées. Finalement, le prochain stade ne doit-il pas être celui de l'acceptation par tous d'un vocabulaire commun et d'une utilisation raisonnée des données quantitatives ?

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**Theodore Buttrey** (Cambridge)

*Calculating ancient Coin Production: the Problem of the Third Element*

Modern attempts at the imitation of ancient coin production, and modern calculations based on number of dies used, and number of coins surviving, have not produced results useful for estimating the size of ancient coin issues. The circumstances of issue varied enormously, and die life was always erratic. Some third element is necessary to calculate the size of an ancient issue meaningfully, e.g. some independent element of historical evidence from which the size of the issue can be estimated or deduced.

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**Peter van Alfen** (New York, American Numismatic Society)

*Hatching Owls: Institutions and the regulation of coin production in later fifth-century Athens*

The quantity of coins produced at anytime in classical Athens, the range of denominations, and the continued adherence to archaic types and the Attic-Euboic weight standard were all the results of calculated and recurrent decisions made within the framework of Athenian democratic institutions. Although we know very little about the institutional framework of ancient coin production generally, we are fortunate to know a fair amount about Athenian political and economic institutions in the later fifth century. For this reason it may be possible to arrive at a broad understanding of where and how the decisions regulating the production of Athenian coinage were made, particularly during a period when the Athenians produced an exceptional amount of coinage. One aim of this paper is to attempt to locate the specific institutional context(s) for these decisions; another is to chart the flow and feedback of information derived from state income and expenditures, and economic activity generally that may have informed decisions about coin production. Since this period coincides with the height of the Athenian *arche* and its tremendous incomes from imperial tribute, the Laurion mines and taxes on trade, and also with its tremendous expenditures in maintaining its overseas conflicts, its navy, its building programs, its various wage programs, and its stores of wealth, in addition to maintaining the accelerated levels of trade in the agora and emporion, decisions about coin production were likely dense and involved processes. These were decisions that had to be taken seriously in order that coinage be available where and when it was needed across an increasingly complicated spectrum of economic activity.

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**Koray Konuk** (Bordeaux, CNRS/Ausonius)

*Token for Silver. Quantifying the Early Bronze Issues of Ionia*

Although numerous, bronze coins tend to be overlooked in studies dealing with the ancient economy. Die studies focus almost exclusively on precious metal coinages, resulting in biased views of the broad picture. For instance, if there are to be reliable, attempts at quantifying the output of a mint should include all coins, regardless of their metal. Even though their purchasing power was much lower than their precious metal counterparts, there is no denying that bronze coins played a major role in monetary exchanges. Bronze was introduced quite late for striking coins and it took some time and adjusting before it took over silver as metal for small change. This paper aims to assess the role and significance of bronze coins when they were first introduced in Ionia c. 400 BC where mints had been used to striking large quantities of fractional coins. The study of a hoard discovered near Phygela will provide us with some clues and allow us for the first time to gain some insight into the quantities involved.

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**Olivier Picard** (Paris, Sorbonne/Paris IV)

*La circulation de l'argent : le cas de Thasos*

L'analyse de la « politique monétaire » des Etats grecs se heurte à une difficulté importante : nous ne savons pas dans quelle mesure les Anciens connaissaient les effets que les décisions monétaires qu'ils prenaient (changement de types, d'étalon etc.) exerçaient sur les échanges et la circulation de la monnaie. Notre information se heurte à l'écart existant entre la tradition écrite, qui ne s'intéresse guère à ces questions réputées extérieures à l'éthique politique, et les savoirs des financiers qui, à en juger par divers indices, étaient beaucoup mieux informés qu'on ne l'admet communément. La circulation monétaire ne nous est guère connue que par la répartition géographique des dépôts monétaires (trésors, monnaie de fouille) ; si biaisée que soit cette image, elle fait ressortir des structures, qui varient selon les caractéristiques de la monnaie. A Thasos, dont l'histoire monétaire est complexe, la monnaie a subi de nombreuses mutations de types et de poids, qui relèvent de décisions politiques. La production des séries monétaires de la cité a varié en fonction de deux paramètres qui ont joué différemment dans le temps : l'accès aux minerais de la zone Pangéenne (du VI<sup>e</sup> siècle à la défaite devant Athènes en 463 et à la mainmise de Philippe II sur la région de Krénidès) et la participation à des structures militaires dominées par des puissances extérieures : en schématisant très fortement, il s'agit de l'Empire perse (513-479), de l'Archè athénienne (478-338) et de l'amitié romaine (à partir de 196). Entre les deux derniers, le voisinage de la puissante Macédoine amène Thasos à quasiment arrêter la frappe de l'argent. A une première mise en corrélation des mutations des séries d'argent et de la circulation de ces espèces, telle qu'elle ressort de la distribution géographique des trésors, nous superposerons l'étude des circonstances politiques des mutations monétaires et nous essaierons d'analyser comment s'élaborait la politique monétaire de la cité.

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**Louis Brousseau** (Paris, Sorbonne / Paris IV and EPHE)

*Les productions monétaires des ateliers grecs de Grande-Grèce du VI<sup>e</sup> au IV<sup>e</sup> siècles  
av. J.-C., essai de quantification comparée*

Les nombreuses études sur les ateliers de Grande Grèce, bien que certains centres importants n'aient toujours pas fait l'objet d'une recherche approfondie, permettent désormais de travailler à partir des résultats afin de comparer les masses monétaires mises en circulation. L'objectif de cette communication est d'estimer et de comparer le rythme des productions monétaire de Grande Grèce du VI<sup>e</sup> au IV<sup>e</sup> siècle av. J.-C. Pour ce faire, nous nous sommes inspirés de la méthode utilisée par R.R. Holloway dans son étude sur les productions monétaires de Sicile. Nous avons d'abord converti les différents monnayages sous un étalon monétaire commun (notre choix est le statère achéen), et ensuite chaque nombre de coins utilisé est reporté dans un intervalle de cinq ans afin de pouvoir comparer chronologiquement les rythmes de mises en circulation des différents monnayages.

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**Mariangela Puglisi** (Messina, Università di Messina)

*Coin circulation data in Sicily as a source for quantifying monetary supplies?*

If we want to try to answer Holloway's question about the existence of a rhythm in the production of civic issues in fifth-century Greek Sicily (see *Rythmes de la production monétaire, de l'antiquité à nos jours*, Louvain-la-Neuve 1987) we can look at the reconstruction of the activity of Sicilian mints through times from the Archaic to the Republican age and, as a consequence, we should answer in a negative sense. It does not appear likely that the production of coinage had to cover long periods, because it was closely related to important events that make necessary new supply of coinage in particular moments of the life of a polis (wars, payments, new political regimes...). That is why is important to look for the reasons that caused increase or decrease in minting, considering other sources, mainly historical and archaeological ones.

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**Maria Caltabiano** (Messina, Università di Messina)

*The importance of an “iconic program” in ancient coin production*

The best way of establishing the production volumes for ancient issues is to perform more die-studies. Establishing the number of dies used is however not always sufficient to quantify the volume of the issues in the various periods, or to provide an historical interpretation of them. In order to historicise the data we in fact need to know how long the dies were used for. Moreover, for the coin issuer, communicating ideologies and propaganda to the user was just as important as having money available for payments. To this end the issuer was forced to plan in advance both the quantity of metal and the denominations to mint, and the types to represent on the coins. This means that in our research we should look for the “logical” links connecting the various dies, presuming the existence of an “iconic programme” which can be reconstructed. The identification of this programme would help establish that even a significant number of dies may belong to the same period, and would help show their relationship with the contemporary historical context. Having performed their communicative function, with the use even of a variety of coin types, and once the metal to be minted had been used up, it was not always necessary to use the dies until they were completely worn out, with evident repercussions on the quantities of coins minted. Moreover, new issues did not always make use of new quantities of metal, as previous series were often re-minted, thus only apparently increasing the quantity of issues. Examples from the Greek and Roman ages will be presented.

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**Panagiotis Iossif** (Athens, Belgian School of Archaeology)

*Testing 'historical' theses against numerical data: the Seleucid case*

In the last years, many new approaches have been proposed for the understanding of the royal Seleucid administration and particularly the royal coinage and its purpose. Many of these theories are based on arbitrary assumptions. Numerical data are almost never considered in order to test the validity of the proposed models. To write that a series is overwhelmingly the largest, without any quantification, is of limited value. Sociology and historical sociology have resolved these kinds of generalities by simply eliminating them, if not supported by numerical evidence. What we will try to do in this paper will be testing some of the new models proposed: can we identify a 'peace-time' coinage as opposed to the 'war-time' coinage? Is it possible to identify issuers and end-users in the monograms and symbols of the Seleucid coinage: is such a model supported by the numerical evidence and quantification? Different study-cases will serve as models for our purpose: Susa under Seleucos I – especially the trophy coins and the elephant-chariot series; Antioch under Seleucos I, Antiochos III and IV. The aim of the paper will therefore be to demonstrate the necessity of a numerical basis to any 'historical' model involving coins and numismatic production.

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**Oliver Hoover** (New York, American Numismatic Society)

*Time is Money: Production Quantification and Chronology in the Late Seleucid Period*

Abstract: This paper builds on and corrects a recent attempt to use Production quantification to deduce the probable relative lengths of reign for late Seleucid kings whose periods of rule are imperfectly known from defective textual sources (*Historia* 56/3 (2007), pp. 280-301). It will be shown that there is often a relatively stable number of dies used from year to year in the early part of the late Seleucid period at Antioch except in times of known conflict when the numbers tend to balloon in order to meet military expenses. Nevertheless, strictly numismatic considerations now make it difficult to map this pattern onto the end of the production pattern of the late Seleucid period and draw solid chronological conclusions. It is possible that the serious problems posed by unknowable variables like mass recoinage may make chronology developed with the aid of quantitative analysis too dangerous to be useful. Conversely, when the chronology of the coinage is well established, the ability to identify periods of probable mass recoinage is important for advancing our understanding of the late Seleucid moneyed economy.

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**Haim Gitler** (Jerusalem, Israel Museum)

*Quantifying small fractions: The Coinages of Philistia and Adjacent Geographical Regions*

Most of the Philistian coins dated to the mid-fifth to fourth centuries BC were struck from the same pair of dies, a phenomenon that can be compared with the contemporaneous Samarian and Yehud coinages. The main instance where we notice the use of numerous dies for the minting of a certain coin type is in relation to production of the Athenian-styled obols and hemiobols which represent the most common coin type circulating in Palestine during the late fifth to mid-fourth centuries BC. Namely, an inter-city coinage that constituted the daily means of transaction for the inhabitants of the southern coast of Palestine as opposed to the larger denominations which were plausibly used for limited purposes by limited users. A recent book by Gitler and Tal gives an updated view of the material, but no die-study. The reason is pretty clear: most of the small silver fractions were struck from different and unlinked pairs of dies. In this paper we will present some innovative ideas regarding the minting procedures of these coinage as well as our interpretation for the pattern offered by the dies.

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**Michel Amandry** (Paris, Bibliothèque nationale de France and EPHE)

*La production des cités pontiques à l'époque impériale : synchronismes et quantification*

Depuis une dizaine d'années des *corpora* de cités pontiques sont publiés régulièrement : à l'exception de ceux d'Amisus, de Gangra-Germanicopolis (en préparation) et de Néapolis-Néoclaudiopolis, les cités d'Amaseia, de Sébastopolis, de Comana, de Néocésarée, de Kérasonte, de Trapézonte, de Zéla, de Mégalopolis-Sébasteia auxquelles on joindra Nicopolis ad Lycum, proche du Pont mais annexée à la Cappadoce avec l'Arménie mineure, bénéficient désormais chacune d'un corpus. L'intérêt du monnayage de ces cités est qu'il est daté d'après une ère dont on connaît pour chacune d'entre elles le commencement : 32/1 pour Amisus, 6/5 pour les cités de Paphlagonie Gangra et Néapolis, 3/2 pour les cités du Pont galatique Amaseia et Sébastopolis, 34/5 pour Comana, 64/5 pour les cités du Pont polémoniaque Néocésarée, Kérasonte, Trapézonte, Zéla et Mégalopolis, de 71/2 enfin pour Nicopolis ad Lycum. Il est ainsi possible de voir si des synchronismes se dégagent et, s'ils s'en dégagent, d'essayer de les interpréter historiquement, avec la possibilité de quantifier les productions. On peut alors juger de l'impact de ces monnayages dans un contexte précis bien identifié.

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**Johan van Heesch** (Brussels, Royal Library of Belgium and KULeuven)

*Quantifying Roman Imperial Coinage: a complex matter*

Quantifying Roman imperial coin issues is a complex matter especially when one wants to use the data to study the evolution of the budget of the Roman state. In addition to coins, other sources do also allow us to make quantifications that are perhaps as valuable as the ones derived from the coinage. In this contribution I will briefly present the results of quantitative research, and focus on the complexities of the Roman monetary system with its substantive and special issues, its multi-denominational structure and the use of certain denominations for special purposes, the role of the so-called provincial coinages as integral part of the states coinage and finally other means of payments.

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