



A CONTRIBUTION TO THE MINTING TECHNIQUES OF THE Umayyad COINAGE

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Compared with other branches of numismatics, especially those of the Ancient¹⁾ and Middle-Ages²⁾, our knowledge of minting techniques and technical equipment of the Islamic mints is rather limited. This fact is due to a relative scarcity of reliable material evidence. First of all, there are not many dies — not to mention other implements — preserved for investigation and those actually existing cover but a part of the whole extent of Islamic coinage and mostly relate to its later periods. Furthermore, there is no pictorial evidence whatsoever of the minting process or of the implements used, as they are shown in carvings, pictures and sculptures by artists of the Ancient World or of Mediaeval Europe — a disadvantage due to the specific ideological background of Islamic art. At least the fact remains that Islamic archeology has not been sufficiently pursued to bring to light materials corresponding to those we are in possession of for the Ancient and especially for the Mediaeval Europe minting techniques.

Nevertheless, during the last decades our knowledge of the Islamic minting techniques — i. e. technological processes and the minting equipment — has attained remarkable progress, due to the contributions by M. Jungfleisch³⁾, P. Balog⁴⁾, and G. G. Miles. Undoubtedly a great deal of information may be expected from Arabic literary sources and archives⁵⁾. The complex analysis of the Ibn Ba'ra manuscript, already treated by S. A. Ehrenkrecht⁶⁾, helped to explain some of the operations for refining

gold and silver at the Ayyūbid mint of Cairo and thus contributes towards solving some questions on Islamic minting production and its technology.

At present, most of the Islamic dies known to us⁷) originate in the later periods of the Islamic monetary history of North Africa and Egypt, and it is true that, especially for Egypt, there are important discoveries of other materials which have already helped to solve some of the basic problems concerning the minting technique⁸).

As for the oldest periods of Islamic minting techniques, we are prevalently bound to deductions and analogies with similar phenomena in other branches of numismatic where we can rely upon a solid basis of material evidence.

Besides these deductions based on analogy, the only concrete and reliable material at our disposal is given only by the issues themselves, i. e. by the complete series of the coinage belonging to the period in question⁹). This total of coinage, produced by the methods and technical equipment used in those times presents — as may be expected — besides a majority of well featured issues a number of specimens showing some defects or marks of faulty processing¹⁰). And especially these imperfect specimens serve best as a guide in determining the methods of preparing and making the flans or the dies or the process of striking the coins¹¹).

The Islamic coinage presents by no means a homogeneous entity, as may be easily understood when considering its chronological and territorial extent. It is true, however, that the birth of the Islamic monepigraphic coinage is linked with the tendency towards Arabisation, Islamisation, and centralization, as they manifested themselves during the rule of the Umayyad Caliph Abd-al-Malik. His monetary reform which to a great extent accomplished the unification and standardization of the monetary system was an inevitable necessity for creation of an economic and political unit out of different areas, which until then belonged to different political, economic, and cultural spheres. Thus a monetary system was introduced with its most stable nominals — as far as their metrology and morphology are concerned — i. e. the *dīnār* and the *dirham*¹²). In the background of both these newly established currency units, however, the traditions

of two former monetary systems persisted: this of the Byzantine solidus and that of the Sassanian drachm. Both of the newly established Islamic nominals stuck to their original patterns, as far as their metrology and morphology are concerned¹³).

We can justly assume that, as far as the minting technique, i. e. the equipment of the mints and the methods of operation are concerned, the practices did not essentially differ from those that were in general use in the Byzantine or Sassanian mints under the ancient régimes. Moreover, this assumption is justified by the simple fact, that the Arabs who themselves had no knowledge of the mint-work and minting processes, used at the very beginning of the Islamic coinage the same mints which already existed under the Sassanians or Byzantines before the Arab Conquest. The network of the Umayyad mint-towns itself is the best testimony for this statement¹⁴).

The whole of the Umayyad mint-production known to us presents the possibility of tracing different manifestations of the techniques used not only in its chronological order but in territorial spacing as well, thanks to the fact that the *dīnārs* bear the dates and the *dirhams* also the name of the mint-town.

As far as other materials for investigation of the minting technique and coining process of the Umayyad Post-reform coinage are concerned, there is no supporting material evidence such as pictorial or literary documents and not even one die of this time has been found so far. It is true that two Sassanian dies have been found¹⁵) and several Abbasid dies have been preserved, too, the oldest one dated 291 A. D. As the Sassanian dies are made of iron, and those of the Abbasid period are of bronze¹⁶), the question what dies were used at the time of the Umayyad Caliphate remains open, as there is no doubt that the dies were used for producing the Umayyad coinage¹⁷). The problem of the Umayyad dies present two aspects which coincide to a certain degree. These are the kind of metal used for making these dies and the method of processing the coin-dies, i. e. the way of providing the die-face with the type-design.

As for the ancient and mediaeval dies of different types they were made either of bronze or iron.¹⁸) Today it appears on the face of existing material evidence that the bronze dies are numerically predominant.¹⁹) But we may assume that their

mutual frequency ratio was rather more balanced originally, when we take into consideration that iron succumbs more easily to rust than bronze.

From what we know so far about making ancient and mediaeval dies, there were three different ways of putting the coin design on the die-surface:²⁰⁾

- 1) Direct engraving into the die-surface.
- 2) Casting the dies from a matrix-mould.
- 3) Engraving the design into the die-surface by punching, i. e. producing the design with punches and scorpers.

The first method could have been used for both metals, bronze and iron alike. But this process was rather laborious and tedious and it hardly could fulfil the requirements for dies, when a great quantity of newly struck currency was needed, for the dies were of only a limited duration.²¹⁾

Through the second method, i. e. by casting the dies, it was possible to obtain a number of moulds and dies from one specimen of coin-design prepared by the engraver. This method was bound to a metal very suitable for casting, preferable bronze. These bronze dies, however, were not so durable as the iron ones.²²⁾

As for the third method mentioned, the use of punches made it possible to expedite and simplify the production of the dies to a certain degree, especially if the punches of certain uniform elements could be used for composing the coin-design. This method which can be also applied for iron-made dies, cummulates the advantages of both methods mentioned previously, i. e. the facility of production and the greater durability of dies.²³⁾

The use of the dies made by one of the two mentioned accelerated processes — i. e. by the casting²⁴⁾ or punching method²⁵⁾ — is known and proved for the Preislamic period even in areas of the former Byzantine²⁶⁾ or Sassanian²⁷⁾ territories which later became an inseparable part of the Umayyad Caliphate.

Until quite recently the primary method of producing the Umayyad dies, i. e. the direct engraving of the coin design into the coin-surface was supposed to be the only one. Due to the research work by Paul Balog, the die-casting method has been

definitely proved for several Islamic types of coinage, including the dīnārs and dirhams of the Umayyad period.²⁸⁾

It now remains for us to prove that the third method of die-production, i. e. by punching, was abundantly used for the coinage of the Umayyad Post-reform type.

Just as the method of casting the dies could be proved from small, more or less detectable traces found on the coins themselves, our statement concerning the punching method is based on the testimony of the issues as well. They are these issues which bear traces of some imperfection in the whole setting up the die-design we can rely upon, as far as the usage of punches is concerned.

The fundamentals of the making a die by punching process may be described as follows: first of all, the circumference of the whole field and the outlines of the circumferential borders are outlined with a pair of compasses. The point of their centre leg, leaving a small round cavity in the die-surface is visible on many of the issues as a small pellet in the centre of the coin.²⁹⁾ Thereafter, the other parts of the coin-design — for the Post-reform types the legends — are punched piece by piece into the coin-field and into the marginal borders.

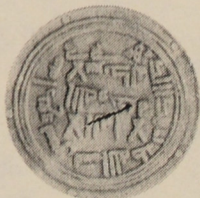
The work itself executed by punches and scorpers could, in the event of necessity, be finished by erasures or corrections by the engraver. The dies produced by the punching method with care and accuracy so that all components of the whole coin-type attained the desired symmetry, do not show any apparent traces of the applied technique, except the characteristic underlining of the outlines of the design or lettering,³⁰⁾ eventually the small pellet in the centre.

Nevertheless, every inaccuracy in the punch-adjusting betrays itself clearly as a disproportion in the whole coin-design, and thus, these wrongly-placed parts of the whole which retain nevertheless their individual perfection and symmetry, reveal the best shape of the individual punches as they were actually used by the die-makers.

As a convincing argument for our statement we may present a well-preserved specimen of an Umayyad dirhami, issued in the year 94 A. D. by the mint of al-Ġayy.³¹⁾ This coin shows a wrongly placed punch with the second line of the central legend of the

obverse, so that instead of keeping a parallel position with the first and the third line of the formula it runs diagonally, touching the end of the first line and the beginning of the third.

Obverse:



Reverse:



This specimen of a dirham serves not only as a proof for our statement that the Umayyad dies of the Post-reform types were executed by the punching method, but it also documents clearly the rather large size of such a single punch which could be cut into the die-surface with one stroke, and thus induces us to estimate the real efficiency of this method of die-making. The fact that complete lines of about 14 mm could be punched at one stroke into the die-surface is by no means exceptional, as there are punches preserved of European mediaeval coinage measuring from 17—23 mm.³²⁾

It is obvious that testimony of such a single specimen could not be considered decisive enough to serve as an evidence for a general conclusion, as one coin of this character might just represent a local anomaly.

The existence of the punching method as an inherent part of the Umayyad minting technique and minting practices used in general cannot be proved but for a large amount of punched specimens which would appear in extensive series among the Umayyad coinage, as it is in Mediaeval Europe with the coins of the denarii type.³³⁾

After examining large numbers of Umayyad issues, especially those of dirhams, of the Post-reform type with special attention given to this phenomenon,³⁴⁾ we can safely conclude that the dirham of al-Ġayy cannot be considered a local deviation, but a specimen with very pronounced characteristic of the punch application, which in a less marked form can be traced on a great number of issues throughout the whole extent of the Umayyad coinage, the dīnārs and above all the dirhams.

In keeping with this assumption we are able to draw following conclusions: during the Umayyad period and especially after the post-reform types were introduced, a considerable number of dies were needed and thus methods offering a speedy supply of dies were used on a large scale. In addition to the method of die-casting, as it was established by P. Balog, a great part of minting production was dependent on dies produced by punching. The fact that no dies of this period of Islamic coinage were found may be explained by the situation existing in the mint organisation of the Umayyads. Several circumstances undoubtedly play a considerable role. First, during the Umayyad period a great attention was paid to the minting and its organization, and, compared with later periods of the Caliphate, their mint-work was under rather strict supervision,³⁵ so that reject dies were mostly destroyed by the authorities. When assuming the punching method was generally used we can also take for granted, that the Umayyad dies — just as the Sassanian ones before — were made of iron. Thus, the speedy method of die-processing and wear resisting material could be cumulated.

The introduction of the punching techniques can be traced on the coins from the very beginning of the post-reform coinage, the dirhams as well as the dīnārs.

This method asserted itself above all especially in two periods of the abundant and largely decentralised mint-production, namely in the years 79—84 A. D. and 90—99 A. D., when the mint-work of the Umayyads displays not only an intensive, but an extensive activity as well.

As the material evidence shows, the punching technique was widely favoured throughout the territory of the Umayyad Caliphate, from the eastern boundary-provinces to al-Andalus, and it can be traced up to the last years of the Umayyad rule.

The existence of this punching method for making the dies has been also mentioned by G. C. Miles³⁶) for the coinage of the Umayyads of Spain where this method, currently used throughout the whole Islamic domain, was continued.

Notes:

1) George F. Hill: *Ancient Methods of Coining*. The Numismatic Chronicle (NC), 1922, p. 1—42; C. C. Vermeule: *Some Notes on Ancient Dies and Coining Methods*, in the Numismatic Circular LXI—LXII, 1953—1954.

2) A. Luschin von Ebengreuth: *Allgemeine Münzkunde und Geldgeschichte des Mittelalters und der neueren Zeit*, Berlin 1926, p. 82 and the literature quoted there.

3) M. Jungfleisch — J. Schwartz: *Jetons de Faïence et moules aux monnaies ptolémaïques*, in *Annales du service des Antiquités de l'Égypte*, LIII, 1955, p. 209—219; *Les moules en terre destinés à couler des monnaies impériales romaines*, BIE (Bulletin d'Institut d'Égypte) XXXV, 1953, p. 239—244; *Réflexion de „Praticien“ sur les monnaies Ptolémaïques en bronze*, in BIE, XXX, 1948, p. 47—60.

4) Besides other papers, in BIE and NC these topics are dealt with as follows: P. Balog, *Apperçus sur la technique du monnayage Musulman au Moyen Âge*, BIE XXXI, 1948—1949; *Études numismatiques de l'Égypte musulmane: Nouvelles observations sur la technique du Moyen Âge chez les musulmans du Moyen Âge*, BIE XXXIII, 1950—1951; *Études numismatiques de l'Égypte musulmane*, BIE XXXIV, 1951—1952; *La technique du monnayage en Égypte musulmane au Moyen Âge*, Actes de Congrès International de numismatique, Paris 1953, ed. 1957, p. 551—556; *Notes on Ancient and Mediaeval Minting Technique*, in NC, 1955, p. 195—202.

5) Ch. Toll, *Minting technique according to Arabic literary sources*. *Orientalia Suecana* vol. 19—20, 1970—1971, publ. 1972, pp. 125—139.

6) A. S. Ehrenkreutz: *Extracts from the Technical Manual of the Ayyūbid Mint in Cairo*, BSOAS, XV, 1953 and *Addendum to this* by P. Balog, 1. c. NC, 1955, p. 201—2.

7) Dealt summarily with by P. Balog, 1. c., BIE, XXXIII, 1952, p. 39 ff and the same, 1. c., NC, 1955, p. 195 ff.

8) Especially a pair of plaques-lead with the reverse engraving of an Abū-Dūlāfid dīnār, preserved sub. No. 15.503/1—2 in the Museum of Islamic Art in Cairo, published by M. Mostafa and examined by P. Balog in the papers quoted above sub. note No. 7.

9) P. Balog, 1. c., BIE, XXXIII, p. 34.

10) F. von Schrötter, *Wörterbuch der Münzkunde*, Berlin 1930, see sub vocem *Stempelfehler*, p. 145 and other literature quoted there.

11) P. Balog, 1. c., BIE, XXXI, p. 96.

12) J. Bergmann, *Die Nominale der Münzenform des Chalifen Abdulmelik*, SBWA 1870, p. 239 ff.

13) C. F. Keary, *The Morphology of Coins* in NC 1885—1886, cf: O. Codrington, *A Manual of Musulman Numismatics*, London 1904, p. 12.

14) P. Balog, 1. c. NC, 1955, p. 195 ff; the same, 1. c. BIE XXXI, 1949, p. 97 and BIE XXXIII, p. 40.

15) H. Nützel, *Sassanidische Münzstempel*, in *Berliner Münzblätter*, XXXI, 1910, p. 429—430.

16) S. Lane-Poole, *Fasti Arabici* VI, NC 1887, p. 335; P. Balog, 1. c. BIE XXXIII, p. 36 and the same in NC 1955, p. 195.

17) P. Balog, 1. c. BIE XXXI, 1949, p. 95 ff.

18) G. F. Hill, 1. c. NC 1922, p. 13 ff and Schrötter, 1. c. p. 659 sub voce *Stempelfehler* and other literature quoted there.

19) C. C. Vermeule, 1. c. and P. Balog, 1. c. NC 1955, p. 196 ff.

20) A. Luschin, 1. c., p. 82 ff.

21) J. Babelon, *Traité de monnaies grecques et romaines* I, Paris 1901, p. 906 ff.

22) Schrötter, 1. c. p. 660; J. Babelon, 1. c. p. 897 ff.

23) A. Luschin, 1. c. p. 83 ff, J. Babelon, 1. c. I, p. 921; A. Markl, *Ueber die Herstellung der Prägestempel in der Zeit der späteren römischen Kaiser*, WNZ, VIII, 1876, p. 244 ff; J. Šejnost, *Příspěvek k mincovní technice českých denárů a otázka denáru knížete Václava Svatého*, *Numismatický časopis československý*, II, 1926, p. 38; F. Cach, *Příspěvek k technice ražby českých denárů*, *Numismatický Sborník* I, 1953 p. 44 ff.

24) G. F. Hill, 1. c. and literature, quoted sub notes Nos. 3 and 4 above.

25) A. Markl, 1. c. WNZ VIII, 1876, p. 250.

26) In Syria already in the prebyzantine period the technique of making the dies by punching was not unknown. The punches were used mostly for a part of the design or single letters only, see A. Markl, 1. c. p. 243 ff.

27) J. Walker, *A Catalogue of the Arab-Sassanian Coins*, London 1941, p. CLVI.

28) P. Balog, 1. c. BIE XXXIII, p. 34 ff; the same, NC, 1955, 1. c. p. 198.

29) P. Radoměřský, *Peníze Kosmova věku*, NČČ, XXI, 1952, p. 34.

30) G. F. Hill, 1. c., CN, 1922, p. 19 ff and Pl. I. No. 8.

31) Now in the Numismatic Collection of the Náprstek Museum of Asian, African, and American Cultures, Prague, Inv. No. 671, published by its former owner B. Augst in: *Inedita ražeb umajjovských a abbásovských ze sbírky autorovy in Numismatický Sborník* VII, 1962, p. 62, where he quotes this explanation of mine of this phenomenon as being due to the wrong position of the punch.

32) Paul Joseph, *Die Münzstempel und Punzen in dem Historischen Museum de Stadt Köln*, NZ, 1888, p. 91 ff.

33) A. Luschin, *Der Brakteatenstempel von Lettowitz. Ein Beitrag zur mittelalterlichen Münztechnik*, WNZ, XIII, 1881, p. 231 ff and other sources, see note 23 above.

34) Especially those kept at the National Museum, Náprstek Museum of Asian, African, and American Cultures, Prague and at Numismatic Department of the

State's Museums in Berlin, GDR, among them 1125 specimens of the treasure unearthed in 1900 A. D. near Babylon.

35) Al-Balādūrī, *Futūh al-Buldān* ed. M. J. de Goeje, Leiden 1866, p. 468 n and Ibn al-Atir: *Ibn el-Athri Chronicon* ... ed. C. Tornberg, *Lugduni Bataviae* 1851—1856, IV, p. 337. G. C. Miles: *The Coinage of the Umayyads of Spain*, ANS New York, 1950, I, p. 97.