A Hoard of Archaic Coins of Colophon and Unminted Silver (*CH* I.3)

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This hoard of the later 6th century BC consists of 903 minute silver coins in essentially two denominations, and 77 pieces of unminted silver, over half of which are small, unweighed disks apparently made for monetary exchange. The coins are the earliest coins of Colophon, and the circumstance that they are smaller than all but three of the pieces of unminted silver suggests that when the hoard was buried the Colophonians were employing what might be termed a bi-specie monetary system: small coins for very low level transactions, and bullion weighed on the balance for transactions involving more substantial sums.

This hoard of 906 minuscule silver coins and 77 small pieces of unminted silver came to the Ashmolean Museum, Oxford, from E. S. G. Robinson in 1953. For a number of years Betty Merrington, an assistant in the Heberden Coin Room, worked on the coins, devoting most of her efforts to identifying the prodigious number of dies. Her completed manuscript catalogue has remained on file in the Coin Room archives. The first published notice of the hoard appeared in 1975 in the inaugural volume of *Coin Hoards* as *CH* I.3, "Asia Minor, 1935/1940." Kim resumed study of the hoard in the early 1990s and made his analysis and revised catalogue of the coins by dies a prominent part of his Oxford Master's thesis (Kim 1994: 23–146, pls. 1–29). In two articles (Kim 2001: 15, figs 1.2–3, pl. 1; and 2002: 46–7), he summarized the evidence of the hoard for illuminating important aspects

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of early coinage. In a paper devoted to weighed bullion as an antecedent of coinage, Kroll (2008: 22–3) has also drawn attention to the hoard's unusual significance.

One factor that has discouraged full publication of the find until now has been the intimidating number of coins in the hoard and the need to illustrate all of them, if the great number of dies from which they were struck is to be satisfactorily documented. We are grateful therefore to the editors of this journal for the opportunity to illustrate all of the coins at actual size. In order to facilitate study of the coins in enlargeable images, we have also reproduced the photographic record of the hoard on the American Numismatic Society's digital publications website (http://www.numismatics.org/dpubs/), while limiting the number of coins in the plates that accompany this article to a representative sampling. A tabular summary of the hoard's contents is given below in Table 1.

That the hoard has been preserved in anything like its present state is remarkable enough in itself. In the numismatic trade, it has long been customary to discard all pieces of silver bullion that might be found with coins, while a huge find of coins that, like these, could be considered virtual duplicates of each other would normally have been broken up and dispersed in small lots, if not in large part melted down. Perhaps it was the very small size of the coins that saved the hoard from this fate. Whether melted or sold individually to collectors, such coins would hardly have produced much profit. However this may be, it is worth reflecting that the very factors that might have made this assemblage uninteresting from a conventionally commercial point of view—the accompanying pieces of silver, the redundant replication of the same type of coin, and the minuscule size of the hundreds of coins themselves—are precisely what make the hoard unique and so valuable for the reconstruction of early Greek monetary history.

Table 1. Synopsis of the Hoard

983 AR pieces   = 583 g
    906 coins (standard of Lydio-Persic silver stater: 10.7 g) = 265 g* (45%)
       1 Twelfth, 0.92 g
      353 Twenty-fourths, 0.43 g
      552 Forty-eighths, 0.21 g
    77 pieces of unminted silver   = 318 g (55%)

Number of coin dies (and estimated original number; see note)

Twelfth:	*Obv.* 1
	Rev. 1
Twenty-fourths:	*Obv.* 135 (representing a possible original 154–174)
	Rev. 153 (poss. orig. 165–191)
Forty-eighths:	*Obv.* 258 (poss. orig. 323–370)
	Rev. 260 (poss. orig. 345–398)
Total	*Obv.* 393 (poss. orig. >477–544)
	Rev. 413 (poss. orig. >510–589)

*Actual total weight, which is 3.4 g less than the total obtained by simply multiplying the number of coins by their typical 0.92, 0.43, and 0.21 g masses.

The Coins (Pls. 14–36)

The coins all have the same obverse design: a profile male head of archaic style with long hair typically delineated in a wig-like stacking of parallel bands. On one early die (see Pl. 35, no. 12) the hair at the neck falls in two pointed locks, and on another die (Pl. 35, no. 85e) the hair, rendered in dots, has a wooly appearance. Reverses are stamped with a squarish or rectangular incuse containing an irregular or roughly quadripartite pattern. There are three weight denominations. One hoard specimen (diam. 9 mm) weighs 0.92 g, 353 specimens (*c.* 7 mm) cluster around 0.43 g, and 552 (5–6 mm) around 0.21 g. The weights correspond to the twelfth, twenty-fourth, and forty-eighth of the 10.7 g stater standard, customarily referred to as the Persic standard. Initiated in the gold and silver staters of Croesus (*c.* 560–545 BC),[1] it was continued by the Persians in their minting of posthumous Croeseid silver half-staters, which near the end of the sixth century were replaced by the minting of royal Persian silver *sigloi* of the same 5.35 g or half-stater weight. A histogram of the hoard coins (Fig. 1) reveals a strong adherence to the weight standard, a surprising feature in coins of such low value, but one that is found also in the metrologies of early electrum coins (Wallace 1989) and that here may reflect a correlation between the coins and the weighing out of small pieces of unminted silver such as are found with the coins in the hoard.

Coins of this type had gone unattributed until Margaret Thompson, in her publication of six specimens in the Burton Y. Berry collection (1961, *ad* nos. 1039–44), tentatively made a case for Colophon. Identifying the head as "almost certainly that of Apollo," she observed that the deity and the weights of the coins are the same as those of the earliest fractions (Period I) cataloged in J. G. Milne's monograph on the coinage of Colophon (1941). Thompson added "that a specimen of this issue was found in the Colophon excavation area, in association with many early fractions of Colophon and some of Miletus and Teos." Although she did not cite her source for this information, it almost certainly came from the notes that Sidney Noe had made in Athens of the coins found in the American excavations at Colophon in 1922.[2]

Thompson's observations on iconographical, metrological, and denominational continuity bear reinforcement. With the questionable exceptions of a few possible Artemis-head obverses in the fifth century, the head of Apollo was employed as the sole obverse type of Colophonian silver coinage down through Hellenistic

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1. For the metrology and chronology of the Croeseid staters, see Cahill and Kroll 2005: 609–13.

2. The notes are mentioned by Milne (1941: 1), who received a summary of them from Noe. In his account of the excavations, Holland (1944: 93–4) explains that the excavation coins were brought to Athens for study before being finally taken to Istanbul.
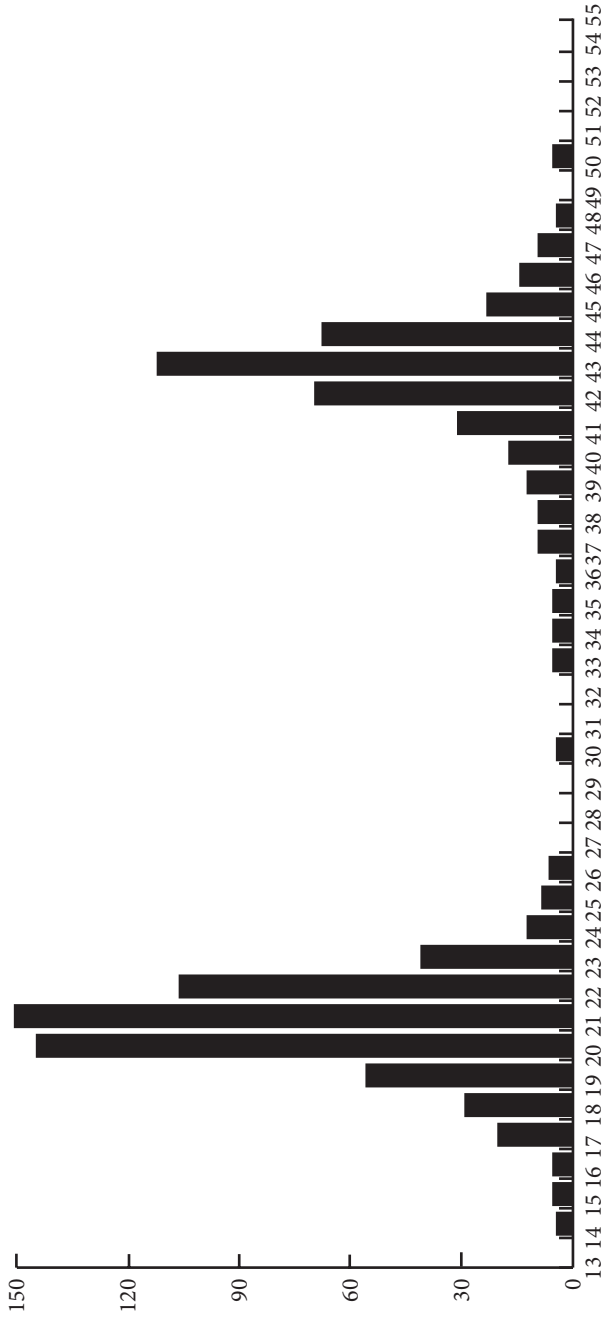
Figure 1. Weights (in 1/100s of a gram) of the Twenty-fourths and Forty-eights

times—understandably in view of the fame of the great oracular temple of Apollo at Claros in the city's territory. More limiting from the standpoint of mint attribution is the Persic weight standard. Rare among civic coinages of western Asia Minor,[3] it remained the standard at Colophon until the end of the fifth century along with the continued production of the same small fractional denominations represented in our hoard. As for proveniences, in addition to the specimen found at Colophon, we have been informed that a number of the hoard-type fractions have turned up in metal detecting in the vicinity of ancient Notion, the port city of Colophon. Given the coherence of this evidence, we accept the attribution of these coins to Colophon as unproblematic. The coins have been listed under Colophon without comment in *Coin Hoards* I.23 ("Ionia, 1972," a group of silver fractions from Colophon [25, including some of our type, e.g., the illustrated no. 2] and other Ionian cities [27+]), and by Koray Konuk in his 2002 *SNG* of the Muharrem Kayhan collection in Turkey (pl. 14, nos. 342–54).

Archaic in style and struck to a standard inaugurated by Croesus, the hoard coinage is clearly a mintage of the second half of the sixth century. Its fabric argues against an early dating in this period; unlike the relatively globular coins, such as those of Croesus, from the middle of the century the hoard coins were struck from flattened flans.[4] Milne's *c.* 525–490 dating for the succeeding fractions of his Period I—Apollo head facing and reverse incuses containing denominational monograms—is almost certainly on the high side as are his dates for probably much of the following fifth century Period IIA-C silver. While some of the facing Apollo heads of Period I are archaic in appearance, the long wig-like locks of hair make some look positively Daidalic, those with short hair—the same head but without the Daidalic wig?—are quite refined. If this Period I coinage began closer to 500 than 525, the coins of the Ashmolean hoard would fall in the last third or quarter of the sixth century, where the most recent estimate (Konuk 2002: pl. 14: "Late sixth century") has placed them.

That Milne's Period I silver is unlikely to have begun much if at all before c. 500 is strengthened, we believe, by the chronological implications of its reverse mono-

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3. In the Muharrem Kayhan Collection *SNG* (Konuk 2002), which gives a fairly extensive sampling of the earlier silver coinages of western Asia Minor, the Persic standard is identified at only two civic mints apart from Colophon: Ephesus (nos. 115–8, and possibly 113–4, 119, 126–37) and Mylasa (?) in Caria (nos. 929–30).

4. A dating close to mid-century might be suggested by *IGCH* 1156 ("Asia Minor, c. 1949"), if one could be confident that it was a genuine hoard and not a conflation of two separate finds. The lot associates four of our silver hoard coins with over fifty lion-head and lion-paw electrum pieces of Lydia. But the mixed character of the material and the absence of any Croeseid silver leaves the integrity of the assemblage open to question.

grams. The monograms—giving on fractions of twenty-fourth size the letters HM for *hemiobolon,* and on the forty-eighth size fractions TE for *tetartemorion*—attest to a shift in denominational nomenclature from the traditional East Greek weight terminology of descending fractions of the stater to the less cumbersome drachma-obol terminology of the coins of mainland Greece (cf. Kroll 2000: 83–4). The drachma-obol system is less cumbersome because the smallest units are divisions of the obol and not of the stater. The shift might have taken place with the introduction of the monograms at the start of the Class I coinage, in which case the monograms were added as an aid to accelerate familiarity with the new fractional terms. Or, if the Colophonians had started calling their twenty-fourths and forty-eighths half- and quarter-obols earlier, already during the time of the Ashmolean hoard coins, the monograms would have been added to the Period I fractions in order to make it easier to distinguish the two small denominations from each other. In any case, the borrowing of the drachma-obol system of Aeginetan and other coinages on the other side of the Aegean is unlikely to have occurred until this terminological system had become so familiar everywhere in the Greek world that people might prefer it to their own. It is possible that our hoard coins may have been called obols, hemiobols, and tetartemoria in their own time, as they surely were to become known later; but since we cannot be sure, we have chosen to retain the traditional fractional nomenclature of the Eastern Greeks here.

The most notable aspect of the hoard coinage is its scale. The die analysis of the hoard specimens reveals a level of production unparalleled among studied early Greek coinages. The 353 coins of twenty-fourth weight were struck from 135 obverse and 153 reverse dies, while the 552 forty-eighths were struck from almost twice as many dies: 258 for obverses and 260 for reverses.[5] If one were to assume very conservatively that each obverse die produced only 1000 to 5000 coins before minting of the coinage was finished or the die wore out,[6] the scale of minting would have been on the order of hundreds of thousands to millions of pieces.

When the total count of roughly 400 obverse dies was first mentioned in print (Kim 2002: 47), it was met in some quarters with incredulity. But it should be emphasized that the die figures are the patient work of two individuals, first, Betty Merrington, whose study was presumably assisted by consultation with Colin

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5. These figures of course pertain only to the dies represented in the hoard. Using Esty's die estimator (Esty 1984, 1986), the 137 obverse and 153 reverse dies of the hoards' twenty-fourths suggest an original number of dies in the ranges of 154–179 and 165–191, respectively. Statistical estimates for the original number of dies for forty-eighths, are 323–370 for obverses and 345–398 for reverses.

6. For a good survey of the research aimed at estimating minting output from obverse dies, see Figueira 1998: 193.

Kraay, Keeper of Greek Coins during her years at the Ashmolean,[7] and, secondly, Kim, who, reviewing Merrington's work with the aid of photos enlarged at four times actual size, found her die identification to be about 95 percent accurate, a commendable achievement for such a difficult series as this. The obverse and, even more so, the reverse dies are in fact quite distinct. As stated, our purpose in publishing all specimens of the hoard electronically is so that others will have the opportunity to examine the evidence for themselves.

How to account for these exceptional die numbers? To begin with, it is probably misleading to compare them with the comparatively modest number of dies that are characteristic of most Greek civic coinages in silver that survive (or have been studied) mainly in large and medium denominational units of drachm weight (3–6 g) or higher.[8] The Ashmolean hoard coins at 0.21 and 0.43 g are, by comparison, minuscule: although there are about 900 of them, their total weight comes to only 268 g, the equivalent of a mere 23 Persic staters or 46 *sigloi*. Had the hoard fractions been minted with pieces of significantly larger denominational weight, they would presumably have been minted in less quantity, as there would have been less need for them. But the only unit of this coinage larger than the twenty-fourth is the rare, obol-sized twelfth of just under one gram (Pls. 14 and 35, no. 1), which is as poorly represented in published and unpublished collections as it in the present hoard. Thus, the very size of the coinage's production would seem to be a function of the individual coins' extremely low values. There certainly appears to be an inverse relationship between the production scale of the two main fractions and their values. As noted, the number of obverse dies attested and estimated (n. 5) for the forty-eighths approaches twice the number attested and estimated for the twenty-fourths. Since we have to do with coins of very low value, it may be most meaningful to compare their die numbers with the numbers of dies of bronze coinages, the common low-value coinages of the fourth century and later. Few Greek bronze coinages have been studied by dies, but one that has, the bronze coinage of the Chalkidian League, comprised of three denominations and minted between *c.* 400 and 348 BC, involved an attested 422 obverse dies, which suggest an estimated original obverse die total in the vicinity of 700 (Callataÿ 2003: 134–7, 243, summarizing the results of Psoma 2001).[9]

7. Merrington was also responsible for the die-study, catalogue, tables, diagrams, and plates for *The Cistophori of Augustus* by C. H. V. Sutherland "in assocation with Nekriman Olcay and K. E. Merrington" (London 1970). In the preface, Sutherland pays tribute to "[h]er scrupulous attention to these matters and her keenness of eye…"

8. Callataÿ's 2003 survey of available die figures for archaic and classical coinages reveals that relatively few of these civic coinages in silver were minted from as many as a hundred, attested or estimated, obverse dies.

9. For the fourth-century bronze coinage of Maroneia, 296 obverse dies have been count-

These massive bronze coinages may owe some of their size to prolonged periods of striking. But this does not seem to be the case with the hoard coins here. Despite the several hundred dies employed, die-linkage, general stylistic uniformity, and minimal wear of the specimens attest to a relatively compact period of minting. The exceptionally fine condition of most of the hoard coins implies that they saw little circulation. Of those that are worn, most are of the head-facing-right type (only 43 obverse dies), suggesting that this type was earlier than the coins with the heads to the left.[10] Even so, what is remarkable among so many obverse dies is the overall consistency of the elements that make up the head. The hair on the back of the neck is nearly always rendered in a series of horizontal lines that blend into the slanted lines that form the hair on the head. A line or series of dots marks the break between the hair and the forehead, and the brow is delineated by a curving line that blends into the nose. An earring appears either in circular form or as a dot. The nose is usually long and thin and the eyes are created with the same combination of a line intersecting a dot to form the almond-shaped frontal eye. A fillet, one long end of which hangs down below the ear, appears more frequently on the twenty-fourths than on the forty-eighths probably owing to the greater working area on the larger die.

By emphasizing that elements of composition are all strikingly the same, we do not mean to suggest that distinct differences in style cannot be detected. Although most heads have characteristically exaggerated archaic features, some, such as die combination 290 of the forty-eighths (Pl. 36), are more naturally proportioned. But the variety of obverse styles—like the variety of patterns in the reverse incuse from amorphous to a regular cross-in-square—are to be explained by the use of multiple die-engravers and the difficulty of maintaining stylistic coherence in engraving metal dies no larger than 5–7 millimeters in diameter. It has proven impossible to order the reverse designs into a linear sequence, and the large number of coins struck from the same dies, the abundance of die links, and slight differentiation in condition, lend strength to the view that the hoard is comprised of coins that had been only recently issued and were collected together at one moment.

What this should imply is that all or nearly all of the dies were engraved at about the same time, and that all or nearly all of the coins were struck and put into circulation together soon thereafter. Since this was the first-ever coinage of Colo-

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ed, leading to an estimated possible original total of over a thousand (Callataÿ 2003: 121–2, 242, referring to Schönert-Geiss 1987).

10. Another indication of the priority of the head r. format is the anomalous depiction of Apollo's hair in two locks on the above-mentioned 12 of the twenty-fourths (Pl. 35), a variant that is understandable if the die was designed before conventions for representing the god's image on the coinage had become fixed.

phon and since the fractions, because of their slight value, had to be manufactured *en masse*, scores of dies needed to be commissioned and put into use simultane-ously to ensure that an adequate supply of these tiny struck pieces of silver, bags upon bags of them, would be ready in time for issue—presumably through ex-change for individuals' unminted silver. In all likelihood, the coinage entered cir-culation in two contiguous phases, beginning with a sizeable initial issue (Apollo head r.), the supply of which was quickly depleted, requiring the commissioning of the truly vast issue (head l.) that followed.[11] The introduction of coinage in the city on a gradual, incremental basis that would have allowed for long-term, less intense striking was apparently not considered a practicable option.

Of special note is a technical feature that can be observed only in hoards that possess a strong duplication of coins. Two noteworthy series of the twenty-fourths demonstrate a clear break down of the reverse die: series 61–62 and 138–139.

The Unminted Silver (Pls. 12–13)

The 77 pieces of unminted silver make up a little more than half of the total 583 g weight of the hoard. About a third of these pieces are of the kinds that are rou-tinely encountered in finds of silver bullion in Anatolia, the Levant, Mesopota-mia, Egypt, and the Western Mediterranean:[12] amorphous lumps of silver (53, 54), irregularly chopped pieces of ingots (55–65), and scrap pieces of worked silver, mostly from jewelry (66–77). What sets these pieces apart from their counterparts in most other bullion deposits is their generally small size—a feature they share with the pieces in the Celtiberian hoard published by van Alfen, Almagro-Gorbea, and Ripollès (2008). Three pieces are exceptionally large: at 40.8 g, the curiously-shaped no. 53 is, for this hoard, truly massive; and the bean-shaped no. 54 (10.22 g) and the tightly folded strip of an embossed, formerly gilded silver sheet 66 (12.5 g), are exceptionally heavy as well. All of the other pieces weigh five grams or less, most falling in the 1–3 g range.

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11. Unbroken continuity between the two phases is reinforced by a reverse die-link be-tween a head l. and two head r. obverse dies (see die combinations 45–47 of the twenty-fourths).

12. For discussion, illustrations, and bibliography on silver bullion in hoards (with and without silver coins), see for the Levant, Giten and Golani 2001; C. Thompson 2003; for Mesopotamia, Le Rider 2001: 1–39; for Egypt, Kroll 2001b; van Alfen 2004–5a and b; for S. Italy (*IGCH* 1872 and 1874) and Sicily (*CH* 8.35), Kroll 2008: 29–33; for Spain, van Alfen, Almagro-Gorbea, and Ripollès 2008 (this volume); for Caria (*CH* 8.10), Kroll 2008: 24; and for two "Black Sea" hoards, Kraay and Moorey 1981 (*CH* 1.15) and Pfisterer, M. 2000. De Callataÿ (2003b) has argued that the two last finds ought not to have come from the Black Sea region, but his suspicions are, we believe, unfounded.
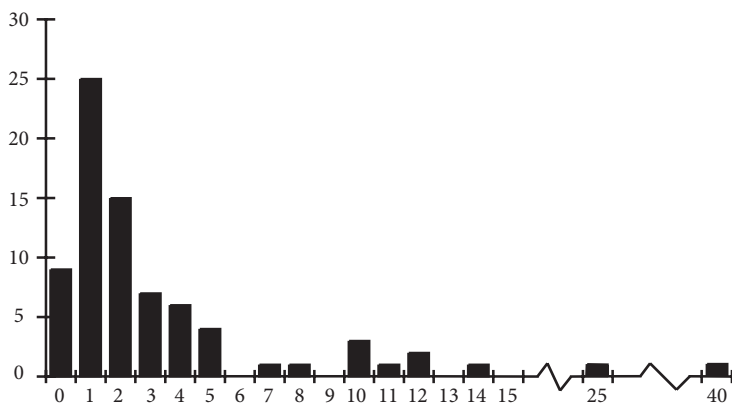
Figure 2. Weights (in grams) of the pieces of Unminted Silver

The remaining two-thirds of the unminted pieces in the hoard (1–52) are in the form of flat, hammered disks, some circular, most elliptical in shape. In general, these rounded pieces were hammered from poured globules or "dumps" of silver. The partially flattened 3, however, was made from a piece of silver—clearly not a coin—that bore a design in relief on both sides. We have found no indication that any of the discs might have been made by flattening a coin. With the disks we have included one rectangular piece (no. 13), since after being cut into this shape it too had been hammered.

The disks span a gamut of sizes, from 25.4 g in mass and 31 mm in diameter, down to 0.24 g and 5 mm. As with the other types of silver pieces, however, the great concentration is toward the lower end of the weight range, with 70 per cent weighing less than 4.0 g.

A few typeless silver disks like these have turned up in admixtures of bullion and coins recovered in Egypt and the Greek West (Kroll 2001b: 7) and in the Black Sea region (Pfisterer 2000: 68, pl. 14, nos. 783–790), although on average they are heavier and larger than most of the disks in the Ashmolean hoard.

In publishing the eight disks and cut-disk fragments in the large hoard from the region of the Black Sea (fifth century BC), Matthias Pfisterer (2000: 68) observed that they, which have the shape and sizes of coins, circulated not as raw silver but specifically for use as money, since several show signs of wear from circulation and three had been carefully cut at the edges with a chisel to test that they were silver to the core. Since such coin-like disks are not found in bullion assemblages earlier than the latter part of the sixth century, it seems that they were in fact loosely imitative of coins. This is not to say that they could have been trans-

acted at sight and on trust the way coins were. As Georges Le Rider (2002: 6) has explained, in a bullion-using monetary economy, the only way of ascertaining or verifying the value of any unmarked silver was by weighing it in the pan of a balance. Even those disks that might have had masses that agreed with one weight standard or another would have to be weighed at the time of expenditure—how else could one be sure of their true weight? Apparently, purveyors of silver bullion that was to be used expressly in monetary exchange had pieces manufactured in the form of these coin-sized disks because of its convenience and the association of the shape with money.

Since these small currency ingots were intended to be weighed out on the balance, no purpose would have been served in making them conform to divisions or multiple units of a fixed weight standard. Accordingly, the masses of the Ashmolean disks are found to be quite random, without any general agreement with denominational weight units of the local, Persic standard—at least not at time of manufacture. At 10.84 g, one disk (5) does have the mass of a Persic stater, but its original, manufactured weight was clearly greater; it was only at some time after the piece had been shaped by hammering that some metal was chopped off at one end to make it a one-stater piece. The only sure conformity between the manufactured masses of some disks and Persic-weight values is found in the three smallest disks (50–52), which at 0.41–0.42 g and 0.24 g correspond to the masses of the twenty-fourth and forty-eighth hoard coins. Even so, it is questionable whether this correspondence at the bottom of the weight spectrum was actually intentional—i.e., that the weights of these three smallest disks alone had been finely adjusted before hammering so that the disks, like coins, could be transacted without weighing at the time of the transaction. In any case the masses of the rest of the disks are haphazard and spread rather evenly, without any significant clustering at one or more points, on a finely calibrated weight scale, i.e., one that measures differences at least as small as a third or a quarter of a gram.[13] The fact that the disks were sometimes cut in half or into other smaller fragments (5, 26, 28, 42; Pfisterer 2000: nos. 786, 789, 790) shows also that they were treated no differently than other forms of silver bullion.

Significance of the Hoard

In keeping with the established principle that fractional silver coins circulated locally and are hardly ever encountered at a distance from their city of origin (Kim

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13. The clustering shown in the histogram of Fig. 2, which tabulates the masses of the disks and the other unminted hoard silver, is not relevant to this question since it lists the silver pieces in large, one-gram increments. Compare the histogram of the hoard coins (Fig. 1), which tallies specimens by hundredths of a gram.

2002: 48), there is good reason to assume that the Ashmolean hoard was recovered in the territory of Colophon. It is thus one of the very few silver hoards from a Greek center that happens to contain pieces of silver bullion mixed in with coins.[14] Moreover, since most of this bullion is in the form of hammered disks that were made specifically for use in monetary exchange, there can be little doubt that the entire assemblage of unminted silver in the hoard was functionally regarded as transactional, monetary silver. The hoard thus gives a glimpse of a local Greek monetary system in transition, at a stage when two forms of currency were being employed concurrently, the old currency of anonymous silver bullion and the new type of currency in the form of state-minted and state-guaranteed coins.

Although a few of the bullion pieces are relatively heavy, the unminted silver as a whole is characterized by the generally diminutive sizes of the pieces—two-thirds of which weigh between 5.0 and 0.24 g. Significantly, the great mass of twenty-fourth and forty-eighth coins consists of pieces that are consistently much smaller still. Weighing either 0.43 or 0.21 g, the coins are lighter than all but four of the unminted pieces. The position of these tiny coins at the bottom of the hoard's weight scale has prompted the suggestion that they were struck principally to accompany or supplement the bullion (Kroll 2008: 23). Since unminted silver was easily weighed in the balance except for extremely small bits, the availability of such coins would have made weighing in minute increments unnecessary.[15]

To be sure, the Colophonian coinage in question includes a third, higher denomination, the twelfth (or obol), weighing just under one gram. Specimens, however, are rare. We know of only two (both with Apollo heads facing left), the one in our hoard and the one from the Berry collection at the ANS (Thompson 1961, no. 1039, from a second pair of dies). While this slight record of surviving examples could be misleading, it appears at present that, unlike the twenty-fourths and forty-eighths, the twelfths were minted in relatively small numbers. Of the three denominations of our hoard coinage, moreover, the twelfth is the only one that was not continued in Colophon's later coinage. The fifth century coinages of Milne's

14. The one mixed archaic hoard with a definite urban provenance is Taranto 1911 (*IGCH* 1874), which, however, containing no Tarantine coins, was a (money-changer's?) hoard entirely of foreign bullion and coins (Kroll 2008: 30–33). Selinus 1985 (*CH* 8.25), with bullion and coins, was apparently recovered about 100 km east of Selinus (Kroll 2008: 30).

15. Experimenting with carefully devised replications of ancient Greek double-pan balances, Grayson (1975: 707–25) determined that they could distinguish differences down to two-tenths of a gram. In one experiment, a balance recorded a difference of one-tenth of a gram, but he discounted the result as unreliable. It may not have been. Judging from the weights of coins, Kagan (2006: 54) writes that "Greek mints may not have been accurate to a hundredth of a gram, but certainly to a tenth." Of course there was more to weighing by a busy shopkeeper than simply the exactitude of his scale; weighing in a market stall needed also to be done with all possible speed.

Periods I and II consist of drachms (with the weight of the Persian siglos), hemi-obols, and quarter-obols (successors to our twenty-fourths and forty-eighths), to which was added in Period II an occasional third-obol piece (Milne 1941: 39–40). The continuing production of these small fractions of the obol throughout the fifth century is one of the more noteworthy features of Colophonian coinage. But the conspicuous absence of the obol unit itself amid this production of its frac-tions makes their continuation even more interesting, especially since an obol or twelfth had been introduced in the pre-Period I coinage of the Ashmolean hoard. Since the coined obol disappeared from the currency apparently because it lacked importance, one is led to suspect, given its minimal representation in the hoard, that its usefulness in the currency system may have been marginal from the outset. Judged by both their scale of production and their continued prominence in the later coinage of Colophon, the small twenty-fourths and forty-eights were over-whelmingly the more significant denominations. It is they that define the hoard coinage. The hoard's lone twelfth, on the other hand, would seem to represent a trial in coining the next step up the denominational ladder in an experiment that proved to be unsuccessful.

This is intelligible if the purpose of the coinage was not to replace the bullion currency—hardly a plausible possibility anyway in view of the coins' limited field of low weights—but rather to supplement it by facilitating transactions in silver that weighing on the balance was singularly ill-suited to measure, namely, transac-tions at the bottom of the value scale. Put abstractly, the limited weight range of the coinage implies a limited function. Introduced for the exchange of silver in quarter of a gram increments, the coinage would have had little need for a denomination as heavy as the *circa* one-gram obol/twelfth that could not contribute to such finely measured precision and whose value was easily made up by its half and quarter fractions. Since payments in this coinage would have been made by counting out these quarters and halves, we should probably think of the quarter-obol or forty-eighth not as the lowest fraction of a higher standard weight unit, as it is named in the traditional top-down divisional sequence, but rather as the basic building block or foundational unit of the coinage as it was used practically, in a bottom-up ladder involving two multiples, its double, the twenty-fourth/hemiobol, and the short-lived quadruple twelfth/obol.

Transactions involving moderate to large sums of money would necessarily have been conducted in another specie or species. Often this would have been the Persian siglos (as Milne [1941: 35] assumed in his discussion of the half- and quarter-obols of his Period I). But the hoard implies that silver bullion was another alternative specie, very likely the most common one, not least because its use prob-ably went back for generations and because its procurement—silver in any form, from any source—was so simple.

The phenomenon thus documented in this hoard, of a monetary system that employed two distinct types of currencies, one for low-level, the other for higher-level expenditures, is so common in world monetary history that it is rarely calls for comment. Most familiar of course are all national currencies of the present day with their metal coins and paper bills. Familiar too are the separate but integrated bronze and silver coinages minted by Greek states in the fourth century and Hellenistic period. Like our twenty-fourths and forty-eights, these bronze coinages represented fractional values of the obol, while also being based on a fundamental value-unit of their own, the *chalkous*. They too were limited-purpose or single-purpose coinages, issued for local exchange in petty retail activity and securing the modest needs of everyday living. In Hellenistic times, purchasing with silver began at the level of a triobol or hemidrachm, the lowest denomination then being minted in silver.

Accordingly, we believe that the minute Colophonian silver fractions of the Ashmolean hoard and Milne's fifth-century Periods I and II should be recognized as forerunners of the conventional bronze coinages of the later Greek world. As with bronze coins later, the twenty-fourths and forty-eights were the pieces that the people of Colophon carried in their purses, or their cheeks (now see Cahill and Kroll 2005: 591), when going off to the market for provisions. Twenty-fourths and forty-eighths occur also in the late sixth- and fifth-century silver coinages of some other Ionian and Carian cities, such as Ephesus, Miletus, Teos, and Mylasa,[16] indicating that the coining of these lowest exchange values in silver was a regional practice, one that can be traced back to the minute denominations of early electrum coinage (Kraay 1962/3: 13).[17]

There are several further considerations that arise from the hoard and merit more discussion than we are able to devote to them here. We conclude by identifying them and emphasizing certain aspects of the hoard that have wider implications for reconstructing the complex early monetary history of Greece.

First and most important, the hoard not only documents what the Colophonians did for money before they had coinage, but it reveals that they continued to employ a traditional currency of unminted silver even after they had begun to coin. Obviously, this complicates the conventional view that Greek cities were

16. See, as a synopsis, Konuk 2002, under the names of these cities.

17. As shown by the twenty-fourths, forty-eighths, and ninety-sixths that make up over half of the electrum coins recovered from the Artemisium Central Basis deposit at Ephesus and occur in the typeless electrum "proto-coins" found elsewhere in the 1905/6 Artemisium excavations (Robinson 1951: 166-67). Such minute divisions were an essential element of coinage from its very beginning. The pieces of unworked silver in the Artemisium contexts were also small. There were seven of them, all in the form of little dumps or drops, although only three were recorded with weights: 0.45, 1.10, and 1.16 g (*ibid.*: 157, 164, 166; and Kroll 2008: 22).

quick to adopt coinage, whereas conservative resistance to coinage and adherence to the age-old practice of weighing out silver on the balance were typical behaviors of Near Eastern, Egyptian, and other non-Greek peoples. Now we have evidence for such adherence in at least one Greek community. The Colophonians apparently found no reason to be dissatisfied with the practice of weighing out silver, except for payments that were too small to be conveniently or accurately measured by this procedure.

Second, while one of the great incentives for adopting a coined currency was to eliminate the step of weighing out metal in each and every cash transaction, the hoard emphasizes that this elimination was most critical for payments at and near the bottom of the value spectrum. Such payments involving weights of silver as small as a quarter of a gram must have been hugely important in Colophon, else the city would not have gone to the very considerable trouble of minting a massive number of tiny coins just to facilitate transactions at this level. Since it is hardly likely that this was unusual, one suspects that a number of other communities were encouraged to adopt coinage primarily because of its specific advantage in dealing not with large amounts of silver money but with silver in small increments.

Third, the slight value of the hoard coins and their massive minting have some revealing social and political implications. The huge number of dies that were cut for this initial coinage of the city underscores what a tremendous undertaking it must have been to put into place a coinage whose function, notably, was restricted to the modest, quotidian exchange needs of the agora and the general population at large. Not only was the decision to coin at Colophon a major civic commitment, but it was one that was designed to benefit the broadest possible range of the populace and the local retail traders on whom the populace depended. It marked an enlargement of the city government's responsibilities into the provision of money and concern for the vitality of internal trade. None of this would be surprising if we came upon it a century later when written sources, Aristophanes and other writers of Attic comedy especially, picture the Athenian agora as a thriving market place teeming with small-time buyers and vendors exchanging silver coins in small denominations. But our limited sources for the Archaic period are concerned mainly with the economic activities of the elite and have hardly anything to say about the common man, his money, and the agora. In this void the twenty-fourths and forty-eighths of the hoard provide invaluable documentation that the economic interests of the entire community were a matter of serious public importance in late Archaic Colophon, and we can sense that the agora there was probably as lively and crowded with ordinary people buying and selling with petty cash as the agora of Aristophanes' Athens.

Finally, in this paper we have briefly compared the hoard coinage to the bronze coinages of Greek states in the fourth century and Hellenistic times with respect to

their analogous monetary roles, values, and scale. Historians have generally taken the banal role of this bronze currency for granted because such low-value coins are late and seemingly appropriate to a developed and fully monetized economy. If the mass use of small-value coins is to be regarded as a index of monetization, however, we see that a remarkably high degree of monetization had been achieved at Colophon and other Greek cities, particularly but not exclusively in Asia Minor, already by the later sixth century, as Kim (2002) and Kagan (2006) have observed with regard to other early coinages that included fractions of the obol. It is not hard to understand why, once we recognize that silver coinage was preceded by a long period in which the buying and selling of goods and services was transacted in other forms of metal money. In Western Asia Minor this included gold and electrum bullion (Kroll 2008: 18–21) and subsequently electrum coins in addition to silver bullion, which was commonly weighed out in small pieces, as shown by the disks and other unminted silver in the present hoard.[18]

References

Balmuth, M. (ed.) 2001. *Hacksilber to coinage: new insights into the monetary history of the Near East and Greece*. Numismatic Studies 24. New York: American Numismatic Society.

Cahill, N., and Kroll, J. H. 2005. New archaic coin finds at Sardis. *American Journal of Archaeology* 109: 589–617.

de Callataÿ, F. 2003a. *Recueil quantitatif des émissions monétaires archaïques et classiques*. Wettern, Belgium: Cultura.

———. 2003b. Review of Pfisterer, 2000. *Revue Belge de Numismatique* 149: 267–72.

Esty, W. W. 1984. Estimating the size of a coinage. *Numismatic Chronicle* 144: 180–3.

———. 1986. Estimation of the size of a coinage: a survey and comparison of methods. *Numismatic Chronicle* 146: 185–215.

Figueira, T. 1998. *The power of money, coinage and politics in the Athenian Empire.* Philadelphia: University of Pennsylvania Press.

Gitin, S., and Golani, A. 2001. The Tel Miqne-Ekron silver hoards: The Assyrian and Phoenician connections. In Balmuth 2001, 27–48.

Grayson, C.H. 1975. *Weighing in ancient Greece*. Unpublished D. Phil. Thesis. University of Oxford.

Holland, L. B. 1944. Colophon. *Hesperia* 13: 91–171.

Kagan, J. H. 2006. Small change and the beginning of coinage at Abdera. In *Agoranomia. Studies in money and exchange presented to John H. Kroll*, P. G. van Alfen, ed., pp. 49–57. New York: American Numismatic Society.

Kim H. S. 1994. *Greek fractional silver coinage: a reassessment of the inception, development, prevalence, and functions of small change during the late Archaic and early Classical period.* Unpublished M. Phil. Thesis, University of Oxford.

———. 2001. Archaic coinage as evidence for the use of money. In *Money and its uses in the Ancient Greek world,* A. Meadows and K. Shipton, eds., pp. 7–21. Oxford and New York: Oxford University Press.

———. 2002. Small change and the moneyed economy. In *Money, labour and land, approaches to the economies of ancient Greece*, P. Cartledge, E. E. Cohen, and L. Foxhall, eds., pp. 44–51. London and New York: Routledge.

Konuk, K. 2002. *Sylloge Nummorum Graecorum, Turkey I: The Muharrem Kayhan Collection.* Istanbul and Bordeaux: Ausonius Publications.

Kraay, C. M., and Moorey, P.P.S. 1981. A Black Sea hoard of the fifth century BC. *Numismatic Chronicle* 141: 1–19.

Kroll, J. H. 2001a. Observations on monetary instruments in pre-coinage Greece. In Balmuth 2001, pp.77–91.

———. 2001b. A small find of silver bullion from Egypt. *American Journal of Numismatics* 13: 1–20.

———. 2008. The monetary use of weighed bullion in Archaic Greece. In *The monetary systems of the Greeks and Romans*, W. V. Harris, ed., pp. 13–37. Oxford and New York: Oxford Univesity Press.

Kraay, C. M. 1962/3. Monnaies provenant du site de Colophon. *Revue suisse de Numismatique* 42: 5–13.

Le Rider, G. 2001. *La naissance de la monnaie. Pratiques monétaires de l'orient ancien.* Paris: Presses Universitaires de France.

Milne, J. G. 1941. *Kolophon and its coinage*. Numismatic Notes and Monographs 96. New York: American Numismatic Society.

Pfisterer, M. 2000. *Ein Silberschatz vom Schwarzen Meer. Beobachtungen zum Geldumlauf im Achaimenidenreich*. Studia Iranica, Cahier 22. Paris: Association pour l'avancement des études iraniennes.

Psoma, S. 2001. *Olynthe et les Chalcidiens de Thrace. Étude de numismatique et d'histoire*. Stuttgart: Steiner.

Robinson, E. S. G. 1951. The coins from the Ephesian Artemision reconsidered. *Journal of Hellenic Studies* 71: 156–67.

Schönert-Geiss, E. 1987. *Griechisches Münzwerk : Die Münzprägung von Maroneia*. Berlin: Akademie-Verlag.

Thompson, C. M. 2003. Sealed silver in Iron Age Cisjordan and the "invention" of coinage. *Oxford Journal of Archaelogy* 22: 67–107.

Thompson, M. 1961. *Sylloge Numorum Graecorum, American Numismatic Society: Burton Y. Berry Collection.* New York: American Numismatic Society.

van Alfen, P. G. 2004–05a. Herodotos' "Aryandic" silver and bullion use in Persian-Period Egypt. *American Journal of Numismatics* 14: 7–29.

———. 2004–05b. A new Athenian "owl" and bullion hoard from the Near East. *American Journal of Numismatics* 14: 47–61.

———, M. Almagro-Gorbea, and P. P. Ripollès. 2008. A new Celtiberian hacksilber hoard, c. 200 BCE. *American Journal of Numismatics* 20: 265–293.

Wallace, R. W. 1989. On the production and exchange of early Anatolian electrum coinage. *Revue des études anciennes* 91: 87–94.

CATALOGUE

Unminted silver (Pls. 12–13)

Weights are given in grams. Dimensions (length/width/thickness) in millimeters.

Hammered disks (and other shapes)

Flat on both sides. One face normally shows two to five slight facets from hammering, while the other face, compressed against the surface of an anvil, is perfectly smooth.

1.   25.39   31/21/6 Thick.
2.   14.83   23/17/5
3.   12.02   25/16/4.5
      Because of the tapering thickness, hammering failed to flatten the metal at its thinner end, which retains traces of relief on both sides from prior working. The lines and grooves in the relief are jumbled and do not suggest any design or lettering, such as would indicate that the metal had previously been a coin.
4.   11.61   22/22/5
5.   10.84   26/15/4
      About a quarter of the original metal was chopped off at one end with three chisel cuts.
6.   10.24   20/16/5
7.   8.62   20/14/5
8.   7.20   21/16/3 Multiple small facets on upper face; cf. 22, 35.
9.   5.90   15/12/3.5
      The smoother, anvil side is lightly scratched with nine, apparently random lines.
10.   5.72   15/14/3.5
      The wide, deeply punched hole on one side was presumably punched for testing, probably before the piece was hammered.
11.   5.12   15/13/3

12.   4.53   16/12/3
    A piece had been chopped off the small end before hammering.
13.   4.16   12/8/3
    Cut into rectangle and then hammered (facets on one face).
14.   4.04   14/13/3
15.   4.01   13/13/3
16.   3.82   12/11/4 Thick.
17.   3.72   16/13/2
18.   3.72   16/11/2.5
19.   3.55   18/11/2.5 One side cut before hammering.
20.   3.29   13/11/2.5
21.   3.14   16/12/2
22.   2.93   18/12/2 Multiple facets on one side.
23.   2.89   13/11/2
24.   2.61   12/11/2
25.   2.52   16/8/2
26.   2.49   13/12/3-1
    Half of disk that was snapped in two after the thickness was reduced with
    small facets towards the middle.
27.   2.46   11/11/2.5
28.   2.24   8/12/2-1.5
    Half of disk that was snapped in two after the thickness was reduced, like 26.
29.   2.11   12/9/2
30.   1.97   11/7/2
31.   1.94   11/11/2
32.   1.91   14/10/1.5-1 Thickness tapers towards both ends.
33.   1.86   11/9/2
34.   1.77   10/7/3
35.   1.72   15/9/1-0.5
    Thickness tapers towards both ends. Multiple small facets on both sides, cf. 8.
36.   1.70   10/9/2
37.   1.67   10/9/2
38.   1.66   8/8/4 Thick.
39.   1.61   12/10/1.5
40.   1.44   11/9/1.5 Rough, unworn edges.
41.   1.37   11/10/1.5 Rough, unworn edges.
42.   1.36   10/9/2 Half of a sharply cut disk.
43.   1.32   10/ll/1.5 Metal probably with 1 or 2 cut edges before flattening.
44.   1.10   10/9/1.5
45.   1.09   6/6/3.5 A partially flatten cube. Thick.
46.   0.92   9/8/1

47.   0.76   11/10/1
48.   0.69   7/7/1
49.   0.58   7/7/1
50.   0.43   7/6/1
51.   0.41   7/5/1 Rough edges before flattening
52.   0.24   5/5/1

Amorphous lumps

53.   40.84   31/18/15
Lumpy, curved piece of silver, cast roughly in the shape of the letter pi. If straightened out into a more or less flat bar, the bar would measure 60 x 18 mm, with a thickness of about 10 mm.

54.   10.22   22/13/6 Bean-shaped lump, rough and rounded on all sides.

Fragments chopped from disks or other ingot types

55.   5.13   17/14/5-1 4 edges, of which 2 are cut. Thickness tapers.
56.   4.92   18/10/6 4 edges, of which 3 are cut.
57.   4.78   16/10/5 4 edges, all cut.
58.   2.89   11/10/3 4 edges, all cut.
59.   1.62   9/7/4 5 edges, of which 3 are cut.
60.   1.58   9/8/5 6 edges, of which 4 are cut.
61.   1.51   7/7/4 6 edges, of which 5 are cut.
62.   1.01   7/7/4.5 6 edges, of which 4 are cut.
63.   1.05   7/6/4 4 edges, all cut.
64.   1.03   9/7/3 6 sides, all cut.
65.   0.47   8/7/1.5 4 sides, of which 3 are cut.

Scrap pieces of worked silver

66.   12.85   25/23/8
Thin, silver sheeting (c. 1 mm thick) tightly folded over 3 or 4 times. The yellowish hue of the surface and a small (c. 2 x 3 mm), adhering flake of gold foil show that the silver had formerly been gilded. It had also been embossed with an indeterminate design, which included a large area stippled with closely-placed dash-like punches.

67.   3.65   9/8/2 Cut end of tongue-shaped strip, bent in curve.
68.   2.79   11/th. 5-7 Fragment of a rod, cut at each end.
69.   2.65   15/8/2.5 Cut at left and right from 8 mm wide strip.
70.   2.58   16/8/2 Cut at left and right from 8 mm wide strip.
71.   2.59   13/10/2 Spirally wound wire (2 mm thick) with finished ends, from an ear ring.
72.   2.48   13/12/ 3.5-2 Curved piece of wire (3.5-2 mm thick), cut at both ends.

73.   2.04   13/11/2 Spirally wound wire (2 mm thick) with finished ends, as 71.

74.   1.84   8/6/7 Fragment, probably from a fibula, where a round and a cubed section were joined. Cut at each end.

75.   1.84   10/11/1 Tongue-shaped strip (1 mm thick), round at both ends, bent double and pinched together.

76.   1.42   8/8/1 Tongue-shaped strip (1 mm thick), round at both ends, bent in curve.

77.   0.76   10/7/1
Length of jewelry band (1 mm thick), ornamented with wire borders and band of raised rectangles in between. Cut at both ends and rolled into a loop.

Coins (Pls. 14-36)

* = illustrated at actual size on Pls. 14–34 and in an enlargement on Pls. 35–36.

Twelfth

1   O 1 Head left
     R 1 Incuse punch
        *a. 0.92

Twenty-fourths

1   O 1 Head right
     R 1 Incuse punch
        *a. 0.41

2   O 2 Head right
     R 2 Incuse punch
        *a.0.42

3   O 3 Head right
     R 3 Incuse punch
        a. 0.44

4   O 3 Same die
     R 4 Incuse punch
        a. 0.43

5   O 3 Same die
     R 5 Incuse punch
        *a. 0.42
        b. 0.44
        c. 0.43

6   O 4 Head right
     R 5 Same die
        *a. 0.40

7   O 4 Same die
     R 6 Incuse punch
        a. 0.45

8   O 4 Same die
     R 7 Incuse punch
        *a. 0.41

9   O 4 Same die
     R 8 Incuse punch
        a. 0.43

10   O 4 Same die
     R 9 Incuse punch
        a. 0.42

11   O 4 Same die
     R 10 Incuse punch
        a. 0.46

12   O 5 Head right; hair in two locks
     R 10 Same die
        *a. 0.43

13   O 6 Head right
      R 11 Incuse punch
         a. 0.42

14   O 7 Head right
      R 11 Same die
         a. 0.41

15   O 8 Head right
      R 12 Incuse punch
         a. 0.45

16   O 9 Head right
      R 13 Incuse punch
         *a. 0.46

17   O 10 Head right
      R 14 Incuse punch
         a. 0.42

18   O 11 Head right
      R 14 Same die
         a. 0.46
         *b. 0.46

19   O 11 Same die
      R 15 Incuse punch
         a. 0.46

20   O 12 Head right
      R 16 Incuse punch
         *a. 0.41

21   O 13 Head right
      R 17 Incuse punch
         *a. 0.43

22   O 14 Head right
      R 17 Same die
         a. 0.43

23   O 14 Same die
      R 18 Incuse punch
         a. 0.40

24   O 14 Same die
      R 19 Incuse punch
         a. 0.42

25   O 15 Head right
      R 20 Incuse punch
         a. 0.38

26   O 15 Same die
      R 21 Incuse punch
         a. 0.36

27   O 16 Head right
      R 22 Incuse punch
         a. 0.41
         b. 0.40

28   O 16 Same die
      R 23 Incuse punch
         a. 0.44
         b. 0.43

29   O 16 Same die
      R 24 Incuse punch
         a. 0.45

30   O 17 Head right
      R 24 Same die
         a. 0.44

31   O 18 Head right
      R 25 Incuse punch
         *a. 0.42

32   O 18 Same die
      R 26 Incuse punch
         a. 0.39

33   O 19 Head right
      R 27 Incuse punch
         *a. 0.42

34   O 20 Head right
      R 28 Incuse punch
         a. 0.41

35   O 21 Head right
      R 29 Incuse punch
         *a. 0.44

36   O 22 Head right
      R 30 Incuse punch
         a. 0.44

37   O 22 Same die
      R 31 Incuse punch
         a. 0.42

38   O 23 Head right
      R 32 Incuse punch
         a. 0.42

39   O 23 Same die
      R 33 Incuse punch
         a. 0.44

40   O 24 Head right
      R 34 Incuse punch
         a. 0.47

41   O 24 Same die
      R 35 Incuse punch
         a. 0.44

42   O 24 Same die
      R 36 Incuse punch
         a. 0.41

43   O 25 Head right
      R 37 Incuse punch
         a. 0.42

44   O 26 Head right
      R 38 Incuse punch
         a. 0.44

45   O 26 Same die
      R 39 Incuse punch
         a. 0.39

46   O 27 Head right
      R 39 Same die
         a. 0.38
         b. 0.38
         c. 0.40

47   O 28 Head left
      R 39 Same die
         a. 0.47

48   O 29 Head left
      R 40 Incuse punch
         a. 0.41
         b. 0.43

49   O 29 Same die
      R 41 Incuse punch
         a. 0.44

50   O 29 Same die
      R 42 Incuse punch
         a. 0.44

51   O 30 Head left
      R 42 Same die
         a. 0.43

52   O 31 Head left
      R 42 Same die
         a. 0.43

53   O 31 Same die
      R 43 Incuse punch
         a. 0.44

54   O 32 Head left
      R 43 Same die
         a. 0.44
         b. 0.43
         c. 0.42
         d. 0.42
         e. 0.42
         f. 0.43
         g. 0.44

55   O 33 Head left
      R 43 Same die
         a. 0.41
         b. 0.42

56   O 34 Head left
     R 43 Same die
       a. 0.43

57   O 35 Head left
     R 43 Same die
       a. 0.43
       b. 0.42
       c. 0.42

58   O 36 Head left
     R 43 Same die
       a. 0.42
       b. 0.42

59   O 36 Same die
     R 44 Incuse punch
       a. 0.42

60   O 35 Same die as 57
     R 44 Same die
       a. 0.44
       b. 0.43
       c. 0.45
       d. 0.41

61   O 37 Head left
     R 45 Incuse punch
       a. 0.45
       b. 0.45
       *c. 0.43
       d. 0.41

62   O 38 Head left
     R 45 Same die
       a. 0.50
       b. 0.44
       c. 0.43
       d. 0.44
       e. 0.42
       f. 0.44
       g. 0.44
       h. 0.41
       *i. 0.42

       j. 0.45
       k. 0.43
       l. 0.44
       m. 0.44
       n. 0.43
       o. 0.44
       p. 0.43

63   O 39 Head left
     R 45 Same die
       a. 0.43
       b. 0.44
       *c. 0.42
       d. 0.42
       e. 0.43
       f. 0.43
       g. 0.43
       h. 0.46
       i. 0.43
       j. 0.40
       k. 0.42
       l. 0.44
       m. 0.44
       n. 0.43
       o. 0.41
       p. 0.43

64   O 40 Head left
     R 46 Incuse punch
       a. 0.43
       b. 0.42
       c. 0.42
       d. 0.43

65   O 41 Head left
     R 46 Same die
       a. 0.42
       b. 0.43

66   O 42 Head left
     R 46 Same die
       a. 0.41
       *b. 0.42

67   O 43 Head left
     R 46 Same die
         a. 0.45

68   O 44 Head left
     R 46 Same die
        *a. 0.43

69   O 45 Head left
     R 46 Same die
         a. 0.43

70   O 46 Head left
     R 47 Incuse punch
         a. 0.45
         b. 0.44
         c. 0.42

71   O 47 Head left
     R 47 Same die
         a. 0.40
         b. 0.43

72   O 48 Head left
     R 48 Incuse punch
         a. 0.35

73   O 48 Same die
     R 49 Incuse punch
         a. 0.40

74   O 48 Same die
     R 50 Incuse punch
         a. 0.43
         b. 0.45
         c. 0.43
         d. 0.44
         e. 0.42
         f. 0.46
         g. 0.44
         h. 0.43
        *i. 0.47
         j. 0.42

75   O 49 Head left
     R 50 Same die
         a. 0.42
         b. 0.41
         c. 0.43
        *d. 0.44
         e. 0.41
         f. 0.43
         g. 0.43
         h. 0.43
         i. 0.44

76   O 49 Same die
     R 51 Incuse punch
         a. 0.39

77   O 50 Head left
     R 52 Incuse punch
         a. 0.43
         b. 0.43
         c. 0.44
         d. 0.44
         e. 0.43

78   O 51 Head left
     R 52 Same die
         a. 0.43
         b. 0.41

79   O 52 Head left
     R 52 Same die
         a. 0.43
         b. 0.43

80   O 53 Head left
     R 52 Same die
         a. 0.43

81   O 54 Head left
     R 52 Same die
         a. 0.43
         b. 0.43

82   O 54 Same die
     R 53 Incuse punch
         a. 0.43
         b. 0.42
         c. 0.42
         *d. 0.42
         e. 0.41
         f. 0.43

83   O 55 Head left
     R 53 Same die
         *a. 0.43

84   O 56 Head left
     R 53 Same die
         a. 0.42
         *b. 0.43

85   O 57 Head left, with curly hair
     R 54 Incuse punch
         a. 0.44
         b. 0.44
         c. 0.43
         d. 0.43
         *e. 0.43

86   O 58 Head left
     R 55 Incuse punch
         a. 0.39

87   O 59 Head left
     R 55 Same die
         *a. 0.39

88   O 59 Same die
     R 56 Incuse punch
         a. 0.37

89   O 60 Head left
     R 57 Incuse punch
         a. 0.43

90   O 61 Head left
     R 58 Incuse punch
         a. 0.39
         b. 0.47

91   O 62 Head left
     R 58 Same die
         a. 0.40

92   O 62 Same die
     R 59 Incuse punch
         a. 0.45
         b. 0.41

93   O 63 Head left
     R 60 Incuse punch
         a. 0.37

94   O 64 Head left
     R 60 Same die
         a. 0.34

95   O 64 Same die
     R 61 Incuse punch
         a. 0.37
         b. 0.39
         c. 0.40

96   O 64 Same die
     R 62 Incuse punch
         a. 0.37

97   O 65 Head left
     R 63 Incuse punch
         a. 0.43
         b. 0.44

98   O 66 Head left
     R 63 Same die
         a. 0.44

99   O 66 Same die
     R 64 Incuse punch
         a. 0.43

100 O 66 Same die
     R 65 Incuse punch
         a. 0.43

101 O 67 Head left
    R 65 Same die
      a. 0.41
      b. 0.42

102 O 67 Same die
    R 66 Incuse punch
      a. 0.43
      b. 0.43
      c. 0.43

103 O 68 Head left
    R 66 Same die
      a. 0.44
      b. 0.44

104 O 69 Head left
    R 65 Same die as 100
      a. 0.43
      b. 0.43
      c. 0.43
      d. 0.42

105 O 69 Same die
    R 67 Incuse punch
      a. 0.41

106 O 70 Head left
    R 68 Incuse punch
      a. 0.38

107 O 71 Head left
    R 69 Incuse punch
      a. 0.43
      b. 0.46
      c. 0.42
      d. 0.43

108 O 72 Head left
    R 69 Same die
      a. 0.42

109 O 73 Head left
    R 70 Incuse punch
      a. 0.40

110 O 73 Same die
    R 71 Incuse punch
      a. 0.42
      b. 0.43

111 O 74 Head left
    R 71 Same die
      a. 0.43
      b. 0.43

112 O 75 Head left
    R 72 Incuse punch
      a. 0.42

113 O 76 Head left
    R 72 Same die
      a. 0.43
      b. 0.33

114 O 76 Same die
    R 73 Incuse punch
      a. 0.42

115 O 76 Same die
    R 74 Incuse punch
      a. 0.44
      b. 0.43

116 O 77 Head left
    R 74 Same die
      a. 0.42
      b. 0.46
      c. 0.41

117 O 76 Same die as 114
    R 75 Incuse punch
      a. 0.43

118 O 78 Head left
    R 75 Same die
      a. 0.43
      b. 0.45

119 O 79 Head left
    R 75 Same die
      a. 0.47

120　O 80 Head left
　　　R 76 Incuse punch
　　　　a. 0.45

121　O 80 Same die
　　　R 77 Incuse punch
　　　　a. 0.44
　　　　b. 0.43

122　O 80 Same die
　　　R 78 Incuse punch
　　　　a. 0.41

123　O 81 Head left
　　　R 79 Incuse punch
　　　　a. 0.45

124　O 81 Same die
　　　R 80 Incuse punch
　　　　a. 0.43
　　　　b. 0.39

125　O 81 Same die
　　　R 81 Incuse punch
　　　　a. 0.42

126　O 82 Head left
　　　R 82 Incuse punch
　　　　a. 0.42

127　O 83 Head left
　　　R 83 Incuse punch
　　　　a. 0.44
　　　　b. 0.42

128　O 84 Head left
　　　R 83 Same die
　　　　a. 0.39

129　O 84 Same die
　　　R 84 Incuse punch
　　　　a. 0.40

130　O 85 Head left
　　　R 85 Incuse punch
　　　　a. 0.42

131　O 85 Same die
　　　R 86 Incuse punch
　　　　a. 0.43
　　　　b. 0.43
　　　　c. 0.42

132　O 86 Head left
　　　R 86 Same die
　　　　a. 0.43

133　O 86 Same die
　　　R 87 Incuse punch
　　　　a. 0.42

134　O 87 Head left
　　　R 88 Incuse punch
　　　　a. 0.33

135　O 88 Head left
　　　R 89 Incuse punch
　　　　a. 0.43

136　O 89 Head left
　　　R 89 Same die
　　　　a. 0.43

137　O 90 Head left
　　　R 90 Incuse punch
　　　　a. 0.44

138　O 91 Head left
　　　R 91 Incuse punch
　　　　a. 0.45
　　　　b. 0.45
　　　　c. 0.43
　　　　d. 0.42
　　　　e. 0.44
　　　　f. 0.43
　　　　g. 0.42

139　O 92 Head left
　　　R 91 Same die
　　　　a. 0.41
　　　　b. 0.44

140 O 93 Head left
     R 92 Incuse punch
        a. 0.45

141 O 93 Same die
     R 93 Incuse punch
        a. 0.43

142 O 94 Head left
     R 94 Incuse punch
        a. 0.44

143 O 95 Head left
     R 94 Same die
        a. 0.42

144 O 96 Head left
     R 95 Incuse punch
        a. 0.38

145 O 97 Head left
     R 96 Incuse punch
        a. 0.38

146 O 98 Head left
     R 97 Incuse punch
        a. 0.46

147 O 99 Head left
     R 98 Incuse punch
        a. 0.35

148 O 100 Head left
     R 99 Incuse punch
        a. 0.43

149 O 101 Head left
     R 100 Incuse punch
        a. 0.43
        b. 0.43

150 O 102 Head left
     R 101 Incuse punch
        a. 0.44
        b. 0.44
        c. 0.42

151 O 103 Head left
     R 101 Same die
        a. 0.42
        b. 0.43

152 O 104 Head left
     R 101 Same die
        a. 0.43

153 O 104 Same die
     R 102 Incuse punch
        a. 0.41
        b. 0.44
        c. 0.44

154 O 105 Head left
     R 103 Incuse punch
        a. 0.40

155 O 106 Head left
     R 104 Incuse punch
        a. 0.42
        b. 0.44

156 O 106 Same die
     R 105 Incuse punch
        a. 0.42

157 O 106 Same die
     R 106 Incuse punch
        a. 0.44

158 O 107 Head left
     R 107 Incuse punch
        a. 0.44

159 O 107 Same die
     R 108 Incuse punch
        a. 0.41

160 O 108 Head left
     R 108 Same die
        a. 0.43

161 O 108 Same die
     R 109 Incuse punch
        a. 0.44

162   O 108 Same die
      R 110 Incuse punch
         a. 0.44

163   O 109 Head left
      R 111 Incuse punch
         a. 0.41

164   O 110 Head left
      R 112 Incuse punch
         a. 0.40

165   O 110 Same die
      R 113 Incuse punch
         a. 0.37

166   O 111 Head left
      R 114 Incuse punch
         a. 0.42
         b. 0.42

167   O 112 Head left
      R 114 Same die
         a. 0.42

168   O 113 Head left
      R 114 Same die
         a. 0.43

169   O 114 Head left
      R 115 Incuse punch
         a. 0.50

170   O 115 Head left
      R 116 Incuse punch
         a. 0.44

171   O 115 Same die
      R 117 Incuse punch
         a. 0.45

172   O 116 Head left
      R 118 Incuse punch
         a. 0.43
         b. 0.44

173   O 117 Head left
      R 118 Same die
         a. 0.42
         b. 0.46
         c. 0.45

174   O 118 Head left
      R 119 Incuse punch
         a. 0.43

175   O 119 Head left
      R 120 Incuse punch
         a. 0.43

176   O 120 Head left
      R 120 Same die
         a. 0.44

177   O 121 Head left
      R 121 Incuse punch
         a. 0.43

178   O 121 Same die
      R 122 Incuse punch
         a. 0.42

179   O 122 Head left
      R 122 Same die
         a. 0.44
         b. 0.43
         c. 0.43
         d. 0.44

180   O 123 Head left
      R 122 Same die
         a. 0.42

181   O 123 Same die
      R 123 Incuse punch
         a. 0.40

182   O 124 Head left
      R 122 Same die as 180
         a. 0.43
         b. 0.42
         c. 0.43

183 O 124 Same die
     R 124 Incuse punch
        a. 0.44
        b. 0.43
        c. 0.43
        d. 0.43
        e. 0.44

184 O 124 Same die
     R 125 Incuse punch
        a. 0.43
        b. 0.43
        c. 0.42

185 O 125 Head left
     R 125 Same die
        a. 0.43

186 O 126 Head left
     R 126 Same die
        a. 0.44

187 O 127 Head left
     R 127 Incuse punch
        a. 0.48

188 O 128 Head left
     R 128 Incuse punch
        a. 0.45

189 O 129 Head left
     R 129 Incuse punch
        a. 0.47

190 O 130 Head left
     R 130 Incuse punch
        a. 0.43

191 O 131 Head left
     R 131 Incuse punch
        a. 0.43
        b. 0.44

192 O 132 Head left
     R 131 Same die
        a. 0.44
        b. 0.44
        c. 0.43
        d. 0.42
        e. 0.41

193 O 133 Head left
     R 132 Incuse punch
        a. 0.43

194 O 134 Head left
     R 133 Incuse punch
        a. 0.37

195 O 135 Head left
     R 134 Incuse punch
        a. 0.34

196 O 136 Head left
     R 135 Incuse punch
        a. 0.30

Forty-eighths

1   O 1 Head right
     R 1 Incuse punch
         a. 0.19

2   O 2 Head right
     R 2 Incuse punch
         a. 0.20

3   O 3 Head right
     R 2 Same die
         a. 0.20

4   O 4 Head right
     R 3 Incuse punch
        *a. 0.17

5   O 5 Head right
     R 4 Incuse punch
        *a. 0.18

6   O 6 Head right
     R 5 Incuse punch
         a. 0.17

7   O 7 Head right
     R 6 Incuse punch
         a. 0.20

8   O 8 Head right
     R 7 Incuse punch
         a. 0.24

9   O 8 Same die
     R 8 Incuse punch
         a. 0.20

10   O 9 Head right
     R 9 Incuse punch
        *a. 0.20

11   O 9 Same die
     R 10 Incuse punch
         a. 0.21

12   O 10 Head right
     R 11 Incuse punch
         a. 0.22

13   O 11 Head right
     R 12 Incuse punch
         a. 0.17

14   O 12 Head right
     R 13 Incuse punch
        *a. 0.21

15   O 13 Head right
     R 14 Incuse punch
        *a. 0.20

16   O 14 Head right
     R 15 Incuse punch
         a. 0.18

17   O 15 Head right
     R 15 Same die
        *a. 0.21

18   O 16 Head right
     R 16 Incuse punch
         a. 0.21

19   O 17 Head left
     R 17 Incuse punch
         a. 0.22

20   O 18 Head left
     R 17 Same die
         a. 0.21

21   O 18 Same die
     R 18 Incuse punch
         a. 0.23

22   O 19 Head left
     R 18 Same die
         a. 0.22
        *b. 0.22

23   O 19 Same die
     R 19 Incuse punch
         a. 0.25

24   O 19 Same die
      R 20 Incuse punch
         a. 0.22
         *b. 0.22
         c. 0.22

25   O 19 Same die
      R 21 Incuse punch
         a. 0.21

26   O 20 Head left
      R 21 Same die
         a. 0.19

27   O 20 Same die
      R 22 Incuse punch
         a. 0.21

28   O 20 Same die
      R 23 Incuse punch
         a. 0.24
         b. 0.20
         c. 0.21

29   O 21 Head left
      R 23 Same die
         a. 0.22

30   O 21 Same die
      R 24 Incuse punch
         a. 0.21

31   O 21 Same die
      R 25 Incuse punch
         a. 0.19

32   O 21 Same die
      R 26 Incuse punch
         a. 0.20
         b. 0.21
         c. 0.21
         d. 0.21

33   O 21 Same die
      R 27 Incuse punch
         a. 0.21

34   O 21 Same die
      R 28 Incuse punch
         *a. 0.22

35   O 22 Head left
      R 28 Same die
         *a. 0.23

36   O 22 Same die
      R 29 Incuse punch
         a. 0.23

37   O 23 Head left
      R 28 Same die as 35
         *a. 0.21

38   O 24 Head left
      R 27 Same die as 33
         a. 0.22

39   O 24 Same die
      R 30 Incuse punch
         a. 0.20

40   O 24 Same die
      R 31 Incuse punch
         a. 0.22
         b. 0.20

41   O 24 Same die
      R 32 Incuse punch
         *a. 0.20

42   O 25 Head left
      R 32 Same die
         a. 0.17

43   O 26 Head left
      R 31 Same die as 40
         *a. 0.25

44   O 26 Same die
      R 33 Incuse punch
         a. 0.20

45   O 27 Head left
      R 34 Incuse punch
         a. 0.21

46 O 27 Same die
    R 35 Incuse punch
        a. 0.22

47 O 28 Head left
    R 35 Same die
        a. 0.22

48 O 28 Same die
    R 36 Incuse punch
        a. 0.21
        b. 0.20
        c. 0.22

49 O 29 Head left
    R 37 Incuse punch
        a. 0.20
        b. 0.20

50 O 29 Same die
    R 36 Same die as 48
        a. 0.19
        b. 0.17

51 O 30 Head left
    R 36 Same die
        a. 0.22

52 O 31 Head left
    R 36 Same die
        a. 0.23
        b. 0.23

53 O 32 Head left
    R 36 Same die
        a. 0.20

54 O 33 Head left
    R 36 Same die
        a. 0.22

55 O 34 Head left
    R 36 Same die
        a. 0.20

56 O 35 Head left
    R 36 Same die
        a. 0.22
        b. 0.21
        c. 0.20
        d. 0.21

57 O 35 Same die
    R 38 Incuse punch
        a. 0.21

58 O 36 Head left
    R 36 Same die as 56
        a. 0.21

59 O 36 Same die
    R 38 Same die as 57
        a. 0.21
        b. 0.21
        c. 0.20
        d. 0.19
        e. 0.19
        f. 0.20
        g. 0.23
        h. 0.21
        i. 0.22
        j. 0.21

60 O 37 Head left
    R 36 Same die as 58
        a. 0.19

61 O 37 Same die
    R 39 Incuse punch
        a. 0.20

62 O 37 Same die
    R 40 Incuse punch
        a. 0.19

63 O 38 Head left
    R 40 Same die
        a. 0.22

64　O　38 Same die
　　R　41 Incuse punch
　　　　a. 0.22

65　O　39 Head left
　　R　41 Same die
　　　　a. 0.20

66　O　40 Head left
　　R　36 Same die as 60
　　　　a. 0.19

67　O　40 Same die
　　R　42 Incuse punch
　　　　a. 0.20

68　O　40 Same die
　　R　43 Incuse punch
　　　　a. 0.22

69　O　40 Same die
　　R　44 Incuse punch
　　　　a. 0.22

70　O　40 Same die
　　R　45 Incuse punch
　　　　a. 0.20
　　　　b. 0.21

71　O　40 Same die
　　R　46 Incuse punch
　　　　a. 0.21
　　　　b. 0.21

72　O　41 Head left
　　R　44 Same die as 69
　　　　a. 0.20

73　O　42 Head left
　　R　44 Same die
　　　　a. 0.24

74　O　43 Head left
　　R　44 Same die
　　　　a. 0.20

75　O　44 Head left
　　R　44 Same die
　　　　a. 0.21
　　　　b. 0.21

76　O　44 Same die
　　R　47 Incuse punch
　　　　a. 0.22

77　O　44 Same die
　　R　48 Incuse punch
　　　　a. 0.20

78　O　44 Same die
　　R　49 Incuse punch
　　　　a. 0.17

79　O　44 Same die
　　R　45 Same die as 70
　　　　a. 0.21

80　O　45 Head left
　　R　48 Same die as 77
　　　　a. 0.17

81　O　46 Head left
　　R　48 Same die
　　　　a. 0.21

82　O　47 Head left
　　R　45 Same die as 79
　　　　a. 0.20

83　O　48 Head left
　　R　45 Same die
　　　　a. 0.23

84　O　49 Head left
　　R　45 Same die
　　　　a. 0.22

85　O　50 Head left
　　R　45 Same die
　　　　a. 0.21
　　　　b. 0.22

86   O 51 Head left
      R 45 Same die
         a. 0.20

87   O 52 Head left
      R 46 Incuse punch
         a. 0.22

88   O 52 Same die
      R 50 Incuse punch
         a. 0.20

89   O 52 Same die
      R 51 Incuse punch
         a. 0.20

90   O 52 Same die
      R 52 Incuse punch
         a. 0.22

91   O 53 Head left
      R 45 Same die as 86
         a. 0.22
         b. 0.20

92   O 53 Same die
      R 46 Same die as 87
         a. 0.20

93   O 53 Same die
      R 53 Incuse punch
         a. 0.20

94   O 53 Same die
      R 54 Incuse punch
         a. 0.20

95   O 53 Same die
      R 55 Incuse punch
         a. 0.21

96   O 54 Head left
      R 55 Same die
         a. 0.22

97   O 55 Head left
      R 55 Same die
         a. 0.23

98   O 55 Same die
      R 56 Incuse punch
         a. 0.22

99   O 56 Head left
      R 57 Incuse punch
         a. 0.21

100   O 56 Same die
      R 58 Incuse punch
         a. 0.21

101   O 56 Same die
      R 59 Incuse punch
         a. 0.21

102   O 57 Head left
      R 60 Incuse punch
         a. 0.20

103   O 58 Head left
      R 60 Same die
         a. 0.20

104   O 59 Head left
      R 59 Same die as 101
         a. 0.23
         b. 0.21

105   O 59 Same die
      R 60 Same die as 103
         a. 0.22

106   O 59 Same die
      R 61 Incuse punch
         a. 0.22

107   O 59 Same die
      R 62 Incuse punch
         a. 0.21

108   O 60 Head left
      R 61 Same die as 106
         a. 0.21

109   O 61 Head left
      R 60 Same die as 105
         a. 0.21

110   O 61 Same die
      R 63 Incuse punch
         a. 0.22

111   O 62 Head left
      R 60 Same die as 109
         a. 0.23

112   O 62 Same die
      R 63 Same die as 110
         a. 0.21
         b. 0.20

113   O 62 Same die
      R 64 Incuse punch
         a. 0.22

114   O 63 Head left
      R 60 Same die as 111
         a. 0.22

115   O 63 Same die
      R 61 Same die as 108
         a. 0.20

116   O 63 Same die
      R 62 Same die as 107
         a. 0.21

117   O 63 Same die
      R 64 Same die as 113
         a. 0.19

118   O 63 Same die
      R 65 Incuse punch
         a. 0.21

119   O 64 Head left
      R 66 Incuse punch
         a. 0.20

120   O 65 Head left
      R 66 Same die
         a. 0.21
         b. 0.21
         c. 0.20

121   O 66 Head left
      R 67 Incuse punch
         a. 0.20

122   O 67 Head left
      R 67 Same die
         a. 0.19
         b. 0.22

123   O 67 Same die
      R 68 Incuse punch
         a. 0.20

124   O 67 Same die
      R 69 Incuse punch
         a. 0.21

125   O 68 Head left
      R 70 Incuse punch
         a. 0.21

126   O 69 Head left
      R 70 Same die
         a. 0.21
         b. 0.22
         c. 0.21
         d. 0.19
         e. 0.22
         f. 0.21
         g. 0.20
         h. 0.21

127   O 70 Head left
      R 70 Same die
         a. 0.18

128   O 71 Head left
      R 70 Same die
         a. 0.21

129 O 72 Head left
     R 71 Incuse punch
        a. 0.18

130 O 72 Same die
     R 70 Same die as 128
        a. 0.22
        b. 0.20
        c. 0.22
        d. 0.20

131 O 73 Head left
     R 72 Incuse punch
        a. 0.20

132 O 73 Same die
     R 70 Same die as 130
        a. 0.21
        b. 0.21

133 O 74 Head left
     R 70 Same die
        a. 0.21
        *b. 0.20

134 O 75 Head left
     R 70 Same die
        a. 0.21
        b. 0.21

135 O 76 Head left
     R 70 Same die
        *a. 0.21
        b. 0.21
        c. 0.19

136 O 77 Head left
     R 70 Same die
        a. 0.21

137 O 78 Head left
     R 70 Same die
        *a. 0.21
        b. 0.19

138 O 79 Head left
     R 70 Same die
        a. 0.20
        b. 0.20

139 O 80 Head left
     R 70 Same die
        a. 0.22
        b. 0.21

140 O 81 Head left
     R 70 Same die
        a. 0.20

141 O 82 Head left
     R 70 Same die
        a. 0.20

142 O 83 Head left
     R 70 Same die
        a. 0.20
        b. 0.24

143 O 84 Head left
     R 70 Same die
        a. 0.20

144 O 85 Head left
     R 70 Same die
        a. 0.20

145 O 86 Head left
     R 70 Same die
        a. 0.20

146 O 86 Same die
     R 73 Incuse punch
        a. 0.21

147 O 86 Same die
     R 74 Incuse punch
        a. 0.21

148 O 87 Head left
     R 74 Same die
        a. 0.22

149   O   88 Head left
      R   74 Same die
          a. 0.21

150   O   89 Head left
      R   70 Same die as 145
          a. 0.20
          b. 0.20

151   O   89 Same die
      R   74 Same die as 149
          a. 0.20

152   O   89 Same die
      R   75 Incuse punch
          a. 0.20

153   O   89 Same die
      R   76 Incuse punch
          a. 0.21
          b. 0.21

154   O   90 Head left
      R   76 Same die
          a. 0.19
          b. 0.21

155   O   90 Same die
      R   77 Incuse punch
          a. 0.21

156   O   91 Head left
      R   78 Incuse punch
          a. 0.18

157   O   91 Same die
      R   79 Incuse punch
          a. 0.21
          b. 0.22
          c. 0.22
          d. 0.20
          e. 0.18
          f. 0.21
          g. 0.21
          h. 0.22

          i. 0.22
          j. 0.19

158   O   92 Head left
      R   79 Same die
          a. 0.20
          b. 0.20

159   O   92 Same die
      R   80 Incuse punch
          a. 0.22
          b. 0.22

160   O   93 Head left
      R   80 Same die
          a. 0.21

161   O   94 Head left
      R   80 Same die
          a. 0.18

162   O   95 Head left
      R   80 Same die
          a. 0.20

163   O   95 Same die
      R   81 Incuse punch
          a. 0.19

164   O   96 Head left
      R   81 Same die
          a. 0.20

165   O   97 Head left
      R   80 Same die as 162
          a. 0.22
          b. 0.20

166   O   97 Same die
      R   82 Incuse punch
          a. 0.20
          b. 0.21

167   O   97 Same die
      R   83 Incuse punch
          a. 0.18

168 O 97 Same die
     R 84 Incuse punch
        a. 0.21

169 O 98 Head left
     R 82 Same die as 166
        a. 0.20
        b. 0.21

170 O 99 Head left
     R 82 Same die
        a. 0.21

171 O 99 Same die
     R 85 Incuse punch
        a. 0.23

172 O 100 Head left
     R 86 Incuse punch
        a. 0.22
        b. 0.20

173 O 100 Same die
     R 87 Incuse punch
        a. 0.24

174 O 101 Head left
     R 87 Same die
        a. 0.21

175 O 102 Head left
     R 88 Incuse punch
        a. 0.21

176 O 102 Same die
     R 89 Incuse punch
        a. 0.21

177 O 103 Head left
     R 89 Same die
        a. 0.19

178 O 104 Head left
     R 88 Same die as 175
        a. 0.24
        b. 0.22
        c. 0.22

179 O 104 Same die
     R 90 Incuse punch
        a. 0.22

180 O 104 Same die
     R 91 Incuse punch
        a. 0.25

181 O 105 Head left
     R 91 Same die
        a. 0.21
        b. 0.20

182 O 106 Head left
     R 91 Same die
        a. 0.20

183 O 107 Head left
     R 91 Same die
        a. 0.22

184 O 107 Same die
     R 92 Incuse punch
        a. 0.21
        b. 0.22
        c. 0.20

185 O 107 Same die
     R 93 Incuse punch
        a. 0.22

186 O 108 Head left
     R 93 Same die
        a. 0.21

187 O 108 Same die
     R 92 Same die as 184
        a. 0.21

188 O 108 Same die
     R 91 Same die as 183
        a. 0.17

189 O 109 Head left
     R 92 Same die
        a. 0.19

190 O 110 Head left
     R 91 Same die
         a. 0.20

191 O 110 Same die
     R 94 Incuse punch
         *a. 0.22

192 O 110 Same die
     R 93 Incuse punch
         a. 0.21

193 O 111 Head left
     R 93 Same die
         a. 0.22
         b. 0.20

194 O 112 Head left
     R 93 Same die
         a. 0.19

195 O 113 Head left
     R 93 Same die
         a. 0.23
         b. 0.20

196 O 113 Same die
     R 95 Incuse punch
         a. 0.20

197 O 114 Head left
     R 95 Same die
         a. 0.21

198 O 115 Head left
     R 93 Incuse punch
         a. 0.20

199 O 115 Same die
     R 95 Same die as 197
         a. 0.24
         b. 0.23

200 O 116 Head left
     R 95 Same die
         a. 0.20

201 O 116 Same die
     R 96 Incuse punch
         a. 0.22

202 O 117 Head left
     R 97 Incuse punch
         a. 0.21

203 O 117 Same die
     R 98 Incuse punch
         a. 0.20

204 O 118 Head left
     R 98 Same die
         a. 0.20

205 O 118 Same die
     R 99 Incuse punch
         a. 0.26

206 O 118 Same die
     R 100 Incuse punch
         a. 0.22

207 O 118 Same die
     R 101 Incuse punch
         a. 0.21
         b. 0.21
         c. 0.20

208 O 119 Head left
     R 98 Same die as 204
         a. 0.21

209 O 119 Same die
     R 102 Incuse punch
         a. 0.22

210 O 119 Same die
     R 101 Same die as 207
         a. 0.18
         b. 0.19

211 O 120 Head left
     R 101 Same die
         a. 0.21

212 O 121 Head left
R 97 Incuse punch
a. 0.23

213 O 121 Same die
R 103 Incuse punch
a. 0.22

214 O 122 Head left
R 103 Same die
a. 0.22

215 O 122 Same die
R 104 Incuse punch
a. 0.20

216 O 122 Same die
R 105 Incuse punch
a. 0.25

217 O 123 Head left
R 105 Same die
a. 0.20

218 O 123 Same die
R 106 Incuse punch
a. 0.22

219 O 123 Same die
R 107 Incuse punch
a. 0.20
b. 0.21

220 O 124 Head left
R 108 Incuse punch
a. 0.22

221 O 125 Head left
R 108 Same die
a. 0.20

222 O 126 Head left
R 107 Same die as 219
a. 0.19

223 O 126 Same die
R 108 Same die as 221
a. 0.20

224 O 126 Same die
R 109 Incuse punch
a. 0.21

225 O 127 Head left
R 109 Same die
a. 0.21

226 O 127 Same die
R 110 Incuse punch
a. 0.21

227 O 127 Same die
R 111 Incuse punch
a. 0.20

228 O 128 Head left
R 111 Same die
a. 0.21

229 O 129 Head left
R 111 Same die
a. 0.21

230 O 129 Same die
R 112 Incuse punch
a. 0.20

231 O 129 Same die
R 113 Incuse punch
a. 0.19
b. 0.22

232 O 129 Same die
R 114 Incuse punch
a. 0.23

233 O 130 Head left
R 114 Same die
a. 0.20

234 O 131 Head left
  R 111 Incuse punch
   a. 0.21

235 O 131 Same die
  R 115 Incuse punch
   a. 0.22

236 O 131 Same die
  R 116 Incuse punch
   a. 0.21

237 O 131 Same die
  R 117 Incuse punch
   a. 0.22

238 O 131 Same die
  R 118 Incuse punch
   a. 0.21

239 O 131 Same die
  R 119 Incuse punch
   a. 0.21

240 O 132 Head left
  R 117 Same die as 237
   a. 0.21
   b. 0.22

241 O 132 Same die
  R 118 Same die as 238
   a. 0.22

242 O 132 Same die
  R 120 Incuse punch
   a. 0.20

243 O 132 Same die
  R 119 Same die as 239
   a. 0.23

244 O 133 Head left
  R 119 Same die
   a. 0.23

245 O 134 Head left
  R 119 Same die
   a. 0.22

246 O 134 Same die
  R 121 Incuse punch
   a. 0.21

247 O 135 Head left
  R 122 Incuse punch
   a. 0.20

248 O 136 Head left
  R 122 Incuse punch
   a. 0.21
   b. 0.21

249 O 137 Head left
  R 123 Incuse punch
   a. 0.20
   b. 0.19

250 O 138 Head left
  R 124 Incuse punch
   a. 0.19

251 O 138 Same die
  R 125 Incuse punch
   a. 0.22

252 O 138 Same die
  R 126 Incuse punch
   a. 0.20

253 O 139 Head left
  R 126 Same die
   a. 0.20

254 O 139 Same die
  R 127 Incuse punch
   a. 0.21
   b. 0.22

255 O 140 Head left
  R 127 Same die
   a. 0.21

256   O   141 Head left
      R   127 Same die
        a. 0.23

257   O   141 Same die
      R   126 Same die as 253
        a. 0.22

258   O   141 Same die
      R   128 Incuse punch
        a. 0.19

259   O   141 Same die
      R   129 Incuse punch
        a. 0.21

260   O   142 Head left
      R   127 Same die as 256
        a. 0.20

261   O   142 Same die
      R   129 Same die as 259
        a. 0.22

262   O   142 Same die
      R   130 Incuse punch
        a. 0.23

263   O   143 Head left
      R   127 Same die as 260
        a. 0.23
        b. 0.20
        c. 0.22

264   O   143 Same die
      R   131 Incuse punch
        a. 0.20

265   O   143 Same die
      R   132 Incuse punch
        a. 0.21
        b. 0.19

266   O   143 Same die
      R   133 Incuse punch
        a. 0.20

267   O   144 Head left
      R   127 Incuse punch
        *a. 0.23

268   O   144 Same die
      R   132 Same die as 265
        a. 0.21
        b. 0.22
        c. 0.21

269   O   144 Same die
      R   134 Incuse punch
        a. 0.20

270   O   145 Head left
      R   127 Same die as 267
        a. 0.20
        b. 0.20

271   O   145 Same die
      R   132 Same die as 268
        a. 0.23

272   O   145 Same die
      R   135 Incuse punch
        a. 0.22

273   O   145 Same die
      R   136 Incuse punch
        a. 0.21

274   O   145 Same die
      R   137 Incuse punch
        a. 0.22
        b. 0.21

275   O   146 Head left
      R   127 Same die as 270
        a. 0.22

276   O   146 Same die
      R   136 Same die as 273
        a. 0.23

277 O 146 Same die
     R 133 Same die as 274
        a. 0.22
        b. 0.22
        c. 0.21
        d. 0.22
        e. 0.20

278 O 146 Same die
     R 138 Incuse punch
        a. 0.22

279 O 146 Same die
     R 138 Incuse punch
        a. 0.20

280 O 147 Head left
     R 127 Same die as 275
        a. 0.18
        b. 0.21

281 O 147 Same die
     R 131 Same die as 277
        a. 0.20

282 O 147 Same die
     R 139 Incuse punch
        a. 0.20

283 O 148 Head left
     R 140 Incuse punch
        a. 0.21

284 O 149 Head left
     R 140 Same die
        a. 0.23

285 O 149 Same die
     R 141 Incuse punch
        a. 0.23

286 O 150 Head left
     R 141 Same die
        a. 0.18
        b. 0.19

287 O 151 Head left
     R 141 Same die
        *a. 0.21

288 O 152 Head left
     R 142 Incuse punch
        a. 0.22

289 O 153 Head left
     R 142 Same die
        a. 0.20
        b. 0.22

290 O 153 Same die
     R 143 Incuse punch
        *a. 0.21

291 O 154 Head left
     R 143 Same die
        *a. 0.21

292 O 155 Head left
     R 142 Same die as 289
        a. 0.22

293 O 156 Head left
     R 144 Incuse punch
        *a. 0.22

294 O 157 Head left
     R 145 Incuse punch
        a. 0.23
        b. 0.21
        c. 0.22
        d. 0.21
        e. 0.23

295 O 158 Head left
     R 145 Same die
        a. 0.21
        b. 0.20
        c. 0.21

296 O 159 Head left
     R 145 Same die
        a. 0.19

297 O 159 Same die
     R 146 Incuse punch
           a. 0.20
           b. 0.20
           c. 0.22

298 O 160 Head left
     R 146 Incuse punch
           a. 0.21
           b. 0.20
           c. 0.19

299 O 160 Same die
     R 147 Incuse punch
           a. 0.20

300 O 161 Head left
     R 148 Incuse punch
           a. 0.17

301 O 162 Head left
     R 149 Incuse punch
           a. 0.18

302 O 163 Head left
     R 150 Incuse punch
           a. 0.17

303 O 164 Head left
     R 150 Same die
           a. 0.20

304 O 165 Head left
     R 150 Same die
           a. 0.23

305 O 166 Head left
     R 151 Incuse punch
           a. 0.19

306 O 166 Same die
     R 152 Incuse punch
           a. 0.18
           b. 0.18
           c. 0.24

307 O 167 Head left
     R 153 Incuse punch
           a. 0.21

308 O 168 Head left
     R 154 Incuse punch
           a. 0.20

309 O 169 Head left
     R 154 Same die
           a. 0.19

310 O 169 Same die
     R 155 Incuse punch
           a. 0.22

311 O 169 Same die
     R 156 Incuse punch
           a. 0.23

312 O 169 Same die
     R 157 Incuse punch
           a. 0.25

313 O 170 Head left
     R 158 Incuse punch
           a. 0.20

314 O 171 Head left
     R 159 Incuse punch
           a. 0.21

315 O 171 Same die
     R 160 Incuse punch
           a. 0.19

316 O 172 Head left
     R 160 Same die
           a. 0.22

317 O 173 Head left
     R 161 Incuse punch
           a. 0.21

318 O 174 Head left
     R 162 Incuse punch
           a. 0.20

319   O 174 Same die
      R 163 Incuse punch
         a. 0.20

320   O 175 Head left
      R 164 Incuse punch
         a. 0.21

321   O 176 Head left
      R 164 Same die
         a. 0.19

322   O 176 Same die
      R 165 Incuse punch
         a. 0.20

323   O 177 Head left
      R 165 Same die
         a. 0.21
         b. 0.21
         c. 0.22

324   O 178 Head left
      R 166 Incuse punch
         a. 0.18

325   O 179 Head left
      R 166 Same die
         a. 0.23

326   O 180 Head left
      R 167 Incuse punch
         a. 0.19

327   O 181 Head left
      R 168 Incuse punch
         a. 0.22

328   O 181 Same die
      R 169 Incuse punch
         a. 0.23

329   O 181 Same die
      R 170 Incuse punch
         a. 0.21

330   O 182 Head left
      R 171 Incuse punch
         a. 0.23

331   O 183 Head left
      R 172 Incuse punch
         a. 0.23

332   O 184 Head left
      R 172 Same die
         a. 0.19

333   O 184 Same die
      R 173 Incuse punch
         a. 0.19
         b. 0.18

334   O 184 Same die
      R 174 Incuse punch
         a. 0.19

335   O 184 Same die
      R 175 Incuse punch
         a. 0.18
         b. 0.20

336   O 185 Head left
      R 176 Incuse punch
         a. 0.23
         b. 0.20
         c. 0.22

337   O 185 Same die
      R 177 Incuse punch
         a. 0.20

338   O 185 Same die
      R 178 Incuse punch
         a. 0.23

339   O 186 Head left
      R 179 Incuse punch
         a. 0.17

340   O   186 Same die
      R   180 Incuse punch
          *a. 0.17

341   O   186 Same die
      R   181 Incuse punch
          a. 0.17

342   O   187 Head left
      R   182 Incuse punch
          a. 0.18

343   O   188 Head left
      R   182 Incuse punch
          a. 0.17

344   O   189 Head left
      R   183 Incuse punch
          a. 0.19

345   O   190 Head left
      R   184 Incuse punch
          a. 0.21

346   O   190 Same die
      R   185 Incuse punch
          *a. 0.22

347   O   191 Head left
      R   186 Incuse punch
          a. 0.20

348   O   191 Same die
      R   187 Incuse punch
          *a. 0.21

349   O   192 Head left
      R   188 Incuse punch
          a. 0.23

350   O   192 Same die
      R   189 Incuse punch
          a. 0.20

351   O   193 Head left
      R   190 Incuse punch
          a. 0.19
          b. 0.19

352   O   194 Head left
      R   191 Incuse punch
          a. 0.20
          b. 0.19

353   O   195 Head left
      R   192 Incuse punch
          a. 0.20

354   O   196 Head left
      R   192 Same die
          a. 0.21

355   O   196 Same die
      R   193 Incuse punch
          a. 0.20

356   O   196 Same die
      R   194 Incuse punch
          a. 0.18

357   O   197 Head left
      R   195 Incuse punch
          a. 0.19

358   O   198 Head left
      R   196 Incuse punch
          a. 0.20

359   O   199 Head left
      R   197 Incuse punch
          a. 0.19

360   O   200 Head left
      R   198 Incuse punch
          a. 0.18
          b. 0.20

361   O   201 Head left
      R   199 Incuse punch
          a. 0.20

362 O 202 Head left
    R 200 Incuse punch
      a. 0.21

363 O 203 Head left
    R 201 Incuse punch
      a. 0.23

364 O 204 Head left
    R 202 Incuse punch
      a. 0.16

365 O 205 Head left
    R 203 Incuse punch
      a. 0.19

366 O 206 Head left
    R 204 Incuse punch
      a. 0.18

367 O 207 Head left
    R 205 Incuse punch
      a. 0.21

368 O 208 Head left
    R 206 Incuse punch
      a. 0.20

369 O 209 Head left
    R 207 Incuse punch
      a. 0.18

370 O 210 Head left
    R 208 Incuse punch
      a. 0.26

371 O 211 Head left
    R 209 Incuse punch
      a. 0.20

372 O 211 Same die
    R 210 Incuse punch
      a. 0.19

373 O 212 Head left
    R 211 Incuse punch
      a. 0.22

374 O 213 Head left
    R 212 Incuse punch
      a. 0.21

375 O 214 Head left
    R 213 Incuse punch
      a. 0.19

376 O 215 Head left
    R 213 Same die
      a. 0.15

377 O 215 Same die
    R 214 Incuse punch
      a. 0.20

378 O 216 Head left
    R 215 Incuse punch
      a. 0.17

379 O 217 Head left
    R 216 Incuse punch
      a. 0.21

380 O 218 Head left
    R 217 Incuse punch
      a. 0.19

381 O 219 Head left
    R 217 Same die
      a. 0.15

382 O 220 Head left
    R 218 Incuse punch
      a. 0.19

383 O 221 Head left
    R 219 Incuse punch
      *a. 0.19

384 O 222 Head left
    R 220 Incuse punch
      a. 0.21

385 O 222 Same die
    R 221 Incuse punch
      a. 0.21

386 O 223 Head left
    R 222 Incuse punch
      a. 0.18

387 O 224 Head left
    R 223 Incuse punch
      a. 0.18

388 O 225 Head left
    R 223 Same die
      a. 0.21

389 O 226 Head left
    R 224 Incuse punch
      *a. 0.19

390 O 227 Head left
    R 225 Incuse punch
      a. 0.22

391 O 228 Head left
    R 226 Incuse punch
      a. 0.26

392 O 229 Head left
    R 227 Incuse punch
      a. 0.24

393 O 230 Head left
    R 228 Incuse punch
      a. 0.20

394 O 231 Head left
    R 229 Incuse punch
      a. 0.20

395 O 232 Head left
    R 230 Incuse punch
      *a. 0.22

396 O 233 Head left
    R 231 Incuse punch
      a. 0.22

397 O 234 Head left
    R 232 Incuse punch
      a. 0.16

398 O 235 Head left
    R 233 Incuse punch
      a. 0.20

399 O 236 Head left
    R 234 Incuse punch
      a. 0.20

400 O 236 Same die
    R 235 Incuse punch
      a. 0.21

401 O 237 Head left
    R 236 Incuse punch
      a. 0.22

402 O 238 Head left
    R 237 Incuse punch
      a. 0.21

403 O 239 Head left
    R 238 Incuse punch
      a. 0.21

404 O 240 Head left
    R 239 Incuse punch
      a. 0.14

405 O 241 Head left
    R 240 Incuse punch
      a. 0.20

406 O 242 Head left
    R 241 Incuse punch
      a. 0.21

407 O 243 Head left
    R 242 Incuse punch
      a. 0.19

408 O 244 Head left
    R 243 Incuse punch
      a. 0.21

409 O 245 Head left
    R 244 Incuse punch
      a. 0.17

410 O 246 Head left
     R 245 Incuse punch
        a. 0.19

411 O 247 Head left
     R 246 Incuse punch
        a. 0.21

412 O 247 Same die
     R 247 Incuse punch
        a. 0.22

413 O 248 Head left
     R 247 Same die
        a. 0.22

414 O 249 Head left
     R 248 Incuse punch
        a. 0.21

415 O 249 Head left
     R 249 Incuse punch
        a. 0.20

416 O 250 Head left
     R 250 Incuse punch
        a. 0.18

417 O 251 Head left
     R 251 Incuse punch
        a. 0.18

418 O 252 Head left
     R 253 Incuse punch
        a. 0.20

419 O 253 Head left
     R 253 Incuse punch
        a. 0.22

420 O 254 Head left
     R 254 Incuse punch
        a. 0.17

421 O 254 Same die
     R 255 Incuse punch
        a. 0.20

422 O 254 Same die
     R 256 Incuse punch
        a. 0.20

423 O 254 Same die
     R 257 Incuse punch
        a. 0.20

424 O 255 Head left
     R 258 Incuse punch
        a. 0.20
        b. 0.23

425 O 257 Head left
     R 259 Incuse punch
        a. 0.21 Not illustrated

426 O 258 Head left
     R 260 Incuse punch
        a. 0.20 Not illustrated

Plate 12

1   2   3A   3B   4

5   6   7   8   9

10   11   12   13   14   15

16   17   18   19   20   21

22   23   24   25   26   27   28

29   30   31   32   33   34   35

36   37   38   39   40   41   43   44

45   46   47   48   49   50   51   52
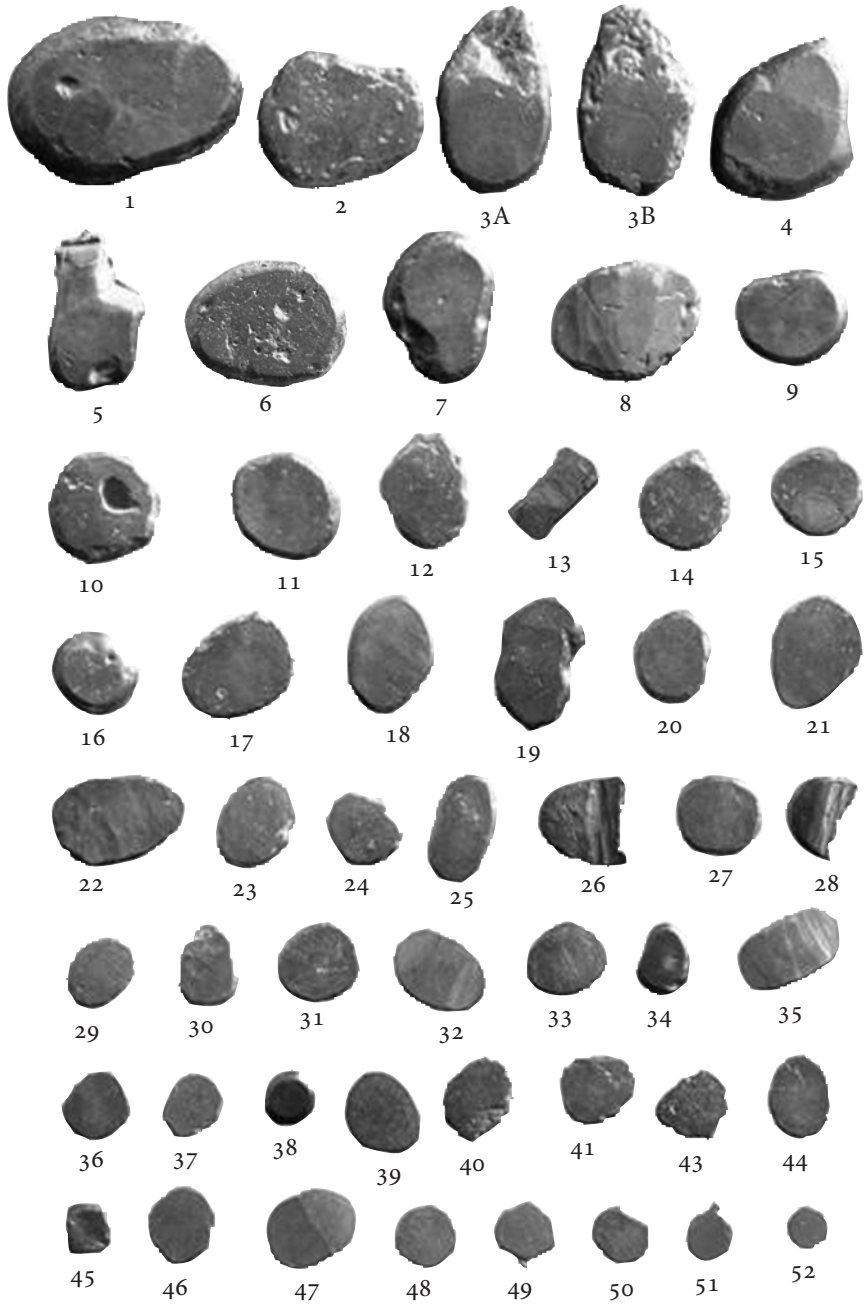
A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 13

53

54

55

56

57

58

59

60

61

62

63

64

65

66a

66b

67

68

69

70

71

72

73

74

75

76

77

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 14

Twelfth

O1

1

R1

Twenty-fourths

O1	O2	O3	O3	O3	O3	O3	O4
1	2	3	4	5a	5b	5c	6
R1	R2	R3	R4	R5	R5	R5	R5

O4	O4	O4	O4	O4	O5	O6	O7
7	8	9	10	11	12	13	14
R6	R7	R8	R9	R10	R10	R11	R11

O8	O9	O10	O11	O11	O11	O12	O13
15	16	17	18a	18b	19	20	21
R12	R13	R14	R14	R14	R15	R16	R17

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 15

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 16

O32	O32	O32	O32	O33	O33	O34	O35
54d	54e	54f	54g	55a	55b	56	57a
R43	R43	R43	R43	R43	R43	R43	R43

O35	O35	O36	O36	O36	O35	O35	O35
57b	57c	58a	58b	59	60a	60b	60c
R43	R43	R43	R43	R44	R44	R44	R44

O35	O37	O37	O37	O37	O38	O38	O38
60d	61a	61b	61c	61d	62a	62b	62c
R44	R45	R45	R45	R45	R45	R45	R45

O38	O38	O38	O38	O38	O38	O38	O38
62d	62e	62f	62g	62h	62i	62j	62k
R45	R45	R45	R45	R45	R45	R45	R45

O38	O38	O38	O38	O38	O39	O39	O39
62l	62m	62n	62o	62p	63a	63b	63c
R45	R45	R45	R45	R45	R45	R45	R45

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 17

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 18

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 19

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 20

O75	O76	O76	O76	O76	O76	O77	O77
112	113a	113b	114	115a	115b	116a	116b
R72	R72	R72	R73	R74	R74	R74	R74

O77	O76	O78	O78	O79	O80	O80	O80
116c	117	118a	118b	119	120	121a	121b
R74	R75	R75	R75	R75	R76	R77	R77

O80	O81	O81	O81	O81	O82	O83	O83
122	123	124a	124b	125	126	127a	127b
R78	R79	R80	R80	R81	R82	R83	R83

O84	O84	O85	O85	O85	O85	O86	O86
128	129	130	131a	131b	131c	132	133
R83	R84	R85	R86	R86	R86	R86	R87

O87	O88	O89	O90	O91	O91	O91	O91
134	135	136	137	138a	138b	138c	138d
R88	R89	R89	R90	R91	R91	R91	R91

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 21

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 22

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 23

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 24

Forty-eights

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 25

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 26

O42	O43	O44	O44	O44	O44	O44	O44	O45	O46
73	74	75a	75b	76	77	78	79	80	81
R44	R44	R44	R44	R47	R48	R49	R45	R48	R48

O47	O48	O49	O50	O50	O51	O52	O52	O52	O52
82	83	84	85a	85b	86	87	88	89	90
R45	R45	R45	R45	R45	R45	R46	R50	R51	R52

O53	O53	O53	O53	O53	O53	O54	O55	O55	O56
91a	91b	92	93	94	95	96	97	98	99
R45	R45	R46	R53	R54	R55	R55	R55	R56	R57

O56	O56	O57	O58	O59	O59	O59	O59	O59	O60
100	101	102	103	104a	104b	105	106	107	108
R58	R59	R60	R60	R59	R59	R60	R61	R62	R61

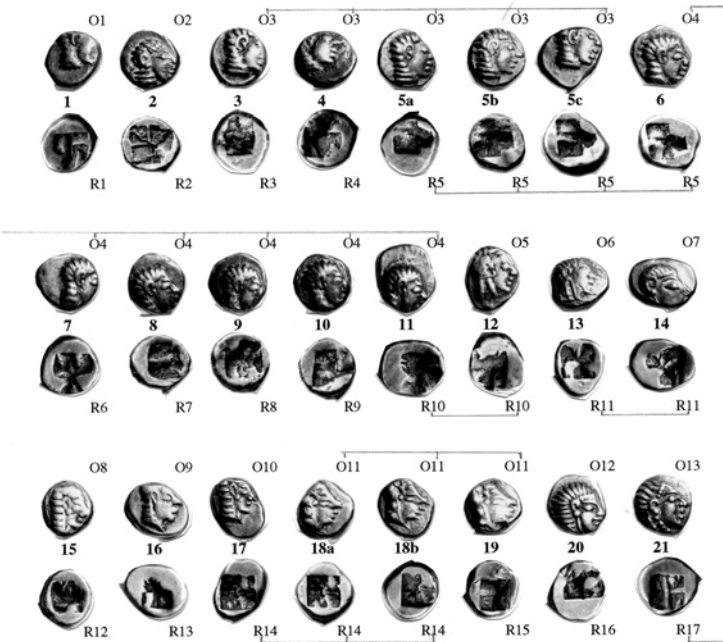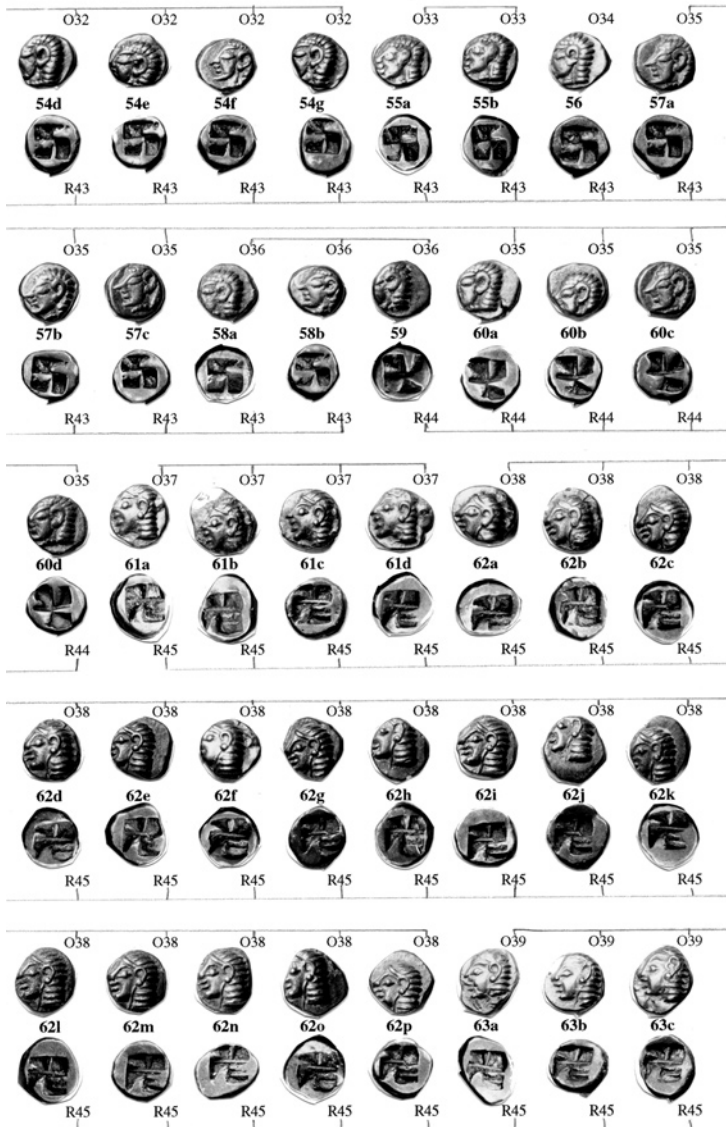| O61 | O61 | O62 | O62 | O62 | O62 | O63 | O63 | O63 | O63 |
| 109 | 110 | 111 | 112a | 112b | 113 | 114 | 115 | 116 | 117 |
| R60 | R63 | R60 | R63 | R63 | R64 | R60 | R61 | R62 | R64 |

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 27

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 28

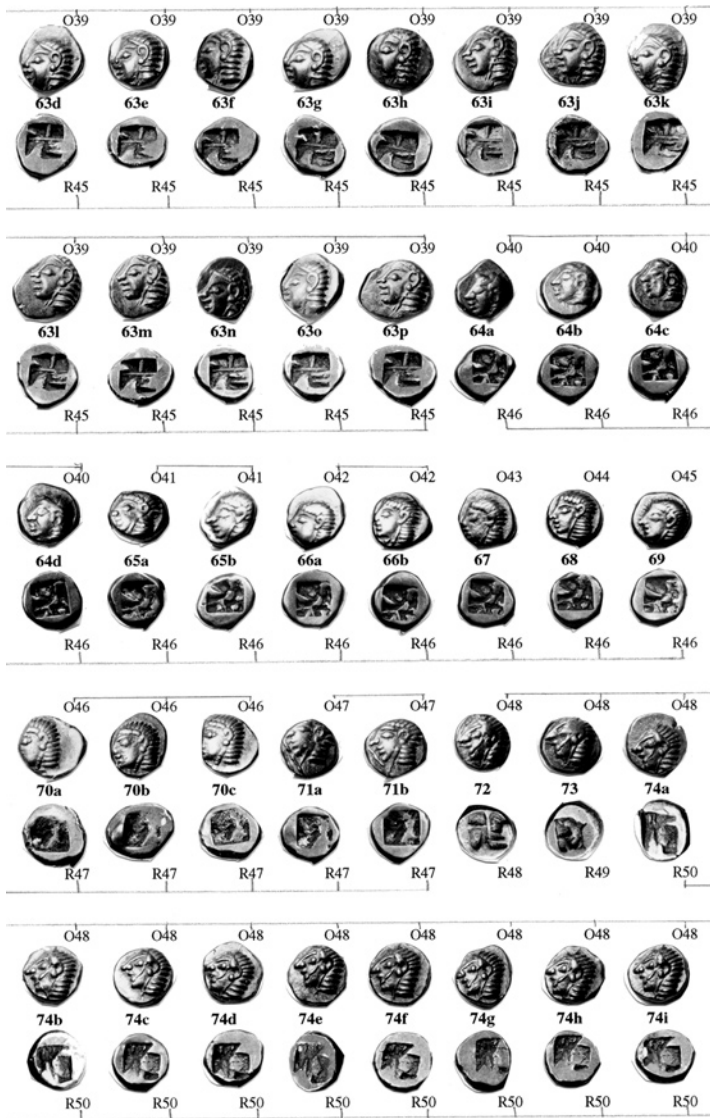| O86	O86	O87	O88	O89	O89	O89	O89	O89	O89
146	147	148	149	150a	150b	151	152	153a	153b
R73	R74	R74	R74	R70	R70	R74	R75	R76	R76

O90	O90	O90	O91	O91	O91	O91	O91	O91	O91
154a	154b	155	156	157a	157b	157c	157d	157e	157f
R76	R76	R77	R78	R79	R79	R79	R79	R79	R79

O91	O91	O91	O91	O92	O92	O92	O92	O93	O94
157g	157h	157i	157j	158a	158b	159a	159b	160	161
R79	R79	R79	R79	R79	R79	R80	R80	R80	R80

O95	O95	O96	O97	O97	O97	O97	O97	O97	O98
162	163	164	165a	165b	166a	166b	167	168	169a
R80	R81	R81	R80	R80	R82	R82	R83	R84	R82

O98	O99	O99	O100	O100	O100	O101	O102	O102	O103
169b	170	171	172a	172b	173	174	175	176	177
R82	R82	R85	R86	R86	R87	R87	R88	R89	R89

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 29

O104	O104	O104	O104	O104	O105	O105	O106	O107	O107
178a	178b	178c	179	180	181a	181b	182	183	184a
R88	R88	R88	R90	R91	R91	R91	R91	R91	R92

O107	O107	O107	O108	O108	O108	O109	O110	O110	O110
184b	184c	185	186	187	188	189	190	191	192
R92	R92	R93	R93	R92	R91	R92	R91	R94	R93

O111	O111	O112	O113	O113	O113	O114	O115	O115	O115
193a	193b	194	195a	195b	196	197	198	199a	199b
R93	R93	R93	R93	R93	R95	R95	R93	R95	R95

O116	O116	O117	O117	O118	O118	O118	O118	O118	O118
200	201	202	203	204	205	206	207a	207b	207c
R95	R96	R97	R98	R98	R99	R100	R101	R101	R101

O119	O119	O119	O119	O120	O121	O121	O122	O122	O122
208	209	210a	210b	211	212	213	214	215	216
R98	R102	R101	R101	R101	R97	R103	R103	R104	R105

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 30

O123	O123	O123	O123	O124	O125	O126	O126	O126	O127
217	218	219a	219b	220	221	222	223	224	225
R105	R106	R107	R107	R108	R108	R107	R108	R109	R109

O127	O127	O128	O129	O129	O129	O129	O129	O130	O131
226	227	228	229	230	231a	231b	232	233	234
R110	R111	R111	R111	R112	R113	R113	R114	R114	R111

O131	O131	O131	O131	O131	O132	O132	O132	O132	O132
235	236	237	238	239	240a	240b	241	242	243
R115	R116	R117	R118	R119	R117	R117	R118	R120	R119

O133	O134	O134	O135	O136	O136	O137	O137	O138	O138
244	245	246	247	248a	248b	249a	249b	250	251
R119	R119	R121	R122	R122	R122	R123	R123	R124	R125

O138	O139	O139	O139	O140	O141	O141	O141	O141	O142
252	253	254a	254b	255	256	257	258	259	260
R126	R126	R127	R127	R127	R127	R126	R128	R129	R127

A Hoard of Archaic Coins of Colophon and Unminted Silver
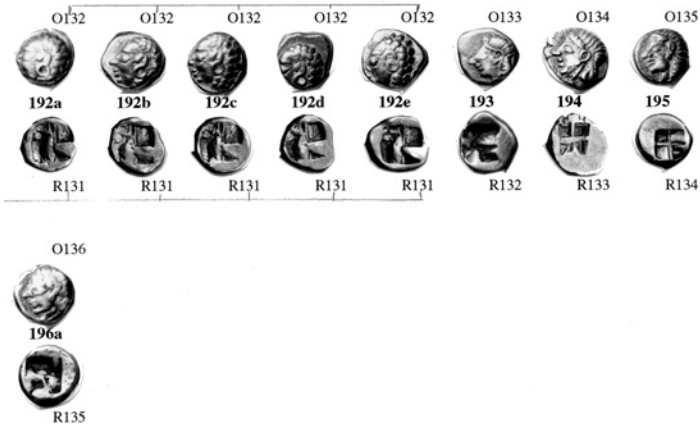
Plate 31
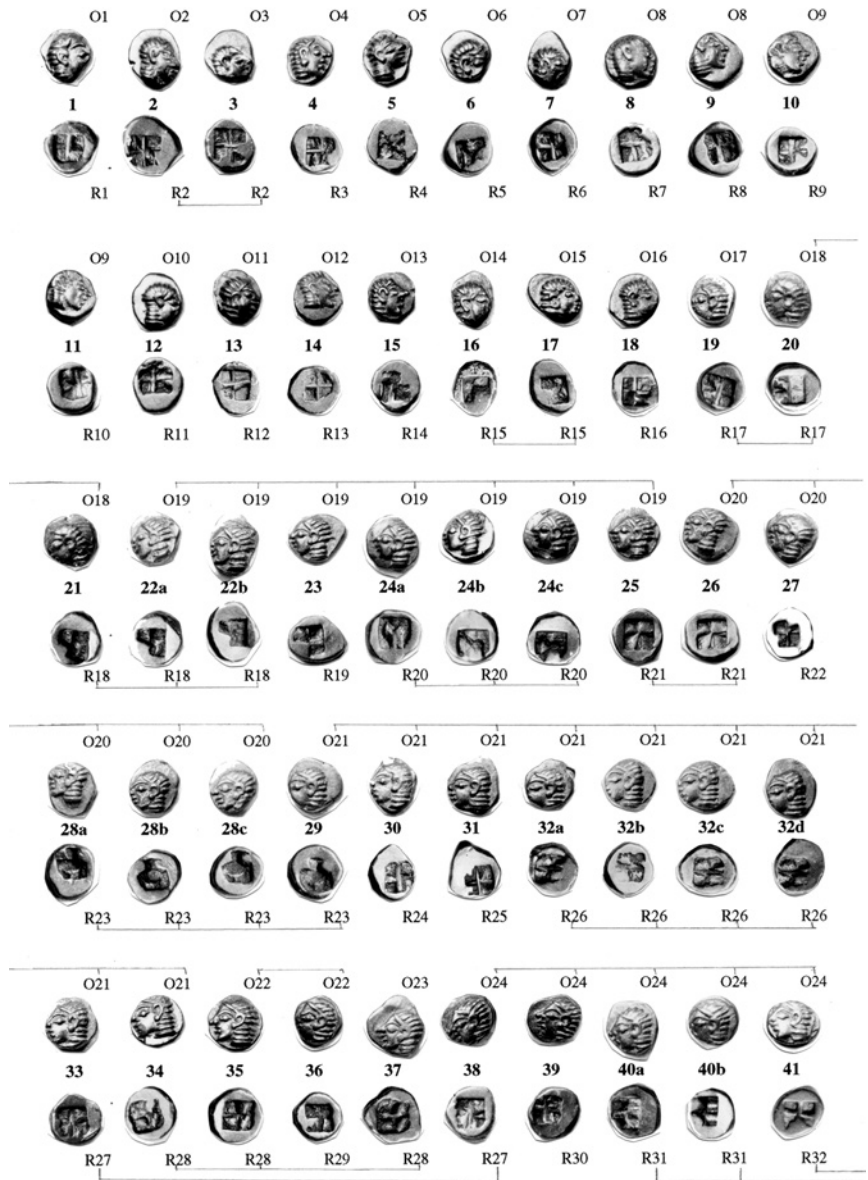

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 32

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 33

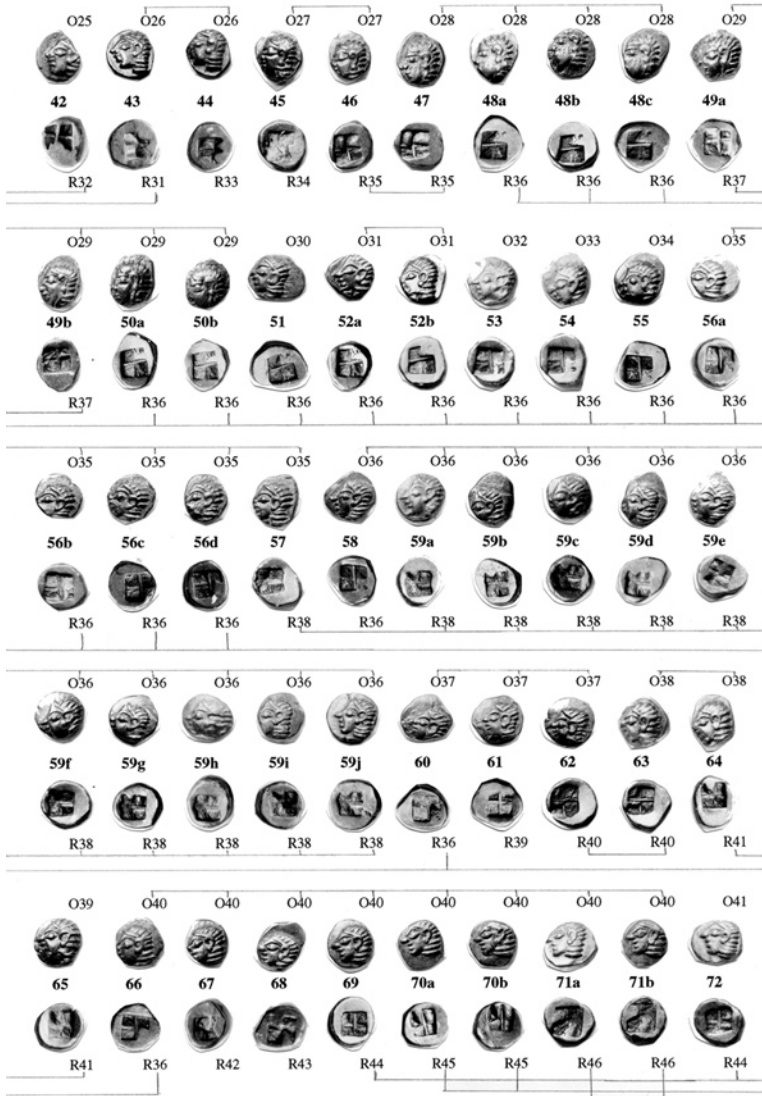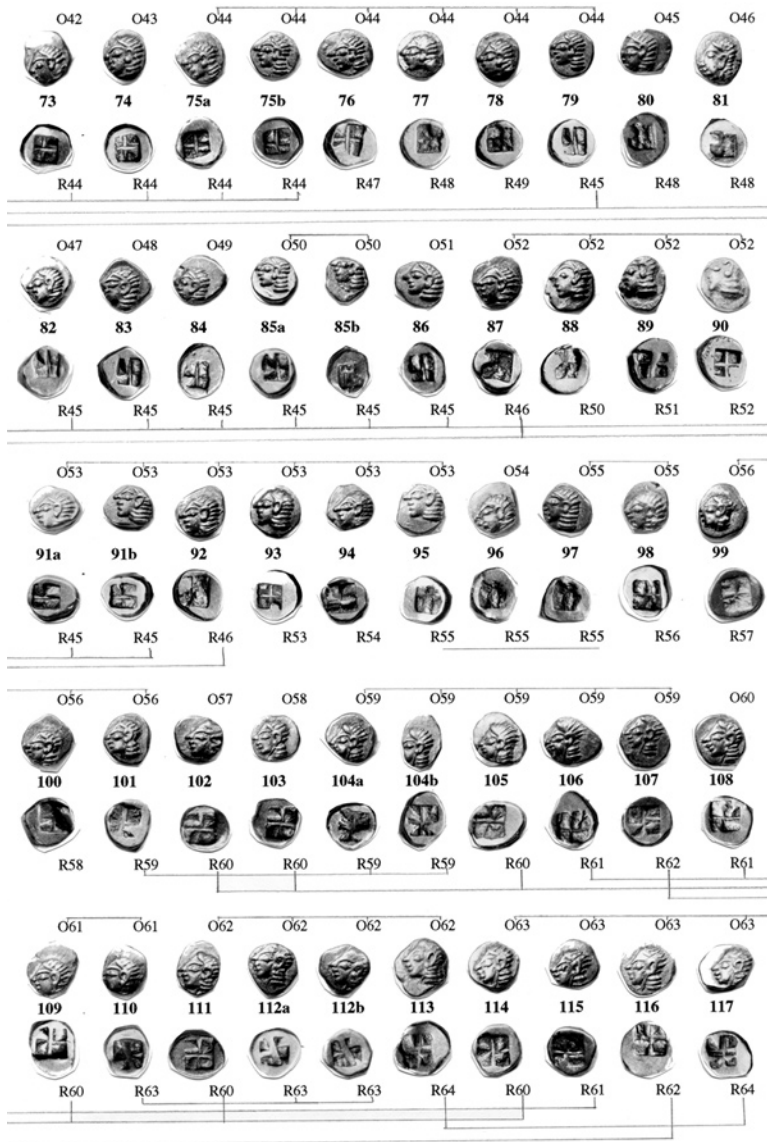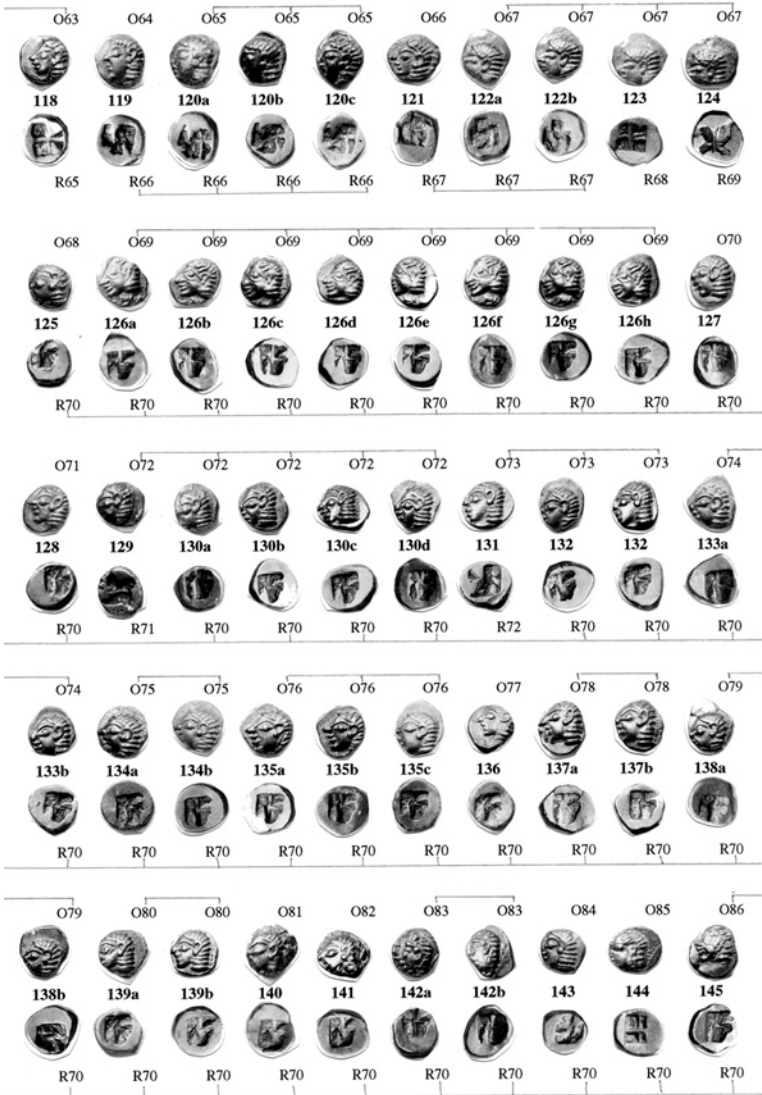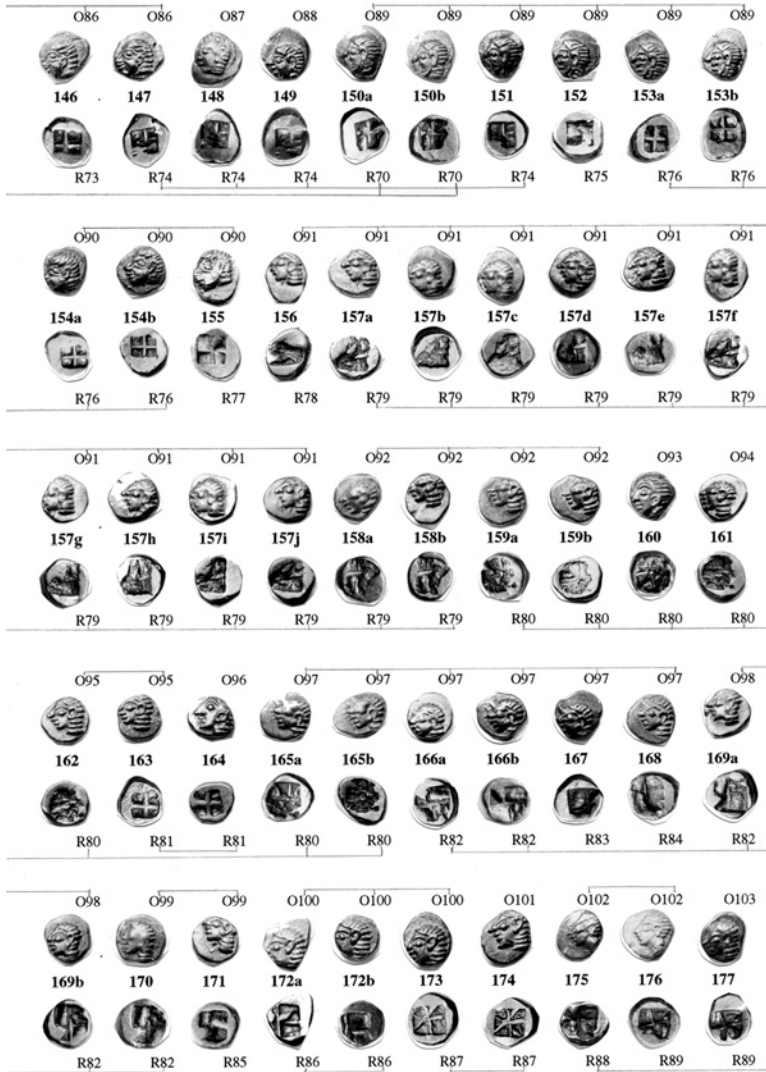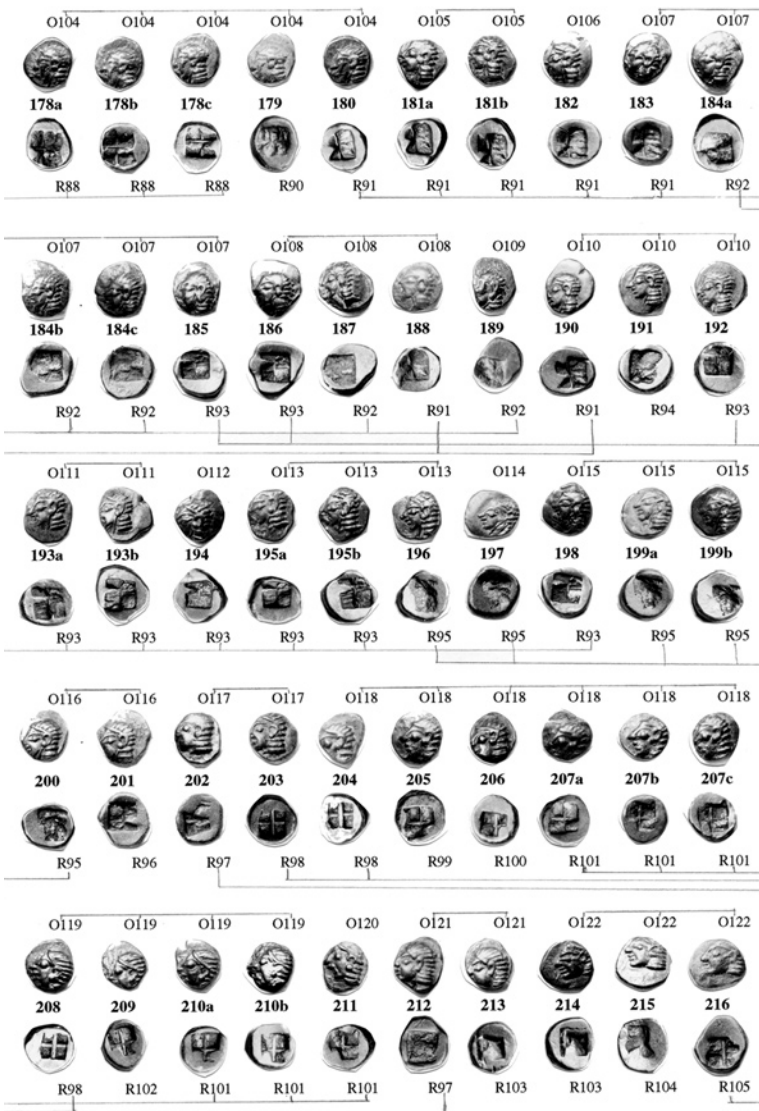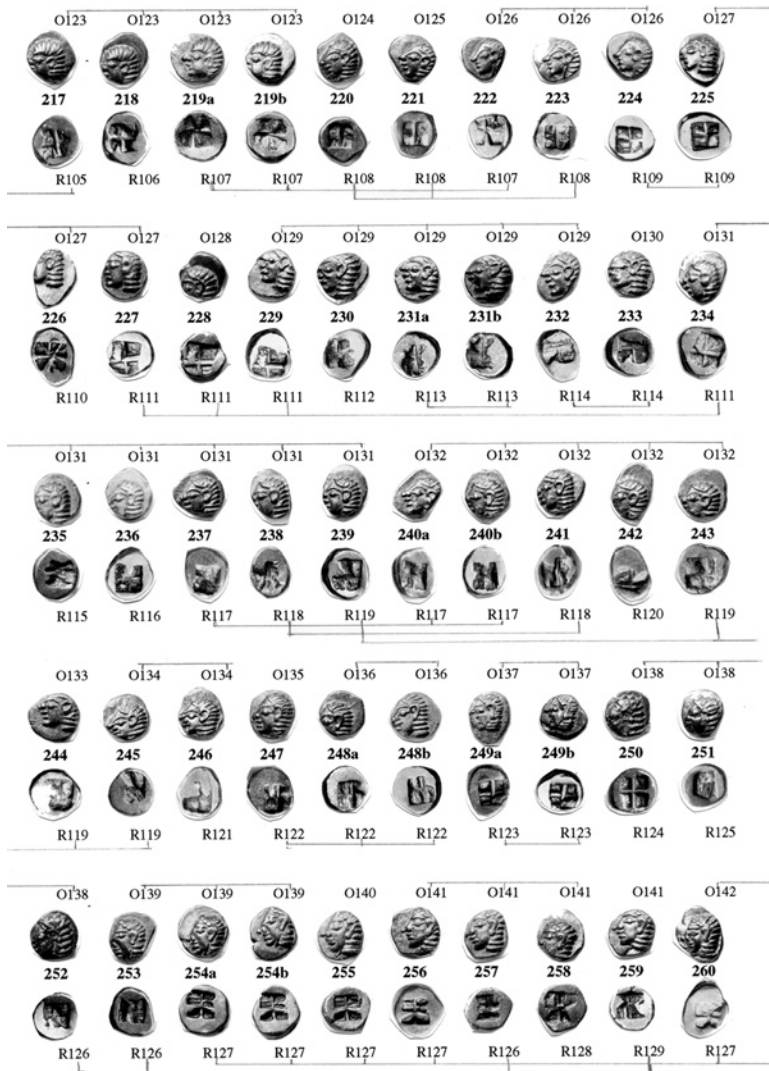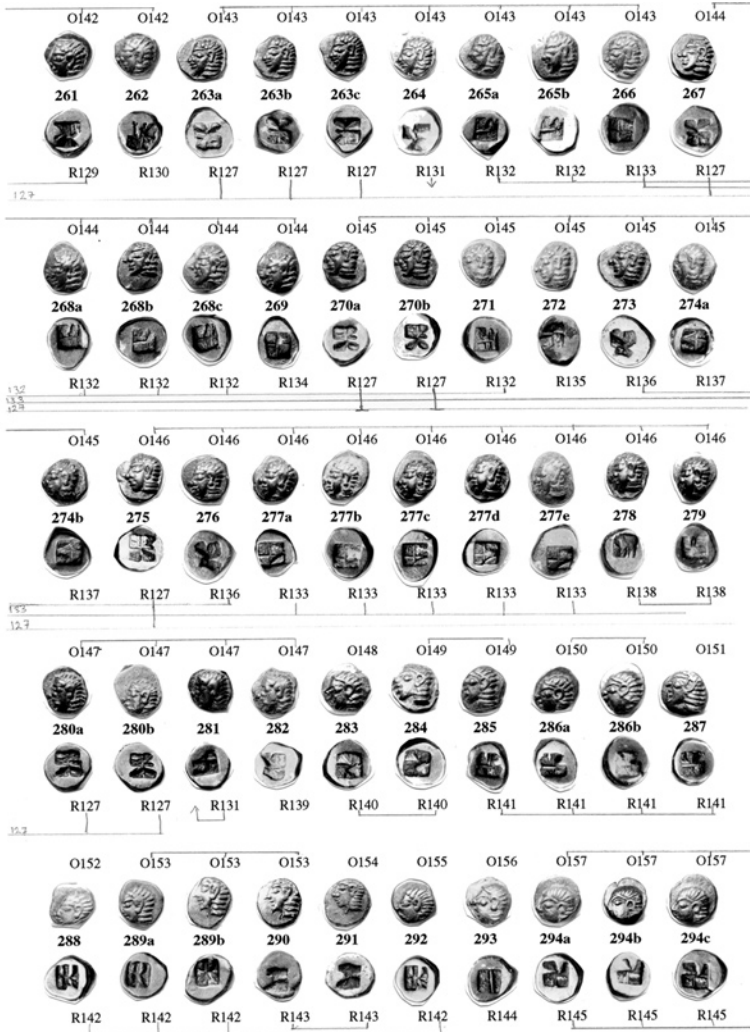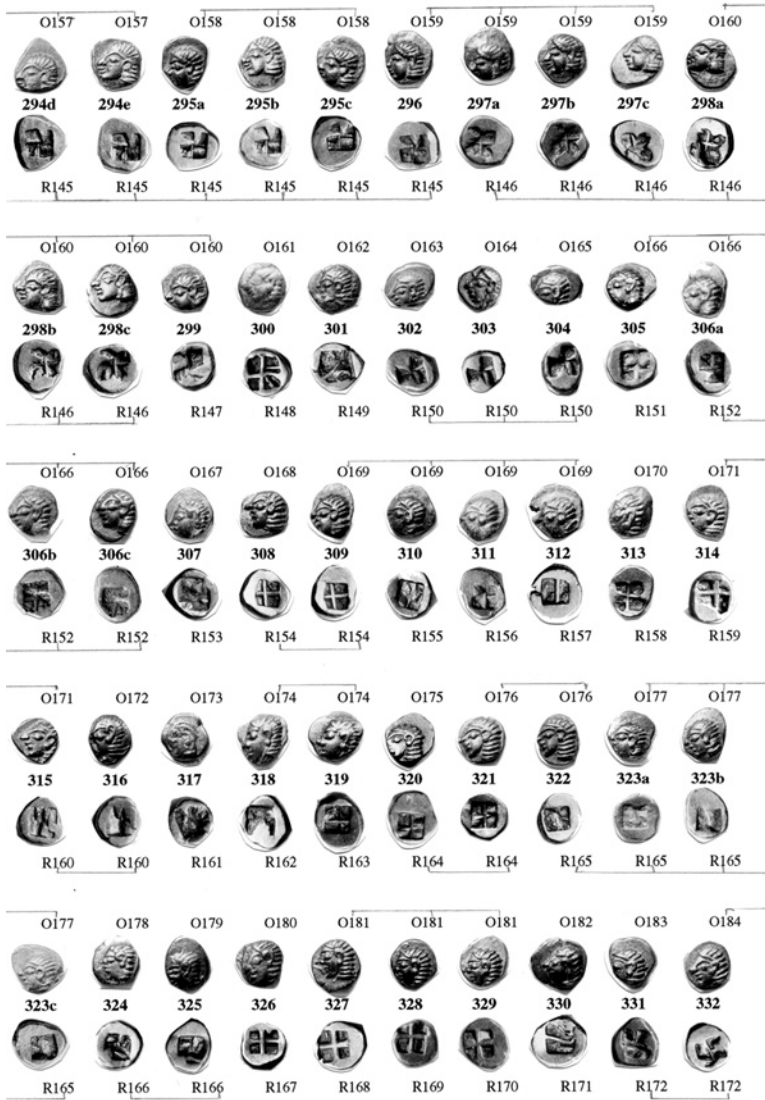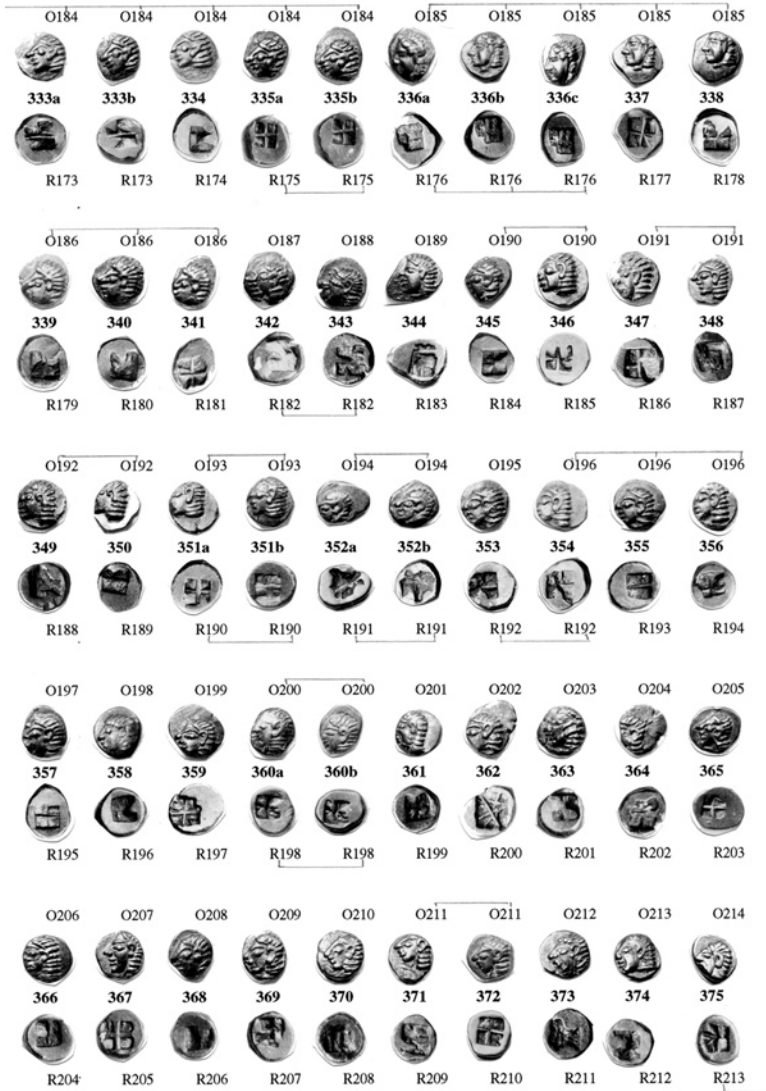A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 34

O215	O215	O216	O217	O218	O219	O220	O221	O222	O222
376	377	378	379	380	381	382	383	384	385
R213	R214	R215	R216	R217	R217	R218	R219	R220	R221

O223	O224	O225	O226	O227	O228	O229	O230	O231	O232
386	387	388	389	390	391	392	393	394	395
R222	R223	R223	R224	R225	R226	R227	R228	R229	R230

O233	O234	O235	O236	O236	O237	O238	O239	O240	O241
396	397	398	399	400	401	402	403	404	405
R231	R232	R233	R234	R235	R236	R237	R238	R239	R240

O242	O243	O244	O245	O246	O247	O247	O248	O249	O249
406	407	408	409	410	411	412	413	414	415
R241	R242	R243	R244	R245	R246	R247	R247	R248	R249

O250	O251	O252	O253	O254	O254	O254	O254	O255	O255
416	417	418	419	420	421	422	423	424a	424b
R250	R251	R253	R253	R254	R255	R256	R257	R258	R258

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 35

Twelfth and selected twenty-fourths, enlarged

1   5a   6   12   16

18b   20   21   31   33   35

61c   62i   63c   66b   68   74i

75d   82d   83   84b   85e   87

A Hoard of Archaic Coins of Colophon and Unminted Silver

Plate 36

Selected forty-eighths, enlarged

4	5	10	14	15	17	22b

24b	34	35	37	41	43	133

135a	137a	191	267	287	290	293

291	340	346	348	383	389	395

A Hoard of Archaic Coins of Colophon and Unminted Silver