

### XIII.

#### ELECTRUM COINS AND THEIR SPECIFIC GRAVITY.

##### I.—ELECTRUM COINS RECENTLY ACQUIRED BY THE BRITISH MUSEUM.

TWELVE years have passed since, in vol. xv. of the second series of the *Numismatic Chronicle*, under the title of "Metrological notes on ancient electrum coins," I gave an account of the early electrum coinages of western Asia Minor, and of the various systems of weight upon which these highly interesting coins throw so much light.

To that sketch and to the views which I therein expressed, I have but little just now to add, nor shall I, on the present occasion, specify the modifications which my opinions have undergone, on more than one point, since I wrote that paper. The whole subject is one which requires more study than I am now able to devote to it, but I hope that if ever it falls to my lot to catalogue this portion of the national collection, I may be able to reconsider some doubtful points in the provisional classification which I made in the article referred to.

Meantime, however, it may be useful to furnish numismatists with descriptions of the electrum coins which have been acquired by the British Museum since my article was written.

In the following list I have included not only the early

electrum of the seventh and sixth centuries B.C., but also the Cyzicene, Phocæan, Lesbian, and Lampsacene staters and hectæ which belong for the most part to the fifth and fourth centuries B.C. The Cyzicenes have already been published in a recent number of the *Chronicle* by Canon Greenwell, but for completeness' sake, I have not thought it desirable to omit them on that account.

Keeping in view the extreme uncertainty of the attributions of most of the early electrum coins, I have not ventured to classify them under the headings of the towns which I have suggested as their possible or probable places of mintage, except in the case of Cyzicus, Phocæa, and Lampsacus, where the attributions are certain. It is safer for the present to adhere to the metrological system of arrangement, whereby the coins of the different standards are kept together. In several instances it will be seen that the coins admit of classification under one or other of two standards. In these cases I have been guided by a consideration of the type which the coin bears, although it must be confessed that here and there it is very doubtful whether the types of some of the smaller divisions are sufficiently characteristic to warrant the classification which I have adopted.

In the following *résumé* of the normal weights, I have confined myself to the coins described in this paper, which should therefore be studied in connection with the lists of electrum coins given in my previous articles, "Metrological Notes on Ancient Electrum Coins," *Num. Chron.*, 1875, and "Notes on Staters of Cyzicus," *Num. Chron.*, 1876 and 1877.

(i.) BABYLONIC STANDARD.

	Max.	Min.	Normal.
Stater . . . .	166.87	.	167

## (ii.) PHOENICIAN STANDARD.

			Max.	Min.	Normal.
1 Stater	.	.	219·5	214·9	220·00
$\frac{1}{2}$ "	.	.	109·94	105·74	110·00
$\frac{1}{3}$ "	.	.	73·02	67·54	73·83
$\frac{1}{4}$ "	.	.	39·90 (?)	.	36·66
$\frac{1}{5}$ "	.	.	27·50	.	27·50
$\frac{1}{6}$ "	.	.	18·60	17·50	18·83
$\frac{1}{8}$ "	.	.	9·30	8·80	9·16
$\frac{1}{12}$ "	.	.	4·60	4·20	4·58
$\frac{1}{16}$ "	.	.	2·70	2·10	2·29

## (iii.) AEGINETIC STANDARD.

			Max.		Normal.
$\frac{1}{2}$ Stater	.	.	3·5	.	4·00

## (iv.) EUBOIC STANDARD.

			Max.	Min.	Normal.
1 Stater	.	.	133·84	123·46	135·00
$\frac{1}{2}$ "	.	.	66·09	.	67·50
$\frac{1}{3}$ "	.	.	45·83	40·60	45·00
$\frac{1}{4}$ "	.	.	22·20	20·59	22·50
$\frac{1}{6}$ "	.	.	4·60	.	5·62

## (v.) PHOCAIC STANDARD.

			Max.	Min.	Normal.
1 Stater (Cyzicus)	.	.	254·10	246·30	254·00
1 " (Lampsacus)	.	.	237·00	232·20	237·00
$\frac{1}{2}$ " (Cyzicus)	.	.	41·60	41·50	42·00
$\frac{1}{2}$ " (Lesbos)	.	.	39·90	38·40	40·00
$\frac{1}{3}$ "	.	.	21·00	19·10	21·00
$\frac{1}{4}$ "	.	.	10·80	9·00	10·00
$\frac{1}{6}$ "	.	.	5·20	4·50	5·00
$\frac{1}{8}$ "	.	.	2·20	.	2·50

The above maximum and minimum weights are those of the coins mentioned in the present article, and may not represent the highest and lowest elsewhere published.

## PHOENICIAN STANDARD.

STATERS (a) Early, 220 grs.

1. *Obv.*—Two lions' heads *adv.* in opposite directions separated by a fish-shaped line; the whole in an incuse enclosed in an oval frame.

*Rev.*—Three incuse depressions; the central one oblong, the others square.

[Pl. X. 1]. El. 219·50. (Whittall.)<sup>1</sup>

This remarkable stater may be conjecturally assigned either to Miletus or Sardes. It probably belongs to the first half of the seventh century B.C.

2. *Obv.*—Lion with open jaws recumbent r., looking l., within an oblong frame of Maeander pattern. (Thrice struck.)

*Rev.*—Three incuse depressions; in the left-hand square, a stag's head r., in the central oblong a fox running l., and . . ; in the right hand square ✕.

[Pl. X. 2]. El. 214·90. (Lawson.)

I would attribute this coin to the same period as the preceding, and preferably to Miletus. The types are the same as those of the half stater engraved in *Num. Chron.*, 1875, Pl. VIII. 4. The mark ✕ on the reverse, which occurs also on the half stater, cannot be considered as a mark of value. Whether the stag's head and the fox are to be interpreted as symbolical respectively of the Ephesian Artemis and the Lydian Dionysos (Bassareus), as has been suggested by F. Lenormant, is a doubtful point.

STATERS (β) Later, 220 grs.

3. *Obv.*—Cock walking r., above, floral ornament; the whole in a circle of dots.

*Rev.*—Quadripartite incuse square.

[Pl. X. 3]. El. 215·79. (Bank collection.)

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<sup>1</sup> The names in parentheses are those of the cabinets from which the coins have passed into the British Museum.

The cock is the well-known type of the coins of Dardanus, on the Hellespont (Head, *Hist. Num.*, 471), where possibly this stater may have been struck; but it may be questioned whether the types on the staters of Class  $\beta$  are those of cities at all. The great similarity of the style and fabric of these coins suggests the possibility of their having all been struck at one mint, which, like Cyzicus, may have adopted a fresh type for each new issue. It seems to belong to a much later period than Nos. 1 and 2, though I see no reason why it may not be assigned to as early a date as the beginning of the fifth century B.C.

4. *Obv.*—Horse prancing l., beneath, flower; the whole in circle of dots.

*Rev.*—Quadripartite incuse square.

[Pl. X. 4]. El. 215·17. (Bank collection.)

The attribution to Cyme in Aeolis of this very rare stater, which I have, perhaps too confidently, ventured to suggest (*Hist. Num.*, p. 479), is not by any means certain.

5. *Obv.*—Sow r.

*Rev.*—Quadripartite incuse square.

[Pl. X. 5]. El. 216·12. (Bank collection.)

With great hesitation I would assign this coin to Methymna, in Lesbos; *cf.* the silver stater with a boar on the obverse, and the legend  $\text{MA}\oplus\text{VMN}\text{A}\text{I}\text{O}\Sigma$  (*Brit. Mus. Guide*, Pl. XI. 27).

6. *Obv.*—Forepart of winged boar r.

*Rev.*—Quadripartite incuse square.

[Pl. X. 6]. El. 217·87. (Lawson.)

Coins of this type are usually attributed to Clazomenae, in Ionia (*cf.* Aelian, *Hist. an.*, xii. 38), but as they bear

no inscriptions, except the single letter **K** on the reverse of some **Æ** hemidrachms of a somewhat later date, we can only accept it with extreme caution.

7. *Obv.*—Eagle l., with head turned back standing on hare; the whole in circle of dots.

*Rev.*—Quadripartite incuse square.

[Pl. X. 7]. El. 217·52. (Whittall.)

This coin, attributed conjecturally to Abydus (*Hist. Num.*, 468), differs from the specimen engraved, *Num. Chron.* 1875, Pl. VII. 7, in that it has no dolphin in the field, and that the eagle on this specimen stands upon a hare.

8. *Obv.*—Forepart of winged horse bridled l.; above, floral ornament.

*Rev.*—Quadripartite incuse square.

[Pl. X. 8]. El. 215·72. (Whittall.)

Although this stater bears the same type as the one which I engraved, *Num. Chron.*, 1875, Pl. VII. 8, and there attributed to Lampsacus, it is from a different die. Both these coins are distinctly earlier in date than the electrum staters of Lampsacus, weighing 237 grs. (*cf. Brit. Mus. Guide*, Pl. X. 23, and *Num. Chron.*, 1876, Pl. VIII. 31, and the two staters of the Lampsacene standard described below, Nos. 89, 90). The attribution of the staters of Asiatic weight to Lampsacus is therefore exceedingly doubtful.

HALF-STATERS (α) Early, 110 grs.

9. *Obv.*—Stellate flower with eight rays and double circle with pellet in centre.

*Rev.* Cruciform incuse.

[Pl. X. 9]. Dark El. 109·05. (Whittall.)

The floral star, which may be an early form of the star-like flower of eight petals, which is the well-known type of the silver drachms of Erythrae, struck in the fifth century B.C. (*Hist. Num.* p. 499), seems to indicate that city as the probable place of mintage of this remarkable hemi-stater. M. J. P. Six has pointed out to me that the cruciform incuse is the result of a second stroke from a single oblong punch.

10. *Obv.*—Floral device consisting of three silphium-flowers (?) with a bud in the space between each ; the whole forming a raised circular boss, outside which is a circle of dots.

*Rev.*—Incuse square.

[Pl. X. 10]. Dark El. 109·49. (Dr. Weber.)

If the flowers on this coin are rightly interpreted as those of the silphium plant, there can be little doubt that it should be assigned to Cyrene. M. Babelon (*Rev. Num.*, 1885, Pl. XV. 1), has already published a coin undoubtedly of Cyrene, which he says is composed of pure gold. It weighs 110 grs., and may be compared with advantage with the present specimen. The arrangement of the floral device is, however, quite different.

11. *Obv.*—Pattern consisting of a raised and ornamented square within a frame.

*Rev.*—Incuse square.

[Pl. X. 11]. Dark El. 108·42. (Whittall.)

I can offer no suggestion with regard to the precise attribution of this curious hemi-stater. As, however, it was acquired by Mr. Whittall, presumably at Smyrna, it is probable that it was struck by some city on the west coast of Asia Minor.

## THIRD. 73·3 grs.

12. *Obv.*—Lion's head r., with open jaws ; above, a star.

*Rev.*—Oblong incuse, divided into two parts.

[Pl. X. 12]. El. 72·89. (Subhi.)

This trite of Miletus (?) may be compared with the one figured in *Num. Chron.*, 1875, Pl. VIII. 9.

## SIXTH. 36·6 grs.

13. *Obv.*—Lion of rude archaic style walking r., with head turned back.

*Rev.*—Incuse square.

[Pl. X. 13]. El. 89·9. (Subhi.)

This coin may also be attributed conjecturally to Miletus, but as it is more than three grains heavier than it should be, it is quite possible that it may be a hecete of the Phocaic standard, and consequently of some other mint.

## EIGHTH. 27·5 grs.

14. *Obv.*—Three silphium (?) flowers.

*Rev.*—Incuse square.

[Pl. X. 14]. El. 27·5. (Whittall.)

Whether this little coin is an *Eighth* of the Phoenician stater of 220 grs., or a light *Fourth* of the Euboic stater of 135 grs., it is difficult to say. In either case Cyrene seems to have been its place of mintage.

## TWELFTHS. 18·3 grs.

15. *Obv.*—Lion's head r., with open jaws, in outline ; very archaic.

*Rev.*—Incuse square.

[Pl. X. 15]. El. 18·6. (Lawson.)



16. *Obv.*—Lion's head r., with open jaws ; beneath, pellet.  
*Rev.*—Incuse square quartered (?) in one division, a pellet.  
 [Pl. X. 16]. El. 17·8. (Bank collection.)
17. *Obv.*—Similar. Pellet on lion's forehead. Numerous countermarks round the edge, in one of which is a recumbent stag.  
*Rev.*—Incuse square.  
 [Pl. X. 17.] El. 17·5. (Lawson.)

These three coins (15—17) may perhaps all be assigned to Miletus.

18. *Obv.*—Lion's head facing.  
*Rev.*—Incuse square.  
 [Pl. X. 18]. El. 18·5. (Bank collection.)
19. *Obv.*—Swastica in linear square.  
*Rev.*—Incuse square.  
 [Pl. X. 19]. El. 18. (M. Panni)

To what cities these two little coins belong I am unable to say.

TWENTY-FOURTHS. 9·16 grs.

20. *Obv.*—Lion's head r., with open jaws ; star or pellet on forehead ; another behind head.  
*Rev.*—Incuse square.  
 Miletus ? [Pl. X. 20]. El. 9·2. (Bank collection.)
21. *Obv.*—Stellate flower with circle in centre containing pellet.  
*Rev.*—Incuse square.  
 Erythrae ? [Pl. X. 21]. El. 9·3. (Whittall.)


22. *Obv.*—Head of bird, serpent, or pistrix.

*Rev.*—Incuse square.

Uncertain. [Pl. X. 22]. El. 8·8. (Bank collection.)

FORTY-EIGHTHS. 4·58 grs.

23. *Obv.*—Lion's head l., with open jaws.

*Rev.*—Incuse divided thus, .

Miletus ? [Pl. X. 23.] El. 4·8. (Whittall.)

24. *Obv.*—Lion's head and foreleg r.

*Rev.*—Incuse square ornamented.

Miletus ? [Pl. X. 24]. El. 4·6. (Bank collection.)

25. *Obv.*—Lion's head facing.

*Rev.*—Incuse square.

Miletus ? [Pl. X. 25]. El. 4·2. (Whittall.)

26. *Obv.*—Swastica.

*Rev.*—Incuse square.

Uncertain. [Pl. X. 26]. El. 4·2. (M. Panni.)

NINETY-SIXTHS. 2·29 grs.

27. *Obv.*—Lion's head r.

*Rev.*—Incuse square divided by lines, 8 pellets within spaces.

Uncertain. [Pl. X. 27]. El. 2·8. (Bank collection.)

28. *Obv.*—Lion's head r.

*Rev.*—Incuse square.

Uncertain. [Pl. X. 28]. El. 2·2. (Bank collection.)

29. *Obv.*—Segment of stellate flower (or scallop shell?).

*Rev.*—Incuse square ornamented.

Erythrae ? [Pl. X. 29]. El. 2·1. (Whittall.)

30. *Obv.*—Stellate flower with many petals.  
*Rev.*—Incuse square ornamented.  
 Erythrae ? [Pl. X. 30]. El. 2·7. (Whittall.)
31. *Obv.*—Human eye (wrongly described as barley-corn,  
 N. C. 1875.)  
*Rev.*—Incuse square.  
 Eresus. [Pl. X. 31]. El. 2·1. (Bank collection.)
32. *Obv.*—Top of sulphium (or lion's head facing?).  
*Rev.*—Incuse square.  
 Cyrene ? [Pl. X. 32]. El. 2·1. (Whittall.)

ÆGINETIC STANDARD ?

Forty-eighth ? 4 gra.

33. *Obv.*—Shrimp ?  
*Rev.* Incuse square.  
 Uncertain. [Pl. X. 33]. El. 3·5. (Whittall.)

EUBOIC STANDARD.

Stater. 185 grs.

34. *Obv.*—Gorgon-head facing.  
*Rev.*—Incuse containing stellate pattern with large  
 pellet in centre and four others at extremities.  
 Eretria. [Pl. X. 34]. El. 123·46. (Mr. Stanton.)

I have already published this coin in *Brit. Mus. Guide*, Pl. I. 4. It is composed of a very pale-coloured electrum. I would assign it to about B.C. 700. It is the earliest representation of the Gorgoneion which occurs on Greek coins.<sup>2</sup>

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<sup>2</sup> M. J. Six has been kind enough to send me a cast of a Hecte of this type.

*Obv.*—Gorgon-head facing.

*Rev.*—Incuse square, within which ⚔.

The coin is of very pale electrum. It weighs about 20·5 grs., and was found in the island of Imbros in 1884.

## THIRDS. 45 grs.

85. *Obv.*—Doubtful type.

*Rev.*—Incuse square.

Uncertain. [Pl. X. 85]. El. 44·7. (Whittall.)

This coin is from the same dies as the specimen weighing 44·1 grs., published in my previous paper.

86. *Obv.*—Uncertain type which looked at in one aspect resembles an eagle l., with head r., devouring prey on a rock; but turned upside down looks somewhat like a lion's head and foreleg to l.

*Rev.*—Incuse square.

Chalcis? [Pl. X. 86]. El. 44·82. (Lawson.)

87. *Obv.*—Wheel of eight spokes, apparently double-struck.

*Rev.*—Incuse square.

Chalcis? [Pl. X. 87]. El. 40·6. (Whittall.)

88. *Obv.*—Tetraskelis or swastica with a pellet in each angle, apparently enclosed in a square compartment with zigzag lines outside it.

*Rev.*—Incuse square.

Uncertain. [Pl. X. 88]. El. 45·83. (Whittall.)

## SIXTHS. 22·5 grs.

89. *Obv.*—Wheel of four spokes with large pellet in centre.

*Rev.*—Incuse square.

Chalcis. [Pl. X. 89]. El. 20·59. (Sava.)

40. *Obv.*—Head of silphium?

*Rev.*—Incuse square.

Cyrene? [Pl. X. 40]. El. 22·1. (Bank collection. Found at Priene.)

41. *Obv.*—Uncertain object.

*Rev.*—Incuse square.

Uncertain. [Pl. X. 41]. El. 22·2. (Bank collection. Found at Priene.)

42. *Obv.*—Owl l.

*Rev.*—Incuse square, in the upper part of which is a triangle.

Athens. [Pl. X. 42]. El. 21. (Payne Knight.)

I omitted this coin from my former paper on ancient electrum, because at that time I believed it to be a forgery. I am, however, now inclined to accept it as genuine, on the ground that Dr. U. Köhler (*Mitth. d. Arch. Inst. Athen.*, ix. 359) has made known as many as five other specimens in different collections, four of which were found in the neighbourhood of Athens. It would appear also that these specimens are not all from the same dies as the one in the British Museum.

If therefore these coins are indeed genuine, and not Euboean like those engraved in *Cat. Cent. Gr.*, Pl. XX. 1—3, they prove that Athens, like her neighbours, Aegina, Chalcis, and Eretria, participated to some slight extent in the widely extended electrum currency, which had its starting-point on the opposite coast of the Aegean Sea, but whether at Athens the electrum money preceded the issue of silver, or whether it is contemporary with the earliest issues in that metal, is a doubtful point.

FORTY-EIGHTH. 5·6 grs.

43. *Obv.*—Owl r. ; in front, olive spray.

*Rev.*—Incuse square.

Athens. [Pl. X. 43.] El. 4·6. (Lawson.)

I am not quite sure that this coin is correctly described, as the type is very indistinct. If I have rightly interpreted it, it is a most important piece of evidence in favour of the authenticity of No. 42, and of the inferences to be deduced from it.

## PHOCAIC STANDARD.

SIXTH. 40 grs.

44. *Obv.*—Flower or floral star of sixteen rays, the alternate ones shorter and ending in pellets.

*Rev.*—Incuse square.

Erythrae ? [Pl. XI. 44]. El. 89·5. (Subhi.)

TWELFTHS. 21 grs.

45. *Obv.*—Goose or duck r., with head reverted over back.

*Rev.*—Incuse square.

Eion ? [Pl. XI. 45]. El. 20. (Whittall.)

46. *Obv.*—Cock's head r., and fish's head.

*Rev.*—Incuse square.

Uncertain. [Pl. XI. 46]. El. 20·6. (Whittall.)

47. *Obv.*—Horse's head r.

*Rev.*—Incuse square quartered.

Uncertain. [Pl. XI. 47]. El. 21. (Whittall.)

48. *Obv.*—Swastica on raised square flanked by four crescents.

*Rev.*—Incuse square.

Uncertain. [Pl. XI. 48]. El. 19·1. (Whittall.)

The obverse of this coin bears some resemblance to the earliest drachms of Apollonia ad Rhyndacum (*Hist. Num.*, 447).

## TWENTY-FOURTHS. 10 grs.

49. *Obv.*—Ram's head l.  
*Rev.*—Incuse square.  
 Cebrenia. [Pl. XI. 49]. El. 10·1. (Whittall.)
50. *Obv.*—Griffin seated.  
*Rev.*—Incuse square.  
 Teos? [Pl. XI. 50]. El. 9. (Whittall.)
51. *Obv.*—Griffin's head l.  
*Rev.*—Incuse square quartered.  
 Teos? [Pl. XI. 51]. El. 10·3. (Lawson.)
52. *Obv.*—Horse's head l.  
*Rev.*—Incuse square quartered.  
 Uncertain. [Pl. XI. 52]. El. 9·4. (Whittall.)
53. *Obv.*—Raised square quartered. (*Cf.* No. 48 above.)  
*Rev.*—Incuse square.  
 Uncertain. [Pl. XI. 53]. El. 10. (Whittall.)

## FORTY-EIGHTHS. 5 gra.

54. *Obv.*—Bull's head l.  
*Rev.*—Incuse square quartered.  
 Uncertain. [Pl. XI. 54]. El. 5. (Bank collection.)
55. *Obv.*—Cock's head l.  
*Rev.*—Incuse square.  
 Uncertain. [Pl. XI. 55]. El. 4·5. (Lawson.)
56. *Obv.*—Horse's head r.  
*Rev.*—Incuse square quartered.  
 Uncertain. [Pl. XI. 56]. El. 5·2. (Whittall.)

## NINETY-SIXTH, 2·5 grs.

57. *Obv.*—Griffin's head l.

*Rev.*—Incuse square.

Teos? [Pl. XI. 57]. El. 2·2. (Lawson.)

## STATERS OF CYZICUS, 254—247 grs.

58. *Obv.*—Upper part of Gaia rising from the soil, clad in chiton which trails behind her; she holds up before her the infant Erichthonios, who stretches out his arms before him. Beneath, tunny.

*Rev.*—Quadripartite incuse square of "mill-sail" pattern. [Pl. XI. 58]. El. 247·5. (Whittall.)

This extremely interesting type seems to have been copied from or suggested by a sculptured group, of which Athena formed a part, as the child is evidently stretching out his arms towards some personage before him. There is in the Berlin Museum an Attic terra-cotta relief (*Arch. Zeit.*, N. F. V. Taf., 63), which is the best and most characteristic extant representation of the birth of Erichthonios. The subject was probably a popular one, especially in Attica, in the fifth century B.C., and the stater now before us shows the central portion of a similar group, which we may suppose to have been in the mind of the engraver of the die of this coin. On the right would have been the figure of Athena advancing to receive the child, and on the left, behind Gaia, that of Kekrops, half man and half serpent, as on the Berlin terra-cotta, but facing the other way. The occurrence of this same figure of Kekrops on another Cyzicene stater (*Brit. Mus. Guide*, Pl. X. 14), would almost warrant us in inferring that there existed at Cyzicus a group representing the birth of Erichthonios, which was utilised by the artist, who has made two coin-types out of it.

For fuller details see Canon Greenwell's article above referred to, p. 64, *supra*.



59. *Obv.*—Head of Athena l., of archaic style, wearing Corinthian helmet without crest. Her hair is indicated after the archaic manner by dots. Behind, tunny.

*Rev.*—Quadripartite incuse square of "mill-sail" pattern.

[Pl. XI. 59]. El. 249·6. (Lambros.)

60. *Obv.*—Head of Athena l., of archaic style, wearing close-fitting Attic helmet, with tall crest. Beneath, tunny.

*Rev.*—Similar.

[Pl. XI. 60]. El. 247. (Lambros.)

These two coins are extremely early examples of the Cyzicene stater. I am inclined to assign them to an earlier date than B.C. 478, the year which I have elsewhere, and on historical grounds, pointed out as probably the date of the commencement of this series of staters.

61. *Obv.*—Chimaera recumbent l. on tunny fish. Style, archaic.

*Rev.*—Quadripartite incuse square of "mill-sail" pattern.

[Pl. XI. 61]. El. 254·1. (Lawson.)

62. *Obv.*—Forepart of lion l. devouring prey.

*Rev.*—Similar.

[Pl. XI. 62]. El. 247·8. (Subhi.)

63. *Obv.*—Lion seated l., with open jaws, and r. fore-paw raised. Beneath, tunny.

*Rev.*—Similar.

[Pl. XI. 63]. El. 246·9. (Bank collection.)

64. *Obv.*—Forepart of cock l. on tunny.

*Rev.*—Similar.

[Pl. XI. 64]. El. 248·2. (Subhi.)

65. *Obv.*—Forepart of winged crested boar l. Beneath, tunny.

*Rev.*—Similar.

[Pl. XI. 65]. El. 247·8. (Subhi.)

66. *Obv.*—Forepart of sphinx l., with fore-paw raised. Beneath, tunny.

*Rev.*—Similar.

[Pl. XI. 66]. El. 248·6. (Subhi.)

67. *Obv.*—Forepart of griffin l., with fore-paw raised. In front, tunny.

*Rev.*—Similar.

[Pl. XI. 67]. El. 250. (Subhi.)

HECTAE OF CYZICUS. 42 grs.

68. *Obv.*—Dolphin l. Beneath, tunny.

*Rev.*—Quadripartite incuse square.

[Pl. XI. 68]. El. 41·6. (Subhi.)

69. *Obv.*—Head of large fish l. Above, tunny l.

*Rev.*—Similar.

[Pl. XI. 69]. El. 41·5. (Subhi.)

TWELFTHS OF CYZICUS. 21 grs.

70. *Obv.*—Archaic bearded head with long straight hair indicated by dots. Beneath, tunny.

*Rev.*—Quadripartite incuse square.

[Pl. XI. 70]. El. 19·7. (Whittall.)

71. *Obv.*—Tail of tunny in linear circle.

*Rev.*—Similar.

[Pl. XI. 71]. El. 20·7. (Whittall.)

72. *Obr.*—Dolphin l. Above, tunny l.

*Rev.*—Similar.

[Pl. XI. 72]. El. 20·7. (Bank collection.)

HECTAE OF PHOCAEA. 40 gra.

(Class i.)

73. *Obr.*—Seal, l. Beneath, another small seal as mint mark.

*Rev.*—Quadripartite incuse square.

[Pl. XI. 73]. El. 38·7. (Bank collection.)

74. *Obr.*—Head of calf l. In front, small seal.

*Rev.*—Similar.

[Pl. XI. 74]. El. 39·8. (Bank collection.)

(Class ii.)

75. *Obr.*—Female head l., of fine early transitional style, wearing round earring, necklace, and hair in sphenone. Behind, seal.

*Rev.*—Quadripartite incuse square.

[Pl. XI. 75]. El. 39·4. (Bank collection.)

76. *Obr.*—Female head l., of fine style, wearing long earring, and hair in saccos, with ornamental border, and fringe at back. Beneath, seal.

*Rev.*—Similar.

[Pl. XI. 76]. El. 39·6. (Whitall.)

77. *Obr.*—Female head l., wearing Phrygian cap. Behind, seal.

*Rev.*—Similar.

[Pl. XI. 77]. El. 38·7. (Bank collection.)

78. *Obr.*—Female head l., of softer and finer style than the last, wearing Phrygian cap confined with band tied behind head. Seal not visible.

*Rev.*—Similar.

[Pl. XI. 78]. El. 39·4. (Bank collection.)

79. *Obv.*—Female head l., of soft, fine style, wearing long earring, and with hair gathered up into a knot behind, and confined with band passing thrice round it. Beneath, seal.

*Rev.*—Similar.

[Pl. XI. 79]. El. 89·0. (Bank collection.)

80. *Obv.*—Female (?) head l., of fine style, with short bull's or cow's horn, from which hangs a fillet; hair rolled over diadem, and with ends loose. Beneath, seal.

*Rev.*—Similar.

[Pl. XI. 80]. El. 89·7. (Bank collection.)

81. *Obv.*—Female head l., of fine style, wearing long earring; hair rolled. Behind, seal.

*Rev.*—Similar.

[Pl. XI. 81]. El. 89·1. (Bank collection.)

HECTAE OF LESBOS (?). 40 grs.

(Class i.)

82. *Obv.*—Fore-part of bull l., in front **M**.

*Rev.*—Incuse lion's head l., behind which is a small oblong incuse.

[Pl. XI. 82]. El. 89·7. (Bank collection.)

The **M** on this coin probably stands for Mytilene.

83. *Obv.*—Ram's head r., beneath which, cock l.

*Rev.*—Incuse bull's head, l.

[Pl. XI. 83]. El. 89·4. (Bank collection.)

(Class ii.)

84. *Obv.*—Young male head r., bound with tænia.

*Rev.*—Incuse square containing crested Corinthian helmet r., and  $\Sigma$  (**M**?).

[Pl. XI. 84]. El. 88·4. (Bank collection.)

85. *Obv.*—Female head r., wearing wreath, apparently of olive.

*Rev.*—Incuse square containing dotted square, within which head and neck of griffin.

[Pl. XI. 85]. El. 89·9. (Bank collection.)

(Class iii.)

86. *Obv.*—Head of Zeus (?) r., laureate.

*Rev.*—Linear square, within which trident.

[Pl. XI. 86]. El. 89·8. (Bank collection.)

87. *Obv.*—Head of bearded Dionysos r., of archaistic style, bound with taenia and with ivy.

*Rev.*—Incuse square, within which linear square containing female head r. wearing calathos.

[Pl. XI. 87]. El. 89·1. (Bank collection.)

88. *Obv.*—Head of Athena r., wearing crested Athenian helmet.

*Rev.*—Incuse square, within which linear square containing young male head r. with short hair, wearing ampyx.

[Pl. XI. 88]. El. 89·1. (Bank collection.)

STATERS OF LAMPSACUS. 237 grs.

89. *Obv.*—Fore-part of winged horse l. Above, symbol, amphora.

*Rev.*—Quadripartite incuse square.

[Pl. XI. 89]. El. 232·2. (Whittall.)

90. *Obv.*—Forepart of winged horse l., the whole in a vine wreath.

*Rev.*—Quadripartite incuse square, of which two alternate quarters are shallow, and the other two deeply incuse.

[Pl. XI. 90]. El. 237. (Sava.)

Both these staters are earlier in style than the staters of similar type described by me in *Num. Chron.*, 1876, Pl. VIII. 31.

II.—COMPOSITION OF EARLY ELECTRUM COINS CALCULATED  
FROM THEIR SPECIFIC GRAVITIES.

BEFORE bringing this paper to a conclusion there is one very important question which must not be altogether passed over. I allude to the quality of the metal of which the early electrum coins are composed.

It seems that this can hardly be ascertained with absolute accuracy without subjecting the coins to a chemical analysis. If we were sure that electrum coins contained only gold and silver thoroughly fused, and that the whole mass was compact throughout, not porous or spongy in any part, then indeed it would be possible to determine the exact proportions of gold and silver contained in each specimen by means of its specific gravity. Unfortunately, however, this is not the case. The few specimens which have been analysed betray the presence in small quantities of a third metal in addition to gold and silver.

The late Dr. Brandis had a  $\frac{1}{4}$  stater of Miletus analysed with the following results—

*Obv.*—Lion's head with star over forehead.

*Rev.*—Incuse. Weight 18 grs.

*N* 53·5, *R* 43·8, *Æ* 2·6 per cent.

The colour of this coin was pale and silvery. It will be seen that it contains more gold and less silver than is indicated by the specific gravities of the four specimens of the same coinage, Nos. 27—30, in the following list.

The Duc de Luynes also had two Lesbian hectæ analysed :

*Obv.*—Lion's head.

*Rev.*—Calf's head incuse (Sestini, *Stat. Ant.* iv. 9—14).  
Weight 89 grs.

*N* 41·33, *R* 51·00, *Æ* 7·67 per cent.

*Obv.*—Head of Apollo.

*Rev.*—Head of youth with long hair (Sestini, *Stat. Ant.* vii. 15). Weight 89 grs.

*N* 41·167, *R* 53·940, *Æ* 4·893 per cent.

Dr. J. Brandis had a third specimen analysed.

*Obv.*—Female head.

*Rev.*—Lyre (Sestini, *op. cit.* vii. 17). Weight 88 grs.

*N* 39·50, *R* 48·90, *Æ* 11·60 per cent.

It is true that these three last-mentioned coins are of a later period than those which I am now discussing; but are we justified in assuming that the majority of the earlier electrum coins are free from any alloy of copper? Probably not; and if copper be present, even in small quantities, it will necessarily, as it is lighter than silver, modify the specific gravity, which will consequently be lighter to a greater or less extent than it would be if the coin were composed of gold and silver only. As, however, it is not to be expected that collectors and museums will allow their coins to be filed, or otherwise injured, in the interests of science, we must content ourselves with the evidence afforded by specific gravities. And yet much information may be derived from carefully taken specific gravities of electrum coins, due allowance being always

made for the fact that these specific gravities are, or at least may be, lighter than they would be if the coins were a simple mixture of gold and silver for the reasons above stated.

Generally speaking we may perhaps assume that the percentage of silver indicated by the specific gravity of most of the pale-coloured electrum coins is slightly in excess of what it is in reality, and the gold contents slightly lower. Hence a coin of which the specific gravity is 12.83, and which should theoretically contain 40 per cent. of gold and 60 per cent. of silver, might, if analysed, be found to contain perhaps as much as 44 per cent. of gold and somewhat less than 56 per cent. of silver plus a little copper. Whether the difference between the actual and the theoretical specific gravity is due entirely to the presence of copper, or whether it is partly to be accounted for by the fact that gold and silver contract to some extent in combining, I am not capable of deciding, but the probability is that any slight contraction which may take place, and which would raise the specific gravity, is more than compensated for by the copper alloy which lowers it again.

I am informed by Mr. Petrie, who has bestowed some attention upon this subject, that chemists assert that the presence of 30 per cent. of silver in a mixture of gold and silver is enough to constitute what is technically called "green gold." If this be a fact, which I rather doubt, any electrum coin which is fairly yellow in colour, ought to contain more than 70 per cent. of pure gold, unless indeed the yellow tint is produced by the addition of a larger quantity of copper than is usually present in electrum coins.

Having thus put the reader on his guard it will be instructive to take note of the specific gravities of a



number of early electrum coins which I have carefully taken by means of a balance accurate to the  $\frac{1}{100}$  part of a grain, kindly lent for the purpose by Mr. Chaney, the Warden of the Standards.

In all cases the gold percentage is doubtless a little higher and the silver lower than the figures indicate, but it is reasonable to suppose that the specific gravities here given furnish, on the whole, an accurate test of the comparative fineness of the metal of the specimens which I have weighed.

It will be seen that colour is not such a very bad rough test of quality after all, for we get the following results.

The figures show the percentage of gold indicated by the specific gravity. In one instance the metal has been so condensed as to be 4 per cent. above the normal gravity.

*Gold.*

104, 98, 84 per cent.

*Electrum.*

- (a) Dark or rich yellow, 72, 70, 63, 64, 60, 55 per cent.
- (b) Yellow, 68, 59, 56, 53, 51, 50, 49, 48, 45, 44, 43, 36 per cent.
- (c) Pale yellow, 43, 40, 36, 35, 33, 31, 29, 21, 20 per cent.
- (d) Very pale yellow, 38, 31, 20, 14, 10 per cent.
- (e) Extra pale yellow, 30, 5 per cent.

It is true that there is sometimes a great difference in the fineness of coins which are almost identical in colour, weight, and style, and which are certainly contemporary issues, but it may be safely asserted that no pale tinted coins contain as much as 50 per cent. of pure gold, and no dark yellow coins as little as 50 per cent.

It is remarkable that there are very few coins which approach in fineness the quality of the electrum slabs or bricks which Croesus ordered to be fabricated to support the Lion of pure gold which he dedicated at Delphi

(Herod. i. 50). This Lion, which weighed 10 gold talents, rested upon four oblong bricks, also of pure gold (size 6 palms by 3, and 1 palm in thickness), each weighing  $2\frac{1}{2}$  talents. These doubtless formed the top step of a plinth or pedestal of four gradations. The topmost stage consisted of the four gold bricks, the next stage of  $3 \times 5 = 15$  electrum bricks; the third stage of  $5 \times 7 = 35$  electrum bricks; the lowest stage of  $7 \times 9 = 63$  electrum bricks. Total 4 gold bricks, each  $2\frac{1}{2}$  talents in weight, and 113 electrum bricks, each 2 talents in weight, but corresponding in size with the gold bricks.

It has been calculated that these electrum 2 talent bricks, in order to be of the same size as the gold  $2\frac{1}{2}$  talent bricks, must have been composed of an alloy consisting of about 73 per cent. of gold, and 27 per cent. of silver.

The total metal value of the Lion and pedestal must have exceeded half a million pounds sterling.<sup>3</sup>

Those who would pursue this question further must have recourse to Dr. K. B. Hofmann's valuable article in the *Numismatische Zeitschrift* for 1884, where full details are given with regard to the errors which may arise, and the allowances which must be made for weight of air, temperature of water, contraction of metals in combination, &c.

I will only add here, for the information of the unscientific reader, that the specific gravity of a coin is obtained by weighing the coin in a balance of great precision first of all in air and then, suspended by a fine platinum wire, in distilled water of the temperature of 60 degrees Fahrenheit. The specific gravity is next arrived at by dividing the weight of the coin in air by the difference between its air-weight and its water-weight.

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<sup>3</sup> Hultsch, *Griech. u. Röm. Metrologie*, p. 579.

Thus the coin No. 16, in the following list, weighs in air 109·05 grs., in water 102·05, the difference is 7. The specific gravity is consequently  $\frac{109\cdot05}{7}$  or 15·57.

From this we obtain the gold contents by the following formula, which I take from Dr. Hofmann's paper.

$$\text{Gold per cent.} = \frac{219\cdot1 (\sigma - 10\cdot48)}{\sigma}$$

Here  $\sigma$  stands for the specific gravity of the coin; 10·48 is the specific gravity of silver.

Therefore  $\frac{219\cdot1 (15\cdot57 - 10\cdot48)}{15\cdot57} = 71\cdot62$  per cent. of gold.

The coin may therefore be said to contain nearly 72 per cent. of gold, and a little over 28 per cent. of silver.

As minute accuracy is impossible I have not thought it necessary as a rule to set down the decimals in the column of percentages.

GOLD.

	Weight in air.	Weight in water.	Differ- ence.	Sp. gr.	N p. c.	Alloy p. c.
1. Gold stater of Croesus . . . . . [ <i>B.M. Guide</i> , Pl. I. 13.] (Rich dark yellow.)	124·20	118·02	6·18	20·09	104·8	0

The specific gravity of this coin is higher than that of 24 carat gold, which is 19·28.

2. Gold Daric . . . . . (Rich dark yellow.)	128·28	121·56	6·72	19·09	98·8	1·2
3. English sovereign . . . . . (Coppery yellow.)	123·25	116·0	7·25	17·00	84·03	15·97

The standard weight of the sovereign is 123·27 grs., and it contains 91·66 per cent. of pure gold, and 8·34 per cent. of alloy; but the above figures would be correct if the alloy were composed of silver.

SILVER.

4. Attic tetradrachm . . . . .	264·25	239·08	25·17	10·49	0	106
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It would seem that this coin contains a trace of gold, as its specific gravity is higher than that of pure silver, which is 10.48.

## ELECTRUM.

## BABYLONIC STANDARD.

	Weight in air.	Weight in water.	Differ- ence.	Sp. gr.	N p. e.	R p. e.
1. Striated stater . . . . . [ <i>B.M. Guide</i> , Pl. I. 1.] (Pale yellow.)	166.87	151.10	15.77	10.58	2	98

From the specific gravity of this remarkable coin it would appear that it consists almost entirely of silver, but from its yellow tint as compared with a pure silver coin, such as a tetradrachm of Athens, it is certain that it must contain a larger proportion of gold than is here indicated, but the yellow colour is produced doubtless chiefly by the addition of copper.

Such an alloy being lighter than silver, would affect a calculation based upon the assumption that the coin consists of gold and silver only.

## PHOENICIAN STANDARD.

*Staters (a) earlier.*

	Weight in air.	Weight in water.	Differ- ence.	Sp. gr.	N p. e.	R p. e.
2. Two lions' heads, back to back . . . . . [Pl. X. 1.] (Yellow.)	219.50	203.50	16	13.66	51	49
3. Forepart of lion . . . . . [ <i>B.M. Guide</i> , Pl. I. 6.] (Yellow.)	217.84	201.28	16.56	13.15	44.5	55.5
4. Lion recumbent, looking back . . . . . (Pale yellow.)	215.40	198.66	16.74	12.83	40	60
5. Similar type in oblong frame . . . . . [Pl. X. 2.] (Very pale yellow.)	214.90	197.87	17.03	12.62	38	62
6. Stag with name of Phanes . . . . . [ <i>B.M. Guide</i> , Pl. I. 7.] (Pale yellow.)	216.50	199.30	17.20	12.58	36	64

*Staters ( $\beta$ ) later.*

	Weight in air.	Weight in water.	Differ- ence.	Sp. gr.	<i>N</i> p. c.	<i>R</i> p. c.
7. Cock . . . . . [Pl. X. 3.] (Pale yellow.)	215.79	198.98	16.81	12.84	40	60
8. Horse . . . . . [Pl. X. 4.] (Very pale yellow.)	215.17	196.53	18.64	11.54	20	80
9. Sow . . . . . [Pl. X. 5.] (Very pale yellow.)	216.12	199.14	16.98	12.73	38	62
10. Half-winged boar . . . . . [Pl. X. 6.] (Very pale yellow.)	217.37	200.30	17.07	12.73	38	62
11. Sphinx seated . . . . . [ <i>B.M. Guide</i> , Pl. I. 8.] (Pale yellow.)	216.97	199.03	17.94	12.09	29	71
12. Forepart of bull, looking back . . . . . [ <i>B.M. Guide</i> , Pl. I. 9.] (Pale yellow.)	216.72	198.03	18.69	11.59	21	79
13. Eagle on hare . . . . . [Pl. X. 7.] (Pale yellow.)	217.52	199.48	18.04	12.06	29	71
14. Forepart of winged horse . . . . . [Pl. X. 8.] (Very pale yellow.)	215.72	198.13	17.59	12.26	31.5	68.5

*Half-staters ( $\alpha$ ) early.*

	Weight in air.	Weight in water.	Differ- ence.	Sp. gr.	<i>N</i> p. c.	<i>R</i> p. c.
15. Lion recumbent, looking back, in oblong frame. Type of stater No. 5 . . . . . [ <i>Num. Chron.</i> , 1875, Pl. VIII. 4.] (Pale yellow.)	106.73	98.08	8.65	12.34	33	67
16. Stellate flower . . . . . [Pl. X. 9.] (Rich yellow.)	109.05	102.05	7.00	15.57	72	28
17. Three silphium flowers on boss . . . . . [Pl. X. 10.] (Rich yellow.)	109.49	102.40	7.09	15.44	70	30
18. Striated half-stater . . . . . [ <i>Num. Chron.</i> , 1875, Pl. VIII. 1.] (Pale brownish yellow.)	105.74	97.08	8.66	12.21	31	69
19. Raised rough square . . . . . [ <i>Num. Chron.</i> , 1875, Pl. VIII. 2.] (Rich yellow.)	109.94	102.83	7.11	15.46	70	30
20. Raised circle, or shield, diagonally divided . . . . . [ <i>Num. Chron.</i> , 1875, Pl. VIII. 3.] (Rich yellow.)	108.37	101.25	7.12	15.22	68	32
21. Ornamented square within frame . . . . . [Plate X. 11.] (Yellow.)	108.42	101.28	7.14	15.18	68	32

*Thirds (a) early.*

	Weight in air.	Weight in water.	Differ- ence.	Sp. gr.	N p. c.	A p. c.
22. Raised square, quartered . . . . . [ <i>Num. Chron.</i> , 1875, Pl. VIII. 5.] (Very pale yellow.)	70.28	63.88	6.40	10.98	10	90
23. Cock and hen . . . . . [ <i>Num. Chron.</i> , 1875, Pl. VIII. 8.] (Yellow.)	73.02	67.18	5.84	12.50	35	65
24. Bee . . . . . [ <i>Num. Chron.</i> , 1875, Pl. VIII. 6.] (Very pale yellow.)	71.24	64.88	6.36	11.20	14	86
25. Bee . . . . . [ <i>Num. Chron.</i> , 1875, Pl. VIII. 7.] (Silver, with slight yellow tint.)	67.54	61.23	6.31	10.70	5	95
26. Lion's head with star on forehead [Pl. X. 12.] (Yellow.)	72.89	67.08	5.81	12.55	36	64
27. Similar . . . . . (Yellow.)	72.75	67.48	5.27	13.80	53	47
28. Similar . . . . . (Yellow.)	72.72	67.13	5.59	13.00	43	57
29. Similar . . . . . (Yellow.)	71.34	66.08	5.26	13.56	50	50
30. Similar . . . . . [Rollin & Feuardent.] (Pale yellow.)	72.06	66.58	5.48	13.10	43.8	56.2

## EUBOIC STANDARD.

*Staters.*

	Weight in air.	Weight in water.	Differ- ence.	Sp. gr.	N p. c.	A p. c.
31. Lion's scalp, facing . . . . . [ <i>Num. Chron.</i> , 1875., Pl. IX. 4.] (Yellow.)	133.34	123.45	9.89	13.48	48	52
32. Gorgon head, facing . . . . . [Pl. X. 34.] (Extremely pale yellow.)	123.46	113.28	10.18	12.12	30	70

*Half-stater.*

33. Lion's scalp, facing . . . . . [ <i>Num. Chron.</i> , 1875, Pl. IX. 5.] (Rich yellow.)	66.09	61.38	4.71	14.00	55	45
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*Thirds.*

34. Eagle on hare ? . . . . . [Pl. X. 3c.] (Yellow.)	44.32	41.03	3.29	13.47	49	51
35. Swastica . . . . . [Pl. X. 38.] (Yellow.)	45.83	42.48	3.35	13.65	51	49

*Sixths.*

	Weight in air.	Weight in water.	Differ- ence.	Sp. gr.	N p. c.	A p. c.
36. Eagle flying . . . . . [ <i>Num. Chron.</i> , 1875, Pl. IX. 8.] (Yellow.)	22.15	20.56	1.57	14.11	56	44
37. Wheel . . . . . [ <i>Num. Chron.</i> , 1875, Pl. IX. 7.] (Rich yellow.)	21.79	20.28	1.51	14.43	60	40
38. Wheel . . . . . [Pl. X. 39.] (Yellow.)	20.59	19.03	1.56	13.20	45	55

## PHOCAIC STANDARD.

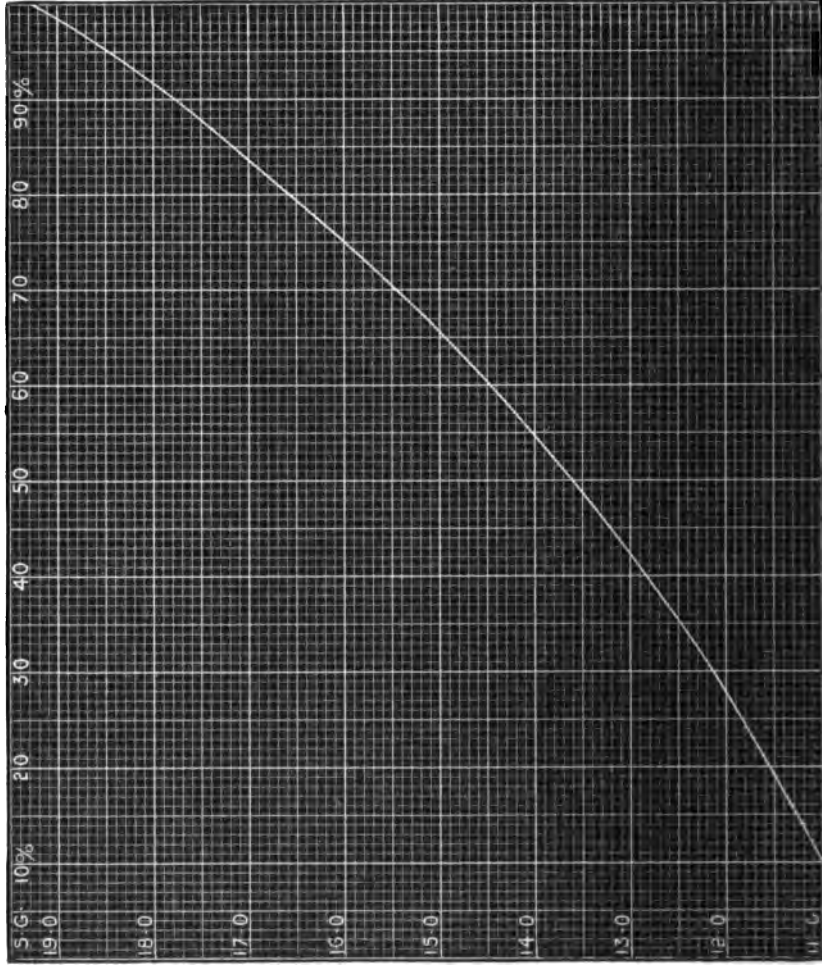
*Staters.*

39. Lion's head with open jaws . . . . . [ <i>Num. Chron.</i> , 1875, Pl. X. 8.] (Yellow.)	248.27	230.98	17.29	14.36	59	41
40. Tunny placed on fillet . . . . . [ <i>Num. Chron.</i> , 1875, Pl. X. 7.] (Yellow.)	252.98	235.32	17.66	14.32	59	41
41. Chimaera . . . . . [ <i>Num. Chron.</i> , 1875, Pl. X. 9.] (Yellow.)	252.60	234.14	18.46	13.67	51	49
42. Centaur carrying off nymph . . . . . [ <i>Num. Chron.</i> , 1875, Pl. X. 11.] (Rich yellow.)	252.50	235.48	17.02	14.83	64	36

As the specific gravities of numerous staters and hectae of Cyzicus have already been calculated by Dr. Hofmann in the article above referred to, by Dr. Hulstsch, *Zeit. f. Num.* xi. 165, and still more recently by Prof. P. Gardner, in the pages of the *Numismatic Chronicle* (*supra*, p. 188). I have not added any of these to my list.

I am indebted to Mr. W. M. Flinders Petrie for suggesting to me the following table, which shows the theoretic curve of mixtures of gold and silver by calculation. By means of this table, the specific gravity having first been ascertained, it is easy to read off the percentage of gold contained in the mixture, presuming that the examples selected are fused, and that they contain gold and silver only.

TABLE OF PERCENTAGE OF PURE GOLD CONTAINED IN FUSED MIXTURES OF GOLD AND SILVER.



EXAMPLE.

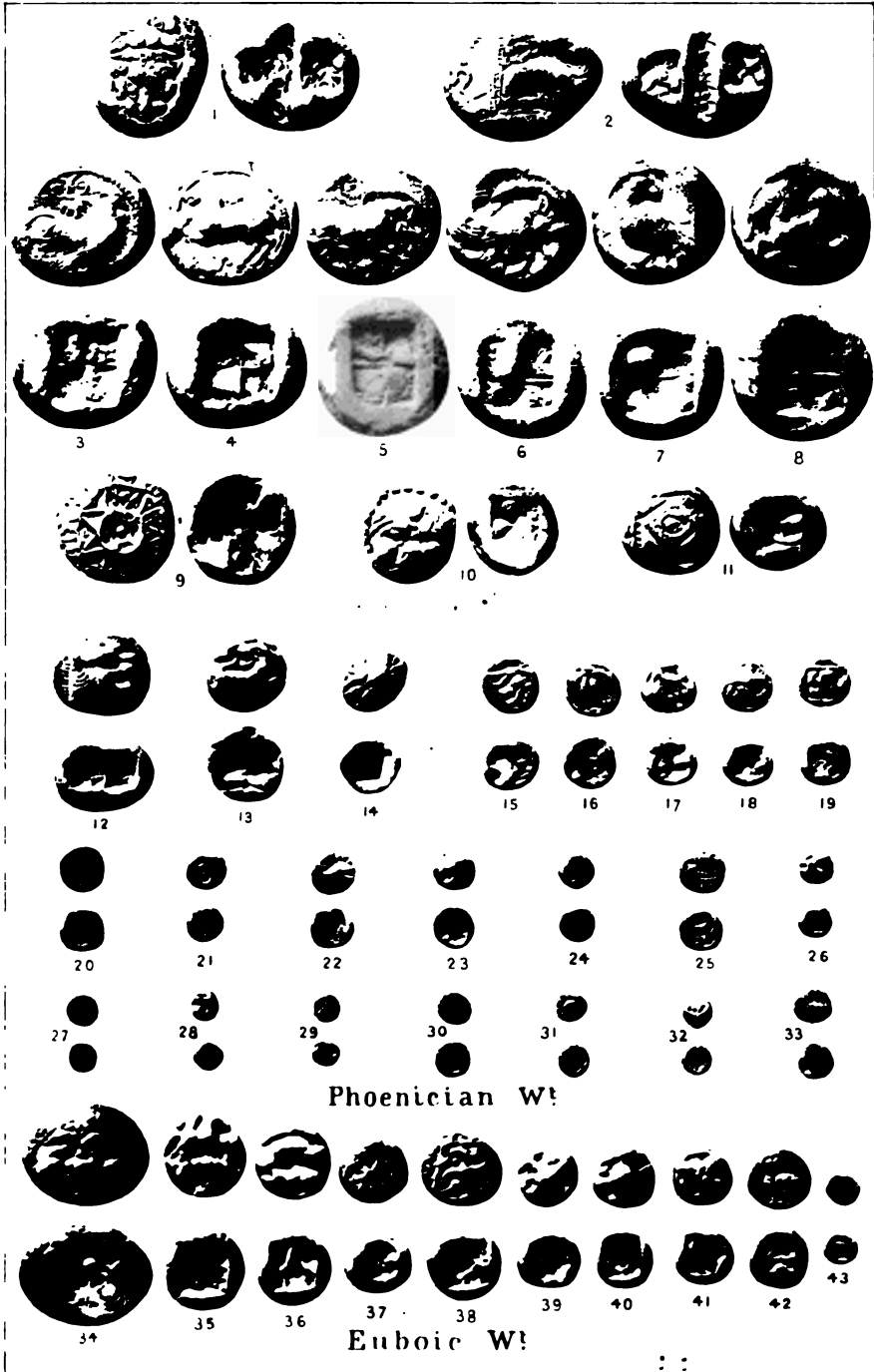
—  
 Coin No. 2, p. 304  
 (Pl. X. 1) of which  
 the S. G. is 13.66,  
 contains 51 per  
 cent. of pure gold.

NOTE.

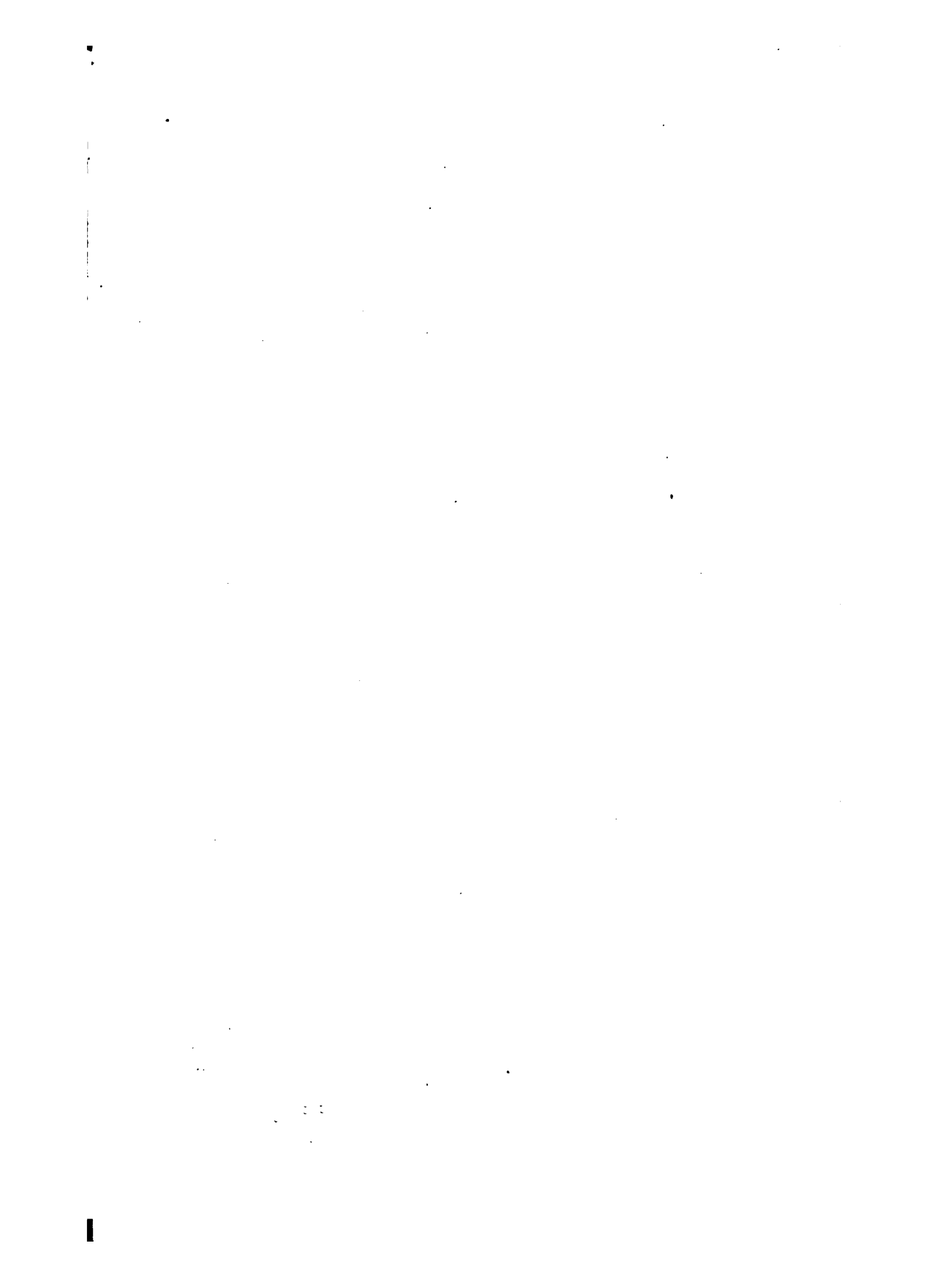
- S. G. of pure silver  
 is 10.48.  
 S. G. of pure gold is  
 19.28.  
 S. G. of electrum  
 ranges between  
 these two.

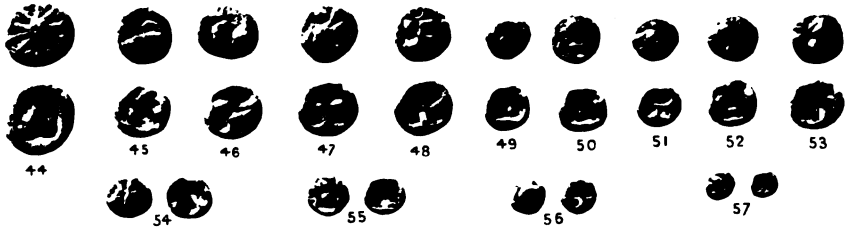
BARCLAY V. HEAD.



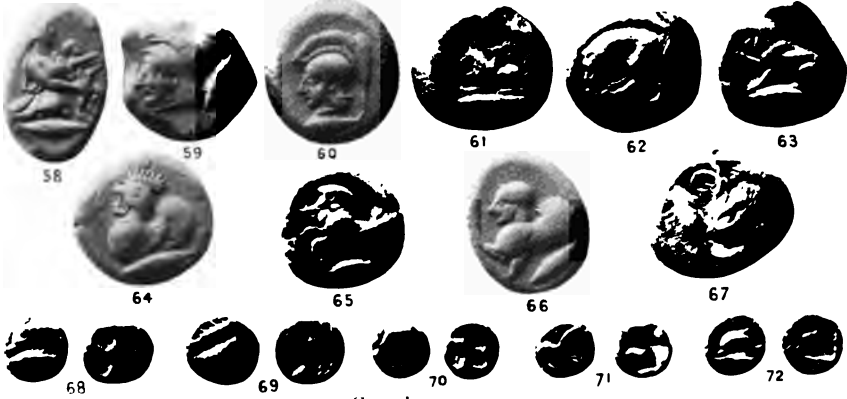


ELECTRUM COINS.

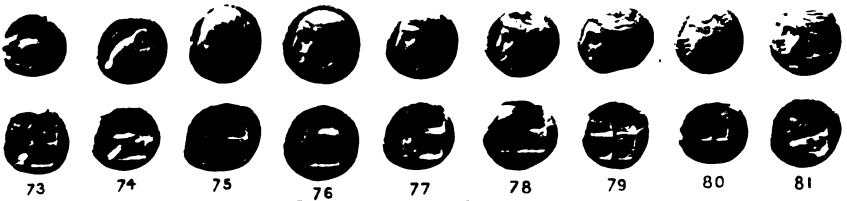




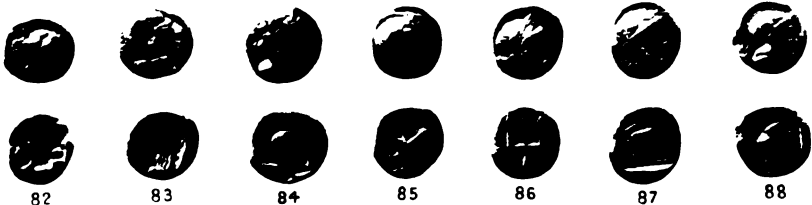
Early Phocaic.



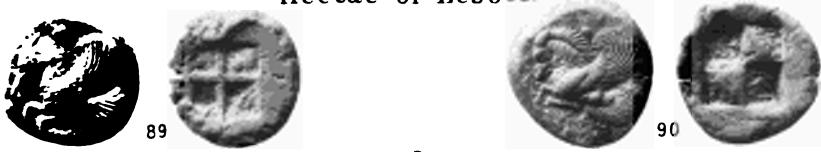
Cyzicene.



Hectæ of Phocæa.



Hectæ of Lesbos.



Staters of Lampsacus

