



ROMAN WEIGHTS FOUND AT MELANDRA.

J. J. Phelps.

Roman Weights found at Melandra.

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ALTHOUGH little definite information can be derived from the examination of the small weights, recently found at Melandra, owing to their diversity among themselves (a defect which has been observed in all the extant weights of the Roman period), yet they form an interesting study as illustrating the systems of weights and coins introduced into this country by the Romans, which still form the basis of our present denominations, and the relationship between the two systems as they originally subsisted.

They are twenty in number, and, with the exception of No. 9a which is of bronze, are all of lead. They were found close together in the north-east corner of the Roman encampment at Dinting, near Glossop, known as Melandra Castle (the supposed *Zerdotalia* of the Ravennate), which is now in process of excavation under the care of Mr. Robert Hamnett, and are in a nearly perfect state of preservation, though covered with a thick coating of oxide.

Our illustration, which is reproduced from a photograph by Mr. J. J. Phelps, of Manchester, represents nineteen of them in a group, the one omitted, No. 16, having been discovered after the photograph was taken. It includes, also, placed on the extreme left, a curious conical helix of lead, of uncertain use, found on precisely the same site. See No. 20.

They are all whole multiples of the scripulum, but they do not form a complete series or conform to one standard, as will be seen from the subjoined lists. In these are given their present and presumed ancient weights in grains, the number of scripula and drachmæ or denarii represented by

each, and the norm or weight in grains of the *libra* to which they severally conform. It will also be seen that there are three sets of duplicates, of which two, Nos. 7 and 8, weighing 18 scripula, conform to different standards. The denomination of two can be determined by the marks upon them. No. 15,* weighing 1,188* grains, and marked — (3 *uncia*), is the *quadrans*, which gives a norm of 4,752 grains for the *libra*, or 396 grains for the *uncia*, which is more than two hundred grains below the average of the trade weights of the Higher Empire, namely, 4,956 grains, and nearly one hundred grains below that of the later Latin standard of 4,819 grains—a decrease of one-fortieth occurring from imperial to Byzantine times. No. 16, weighing 1,712.5 grains, and marked IIII (4 *uncia*), is the *triens*, giving a norm of 5,137 grains for the *libra*, or 428 $\frac{1}{2}$ grains for the *uncia*, which is nearly one hundred grains higher than the average gold standard (5,053 grains) of the earliest and best period of the coinage. The total difference between the two normals, deduced from the Melandra weights, is 385 grains.

There is found, however, to be as great a diversity between other sets of weights of the same age. Those, for instance, in the British Museum marked "Ad Augusti temp." range from 4,971 to 5,535 grains to the *libra*; and in another instance, a single set varies from 4,700 to 5,168. For the purpose of comparison, a table is subjoined, giving, in adjoining columns, the weight in grains of (1) a set in the British Museum; (2) the normal weights derived from the coins given in Dr. W. Smith's *Dictionary of Greek and Roman Antiquities*; (3) the like from the coins in Mr. Hill's *Handbook of Greek and Roman Coins*; (4) and (5) the like from the two weights above mentioned, Nos. 15 and 16 of the Melandra set.

	(1) grains.	(2) grains.	(3) grains.	(4) grains.	(5) grains.
Siliqua, $\frac{1}{144}$,	2·87	2·92	2·92	2·75	2·97
Scripulum, $\frac{1}{24}$,	17·2	17·534	17·55	16·5	17·83
Sextula, $\frac{1}{6}$,	68·7	70·138	70·2	66·	71·34
Uncia, Unit	412·	420·833	421·12	396·	428·05
Libra, 12,	4950·	5050·	5053·32	4752·	5137·

* These numbers refer to the plate and the table on page 168.

Two bronze weights of the Roman *uncia* standard found by Professor Flinders Petrie, at Naukratis, in Egypt (Tanis, *Fourth Mem. of the Egyptian Exploration Fund*, 1888, pt. II., p. 93) weigh 396.7 and 400.9 grains respectively. The former approximates very closely to that of the *uncia* derived from No. 15 of the Melandra weights; and a leaden weight marked 2 (*semis* or 6 *uncia*), weighing 2,573 grains, recently discovered during my own excavations at Wilderspool, gives an *uncia* of 428.8 grains, which is an equally close approximation to that obtained from No. 16.

Though numbered progressively in one series according to weight, those under consideration are grouped in two tables, each containing 10. These are respectively headed, "Trade Weights, *libra* 4,752 grains," and "Coin Weights, *libra* 5,137 grains," according to their approximation to either standard derived from the two marked weights, Nos. 15 and 16, on the supposition that they form separate sets, intended for different purposes.

The standard of the coinage was always higher and more uniform than that of the ordinary trade weights or mean standard, as will be perceived by a comparison of the following averages, taken from the article on "Weights and Measures" in the *Encyclopædia Britannica*:—

<i>Trade Weights.</i>		Weight of <i>libra</i> .	
100 of the Higher Empire	average	4,956	grains.
42 later Greek	"	4,857	"
16 later Latin	"	4,819	"
<i>Coin Weights.</i>		Weight of <i>libra</i> .	
The oldest coins	average	5,056	"
The Campanian Roman	"	5,050	"
The Consular gold	"	5,037	"
The Imperial gold (<i>aurei</i>)	"	5,037	"
The <i>solidi</i> of Constantine I.		average	5,053 grains.
Justinian gold	...	"	4,996 "

Coin weights of glass of the Byzantine period, found in Egypt, average 68 grains to the *solidus* or *sextula*, giving a *libra* of 4,986 grains.

WEIGHTS FOUND AT MELANDRA.

TABLE I.—TRADE WEIGHTS, *Libra* 4752 GRAINS.

Prog. No.	Present Weight. Grains.	Name and Mark.	NO. OF SCRIPULA. $\frac{1}{24}$ uncia.	NO. OF DRACHMÆ. $\frac{1}{6}$ uncia.	ORDENARIIL. Divisions & Multiples of UNCIA.	Ancient Weight. Grains.	NORM. LIBRA. Grains.	Description.
1	148.32		9	3	$\frac{263}{263}$	148.5	4746	Hemispherical.
2	148.8		9	3	$\frac{263}{263}$	"	4761	Plano-convex, pierced.
6	241.92	.	15	5	$\frac{269}{269}$	247.5	4798	Discoidal, punctured.
7	299.52		18	6	$\frac{412}{412}$	297	4792	Flat disc.
9	331.2		20	$6\frac{3}{4}$	$\frac{619}{619}$	330	4769	Discoidal, recessed on top. ($\frac{3}{4}$ oz. Avoir.)
9A	405.6	<i>Uncia</i>	24	8	1	396	4867	Bronze, cylindrical, notched across one end.
13	918.7	...	56	$18\frac{3}{4}$	$2\frac{1}{2}$	924	4724	Double conic section.
14	921.12		56	$18\frac{3}{4}$	$2\frac{1}{2}$	"	4737	Square prism, notched across one end.
15	1188	<i>Quadrans</i>	72	24	3	1188	4752	Cubical.
19	4744.32	<i>Libra</i>	288	96	12	4752	4744	Oblate-spheriod.
						Average ...	4769	

TABLE II.—COIN WEIGHTS, *Libra* 5137 GRAINS. ANCIENT GOLD, *Libra* 5053 GRAINS.

Prog. No.	Present Weight. Grains.	Name and Mark.	NO. OF SCRIPULA. $\frac{1}{24}$ uncia.	NO. OF DRACHMÆ. $\frac{1}{6}$ uncia.	ORDENARIIL. Divisions & Multiples of UNCIA.	Ancient Weight. Grains.	NORM. LIBRA. Grains.	Description.
3	177.12	.	10	$3\frac{1}{2}$	$1\frac{5}{12}$	Anc't Gold. 175	5101	Discoidal, plugged.
4	192.5		11	$3\frac{3}{4}$	$1\frac{3}{4}$	193	5040	Flat ring.
5	218.88	<i>Semuncia</i>	12	4	$\frac{1}{2}$	210	5253	Square. ($\frac{1}{2}$ oz. Avoir.)
8	314.4		18	6	$\frac{3}{4}$	315.8	5030	Discoidal, recessed on top.
10	435.36	.	25	$8\frac{1}{2}$	$1\frac{1}{24}$	438.6	5224	Do. (1 oz. Avoir.)
11	535.2	...	30	10	$1\frac{1}{2}$	526.8	5137	Flat disc.
12	625.44	<i>Sescuncia</i>	36	12	$1\frac{1}{2}$	631.5	5003	Do.
16	1712.5	<i>Triens</i>	96	32	4	1684	5137	Do.
17	1728	<i>Triens</i>	96	32	4	"	5184	Discoidal.
18	1882.08	$\div\div$	108	36	$4\frac{1}{2}$	1894.8	5040	Flat Oval.
						Average ..	5115	

It is evident, from the small size of the majority of these weights, that they were not employed for weighing copper coins, eight of their number being of less weight than a bronze *sestertius*; and the low standard to which ten of their number included in Table I. conform, makes it evident that the latter were not used for weighing coins of any description, except, perhaps, as bullion. Yet the fact that so many small and irregular weights have been found together in a military encampment strongly suggests that they were employed for some special purpose, such as the apportionment of the various defective and alloyed silver and gold coins forming the pay of the garrison. If so, they probably correspond to definite numbers of gold or silver coins, but whether these were *aurei*, *solidi*, *denarii*, *argentei*, *miliarensia*, or *sestertii*, or their sub-divisions, could only be determined by a more definite knowledge of the period to which the weights belong, which, however, was probably late.

No doubt the Roman *quaestor* and *stipendiarius* were as much alive to the necessity of weighing worn, defaced, and imported coins as the money-changer and banker of the present day. They likewise possessed special weights marked and adjusted to the official standard; and at Rome, the standard weights were deposited in the temples of Ops, Mars Ultor, Hercules, Castor, etc. Evidence also exists, in the form of an inscription upon a *statera* (steelyard), that a central office was provided for adjusting such instruments. The counterpoises used in connection with the latter found in this country are often patched with lead for a similar purpose. The want of sensibility in the extant examples of the *statera* and *trutina* (beam and scales), however, of which the support is obtuse and above the centre of gravity, may explain the diversity of these weights among themselves which is so confusing to us, and perhaps suggests that no great precision in weighing was attained.

The Roman monetary system was based upon the *libra* weight of bronze (*aes*), the earliest circulating medium being the *as libralis*, with its sub-divisions, viz. :—

<i>As libralis</i> , mark of value I			12 <i>unciae</i> .
$\frac{1}{2}$, <i>Semis</i> ,	„	S	6 „
$\frac{1}{3}$, <i>Triens</i> ,	„	4 „
$\frac{1}{4}$, <i>Quadrans</i> ,	„	. . .	3 „
$\frac{1}{6}$, <i>Sextans</i> ,	„	. .	2 „
$\frac{1}{12}$, <i>Uncia</i> ,	„	.	1 „

The silver coinage was based upon the *denarius* introduced in B.C. 269, weighing one *sextula* (70 grains) or four *scripula*, which was then worth 10 bronze *asses*, the weight of the *as* having fallen to 4 *unciae* (*triental*). The *denarius* was subdivided into its half, the *quinarius*, and fourth part, the *sestertius*; and later the *victoriat*, equal to two-thirds of the *denarius*, was introduced.

The earliest gold coins, dating from about B.C. 217, were the scrupular *aurei*, weighing 1, 2, and 3 *scripula*, valued at 20, 40, and 60 *sestertii*; subsequently, B.C. 207, a gold *aureus* of one-fortieth *libra* (126 grains), valued at 25 silver *denarii*, or 100 silver *sestertii*, or 250 bronze *asses* (*sextantal*), was employed.

In the time of Augustus, B.C. 15, the *sestertius* of yellow brass (*orichalcum*), worth double its weight of ordinary red bronze,* and weighing about one *uncia*, first came into use, and was reckoned equal to a quarter *denarius*, or four bronze *asses*, the weight of the *as* having fallen to half an *uncia* (*semuncial*).

The principal coins of the early Empire were: (1) the gold *aureus*, one-forty-second of the *libra* (120 grains); (2) the silver *denarius*, one-eighty-fourth of the *libra* (60 grains); the brass *sestertius*, 1 *uncia*; the *aureus* being reckoned at 25 *denarii*, 100 *sestertii*, or 400 *asses*.

A larger and smaller silver coin, the *argenteus*, one-sixty-fourth of the *libra*, and the *denarius minutus*, one-ninety-sixth of the *libra*, were added by Caracalla in A.D. 215.

After Severus Alexander, A.D. 222, "begins a period of hopeless confusion, such that the scales must have been necessary

* Hill's *Handbook of Greek and Roman Coins*, p. 50.

in all transactions in which gold passed" (*Handbook of Greek and Roman Coins*, p. 54). By the time of Diocletian, A.D. 284, successive debasements had reduced the principal gold coin to one-sixtieth of the *libra* (84 grains), the silver to one-ninety-sixth of the *libra* (52.6 grains), and the brass *sestertius* had disappeared. The restorations by the latter emperor in A.D. 296, and by Constantine the Great in A.D. 306, established (1) the gold *solidus* or *sextula* of one-seventy-second of the *libra* (70 grains), which remained long in use; (2) the silver *miliarensis*,* of equal weight, but alloyed to equal in value, one-twelfth of the *solidus*; and (3) the bronze *folles*, worth one-twenty-fourth of the *miliarensis*. In A.D. 301, the nominal value of *libra* of gold (5,053 grains) was 50 *aurei*, or 1,000 *miliarensia*, or 25,000 *folles*, or 50,000 *denarii*; the latter denomination being merely money of account. The standard weights of the gold *aureus* and silver *miliarensis* were consequently 101 grains and 70 grains respectively. The silver *folles* or purse was equal to 250 *miliarensia*.

Under the early Empire, silver *denarii* were the coins actually used in the payment of large amounts, which were generally reckoned in *sestertii*; the unit *sestertium* meaning 10 *aurei*, or 250 *denarii*, or 1,000 *sestertii*.

During the Republic there was a separate military coinage, the earliest gold coins, issued about 217 B.C., being for that purpose.† Under the emperors this series of the coinage was included in the general system. According to Polybius (vi., 37), in his time the foot soldier received 2 *oboli* ($3\frac{1}{3}$ *asses*) a day. He uses the word *ὀψώνιον*, which Luke (iii. 14) also employs in the passage "and be content with your wages." It is equivalent to the Latin *stipendium*, a unit paid three times a year. The soldier's annual pay was, therefore, 1,200 old standard *asses* or 120 *denarii*, the *denarius* being always reckoned as 10 *asses* in such payments (Pliny, N.H. xxxiii. 45),

* So named from its original value being equal to $\frac{1}{1000}$ of a *libra* of gold. *Handbook of Greek and Roman Coins*, p. 53.

† *Ibid.*, p. 99.

and the *stipendium* or unit was 400 *asses*, or 40 *denarii*, or $1\frac{2}{3}$ *aureus*.

Under Augustus the annual amount was 3,600 new standard *asses*, equal to 225 *denarii*, or 9 *aurei*, and the *stipendium* was 1,200 *asses*, or 75 *denarii*, or 3 *aurei*.

Domitian added 25 *denarii* or 1 *aureus* to the *stipendium*, making it equal to 1,600 *asses*, or 100 *denarii*, or 4 *aurei*.

The foregoing data furnish the means of estimating the actual weight of the gold and silver coins equal to a *stipendium* at those three periods of Roman history. In the time of Polybius (*circa* 150 B.C.) its nominal weights in silver and gold were ($60 \text{ grs.} \times 40 =$) 2,400 grains and ($126 \text{ grs.} \times 1\frac{3}{8} =$) 201.6 grains; in that of Augustus ($60 \text{ grs.} \times 75 =$) 4,500 grains and ($126 \text{ grs.} \times 3 =$) 378 grains; and in that of Domitian ($52.6 \text{ grs.} \times 100 =$) 5,260 grains and ($112 \text{ grs.} \times 4 =$) 448 grains respectively.

The fact that Nos. 5, 9, 10, and 17 in the list of weights from Melandra are practically equal to $\frac{1}{2}$ oz., $\frac{3}{4}$ oz., 1 oz., and 4 oz. avoirdupois must be merely an accidental coincidence, for there can be no doubt as to their Romano-British origin and antiquity. The equality shown to exist between those in Table II. and a certain number of *drachmæ* or *denarii* stated in column 5 is in accordance with the Roman system, whereby coins were manufactured to weigh a definite fraction of the *uncia* or *libra*; and the same name was frequently applied to both weight and coin, *e.g.*, *as* or *libra*, *semis*, *quadrans*, *siliqua*, *sextula* or *solidus*, *drachma*, *obol*, etc. The average weight of the unit in column 5, computed from the total of the ten weights in Table II., is 53 grains, which coincides very nearly with that of the *denarii* of Trajan and Hadrian.

To prevent confusion, these weights are distinguished by both punch-marks and differences in shape. No. 18 is a flat oval, and is marked by five small punctures peculiarly arranged, and by a deep groove along its transverse diameter, thus: $\div \div \div \cdot$. It may be shown to equal 5 *stipendia* of the age of Augustus, or 15 gold *aurei*, in the following way:—

No. 18. Present weight, 1882.08 grains;

ancient weight ($\frac{1894}{5} = \cdot$) ... 378 grains.

Stipendium, 3 gold *aurei* ($126 \times 3 =$) ... 378 grains.

The same weight may be shown equal to 36 imperial *denarii* of one-ninety-sixth of the *libra*; ($\frac{5053}{96}$ grains =) 52.63 grains $\times 36 = 1,894$ grains. It is also the largest of three weights in multiple progression, Nos. 8, 12, and 18, corresponding in weight to 18, 36, and 108 *scripula*; 6, 12, and 36 *denarii* or *drachmæ*; and $2\frac{1}{2}$, 5, and 15 *aurei* respectively.

The denotation of the marks upon Nos. 10, 11, and 13 (one, two, and three punch-marks respectively) is still a matter of conjecture, since the unit of weight is in each case different and does not correspond to any ordinary denomination.

The foregoing suggestions as to the uses of these weights are submitted tentatively, and they are probably incomplete, but the subject seems to be worthy of further research and enquiry.

That like needs give rise to like contrivances or survivals in widely distant ages and localities is well seen in the resemblance of our own principal coinage—pounds, shillings, and pence—in size, weight, and material to those of the Romans; and their names also are recalled by the abbreviations, £ s. d., for *libra*, *solidus*, and *denarius*, at the head of our accounts.