THE

CLASSICAL MUSEUM.

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I.

METROLOGISCHE UNTERSUCHUNGEN ÜBER GEWICHTE, MÜNZFÜSSE, UND MASSE DES ALTERTHUMS IN IHREM ZUSAMMENHANGE, VON AUGUST. BOECKH. BERLIN, 1838. 1 Vol. 8vo.

(*INVESTIGATIONS ON ANCIENT WEIGHTS, COINS, AND MEASURES.*)

M. BOECKH has so long been celebrated in the philological world for profound erudition—for method, as well as ingenuity, in the combination of scattered facts, and for the quality, some-what rare among eminent scholars, of sobriety in the field of conjecture—that no preface is necessary when I proceed to offer a few remarks upon one of his recent and most elaborate pro-ductions.

The *Metrologie* is a work not unworthy of its distinguished author. The dispersed fragments of evidence, respecting the weights, measures, and monetary systems of the ancient world—one of the most perplexing subjects in the whole range of phi-lology,—are patiently collected, and perspicuously discussed: and the thirty chapters, of which the book consists, are so closely packed with matter, as to forbid the possibility of any condensed abstract of the entire contents. The views of M. Boeckh are, in several respects, original, differing even from opinions stated by himself in former publications: he has, moreover, imparted to the subject a new interest, by considering the metrological systems of the various countries in antiquity in continual com-

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parison with each other, so as to elicit valuable proofs of early communion and transition of ideas between them. His book embraces the weights and measures prevalent throughout all the countries known to us in the ancient world. Babylon, Syria, Phenicia, Judæa, Egypt, Sicily, Italy, and Rome: and the comparative metrology of these nations is presented to us in a way analogous to the *Vergleichende Grammatik* of Bopp, in regard to the extensive family of the Indo-Germanic languages; it exhibits the diffusion of institutions, originating in the very ancient civilization of Babylon, to the neighbouring countries whose period of settled ordinances and commerce was more recent.

Though this transition must have taken place anterior to recorded history, and, therefore, in a manner which we cannot now fathom, yet the reality of the fact is sufficiently proved by its lasting and ascertained results. In cases where the weights and measures of two different nations are found to be in a precise and definite ratio one to the other,—either exactly equal, or exact multiples and parts of each other,—we may fairly presume, either that the one has borrowed from the other, or that each has borrowed from some common source, (*Metrol.* c. ii. § 3.) Where the ratio is inaccurate, or simply approximative, it is to be treated as accidental and undesigned.

I request particular attention to this distinction between a precise ratio, and a ratio merely approximative, which M. Boeckh lays down very clearly, and which he justly announces as the cardinal principle of his metrological reasonings. To a great extent, he has succeeded in exhibiting an analogy, both interesting and hitherto unknown, between the metrical and statical systems of the various countries to which his work relates. But I must at the same time add, that there are several of his conclusions which appear to me very imperfectly supported, and some even which are not to be reconciled with the evidence. In a subject so obscure and perplexed from beginning to end, this is by no means wonderful.

In investigating the subject of the ancient weights and measures, in so far as they afford evidence of communion or analogous proceeding between the different nations of antiquity, the great point to be attended to is the normal system as it was

fixed by law, abstracting from those imperfections which at-
tended the execution of it in detail. All mechanical processes
in antiquity were carried on far more loosely and inaccurately
than they are at present: pieces of money, as well as weights
and measures, were both less durable and less exact, in spite of
the solicitude of the ancient governments. We know by the evi-
dence of inscriptions, with respect to Athens, that normal weights
and measures were preserved under custody of a public officer
in the chapel of the Hero Stephanephorus; that copies of these
were made and distributed for private use; and that strict watch
was directed to be kept for the purpose of excluding fraudulent
or incorrect weights and measures in the shops and the market[1].
The case was similar at Rome, and seemingly also at Jerusalem
(*Metrol.* c. ii. § 3). In this manner the theoretical perfection
of the standard was maintained in the minds of the people as
it was when originally adopted, in spite of imperfect execution
in practice.

M. Boeckh enters upon his subject, in the third chapter of
the work, by an investigation of the Roman liquid measure,
quadrantal or amphora, in its relation to the Roman pound
weight. According to the Silian plebiscite, as reported by Festus,
the legal definition of a quadrantal was, a vessel containing 80
pounds weight of wine or water: the congius being one-eighth
part of it, and containing 10 pounds weight of the same. By
this regulation the dimensions of the vessels containing liquids
were made dependent, not upon cubical measurement, but upon
weight, like the imperial gallon in England. Now the Attic
liquid measure called χοῦς, was the exact equivalent of the Ro-
man congius; and the Attic μετρήτης, the largest unity of liquid
measures at Athens, contained 12 χόες, and was equivalent to
1½ amphoræ, or quadrantalia. Such a definite ratio does un-
doubtedly indicate either some common original from which
both systems must have been deduced, or an imitation of one
of them by the other. M. Boeckh seeks to deduce both one
and the other from the East, where it will be presently shewn
that the Chaldæans at Babylon had adopted in very early times

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Boeckh, *Corpus Inscript. Græcar.* No. 123—150.

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a system of determining their cubic measures by ultimate refer-
ence to a given weight.

" If," (he says, iii. 4, p. 26) "we regard this relation of the
weights and measures, based upon a given weight of water, which
is the keystone of the Roman system—and if we carry the appli-
cation of this water-weight backwards to the chief measures of
the ancient world—we shall find a connection really and truly
organic between the systems of the different people of antiquity,
and we shall arrive at last at the fundamental unity of weight
and measure in the Babylonian system; so that this supposi-
tion is found to be verified in all its consequences and details.
To give some preliminary intimation of this—I shall shew that
the Grecian (or, more accurately, the Æginæan) and the Roman
pound are in the ratio of 10 : 9 : the Æginæan pound is half the
Æginæan mina : but the cubical measures stood normally in the
ratio of the weights ; and therefore the Grecian cubic foot was to
the Roman as 10 : 9—and as the Roman cubic foot weighs 80
pounds of rain-water, so also the Grecian cubic foot weighs 80
Grecian or Æginæan pounds, equal to 40 Æginæan minæ. The
unity of weight (in Greece) however is, not 40 minæ, but 60 minæ,
or a talent. In the original institutions of the people of antiquity
every thing has its reason, and we find scarcely any thing purely
arbitrary : nevertheless, this unity of weight, the talent, does not
coincide with the unity of measure—neither with the cubic foot,
nor with any other specific cubical denomination. But the coin-
cidence reveals itself at once, as soon as we discover that the
Babylonian cubic foot, standing as it does in the ratio of 3 : 2 to
the German cubic foot, weighs 60 Æginæan minæ (= 60 Baby-
lonian minæ = 1 Babylonian talent) of rain-water."

M. Boeckh here promises more than his volume will be found
to realise. He does, indeed, satisfactorily shew that the Baby-
lonian talent was identical with, and was the original prototype
of, the Æginæan talent, and that the standard and scale of
weight was strikingly and curiously similar in Asia, in Egypt,
and in Greece. But he has not, I think, made out the like
with regard to the Grecian *measures*, either of length or of capa-
city, and his proof of the ratio of 3 : 2 between the Babylonian
and the Grecian foot will be found altogether defective. Nor

has he produced adequate evidence to demonstrate, either the
ratio of 10 : 9 between the Grecian or Æginæan pound and the
Roman pound—or that of 1 : 2 between the Æginæan pound and
the Æginæan mina—the ratio between the Grecian cubic foot and
the Roman cubic foot, too, as also that between the Grecian cubic
foot and any given Grecian weight, is, as he proposes it, inad-
missible. In fact, there is no such thing (properly speaking)
as an Æginæan pound weight: nor is there any fixed normal
relation between Grecian weight and Grecian measures, either
of length or of capacity,—though there is a fixed normal rela-
tion between Babylonian weight and Babylonian measures, as
also between Roman weight and Roman measures.

The Greek scale of weight consisted of the talent, the mina,
the drachma, and the obolus: the talent consisting of 60 minæ—
the mina of 100 drachmæ—the drachma of 6 obols. The scale of
weight in Sicily and Italy was essentially and originally different,
having for its unit the pound—always divided into twelve ounces,
except in central Italy, north of the Apennines, where it contained
only ten ounces. These denominations were universal throughout
Sicily and Italy, though the pound, in one part of Italy and another,
was not the same absolute weight, any more than the talent in
Greece. M. Boeckh, as well as all other writers on the subject,
recognises this radical distinction between the Hellenic population
on the one hand, and the earliest inhabitants, both of Italy and
Sicily, on the other, in respect, both to the denomination and
divisions, of the statical and monetary scale. And I may here re-
mark, that the supposition of identity of Pelasgian race between
the original population of Epirus, and that of the south-eastern
regions of Italy, announced with confidence by Niebuhr, and
adopted by K. O. Müller, becomes open to doubt from our find-
ing no mention of pound weight or ounce weights among the
Epirots. The Corinthian colonies on the coast of Epirus—Leukas,
Anaktorium, and Ambrakia, as well as the island of Korkyra—
pursued a system of coinage purely Hellenic, consisting of talents,
minæ, and drachmæ. But the Corinthian colony of Syrakuse, as
well as every other Hellenic establishment, either in Sicily or Italy,
adopted a mixed system, in which talents, minæ, and drachmæ,
were blended together with pounds and ounces—not according to

any one uniform principle, but varying from town to town both in
Italy and Sicily. The statical denominations prevalent among the
Italian and Sicilian Greeks, arising as they do out of a compound
of two systems originally distinct, present questions full of per-
plexity, and such as can hardly be solved with our existing stock
of information.

The words talent, drachma, and obolus, are genuine Greek, and
of Grecian origin: the first of the three even occurs in Homer,
though in a sense quite different from that which it subsequently
bore in Greece—denoting, seemingly, a definite, but small, weight[2].
But the systematic graduation of weights in Greece seems of a
date later than the Odyssey; and the word mna, or mina, which
forms the central point of the scale, has no root in the Greek
language. It is of Chaldaic origin, and has also been discovered
by Champollion among the ancient hieroglyphic writing of Egypt,
(*Metrol.* iv. 2. p. 39). The etymology of this word points to the
quarter from whence the Greeks received their scale of weight:
and it will be found that there is sufficient analogy between the
scales adopted in Greece, Judæa, Phenicia, and Egypt, to warrant
a belief that all of them were derived from one common origin—
the Chaldaic priesthood at Babylon. We are told by Herodo-
tus, that the Greeks adopted from the Babylonians the sun-dial,

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[2] Aristotle had said (*Schol. Ven. ad Iliad*, xxiii. 269), that the talent in Ho-mer was a weight altogether undefined. M. Boeckh agrees with him, (*Metrol.* iv. 1, p. 33). But surely this opinion cannot be reconciled with the assertion that "Odysseus weighed out ten talents of gold," (*Iliad*, xix. 247. Χρύσου δὲ στήσας Ὀδυσεὺς δέκα πάντα τάλαντα): or even with the specification of a definite number of talents of gold—*ten* talents, *two* talents, &c. (*Odyss.* iv. 526, and other passages cited in Damm's Lexi-con). The word τάλαντον originally means a *scale*, as is well known, and is often so used by Homer.

In the Iliad and Odyssey, as well as in the Hesiodic Works and Days, refer-ence occurs to the chief measures of length and of area: ὄργυια, πῆχυς, πούς, σπιθαμὴ, δῶρον, πλέθρον, γύη: but no precise or definite measure of capacity is noticed in them—μέτρον and ἀμφι-φορεὺς are of unknown bulk. But the scale of dry measure is at least as old as the Hesiodic poem, called *The Cata-logue of Women*, as we may ascertain by the occurrence of the word μέδιμνος, which only belongs to the language as a technical denomination of measure. See the story of *Mopsus and Kalchas*, *Hesiod ap. Strab.* xiv. p. 921. *Fragm.* ed. Gaisf. xiv.

Μύριοί εἰσιν ἀριθμὸν· ἀτὰρ μέτρον γε μέδιμνος.

The word μέδιμνος seems to belong to the same family as μέτρον, *metior*, which is said to be traceable to a Sanskrit root. (Curtius, *De Nominum Græcorum Formatione, Linguarum Cognatarum Ratione habitá*, p. 48. Berlin, 1842).

the gnomon, and the division of the day into twelve hours: and
M. Boeckh, in one of the most learned sections of the *Metrologie*
(iv. 4) has traced the diffusion of the worship of Mylitta, or
Aphrodite Urania, original in Assyria, through the intermediation
of the Phenicians, to Greece, Asia Minor, and Sicily.

In the fifth chapter of his work, M. Boeckh investigates
the value of the Babylonian talent-weight as compared with the
Grecian. Herodotus, in his enumeration of the tribute-money
paid by the various regions subject to the kings of Persia, states
that the greater number of them were directed to pay in silver,
a given number of Babylonian talents; while the Indians were
required to pay in gold, a certain number of Euboic talents: and
he then adds that the Babylonian talent was equivalent to
70 Euboic minæ (Herod. iii. 89). The total sums however, as
Herodotus states them, do not precisely coincide with the items
of his estimate: but there is a confusion either in the calculations
of the historian, or in the text, which cannot be rectified by
the aid of our present MSS., and we are only enabled to see that
the estimate of 70 Euboic minæ is lower than the real value of
the Babylonian talent.

Two other statements are found, of the value of the latter:
Pollux gives it at 70 Attic talents, Ælian at 72 Attic talents.
That the number 72 is more exact than 70, is a reasonable pre-
sumption: but if we attach to Attic talents the value of the Attic
money talent as established by Solon, the three statements of
Herodotus, Pollux, and Ælian, will become absolutely irrecon-
cileable: for the Euboic talent was a weight decidedly and consi-
derably larger than the Solonian Attic talent. But the three
statements come into complete harmony when we interpret the
Attic talents, as stated by Pollux and Ælian, to mean "great
Attic talents," as they are called by Dardanus the ancient Metro-
logue—that is, Attic talents as they stood before the reduction of
Solon. It is ascertained not merely by the evidence of Dardanus,
but by the still more incontrovertible testimony of a published
Athenian inscription, that the "great Athenian talent and mina"
continued in exclusive use at Athens, *as weights,* for several
centuries after Solon—that the debasement introduced by that
legislator applied only to the coins, drachmæ, obols and their

multiples, together with the mina and talent considered as pecu-
niary denominations apart from actual weight. The Attic mina
and talent underwent, by the enactment of Solon, a change similar
to that of the English pound during successive centuries. Our
pound originally contained a full pound weight of standard silver,
and its signification both as money and as weight was identical;
but in process of time the standard was lowered, and its pecuniary
meaning was greatly changed, while its meaning as weight re-
mained unaltered. We know by the evidence of the inscription
above alluded to, that the mina as weight—the *commercial mina,*
as it was formally denominated—was required to weigh 138 Solo-
nian standard drachmæ: and it will be shewn presently that its
exact weight had originally been $138\frac{8}{9}$ of such drachmæ.

Construed in this very rational and admissible sense, the three
accounts of Herodotus, Pollux, and Ælian, respecting the value of
the Babylonian talent will be found concurrent. It is divided
according to the common scale—viz. 60 minæ, and 6000 drachmæ
of its own: and it is equivalent to 72 Euboic minæ each weighing
$138\frac{8}{9}$ Solonian standard drachmæ. In other words, it is equivalent
to 10,000 of these Solonian drachmæ,—the precise value of the
Æginæan talent, according to the express announcement of Pollux,
being in the proportion of 5 : 3 to the Solonian standard. Calcu-
lating by this proportion, the standard weight of a Babylonian or
Æginæan drachma (the 6000th part of a Babylonian or Æginæan
talent) ought to be 112.295 English grains Troy. We are hardly
entitled to expect any remaining actual coins to be of full standard
weight, since almost every state in antiquity coined below its own
standard, even when the standard continued legally unchanged;
and we must allow besides for loss arising from wear and tear.
But it is remarkable that the Persian silver darics, now in the
British Museum, adjusted as they doubtless were to the Baby-
lonian scale by which the silver tribute was measured, do exhibit
a weight of 224 English grains Troy, or a little above—nearly the
exact weight which they ought to have as Babylonian or Æginæan
didrachms.

In the sixth chapter of his work, M. Boeckh enters into an
elaborate examination of the Hebraic, Phenician, and Syrian,
system of weight and money: and he establishes on probable

grounds, that the scale followed in these countries even from very early times, agreed with and was borrowed from the Babylonian. The Hebraic talent had 60 minæ, and 3000 holy shekels or didrachms: of the latter, the best and heaviest specimens now remaining approach so very near to the normal weight of the Babylonian or Æginæan didrachma, that we may confidently reckon them as having been originally the same (c. vi. § 3). It appears however, that the subordinate divisions of the Hebraic scale were not coincident with those of the Æginæan, which portioned the drachma into 6 obols: the Hebraic holy shekel or didrachm was divided into 20 gera, and the common shekel or drachma (the half of the holy shekel) into 10 gera: thus rendering a gera the equivalent of an Attic obolus (vi. 3 and vi. 5). M. Boeckh gives in c. vi. § 7, the weight of a number of different coins, some of various Syrian kings, others of the Phenician cities. The heaviest and least worn amongst them come so near to the normal weight of the Æginæan didrachm as to authorise the conclusion that they were intended to conform to it: and there are several conformable coins, belonging to the Sicilian city of Panormus, which raise an inference that the same standard of weight and money had passed from Tyre to its colony Carthage.

That both the Euboic talent with its subdivisions, and the Babylonian talent with its subdivisions, were in use throughout the Persian empire, is proved by the fact that the tributes to government were required to be paid in them. I may remark however, that it is very doubtful whether the Persian tribute was paid in coined money. Herodotus tells us, that it was the practice of the great king's officers to melt the silver and gold which they received in payment of tribute, and to pour it into large earthenware jars: as soon as the metal cooled, the jars were broken: portions were then detached from the mass when there was occasion to make disbursements[3]. We know farther from the same historian, that the gold and silver in the treasury of Krœsus was principally, if not entirely, uncoined[4]. There

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[3] Herod. iii. 96. Τοῦτον τὸν φόρον θησαυρίζει ὁ βασιλεὺς τρόπῳ τοιῷδε. Ἐς πίθους κεραμίνους τήξας κατεγχέει· πλήσας δὲ τὸ ἄγγος, περιαιρέει τὸν κέραμον· ἐπεὰν δὲ δεηθῇ χρημάτων, κατακόπτει τοσοῦτο ὅσον ἂν ἑκάστοτε δέηται.

[4] Herod. vi. 125.

could be no advantage in receiving coin when it was destined to be melted: moreover, the coins, which the great king might receive at one extremity of his large empire, would be unsuitable for payments at the other extremity, or even at the centre. The object of the requisition was a given weight of fine metal; weighed according to the Euboic, or smaller talent, for the gold; according to the Babylonian, or larger talent, for the silver. I shall have occasion to revert to this point, which I do not find noticed by M. Boeckh, when I come to speak of the conventions between Antiochus and the Romans.

Both the Babylonian and the Euboic scale of weight passed from Asia, probably through the medium of Phenicians, into Greece: the former being adopted principally in Peloponnesus and the Dorian states: in Bœotia, Phokis, Thessaly, Makedonia, and Krete. M. Boeckh adds Achaia to the list: but the passage of Hesychius, on which he relies, is obscure and unsatisfactory[5]. The conventions between Athens, Argos, Elis, and Mantineia, in the Peloponnesian war, respecting the pay of troops, were stipulated in Æginæan drachmæ and triboli; and the reckoning of the assembled Amphiktyonic council was carried on in Æginæan staters or didrachms[6]. There may possibly have been other scales in some Grecian cities coinciding neither with the Æginæan, the Euboic, and the Attic: but we have no distinct information concerning any such. The coins now remaining, of those Grecian states which followed the Æginæan standard, do not exhibit a full proportion of $5:3$ between the Æginæan and the Attic drachma: their actual weight falls decidedly below it. On the ground of this inferior weight, Mr. Hussey, in his instructive *Treatise on the Ancient Weights and Measures*, disputes the correctness of Pollux, in giving the proportion of $5:3$, a statement hitherto universally admitted, and which M. Boeckh successfully vindicates. That states which professed to follow the Æginæan scale, should nevertheless coin a

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[5] Hesych. παχείη δραχμῇ· τὸ δίδραχμον· Ἀχαιοί. When the Achæan confederacy first established itself extensively in Peloponnesus, the cities composing it were bound by a special resolution to use the same weights and measures and coins. Polyb. ii. 37.

[6] Thukyd. v. 47; also Xenoph. *Hellen.* v. 2, 21. Boeckh. *Corp. Inscrip. Græcarum*, No. 1688.