Mensae Ponderariae from the North-Western Black Sea Region. Preliminary Approach

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Abstract: Studies of mensae ponderariae, or σηκώματα, are important for the understanding of economic processes in the Roman Empire. After the pioneer studies undertaken in the 19th century, modern scholars did not pay due attention to these items for a long time. The authors of this paper propose a more systematic approach to the research, focusing only on several ancient tables for measuring capacities found in the North-Western Pontus region. The first stage of the investigation consists of thorough direct observations, gathering data from museum collections, photography, and graphic documentation of samples. An analysis of epigraphic sources gives an opportunity to study the economic processes related to the supply of the Roman army at the Danube limes and the trade relationships in the Black Sea region. The compilation of a corpus of mensae ponderariae from this region would be of paramount significance for the further study of economic history.

Key words: mensae ponderariae, Chersonesos, Emporium Piretensium, Parthicopolis, Mesambria, Municipium Montanensium, Roman period.

Measuring tables were an important element of market squares in ancient cities. In scholarly literature they are often called both sekoma-ta (σηκώματα) in Greek, which is supposed to represent the original idiom for them, and mensae ponderariae in Latin. The second name is a modern denomination given in the 19th century by Italian archaeologists (Cioffi 2014, 42). The term sekoma is known from epigraphic documents and used in relation to weights and measures, where it defines standards in general and acts as a model at the community’s disposal against frauds and the adulteration of measuring instruments in trade (Stroud 1998, 56-61). There is, for example, a measuring table discovered on Delos with an inscription in which the idiom sekoma is used. The inscription refers to an epimeletes who donated a sekoma of hemi-medimmon of grain to the god Apollo (Deonna 1938, 175, # 5; Chankowski / Hasenohr 2014, 29-30, table 7). In written sources sekoma means simply “a measure of” (Cioffi 2014, 42).

In the 19th – early 20th century studies of mensae ponderariae were comprehensive with a pioneering approach (Mazois 1829; Mancini 1870, 144-161; Domaszewski 1892, 144-150; Deonna 1913, 167-179). Most measuring tables found in the following years were just mentioned in reports on excavations among other archaeological materials. Modern studies on tables for measuring capacities lack complex and systematical approaches that would include a compilation of a catalogue of the measuring tables, the development of typology and chronology, and mapping of distribution of different mensa types throughout the

1 We thank A. S. Namoilik for translating the text into English.
ancient Mediterranean. It would be also very important to analyze the metric systems used in different regions of the Mediterranean in the ancient period.

**Mensae ponderariae** served for inspecting the weight of grain, salt, and liquids, being set in a public place in the vicinity of or directly on the *agora*. Inscriptions on the front side of the tables usually mentioned magistrates who controlled and inspected public cargos, trade, and especially measures and weights (*cura urbis*). They ordered these tables after taking office on their own will or following an instruction. City magistrates were also responsible for ratio of weights and measures (*mensurae exaequandae*) that, according to the inscription on the table from Pompeii, contributed to the consolidation of the state. *Aediles* were the most frequently mentioned among the officials monitoring weights and measures. *Duumviri* fulfilled control functions, too (Gaspari / Novšak 2012, 201).

The main characteristics of *mensae ponderariae* are the following:
1. A block of a rectangular (less frequently, round) shape, sometimes with small legs;
2. One or more cavities of different sizes arranged in one or several rows on the surface;
3. Some cavities had through holes in their bottoms.

In some cases, cavities had a small roll that prevented spilling of liquids during the process of pouring. Cavities without through holes had no rolls around their edges. After the check measurement of a bulk product had been performed, the hollows of this type were thoroughly cleaned by taking out the contents over the edge. The inner surface of hollows could be smoothed, but in most cases it was rough. Larger cavities had broad apertures or metal pipes in their bottoms, so that contents could be poured out directly in containers (wineskins, *amphorae*, or other vessels). The cavities were a little bigger than the corresponding measuring vessels (*mensurae*), which should be taken into account while determining their capacities. The *mensurae* were bronze vessels with bucket-shaped bodies. One of the samples was discovered outside the fort of Carvoran on Hadrian’s Wall (Britannia). There is an inscription on its outer surface informing that it was made during the reign of the Emperor Domitian in the late 1st century AD and it holds 17½ *sextarii*. In fact it comprises 20.8 *sextarii*. It has been suggested that it was a device to defraud farmers when they paid the corn tax (*annona*) (Liversidge 1968, 177).

Octavian Augustus implemented a number of economic reforms which had a significant effect on the development of the Roman Empire in the subsequent years. The currency reform and the unification of tax policy became of great importance for economic development. At the beginning of the reign of Augustus, Hellenistic tax systems still persisted in some eastern provinces, though they were gradually replaced by taxation under the Roman rule. An essential part of the taxation reform was the unification of measuring units. The ancient Roman units were largely built on the Hellenic system. The Greek *hemina*, or *kotyle* corresponded to 1/12 *congios* (273 ml), and 1/6 *congios*, to a *sextarius* (Hultsch 1882, 34, 104, 117). In the Roman period, both liquid and dry measures were based on *sextarius*. As no two surviving samples of *sextarius* are identical, scholarly opinion ranges from 549.28 ml to 580 ml (Cardarelli 2003, 74-75).
During the period of the Principate, measuring tables were not only an instrument of inspecting sellers for compliance with standards in the city and rural markets, but also became an important element in the process of purchasing grain at fixed prices from the rural people in some Roman provinces. The unified units of measure facilitated the following of determined tax rates in all the provinces of the Roman Empire. However, there are precedents when the capacity of mensurae does not meet the standards (Liversidge 1968, 177). In such a way officials could deceive sellers of grain.

Several measuring tables have been uncovered in the territory of the Roman provinces of Thrace, Moesia Inferior, and Moesia Superior (fig. 1/1). A fragment of a marble table was found in Mesambria (Thrace), one of the largest centers of the Western Black Sea region (fig. 3/1). Its preserved length is 123 cm, the width is 47 cm, and the thickness is 16 cm². Six cup-shaped cavities have fully survived on the upper surface of the table. Three other cavities, in a state of partial preservation, were identified on the line of broken edges. There are thoroughly drilled through holes in the bottom of every cavity. The hollows are situated irregularly in several rows. The sekoma dates back to the 2nd – 3rd century AD.

A fragment of another marble rectangular mensa ponderaria of the first centuries AD with six typical cup-shaped cavities arranged in two rows and a relief image of a caduceus was discovered in Parthicopolis (modern Sandanski in South-Western Bulgaria) (Димитрова-Милчева 2002, 275; Нанков 2017) (fig. 3/2).

A perfectly preserved marble measuring table originates from Perinthos-Herakleia in Thrace. On its surface, there are nine hollows arranged in one row in ascending order by volume³.

The described sekomata were evidently set in public places, being intended for city control over compliance with the standards in commercial operations. Mensae ponderariae of a similar shape were also found in Pompeii, Tivoli, Ostia, Piraeus, Salinas, Dion, Assos, Delos, Thasos, Naxos, and Leptis Magna (fig. 5/1-5).

In the province of Moesia Inferior, in close proximity to the border of the Empire, fragments of two massive measuring tables were discovered in the territory of a statio and emporium.

A fragment of a marble mensa ponderaria was found in Moesia Inferior, in a room of “Villa # 3”, in the vicinity of Municipium Montanensium (Александров 1984, 23) (fig. 3/3-4). The width of the fragment is 80 cm, the length is 70 cm, and the height is 40 cm. On its surface, there are two cup-shaped cavities with round apertures in their bottoms. One of the cavities is preserved partially. The larger one, with a roll on the edge, is 32 cm in diameter and 30 cm in depth. Its volume was probably equal to one modius. The smaller cavity, 20 cm in diameter and 30 cm in depth, could hold a semimodius. The inner surface of the hollows is treated roughly. The mensa is dated back to the late 2nd – 3rd century AD (Велков / Александров 1994, 6, # 8, инв. # 387; IGBulg V 5160). An inscription in ancient Greek is carved on its lateral face:

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[- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - ]
[πρεσβ(ευτοῦ) Σεβ(αστοῦ) ἀντιστρατήγου - - -]
ΠΑ.Ο Πομπείου Διογένους - - - - - - - - - -
ἐπιστάθμου στατιῶνος Αὐρήλιος [- - - - - - - - - - - - - - - -]
Εὐτυχῶς.
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² This mensa ponderaria is exhibited in the Archaeological museum in Varna (Bulgaria). The authors express their sincere gratitude to Dr. Valeri Yotov for the useful information and for providing photos.

³ We thank Dr. Milena Raycheva for the information. Unfortunately, we have not had an opportunity to carry out independent measurements.
It is clear from the inscription that the table was made by order of Aurelius, probably in honor of a governor of Moesia Inferior, whose name has not survived, and a head of a station (ἐπιστάθμου στατιώνος), Pompeius Diogenes. The Greek word στατιών corresponds to the Roman statio cursus publici, i.e. a station of the state road. The text provides information that a garrison of Roman soldiers was deployed at this station (Велков / Александров 1994, 6).

Not only is the content of the inscription of interest, but also the reason for using Greek in the territory where Latin dominated. Why in such a remote from the Greek colonies place does the Roman legionnaire use Greek in an inscription? There are several possible explanations of this fact. On the one hand, in Montana and its vicinity the local Romanized population and natives of Italy lived together with the Greek migrants from Asia Minor. It is possible that part of the rural people engaged in the cultivation of grains and grapes preferred Greek. On the other hand, judging from the name, the head of the station Pompeius Diogenes was of Greek origin. Unfortunately, the reasons

Fig. 1. 1 Map of Bulgaria with major ancient sites (after R. Ivanov, S. Gochev, R. Konstantinova); 2 map of the Black Sea region (after Carter 2003, 18, map 3/2)
for such choice cannot be defined for sure. Nevertheless, the mere fact of using Greek in the inscription on a mensa ponderaria points to the great significance of the Greek-speaking population in this region.

The text of the inscription shows that the measuring table was intended for στατιών, or statio cursus publici, functioning not only as a stronghold on the Roman road, but also as a trading center where farmers from all around gathered in high season. The main products in this region were wine and grain. A large part of grain was sold through free market. Merchants could count on making a profit. Grain was also collected as tax in kind; some of this was distributed to officials and soldiers, and some was sold at market rates. Pompeius Diogenes was probably a praefectus annonae. His responsibilities included care of grain supply (cura annonae). As it is evident from the inscription, a small garrison protected the Roman state road ensuring secure transportation of goods up to destination points. Products were intended mainly for vexillatio legionis XI Claudiae and vexillatio legionis I Italicae stationed in Montana in the first centuries AD and numerus civium Romanorum, in the second half of the 3rd century AD (Велков / Александров 1994, 6).
Similar tables for the measurement of grain were found, for example in Side (Lycia and Pamphylia) (fig. 5/6), Tivoli, Ostia (Italia), Delos, and Messene (Achaia). These samples have quite big apertures in their bottoms, while the mensa from the Montana district has a through hole analogous to those in liquid-measuring cavities. A rather high roll on the edge of the hollow also might indicate that it was used for measuring volumes of liquids, for example wine.

The other fragment belongs to a massive stone table with preserved six cavities arranged in two rows and was found in Gorsko Kosovo (Northern Bulgaria) (fig. 2/1, 3-5) (Domaszewski 1892, 144-145; Gerov 1988, 119, 155-156). This mensa dated to the 2nd – 3rd century AD is unique for two reasons: firstly, it has inscriptions both in Latin and Greek, and, secondly, the inscriptions naming units of measure have survived beside every cavity.

On the lateral face, there is a partially preserved inscription in Latin (CIL III 12415; ILBulg 401; IGBulg II 695):

[- - - - - - - - - - - -]
[empori]archa em-
pori Piretensium
de suo posuit.

This mensa ponderaria was set in Emporium Piretensium near Nicopolis ad Istrum in Moesia Inferior (Tserov 2005, 47-51).

Inscriptions naming measures of capacity have preserved on its surface, in front of every cavity (fig. 2/2). In the lower line, in front of the first round hollow, there is an inscription HMEINA (ἡμεῖνα) – the Roman unit of volume of liquid and bulk materials which corresponds to the Greek kotyle, or ½ sextarius. In front of the second cavity of the same line, we read the word ΞΕΣΤΗΣ (ξέστης). This is the Greek unit of volume corresponding to the Roman sextarius. The word is followed by letters OIN, as additional information to the main measure. The whole text can be understood as ξέστης οἴν(ου) – a special unit for the measurement of wine. The next cavity in this line, square in shape, is also inscribed: ΣΗΜΟΔΙΝ (σημόδι(ο)ν) – the Roman semodius, or ½ modius. Two letters MO are clearly visible in front of the following, partially preserved rectangular cavity. The word is obviously to be read as μό(διος), or 1 modius.

An inscription HMEINA (ἡμεῖνα) is distinctly seen in the upper row. The adjacent hollow marked as ΞΕΣΤΗΣ ΕΛΗΡ was apparently intended for measuring volumes of olive oil: ξέστης ἐλ(αι)ηρ(ός).

This sekoma is singular as the inscriptions name units for measuring certain products – wine and olive oil. Olive oil was not produced in this part of the Black Sea basin, being imported from Asia Minor, the islands of the Aegean Sea, etc. The choice of language for marking units of measurement was perhaps preconditioned by the presence of Greeks from Asia Minor who settled not only in Nicopolis ad Istrum, but also in its territory.

Fragments of a measuring table similar in shape were discovered on the Forum of the Roman Asseria (Dalmatia). Covering two opposite sides, the inscription is interrupted on one side at the name C·OPPIV [S..........] / TI·C [... to be continued on the opposite side with MIL LEG, probably TRIB[VNVS] MIL[ITVM] LEG[IONIS]. It
could be Gaius Oppius, either still in that function or afterwards, probably as praefectus annonae or as aedile, caused the table to be erected on the Forum of Ancient Asseria (Jeličić 1980, 65-67).

In the Northern Black Sea region, a fragment of a massive mensa ponderaria of the same period with three cavities was found in the quarter # 45 of Tauric Chersonesos. The fragment of a large limestone block was mounted into the wall of the southern corner of the Early Byzantine basilica. It is obvious that in the Early Byzantine period the table had been broken into several unequal pieces which were used as building material during the erection of a basilica together with other architectural details and elements of large ancient public buildings (fig. 4/1-3). The maximum preserved length of the fragment is 94.0 cm, its maximum preserved width is 47.0 cm, and its height is 18.1 cm. The entire table could have been as long as 1.15 cm. Three cavities for measuring volumes of products have partially survived on its surface. Two of them had apertures in their bottoms (fig. 4/4). The volume of the first small cavity is 0.55 l that corresponds to a sextarius, the second one contained 3.275 l (congius), and the third and largest one, 6.185 l, or 2 congia.

The Roman mensa ponderaria from Chersonesos is likely to have had three cavities. A similar weights-and-measures table was found on the Forum in Leptis Magna (Africa Proconsularis). In Chersonesos, the mensa was set at the agora or its close vicinity.

A small fragment of a mensa ponderaria (Chersonesos museum, inv. # 7/37561) (fig. 4/5) was discovered in the layer of fire of the first half of the 14th century in the room # 2 of the quarter # 45 in Chersonesos. The table was made of local fine-grained sandstone. Its dimensions are 7.8 x 8.8 cm, and its height is 2.2 and 2.6 cm. It was also reused as building material for a Byzantine structure. This fragment belonged to an earlier table, probably, a Hellenistic one, and served for measuring dry products, among them salt.

Mensae ponderariae are known in many ancient cities of the Mediterranean. However, in the North-Western Black Sea region they are represented only by a few fragments (Frayn 1993, 113). The most famous measuring tables are the mensa installed in a narrow niche of a portico near the temple of Apollo in Pompeii (CIL X 793) and two mensae from the building specially designed for keeping official measures (ponderarium) in Tivoli not far from Rome (CIL XIV 3687-3688) (Corti 2001, 220-221, fig. 5). A similar stone table with six hollows of different diameters is exhibited at the entrance to the macellum in Dion (Macedonia). On its side surface, there is a two-line inscription in Latin which says that the first aedile L. Cassius has set [the table] at his expense, and the duumvir has formally adopted it. Another marble mensa ponderaria with five cup-shaped cavities was found in the immediate neighborhood of the agora in Assos (Asia). It is 110.3 x 45.8 x 21.6 cm in size. There are traces of abbreviated ancient Greek names of units for measuring volumes of liquid and bulk products on the table surface in front of every hollow except one (B). These are κοτύλη (A), ξέστης (C), χοῦς (D), and τρίχους (E) (Tarbell 1891, 441-442). A mensa ponderaria of similar type dated back to the first centuries AD was discovered in Emona (Italia). Its dimensions are 180 x 50 x 26 cm. The researchers who found this artifact managed to calculate that the first (biggest) hollow comprised 13.67 l, or 1.566 modia, and the next...
ones, 4.32 l (0.495 modia) and 1.86 l (0.213 modia) correspondingly (Gaspari / Novšak 2012, 200).

The number of cavities in mensae ponderariae could be no more than three. We know two examples, and both of them originate from the Western Mediterranean. One of them, a square table bearing three hollows with proportions 1:2, 1:4, and 1:16, was discovered at the foot of the acropolis in Salina (Sicily), and the other one, at the marketplace in Leptis Magna (Africa Proconsularis).

Fragments of a big measuring table with irregularly situated cavities were found on the forum in Asseria (Dalmatia). One of the fragments has the dimensions of 20 x 38 cm and the height of 29.5 cm. Only two hollows on its upper face are completely preserved. One of them comprised 0.900 l and the other 0.500 l (Jeličić 1980, 62-64). There is a letter L (libra) near the first cavity and letters LIB (libra) near the second one. Two other hollows have been partially preserved. One of them is also marked as L (libra). There are symbols S-I (= sextarius unus?) along the broken edge of the table, the cavity itself being fully destroyed. Both surviving hollows had no typical apertures in the bottoms, unlike the damaged one with the letter L. The Roman unit of

Fig. 4. Mensa ponderaria from Chersonesos in Taurica: 1 the southern corner of the basilica in the block # 45; 2-3 fragment of a limestone mensa in situ in the wall of the basilica (photos: E. Klenina); 4-5 details of the mensa ponderaria.
weight libra amounts to 328.9 g. It is worth mentioning that units of weight, and not volume, were preferred in this case.

A mensa ponderaria from Montellano (Baetica) of the first centuries AD somewhat differs in shape. It is an irregular block (78 x 49 x 19 cm) with five hollows for measuring which held 4.5 l (semodius), 1.5 l, 0.2 l, 0.2 l (hemina), and 0.1 l (quartarius) corresponding. Presumably, the table was used in order to measure the volume of wheat or barley and maybe lime and sand (Fernández Gómez 2004, 132; Lange 2010, 277-278).

In conclusion, there are several points to outline. The 19th century research of mensae ponderariae studied mostly philological data and gave a valid background to begin. Modern knowledge should be integrated with a new view, focused on the systematic comparison with archaeological finds. The analysis of new data suggests that Roman metrology was predominantly based on the sexagesimal system. In the Greco-Roman cities such as Mesambria, Parthicopolis, Perinthos, Chersonesos, mensae with a standard set of cavities for measuring were used. On them, there are no references to units and magistrates who fulfilled control functions, which bears evidence of a steady trend to use certain units for measuring products. Tables of similar type were spread in the cities of the Aegean Sea basin, too.

Mensae of another type originate from the border provinces. Both
samples have votive inscriptions which inform of officials controlling trade and taxes. One of the *mensae ponderariae* has clearly indicated measurement units over every cavity. Further research will let us study metrology and commercial relations in the North-Western Black Sea region in more details.

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