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UDC 389.1(091)(497)

SOME PARALLELS BETWEEN BALKAN POPULAR AND MYCENAEAN MEASURES OF VOLUME FOR DRY MATERIALS

Contents: 1. Possible parallels between Mycenaean and contemporary Balkan popular measures of volume for dry materials. – 2. Reasons for metric and terminological diversity of the Balkan popular measures. – 3. Attempts at reconstructing the Balkan-Macedonian popular volumetric system – 4. Metrological and linguistic analysis of the main units among the Balkan popular measures. – 5. Parallels of the Balkan popular measures with corresponding ones in the ancient volumetric systems. – 6 Common basis, influence and tradition in the development of the metric systems. – 7. Conclusions.

1. E. L. Bennett, Jr. gave a detailed description and analysis of the Ohrid *kutel*[1], presented to the participants of the VIII Mycenaean Colloquium (Sept.15–20, 1985 in Ohrid), and found that it corresponds to the Mycenaean tenth part of the main volumetric unit for dry materials (T), but noticed: „As for the question of pertinence of this *kutel* to the system of weights and measures known from Linear B, our initial enthusiasm should be tempered by great caution. The marked divisions of the *kutel*'s volume, which permit direct measurement of its half and of two-thirds, suggest but do not in themselves confirm the existence of a physical measure (whose name is still unknown to me) of one-sixth of a *kutel*. And the shape and function of the larger measure, the *kilo*, is equally unknown, though its volume as 93 (-95-98) kg of wheat can readily be accepted. Just as for the Linear B systems of measurement we would be greatly helped by the appearance of some of the physical measures there represented, so for the *kutel* we would be greatly helped by the publication (or perhaps reference to publication) of records in which the *kutel* and its companions were used for measurement. To expect to find a continuous tradition which would link this modern and solid

[1] *Tractata Mycenaea*, Skopje 1987, 62–64; *Studies in Mycenaean and Classical Greek Presented to John Chadwick, Minos XX–XXII*, 1987, „To Take the Measure of Mycenaean Measures", 89–95.

measure with the Linear B notations of measures is unreasonable – but a pleasant dream." Therefore he eagerly appealed to those who know the language and people of that region to make proper inquiries about the history and affinities of the *kutel* as a measure, and if modern counterparts (undoubtedly of plastic) are still in use to discover how the *kutel* was actually used and in what relationship to other measures.

In a letter of March 1986, among other things, I informed Prof. Bennett of the following: „Last weekend I went to Elšani and talked with the man through whom I got the *kutel.* He is, in fact, a carpenter who also makes kutels among other things for villagers. When I went to him last summer, he proposed to make a new *kutel* for me, but I preferred the old one. Then he brought me the one from Ilo Gelevski. I noticed that the piece previously inserted was simply putrified and I asked him to replace it. Three days later (at the end of August), his son brought me the repaired *kutel.* Last week, when I visited the carpenter, I asked him how he makes the *kutels* and whether they are all the same size. He answered that he must always have an old *kutel* in order to take the exact dimensions from it. A *kutel* must contain 7 1/2 *oka* wheat, which makes 9.6 kg (1 oka = 1.280 kg). „One day," he said, „the cowherd of the village came to me and asked me to make a bigger *kutel* for him in order to collect more wheat from the villagers. For a long time I did not want to do that. But since he insisted very much, I made a bigger *kutel* for him. After a few days the cowherd came to me asking me to remake the *kutel* according to the standard size, because the villagers refused to measure grain with his *kutel*".

Even today in some of our villages the *kutel* is an important measure in widespread use. The surface of fields is counted according to the seed measured in *kutels* (5 kutels = one *osmak*, 2 *osmaks* (10 kutels) = 1 *kilo*. When a peasant wanted to load his ass with corn, he would measure twice 5 *kutels* (two *osmaks*) in two sacks and put them one on each side of his donkey.

Common services in a village (cowherd, swineherd, sexton, field-keeper, public crier – κῆρυξ, etc.) were usually paid in wheat, measured by the *kutel*, e.g. the cowherd, swineherd, etc., were paid one *kutel* per head of animals for six months (from 6th May, St.George, to 8th of November, St. Demetrius). People used *tallies* for recording: so many *kutels* for so many cows, oxen, calves, swine, etc. They used to sell wheat by *kutels*, the same as they did in the classical period, cf. κοτυλίζω. I could not find anybody who knows the name of the smaller parts of the *kutel*. However, I remember from my childhood that my grand-mother used to measure small quantities of flour, wheat, beans, etc. with a *vagan*. In our country it is a bigger dish, made of clay, which contains about 1 1/2 – 2.0 litres. *Vagans* were, and still are used as common plates for several people to eat food from them on a round table called a *sofra*. I obtained another *kutel* from a mountain village (Slatinski Čiflik) near Ohrid. It is the same as the one you have got. But this one is not divided into smaller parts. I am looking for other *kutels* with subdivisions. The *kutel* I obtained recently is also made of one piece of salix. Its handle is also an indivisible part, made of the same trunk. It is quite old, but yours is very likely much older.

The weight of the material contained in a *kutel* differs according to the kind of corn: oats – about 6 kg, barley – about 8 kg, wheat – the new sort is nearly 10 kg, but the earlier sorts were a little bit lighter, about 9 1/2 kg.

In some places in Macedonia the *unit* (*donkey-load*) is subdivided into 8 parts. I think that this subdivision is rather recent (?). When *tins* (for petrol) began to be used, a *kutel* was replaced by a *tin* of about 12 kg, because of practical reasons (their standard size). Four such measures are equal to 1 *osmak*, called in these places *tagar* (i.e. a burden that can be carried by a man on his shoulders, or one half of a *donkey-load*), eight *tins* = 1 *kilo* (a *load*). In Struga (14 km from Ohrid, to the west) there is a workshop where *kutels* like the one you have are made from thick tin, and in other places (e.g. the villages round Skopje) wooden *kutels*, called *shiniks* (χοίνικες) are made to a size of about 12 kg wheat. But in the villages round Skopje there is still another measure, called *buçuk*, a wooden vessel which contains about 18–19 *okas*. I suppose that it is a *double kutel*. I also saw a wooden vessel, an *osmak*, which contains 45–48 kg."

E. L. Bennett found that „the letter was full of so much information," adding: „I am helped tremendously toward an understanding of its use and nature. Let me say right away that I do think you should write this material up. It will be useful for Linear B, to be sure, but I think also that others interested in historical metrology, and in anthropology in general, will find useful materials there" (his letter of 11 Apr. 1986).

2. However, I was not satisfied with data on measures from only the western part of Macedonia, known best to me. Examining the measures of volume for dry materials which are still used in some mountain villages in this region, I came across some problems, which prevented me from reconstructing the whole system: a. the term *osmak* 'the eight', which denotes a quantity of one half of a *kilo,* does not correspond to the number of its composite parts, because it consists of five, not of eight *kutels.* Therefore I wanted to compare the data on the measures from the western part of Macedonia with corresponding ones from a wider Balkan region and to define the place of the metric system to which *the Ohrid kutel* belongs. But when I expanded my investigation of measures, first to the republics of the former Yugoslavia, then to other Balkan countries, I was simply disappointed by the great diversity of the volumetric units with different capacities and their terminology. I realized that this complicated material cannot be understood, without a systematic metrological and historical approach.

One of the reasons for the diversity of their capacity is the fact that the vessels, usually intended for other practical aims and also used for measurement, are hand-made. Naturally, they are not precise and they do not guarantee an absolutely equal size. On the other

hand, there is a dialectical and linguistic discrepancy: one and the same term in different places is used with different meanings and denotes various volumetric values. Quite often one and the same measure is called by different terms in various places.

There are also some other reasons for terminological and metrological differences in the popular Balkan measures. Before their immigration to the Balkan Peninsula, the South Slavonic peoples certainly used their own inherited measures[2] for grain, together with their names and corresponding vessels. In the half-Romanized and half-Hellenized Balkan enviroments, they entered into contact with people who used other measures, or at least different terms. On the main roads, they could see Roman mile-stones, and at the market balances and weights of various size (some of which can be seen in the present day museums). The influence of their neighbours, living in one and the same society, on the use of the same measures and their names was inevitable. Then frequent political, economic, social (feudal) changes in the Balkans also caused numerous changes in the terminology and the size of the measures. Sometimes the metric terms were kept, but their contents changed, or, more often, the terms were changed (the old names were replaced by new ones: Greek, Latin or Turkish) for the same volumetric quantity, known before. In this complicated situation it seems simply impossible for one to find an absolute value of the measures, valid for ever and for everywhere. I had serious doubts especially about the measures smaller than the *kutel* and its subdivisions (*vagan* and *grst*). For a long time I could not find either their terms (names) or vessels with a corresponding capacity.

3. When I read the article on ϝάγανον of the Boeotian (Thespian) inscription in J. Chadwick's *Lexicographica Graeca* (117–119), *SEG* 24.361, last January, I received new ideas about the *vagan* as a kitchen utensil and measure. Then I re-examined once again the entire material gathered on Balkan popular measures, revising the results I obtained ten years ago. I checked up numerous vessels, kept in our museums and in some villages where they are still used. In spite of the great diversity of vessels concerning their measures and their names, on the basis of a linguistic and metrological analysis I could clearly see some common points in their division and subdivision.

[2] Along with the natural measures accessible to everybody, e.g. for length: *prst* 'finger', *palec* 'thumb', *dlan* 'palm', *peda* 'span, inch', *lakt* 'elbow', *sažen* 'span, stretch of both hands', *stapka* 'foot, passus'; for height: *glužd* 'ankle', *kolena* 'knees', *pojas* 'waist', *ramena* 'shoulders'; for surface: *ralo* 'yoke'; for weight: *od oko* 'ad oculum'; for distance: *osten* 'goad'; for quantity: *raka*, *šepa* 'handful', *grst* 'quantity that can be held with both palms; they also had vessels used as measures, e.g. *vedro* 'bucket'; *spond* 'bushel, *vagan*, *panica*, 'bowl', etc.

In Macedonia, as well as in some other Balkan regions, four main volumetric units were used, and in some places they are still used: a. *kilo,* equated with a *load*; b. *kutel*, in recent times replaced by (petrol) *tin*, but still called *kutel*; c. *vagan* (with its synonyms *misur* and *panica*), and d. *grst* (a quantity that can be held in both hands). Every one of these four measures, except the smallest one (*grst*), is divided into *halves*, usually known under separate names: α. half a kilo = 1 *osmak*, or somewhere *tagar*; half of a horse-load is called a *strana* 'side'; β. half an *osmak* (/*tagar*) = 1 *shinik*; γ. *half kutel*, documented by separate wooden vessel-measures; δ. half *vagan* (/*misur*, *panica*) = 1 *ispol*, and ε.one half of the *ispol* = 1 *crpalka, kutlica* 'ladle' with the volume of one *grst.* The sizes of the measures, often different from place to place, do not always coincide with standard measures, which are quite stable and valid for a large territory, neither does the number of parts correspond to the meaning of every metric term.

However, measuring and analysing the old wooden vessels in our museums and in some villages where they are still produced and used as measures, I found that they can be classified in three general systems, which share some common elements of their essential structure.

a.) Starting from a linguistic analysis of the volumetric term *osmak*, Gr. ὀχτάρι, It. *ottavo*, Lat. *octavus* (half of a donkey-load), obviously containing eight smaller parts, one cannot escape the conclusion that the main measure of volume for dry materials in that system was divided into 16 parts. I noticed that such a subdivision was in use over a wide Balkan territory.

b.) Half a load of the second system is also called *osmak* 'the eight', which does not correspond semantically to the number of its parts, because it does not contain 8, but 5 *kutels*, which means that the main biggest unit, a donkey load (*kilo*), was divided into 10 parts.

c.) The third system is a combination of the first two. Its half is called a *strana* 'side', (one half of a horse-load) which consists of 6 *kutels* (of the Ohrid type), equal to 5 bigger *kutels,* or (in the plains) 6 bigger *kutels,* equal to 5 full *tins* (for their quantities see below 6.c).

4. *Survey of the main Balkan-Macedonian popular volumetric units* with the size in descending order:

a.) The term for the main and biggest metric unit, *load,* is not so frequently used as its half, *osmak* or *tagar,* like the classical Greek *medimnos* of approximately the same capacity. However, all the smaller volumetric parts depend on the *load.* Its general usage is as a measure of weight both for solid and liquid materials, but from

remote times the *load* was also considered as a measure of volume for grain and other pourable materials. Its weight depends on the animal that carries the burden: horse, donkey, mule, camel, etc., as well as on the kind of grain and its specific weight. From the oldest times the *load* was also considered as the main volumetric unit. It represents a burden which can be carried, usually by a donkey, a common domestic animal for transport in the Eastern, Mediterranean and Balkan regions, up to the river Drina[3]. In Mesopotamia the donkey load, *imêru,* was also such a volumetric unit, used both for weight and surface. This meaning is also reflected in Modern Greek γομάρι 'load' and 'ass'. In the Balkan Slavonic languages this word was accepted with a metathesis *g..m* > *m..g*, and a regressive assimilation of *o..a* > *a..a*, *magare*, which replaced the O.Ch.Sl. *osel,* probably from Lat. *asellus*, dim. of *asinus*. The Clasical Gr. word for *load*, φορτίος, φορτίον < φέρω, contains only the idea of carrying, whereas the animal is not indicated. However, from the quantity contained in half a φορτίον, μέδιμνος (Attic *medimnos* = 52,5 l.), one could conclude that it was a donkey load.

The quantity of a *tovar* (*load*) of grain in South-Western Macedonia is called a *kilo*. The etymology of this term has often been a subject of long discussions. Some scholars connect it with Gr. κοῖλον < adj. κοῖλος (poet. κόιλος) 'hollow', used as a measure for volumen (Germ. *Scheffel*, Fr. *boisseau*)[4].

The Greek word κοῖλος has been known since Mycenaean times, cf. *ko-wi-ro-wo-ko /kowiloworgoi/*, plur. 'makers of hollow ware' (Maced.: *vaganari, shinitsari*). If the measure *kilo* was derived from κοῖλος, it would certainly be documented in Greek earlier. But the term *kilo* appears in the Balkans from the XV century onwards. The first record of *kilo* in Macedonia dates from 1469[5]. There is no doubt that the Turks transferred this word to the Balkans, and Barbiér[6] correctly connected it with the Arabic root *k-j-l*, *keil* (*keyl*) and the Turkish (vernacular) *kilo* and (literary) *kîle*, with the meaning „measure". The majority of the metric terms in IE languages are also derived from the stems of this semantic circle (cf. J. Pokorny *IEW*

[3] To the north-west of the river Drina and to the north of the Sava – Danube a *load* usually represents a burden for a horse.

[4] Cf. G. Meyer, *Etymologisches Wörterbuch der albanesischen Sprache,* Strassburg 1891, 226; E. Berneker, *Slavisches etym. Wb.,* Heidelberg 1908–13, s.v.; V. Mošin, *Spomenik XCII,* 166; P. Skok, *Etim. rj. srp. ili hrv. j.* s.v. *ćila.*

[5] When Isa-Bej gave his Vakufname for his foundation in Skopje and assessed a tax on bread of two and a half *kilos* of flour, cf. *Гласник Скопског научног друштва I*, 1926, 421; Г. Елезовиќ, *Турски споменици I,* fasc. 1, 121; М. Влајинац, *Речник наших старих мера I–IV,* Beograd (SAN), 1961–1974, s.v.

[6] A. S. Barbiér de Meynard, *Dictionnaire turc-français*, Paris 1881–1886, s.v.; cf. also Ф. Бајрактаревиќ, *Гласник историјског друштва у Н. Сад*у, V, 350; Ν. 'Ανδιώτη, 'Ετυμολογικὸ Λεξικὸ τῆς νεοελληνικῆς, s.v.

s.v. **m-e-t-*, **mē-ti/to*, **mē-no;* P. Chantraine, *DELG*, s.vv; A. Ernout – A. Meillet, *DLL*, s.vv.).

The term *kilo* was used over a large territory, governed by Turks, but with different volumetric values. The *Stambol kilo* weighed 18–22 *oka*s, depending on the kind of grain. The *Salonikan kilo* was 3 3/4 heavier than the *Stambol* one, i.e. *ca.* 85 *oka*s of wheat. Bitola, geographically and commercially connected with Salonika, had a *kilo* with the same contents (85 *oka*s). A *kilo* of the same capacity was also used in other Macedonian towns and G.Young[7] determined the *Macedonian kilo* as having a capacity of about 160 l. i.e. 87–100 *oka*s wheat, 68–80 barley, 45–50 oats. The *Ohrid* and *Struga kilo* was about 60 *oka*s[8] . I found that it is 70–75 *oka*s heavy, i.e. 90–96 kg, as Hadzi-Vasiljević also did (*Brastvo* 31,153). In South-eastern Albania, a *kilo* is 40 *oka*s, a double *Stambol kilo.* In South Bulgaria a *kilo* weighs 24 *oka*s and going to the north-west (to Vidin), it becomes heavier and heavier, about 90 *oka*s, as in Serbia[9].

b.) The measure of one half of a *kilo*, as we have already mentioned, an *osmak*, is in some places known under the name of *tagar* 'burden' and *vrekja, vrešta* 'sack'.

Wooden vessels called *osmaks* with a capacity of about 50 l. can still be found in some Macedonian villages and in the museums. Until recently special sacks were woven from goat-hair, called *osmaks*, with the same volume. The *osmak* is a very old Balkan measure, but its eight parts have been forgotten *(Rječnik Jugoslavenske akademije [RJA]*, s.v.). However, they can be reconstructed from the rare wooden vessels kept in the museums. Among them there are vessels for *half kutels*, of about 6–7 l. (6 kg)[10]. Eight such smaller *kutels* contain the same capacity as 5 of the Ohrid type, of 10–11 l. (9.6 kg) or 4 bigger *kutels* of 13.5 l. (12 kg) = 48 kg. The latter is equal to a double small *kutel*, of 6 kg. In Serbia and Vojvodina 1 *merov* (= *strana*, a half horse-load) of 60 *oka*s contained 4 *meritsas*

[7] *Corps de droits Ottoman,* Oxford, 1906, 373.

[8] *Сборник на български народни умотворения,* София, 1891–94, VIII, 30.

[9] In Dalmatia, the *star/ium* was a measure corresponding to a *kilo* with a capacity of about 100 *oka*s, i.e. a horse-load. It is explained as a derivation from Lat. *sextarium/us* (J. Stulli Dubrovcsanin, *Lexicon latino-italico-illirico,* Budae 1801, s.v.; Ґ. Даничић, *Рјечник из књижевних старина српских,* I–III, Биоград 1863–4, s.v.; М. Решетар, *Дубровачка нумизматика*, Сремски Карловци 1924, 89, 689: „Venetus *sextarius,* vulgo *sta(r)io*; В. Караџић, *Српски рјечник, s.v.*; Влајинац, o.c. 866–877), but it seems more probable that *star* is from the Gr. στάρι < σιτάρι. It is used „apud mare" (В. Караџић, s.v.), where numerous Greek colonies have been situated since archaic and classical times.

[10] Dončo Jovanovski, at the age of 81, from the village of Dobrenovec, now a miller in Starovec, remembers from his childhood how they used a *kutel* of about 12 kg, and a *kutle*, dim. i.e a *half kutel* of about 6 kg wheat.

of 15 *oka*s, or eight *half meritsas* of 7.5 *oka*s. M. Vlajinac (o.c. 587) mentions an account book of 1791/2, where some quantities of corn were registered. They were noted in whole *merovs*, as well as in their smaller parts: 1/8, 2/8, 3/8... 7/8, which shows that 1 *merov* was divided into eight units. In Croatia a corresponding measure for this quantity was a *vagan*, of 62.5 l., divided into eight parts, called *osmaks*. Thus in Virovitica every conjugal pair was obliged to give annually „an *osmak* of grain" (about 8 l.) to the priest (i.e. to church)[11]. The Serbian *half meritsa*, Croatian *osmak* and Macedonian *kutle*, i.e. *half kutel*, are of different size, but they represent the same subdivision of one half of a *load* (in Serbia and Croatia of a horse-load, and in Macedonia of a donkey-load) into eight units. One *Stambol kilo* of about 22 *oka*s (37 l.) also contained 8 *kuties* „boxes" of 4,625 l. Thus, the contents of the measures were various, and called by different names, but the principle of their subdivision was generally the same.

Along with this division of an *osmak* into eight parts (already forgotten) this volumetric unit in the central and south-western regions of Macedonia consists of 5 parts (*kutels*) of 7.5 *oka*s (9.6 kg), i.e. 10–11 l. This division today is still in practice and it is abundantly documented in literature from the last and this century, cf. K. Šapkarev (o.c., see above n.8). The term *osmak* is kept although it is divided into five, not into eight parts. It is difficult to say whether the division of the main unit *kilo* into 10 parts (2 × 5) or that into 16 parts (2 × 8) is older. The quantity of an *osmak* and its division into 5 smaller units corresponds to the *sack* in Montenegro and Dubrovnik (one half of a load, 50 *oka*s), which consists of 5 *uboraks*[12]. It is significant that with the seed contained in an *uborak* the same surface can be sown as with that of a *kutel*, i.e. 400m^2.

Instead of *osmak*, for the same quantity of grain in other parts of Macedonia the term *tagar* is used. This term appears not only in the South Slavonic languages, but also in Romanian *tagar*, Gr. ταγάρι, Alb. *tagar* (but here with another meaning, 'brazier'). According to P. Skok (o.c., s.v.) it is a Turkish Balkanism from *tagar/ dagar*[13], with the meaning of „shepherd's leather sack", metaphorically used as a burden which can be shouldered by an adult man (a half of the '*pondus asini*').

[11] Cf. М. Влајинац, o.c. 185.

[12] *Uborak*, from Greek-Latin *amphora* through O.H.German *amvar* (cf. Skok, o.c., s.v.), with a volume similar to that of a *kutel*, is also documented as a measure in Polog, West Macedonia.

[13] Another etymology for *tagar* is sugested by Andriotis (o.c., s.v.), accepted by Филипова-Байрова, *Гръцки заемки в съвременния български език*, София 1969, 161, who derive it from Gr. ταγάρι(ον), dim. of ταγή 'sack for food of a conjugated animal'.

c.) The term *strana* < **storna* 'side' (half of a horse-load) in Macedonia and Kosovo is also used as a measure for the surface of land sown with 20% more seed than with an *osmak*. In places north-west of the Drina (Croatia, Slovenia, etc.) the measure for the quantity of a *strana* is called a *vagan*, containing 61–63 l.

d.) The general measure which until recently could be found almost in every Macedonian family is a *kutel*. That is a vessel the cylinder of which is usually made from one piece of wood, often chosen with a branch on it, so that the handle can be carved from it[14]. The volume of hand-made *kutels* is not absolutely equal, but in most cases it is about 10–11 l., containing about 8.5–9.8 kg. of qualitative wheat. The *kutel* is an important measure with a large use. The surface of fields is counted according to the seed measured by it (400 m^2 with the seed of one *kutel*; 1 hectare, 10 000 m^2 with 5 *osmaks*, 25 *kutels*). In the regions where the *kutel* has been replaced by a *tin* (a bigger *kutel* of 12 kg) a surface of 500 m^2 is sown, with a *tagar* (4 *tins*) – 2000 m^2, and with 5 *tagars* (20 *tins*) the same as with 5 *osmaks* (25 *kutels*) = 1 hectare.

In the old water-mills, balances were not used at all; the grain and flour were measured only by *kutels*. Grain was also measured in *kutels* and *osmaks* for sale purposes.

The word *kutel* is of Mediterranean origin, transferred to the Balkans through Modern Gr. κούτελο, Middle Gr. κουτέλιον, the diminutive of κούτελον < class. Gr. κουτάλα, κοτύλη '(big) spoon' = δοχεῖο 'vessel'[15]. The term *kutel* replaced the old Slav.

[14] There are three different kinds of technology for making *kutels*: *a.* if the wood is solid, the bottom is from the same trunk, from which the *kutel* is hollowed out. More often, a willow trunk with a decayed (rotted) core is chosen, so that can be easily hollowed; then it is cut horizontally at the base, where another, round piece of wood has to be added for the bottom. There are also *kutels* with added handles, fastened onto the outer side of the cylinder, or an iron bar diagonally across the opening of the *kutel*. In order to be protected, *kutels* are fastened with two or three iron hoops, at the top, in the middle and at the bottom. *b.* In the village of Zvečan, Poreče, *kutels* are made from pressed and rolled thin planks, usually of walnut or beech. The planks are first soaked in slime for a long time, then they are bent together between two rods of iron until the edges weld together, in order to form a cylinder. First the makers used to form cruciform supports inside the cylinder, to keep its round form, and, after the roll dries, they take out the supports, insert the round bottom and fasten the *kutel* with iron or wooden hoops. They used to sell them in the market, or around the villages for corresponding quantity of grain. *c.* In Struga there is a workshop, the property of Mr. Jone Nikolovski, where *kutels* today are made from thick tin in standard dimensions (75 cm long, 33 wide, and, after folding the edges and adding the bottom to the cylinder, the height of the *kutel* is 30.5 cm. At the outer side of the cylinder a handle is fastened in the same way as on wooden *kutels*.

[15] Cf. Meyer, o.c., s.v.; Berneker, o.c., s.v.; M. Vasmer, *Russisches etymologisches Wörterbuch* 1–3, Heidelberg 1953–1958, s.v.; N. 'Ανδριώτης, o.c., s.vv.; P. Skok, o.c., s.v. *kutao: cytulus, y* > *iu*, Roman. *ciutura*, which, via the nomadic Vlachs, penetrated into all the Balkan languages.

спѫдъ, probably from *s/pondus*, with parallels in other I-E languages, cf. Arm. *þund,* Lat. *sponda*, etc. (J. Pokorny, *IEW* 989), which in Byzantine times possibly was of the same dimensions as the *kutel,* and Lat. *modius*.

e.) *Kanta* 'tin'. – When at the end of the XIX century petrol tins appeared, they were used instead of the *kutel,* and even under the name *kutel*. Such a quick change was very likely based on some older measure, probably a double unit of those eight parts of the *osmak*, although their capacity does not coincide exactly. The real volume of a *kanta* is 16.2 l. (14.4 kg wheat), but it is usually not filled to the top; then its capacity is approximately equal to a bigger *kutel.* Four of them form an *osmak*, or *tagar* (4 × 12 = 48 kg), and five of them a *strana* (5 × 12 = 60 kg), *a side* (one half of a horse-load), which is approximately the same capacity as that of 6 *kutels*. Thus, the subdivision of the horse-load measured with these „bigger" *kutels* is divided again into 10 parts, while the *osmak* (one side of a donkey's load), a *half kilo,* contains either 5 *kutels* of 9.6 kg, equal to four *kutels* of 12 kg, or 8 *half kutels* of 6 kg = 48 kg. In the plains, e.g. Pelagonia, where the soil is more fertile, five *kantas* full to the rim (equal to 6 bigger *kutels*), form a *strana* of 81 l. (see below 6.c).

f.) The *shinik* < Gr. χοῖνιξ, transferred into the Balkan languages through Turkish mediation, cf. *šinig, chinik* (Barbiér, o.c. II 157), is in some places a measure with approximately the same quantity (about 13 l.) as that of a bigger *kutel*; in others it represents a quantity of two bigger *kutels*, 27 l. i.e. half an *osmak,* or *tagar*. The *shinik* with such contents varying from place to place is documented by some authors of itineraries, consuls, ethnographers and historians from the last century (cf. M. Vlajinac, o.c. 1050–1055). So the Skopje *shinik* contained 10 *oka*s of wheat (or 8 barley, 6 – oats), in Veles, Štip, Kumanovo – 9 *oka*s wheat. According to G.Young (*Ottom.*, 373) a *shinik* was 1/4 of the old *Stambol kilo* (of 36 4/5 – 40 l.) and contained 9.20 – 10 l., about 8 *oka*s of wheat. In some places on the Balkans a *shinik* corresponds to 1 *kutel*, in others to 1 *osmak*, and even to 1 *kilo,* but in most cases it is 1/4 of a *kilo,* or *half* an *osmak/ tagar*.

Thus, in Central, South and West Macedonia (Prilep, Kičevo, Debar, Sv. Nikole, Gevgelija, etc.) a *shinik* is 1/4 of a *kilo (load)*, containing 108–110 l., so that it contains 27 l., i.e. one half of the *osmak*. A *shinik* with that quantity of seed is used as a measure for the surface of fields (of a *dekare* – 1000 m^2). Approximately the same quantity of seed in the Skopje region is called *bučuk* < Turkish *buçuk*, with the meaning 'a half' (one half of a *half kilo*), i.e. 1/4 of a *kilo*. In other parts of Macedonia, the content of a *bučuk* is smaller, about 15 *oka*s, 1/4 of a *kilo*, containing 60 *oka*s. In some places in

Bulgaria a *shinik* contains 20 *oka*s, and in Mostar (Hercegovina) – 80 *oka*s, equal to a *kilo* (Vlajinac, o.c. 1051).

Measures of volume, smaller than a ***kutel***

g.) There is evidence from two villages (Elšani and Konjsko) near Ohrid that the *kutel* was divided into six parts[16]. The above-mentioned *Ohrid kutel* has signs with horrizontal lines, described by Bennett: „on the inner surface of the cylinder, near the place for the handle, are rather informal markings, obviously to mark the measurement of half and two thirds-full" (*Tractata Mycenaea,* 62). The sixth part of the *kutel*, the thirtieth of the *osmak*, is a sixtieth of the basic unit – *kilo*. Such a division is very significant, because it points out that on this terrain two metric systems were interwined: *decimal* and *hexagesimal*.

The name of this smaller unit is almost forgotten among the younger generations. However, older people know it, and I personally remember since my childhood that for such a measure my grandparents used a *vagan,* a utensil in every-day use, which can be found in every house. The *vagan* is a big round, wooden or earthen deep dish, like an open tureen. It has been used since the oldest times, and in the villages it is still in use as a common dish, put in the middle of the *sofra*, a low round table. The members of the family, seated arround the *sofra*, eat from that *vagan*. P.Skok (*Et.rj*.s.v.) describes it: a. as a wooden or clay vessel for keeping food; b. a dish for common eating, and c. a measure for grain. The same description of *vagan* is given in other dictionaries and ethnographic studies[17].

In museums there are a large number of wooden and clay *vagans*. As it is still in active domestic use, the production of *vagans*, both wooden and ceramic, has continued until the present day. The previous primitive manufacture of wooden *vagans* from a single piece of wood (beech, oak, walnut) was changed with turning techniques, and in recent times with electric machines. In the mountain village of Oreše, below the peak of Solunska Glava, between Veles and Prilep, there are several families who continue manufacturing *vagans* by tradition from the father to the sons. Clay *vagans* were first also hand-made, later on a potter's wheel, now there is a ceramic industry, where among other things, *vagans* are also made.

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[16] There are old people in the village of Konjsko, who remember that their *kutels* were divided inside with lines (informant Lambe Novakovski, 82 years of age, from the village of Konjsko, near Ohrid).

[17] *Речник на македонскиот јазик*, s.v.; Ст. Младенов, *Български тълковен речник*, София, 1951, s.v. *vagán*: „deep vessel, clay, metal, or wooden, sometimes with a handle"; В. Георгиев, *Български етимологичен речник (БЕР)*, s.v.; *Rječnik Jugoslavenske akademije (RJA)*, s.v.; P. Skok, o.c., s.v.

Along with the term *vagan*, several other variants are widespread in all the Balkan languages: *misur, panica, pjato,* etc. In Modern Gr. βαγένι 'barrel', μισούρι 'dish'; Alb. *misúr, pjatë*; Romanian *gaván*, with a metathesis from *vagan*, *platóu* (= *pjato*)[18]; Arom. *misur*^{u} 'clay-pot', a kind of measure[19].

The term *vagan,* as a cultural term, is wide-spread in some other European languages, cf. Czech *vahán*, 'pan of balances, and vessel for baking', Ukrain. *vagan* 'bread-trough', Russian *vagán* 'wooden dish'; Lit. *vagõnas* 'vessel for butter', Old Prussian *wagonis* 'a kind of dish', Est. *waagen* 'deep dish, tureen'. But its etymology is not clear[20]. In O.Ch.Sl. the term *vagan* does not appear.

The oldest known record of this word appears in a Boeotian inscription from Thespiae, dated to early IV century BC.[21], which represents a list of different public goods of the Heraeum. The majority of the things mentioned are kitchen utensils: ὑδρίαι hένδεκα / στάμνοι χάλκιωι τρῖς / φιάλα / ϝαγάνω δύω, etc.

The form ϝαγάνω (l. 18), evidently the dual of a noun, m. in -ος, or n. in -ον, is not included in Liddell-Scott-Jones's *GEL* with the initial ϝ, lost in most Gr. dialects, but as ἤγανον, τὸ, Ion. for τήγανον, Anacr. 26. Τήγανον is a known word for *frying pan*, the meaning of which, according to J. Chadwick, is wholly appropriate to the contents of the Thespian inscription. Until recently, this form has been regarded as a variant of τάγηνον, which is the more common name for a *frying pan,* but the details of its formation were not clear. Its form has usually been explained[22] on the basis of Hesych. gloss ἠγάνεα· πέμματα τὰ ἀπὸ τηγάνου, as a scribal fault with erroneus dividing of τήγανον as τ' ἤγανον, opposite to ἔχε νήδιμος, etc. J.Chadwick (*Lexic.Gr.* 1996, 117-19), however, found that „if there were two words (ϝ)άγανον > ἤγανον and τάγηνον, contamination could have been responsible for τήγανον, combining the initial τ- with the metric pattern of ἤγανον. Thus τήγανον will have replaced both the original forms, and it is this which in the diminutive τηγάνι survives into Modern Greek",

[18] M. Tomici, *Dictionar macedonean-român,* Skopje, 1986, s.v.

[19] Z. Gołąb, *The Aromanian Dialect of Kruševo in SR Macedonia SFR Yugoslavija,* Skopje, 1984, 235.

[20] Cf. Vasmer, o.c., s.v. According to G. Meyer, *Neugriechische Studien,* 2, Wien 1894, 15, Modern Gr. βαγένι is borrowed from Slavonic languages, but Vasmer found that the borrowing is in the opposite direction; Battisti-Alesio, *Dizionario etimologico italiano,* 1–4 Firenze 1950–54, – of Mediterranean origin.

[21] Cf. C. D. Buck, *Greek Dialects*^{3}, No 39, *SEG* 24, 36; J. Chadwick, *Lexicographica Graeca,* Oxford, 1996, 117.

[22] Cf. Schwyzer, *Gr. Gram. I,* 413; J. Pokorny, *IEW,* 245, 1057; H. Frisk, *GEW;* P. Chantraine, *DELG,* s.v.

continuing to be used until the present day not only in Greek but in all the Balkan languages with the same meaning.

This is a probable and economical solution. However, I would like to add a few words about the reasons why these two words have been syncretised:

I think that the first contacts between ἤγανον and τάγηνον came at the semantic level rather than at a morphological one. As a technical term, the meaning of ϝάγανον cannot be separated from Germ. *Wage* 'balance', *bilanx*, *kantar* (< Lat. *centenarius*), *merilo*, etc., 'measure' for weight, but at the same time for volume. It denotes one 'pan' of the balance, the same as Gr. πλάστιγξ, -ιγγος, Lat. 'lanx' (cf.. Meillet, *DELL* s.v.: „plat circulaire [ou rectangulaire] plateau de balance").The root of the word is probably **weight-*, from which there are derivatives in almost all the IE languages (cf. J. Pokorny, *IEW*, 1119-20): Skt. *váhati* 'führt', Lat. *veho*, Got. *gawigan*, iterat. *vaga* 'hin-und her-bewegen', *wagon* 'vibrieren', etc.). The first *-a-* in (ϝ)άγανον > ἤγανον is long, the same as in other IE corradicals, e.g. Ang.-Sax. *wāga* 'lanx', O.Ch.Sl. **вѣсь**, O.H.Germ. *wāga* 'Wage' and *Wiege* 'cradle', etc. The form of *vagan* looks very much like a balance 'pan', and its original meaning is a measure, ration (fixed quantity of food allowed to four people, as we shall see below).

The etymology of the second word τάγηνον is obscure[23]. Very likely it is derived from ταγή (< τάσσ/ττω), which has several different meanings. However, one of its quite frequent uses in the Hellenistic period is also 'ration', and 'stipulated amount to be delivered' (cf. LSJ, *GEW*, s.v.: 5 and 6). Thus it denotes a measure, the same as *vagan*, and this could support the suggested contamination. From the technology and the external appearance of the old vagans kept in our museums, there can also be followed the transition of (ϝ)άγανον to τήγανον.

Vagans with handles are an intermediate degree of this transition to the τήγανον 'frying pan' (see illustr. № 10).

It is not easy to determine the size of the absolute value of a *vagan* which is a very old measure and during the centuries its value varied in different places. In Croatia the *vagan* was a measure of grain with a volume of about 50–63 l. (Vlajinac, o.c.184), which corresponds to the Macedonian *osmak* and *strana*, and in some places with a *kilo* and *tovar* 'load'[24]. Regarding the signs noted on the inner surface of the *Ohrid kutel*, and the practice in some parts of Central

[23] Cf. H. Frisk, *GEW*, s.v.; The connection of this word with the root **tēg-* 'bruler', Boisacq, s.v.; P. Chantraine, *Formation*, 198, is rejected in *DELG*.

[24] The capacity of the Austrian *vagan* was 61.5 l.; Hungarian about 62.5; in Croatia during the last century its size varied from 40–52 *okas*, cf. Влајинац, l.c.

and West Macedonia (Prilep, Veles, Kičevo, etc.) the approximate volume of the *vagan* is 1.5–2 l.[25]

The synonyms of *vagan,* widespread in Macedonian dialects: *misur* and *panica,* have the same meaning.

The *misur* is a deep round ceramic or wooden vessel for eating, but also used as a measure. According to Vasmer (o.c.), Filipova-Bajrova (o.c.), etc., it penetrated into the Balkan languages through Modern Greek μισούρι, Middle Gr. μισούριον), from Lat. *missorium* < *misus, -us* 'dish, measure (as a part of the table)', and this from *mensura* < *metior, 4, mensus sum*, cf. also *mensa* 'table' with the original meaning 'a holy round cake', which was divided diagonally into four parts. Its division into four (equal) parts, which dates from very remote times, is significant for determining the size of the *misur* and *vagan.*

The word *panica* is from the same semantic circle. It is a term which appears in several IE languages with the meaning 'vessel and measure for volume', but is of unknown origin. P.Skok (o.c., s..v.) describes it as a 'dish, frying pan', '*tigan*', which could be earthen, wooden or metallic; Slov. *ponvica* and *povna,* with a metathesis < *ponva*, O.H.Germ. *pfana* < Middle Lat. *panna* 'pan', transferred into West French *pan, pon,* 'cupola, dome'; Bret. *pann, panne,* 'frying pan' and 'illus' of balances; Swedish *panne*, Irl. *panna*, Lit. *pana*, etc. This was transferred into South Slav. languages from Balkan Latin. Czech *pánev*, Pol. *pánew* is from O.Ch.Sl. **панъ**.

The volume of a *panica* was not always equal everywhere. In O.Ch.Sl. **паница**, dimin. of **панъ**, gen. **панве** (very likely borrowed in the Moravian period from German), could be a big vessel 'cisterna' (*Supr.*, 552, 13) along with **паницѫ ꙁѣло малѫ** (*Supr.* 550.1)[26]. In Macedonia it corresponds both to the standard size of *vagan*, i.e. *misur*, and *vaganka, misurka*, of a small size. *Pjato* and *kalenica* are not registered as measures [27].

[25] The makers of wooden *vagans* in the village of Oreše explained to me how they make them of approximately equal size. First they cut pieces of solid wood (beech, oak, walnut) of equal dimensions, and then they hollow them. I have measured both old wooden *vagans* from the museum and the newly manufactured ones, and I found that the differences in their capacity are minimal (about 0.1–0.2 l.).

[26] *Slovník jazyka staroslověnského,* Akad. VÉD, Praha, 1982, s.v.

[27] The *pjato* is a shallow dish of different dimensions. The name is connected with Ital. *piatto*, Lat. **plattus* < Gr. πλατύς, 'flat, shallow, wide'. Modern Gr. πιάτο is borrowed from Italian *piatto*, which is also distributed in all the Balkan Slav. and non-Slav. languages, cf. Alb. *pjat*, Rom. *platou*, Arom. *piatéle*, through Greek from Italian (cf. Z.Gołąb, *The Aromanian Dialect of Kruševo in SR Macedonia*, SFRYu, MANU, Sk. 1984, 243). *Kalenica*, 'earthen dish', from the pan-Slavonic *kal* 'mud', a ceramic term (cf. P. Skok, o.c., s.v. *kão*), borrowed in Alb. *kalenicë* with the same meaning is also not documented as a special measure, exept in cases when women borrow from their neighbours flour, soft cheese, etc.

In cases when millers do not have a *vagan* or a similar measure smaller than a *kutel*, they use a *cap*, which is of nearly the same size. The oldest record of a *cap* as a real measure appears in miner's affairs with a volume of 4 *oka*s. M. Vlajinac (o.c.p.361) notes that in some places grain, flour, fruit and other products were measured with *caps*.

h.) Following the principle that every standard measure can be divided first into its halves, there is also a vessel called an *ispol* with the capacity of a *semi-vagan*. It is made in different forms, but often like (an) open hand/s, ready to accept something. The Serbian *ispolac* is used as a measure of about 0.5 l. (cf. M. Vlajinac, o.c. 311). It is used in water-mills for drawing flour, in settlements along lakes and bigger rivers for ladling out water from boats, at fountains along the roads for drinking-water, etc. The word is a compound from the prefix *iz- (ex, de-)* and the noun *pol/ovina* 'a half' (cf.St. Mladenov, o.c.; *БЕР*, s.v.; P.Skok[28], o.c., s.v. *pol*[2]). Its original meaning is a vessel with the capacity of one half of a certain measure. In Croatia there is a term *polvaganica*, but the Croatian *vagan* has a much larger volume. The word *pol* is derived from IE **(s)p(h)el* 'split', with *o*-grade *pol-*.

In Macedonian museums there are *ispols* of different dimensions, but two prevail: the first bigger, a *semi-vagan* = 2 *grsts*, and the other = a half of it, a quarter of the *vagan*, i.e. one *grst*.

i.) From practice it is known and confirmed in the literature that the smallest popular measure of volume is a *handful*. In Macedonia, along with the *handful*, known as a *raka* (hand) or *šepa*, there is another measure with both hands, called a *grst* < **grъt-ti* from the verb *grtati*, **грънѫти**, 'gather together'. It is a „manciata e manata con due mani" (Belini, *Dizionario*, s.v. *brancata* „quanto uno, può, prendere con due mani"; Stulić: „it quod manibus continentus"; Vuk Karadzić, *Srpski rečnik*, s.v. *grst* and *pregršt*: „Beide flache Hände zum Fassen hingehalten; ambae volae ad accipiendum quid paratae"). From the Slavonic languages it penetrated into Alb. *grusht*, Roman. *gîrst* (Miklosich), corradical with Myc. and Homeric Greek ἀγορτός, ἀγείρω, ἀγορά.

[28] P. Skok, o.c., s.v. *pälj*, gave another possible explanation of *ispo(l)/ac* < *pällj*, gen. *p(a)llja* 'haustrum', denom. *paljkati* 'to draw'; *paljka* 'pumpkin, watering-pot from gourd', derived from a pre-Slavonic stem in different grades: **pel-*, **pil-*, **pol-*, **pal-*, cf. *(s)plakati* 'to rinse, swill', Maced., Bulg. *plakne* with the same meaning, Polish *plokac* 'wash'; *pljuskati* 'to ladle water from a boat' < IE **pleu-*, etc. This etymological explanation perfectly corresponds to the function of the *ispol*, a vessel for drawing water, flour etc., but in popular etymology the word is also connected with *pol* 'half' since the middle ages, cf. *Solunska legenda:* „zborьk sъčici ...*soupoulь* svezanou" 'bound through the middle'. In fact *ispol*, as a measure, denotes one half of some quantity.

Although strictly taken the extent of the *grst* depends on the hands, from 0.3 to 0.6 l., in popular metrology it is a real measure with a determined value of average size, ca 0.4–0.450 l. There is evidence that hominy has been made in Montenegro, by the Kuči tribe, with a ration of „one full *grst* of corn-flour for every adult man" (*Etnografski Zbornik*, SANU, XLVIII, 101). M. Vlajinac (o.c., 241) hesitates whether it is a *handful* or a *grst*. In Macedonia (Prilep, Demir Hisar, village of Velmevci, etc.) the same measure, i.e. one full *grst,* is also taken as a ration of hominy for an adult man.

Valuable data about the size of the *grst* were registered in 1933 (*Гласник Етнографског музеја у Београду*, VIII, 23) determining precisely that one *kutel* (of 13.5 l., or *kanta* of about 12 kg) contains 30 *grsts* of grain. The *kutel* of the Ohrid type, which is 2–2,5 l. smaller, contains 24 *grsts*, reckoning 4 *grsts* to a *vagan;* one kutel of 6 *vagans* × 4 = 24 *grsts*, and a *kilo* contains 10 *kutels* × 6 *vagans* × 4 *grsts* = 240 *grsts*. The most frequent values of the units in the Balkan volumetric system/s, still practised in Western Macedonia, are reviewed below (see 6.c).

5. It is noticeable that a large number of these measures, and their interrelations under different names, have parallels in the volumetric systems of ancient eastern and Mediterranean countries, which indicates that the Balkan metric system originates from the remote past.

Thus, the biggest measure, the *kilo*, which consists of 10 smaller parts, *kutels* (of 5 on each side of the load) corresponds to the Babylonian *imêru* (donkey-load) – both in its volume of *ca.* 100 l. and its division into 10 smaller parts (the horse-load containing 10 bigger *kutels* = 135 l., i.e. *ca.* 120 kg, also belongs to this system). It is not to be ruled out that the next division of the tenths (*kutels*) into 6 smaller parts, *vagans*, i.e. 10 × 6 = 60 of the main measure, may depend on the Mesopotamian hexagesimal system.

Regarding the term *osmak*, we can conclude that a system of 8 units was practised in the Balkans. The *osmak* coincides with the classical-Greek *medimnos*, both in its volume of about 50 l. and in the composition of its smaller parts: 6 *hekteis* × 8 *khoinikes* (one *hecteus* contains 8 *khoinikes* = 48 *khoinikes*), and corresponds to 1 *osmak*, which in the beginning very likely contained 8 units, equal to 4 *kutels* of 13.5 l., or 12 (2 × 6) kg, known as *tagar* (for the system of eight units in Mycenean measures see below).

The smallest unit, the *grst*, which also represents a meal of flour (grain) for an adult person, can be paralleled with classical Greek *kotylē*, Egyptian *hin,* Israelite *lôg,* Akadian *qa,* etc. All of them have approximately the same volume of about 0.4–0.5 l. and serve as a measure for grain necessary for a meal (except the

Akadian *qa,* which varies from 0.4 – 1.34 l. and sometimes denotes a daily ration for a person).

The Balkan volumetric system from the South-eastern part of Macedonia, where the *osmak* containes 5 *kutels*, each divided into 6 *vagans,* shares the most common features with the Mycenean system. The smallest Mycenaean measure, represented by the ideogram **110* (a *cup, kotylē,* with a handle, marked with the symbol Z, similar to the Balkan vessel *ispol,* is also a measure for a meal, and in Mycenaean Greece three such measures stand for the daily ration of a man as J.Chadwick concluded after analysing KN Am 819: *173 LUNA VIR 18 KOWO 8 SITO HORD 9 T 7 V 3, and PY Na 114: *me-ni-jo* 'menion'; *o-pi-me-ne /opimenei/* 3 3/4 HORD = Z 90, daily 3 Z (cf. *Docs*[2] 420, and *Gnomon* 36,1964, 323–4).

The Mycenean metrical system of weights and volumes was clearly classified and convincingly explained by E.L.Bennett in 1950 (*AJA* 54, 204–222). It was later revised by Ventris and Chadwick [*Docs* (53–60)] only in some details. The Mycenean measures of dry materials in descending order are as follows: 1 : 1/10 :1/60 : 1/240 or 1 × 4 × 6 × 10; for liquides: 1 : 1/3 : 1/18, or 1 × 4 × 3. The last two of the smallest measures are common to dry and liquid substances both in the Mycenean and the Balkan systems. The authors of *Docs* (55) also found a parallel with the English „*pint* and *quart*, but diverge to *bushel* and *gallon*". The Balkan system explained above shows subdivisions identical with these ones.

As a starting-point in defining the absolute value of these Mycenean measures, a daily/ monthly minimum of grain for an adult person is taken. In classical times a standard daily ration of wheat for a man is one *khoinix* (cf. Hdt. VII, 187) for the Persian army: ἡ γὰρ χοῖνιξ ἡμερησία τροφή, i.e. 27.5 monthly. The Spartan army, however, used to get two *khoinikes* of barley daily, i.e. 55 l. monthly (Thuc. IV. 16), because of its smaller nutritional value[29]. According to the cuneiform texts from Ur, between 2100–1400 BC, as well as to the tablets from Nuzi, the monthly grain ration of women-slaves and menial workers is fixed at 30 *qa*, i.e. 40 l. (*Docs*, 59).

Analysing the measures from the Linear B tablets, especially in the series PY Aa, Ab, F, etc. in comparison with those from Babylonia, Egypt, Ugarit and Classical Greece, the authors of *Docs*. in 1956 found the following value of the Mycenaean volumetric system (*Docs* 60):

[29] For more details about the rates of consumption in classical Greece see A. Jardè, *Les céréales dans l'antiquité grecque* I, Paris, 1925; L. Foxhall – H. A. Forbes, „Σιτομετρεία: The Role of Grain as a Staple Food in Classical Antiquity", *Chiron* 12, 1982, 43–82; A. Aloni – M. Negri, „Il valore dell'orzo nella Grecia micenea", *Atti e memorie del II Congresso internationale di micenologia* I, Roma, 1996, 159–168.

Dry measures	*Liquid measures*
1 unit = 120 l.	1 unit = 36 l.
T 1 = 12 l.	S1 = 12 l.
V 1 = 2 l.	
Z 1 = 1/2 l.	

with a note that a more accurate determination must await further evidence.

In 1964 M. Lang undertook an investigation of vessels from Mycenaean Pylos with the aim of discovering the system of measurement registered on the tablets (cf. *AJA*, 68, 99–105). She found a large concentration of vessels measuring 0.25, 0.30, 0.40, 0.50, 0.60, 0.70, 0.75 litres, and larger vessels of 2.40, 3.20 l. This sugests that 0.8 l. is an element in the system which M. Lang identified with V 1, and the smallest Z 1 with 0.2 l., so she reduced the above figures proposed by the authors of *Docs* by 60%. However, in the unit of 0.8 l. J. Chadwick saw a double Z 2, in 2.4 = V 1 1/2, and in 3.2 = V 2. In view of these data he reduced the value of the system proposed in 1956 by 20%, viz :

Dry measures	*Liquid measures*
1 unit = 96 l.	1 unit = 28,8 l.
T 1 = 9.6 l.	T1 = 9.6 l.
V 1 = 1.6 l.	
Z 1 = 0.4 l.	

L. R. Palmer, *Interpr.* 12–15, 96–98, 117f. proposed a very low scale of measures with the volume of the highest one 54 l., < V 60 × 0.9 (Attic *khoinikes*) and as a standard monthly ration of grain T 5 which is too large. The fault is that he took *medimnos* as the biggest measure. In fact, *medimnos* is only a half of the main load. It corresponds to *osmak*, or *tagar* in the contemporary Balkan volumetric system. It is noticeable that the halves of these measures are used more frequently than the main one. The Greek term φορτίον, like the Balkan *tovar,* is seldom used, but all the smaller measures depend on it.

Palmer (o.c.12–13) equated the Mycenaean unit V with the Attic χοῖνιξ of 0.9 l., and the smallest Z – with 1 *kotyle*. J. Chadwick (*Docs*^{2} 394) noticed that Palmer's identification may well be right linguistically, but there is no reason to prefer the Attic value of ca. 0.9 l. to the Pheidonian value of ca. l.3 l. He pointed out that „all values proposed are merely an attempt to establish an order of magnitude, and none should be regarded as an exact determination, which will probably remain impossible, until a vessel is discovered which is clearly marked as a measure."

Probably we shall never discover the original Mycenaean vessels used for measures, because they were made from perishable material, wood and clay, but the analogies with those of later times are quite indicative. The presentation of the *Ohrid kutel* at the VIII Myc. Colloquium in 1985 threw new light on the Mycenaean volumetric system. E. L. Bennett was excited by the fact that the *kutel*, divided into 6 smaller units, corresponds exactly to the Mycenaean unit T. Acording to him it represents a first real proof of the way the Mycenaeans could measure dry pourable materials. Therefore he appealed to those knowing the language of the region to describe the use of a *kutel*, and to give more details about the other measures, smaller than it.

At the same time he expressed some serious doubts about the system to which the *Ohrid kutel* belongs. Starting from the note with a description of the *kutel*, that it is a tenth part of the main measure, the *kilo*, containing 95–98 kg wheat, and the *kutel* itself -9.5-9.8 kg of wheat, E. L. Bennett correctly remarked the confusion of the volumetric and gravimetric values of the units: „Although the *kilo* is defined by weight, its part, the *kutel,* is ill-fitted to measure wheat directly in units of weight" (*Minos*, 22–24, 92). The measures for volume are here also defined both with *l*(itres) and weight, in *kg* and *oka* (1 oka = 1.280 kg), of dry qualitative wheat. In determining the value of the popular measures I used the same definitions I had heard in the inquiries and in the literature (see below the table of the volumetric units with their most frequent values). The weight is taken into consideration, because the burden which is going to be carried must not exceed the capacity of the domestic animal.

6. The parallels mentioned above show that almost the same volumetric units and their interrelations appear under different names on a very large territory of the Midde-Eastern, Mediterranean and Balkan countries. Therefore the question of the origin of these measures and the reasons for their diversity and uniformity arises spontaneously.

External influence, doubtless, was inevitable, but in order for foreign measures with their subdivisions to be accepted, there were certainly other external, especially socio-economic, reasons, as well as a common psychological and cultural basis.

The basic norms on which the system of this large territory was built, beyond any doubt, depended on determining the highest and lowest metric value. The first is conditioned by the carrying capacity of the main means of transport in these regions, and they are the donkey and horse. Therefore the upper limit of the biggest measure is *ca.* 100 l. (a donkey-load), or *ca.* 130 l. (a horse-load).

The lowest metric unit represents the quantity of food necessary for a meal, and/or daily nutrition of an adult male worker.

The classification of the different quantities in the volumetric units with their parts reveals three subsystems which, in spite of all differences, coincide in some key-points with the same value:

a. Very likely the oldest of them is that with a highest unit corresponding to the donkey-load. It is divided into 10 parts, 2 × 5 *kutels* by 10.8 l., i.e. 9.6 kg, according to primitive counting on the digits of both hands.

b. The *Kilo,* with divisions into a half (*osmak/tagar*), quarter (*shinik*) and eighth (*kutle, half-kutel* of 6.750 l.), or four *bigger kutels* of 13.5 l., i.e. 12 kg. It is remarkable that their quantity 8 × 6.75, or 4 × 13.5 = 54 l., etc. (see the table) is equal to that of 5 × 10.8 l. There is also a *kilo* in decimal division with the *bigger kutel:* 10 × 13.5 l.= 135 l. (or 120 kg), but then it denotes a horse-load.

c. The newest subsystem is that measured with the *kanta* (tin). If it is not filled to the top and without shaking, then its size is approximately that of the bigger *kutel.* If it is full up to the rim, their volume is 16.2 l Then its size coincides with that of the bigger *kutel* in the unit called *strana* 'side', a half of the horse-load: 6 bigger *kutels* × 13.5 l. = 81 l., and 5 full *kantas* × 16.2 l.= 81 l. × 2 = 160 l.[30], or 144 kg.

The metrical units of seed as measures for surface are taken mainly from the first subsystem, coinciding with donkey-load (see above 3.g and d). However, for the quantity of seed another important factor, the fertility of the soil, must also be taken into consideration. More fertile soil needs more seed than a poorer one[31]. Therefore in the plains (e.g. Pelagonia) and valleys a *kutel* of the bigger type and even a full *kanta* are in use.

While the size of the bigger volumetric units (*kilo* and *kutel*) with their halves (*osmak* and *shinik*) differ depending on the *load* (donkey- or horse-load), but their number is constant, the value of the smaller units (*vagan* and *grst*) is the same, but their number is higher in correlation with the *kutel.* Thus, the *kutel* 1/10 of *kilo* contains 6 *vagans* by 1.8 l. (1.6 kg); 24 *grsts* by 0.45 l. (0.4 kg), the *bigger kutel* of 13.5 l. comprises a quantity of 7.5 *vagans,* i.e. 30 *grsts,* [full *kanta* 'tin', probably – 9 *vagans*, i.e. 36 *grsts* with the same volume], as can be seen from the following survey:

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[30] G. Young, o.c. 373 found the same quantity for the *Macedonian kilo.*

[31] According to Dr Risto Lozanovski, Professor at the Faculty of Agriculture in Skopje, 500–600 grains of productive wheat are necessary for sowing of 1 m^2 on fertile soil, whereas 300–450 are sufficent for 1 m^2 of poorer ground.

Most frequent values of the Balkan popular volumetric units

I. Standard *kutel* 1/10 of *kilo* = 10.8 l.; 7.5 *oka*, 9.6 kg
5 kutels = 1 *osmak* × 10.8 l. = 54 l. 37.5 *oka* × 1.280 = 48 kg.
10 kutels = 1 *kilo* × 10.8 l. = 108 l., 75 *oka* × 1.280 = 96 kg.
1 *vagan* 1/6 of *kutel*, 1/60 of *kilo* = 1.250 *oka* × 1.280 =
= 1.6 kg × 60 = 96 kg.
1 *grst* 1/4 of *vagan*, 0.450 l.; 1/24 of *kutel*, 1/240 of *kilo*;
0.312 *oka*; 0.4 kg.

II. *bigger kutel* with volume of 13.5 l.; 12 kg.
1 *osmak*, 8 *half kutels* × 6.750 = 54 l.; 4.687 *oka* × 8 = 37.5 *oka*, 48 kg.
1 *tagar*, 4 *kutels* × 13.5 l. = 54 l.; 4 × 9.375 = 37.5 *oka*; 4 × 12 = 48 kg.
1 *shinik*, 2 *kutels* × 13.5 = 27 l.; 2 × 9.375 = 18.750 *oka*; 2 × 12 = 24 kg.
1 *strana*, 6 *kutels* × 13.5 = 81 l. 6 × 9.375 = 56.250 *oka*; 6 × 12 = 72 kg.
1 *horse-load*, 12 *kutels* × 13.5 l. = 160 l.; 12 × 9.375 = 112.5 *oka*;
12 × 12 =144kg.
1 *vagan* 1/7.5 of *kutel* = 1.8 l.; 1.250 *oka*; 1.6 kg. (1 *kutel* 7.5 *vagans* ×
1.8=13.5 l.; 7.5 × 1.250 = 9.375 × 8 = 75 *oka*;
7.5 × 1.6 kg = 12 × 8 = 96 kg
1 *grst* 1/30 of *kutel*. 30 × 0.45 l. = 13.5 l.; 30 × 0.312 = 9.375 *oka*;
30 × 0.4=12 kg.

III. *kanta* 16.2 l. ; 11.25 *oka*; 14.4 kg.
1 *strana* 5 × 16.2 = 81 l.; 5 × 11.25 = 56.25 *oka*; 5 × 14.4 = 72 kg.
1 *horse-load* 10 × 16.2 l. = 162 l.; 112.5 *oka*; 144 kg.

Smaller units than *kanta* are not registered in the literature.

It seems that similar, if not the same, principles for defining the highest and lowest measures are applied in the mentioned regions, because *pondus asini* and *pondus equi* is the same, and a man needs the same daily and monthly quantity of food. Their division and correlation depends on natural and practical needs, determined by centuries-old experience. Thus the system, created according to the same principles in remote times, by tradition continues to be practised especially in the mountain villages where the modern agricultural civilization has not yet penetrated.

Bearing in mind the common basis for the appearance and development of such a volumetric system, it is difficult to determine only one place of its origin. However, there is reason to admit that the experience achieved in the Mesopotamian basin, where the decimal and hexagesimal reckoning are intermixed, played a vital role in the development of this volumetric system.

In spite of their great temporal and geographical distance an exact parallel between the Balkan (from SW Macedonia) and the Mycenaean volumetric systems has been noticed. Very likely such parallels existed in other places too but, because of the lack of literacy, they have not been registered.

Prof. E. L. Bennett all his life has been looking for an exact model from which the Linear B system might have been taken and to which it might have descended. He found American and British weights and measures closest to Linear B, but he discovered better chronological matches in the regions of the cuneiform script, while for Linear A he found apparent parallels in Egyptian texts. Therefore he was inclined to admit some historical influence from Mesopotamia upon the Mycenaeans stronger than the influence of a Minoan tradition from Egypt[32].

7. Different heterogeneous linguistic survivals are stratified in the terms of the metrical units of this system. From their lexical analysis it is evident that a number of them are derived from Slavonic and IE stems (*tovar, osmak, strana, ispol, grst*) which, as Slavonic Balkanisms, were accepted by some of the non-Slavonic Balkan languages. The majority of the terms, however, are of Mediterranean and near-eastern origin through the mediation and adaptation of other languages, especially through Turkish administrative terminology.

How strong the tradition of the metric Balkan terminology is one can see from the fact that the *kanta* (tin), which replaced the *kutel*, is called a *kutel.* In some places old popular measures have been replaced by modern ones, but the old terms continue to be used especially for the surface of land according to the quantity of seed. On the other hand the term *osmak*, which contains five, not eight units, very likely replaced some other, older term for a corresponding quantity of a half of load.

The double structure of the *osmak* shows that two volumetric systems were practised on the Balkans: one *decimal,* crossed with a *hexagesimal* subdivision, and the second divided into *halves, quarters* and *eighths*. It is extremely difficult to say which of them is older. The survivals of both coexist in some mountainous villages of SW Macedonia, and, through the combination of the elements from these two systems, a third one is formed..

ILLUSTRATIONS

1. *Slatina kutel*, integral, made of a trunk of salix: diameter at the top of the handle 31 cm, at the right angles 28 cm; height at the handle 31 cm, opposite the handle 30.5; handle integral with the strip of 5 cm, the hole 11 × 2.5 cm.; average thickness of the cylindrical shell 1.5 at the top, 2 cm at the bottom; base with a separate circular bottom of populus, maximum length along the grain 21

[32] Now (cf. *Minos* XXII–XXIV, 89–95) he hesitates about these ideas of his, but the effects of the Mesopotamian influence on the Mycenaeans, and even more on Mediterranean civilization, cannot be denied.

cm, thick 2.5 cm, fastened with 2 hoops; volume ca 10.8, property of Božin Petreski from Slatinski Čiflik, Ohrid.

2. *Polkutel* (half a kutel) from the village of Bajlovce, Kumanovo; Archaeological Museum, Skopje, No 9920, integral, made of a trunk of salix: diameter at the top of the handle 24 cm, at the right angles 26 cm; height 23 cm; handle added, fitted with 2 nails, the strip 3 cm, the hole 8 × 3; cylindrical shell: average thickness of ca 2.5; base with an added circular bottom of populus, maximum length along the grain ca 21; fastened with 2 hoops; perimeter 83 cm; volume 6.75 l.

3 and 3a. *Kutel* (*Pelagonian type*) of bigger size, made of chestnut with iron bars from the village of Lopatica, Prilep; Archaeol. Museum, Skopje, No 16019; diameters 31 × 31.5; height 30.5; thickness of the bottom 2 cm; perimeter 98.5 cm; edge 1.2 cm, fastened with 3 hoops; volume ca 16 l., corresponding to a tin.

4 and 4a. *Ohrid (Elšani) kutel.* For the description see Bennett, *Minos* 22–24, pp. 90–91.

5. *Šinik* (a half of an osmak) from the village of Rajčica, Debar; Archaeol. Museum, Skopje, No 12493, made of walnut; d. at the top of the handles 42 cm, at the right angles 43 cm; height 22.5 cm, inside ca 21, thickness of the bottom 1.5; average thickness of the cylinder shell 1.5; volume equal to 2 bigger kutels by 13.5 l. = 27 l.

6 and 6a. *Vagan*, made of one piece of oak from the village of Lešok, Tetovo; Archaeol. Museum, Skopje, No 12614: diameter at the top 23 cm, at the right angles 22 cm, height 14 cm average thickness of the shell at the top 1.5 cm, base round; volume ca 1.6 l.

7. *Vagan* made of one piece of oak from the village of Pateec, Kičevo, Archaeol. Museum, Skopje, No 6195: diameter 22 cm at the top, 11 at the bottom; height 11.5, inside 9 cm, average thickness of the shell at the top 1.7; volume ca 1.5 l.

8. *Vagan* made of one piece of walnut in the village of Oreše, Veles, now in the Archaeological Museum, Skopje: diameter 23 cm, height 11.5 cm, thickness of the shell at the top 2 cm, deep 10 cm, base round, diameter 8 cm, volume ca 1.6 l.

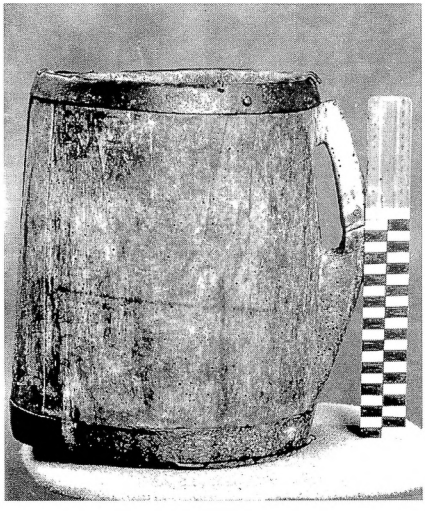
9. *Clay vagan* from Prilep, Archaeol. Museum, Skopje, No 7404: diameter 25 cm, height 10.5; edge 0.8 cm; bottom diameter 10 cm., inside 8.5 cm; volume 1.8.

10. *Vagan (ḱupan)* with a handle, wooden vessel used as a measure for feeding cattle with salt, from the village of Rastež, Poreče, Archaeol. Museum, Skopje, No 6275; diameter at the top including the handle 30 cm, without the handle 22, at the right angles 23 cm; height at the handle 7 cm, opposite the handle 6 cm; handle, length 8 cm, maximum width 5.8, thick 1 cm; average thickness of the shell at the top 0.5 1, at the botom 1 cm; base: diameter at the handle 12.5, at right angles 14 cm; volume ca 1.5 l.

11. *Ispol (kutlica, crpalka)*, wooden vessel for drawing and measuring salt, with a handle, made of a piece of beech, from the village of Samokov, Poreče, Archaeol. Museum, Skopje, No 8848, diameter at the top of the handle 13.5, at right angles 11 cm; height at the handle 8.5 cm, opposite of the handle 7 cm; handle: length 7 cm, width 2.5 cm at the top, and 2 at the bottom; average thickness of the shell at the top 0.7 cm, maximum length of the base 8, width 7.5 cm; volume 0.4 l.

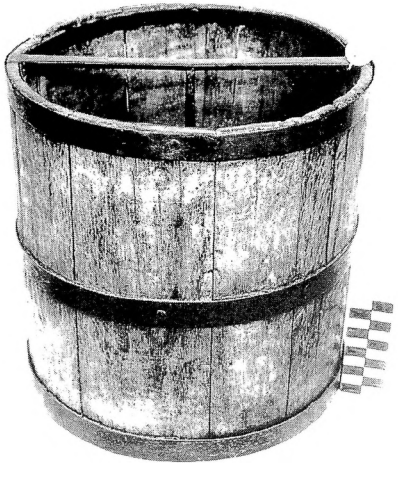
12. *Ispol (kutlica, crpalka)*, wooden vessel for drawing and measuring cottage-cheese, from the village of Konjsko, Ohrid, Archael. Museum, Skopje, No 15226: diameter at the top of the handle 18 cm, at the right angles 17 cm; height at the handle 7cm, opposite the handle 7.3 cm; handle length of the strip 23, width 2.5 including the volute; average thickness of the shell at the top 0.3–1 cm; volume ca 0.8, a double ispol of No 10 and 12.

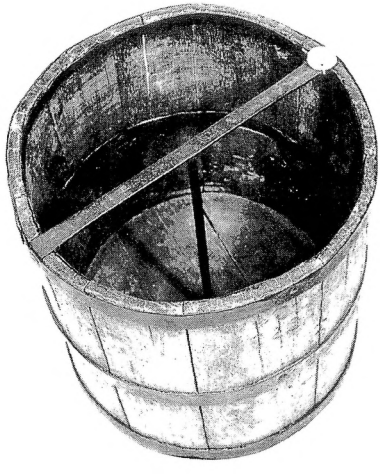
13. *Ispol (crpalka)*, wooden vessel of a piece of walnut, from the village of Elšani, Ohrid, used for drawing of flour in water-mills and water from boats, as well as a cup for drinking water at fountains, now in the Archaeol. Museum in Skopje: length 32.2 cm together with the handle, width 13–14 cm, cavity long 17.5 cm; volume 0.4 l.



1 *Slatina kutel*

2 *Polkutel* (half a kutel)





3 and 3a *kutel* of a biggen size
Pelagonian type

4 and 4a *Ohrid (Elšani) kutel*
Minos 22–24, 90–91

5 *Šinik*, Rajčica, Debar

6 and 6a *Wooden vagan* from Lešok, Tetovo

7 *Wooden vagan* from Pateec, Kičevo

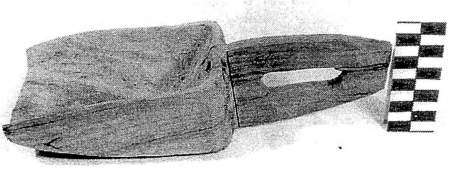
8 *Wooden vagan* from Oreše, Veles

9 *Clay vagan* from Prilep

10 *Vagan (ḱupan)* with a handle from Rastež, Poreče

11 *Ispol*, Samokov, Poreče

12 *Ispol*, Konjsko, Ohrid



13 *Ispol*, Elšani, Ohrid