

OIL, LEAD, AND SILVER (Varro, *L. L.* ix. 66)

Item qui reprehendunt, quod non dicatur ut unguentum unguenta vinum vina sic acetum aceta garum gara, faciunt imperite: qui ibi desiderant multitudinis vocabulum, quae sub mensuram ac pondera potius quam sub numerum succedunt: nam in plumbo, [oleo,] a(r)ge(n)to, cum incrementum accessit, dicimus [enim] multum [oleum], sic multum plumbum, argentum; non [multa olea] plumba, argenta, cum quae ex hisce fiant, dicamus plumbea et argentea . . . etc.

So Goetz-Schoell (Teubner, 1910) accepting L. Spengel's removal of *oleo* (1. 4 supr.), *oleum* (1. 5), and *multa olea* (1. 6), as also did R. G. Kent (Loeb ed., 1938 and rev. repr. 1951). The text printed by Neue-Wagener, *Formenl. d. lat. Spr.*, Leipzig, 1902, i. p. 581, in their discussion of Varro's statement, had shown no omission except *enim* (1. 5); but it had inserted *multum* before *argentum* (ll. 5—6) without authority.

For the ancients, however, the two systems of calculating cubic capacity (i. e., liquid measure, with which alone we are here concerned) and of

calculating weight were interlocked no less than they are today, when we speak of the output of an oil-refinery or of a lead-works in terms of tonnage, or refer to the standard weight of a standard volume of a liquid. Oil was regularly sold and calculated by weight (see, e.g., Hor., *Sat.* II. 2. 59—61; Pliny, *H. N.* XV. 1. 2 and 4. 14; Plut., *Caes.* 55; Suet., *Caes.* 38), in the same way as wine was measured by the *amphora* or by the *quadrantal*, which had the capacity of a cubic Roman foot (*pes quadratus*, *pes solidus*) and was standardised in weight at approximately 80 Roman pounds (F. Hultsch, *Metrol. Script. Reliq.*, II. pp. 78, 79; P.-W., s. vv. *Amphora*, *Pes*; Daremberg-Saglio, s. v. *Quadrantal*).

Similarly, where lead was to be put on to the market for trade purposes, it was clearly essential that fairly accurate standards of weight should be maintained. In Varro's time, this seems to have been ensured by the agreed use, in the great lead-mining areas, of an almost semi-cylindrical mould of standard dimensions, giving an ingot of lead weighing on the average approximately 100 Roman pounds. Many examples of such ingots have been found, in Spain and elsewhere (e.g., C. I. L. II. 3439; M. Besnier, *Rev. Archéol.* (5. Ser.) XII. 1920. 231—2; Daremberg-Saglio, s. v. *Forma*). The volumetric calculations involved in the making of moulds of this type were complex (whence, no doubt, the change to the somewhat simpler angular type of mould of the Imperial period, notably from Britain: C. I. L. VII. 1202 ff.), and are only likely to have been acceptable in view of the need for precision in casting to a fixed weight, while making full allowance for such technical and practical problems as easy removal of the ingot from the mould and subsequent convenience of transport. In other words, the molten lead at the casting stage was regarded primarily as a liquid which was required to fill a container of a certain volume, the relationship of which to the weight of the ingot when solidified had been carefully calculated beforehand (cf. Vitruv., VII. 8. 2: for practical guidance, four *sextarii* of *argentum vivum* are said to weigh 100 Roman pounds).

References by weight to large quantities of silver (the by-product of lead) are so familiar as to need no comment. For the smaller amounts involved in ordinary commercial or fiscal transactions, evidence for casting to a precise weight within pre-determined cubic dimensions, as was done with lead, is admittedly slight for Varro's own time. But the practice could reasonably be assumed to have existed, not merely on general grounds but also on the analogy of the later ingots of silver of standard shape and weight, guaranteed by official stamps (e.g., *Eph. Epigr.*, IX. 1196 and 1257; H. Willers, *Num. Zeitschr.*, XXXI. 1899. 369).

From what has been said above, it may be seen that reference by Varro to olive-oil in the same context with lead and silver involves no inconsistency but is indeed fully in keeping with his argument, since all three are instances of materials *quae sub mensuram ac pondera . . . succedunt* (a contrast of correlated terms with which one may compare Cato *ap. Columella*, XII. 52. 20). *enim* (1. 5: secl. Aldus) is not easily defended. But Goetz-Schoell, in following L. Spengel elsewhere in these lines, have departed unjustifiably from their normal conservative treatment of the text (cf. J. Collart, *Varron, De L. L., Livre v.*, Paris, 1954; p. XXXVIII); *oleo*, *oleum*, and *olea* should be retained — and, before *olea*, *multa* also, as A. Spengel rightly suggested.

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