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Tyche 16 (2001)

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Accounting and Endowments

The following notes attempt to make sense of three Greek inscriptions that contain problems of accounting. All three texts concern perpetual endowments. In all three the prevailing interpretation of crucial economic details stands on the assumption that the ancient actors, both benefactors and their fellow citizens, were either stupid or lazy, unconcerned with the viability of the endowments and unworried by the prospect of wastage. I argue here that the texts show careful calculation and adroit planning.

I. Ilion

In the second century BC Hermias son of Skamandrios, priest of all the gods, established an endowment at Ilion. The purpose of the endowment was to distribute cash awards to the city's 12 tribes at the annual celebration of the *Miaka*. The endowment earned 1525 drachmas per year. Each tribe, however, was to receive 127 drachmas 3 obols, for a total of 1530 drachmas. Why do the numbers not agree? The relevant lines¹:

- 12 [τὰ ἐπιδομεῖ]να ὑπὸ Ἐπιμίου ἱερέα τῆς Ἀθηνῶν· τοὺς δὲ τραπεζίτας, εἶσι διεγρομμέ-
[να ἔσσι τὰ διὰφορα, ἔχειν ἐνθemia, καὶ φέρ[ειν] τόκον αὐτῶν δέκατον,
καὶ παραδοῦναι τῷ]
[τε κερῶλατον] τοῖς μεθ' αὐτοῦς τραπεζίταις καὶ τόκον θυμῆνου δέκα-
τον· τοὺς δὲ
[παραλαβόντας εἶχειν ἐνθemia τὰς μυριάς καὶ πεντακισχίλιας Ἀλεξαν-
δρείας καὶ
16 [τὸν θυμῆνου τό]κον· ἀπὸ δὲ τῆς προσόδου γίνεσθαι ἀν[α] πᾶν ἔτος ἐν τῷ
Παναθη-
[ναίῳ μηνί τῆι πρώτῃ τῶν Ἰλιακῶν πομπῆν καὶ θυσίαν τῆι Ἀθηνῶι·
τοὺς δὲ τραπε-
[ζίτας διδόναι ἕκασ]του ἔτους ἀπὸ τῆς προσόδου τῆι ἐνδεκάτῃ ἐν τῷι
Παναθηναίῳ
[μηνί τοῖς ἀπ' ἑκάστ]ῃς φυλῆς αἰρεθσομένους φυλάργιας κατὰ φυλῆν
δραχμάς ἕκα-
20 [τὸν εἶκοσι καὶ ἑ]πτὰ τριῶβολον ἀπρυακοστολογη[τοῦς] ...

¹ The text is Frisch's, *Ilion* 52, essentially reproducing that of J. Vanseveren, *Inscription d'Ilion*, RPh 62 (1936) 249–267, at 252–254 [= B. Laum, *Sifnungen in der griechischen und römischen Antike: Ein Beitrag zur antiken Kulturgeschichte*, Leipzig 1914, no. 65].

[11] It has been resolved by the council and people that the money donated by Hermias shall be the sacred property of Athena. The bankers, once the fund has been registered, shall keep it on deposit, and pay $1/10$ -interest on it, and transfer the principal to the bankers after them and the $1/10$ -interest for two months. Upon receipt the latter shall keep on deposit the 15,000 Alexandrian drachmas and the interest for two months.

[17] From the income every year in the month of Panathenaios, on the first, the procession of the Iliaka and the sacrifice to Athena shall take place. The bankers shall give from the income each year on the eleventh of the month of Panathenaios 127 drachmas and one triobol, tribe by tribe, free from the tax of $1/30$, to the phylarchs to be selected from each tribe. . . .

Thanks to Boeckh's ingenious restoration [τὸν δὲ μὴν τοῦ] (16; after τ[ὸ] ἢ κεφάλαιον] ... καὶ τόκον δὲ μὴν τοῦ δέκατον 13–14), Preuner saw that Hermias must have donated the principal two months before the beginning of the next calendar year (Panathenaios)². Rather than let the money sit idle Hermias stipulated that the bankers A) pay 10% interest pro-rated for the two months (= 250 drachmas) and B) re-invest the 250 drachmas with the principal, yielding a total interest-bearing principal of 15,250 drachmas. Thus, at 10%, the fund earned 1,525 drachmas annually.

Next, Keil restored δραχμῶν ἕκκατ[ὸν] εἴκοσι καὶ ἑπτὰ τριώβολον (19–20) on the strength of a clever calculation³. At *OGIS* 1212.14–15 (= *Illiou* 31) Dittenberger had restored ἑρεβ[ύει] μὲν τὰς δάδεκα ἰ [φουλάς] ... The principal of the endowment was 15,250 drachmas and the interest was 10%. If Ilians were grouped in 12 tribes, as Dittenberger suggested⁴, then the annual earnings of the foundation, 1,525 drachmas, would have translated to payments of 127 drachmas 4 *chalkoi* each (1,525 ÷ 12 = 127.083). Keil's restoration fits the space, but gives an aggregate payment that is too high by five drachmas (127 drachmas 3 obols × 12 = 1,530 drachmas), i.e. by $2\frac{1}{2}$ obols per tribe⁶. We have seen already that the endowment earned only 1,525 drachmas per year. How to explain the five-drachma deficit? Preuner suggested that the interest was pro-rated to the day and that the ten days between the beginning of the festival and the disbursement of the money by the bankers (17–21) were somehow interest-free. This is dubious. The bank never re-paid the principal. It retained the money on deposit forever. Why would the bank not have been asked to pay interest for those ten days, when it was generating revenue from the endowment's capital during that

² Boeckh, *CIG* II 3599; E. Preuner, *Die Panegyris der Athena Ilias*, Hermes 61 (1926) 113–133, at 125–126; cf. R. Bogaert, *Banques et banquiers dans les cités grecques*, Leiden 1968, 237.

³ B. Keil, *IG* XII.5 p. 33.

⁴ Corrected to ρομπεῖσιν by L. Robert, *Études* 177.

⁵ Followed by N. F. Jones, *Public Organization in Ancient Greece: A Documentary Study*, Philadelphia 1987, 299.

⁶ Yet the restoration must be correct. Neither τριώβολα, which would not fit the space, nor δέκα brings us even close to an aggregate payment of 1525 drachmas.

time? Bogaert rejects the idea of pro-rated interest, suggesting instead that the figures were simply rounded⁷.

Preuner's suggestion works if we assume first that Hermias required the state bank at Iliou to pay interest every day of the year but ten, and second that neither he nor anyone else thought to stipulate this fact or its reason in the endowment's enabling decree. The first seems unlikely, the second unthinkable. Bogaert's explanation has less to recommend it. It is difficult to see on what logic an accountant could find it simpler to round to three obols, instead of to four χάλκοι. More pressing, upward rounding of payments kills endowments. Such rounding entails shortfall. Repeated shortfalls compound. The death of the endowment would have been a mathematical certainty to Hermias and his peers if upward rounding had been built in to the operating procedure. Both explanations stand on the laziness or stupidity of Hermias and his fellow citizens. A more efficient solution would be welcome.

The mathematical problem would disappear if the mason had carved τέσσαρας χάλκοις at 19–20 instead of τριώβολον, that is, half an obol instead of half a drachma. This would appear to be an improbable slip. But what was written on the papyrus that the mason used as an exemplar? Three obols and four χάλκοι are both half of the next highest denomination: 2×3 obols = 1 drachma; 2×4 chalkoi = 1 obol. I suggest that the mason's exemplar did not spell out the numbers in full, as the inscription does, but contained numerical signs instead⁸. It is easy to imagine how such confusion could have arisen. The symbol, C, often rendered ζ, was widely used for half an obol in Attica, Epidaurus, Delos, Amorgos, the Tauric Chersonnesos and elsewhere⁹, but it was also frequently used for the drachma¹⁰. Furthermore, the symbol, T, was also in common use as an acrophonic abbreviation for both τριώβολον¹¹ and τετραπληρόν¹², each one-half the next highest fractional¹³. The potential for

⁷ Bogaert, *Banques et banquiers* (n. 2), 238 n. 53 and 237, followed by P. Debord, *Aspects sociaux et économiques de la vie religieuse dans l'Anatolie gréco-romaine* [= *EPRO* 88], Leiden 1982, 205. „chaque année les banquiers devaient verser avant la fête des Iliaca 127 dr. et 3 ob. à chacun des phylarques des 12 tribus (soit 1530 dr. au total). C'est la chiffre rond le plus proche des 1525 dr. que rapporterait le capital placé à 10% l'an.”

⁸ I find no inscriptions from Iliou that denote numerals with symbols.

⁹ M. Tod, *The Greek Numeral Notation*, BSA 18 (1911/12) 98–132, 101, 104–105, 115, 117, 119; idem, *Further Notes on the Greek Acrophonic Numerals*, BSA 28 (1926/7) 141–157, 144–145, 148; idem, *The Greek Acrophonic Numerals*, BSA 37 (1936/7) 236–258, 237; the symbol is also attested as six *chalkoi* in a 12-*chalkoi* obol and 9 *chalkoi* in an 18-*chalkoi* obol, with T indicating quarter-obols: Tod, BSA 37 (1936/7) 239–240, 243; idem, BSA 18 (1911/12) 104.

¹⁰ E. g. at Chalcedon; see M. Tod, *Three Greek Numeral Systems*, JHS 33 (1913) 27–34, 28–29; idem, BSA 18 (1911/12) 120, 123–124.

¹¹ Tod, BSA 18 (1911/12) 108–109, 113, 120; idem, JHS 33 (1913) 28–29, 33–34; idem, BSA 28 (1926/7) 143.

¹² Tod, BSA 18 (1911/12) 101, 105, 107, 113, 115; idem, BSA 37 (1936/7) 237.

¹³ For the abstraction of the sign, C, to the meaning 'half' and the conflation of the 'demi-obole' and 'demi-motif d'obole' see A. Blanchard, *Signes et abréviations dans les papyrus documentaires grecs: Recherches de paléographie* [= *BICS* suppl. 30], London 1974, 30 with n. 41–42 n. 8.

confusion would have been increased by the occasional use within the same system of C to indicate half an obol and both C and T to denote a quarter-obol.¹⁴

I suggest that the mason's exemplar bore some symbol for a half-obol, perhaps C, which the mason botched during expansion. Perhaps he conflated the abbreviation with another for a half-drachma, perhaps T. Perhaps the mason made an error of a less graphic nature, thinking „half“ but not „half an obol“. In any case, I suggest that the mason wrote τριόβολον in error and that his exemplar called for him to expand to τέσσαρας χάλκους, i. e. 127 drachmas $\frac{1}{2}$ obol. If this is so there were no pro-rata interest-free days and no rounding of figures. The foundation's earnings and annual disbursements were reckoned precisely down to the half-obol. By simple scribal confusion it appears to us that the tribes were allotted an additional two obols four χάλκoi each, per year. But officials would have followed the internal document, the papyrus. We may be certain that if this minor error was made on stone once it was not made on the ground year after year. The 12 tribes received 127 drachmas 4 χάλκoi each year, not a χάλκους more.

II. Teos

In the third century BC Polythrous son of Onesimos established an endowment at Teos for the purpose of educating free youth.¹⁵ The endowment's principal was 34,000 drachmas. The rate of interest at which the principal was lent is not stated in the fragmentary inscription. The surviving fragments do list annual salaries that the instructors were to receive.

Line	Position	Annual Salary
A.10-11	Grammar instructors	1 st <i>ergon</i> 600 dr.
A.11-12	“	2 nd <i>ergon</i> 550 dr.
A.12-13	“	3 rd <i>ergon</i> 500 dr.
A.13-14	Gymnastic trainers	500 dr.
		2
A.14-16	Kitharist or Harp-player	500 dr.
A.25-6	Archery/Javelin coach	700 dr. ¹⁶
A.26-7	Drillmaster	250 dr.
		300 dr.
		Total 3900 dr.

We appear to have a complete list of the endowment's annual expenditure, 3900 drachmas, which is 118 $\frac{1}{7}$ % of the principal. We may be relatively certain that the endowment did not charge 118 $\frac{1}{7}$ % in annual interest, but rather 12%, or a drachma

¹⁴ Tod, BSA 18 (1911/12) 101; also 123-124 for C as half a talent and half a gold stater. Such systems of abbreviation did often give rise to confusion: Tod, BSA 37 (1936/7) 237, here in an „abacus“, where confusion had special potential for damage.

¹⁵ The inscription is preserved on two stones that do not join. They were first associated by Havvette-Besnault and Potier, BCH 4 (1880) 110-121, 113-116 [Laum, *Stiftungen* (n. 1), no. 90]; Hiller von Gaertringen, Syll.³ 578.

¹⁶ Laum, *Stiftungen* (n. 1), vol. 1, p. 106 erroneously: „Kitharistes und Psaltes, beide je 700 Drachmen“, translated correctly ad loc.

per mina per month. At this rate the fund would have earned 4,080 drachmas per year, 180 more than its annual need. The fragmentary inscription does not say what happened to this small surplus. The endowment's enabling decree stipulated that if the city enacted an intercalary month instructors were to be paid additional wages.¹⁷ If instructors received a full twelfth of their annual salary for the intercalary month then the total expenditure would have been 325 drachmas (3,900 ÷ 12 = 325).

Laum suggested that intercalary salaries were paid out of this annual surplus of 180 drachmas.¹⁸ But math suggests otherwise. There is no reason to believe that interest was not calculated as a number of drachmas per mina per month. Thus in the event of an intercalary month the interest owed by borrowers from the fund would have risen the same amount as the instructors' salaries. One month's interest for one month's wages — nothing could be simpler. So even with intercalary salaries the fund seems to have generated a surplus. The endowment's managers were not free to disburse money for anything but the stipulated purposes.¹⁹ The surpluses, therefore, would have mounted, swelling an ever growing sum of money that could not legally be spent.²⁰ This state of affairs would have been as unsatisfactory as it would have been predictable.

What then became of the 180 drachmas? Two other endowed schools are attested on stone. In 160/59 King Attalos established at Delphi with a single gift two endowments²¹; 18,000 drachmas were to be lent toward payment of teachers' salaries, and 3000 to fund sacrifices and a procession in which the students took part. Both lots of money were lent at one-fifteenth per year ($6\frac{2}{3}\% = 3\frac{1}{3}$ obols / month). Thus, the smaller endowment would have generated 200 drachmas per year, to pay for the sacrifices and procession. A Milesian endowment paid teachers' salaries and with the small amount left over — I argue below that this sum was 240 drachmas — a sacrifice and procession were held for the students.²² Hence I suggest that in the missing sections of the Tean inscription, before fragment A or, perhaps more likely, between the end of A and the beginning of B, we are missing stipulations that the 180

¹⁷ Syll.³ 578, 20-21: προσδίδουσαι δὲ καὶ ἐὰν ἐμβόλιμον μῆνα ἄρωμεν τὸ ἑντιβάλλον τῷ μισθῷ τῶν μηνῶν.

¹⁸ Laum, *Stiftungen* (n. 1), vol. 1, p. 106.

¹⁹ Syll.³ 578, 39-47: ἦν δὲ οἱ ἐνεστῆκότες ταμίαι ἢ οἱ ἐκαστοτε γινόμενοι ἢ μὴ παροῦσιν τὸ ἀπύριον τοῦτο κατὰ τὰ γεγραμμένα, ννν ἢ ἑλάσας τις ἄρχων ἢ ἰδούσης εἰρηῆ ἢ κρήνηται ἢ προβῆναι ἢ ἐπιτησίοντι ἢ νόμου προβῆναι ἐναντίον τοῦτῶν ἢ τοῦτον τὸν νόμον ἀπὸ τῶν ἀπὸ τῶν τῶν ἢ παρευρέσει ἡσὼν ἄς δεῖ τὸ ἀπύριον κινηθῆναι ἢ μὴ ἀναλίσκεσθαι ἀπ' αὐτοῦ εἰς ἄ ὁ νόμος συντάσσει, ἢ ἄλλῃ ποῦ] καταχρησθῆναι καὶ μὴ εἰς ἄ ἑν τῶνδε τῶν νόμων διατετακται, τὰ τε πρᾶξιεντα ἄκουρα ἔστω, καὶ οἱ μετὰ ταῦτα ταμίαι καταχρηστέσθων εἰς τὸν λόγον κατὰ τὸν νόμον τῶ(ν)δε τὸ πᾶθος τῶν χρημάτων τὸ ἴσον εἰκ τῶν] τῆς πόλεως πρὸςδίδων καὶ τᾶλλα πάντα συντελείεσθων κατὰ τὸν νόμον τῶνδε.

²⁰ The principal of this endowment was not deposited with the state bank, which could fold surplus money into its deposits; for endowments deposited with state banks see Laum, *Stiftungen* (n. 1), no. 65 (see Bogert, *Banques et banquiers* (n. 7), 237-8), no. 66 (Bogert, 235-237), and no. 129.

²¹ Laum, *Stiftungen* (n. 1), no. 28; cf. K. Brügmann et al., eds., *Schenkungen hellenischer Herrscher an griechische Städte und Heiligümer*, Berlin 1995, no. 94 [E].

²² Laum, *Stiftungen* (n. 1), no. 129, 68-72; see pt. III below.

drachmas be spent on festivities for the Team students. There was no surplus and no waste, but a subvention for a sacred procession and festivities. A solution is not to be found in intercalation, but in the stone's missing middle.

III. Miletos

In 206/5 BC the people of Miletos erected an inscription in gratitude to Eudemos son of Thallion for endowing ten talents of silver for the „education of free children“ (*IMiler* I.3 145, 4)²³. The money was deposited with the state bank on condition that the annual income be reserved for instructors' salaries (49–53) and the purchase of an ox for a procession to Didyma and sacrifice (68–76). Salaries and ox—spending the money otherwise was forbidden²⁴, and carried a heavy fine²⁵. As ancient endowments go the terms and the careful accounting of expenditure are boilerplate²⁶. But a basic problem in the inscription has never been solved: the numbers do not compute.

Eudemos' endowment had a principal of 10 talents of silver (4–5) and an annual yield of 300 staters (20–21) of gold²⁷. From the latter four gymnastic trainers (49–50) and four grammar instructors (50) received salaries of 30 (51–52) and 40 drachmas per month (52–53) respectively. Thus, annual expenditure on salaries was 3,360 drachmas²⁸. Since the instructors were paid in silver drachmas, the figure in gold must have been an accounting stand-in, meaning 300 gold staters' worth of silver. Assuming a gold : silver ratio of 1 : 10, Ziebarth deduced that the annual revenue, accounted as 300 staters, was 6,000 drachmas²⁹.

At 1 : 10, 300 gold staters equaled 6,000 Attic drachmas. If the fund earned 6,000 drachmas annually and was obligated to pay 3,360 to the instructors, what was done with the remaining 2,640 drachmas? The decree stipulated that the head instructors use the remainder of the endowment's annual revenue, after the instructors had been paid, to procure the finest ox available, with which they were to lead an annual procession to Didyma (68–76)³⁰. No expense but the ox is mentioned. No single ox could have

cost anywhere near 2,640 drachmas³¹. If payments were made in Attic drachmas then the fund was massively inefficient. Why would Eudemos' endowment have included such a sloppy piece of budgeting? Ziebarth seems to suggest that Eudemos was anxious lest the sacrifice lapse into disuse, and so included the surplus as a safeguard³². By decree the endowment's income could not be spent on anything but the salaries and the ox (64–65). Such gross overbudgeting would have created a fiscal nightmare, a fund that generated nearly half a talent per year that could not legally be spent.

I suggest that the Milesians did not convert to Attic, as Ziebarth did, but to their own Milesian standard. Gold may have been tied to silver, in value, by a ratio of 1 : 10, but the same ratio did not apply in practice to the exchange of physical coins. One stater of gold, for example, was the equivalent of 20 Attic drachmas but only 14 of the heavier Aiginetan drachmas. The numbers in Eudemos' endowment make better sense, as we shall see, if Eudemos and the Milesians calculated on the Milesian weight standard.

In the sixth century coins struck on the standard that scholars have named Milesian dominated south-western Asia Minor and Lydia³³. Although its use in general seems to have ebbed by the late sixth century³⁴, the standard held out at Melos down to the city's destruction in 416³⁵. Around this time coins more or less ceased to be struck on Miletos' eponymous standard³⁶. Scholars are not alone in designating a known ancient standard as Milesian. Hellenistic Didyma knew a weight standard called by the same name. Numerous third- and second-century temple inventories from Didyma (*Didyma* 425–478) record *φιάλαι* by weight (and dedicator), in an array of standards, including one called Milesian. According to the temple inventories, the Milesian drachma in the Hellenistic period was not a coin minted by the city Miletos, but a measure of weight. A *φιάλη*'s weight mattered. The origin of coins melted down to fashion a *φιάλη* was irrelevant and beyond verification. And verification was the purpose of the label.

It would be tempting to suppose that in the inventories „Milesian“ or „local“³⁷ drachmas simply indicated the standard on which Miletos struck coins at the time,

31 For oxen-prices in fourth-century Athens see V. Rosivach, *System of Public Sacrifice in Fourth-Century Athens*, Atlanta 1994, 100–106.

32 Ziebarth, *Schulwesen* (n. 23), 23. Laum, *Stiftungen* (n. 1), vol. 1, p. 106 n. 3, thought the money was to be spent either „bei der Festeier ... oder wahrscheinlicher zu dem Unterricht“. The ox and salaries might be included under the headings Festeier and Unterricht, but these are accounted for already. It is hard to know precisely what Laum meant.

33 C. Kraay, *Archaic and Classical Greek Coins*, London 1976, 27; G. Mouchartre, *À propos d'une découverte de monnaies de Milet*, RBN 130 (1984) 19–35; H. A. Cahn, *Knidus: Die Münzen des sechsten und des fünften Jahrhunderts v. Chr.*, Berlin 1970, 179–181; F. Becker, *Ein Fund von 75 milesischen Obolen*, SNR 67 (1988) 5–42.

34 Kraay, *ACGC* (n. 33), 35, 38.

35 Kraay, *ACGC* (n. 33), 45.

36 Hekatomnos, dynast of Caria, is alleged to have minted, in a propagandistic gesture in assertion of his control, real or not, of the city, a series of coins on the Milesian standard early in the fourth century: Kraay, *ACGC* (n. 33), 238.

37 *Didyma* 471, 5–9: ... Ἀθναίου τοῦ Τί- - εἰλιος φιάλη Βοηγαί νικησάντος, ἐφ' ἧς ἐπιγράφη· ἐπιχώρια εὐεργήκοντα· Κούκτιων φιάλη, ἐφ' ἧς ἐπιγράφη· ὄκλη

23 Ziebarth, *Aus dem griechischen Schulwesen*, Leipzig 1914², 2–9; Rehm, *IMiler* I.3 145; Laum, *Stiftungen* (n. 1), no. 129; Hiller von Gaertingen and Ziebarth, *Syll* 3 577; Pleker, *Epigraphica* I 341; Date: M. Wörle, *Inchriften von Herakleia am Laimos I: Antiochos III., Zemis und Herakleia*, Chiron 18 (1988) 421–476, 432–437; Herrmann, *Milet* V.1 p. 178.

24 *IMiler* I.3 145 64–5: τὸ δ' ἐξαιρούμενον εἰς ταῦτα κατὰ τὴν ἰ δὲν ἀραξίν μὴ εἶναι μετενεγκεῖν εἰς ἄλλο μῦθεν πρόστοι μῦθεν.

25 *IMiler* I.3 145 65–8: εἰς τὸ δὲ τις εἴημι ἢ ἰ(1) προβῆι ἢ ἐπισηφίονη ἢ μετενεγκῆι τὴν τάξην ἔκαστον τοῦ ἐκτεμεύονου, οὐραϊτέρω ὁ τούτων τι τοῖστας στρατήροσ πεντακοσίους ἰεπὸς Ἐπιούθ καὶ Μουσαῶν.

26 Laum, *Stiftungen* (n. 1), vol. 1, p. 178–193 and 193–211 on injunctions and fines.

27 Ziebarth, *Schulwesen* (n. 23), 15–16; Bogaert, *Banques et banquiers* (n. 7), 257–259.

28 4 × 30 × 12 = 1440; 4 × 40 × 12 = 1920; 1440 + 1920 = 3360.

29 Ziebarth, *Schulwesen* (n. 23), 15–16; Laum, *Stiftungen* (n. 1), vol. 1, p. 106; Bogaert, *Banques et banquiers* (n. 7), 259.

30 On the occasion of the penitetic Didymaia and of the Boegia in intervening years.

either the Rhodian³⁸, Persian³⁹ or Attic⁴⁰ standard. But this is impossible. At *LDidyma* 446.9–12 we find two groups of $\phi\rho\acute{\alpha}\lambda\alpha\iota$, one with a weight given in Alexandrian drachmas and the other in Milesian⁴¹. Thus, Milesian drachmas were not equal to Alexandrian or, by extension, Attic. At least one account, moreover, lists separate $\phi\rho\acute{\alpha}\lambda\alpha\iota$ with Alexandrian, Milesian and Rhodian weights⁴². Thus, designation of weight in Milesian drachmas did not allude to the coins struck at Miletos on the Rhodian standard either⁴³.

For Hulstsch the Milesian standard was another name for the Persian. He believed that the Milesian standard had a stater with a theoretical weight of 11.2 grams (and so a drachma of 5.6 grams), borrowed from Babylonia in the seventh century⁴⁴. The drachmas struck in the third and second centuries consistently weighed less than 5

³⁸ $\lambda\alpha\epsilon\tilde{\iota}\nu\delta\iota\beta\rho\epsilon\iota\alpha\iota$ $\epsilon\kappa\alpha\tau\acute{\omega}\nu$: the designation „local“ for Milesian weight appears only once in the records. For local drachmas on Ithaca see K. J. Rigsby, *Asylia: Territorial Inviolability in the Hellenistic World* (Berkeley 1996, 86–20 with n. on p. 215; for local bronze see *IG* XI.2 161. B. 20, 162. B. 16. *Ilios* 78. 3–4 may concern money and surplus of local money: $\chi\rho\eta\mu\alpha\tau\alpha$ $\pi\acute{\alpha}\nu\tau\eta\upsilon$ $\tau\omicron\upsilon$ $\rho\epsilon\lambda\pi\eta\gamma\mu\epsilon\nu\epsilon\upsilon\lambda\omicron$ ι – – $\lambda\iota\upsilon\upsilon$ $\tau\omicron\upsilon$ $\epsilon\tau\gamma\omega\rho\iota\sigma\iota$ $\epsilon\tilde{\iota}\varsigma$ $\omicron\kappa\omicron\nu\omicron\lambda\omicron\iota$ $\epsilon\tau\gamma\omega\rho$ $\omicron\upsilon$ $\delta\epsilon\alpha\chi\mu\acute{\alpha}\varsigma$ $\epsilon\upsilon\epsilon\tau\eta\kappa\lambda\omicron\nu\epsilon\tau\alpha$: 91: $\epsilon\tau\gamma\omega\rho\iota\sigma\iota$ $\delta\rho\alpha\chi\mu\acute{\alpha}\varsigma$ $\delta\iota\alpha\kappa\lambda\omicron\upsilon\sigma\iota\alpha\varsigma$: 101: $\epsilon\tau\gamma\omega\rho\iota\sigma\iota$ $\delta\rho\alpha\chi\mu\acute{\alpha}\varsigma$ $\chi\eta\lambda\alpha\varsigma$ $\omicron\kappa\tau\alpha\kappa\lambda\omicron\upsilon\sigma\iota\alpha\varsigma$.

³⁹ Rhodian standard: Kraay, *ACGC* (n. 33), 258; see B. Deppert-Lippitz, *Die Münzprägung Miles von vierten bis ersten Jahrhundert v. Chr.*, Aarau 1984, Periods I–III; with P. Kinnis, *The Coinage of Miletus*, NC 146 (1986) 233–260, 234–235, and 249 for the suggestion that the silver coinage may have begun two decades before the death of Mausolus (353/2).

⁴⁰ Persian standard: Deppert-Lippitz, *Die Münzprägung Miles* (n. 38) Periods IV–V, but see with Kinnis, NC 146 (1986) 233–257; reduced Persian: Kinnis, NC 146 (1986) 235.

⁴¹ Gold staters on the Attic standard: Kinnis, NC 146 (1986) 257–258; Deppert-Lippitz, *Die Münzprägung Miles* (n. 38), 121–123, thought that these were forged, a theory now shown incorrect by Kinnis 245–247; for a revised chronology of Milesian silver in the second century see P. Kinnis, *CH* 8, 474: *Milesian Silver Coinage in the Second Century BC*, in: R. Ashton and S. Hurter (eds.), *Studies in Greek Numismatics in Memory of Martin Jessop Price*, London 1998, 175–195, esp. 182 on the Attic tetradrachms; cf. Deppert-Lippitz, *Die Münzprägung Miles* (n. 38), 185–186, Period VIII; Kinnis, NC 146 (1986) 235.

⁴² ... $\text{Ἡμισίος } \Gamma' - \epsilon - 6 - 7 - \text{ Σταλβαίνιος } \phi\rho\acute{\alpha}\lambda\alpha\varsigma$ $\tau\rho\epsilon\iota\varsigma$, $\delta\acute{\alpha}\kappa\tau\eta$ $\epsilon\kappa\acute{\alpha}\tau\omicron\lambda\omicron\iota$ (τρῖς) $\lambda\alpha\epsilon\tilde{\iota}\nu\delta\iota\beta\rho\epsilon\iota\alpha\iota$ $\epsilon\kappa\alpha\tau\acute{\omega}\nu$. $\text{Ἐνάρσιος } \text{Ἀντήνορος } \phi\rho\acute{\alpha}\lambda\lambda\alpha\varsigma$ $\epsilon\tau\kappa\lambda\omicron\iota$, $\delta\acute{\alpha}\kappa\tau\eta$ $\epsilon\kappa\acute{\alpha}\tau\omicron\tau\epsilon\iota\varsigma$ $\text{Μιλῆσιον } \epsilon\kappa\alpha\tau\acute{\omega}\nu$: the restoration $\lambda\alpha\epsilon\tilde{\iota}\nu\delta\iota\beta\rho\epsilon\iota\alpha\iota$ is certain; cf. the widespread citation of weights in Alexandrian drachmas in *LDidyma* 441, 443, 444, 446, 448, 449, 451, 452, 456, 457, 463.

⁴³ *LDidyma* 463. 17–20: $\text{Κυζικηνῶν } \phi\rho\acute{\alpha}\lambda\eta\eta$, $\delta\acute{\alpha}\kappa\tau\eta\iota$ $\acute{\alpha}\rho\theta\upsilon\sigma\alpha$ $\lambda\alpha\epsilon\tilde{\iota}\nu\delta\iota\beta\rho\epsilon\iota\alpha\varsigma$ $\epsilon\kappa\alpha\tau\acute{\omega}\nu$. $\text{Κρατέ(ρ)ου } \tau\omicron\upsilon$ $\text{Κρατέ(ρ)ου } \phi\rho\acute{\alpha}\lambda\eta\eta$, $\delta\acute{\alpha}\kappa\tau\eta\iota$ $\acute{\alpha}\rho\theta\upsilon\sigma\alpha$ $\text{Μιλῆσιος } \acute{\epsilon}\lambda\epsilon\upsilon\theta\epsilon\rho\iota\sigma\tau\alpha$ and 33–34: ... $\text{ΕΚΑΤΙΩΝ } \phi\rho\acute{\alpha}\lambda\iota\omega\upsilon$ $\delta\acute{\alpha}\kappa\tau\eta\varsigma$ $\text{Ῥοδίων } \epsilon\tau\kappa\omicron\sigma\iota\alpha\iota$ (v); ΕΚΑΤΙΩΝ is clearly corrupted from an ethnic designation like Κυζικηνῶν (17).

⁴⁴ H. A. Cahn, *Knidus: Die Münzen des sechsten und des fünften Jahrhunderts v. Chr.*, Berlin 1970, 184 n. 562, appears to be mistaken in claiming that K. Regling, *Die Münzen von Priene*, Berlin 1927, 130 n. 264, demonstrated that the Milesian standard had nothing to do with the Milesian drachmas mentioned in the inventories.

⁴⁵ F. Hulstsch, *Griechische und römische Metrologie?*, Berlin 1882, 174.

grams⁴⁵. Moreover, two $\phi\rho\acute{\alpha}\lambda\alpha\iota$ with weights expressed in Milesian and local drachmas are attested after the mid second century, by which time Miletos had ceased to strike coins on the so-called Persian standard⁴⁶. By then the Attic standard had supplanted the long-since reduced Persian as that on which Miletos struck silver⁴⁷. Thus, the temple inventories show that Milesian and Persian standards were not identical.

Designation of weights as „Milesian“ or „local“ at Miletos appears never to have indicated the standard in current use for the minting of coins. Temple inventories distinguished Milesian from Rhodian, Attic/Alexandrian and Persian standards. The Milesian was an independent standard that referred purely to weight, not to the weight-designation of a physical coin. From the fourth century onward when Miletos struck coins it used the standards of other cities.

The so-called Milesian standard possessed a stater with a theoretical weight of c. 14.1 grams and so a drachma of c. 7.05 grams⁴⁸. Thus, we can calculate the value of Milesian drachma against the gold stater through comparison to the Attic. We do not have documents that furnish weight equivalencies between Milesian and other standards, as we do with Aiginetan⁴⁹. But we can derive the number of Milesian drachmas per stater of gold from the observed weights. The actual weights of coins struck on the Aiginetan and Attic standards agree with known exchange rates in antiquity to two decimal places (1 gold stater = 20 Attic drachmas = 7 Aiginetan staters = .70; 4.3 grams [1 Attic drachma] ÷ 6.1 grams [$1/2$ Aiginetan stater] = .7049). If we add the Milesian drachma to the equation we get an exchange rate of 12 Milesian drachmas per 20 Attic (12 ÷ 20 = .60; 4.3 ÷ 7.05 grams [1 Milesian drachma] = .6099). Thus, the relationship of Attic and—for the sake of illustration—Aiginetan and Milesian standards is as follows:

	Attic	=	Aiginetan	=	Milesian
1 talent	= 6,000 drachmas	=	4,200 drachmas	=	3,600 drachmas
1 gold stater	= 20 drachmas	=	14 drachmas	=	12 drachmas
1 drachma	≈ 4.3 grams	≈	6.1 grams	≈	7.05 grams

⁴⁵ Calling in to question their designation as Persian at all: Kinnis, NC 146 (1986) 235; the drachmas struck on the so-called Persian standard by Miletos weighed considerably less than 5.6 grams.

⁴⁶ Kinnis, NC 146 (1986) 235–236; an object (*LDidyma* 477.7), no doubt a $\phi\rho\acute{\alpha}\lambda\eta\eta$, weighing 90 Milesian drachmas is recorded in an inventory from the mid-first century; *LDidyma* p. 152b; the $\phi\rho\acute{\alpha}\lambda\eta\eta$ that weighed 90 local drachmas (*LDidyma* 471.5–7) dates from the second half of the second century; Rehm, *LDidyma* p. 276, suggested reasonably that the treasurer Kallikrates son of Apollonios (3–4) was the grandson of the homonymous stephanephoros of 721 attested in *Milet* 1.3 125.25. Even if we generously calculate 70 years between grandfather and grandson, the present document would be dated to c. 140, probably after Miletos ceased to strike drachmas on the Persian standard.

⁴⁷ Kinnis, NC 146 (1986) 235; idem, *Milesian Silver Coinage* (n. 40), 182–183.

⁴⁸ Kraay, *ACGC* (n. 33), 258; this is a modern deduction from the known weights of early Milesian fractional staters; see E. Babelon, *Traité des monnaies grecques et romaines*, Paris 1901, II 263–264; B. Pfeiler, *Die Silberprägung von Milet im 6. Jahrhundert v. Chr.*, SNR 45 (1966) 5–25; Becker, SNR 67 (1988) 5–42.

⁴⁹ For example J. Sosin, *Agio at Delphi*, NC 160 (2000) 67–80.

On the Milesian standard the endowment would have had a principal of 36,000 drachmas and an annual yield of 3,600 drachmas ($300 \times 12 = 3,600$). An annual yield of 3,600 drachmas leaves a surplus of 240 (heavy) drachmas ($3,600 - 3,360 = 240$). This is steep for an ox, but it is in the right order of magnitude⁵⁰, unlike the 2,640 Attic-drachma surplus.

A contemporary inscription may provide further support for a 3,600-drachma talent in Hellenistic Miletos. The text in question is dated to 211/10 BC and is the enabling decree of an annuity fund established by subscription at Miletos (*Miletos* I.3 147)⁵¹. On its terms individuals were invited to contribute 3,600 drachmas from whose interest they would draw 30 drachmas per month, or 10% annually, for the rest of their lives (lines 8–25). Perhaps the state arrived at the required contribution by calculating the sum of money that donors would have had to give in order to receive a predetermined monthly payment of 30 drachmas. The city's primary objective was to raise cash, and quickly⁵². Miletos required payment of 100 staters of the 3,600 drachmas immediately (12–13) and the rest by the eighth of Artemisiôn (13–14). Bogaert assumed that the transactions were calculated in Attic drachmas, reckoning the staters as equivalent to 2,000 drachmas⁵³. On this interpretation the donors paid 2,000 drachmas, five-ninths of the total donation, up front, and the remaining 1,600 drachmas later. If calculations were made on the Milesian standard, subscribers would have paid 1,200 Milesian drachmas up front and the remaining two-thirds by the eighth of Artemisiôn, five months later. Installments of one-third and two-thirds are not inherently more probable than payments of five-ninths and four-ninths. But it is worth considering that both the annuity fund and Eudemos' endowment operated on the same Milesian weight standard.

The texts share additional financial particulars. On the terms of Eudemos' endowment the fund's interest was to be allocated by the bankers in gold staters, which was apparently Milesian accounting convention for 300 gold staters' worth of Milesian drachmas in silver. Similarly, the annuity-fund stipulated contributions in staters and payments in drachmas. What was the purpose of this accounting convention? Hellenistic Miletos employed a single standard to measure generic weight, including that of silver money, the Milesian standard. But it did not strike coins on this standard; for this it employed the Rhodian, Persian and Attic standards. Efficiency, therefore, might urge someone reckoning drachmas of multiple standards in the same account to use a single unit of account. The gold stater was as good a choice as any. Eudemos' endowment and the annuity-fund were both under the financial administration of the public bankers. As these bankers would have had to handle large sums of money struck on

⁵⁰ And not too far from the 200 drachmas generated for similar purposes by the Delphic school-endowment and the 180 generated by the Tean; see above under section II.

⁵¹ Date: Wörle, *Chiron* 18 (1988) 432–437; bibliography and notes: Herrmann, *Miletos* V.1 180; commentary: L. Migeotte, *L'empunt public dans les cités grecques: recueil des documents et analyse critique*, Quebec 1984, no. 97, p. 307–311.

⁵² *Miletos* I.3 147. 4–7: μήτε εἰδιφορέας διὰ ταῦτα γενομένης ὑπὸ μνησθένος μήτε τῶν μηδισθησάντων ἀγαπήσεως διὰ τὸ κερωνηκῆναι τάς τε κοινὰς καὶ τὰς ἰδίας ἐκείνου προσιόδους γένηνται ἐνὶ πλείονα ἔτη κατὰ τὴν χόρον ἀπορίας.

⁵³ Bogaert, *Banques et Banquiers* (n. 38), 257 n. 160; also Herrmann, *Miletos* V.1 181.

various standards, it may have made good accounting sense for them to reckon allocations in notional gold staters (and weighed silver) regardless of the standard(s) on which the coins they handled had been struck.

The Milesian habit of weighing money with its own local standard, long after coins had ceased to be struck on that standard, may seem odd. In fact it was not only rational but must have been the norm: many Greek cities struck no coins at all. Unless these cities borrowed weight standards from a city that did, there was very little chance that their official weights would map to the standards of the coins circulating in local markets. In antiquity the fact was that a drachma of cheese or fish or silver in one city did not necessarily weigh a drachma in the adjacent city. Whether these cities minted coins and, if so, what standards they used in the process, never changed this fact. The Milesian drachma was a purely notional unit of weight.

If monetary practice at Miletos seems needlessly difficult, the situation on the ground was simple: at Miletos, as elsewhere, coins and the standards on which they were struck came and went but the lump of metal to which any citizen could appeal to determine the weight of an object weighed the same in 200 BC as it did in 500 BC. A bullion coin weighed what it weighed, but official weights were the solid foundation without which market exchange would have been hamstringing. Milesian practice did not create chaos but was a bulwark against it. So long as the Milesian drachma-weight had a basis in reality the relative value of any currency could be calculated with ease and, more importantly, confidence. As a civic gesture this was predictably conservative; Miletos maintained its own legally sanctioned system of weights and measures in the face of changing minting conventions, fashion and macro-political change. Such was custom⁵⁴.

Another inscription may support our conjecture of Milesian drachma related to the Attic drachma by a weight ratio of 6 : 10. The text is a fragmentary account from the first half of the second century from Didyma. The stone appears now to be lost, and seems to have been so when Rehm edited the text more than half a century ago (*Didyma* 38):

[μ]ειζόνων στρογγύην, ὄν π[ό]δες στροπεοὶ [Ϝ]ϞΓ, vacat
 [ω]ς τοῦ ποδός Ὑ ΕΣ ὕ, γίνονται δραχμαὶ ΜΠΛΑΣ καὶ σ.
 τῶν δραχμαὶ ΦΤΓ, ὁμοῦ τῶν γενημένων ἔργων ΜΠ[Φ]Ϟ

⁵⁴ A. Giovannini, *Rome et la circulation monétaire en Grèce au I^{er} siècle avant Jésus-Christ*, Basel 1978, 116–118; J. Kroll kindly alerted me to this citation. J. Tréheux, *L'unité de pesée et l'unité de compte des hiéropes à Délos*, in T. Linders and B. Alroth (eds.), *Economics of Cult in the Ancient Greek World*, Uppsala 1992, 21–23; Delos furnishes an excellent parallel, accounting on the Attic and striking coins on the Rhodian standards; see also J. Tréheux, *L'administration financière des EPII TA JEP A à Délos: une théorie nouvelle*, BCH 115 (1991) 349–352; J. R. Melville Jones, *Danarii, asses and assaria in the early Roman Empire*, BICS 18 (1971) 99–105, esp. 99–100; s. Broughton, ESAR IV 889, J. Sosin, *Boeotian Silver, Theban Agio and Bronze Drachmas*, NC 162 (2002) forthcoming.

4 [5 vν δεσαράνητραι δε vvvvv vvvvv εἰς αὐτοὺς εἴ[5] τε τὰ ὀ-
 νώνια καὶ τὸν στρον καὶ εἰς τὸν ἀμφοισμὸν δραχμαὶ ἸΤΤ.

καὶ εἰς τὴν στρόμωσιν v P A v καὶ εἰς τὰ ὄξυντρα τοῦ σιδήρου ἸΣ.
 καὶ εἰς στρόμωα [A]λεξάνδρεα ἸΟΒ—. ὁμοῦ τὸ ἀνηλωμένον[v]

8 δραχμαὶ ἸΦΜΗ. λοιπαὶ περὶεῖσιν ἀπὸ τῶν ἔργων ἀποδολο-
 [πριμέν]ω[v] πάντων δαρ[ανημάτων] vacat.

Not certain whether another line followed.

... whose solid feet were 3,093 drachmas at 5 drachmas 3 obols per foot, makes 17,011 drachmas 3 obols and 586 drachmas for X, so for all the work that has been done 17,597 drachmas 3 obols

[4] N was spent for these: for sauces and the bread and the clothing 3,380 drachmas; and for the tempering 130 drachmas; and for the sharpening of the iron 1,200 drachmas; and for tempering 1,072 drachmas 1 obol Alexandrian; so the expenditure was 5,548 drachmas 3 obols.

[8] The rest was surplus from the work when all expenditures had been accounted.

The document presents an itemized account of expenditure and a total. In the complete section one expense (7) is qualified as paid in Alexandrian drachmas. If the raw numbers are added together they exceed the expressed total expenditure: 3,380 drachmas + 130 drachmas + 1,200 drachmas + 1,072 drachmas 1 obol = 5,782 drachmas 1 obol. If we do not convert the Alexandrian drachmas the account fails to square by 233 drachmas 4 obols (= 5,782 drachmas 1 obol – 5,548 drachmas 3 obols). Rehm, therefore, added all expenses but the one that was reckoned in Alexandrian drachmas (1,072 drachmas 1 obol):

Food and clothing	3,380	
Tempering	130	55
Sharpening	± 1,200	
Total	4,710	
Total expenditure	5,548 $\frac{3}{6}$	
	— 4,710	
	838 $\frac{3}{6}$	

Rehm assumed that the default drachma of reckoning in this account was the Milesian. He deduced, therefore, that the ratio of the Alexandrian drachma to the Milesian should equal $838\frac{3}{6} : 1,072\frac{1}{6}$ (7.82). In order to convert the 1,702 drachmas 1 obol from Alexandrian to Milesian drachmas Rehm divided the theoretical weight of the Alexandrian drachma, 4.37 (so Rehm) by the theoretical weight that Hultsch had de-

⁵⁵ Though Rehm read the stone PA (130 drachmas) he seems accidentally to have calculated 120 drachmas, so his calculations are off by 10; I have corrected them here.

rived for the Milesian drachma, 5.6 grams (7.80)⁵⁶. He then multiplied 1,072 by 4.37 + 5.6, obtaining the figure c. 836. This brought Rehm to within three drachmas of the desired figure, $838\frac{3}{6}$.⁵⁷

Rehm's perspicacity was awesome and his precision impressive, but the calculations are problematic. As we have seen, Hultsch's Milesian drachma of 5.6 grams is not supported by the Milesian drachmas and hemi-drachmas that have survived. And Rehm himself doubted the security of his readings. The first digit of the number in line 7 was not certain and at the end of line 6 Wiegand's ΦΥ seemed to Rehm as sure as his own ἸΣ.

Another more pressing textual problem concerns the total expenditure ἸΦΜΗ (8), 5,548 drachmas 3 obols. The third digit, Μ (= 40), clearly visible in Rehm's photograph of the squeeze (Abh. 35, p. 40), stands out as wider than the other μs in the text by almost half (compare στρόμωα in the preceding line). A vertical stroke has clearly been carved down the middle of the Μ, bisecting it into a N-like shape and an adjacent A-like shape: Μ → N/1 Was Μ (= 40) corrected to Ν (= 50)? Moreover, the horizontal stroke of Rehm's Η is invisible in the photograph. Thus, the figure in line 8 can better be read ΦΘΝ/1115, i. e. 5,55Ν drachmas 3 obols. Perhaps the first diagonal may be written off as extraneous, the residue of correction. But how to construe the remaining three verticals? At Miletos the sign for three drachmas was Γ and the sign for one drachma was Ι. Is it possible that after the correction of Μ to Ν the scribe let ΙΙΙ pass for three drachmas rather than erase two verticals and cut a new horizontal to make the Γ? As conjectures go this is not entirely satisfactory. Nevertheless, any attempt to render the account sensible must accommodate the extraordinary Μ.

Our tentative reconstruction would give a total expenditure of 5,553 drachmas 3 obols. Let us reconfigure Rehm's calculations in the light of his uncertainty in line 7 (i. e. reading ΦΥ with Wiegand instead of ἸΣ) and our proposed re-interpretation of the number in line 8:

Food and clothing	3,380	
Tempering	130	
Sharpening	± 1,400	
Total	4,910	
Total expenditure	5,553 $\frac{3}{6}$	
	— 4,910	
	643 $\frac{3}{6}$	

On these calculations 643 drachmas 3 obols would be the Milesian equivalent of 1,072 Alexandrian drachmas 1 obol. Now, on the strength of Eudemos' enabling decree and the Archaic and Classical silver fractionals we have deduced a Milesian : Attic/Alexandrian ratio of 6 : 10. 60% of $1,072\frac{1}{6}$ is 643.3, just under 643 drachmas 3 obols. On Wiegand's reading in line 7 and our tentative interpretation of line 8 the account squares, to within one obol, with a Milesian drachma related to the Attic drachma by a ratio of 6:10.

⁵⁶ Hultsch, *Metrologie*² (n. 44) 579–580.

⁵⁷ His mistaken calculation of the 130 drachmas made his calculations seem farther from the mark than they were.

Another explanation of the numbers may also be advanced. It pre-supposes Wiegand's reading in line 7, but is equally compatible with Rehm's reading in line 8 and my own tentative conjecture. The payment in Alexandrian drachmas stands out as the only figure in the account that is not a round number. The others, 3,380, 130 and 1,200/1,400, are round — to tens. Rehm did not consider the realities of the transaction on the ground. We have suggested that at Miletos a quantity of Milesian drachmas denoted weight without reference to the number, denomination or origin of the constituent silver coins. If so, then the city measured out the $1,072\frac{1}{6}$ Alexandrian drachmas to the metalworker in weight rather than number. The metalworker probably received payment in a variety of coins, tetradrachmas, didrachmas, drachmas, even hemi-drachmas struck on any number of different standards. Even if the metalworker preferred to receive payment in currency of a single standard and denomination, it is possible that the Milesian bankers — for whom default operating procedure rendered the distinction usually irrelevant — would have been unable to satisfy his preference.

In explanation of the curiously non-round payment of 1072 drachmas 1 obol, I suggest the following scenario. The metalworker and the city negotiated a fee of 600 Milesian drachmas, which the metalworker requested be paid to him in Alexandrian drachmas. The public bankers, who were accustomed to measure money by weight, not denomination or origin, could not satisfy the request. They could weigh out 600 Milesian drachmas, which weighed the same as 1,000 Alexandrian drachmas, but they could not guarantee that the 1,000 Alexandrian drachmas would consist of 1,000 physical Alexandrian drachmas; in fact they could be relatively certain that the payment would not.⁵⁸ Expecting that he would have to exchange some or all of the money at a money-changer's table, the metalworker demanded additional payment to defray the *agio* that he would have to pay to convert his assortment of silver coins to Alexandrian drachmas.⁵⁹ He demanded an additional 7.2% — plus one obol — or, 12 Attic drachmas per 100 Milesian. As a fee for exchange this is slightly high but not inconsistent with rates known from elsewhere.⁶⁰

The inventory from Didyma is problematic. The stone's loss may prevent verifiable solution. I suggest the preceding as one simple way out of a difficult problem. But whatever we agree about this text the fundamental question in Eudemos' endowment remains. It is inconceivable that the people of Miletos could have sanctioned an endowment that produced nearly half a talent in annual revenue, which they could not

⁵⁸ The explosion in variety of standards and the growing prevalence of reduced-weight coins could pose difficulties; temple authorities at Delos took advantage of these developments: V. Chanakowski-Sabé, *Les espèces monétaires dans la comptabilité des hiéropes à la fin de l'indépendance Délienne*, REA 99 (1997) 357–369. Athens, by contrast, may have preferred greater uniformity: Tréheux, BCH 115 (1991) 349–352; Giovannini, *Rome et la circulation monétaire* (n. 54), 60–62.

⁵⁹ For a similar instance of a private businessman demanding money to cover exchange in addition to payment, see CID II 62. II. A. 5–13: ἐλέφαντα ἐπιτάχθεθα [τέ]λεπασά-στων, ὁκὰ ἀττικῶν [α]ν[τα] ἐνενηκοντα τρεῖς, τιμὰ [ἀ]ττικῶν μναὶ ἑκατὶ δύο δ[ι]α[κ]ιλια[κ]ῆ ἐβδμήκοντα [τέ]λεπες· τούτο αὐτιναῖον ἀρεδωκουες ταὶ ἐπικρατά-λαργὰ δωαυιάς χιλια[κ]ῆς ἐπικρατίας νέντε, ὀβολὸς τρεῖς.
⁶⁰ Sosin, NC 160 (2000) 79, *idem*, NC 162 (2002) forthcoming.

legally spend. However we are to interpret *Didyma* 38 the problem in Eudemos' endowment vanishes if we posit the use of the Milesian standard to reckon payments.

* * *

The survival of endowments, self-standing economic entities, depended on careful calculation, rational engineering, forethought. These three case-studies highlight a tendency in studies of Greek economic behavior. In the first case scholars have assumed that the citizens of Ilion endowed their famous local festival, the Panathenaia, with a fund that was guaranteed by the very terms of its creation to die slowly, in five-drachma increments. In the second and third cases scholars have assumed that the assembled citizens of Teos and Miletos did not realize — or did not care — that they were setting their cities up to produce large sums of precious money that could not by law be spent. Low expectations will be met. But the stakes were high. Children had to be educated, cult performed. And cash was precious. The creators and managers of ancient endowments did not round up; they did not throw money away and they did not pad. They did the math.⁶¹

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