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P. OXY. XVI 1919 AND MULE-BREEDING

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P. Oxy. XVI 1919 and Mule-breeding

P. Oxy. XVI 1919 is a single column of accounts listing disbursements of various kinds. The papyrus was dated by its editors to the seventh century A.D. on the basis of the hand of its scribe.¹ Our interest in the text concerns the entry in the last and fourteenth line: ὑπὲρ μολογενίας ἦτοι ἵπωβουρδων^ο. We shall argue that line 14 most likely concerned expenses encountered in the breeding of mules and that proper understanding of the line expands our knowledge of the technical terminology of Byzantine Egypt employed in the breeding of mules. The original editors assumed that line 14 should be understood with the line that preceded and they combined lines 13 and 14 together into a single entry as follows:

τῷ λαμπροτάτῳ Ἀγαπητῷ (ὑπὲρ) τιμ(ῆς) κριθῶν (άρταβῶν) ος L ὄν[όματος]
 Φοιβάμμωνος κεφαλ(αιωτοῦ) Ἀλεξ(ανδρείας) νο(μικμάτια) ε
 ὑπὲρ μολογενίας ἦτοι ἵπωβούρδωνο(c) [] vac.
 “To the most illustrious Agapetus for the price of 76 1/2 artabae of barley on account of
 Phoibamon, *capitularius*, for a mare’s or a horse’s mule, 5 sol. the Alexandrian
 standard.”

There can be little doubt, however, that two separate entries are involved in these two lines, as their presentation and spacing suggest. The first entry (line 13) was a payment to Agapetus for the price of barley; this entry was completed at the end of the line with the mention of the sum paid (5 *solidi*). The second entry (line 14) was the payment ὑπὲρ μολογενίας ἦτοι ἵπωβουρδων^ο and the amount paid was lost in the lacuna of 2.3 cm. directly to the right.² In their critical apparatus the editors suggested that μολογενίας was an orthographic variant of μυλογενείας and that ἵπωβούρδωνο(c) was an orthographic variant of ἵπποβούρδωνο(c).³ In their note *ad loc.* the editors observed that both words, μ(υ)λογέν(ε)ια, “mare’s mule” in their translation, and their ἵπποβούρδων, “horse’s mule,” were novelties. When the two words were juxtaposed one to the another, the result was, they claimed, “an unnecessary pleonasm.”

Such an explanation for line 14 is unsatisfactory on several grounds. It is true that the papyrus have furnished examples of upsilon replacing omicron.⁴ Hence it is not impossible that the scribe wrote μολογενίας for μυλογενείας. More likely, however, is that the scribe intended μουλογενείας, with omicron replacing the diphthong ου,⁵ because the Latin words *mulus*, *mulio*, etc.,

¹ For corrections to the text of *P. Oxy. XVI 1919*, see *BL VII* 142. The papyrus was cut off at all sides in a rather regular fashion. It was mutilated by a large hole in the middle of the sheet and marred by numerous small holes. The lower margin is 9 cm.

² After this lacuna is an empty space of 15 cm.

³ Indexed in *P. Oxy. XVI* as ἵπποβούρδων. But see the uncompounded form βουρδῶν, βουρδῶνος — which suggests a nominative ἵπποβουρδῶν and a genitive ἵπποβουρδῶνο(c) for line 14. Although neither Preisigke, *Wörterbuch*, nor *LSJ*⁹ include the hapax ἵπποβουρδῶν, derivatives such as βουρδωνάριος also retain omega.

⁴ F.Th. Gignac, *A Grammar I*, Milan 1976, 293.

⁵ F.Th. Gignac, *op. cit.*, 211f; see also *CIL IV* 2204, with μολα.

were normally transliterated μουλ-, whenever written with Greek characters.⁶ Perhaps by late antiquity this orthography was a deliberate effort to differentiate compounds based on the Latin root *mul-* (“mule”) from compounds based on the Greek root μιλ- (“mill”).

Once the editors had normalized the orthography as ὑπὲρ μο(υ)λογεν(ε)ίας ἦτοι ἵπποβούρδωνο(ς), they offered the translation “for a mare’s or a horse’s mule.” This too is unsatisfactory, because the resulting pleonasm implies an indifference to the type of half-breed animal which was being indicated. That is, in the editors’ interpretation of the line, a sum of money was paid for barley for the hybrid animal that resulted either from the breeding of a mare and a he-ass (English “mule”), or from the breeding of a she-ass and a horse (English “hinny”). This specific indifference to the offspring produced violates ancient habits: when both mule and hinny were mentioned together in the same breath, there was a marked tendency to express a preference for the work capabilities and other virtues of the offspring from a mare and a he-ass (see further, below). It seems, therefore, worthwhile to begin again with the evidence available to see if a better explanation for the intention of line 14 can be found.

To be sure, neither μο(υ)λογέν(ε)ια nor ἵπποβουρδωνο() occur in our Greek lexica. Nevertheless, μο(υ)λογέν(ε)ια is the term written out in full in the text; hence it seems better procedure to begin with this form. The translation “mare’s mule” or “a mule born from a female (horse)” for μο(υ)λογέν(ε)ια is without parallel, as far as we are aware. Μο(υ)λογέν(ε)ια appears to be a hybrid, composed of the Latin *mulus* and the Greek suffix -γένεια.⁷ Compound adjectives with the element -γένεια, the feminine form of -γενής, are generally passive in meaning — that is, “born from ...”⁸ But mules do not normally produce offspring — an objection that was surely in the minds of the first editors of the papyrus.⁹ When mules did, in fact, foal on rare occasions, it was regarded by Romans as an omen worthy of note: *...idcirco mulas non parere. Est in Annalibus nostris peperisse saepe, verum prodigii loco habitum...* (Pliny *NH* 8.59.173).¹⁰ Hence, the element -γένεια in μο(υ)λογέν(ε)ια is unlikely to mean “a female animal born from a mule.” The first editors no doubt proposed “mare’s mule,” because it served as a better complement to “horse’s mule,” their translation for ἵπποβουρδωνο. This, in turn, apparently led them to the judgment that the juxtaposition of the two words was pleonastic.

A few compounds ending in -γένεια, however, are substantives, expressing the abstract notion of the adjective from which the noun derived,¹¹ such as εὐγένεια, “nobility,” “well

⁶ For μουλ- (= “mul-”), see S. Daris, *Il lessico latino nel Greco d’Egitto*, Barcelona 1971, 74f.

⁷ Cf. P. Kretschmer and E. Locker, *Rückläufiges Wörterbuch der griechischen Sprache*, Göttingen 1963, 14. The suffix -γένια occurs only in the word εὐγένια, a poetic form of εὐγένεια. Hesychius has the lemma γενιάς = ἔκγονος. But if γενιάς were the final element in the word μο(υ)λογενιάς, the scribe used a nominative form instead of a genitive (F.Th. Gignac, *A Grammar* II, Milan 1981, 16, and for parallels, the literature cited in his footnote 1).

⁸ E.g. ἀφρογένεια = “foam-born,” “born from foam”; Κυπρογένεια = “Cyprus-born,” “born on Cyprus”; ποντογένεια = “sea-born,” “born from the sea”; Λατογένεια = “Leto-born,” “born from Leto,” etc. See *LJS* ⁹ for πρωτογενής and πρωτόγονος apparently used interchangeably in the meaning “first-born.”

⁹ A. Hyland, *The Endurance Horse*, London 1988, 12, speaks of 14 recorded cases of mules foaling in America. H. Hauben took impetus from the first foaling of a mule under laboratory conditions to write his thorough study “‘Onagres’ et ‘Hémionagres’ en Transjordanie au III siècle avant J.-C.,” *Ancient Society* 15-17, 1984-86, 89-111 (cf. p. 110, footnote 126)

¹⁰ Cf. A. Ernout’s edition of Pliny, *Les Belles Lettres*, Paris 1952, 155-56 and notes 2 and 3.

¹¹ E.g. H.W. Smyth, *Greek Grammar*, Cambridge 1956, sect. 840b, 1.

borned-ness.”¹² But for μο(υ)λογέν(ε)ια, the abstract noun, passive meaning still entails the difficulty of birthing from a mule. A substantive that meant “mule breeding” may, however, find parallels in the use of κοσμογένεια, an abstract noun with active meaning — “creation of the world.”¹³ *LJS*⁹ cites κοσμογένεια as a synonym for κοσμογονία from Julian’s *Contra Galilaeos* 49a, and this was not an uncommon interchange for late Greek authors. The following used both κοσμογένεια and κοσμογονία in the meaning “creation of the world,” sometimes mixing the two forms in the same work: Basilius, a 4th-century A.D. theologian from Caesarea in Cappadocia, in his *Homilies on Psalms*¹⁴; Eustathius in his commentary on the *Iliad*¹⁵; Gregory of Nyssa in his *Against Eunomius*¹⁶ and his *Refutation of Eunomius’ Confession*¹⁷; Origen in his *Against Celsus*¹⁸; and Photius in his *Library*.¹⁹ Following that analogy, μο(υ)λογέν(ε)ια, would thus mean “breeding of mules,” and hence it becomes an equivalent to the expected, but unattested, μουλογονία*.²⁰ Μο(υ)λογέν(ε)ια in line 14 of *P. Oxy.* 1919 in all likelihood refers to charges incurred in the breeding of mules.²¹

The papyrus reads only ἰπωβουρδων^ο. What forced that form to be expanded and explained as ἰποβούρδο(ν)ο(c) was the editors’ supposition that, like μο(υ)λογέν(ε)ια, this term referred to the animal in whose interests 76 1/2 artabae of barley had been purchased and the purchase price of five solidi registered among the disbursements of the account. The abbreviation could equally well, however, stand for the genitive of ἰποβουρδωνο(γένεια)* or perhaps, ἰποβουρδωνο(γονία)*, or even ἰποβουρδωνο(ποιία)*, *vel simile*. Preisigke offered two meanings for the connector ἤτοι: 1) ”or” (“oder”), as an expression equivalent to ὁ καί; 2) “and especially” (“und zwar”), as a means of giving additional information about a previous term.²² In some way, then, ἰποβουρδωνο() ought to be either an equivalent (1) of μο(υ)λογέν(ε)ια, or an elaboration and specification (2) of μο(υ)λογέν(ε)ια.

The following summary of mule breeding by Pliny the Elder highlights the desiderata in mule breeding: namely, the production of a very strong animal, preferably a female half-breed born from a mare and an ass, that was ideally suited for work on the farm.

...a mare coupled with an ass after twelve months bears a mule (*mula*), an animal of exceptional strength for agricultural operations. To breed mules they choose mares

¹² Εὐγένεια also knows the poetic form εὐγενία.

¹³ Cf. also Ἰφιγόνης for Ἰφιγενείας in Eur. *El.* 1023.

¹⁴ *MPG* 29: 289.34.

¹⁵ 4.85.25 and 4.86.12 Stallbaum, Leipzig 1830 (reprint Hildesheim 1976).

¹⁶ *Contra Eunomium* 2.1.213.4, 2.1.228.4, 2.1.255.3, 2.1.264.3, 2.1.292.5, 2.1.443.2, 3.7.34.10 Jaeger, Leiden 1960.

¹⁷ *Refutatio confessionis Eunomii* 69.5 and 150.4 Jaeger, Leiden 1960.

¹⁸ *Contra Celsum* 6.29.6, 6.49.4 Borret, Paris 1967-69.

¹⁹ *Bibliotheca* 34.7a.11, 222.187b.23, 222.191b.27, 232.289a.42, 237.313a.25, 240.322b.8 Henry, Paris 1959-1977.

²⁰ There is also the possibility that the scribe wrote μουλογενίαc, but intended μο(υ)λογονίαc, since the interchange of ο)ε is also attested in the papyri: see F.Th.Gignac, *A Grammar* I, Milan 1976, 209f.

²¹ If not an abstract noun, μο(υ)λογένεια would, by this argument, mean “a mare that bore mules.” As will become apparent below, we have been unable to see how this meaning could be joined through ἤτοι with ἰποβουρδων^ο, however expanded, since the term with a specific meaning must refer to the hybrid animal.

²² *Wörterbuch* I (Berlin 1925), col. 663. P.J. Sijpesteijn presently works upon a study of the use of ἤτοι and ἤγουν.

not less than four or more than ten years old. Also breeders say that females of either genus refuse stallions of the other one unless as foals they were suckled by females of the same genus as the stallions; for this reason they stealthily remove the foals in the dark and put them to mares' or she-asses' udders respectively. But a mule (*mula*) is also got by a horse out of an ass, though it is unmanageable, slow, and obstinate. Also the foals from old mares are sluggish. (172) It causes miscarriage for a mare in foal by a horse to be put to an ass, but not *vice versa*. It has been observed that female asses are best coupled six days after they have borne a foal, and that males couple better when tired. It is noticed that a female that does not conceive before she casts what are called her milk-teeth is barren, as is one that does not begin to produce foals from the first coupling. Male foals of an ass by a horse were in old days called hinnies, while the term mules was used for the foals of a mare by an ass.²³ (NH 8.69.171-72)

Traditional usage was to reserve the term *mulus* / *mula* for the meaning "mule" — that is, an animal with a mare as mother and an ass as father, as in the German "Maultier," the French "mule," the Dutch "muilnier," etc.,²⁴ and to reserve *burdo* (βουρδών) for the meaning "hinny" — that is, an animal with an ass as mother and a horse as father, as in "Maulesel," "bardot," "muilezel."²⁵ *Mulus* could also be used in the place of *mula* to indicate the female as well as the male,²⁶ and in the passage from Pliny quoted above, *mula* was used for the broader *mulus* to indicate the strong preference for the female hybrid, especially that born from a mare and a he-ass.

In spite of these clearly stated preferences about how to breed the more useful animal, grounded in experience with the hybrid's capacities in hauling and in agricultural work in the fields, linguistic practice violated "traditional usage," and the terms *mulus* and *burdo* (βουρδών) were used without the precision the terms theoretically afforded.²⁷ That is, popular usage in Greco-Roman antiquity approximated the looseness with which the English word, "mule" is

²³ *Ex asino et equa mula gignitur mense xiii, animal viribus in labores eximium. ad tales partus equas neque quadrimis minores neque decennibus maiores legunt. acerique utrumque genus ab altero narrant nisi in infantia eius generis quod ineat lacte hausto; quapropter subreptos pullos in tenebris equarum uberi asinarumve eculeos admovent. gignitur autem mula et ex equo et asina, et effrenis et tarditatis indomitae, lenta omnia et e vetulis. (172) conceptum ex equo secutus asini coitus abortu perimit, non item ex asino equi. feminas a partu optime septimo die impleri observatum, mares fatigatos melius implere. quae non prius quam dentes quos pullinos appellant iaciat conceperit sterilis esse intellegitur, et quae non primo initu generare coeperit. equo et asina genitos mares hinnulos antiqui vocabant, contraque mulos quos asini et equae generarent. Text and translation are from H. Rackham's edition of the *Natural Histories* for Loeb Classical Library, London and Cambridge, Mass., 1947.*

²⁴ For *mulus* / *mula*: see *TLL* VIII, cols. 1619-1621. "*Mulus: usu sollemni de animali ex asino et equa natus* (Varro *Ling.* 9.28 and *Rust.* 2.8.1; Paul. Fest. p. 33; Pliny *NH* 8.172). *Mula: "usu sollemni de animali nato ex asino et equa* (Varro *Ling.* 9.28 and *Rust.* 2.8.6 Columella 6.37.3).

²⁵ For *burdo*, see *TLL* II, col. 2248: "Isid. *Orig.* 12.1.61: *burdo ex equo et asina nascitur* (Eug. Tolet. *Carm.* 42.2: *burdonem sonipes generat commixtus asellae; CGL* V 493.25; 563.45)."

²⁶ *Mulorum appellatione etiam mularum continentur* (Iul. *Dig.* 32.62). Cf. also *TLL* VIII, col. 1620.62ff.: *de toto hoc genere animalium, sc. ita ut muli simul intellegantur, dictum esse videtur (fortasse quia mularum magis idoneae erant ad usum): Colum. 6 praef. 6; 6.35.2; 6.36.1 (cf. epitomen loci Pallad. 4.14.1 mulorum).*

²⁷ Modern scholars have, in fact, often assumed that there was greater rigor in the terminology: thus, W. Richter, *Der Kleine Pauly* vol. 3, col. 1090, "Die Römer unterscheiden beide Arten auch sprachlich (*hinnus, hinnulus*, in der Kaiserzeit auch *burdo* = M.-Esel, *mulus, mula* = M.-Tier)."

employed.²⁸ *Mulus / mula* was used in the meaning “hinny” and *burdo* in the meaning “mule.”²⁹ Further, both *mulus* and *burdo* could on occasion refer to either mules or hinnies without discrimination.³⁰ Diocletian’s *Edictum de pretiis* seems to afford examples of a single word being used for both mule and / or hinny.³¹ At 11.4 under the rubric *περὶ καμηλάτων*, only a *burdo*, an *asinus*, and a *camellus* — a mule, an ass, and a camel — are mentioned; similarly at 14.9-11, where the text looks to burdens carried by a *κόμηλος*, *βουρδών*, and *ὄνος*. Or again in 17.17, when the topic is drivers for beasts of burden, the men listed are *καμηλάριος*, *ἦτοι ὀνηλάτης*, *ἦτοι βουρδωνάριος*, although a *μουλίων* appears by himself at 17.19. Finally, when it comes to whips in 10.16f., only a *φλάγγελλον μουλωνικόν* (*i.e. flagellum mulonicum cum virga*) is mentioned. As these examples suggest, a single term “mule” often suffices in everyday speech; an attempt at greater precision comes largely when the discussion’s intent is to draw attention to the two, quite different mules offspring that result from the two, quite different breeding procedures.

In *P. Oxy.* 1919.14 a payment was listed *ὑπὲρ μο(υ)λογεν(ε)ίας*, which should either refer to a specific animal, “a mule-bearing mare,” or to the abstract “breeding of mules.” As the first editors rightly saw, it was difficult to understand *ἵπποβουρδών*^o as involving any animal other than the hybrid. Hence, their translation “mare’s mule” was perhaps the result of compelling *μο(υ)λογέν(ε)ια* into being an equivalent for their *ἵπποβουρδών*, “horse’s mule.” Yet if *μο(υ)λογέν(ε)ια* is the abstract “mule breeding,” the addition of *ἦτοι ἵπποβουρδωνο(-γενίας, -γονίας, κτλ.)* introduces a further specification to the breeding of a mule or mules³² — the animals to be bred were *ἵπποβουρδῶνες*, *i.e. βουρδῶνες* whose mother was a *ἵππος*³³ and that variety of the half-breed valued the more highly in antiquity, as well as today. As noted already by Aristotle, it was the mother who influenced the constitution and the appearance of her offspring to the far greater degree.³⁴ What remains unclear about line 14 is whether the expenses incurred (but lost in the lacuna at the right side of the papyrus) were for stud services in the covering of a mare by a he-ass, or for the costs of the valuable hybrid animal or animals expected

²⁸ Cf. R.G. van Gelder, *s.v.* “Mule,” in *Encyclopaedia Americana* 19, 1972, 553-54: “a term applied to any hybrid, but most commonly to the offspring of a jackass and a female horse.”

²⁹ For *mulus / mula*: see *TLL* VIII, cols. 1619-1621. *Mulus*: “*usu rariore de hinno*: Paul. Fest., p. 33: *muli ex equo et asina*; Verrec. in Catn. 9.11: *muli enim animalium vario genere procreantur, ex equo vide licet et asella, aut ex asello et equa*.” *Mula*: “*usu rariore de hinno fem. generis*: Columella 6.37.3; Pliny *NH* 8.69.172 [quoted above, note 23].”

For *burdo*, see *TLL* II, col. 2248, and cf. *CGL* III 189.6-7: “*imonos* (*i.e. ἡμίονος*, for the use see H. Hauben, *loc. cit.* [above, note 9], 102ff.) *mulus mulaus burdo*” and *CGL* II 324.56: *ἡμίονος ἐξ ἵππου θηλείας καὶ ὄνου. mulus uurdo*.”

The words *μεσοβουρδόνιον / μεσοβουρδόνιον / μεσομουλάριον* are not relevant for the meaning of *mulus / mula* and *burdo*, since they mean “a small *burdo*” / “a small *mulus*” (cf. J.M. Diethart, *Papyrologica Florentina* XIX, Firenze 1990, 141 note to lines 3/8).

³⁰ For the conflation of “mule” and “hinny,” see also Mart. 6.77.7, “*mulo*” is a *varia lectio* for “*ginno*.” “*Hinnulos*” is a correct conjecture for “*mulos*” in Titin.*Com.*140, “*vende thensam atque mulos*.” For *hinnu(lu)s*, see *TLL* VI.3, col. 2810. P. Louis, *RPh* 31, 1957, 63-65, has demonstrated that *γίννος* (*γιννός, γίννος*) does not refer to a “hinny,” or any specific kind of animal — but to a donkey, mule, or horse of small stature. By contrast, the Latin *hinnu(lu)s*, however, does refer to a “hinny.”

³¹ S. Lauffer, ed., Berlin 1971.

³² *I.e. ἦτοι*, according to the second use given by Preisigke, “und zwar.”

³³ If our explanation of the word *ἵπποβουρδών* is correct, the word *ὄνοβουρδών* may have existed as well, although to date it has not survived in written form.

³⁴ *HA* 577b: *τὸ μέγεθος τοῦ σώματος καὶ τὸ εἶδος καὶ ἡ ἰσχὺς μᾶλλον τῷ θήλει ἀφομοιοῦται τοῦ γηνομένου*. Cf. also Colum. 6.37.5 and Pliny *NH* 8.69.171 (quoted above, note 23).

to be the result of that covering.³⁵ In any case, because of the difference in the capabilities of mules and hinnies, it was important to specify how the mule breeding was to proceed, and ἦτοι ἱπποβουρδωνο(-γενίας, -γονίας, κτλ.) added that specification to ὑπὲρ μο(υ)λογεν(ε)ίας in *P. Oxy.* 1919.14.

Breeding mules was not an easy business.³⁶ Nonetheless, dealing in the production of mules was highly profitable.³⁷ The future emperor Vespasian may have resorted to the mule business, when short of cash after his governorship in Africa.³⁸ Mules were not employed within Egypt as beasts of burden with the same frequency as camels and donkeys. For example, no mules appear in the nearly 1000 customhouse receipts published to date,³⁹ and a list of animals (γραφή τετραπόδων) in accounts from the Heroninos archive shows that at one point in time the estate of Aurelius Appianus near Theadelphia possessed 13 full-grown asses, but only a single mule.⁴⁰ That lone mule gathered hay (χορτηγία) together with some seven or eight asses over a period of days.⁴¹ Camels and asses also outnumber mules in an extensive account from another estate that included parcels of land at Theadelphia, Dionysias, and Alexandrou Nesos in 239/40 A.D.; although the hauling of various items was assigned to camels and female asses, the one and two mules mentioned were said to be stabled with 22 and 23 male asses.⁴² On the other hand, Zenon often used mules as baggage carriers both in Palestine and in Egypt,⁴³ and a significant number of terra-cotta representations of mules have been unearthed in Egypt as well.⁴⁴

P. Oxy. 1919 lacks an exact date, although this reference to mule breeding in line 14 may indicate that the expenses were incurred during the spring of the year, because, according to Columella,⁴⁵ mares used for breeding mules were covered at the spring equinox, or, according to Varro, between the spring equinox and the summer solstice.⁴⁶ The mule or mules whose production *P. Oxy.* 1919.14 anticipated were not likely to have been destined for service in the Roman

³⁵ For the price of asses / donkeys (but not mules) and other beasts of burden in the early 4th cent., see R.S. Bagnall, *Currency and Inflation in Fourth Century Egypt = BASP Supplement 5*, 1985, 67-68. The price of asses rose from 15 talents in 305 (*P. Oxy.* XLIII 3143) to 39 talents in 316 (*SB* XIV 11278) and 40 talents in 331 (*CPR* VII 36). For the amount spent on an undisclosed number of mules in 345/46, see *P. Oxy.* LVI 3874.19-22.

³⁶ Cf. A. Nibbi, *ZÄS* 106, 1979, 167.

³⁷ Cf. Isaeus 6.33; Plautus, *Aulularia* 494; Colum. 6.37.11; Martial 3.62.3.

³⁸ This is the usual interpretation put on Vespasian's nickname *mulio* in the Suetonius biography (*Vita Vesp.* 4.3): *rediit certe nihilo opulentior, ut qui prope labefactata iam fide omnia praedia fratri obligaret necessarioque ad mangonicos quaestus sustinendae dignitatis causa descenderit; propter quod vulgo mulio vocabatur.*

³⁹ See the survey in P.J. Sijpesteijn, *Customs Duties in Graeco-Roman Egypt*, Zutphen 1987, 51-57; A. Leone, *Gli animali da trasporto nell'Egitto greco, romano e bizantino*, Rome and Barcelona, 1988, does not treat mules, but only donkeys and camels.

⁴⁰ *SB* VI 9409, 7.108-115; for corrections to the text, see P.J. Sijpesteijn, "Neue Heroninos-papyri. Mit Bemerkungen zum Archiv," *CE* 55, 1980, 175-210, espec. 207-210; cf. also *BL* VII 208.

⁴¹ *SB* VI 9409, (1).69 and 9409, (5).12.

⁴² *P. Mich.* XI 620.284 and 292.

⁴³ E.g. *P. Lond.* V I 1930.48 and 1973.4 (νοτοφόροι ἡμίονοι).

⁴⁴ G. Nachtergaele, "Le chameau, l'âne et le mulet en Egypte gréco-romaine. Le témoignage des terres cuites," *CE* 64, 1989, 287-336.

⁴⁵ 6.37.9; cf. also 6.27.3.

⁴⁶ *Agricult.* 2.7.7, for breeding of horses; as for mules, "we mate them at the same season in which we mate horses" (2.8.7). Cf. A. Hyland, *Equus: the horse in the Roman world*, London 1990, 31.

imperial army, since deliveries of mules for military service had been replaced by an animal tax, the χρυσὸς βουρδώνων, by the seventh century A.D.⁴⁷ In the 4th cent. mules had seen service in transporting public moneys,⁴⁸ and the Roman government continued in subsequent centuries to use mules as carriers in the postal service.⁴⁹ It is possible that official employment loomed ahead of the mule or mules of 1919.14. But perhaps the more likely guess is that the hybrid or hybrids would some day work on one of the large estates in the vicinity of Oxyrhynchus, hauling hay and carrying out other agricultural duties.⁵⁰

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⁴⁷ S. Daris, *op. cit.* (above, note 6), 36, and to his list, add *P. Oxy.* XLVIII 3420 and 3424. Cf. also J. Gascoü and K.A. Worp, *ZPE* 56, 1984, 122ff.; B. Kramer, *Archiv* 32, 1986, 44, line 11, note ad loc. In text no. 13 of the so-called Abinnaeus Archive, the exactor Philammon seems to scold Abinnaeus, when he received horses from him instead of a payment of cash.

⁴⁸ *P. Beatty Panop.* 2.292-304 and *P. Oxy.* LVI 3860.29-31, 44-46.

⁴⁹ As in *P. Oxy.* LV 3804.225. Cf. J. Gascoü, "Les postes 'domaniales'," (= chapter III, pp. 53-59), in *Les grands domaines, la cité et l'état en Egypte byzantine. Travaux et Mémoires* 9, 1985, 1-90.

⁵⁰ Cf. J. Gascoü, *loc. cit.*