

P. Oxy. 4527 and the Antonine plague in Egypt: death or flight?

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P. Schubert has recently published, as *P. Oxy.* LXVI 4527, a classic illustration of how even a very fragmentary document can make a significant contribution to an important historical question. It is a piece cut from a taxation account in order to be re-used for a letter on the other side (*P. Oxy.* 4544). Although the account side preserves only the ends of some lines of one column and a few traces from the next, they are of real interest for the size of the numbers. The most striking of these is the figure of just less than 814,863 artabas of wheat. The heading a few lines earlier reads Ἡρακλείδου μερίδος (the Herakleides division of the Arsinoite nome) and the figure seems to be ὑπὲρ φόρων ("for the taxes") of the 25th year of Commodus (A.D. 184/5), at some point not long after which the account was written.¹ I wish to explore the possible significance of this papyrus scrap for the question of the effects on Egypt's agricultural economy of the plague that struck Egypt and other parts of the Roman empire in the 160s and 170s.

The editor reasonably compares to the large amount of wheat mentioned here the total figure for grain taxes in the Oxyrhynchite nome in the 4th c., preserved in *SB* XIV 12208 (as corrected in *ZPE* 37 [1980] 263-64), namely 321,278 artabas of wheat. Given that the Herakleides division of the Arsinoite nome and the entire Oxyrhynchite nome were roughly comparable in size, this large discrepancy in tax revenues (a ratio of about 2.5 : 1) calls for an explanation. The editor offers three possibilities: (1) the Arsinoite was more intensively cultivated than the Oxyrhynchite; (2) "conditions of management could have deteriorated" in the period between Commodus and the 4th c.; (3) differences between the harvests of the years in question could account for the gap. Of these, the third may be rejected, because 4th-c. tax-rates were fixed and there is no evidence for abatements in bad years. The other two possibilities raise more complicated issues, but for neither do we have sufficient evidence to assess the hypothesis. A closer look, however, suggests a relatively straightforward explanation.

The Oxyrhynchite total figure cited above derives from the application of fairly simple tax rates to two categories of land. The 163,677 arouras of private arable land were taxed at 1 artaba per aroura, plus $\frac{1}{7}$ surcharge. The 38,857 arouras of public land were taxed at 3 artabas per aroura, plus the same $\frac{1}{7}$ surcharge. Total arable land was thus 202,534 arouras, which may be estimated at about 72% of the total land area of the nome.² For the Herakleides division, we do not have an accurate computation of the area, but Schubert cites D. Rathbone's estimate that the total area of the Arsinoite nome was about 435,420 arouras at its peak in the Ptolemaic period but probably little changed under Roman rule, and we may reasonably suppose that there had been no significant decline in the 180s.³ He further suggests that the Herakleides division amounted to about half of the Arsinoite nome, an estimate that seems to me a little on the high side but cannot be verified or disproved, as we know neither the precise boundaries nor the exact area under cultivation. If it were accurate, the Herakleides division would have an area of 217,710 arouras. In any case, it is not likely to be wrong by very much. This of course is a total figure. If the proportion of arable in the Oxyrhynchite nome, 72%, is applied to that figure, it brings us to 156,751 arouras of arable land for the Herakleides

1 Apollonios is referred to as the former *strategos* in l.4; his term of office seems to have roughly coincided with the 25th year, and l.15 refers to the taxes collected in Mesore. The date is thus probably sometime in year 26 (A.D. 185/6).

2 See Bagnall, *Egypt in late antiquity* (Princeton 1993) 335, for the calculation.

3 At *ibid.* 335 I gave a considerably lower figure (326,700 arouras) as a speculation for the 4th c.; but it should be remembered that much land had gone out of cultivation between the reigns of Commodus and Diocletian.

division. It is true that 72% may be too high since the Arsinoite was famous for vineyards and gardens, but we may take it as a working hypothesis.

To produce 814,863 artabas of wheat, these 156,751 arouras would have had to yield an average of 5.2 artabas per aroura, much more than the 4th-c. Oxyrhynchite rates quoted above (which amounts to a net average of 1.58 artabas per aroura). But a yield to the government of 5.2 artabas per aroura is not in itself implausible. Karanis and its surrounds in the mid 2nd-c., an area of something over 22,841 arouras, produced grain revenues to the state of more than 122,147 artabas, or 5.35 artabas per aroura.⁴ The reasons for such a high average revenue yield are two. First, the Arsinoite nome had a much higher percentage of public land (*basilike* or *demosia*) than the Oxyrhynchite.⁵ In the case of Karanis and environs (probably the most important village of the Herakleides division in this period), some 71% of the land was in one category or another of public land. If the same percentage of public land had been present in the 4th-c. Oxyrhynchite, even the rates in use at that period would have produced anticipated revenues of 560,151 artabas, or more than 74% higher than the 321,278 actually given. That is, the difference in the proportion of categories of land by itself explains about a third of the difference.

Second, tax rates on public land were considerably higher in the 2nd c. than in the 4th. In the 2nd, the main category of public land was taxed at rates that varied considerably by quality of land, but the most typical range of rates (including surcharges) was 4 to 5.2 artabas per aroura.⁶ Our evidence for the Herakleides division suggests that most land there was probably taxed near the upper end of this spectrum. Private land was taxed at lower rates, and some categories of public land at higher rates.

To reach the grain taxes shown in *P. Oxy. 4527*, then, requires only applying the average tax rates already known for the 2nd-c. Herakleides division to a plausible figure for its arable surface area. We are not required to make any supposition about changes in total output over time. We have other grounds to believe that the Arsinoite's land in cultivation (and hence production) declined from the 2nd c. to the 4th, but that is relevant to the present discussion only in that the Arsinoite's scaled tax rates on public land in the 2nd c. were probably at the high end of the spectrum. The Diocletianic rates, by contrast, seem to have been intended to produce a uniform burden that took no account of the quality of land. They probably caused tax rates in the Arsinoite to fall much more steeply than its productivity. It is thus the Diocletianic revolution in taxation, coupled with the high proportion of private land in the Oxyrhynchite, that produced the disparity in the grain tax figures cited by Schubert. We should probably accept 814,863 artabas (or perhaps a bit more, if some of the figures in the following lines are to be added to it) as a reasonable estimate of the wheat revenues from the Herakleides division before the difficulties that set in later and led (among other things) to the virtual abandonment of Karanis.⁷

The 2nd-c. figures for the Arsinoite nome mentioned above, however, come from 40 years earlier than *P. Oxy. 4527*. There has been much recent study of the plague that began in 165 and of its possible impact on the Egyptian population and economy.⁸ It is striking to find, 20 years

4 This statement and those below about Karanis are based on my article "Agricultural productivity and taxation in later Roman Egypt," *TAPA* 115 (1985) 289-308; see 291-94 for the 2nd-c. land and tax figures.

5 On this difficult question, see most recently J. Rowlandson, *Landowners and tenants in Roman Egypt* (Oxford 1996) 63-69.

6 Rowlandson *ibid.* 71-80, who notes that half of the known rates in the Oxyrhynchite nome fall within this range (3.5 to 4.5 before surcharges).

7 On the decline of Karanis, see P. van Minnen, "Deserted villages," *BASP* 32 (1995) 41-56.

8 The major study is R. P. Duncan-Jones, "The impact of the Antonine plague," *JRA* 9 (1996) 108-36. See subsequently M. Sharp, "The village of Theadelphia in the Fayyum," in A. K. Bowman and E. Rogan

after the start of the plague, an indication that the production of government revenues in wheat from the Herakleides division was at a level consistent with our pre-plague evidence for land area under cultivation and for the tax rates applied to it before the plague. The Herakleides division, indeed, has been thought to have been hard hit by the plague, with sharp population losses at villages like Karanis and Soknopaiou Nesos.⁹ Views on the likely impact of such losses on agricultural production and prices have varied, but they have generally been offered in passing, rather than with detailed analysis. Duncan-Jones noted that in the 14th c. at the time of the Black Death agricultural rents fell sharply in England, accompanied by rising wages for now-scarce workers.¹⁰ The results, it is generally claimed, included widespread conversion of agricultural land to such less labor-intensive uses as pastureland. The combination of decreased manpower and reduced demand for food presumably led to lower prices for food and thus for land, at least in comparison to the cost of labor. Duncan-Jones' analysis of Egyptian rent yields, however, leads to the conclusion that "rents in wheat show little clear alteration" (123), although he pointed out that documentation also decreases in this period. He did note other possible signs of distress, notably that surviving leases are for much shorter average periods of time, and for much smaller average areas than before, and that money rents show decline as well.

Unfortunately, the poor level of documentation noted by Duncan-Jones in the case of rents affects the study of prices in this period. In two articles D. Rathbone has shown that both wheat and wine prices seem to remain roughly stable until some time after 164.¹¹ He also contends that wine and wheat prices remained stable from 190 to 275, when the next major change of levels occurred.¹² The course of events between 164 and 190, however, it is not possible to follow, although Rathbone notes some hints that the change in wine prices may have occurred by about 175.¹³ Duncan-Jones also noted a rise in wages in the period, although the evidentiary base of his argument is, as he recognizes, very slim.¹⁴ Rathbone has suggested that the late 2nd-c. rise in prices is the product of the plague:

I still believe that the primary cause of this is to be found in unprecedented economic dislocation, leading to an exceptional general increase in prices (and wages), caused by the Antonine plague.¹⁵

He does not explain exactly by what mechanism prices will have risen rather than fallen in response to the plague, but a brief hint is given in his earlier article:

Admittedly the general trend (with exceptions) in northern Europe after the Black Death of 1348-9 and subsequent plagues was to lower prices of grain and relatively higher agricultural wages ... but the cases may not be directly comparable ... Roman Egypt, I suspect, was a more urbanised and monetised society, with a stronger cash market for agricultural produce (underpinned, of course, by state and private exports of wheat).¹⁶

If we may follow the logic, it appears to be that production would have fallen, but because Egypt sold much of its produce abroad or to the government, demand would not have fallen nearly as much; thus prices will have risen. One flaw in this argument is that the plague

(edd.), *Agriculture in Egypt from pharaonic to modern times* (ProcBritAc 96, 1999) at 185-89, with bibliography.

9 Duncan-Jones, *ibid.* 120-21.

10 *Ibid.* 123-24.

11 "Monetisation, not price-inflation, in third-century A.D. Egypt?" in C. E. King and D. G. Wigg (edd.), *Coin finds and coin use in the Roman world* (SFMA 10, Berlin 1996) 321-39; "Prices and price-formation in Roman Egypt," in *Économie antique: prix et formation des prix dans les économies antiques* (Saint-Bertrand-de-Comminges 1997) 183-244.

12 For a contrary view, see R. P. Duncan-Jones, *Money and government* (Cambridge 1994) tables on 26-27.

13 Rathbone (1996, *supra* n.11) 331.

14 Duncan-Jones (*supra* n.8) 124.

15 Rathbone (1997, *supra* n.11) 215.

16 Rathbone (1996, *supra* n.11) 334 n.36.

affected not only Egypt but many other parts of the empire too; as population fell there, so should export demand have declined.

M. Sharp's analysis of evidence from Theadelphia for around the time of the plague leads him to suggest that considerable amounts of arable land might have gone out of production, and that much of that land may have been converted to vineyard, a use providing a higher revenue per aroura.¹⁷ This argument is also problematic because land going out of use will have declined in value. Large-scale capital investment is required for the creation of vineyards, because not only is infrastructure and planting of shoots required, the land also produces little or no revenue until the vines mature in a few years. Such investment makes sense more when land is expensive than when land is cheap. A shortage of land should lead to more intensive use of what is available, with more capital put into improvements of each aroura. But it is the reverse here. And if the population had shrunk, who would drink the additional wine?

Into this somewhat confusing array of hypotheses about the effects of the plague on the agricultural economy of late 2nd-c. Egypt comes the evidence of *P. Oxy.* 4527, showing apparently that the government in 185 was still able to collect a level of rents in wheat comparable to that 40 years earlier. Before going further, however, we should ask if it is possible that the figure given of 814,863 artabas was simply wishful thinking, a figure ordered but impossible to collect. This seems unlikely. Rents in the 2nd c. were more responsive to current conditions than in the flat-tax environment of the 4th. Even if we were to assume that in the immediate aftermath of the plague the government resisted reducing assessments and ignored the abandonment of land, it is difficult to imagine that after nearly two decades and a second wave of plague the administration would have carried on, resolutely listing uncollectable amounts. Moreover, it appears from l.15 as if some 223,581 artabas were declared to have been paid in Mesore; if something like comparable amounts came in during Pauni and Epeiph, the main threshing months, the total would not have been far off being achievable.

Is it possible for population to have fallen significantly *without* a concomitant decline in wheat production? That depends in considerable part on the population level before the plague relative to the labor needed for farming the land. We do not know what that population was, but if it had grown slowly over the two centuries of Roman rule, it is possible that there might have been more people than were needed to maintain agricultural productivity.¹⁸ But if production was sustained while demand (presumably) fell, it becomes more difficult to explain the rise in prices during this period by the sorts of arguments Rathbone advances. One wonders if his dismissal of debasement of the currency as an explanation for the broad rise in price and wage levels is not a little hasty.¹⁹ The apparently concomitant rise in prices and wages, in particular, does not seem well justified by the aftermath of the plague.

If the interpretation of the papyrus offered above is correct, it appears as if Egypt's agricultural economy was more resilient in the face of the plague than has been supposed. The disruption caused by the plague may in that case have been more short-term than lasting, at least in some areas. One reasonable explanation would be, as a referee for this journal put it, that the evidence for population decline may be in part the result of flight rather than of mortality. Indeed, Duncan-Jones raises this possibility in the context of discussing the decline in the population in some small villages in the Egyptian Delta between 159/160 and 169/170. He comments, "In theory, the decline seen in Table 1 [listing four villages and their populations] might be solely due to flight (*anachoresis*), a common theme of the documentary papyri."²⁰ He proceeds to give other ancient and early modern parallels for flight from plague.

17 Sharp (*supra* n.8) 186.

18 In R. S. Bagnall and B. W. Frier, *The demography of Roman Egypt* (Cambridge 1994) 87-79, we use a long-term growth factor of 0.2%, leading to a doubling of the population roughly every 350 years.

19 In Rathbone (1996, *supra* n.11) 334.

20 Duncan-Jones (*supra* n. 8) 121.

Our documentation for the Delta is in fact more explicit about the causes of depopulation than this statement suggests. The careful discussion by S. Kambitsis in *P.Thmouis* 1 (pp. 25-31) shows that the decline of the villages in the Mendesian nome which is revealed by the carbonized papyri was not a sudden event, but had begun even before the "former times" (*to palai*) customarily referred to. In four cases the killing of residents in the course of attacks by the "impious Nikochitai" is blamed for part of the population loss. In only one instance is the plague mentioned. For the most part, the language used (*ekleipo*, in particular) indicates that most of the loss of population resulted from *anachoresis*, and that is stated to be the case in all instances for the most recent disappearance of the remaining population. We are told explicitly in some cases that these taxpayers had been exhausted by the burdens placed on them by the government's attempt to collect the taxes due from a shrinking population. Kambitsis concludes that "il reste probable que le dépeuplement d'autres villages du nome, dû en premier lieu à l'ἀναχώρησις, fut accélérée à partir de cette année par les agressions et par la peste" (p.29).

We are not entitled to generalize the conditions in the Mendesian nome to the rest of Egypt, but the salient lesson of the papyri of the Delta is probably applicable. That is that population decline was local, progressive, and the product of multiple interacting causes. Once started, it tended to continue because of the structure of the taxation system, which always tried at first (and sometimes for quite a while) to collect the same quantity of taxes from a diminishing number of taxpayers. But most of the people did not die; they simply went elsewhere, to villages where they were not registered and would (at least for a time) not face the same pressures. They might come back, or they might not,²¹ but they went somewhere other than to the grave.

Undoubtedly some parts of the Fayyum, and even of the Herakleides division, suffered real mortality, like Soknopaiou Nesos. But the desire to reach general conclusions should not blind us to the fact that mortality may have varied locally, and considerable numbers of residents may have fled, only to return later. If so, we can expect to see substantial disruptions in the short term, but also the potential for a recovery in a much shorter time-frame than if the population suffered mortality on the scale that has been supposed.

The above is no more than a sketch of some of the implications of the figures in *P.Oxy.* 4527. Many critical questions about the evolution of the economy of Egypt in the late 2nd c. need to be re-opened in the face of this evidence, which reminds us both how much local variation there must have been and how many of the data needed for an economic analysis of the plague's effects still remain unknown.

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²¹ See van Minnen (*supra* n.7) for the recovery of some of the Arsinoite villages after a period of depopulation.