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AMERICAN STUDIES IN PAPYROLOGY

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VOLUME TEN

DEATH AND TAXES

OSTRAKA IN THE ROYAL ONTARIO MUSEUM

I

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To
Mrs. Prescott W. Townsend

Acknowledgements

The research leading to this publication was largely supported by a grant from The Canada Council, which permitted us the opportunity to prepare for publication the ostraka now in the Royal Ontario Museum, Toronto. These texts came to the Museum in the early part of this century, and, after a first publication of some of them in *Theban Ostraca*, by J. G. Milne, little has been done to forward publication of the remaining texts.

With the support of The Canada Council, we began work on editing the texts in 1968. It seemed to us, as work progressed, that the evidence of the ostraka, not only those in Toronto but those in other collections as well, might be brought to bear on an historical problem for which quantitative data were particularly useful. So papyrologists and statistician joined to reach new conclusions about life expectancy in antiquity. The statistician, informed about the nature of the problem and the data, developed an appropriate theory which permitted him to analyse the data reported by the papyrologists.

As a result, we have an edition in two parts. Part I, Death, represents our study of life expectancy, while Part II, Taxes, is the edition of a number of texts in the Royal Ontario Museum. We worked together on Part I; the papyrologists wrote the account of the study of life expectancy (Sections 1-3, and the list of persons, Section 7), while the statistician wrote the account of the statistical theory (Sections 4 and 5, and the tables and graphs, Section 6). But we have all read all sections, insofar as we understand each other's mysteries.

Part of the statistical work was supported by a grant from the National Research Council of Canada. We would like to thank Professors D.C. Baillie, D.B. DeLury and R. Wormleighton, who generously read and made comments on earlier versions of Sections 4 and 5.

Part II, the editions of texts, is the work of the papyrologists alone. All of us worked on all the texts, and in general we have convinced each other of the correctness of the difficult readings, or we have all agreed to present a considered opinion when we feel we have not really solved a problem. We should like to acknowledge the help of Dr. James Shiel, who, when he was here in Toronto, worked on a number of texts and made some preliminary transcriptions, and who has written to us from time to time to make further suggestions. We are particularly grateful to Professor Herbert C. Youtie, who examined the manuscript at its final stages and who, with his unique genius, saw solutions to

problems that had baffled us. We are also indebted to Professor Naphtali Lewis who visited Toronto and helped us considerably, spending much time discussing our problems, and to E.G. Turner, for helpful comments.

Professor R.J. Williams, of University College, Toronto, has read the Demotic passages where this has been possible, and has contributed a note on text 65.

We would be remiss if we did not acknowledge the contribution of J. G. Milne, who first brought these texts to Canada. Milne's *Theban Ostraca* was one of the earlier publications of ostraka, and it still stands as a valuable tool in the editing of new texts. In addition to the published texts, Milne apparently worked on other Toronto ostraka, since we found about a dozen preliminary transcriptions among the Museum records.

There are at present several hundred unpublished ostraka in the Royal Ontario Museum, and a respectable number of these are publishable. We continue to work on these texts, and hope to work on the papyri, such as are publishable, to produce further volumes in the series. We anticipate with some confidence that there will be at least one more volume to follow this one. We are particularly grateful for the very generous co-operation of the Museum staff, especially Mrs. Neda Leipen and Miss Alison Harle. They facilitated our work in every way possible, and have been liberal with their space and time. We are also grateful to the staff of the Sigmund Samuel Library of the University of Toronto, for finding space for us to work over a long period of time.

We thank our typists, Mrs. Joan Murray and Mrs. Katharine Peacock, for their forbearance in producing the manuscript from complex drafts.

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A Note on the Method of Publication

The editorial practice used in this volume is, in the main, that of the Leiden convention followed in most editions of papyrus and ostraka texts, with ( ) indicating the resolution of an abbreviation or a symbol, [ ] a lacuna, ⟦ ⟧ a deletion in the original, ⟨ ⟩ an omission from the original, and { } superfluous letters. For those less familiar with ostraka texts, we have resolved all abbreviations and symbols, except for numerals and signs for denominations of coinage. We have not "corrected" scribal orthography in general, but have taken the view that scribes spelled Egyptian names as they heard them, so that it is difficult to say what is a "correct" spelling in Greek of an Egyptian name. Similarly, we have taken the grammar of the names in formulae as conventional; so many texts have nominatives for genitives and datives that we consider such to be acceptable grammatical constructions for the purposes of these texts. We have, however, noted orthographical peculiarities which seemed to vary noticeably from the norms of these texts, or where we thought scribal practice to be inconsistent in a single text. And we have presented a critical apparatus where our readings differ from Milne's preliminary transcriptions.

We have tried to reproduce, insofar as typography makes possible, the actual writing of the scribes. Thus, where a scribe used a stroke over a numeral, we have reproduced that single stroke; where accent-like marks (′) appear over numerals, we have reproduced those. Similarly, we have tried to present varieties in symbols in type, where possible, trusting that the provision of translations makes the meaning of the symbols clear. Naturally, no typographical representation does justice to the great variety of the hands, and of scribal practice in using symbols, so we do not give a list of symbols in the index. Instead, we index the symbols by the meaning as resolved, and, since each text is illustrated, the use of symbols can best be seen by reference to the plates.

We have omitted punctuation from our transcriptions of the Greek, using the translations to suggest our interpretation of the syntax of these highly formulaic documents.

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PLATES

DEATH AND TAXES

OSTRAKA IN THE ROYAL ONTARIO MUSEUM

I

PART ONE: DEATH

LIFE EXPECTANCY IN ROMAN EGYPT

Section One

The Problem of Longevity in Antiquity

1.1 Introduction

Length of life in antiquity has always been of interest to historians, since a satisfactory determination of life expectancy, or even better, life expectancy on maturity, would have important implications for the interpretation of historical data. It would be useful to have quantitative data, so that we might know, for example, just what the chances are that a person in antiquity might have lived to 40, 50, 60 years of age or more. There are not a few historical theories which depend upon assumption of longevity for some important (or unimportant) figure, and it would be useful in evaluating such theories to know just what odds favor or dispute such assumptions.

Furthermore, a conclusion about longevity with which most ancient historians would be satisfied would have far-reaching implications for our understanding of certain ancient institutions. For example, touching upon the documents included in this volume, we know that the poll-tax was imposed in Roman Egypt from ages 14 to 62,[1] and it would be interesting to know whether 62 could have been seen in antiquity as some sort of "retirement age," or whether, in fact, so few would have reached that age as to make the benefit virtually meaningless.

1.2 The Evidence of Epitaphs

Historians who have worked with demographical problems of this sort have depended for their data upon statements of age in ancient documents, primarily in the thousands of epitaphs which have been found in all provinces of the Roman Empire.[2] This material has been examined and re-examined, in this century as in the last, and, with such plentiful material at hand for the more recent studies, it is not likely that new finds will affect the statistics significantly. If the methodology is good, it is likely that we know a good deal about life expectancy in the Roman Empire.

1. S. L. Wallace, *Taxation*, pp. 106-7. This is true for lower Egypt, at least, as shown by *P. Lond.* 259.64 (II, p. 36), and *Stud. Pal.* XXII, 93.12, which states the completion of 62 years. Wallace, *ibid.*, is unwilling to assume that this holds true for upper Egypt. See below, p. 22, n. 1.

2. For bibliography, see I. Kajanto, *On the Problem of the Average Duration of Life in the Roman Empire, Ann. Acad. Scient. Fennicae*, Ser. B, Tom. 153, 2, 1968, p. 3, and citations below.

But it is just this methodology which we wish to challenge, and for which we would substitute another. It will be well first to present in tabular form some results obtained from the investigation of epitaphs.

Probable Duration of Life (From A.R. Burn, "Hic breve vivitur," *Past and Present*, 1952-3, 4.)

	Of those reaching the age of 15, in the groups shown below, one-half reach the following ages—		Of those reaching the age of 42, in the same groups, one-half reach the following ages—	
I. African Provinces:	Males	Females	Males	Females
(a) Civil districts, N.W. Africa; chiefly citizen population	48	44	69	67
(b) Carthage: slaves and freedmen of "Caesar's Household"	38	33	62	60
(c) Lambaesis: Cantonment and district	45	38	61	61
(d) Egypt (after Hombert and Préaux); all classes; sexes not distinguished	36		56	
(e) N. African provinces excepting Egypt; Christian tombstones (4th to 6th cent.)	52	47	68	68
II. Europe:				
(a) Southern (average of groups from Bordeaux, Brindisi and Merida, with their districts)	44	36	59	54
(b) Danube provinces (average of groups from Noricum, Upper and Lower Pannonia, and Dacia)	40	33	60	58
(c) Britain (N.B.: small sample). Chiefly military districts	40	37	52	55
(d) N. Italy: Christian period	52	40	64	57
III. Modern Figures, for comparison:				
(a) India (Census of 1931)	48	43	59	59
(b) Egypt, 1927-37 (after Kiser)	51	49	64	63
(c) England and Wales (conditions of 1946-7)	72	76	73	77

IV. Comparison of men reaching age 17 and joining or not joining the Roman Army. Half reach the following ages:

Where buried:	Soldiers	Civilians
(a) at Lambaesis	44	48
(b) in Danube provinces	40	47
Of those alive at 42 in same categories, half reach:		
(a) at Lambaesis	57	69
(b) in Danube provinces	58	60

It is clear from this table that there are striking differences in different parts of the Empire. There are even differences in different parts of Africa, a result which might not have been anticipated, had it not been apparent for a long time that the evidence of the epitaphs was showing some wide disparities. W.R. MacDonell, by dividing the sum of all the years in epitaphs by the number of persons attested, calculated the following mean ages:[3] Rome – 21.65 years; Spain – 37.4; Africa – 46.7. MacDonell attributed the disparity between Rome and Africa to "the extreme unhealthiness of ancient Rome," against "climate and strict selection in childhood" in North Africa, and perhaps the influx of vigorous colonists who engaged in agriculture in Africa. R. Etienne proposed a similar explanation for his calculations, which were remarkably close to those of MacDonell:[4] Spain – 36.2 years; Africa – 45.2; Burdigala – 35.7. Moretti, who re-examined the Roman material, came to a mean very similar to that of MacDonell,[5] 21.16 years, and de Grassi, examining a number of areas,[6] found the following means: Ostia – 16.85 years; Rome, liberti and slaves – 26.88; Tivoli – 22.67; Pola and Nesazius – 18.95; Istria – 29.38; Brescia – 32.16; Rusicade, Algeria – 44.99; Noricum and Pannonia – 43.54. The pattern is repeated, a low median in the area around Rome, higher elsewhere, particularly in North Africa, and recurs in other studies.[7]

Although one may easily see flaws in the detail of method, as Burn has argued,[8] it is quite clear that the discrepancies exist. Inherently uncertain is the matter of infant mortality; Burn has attempted to obviate that by beginning his computations with age 10. Moretti, acknowledging the low figures for infant mortality (1.5 per cent at Rome)[9] nevertheless thinks that the low median for Rome is accurate, with the scarcity of records for older people balanced by the error inherent in the impossibly low figure for infant mortality.[10]

1.3 Weaknesses of the Evidence from Epitaphs

The whole question of the reliability of the data for a computation of average duration of life has recently been taken up by Kajanto in the fundamental study referred to above. He too found striking deviations, so that the survival rate, male and female respectively, to the age of 40 was at Rome, 17.2 per cent and 8.3 per cent; at Carthage (early empire) 39.9 per cent and 29.3 per cent, (later

3. W. R. MacDonell, "On the Expectancy of Life in Ancient Rome, and in the Provinces of Hispania and Lusitania, and Africa," *Biometrika* 9, 1913, pp. 368, 373, 376.

4. R. Etienne, "Démographie et Epigraphie," *Atti III Cong. Intern. di Epigr. Greca e Latina,* Rome, 1959, pp. 418-9.

5. Moretti, "Statistica Demographica ed Epigraphica: Durata Media della Vita in Roma Imperiale," *Epigraphica* 21, 1959, p. 77.

6. de Grassi, "L'Indicazione dell' Eta nelle Iscrizioni Sepolcrali Latine," *Akta IV Int. Kongr. für Griech. u. Lat. Epigr.,* Vienna, 1962, pp. 91-98.

7. E.g., similar figures for Christian Rome in H. Nordberg, *Biometrical Notes, Acta Instituti Romani Finlandiae* 2.2, Helsinki, 1963.

8. A.R. Burn, "Hic breve vivitur," *Past and Present*, 1952-3, 4, pp. 2-7, 30-31.

9. *Op. cit.*, p. 72.

10. *Ibid.*, p. 77.

empire) 39.7 per cent and 33.2 per cent; at Quattuor Coloniae, 56.9 per cent and 52.7 per cent; while at Celtianis the rate of survival to age 40 was 79.6 per cent and 75.1 per cent. Kajanto's tables show the deviations clearly:

Figure 2: Rome

Age	Males	%	Female	%
1	709	100.0	443	100.0
5	588	82.9	384	86.7
10	493	69.5	310	70.0
15	426	60.1	277	62.5
20	357	50.3	226	51.0
25	283	39.9	138	31.1
30	213	30.0	97	21.9
35	171	24.1	64	14.4
40	122	17.2	37	8.3
45	90	12.7	30	6.8
50	62	8.7	24	5.4
55	48	6.8	19	4.3
60	37	5.2	17	3.8
65	23	3.2	10	2.2
70	18	2.5	9	2.0
75	11	1.5	6	1.3
80	10	1.4	3	0.7
85	5	0.7	1	0.2
90	2	0.3	—	
95	1	0.1		
100	1	0.1		
105	—			

Figure 3: Carthage, Early Empire

Age	Male	%	Female	%
1	298	100.0	222	100.0
5	269	90.3	198	89.2
10	250	83.9	187	84.2
15	231	77.5	177	79.7
20	213	71.5	153	68.9
25	187	62.7	130	58.5
30	154	51.7	108	48.6
35	134	45.0	80	36.0
40	119	39.9	65	29.3
45	100	33.5	49	22.0
50	83	27.8	45	20.3
55	73	24.5	36	16.2
60	68	22.8	32	14.4
65	54	18.2	22	9.9
70	49	16.4	18	8.1
75	32	10.7	11	4.9
80	24	8.0	10	4.5
85	14	4.7	4	1.8
90	10	3.3	2	0.9
95	4	1.3	1	0.4
100	2	0.7	1	0.4
105	—		—	

Figure 4: Carthage, Later Empire

Age	Male	%	Female	%
1	312	100.0	223	100.0
5	274	87.8	200	89.7
10	242	77.6	182	81.6
15	228	73.1	171	76.7
20	213	68.3	149	66.8
25	188	60.1	129	57.8
30	158	50.6	111	49.8
35	140	44.9	93	41.7
40	124	39.7	74	33.2
45	112	35.9	63	28.2
50	100	32.0	54	24.2

Figure 5: Quattuor Coloniae

Age	Male	%	Female	%
1	901	100.0	690	100.0
5	878	97.4	671	97.2
10	841	93.3	632	91.6
15	791	87.3	603	87.4
20	743	82.5	579	83.9
25	661	73.4	531	76.8
30	607	67.4	474	69.1
35	555	61.6	413	59.8
40	505	56.0	364	52.7
45	464	51.5	322	46.7
50	429	47.6	295	42.7

Figure 4 continued

Age	Male	%	Female	%
55	75	24.0	43	19.3
60	68	21.8	34	15.2
65	51	16.3	26	11.7
70	41	13.1	22	10.0
75	28	9.0	12	5.4
80	24	7.7	10	4.5
85	10	3.2	4	1.8
90	7	2.2	3	1.3
95	4	1.3	1	0.4
100	3	1.0	1	0.4
105	—		—	

Figure 6: Celtianis

Age	Male	%	Female	%
1	683	100.0	575	100.0
5	680	99.6	575	100.0
10	678	99.3	573	99.6
15	670	98.1	567	98.6
20	659	96.5	548	95.3
25	641	93.8	531	92.3
30	605	88.5	505	87.8
35	571	83.6	476	82.6
40	544	79.6	432	75.1
45	499	73.0	401	69.7
50	466	68.2	365	63.4
55	405	59.3	327	56.9
60	360	52.7	302	52.5
65	295	43.2	271	47.1
70	257	37.6	237	41.2
75	224	32.8	209	36.3
80	188	27.5	165	28.7
85	137	20.1	131	22.8
90	92	13.5	97	16.9
95	76	11.0	85	14.8
100	60	8.8	61	10.6
105	24	3.5	17	2.9
110	14	2.0	12	2.1
115	2	0.3	6	1.0
120	2	0.3	5	0.9
125	2	0.3	4	0.7
130	1	0.2	3	0.5
135	—		1	0.2
140			—	

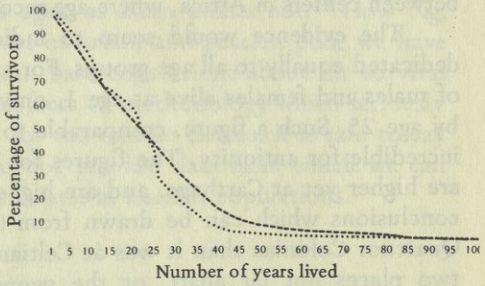
Figure 5 continued

Age	Male	%	Female	%
55	384	42.6	259	37.5
60	341	36.8	237	34.3
65	283	31.4	190	27.5
70	244	27.1	170	24.6
75	202	22.3	134	19.4
80	170	18.9	111	16.1
85	123	13.6	67	9.7
90	91	10.1	56	8.1
95	66	7.3	44	6.4
100	48	5.3	37	5.4
105	21	2.3	16	2.3
110	5	0.5	9	1.3
115	2	0.2	5	0.7
120	1	0.1	4	0.6
125	—		1	0.1
130	—		—	

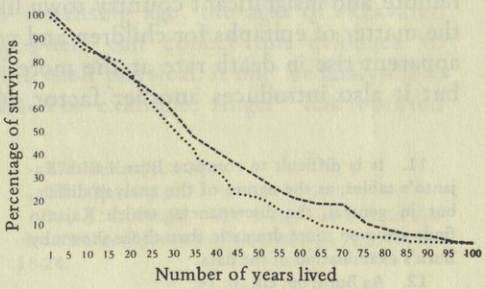
Figure 7: Graphs

---------- Men
..... Women

1. Rome



2. Carthage, Early Empire



Kajanto found the differences "too great to be credible," and offered a number of reasons for the unreliability of the data. First, the tables do not give an actual rate of infant mortality, and the data do not permit the construction of tables which would do so. Any statement of infant mortality must be based on modern analogies,[12] and is only a guess. One may avoid the problem by beginning the tables with those who survived to the age of one year, as Burn did,[13] followed by Kajanto. But then one has, in fact, no infant mortality represented, and the effect of this would be to make the medians relevant not to all births, but only to survivors of a year of life. Even this, however, would be quite useful, could it be relied upon.

The discrepancy between Rome and Africa might be accounted for by the fact that at Rome, children's epitaphs more commonly recorded ages than did those of adults, while in Africa this difference in treatment did not appear.[14] Moretti has argued that the under-representation of adults is balanced by the absence of accurate infant mortality figures, to give a reasonably accurate projection for life expectancy at birth. But it is also possible to argue that, beginning the computations of mortality at year 1, the very low figures for Rome, 17.2 per cent and 8.3 survival to age 40 for men and women respectively, due to the under-representation of adults, present a distorted picture of what life expectancy would be at age 1. It might thus be said that, with this factor understood, the epitaphs do give useful data so long as differences in practice are taken into account, and one should understand a higher survival rate at Rome. But Kajanto still challenges the data; his tables show striking discrepancies between centers in Africa, where age records were more or less the rule.

The evidence would seem to indicate that epitaphs were not necessarily dedicated equally to all age groups. For example, the table for Celtianis shows that of males and females alive at age 1, only 6.2 per cent and 7.3 per cent had died by age 25. Such a figure, comparable to that of modern western countries, seems incredible for antiquity. The figures for the death rate rise at Quattuor Coloniae, are higher yet at Carthage, and are highest at Rome. There are only two possible conclusions which can be drawn from this. Either the death rate was greater at Quattuor Coloniae than it was at Celtianis, thus greater at the more important of two places not far apart, or the people of Celtianis made fewer epitaphs for younger people. Kajanto naturally chose the latter alternative: "the denizens of a remote and insignificant country town like Celtianis were particularly niggardly in the matter of epitaphs for children and younger people."[15] This would explain the apparent rise in death rate at the more important centers like Carthage or Rome, but it also introduces another factor, impossible to assess quantitatively, which

11. It is difficult to compare Burn's with Kajanto's tables, as the nature of the analysis differs, but in general, the discrepancies which Kajanto finds are even more dramatic than those shown by Burn's examination of the data.

12. As Burn, *op. cit.*, p. 14.

13. Review of Nordberg, *Biometrical Notes*, in *JRS* 55, 1965, pp. 254-5.

14. Kajanto, pp. 9-14, examines this matter quite fully.

15. *Ibid.*, p. 16.

undermines the reliability of reducing the data to life expectancy tables. We do not know, for children or any other age group, what percentage of the population might have received epitaphs, and we do not know how those percentages might have varied from place to place.

Finally, ancient records of age may not be reliable. The tendency to "round off" at fives and tens is well known,[16] and of course, the difficulty with ancient chronological systems would complicate accurate recollection of ages. We will comment further on this point below,[17] but it is worth noting here that Kajanto suggests that African records were less reliable than those of Rome, that Carthage accords more with Rome than does the African countryside, and that this inaccuracy is illustrated *inter alia* by exaggeration of age to the point that over 5 per cent of the men and women of Quattuor Coloniae would still be alive at the age of 100.

Considering all these factors, Kajanto concluded that variations in duration of life are more apparent than real, and guessed that life expectancy was more or less the same throughout the Roman Empire, but that the epigraphical material does not permit the calculation of the average duration of life. This scepticism about the use of the data from epitaphs is extremely well founded. The disparities justified questioning the methodology, and Kajanto has shown a number of reasons why the data have produced such disparities and why the method is inherently unreliable. Indeed, there are other reasons for hesitating before assuming that the epitaphs can provide data which will yield mortality figures for a whole population. What we have, at the very best, is data for the middle classes, the people who erected tombstones with ages, as Burn points out.[18] How big, indeed, was that group? For the multitudes of urban and peasant poor we have little or no data, nothing on which we can base conclusions about the survival rate. Adding this great deficiency to the defects of methodology which seriously impaired the validity of the calculations for the middle classes, it is safe to say that the ages recorded on tombstones do not provide data from which we can calculate average life expectancies or survival rates in ancient populations.

1.4 Evidence from Physical Anthropology

An entirely different approach is that of physical anthropology. Changes take place in human bone structure with increasing age, the ages of excavated skeletons can be estimated, and demographers can collect this evidence to produce vital statistics. Although the data is itself physical, it may be analysed in different ways to produce different results. For example, Angel[19] has reported

16. Burn, *op. cit.*, p. 19, pointing out that of 2,675 ages, the number 10 was represented 1,059 times, 5, 684 times, while others ranged from 194 down to 27; i.e., these are the numbers of times ages were reckoned in multiples of 10 and 5, respectively.

17. Below, p. 000.

18. *Op. cit.*, p. 7.

19. J. L. Angel, "The Length of Life in Ancient Greece," *Journal of Gerontology* 2, 1947, pp. 18-24.

distribution according to age groups of skeletons found on the Greek mainland and dating to the Roman period, indicating distributions by age group and by the degree of sagittal suture of the skull.

Figure 8: Distribution by age group

		Males (%)	Females (%)
Subadult	(19)	0	0
Young Adult	(28)	27.8	80.0
Middle-aged adult	(46)	66.6	20.0
Old adult	(66)	5.6	0

Figure 9: Degree of Closure of Saggital Suture (Both Sexes)

Open	(age 20)	36.4 (%)
Beginning	(24)	9.1
Medium	(29)	24.2
Pronounced	(33)	21.2
Complete	(60)	9.1

Mean ages at death can be computed from these figures and from the skulls seriated in five-year groups, with the following results:

Figure 10: Mean ages at death estimated by three different methods (150 B.C. - A.D. 450)

	From age categories	Closings of Sutures	Seriation by 5 year intervals
Males	42.1 years		
Females	31.6		
Both sexes	36.8	27.8	38.5 probable error 1.09

Since other skeletal portions provide a more accurate means of estimating age than suture closures, and these support the higher estimations,[20] Angel used the 5-year seriations to produce a life expectancy curve.

But there are many difficulties in applying these data to obtain accurate survival rates. Apart from the fact that the data are few, 33 skulls for the period above, Angel himself notes factors which affect the survival of the skeletons: "Among the adults, the age distribution inevitably must be greatly affected by soil conditions, which preserve only the toughest skeletons for survival for

20. A more accurate calculation, from pubic symphysial faces, indicates an average of 31.9 for both sexes, but soil and archeological selection might have eliminated more old pelvises than skulls (Angel, *op. cit.*, p. 20).

study."[21] He comments also that excavators themselves often further affected the data by discarding the more broken specimens, and so the trustworthy data are in the age range 18-40. If, then, we have lost the skeletons of, let us say, adolescents at a greater rate than we have for adults, the mean ages at death would be distorted upwards. Furthermore, if the factors tending towards the production of tougher skeletons also tend towards producing general well-being, and therefore greater longevity, the loss of the weaker skeletons would further distort the mean ages upwards. On the other hand, the brittleness of older bones might lead to greater breakage, scattering, and loss of these specimens, a factor which might tend to distort the mean downwards.

It is difficult to assess the effects of these factors, but it is clear that the nature of the evidence in its physical form suggests that there is reason to believe that the true means and the true life expectancies might have varied by not inconsiderable percentages from the figures produced by the skeletons. Furthermore, the sample may be strongly affected by class factor, as we have seen in the case of the epitaphs. The skeletons may be, by and large, those of people who could have afforded better, and therefore more protective, burials. We may have again lost the data for the poor, who may have had considerably greater mortality. This factor would have been of less consequence for the prehistoric burials considered, but might have been of considerable importance in the Roman period.

Nevertheless the evidence is significant, in that it does give us some objective data upon which we may judge ancient longevity. The evidence does show with some force that life was short, and the high number of infant and child deaths – around 50 per cent of all deaths[22] – indicates frightful mortality at those early ages. And summary figures like those of Wells[23] illustrate the toll: of prehistoric populations, 80 per cent of Neanderthalers were dead by age 30, 95 per cent by 40, and all by age 50, while by medieval times, the figures for Caister Anglo-Saxons, while improved, are still grim, with 57.4 per cent dead by 30, 81.8 per cent by 40, and 97.5 per cent dead by the age of 50.[24] But, although we can come to these general conclusions about the high mortality rate, there are too many uncertainties to permit precise quantification. The various factors affecting the survival of the skeletons, both the considerations which raise the possibility that not all classes are represented as well as the physical factors which suggest

21. *Ibid.*, p. 19.

22. *Ibid.*, p. 22.

23. C. Wells, *Bones, Bodies and Disease*, Thames and Hudson, London, 1964.

24. The best analysis of the figures from Wells is provided by J. A. Newth, in Molly Miller's *Sicilian Colony Dates*, forthcoming from the State University of New York Press. Newth shows that the life expectancy for Romans at 18 years (Wells' table, fig. 39, p. 179), is 13 years for both sexes. Combining the skeletal evidence, he created a model population in which the death rate was 62.2 per thousand, so that, for example, of 425 people alive at age 15, 145 had died by age 25. We have no doubt that this model has some validity, and that the life expectancy of 13 years at age 18 in the Roman period is real for some elements of the population, but it is difficult to determine for whom.

that the sample may not in fact be representative of any class, combine again to raise serious doubts about the validity of specific figures computed from skeletons, insofar as they may be applied to the population as a whole.

1.5 Egyptian Census Data

Those interested in Egypt are fortunate in having the fullest demographical studies made for any single area in antiquity. Préaux and Hombert have devoted two studies to the Egyptian material. The first of these[25] was based on the kind of data which we have already discussed; the computations rest on the ages of deceased in 813 epitaphs and mummy labels. Although it is interesting to note the mean age, 32.39 years,[26] the conclusions are subject to the same reservations as are expressed above. Indeed, Préaux and Hombert were acutely aware of the problems, and noted that the statistics probably related to upper classes: "Nous pouvons considérer que nous ne savons rien de l'âge du décès, ni dans le prolétariat alexandrin, ni parmi les 'paysans royaux' qui forment le prolétariat agraire."[27]

The second study[28] used a completely different kind of data and produced strikingly different statistics. Using census returns, they obtained ages for 256 men and 247 women. These do not represent ages at death, of course, but by assuming the convention that the persons made up a population taken at a point in time, they were able to work with a stable population with age distributions attested. Of this population, they found mean ages for men of 27.23 years, for women, 26.38 years, and for both sexes, 26.60 years. By dividing the population

Figure 11: Number of Survivors (Hombert-Préaux)

Age	Men	Women	Both Sexes
10	188	196	384
20	148	143	291
30	106	96	202
40	72	55	127
50	42	31	73
60	22	17	39
70	12	6	18
80	1	0	1

25. M. Hombert and C. Préaux, "Note sur la durée de la vie dans l'Egypte gréco-romaine," *Chronique* 20, 1945, pp. 139-146.

26. Cf. W. F. Willcox, "The Length of Life in the Early Roman Empire," *Congrès international de la population* II, Paris, 1937, pp. 14-22, for the very similar figure of 31.4 years, from 141 mummies.

27. *Op. cit.*, p. 142.

28. M. Hombert and C. Préaux, *Recherches sur le recensement dans l'Egypte romaine*, Papyrologica Lugd.-Bat. V, 1952, pp. 156-160.

into decennial groups, they were able to show the number attested in each group, and we in turn can convert those data to show the number of people surviving each decade.[29]

From this it appears that the male population is halved every 20 years up to age 50, and every 10 years from 50 to 70. Among females the population is halved in the 20 years between ages 10 and 30, and thereafter halved again every ten years. The combined figures show halving in the first 20 years, with the mortality rate increasing to a halving every ten years after 50. This is an extremely heavy rate, just as the mean age is lower than anything we have seen for the other provinces of the empire. Yet it may still be that certain flaws in the data are prejudicing the means on the high side, so that the average age of the population may have been lower, and the mortality rate, at least in the early years, higher.

Préaux and Hombert themselves note these factors: because of the frequent loss of the ends of lists, "nous perdons la mention d'un certain nombre d'enfants en bas âge," so that the mean age should be lower.[30] This is certainly right, and in fact, the ages lost from enumeration of children may not necessarily be such low ages. The situation arises from the format of the declarations themselves. In the body of the documents, the inhabitants of houses are listed with their ages. When the declarant himself is an inhabitant his name is first[31] and any children are listed thereafter, and as a general rule, children's names follow those of their parents. Thus the tendency will be that when declarations are lost or mutilated at the bottoms of sheets, where damage is relatively more common, the ages lost will be those of children. But the children need not be young. The list of inhabitants reported in *P. Teb.* 322, showing a rather complicated family, is, in order:

Pasigenes	age 61
Eutychos, Pasigenes' son by a former wife	30
Herakleia, Pasigenes' current wife	40
Thasis, daughter of Pasigenes and Herakleia together	5
Sabinus, Herakleia's son	18
Sarapias, Herakleia's daughter	22
Tapesouris, wife of Eutychos, Pasigenes' son	18

The latter part of the declaration lists children, but two are in their late teens and one is in her early twenties. Similarly, the ages lost in *BGU* 117, where a number of children in their teens are reported, could as easily have been high as very low. So, although it is certainly true that the loss of data in general is such as to deprive us of the full representation of the lower ages, that loss was probably scattered through the teens and early twenties as well as through the considerably earlier ages.

This factor may well account, at least in part, for the apparent change in mortality rates in the early decades. If those decades are under-represented by

29. *Ibid.*, p. 159 presents a pyramid giving the actual numbers in each group.

30. *Recensement*, p. 157.

31. *Ibid.*, p. 114.

distortion of the data, there should be more people in those groups, the population would decrease at a higher rate, and the mortality rate would be more constant. But it is impossible to know to what extent this factor played a part, and what weight to give it in any age group. This characteristic bias of the evidence is most significant in evaluating the statistics produced by the census returns, and it also justifies reservations about accepting the age means. These are almost surely too high, although we do not know by what amount. Similarly, the mortality rates are too low for the early years, although again we do not know how much too low, or at what age the factor may be discounted.

A second factor which may affect the correctness of the data is the matter of the accuracy of the ages in the records. While a cursory examination of the declarations does not reveal the tendency toward selection of multiples of ten and five discussed above,[32] there is no doubt that inaccuracy of ages was common, so that life statistics which depend upon ages as given by ordinary people in Egypt run the risk of being affected by ancient error or carelessness. As Youtie has remarked, "The indifference of Egyptian villagers to precise statements of age is notorious."[33] Youtie's table of ages given by and for Aurelius Isidorus is instructive:[34]

Figure 12: The Ages of Aurelius Isidorus

P. Cair. Isidor.	Date	Age
81.5	April 297	35
97.6	April 308	37
125.14	August 308	40
91.2	before June 309	45
8.9	June 309	40

Allowing for the possibility that the tendency to round off was prevalent, Youtie regarded the ages given as indicators of how old Isidorus *looked*, and remarked that "We ought to hit the truth if we say that his age was between thirty-seven and forty" in 308, thus discounting the entry which gives his age as 45 in the next year.[35]

Of course it is quite impossible to determine the effect that this kind of inaccuracy might have on the statistics. It may well be that the errors would cancel each other out, as people have argued in dealing with the tendency to round off to tens and fives. On the other hand it may be that these errors could produce a real bias. Youtie remarked, explaining the higher entries for Isidorus' age, that "If he looked older than his years, the burdens of an Egyptian farmer might be sufficient excuse."[36] If the peasantry got worn down and looked older,

32. Page 11.
33. H. Youtie, *The Archive of Aurelius Isidorus*, Ann Arbor, Michigan, 1960, p. 394.
34. *Ibid.*
35. *Ibid.*, p. 4.
36. *Ibid.*

so that ages were given as higher than they truly were, we have another bias tending to distort the survival rate and the age means upwards. Again there is no way to assess this, and although the effect is not likely to have been too great, it is nevertheless an unsettling factor.

In any case, we have no doubt that the calculations of Préaux and Hombert, based on census declarations, are the best guide to the realities of life expectancy in antiquity, at least for Egypt. Although there are biases, the direction of the bias is clear, tending to distort the survival rate upwards. We should thus expect the real mean ages to be lower than those reached by Préaux and Hombert, and the real survival rate to be lower as well at some ages at least, although we cannot estimate from this body of data how great those differentials might be. A completely different source and kind of data is needed.

Section Two

The Evidence of the Theban Ostraka

2.1 Introduction

Because evidence for longevity has in general been scanty, it would be of particular value if data could be generated by large quantities of evidence. The Theban ostraka offer such quantities. The thousands of receipts provide the names of thousands of individuals from one relatively small geographical area, and the non-archival nature of the ostraka provides a reasonable assurance that these individuals represent a random sample of the population. With the names of fathers, wives, or brothers given for most individuals, and for many, grandfathers' names too, it is often possible to make firm identifications of individuals as they recur in different receipts over the years. The ranges of years over which these individuals are attested provide a sample of the years of activity enjoyed by the Egyptian peasants in the Thebaid, and a statistical analysis of the data provides a new means of determining vital statistics for antiquity.

2.2 Statistical Methods

Although a technical description of the statistical methods used to obtain information about longevity from the ostraka will be found below in Section 4, it will be supplemented here by a basic and mainly non-technical explanation; the technical description will be unintelligible to those without considerable mathematical training reasonably fresh in their minds, training of a sort that we cannot expect from more than a small minority of our readers in classics. We will use money tax receipts in this discussion for illustration.

We use data only for those persons for whom payment of money taxes can be attested in at least two different (Julian) calendar years in surviving receipts, and for each of these people we use only the years in which he appears as a payer and the number of times he pays, not the amount he pays. In our full tables the taxes in grain are also taken into account. All government officials have been excluded from consideration, since their duration of appearance depends on definite factors other than true longevity. We have assumed that 14 was the earliest age at which any tax would have been paid. Therefore if a hypothetical Pamonthes son of Harsiesis was attested paying taxes in A.D. 91, 97, 101, 102, 106, 107, 108, and 109, his span of activity known to us is 19 years; his age at death must therefore have been equal to or greater than 32. It may well be that he lived to an age greater than 32, but we can be confident that he reached at least

this age. The age 32 in this instance we will call Pamonthes' pseudo-age at death, the youngest age at which he can have died.

But our data are not complete, and we cannot distinguish with certainty Pamonthes' age at his death from his pseudo-age. To find out the relationship of the pseudo-age to the true age at death, we must first consider the determination of longevity when all the data are known; the technical development of the relationship between pseudo-age and true age is reserved for Section 4.

In a population of persons of age 15 (the starting point of our consideration, since to be attested in two or more years a person must reach at least this age), the number of persons will be denoted by n_{15}. For successive years we use the terms n_{16}, n_{17}, n_{18}, and so forth for the number of persons with age at death greater than or equal to 16, 17, 18, etc. In general terms, n_x is the number of persons with age at death greater than or equal to x.

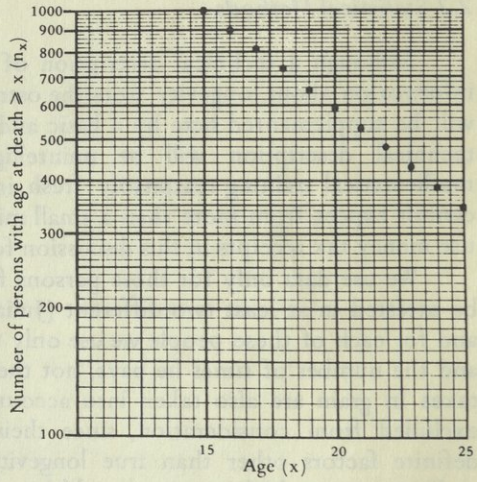
From this concept is derived that of the survival rate, denoted by a. The survival rate in a population is the fraction of the population surviving to age x whose age at death is $\geqslant x + 1$; thus, $a_x = \frac{n_{x+1}}{n_x}$. This represents the survival rate at age x. If this survival rate is constant over the years, it can be represented by a, a constant.

The concept may be illustrated by the following hypothetical population:

Figure 13: Survival for a Hypothetical Population

Age (x)	Number of persons with age at death $\geqslant$ x (n_x)
15	1000
16	900
17	810
18	729
19	656
20	590
21	531
22	478
23	430
24	387
25	348

Figure 14: Graph



Of 1000 people alive at age 15, 900 were still alive one year later. The survival rate at age 15 is therefore figured as $a_{15} = \frac{900}{1000}$, or $a_{15} = .90$ (or 90 per cent). In this hypothetical population, it may be seen that the same survival rate is found in the years following so far as the artificial data continue.

If the results of this table are expressed in the form of a graph, Figure 14 illustrates the outcome. The number of persons with age at death $\geqslant$ x (for x from 15 to 25) constitutes the vertical axis, while the age itself constitutes the

horizontal axis. The graph is a straight line, indicating that the survival rate is constant throughout the time-span under consideration. It will be seen later that our graphs from the data giving pseudo-age at death approximate this situation quite well.

At this point we may derive another concept from that of the survival rate, the mean (arithmetically average) number of years of life left to a person, which may be denoted by λ. At age x, the mean number of years of life remaining would be λ_x. In the case (such as the table and graph above) where a, the survival rate, is constant, the value of λ will also be constant, and an algebraic formula for the relationship can be derived, $\lambda = \frac{1}{(1-a)} - \frac{1}{2}$. An example of the working of the formula may be taken from our table above, where $\lambda = \frac{1}{(1-.9)} - \frac{1}{2}$, or $\lambda = 9.5$; each person has a mean life expectancy of 9.5 years.

We now turn briefly to the transition from true age to pseudo-age as a criterion of longevity. Since our information is incomplete, the pseudo-age at death may be less than the real age by varying amounts of time for each individual. Nevertheless, the theory given in Section 4 shows that the pseudo-survival rate is simply related to the true survival rate when the receipts are lost in a random way. In particular, when either the true survival rate or the pseudo-survival rate is constant, then so is the other and they have the same value. Analysis of the data in Section 5 lends some support to the supposition that receipts are lost in a random way. Graphs 6.1 through 6.9 are therefore analogous to Figure 14; they are appoximately linear and this suggests that the pseudo- and true survival rates are the same and constant.

2.3 Treatment of the Data

In order to generate data for analysis, it was first necessary to identify our individuals, and ensure, insofar as possible, that an individual to whom we were ascribing a *range*, the number of years from his first through his last appearance in the data, was indeed the same man in all the different texts in which he appeared. The means of identification was clear: appearance of grandfathers' names, or other names besides that of the father in the denomination of the taxpayer increased the reliability of the identification; similarly, uncommon names of father, payer, or even better, of both, made identification certain; names of trades, or of other members of a payer's family could lend credence to an identification.

Nevertheless, aware that there are many opportunities for error in this kind of effort, we provided a number of checks upon our operations. First, as we worked with the data, we selected individuals who recurred in different receipts and for whom the criteria mentioned above served as identifiers, and we discarded those individuals about whose identifications we were doubtful. We then divided the identified individuals into two groups, one, of those about whose identifications we were absolutely certain, the other, of those for whom we did not feel the same complete confidence.

We further subdivided the data in other ways. We tabulated ranges of payments and intervals between payments separately for poll tax payments, dike tax payments, and bath tax payments; we tabulated intervals between and ranges of payments for these three taxes as a group; we tabulated intervals and ranges for all money taxes taken together; and we tabulated ranges between the first attested payment for poll tax and the last attested payment of any kind, including grain. Last, we tabulated for all money taxes together, excluding data from the beginning and end of the period for which receipts are extant.

We worked with capitation taxes, particularly the poll tax, since we considered that payment probably began for all of them, but certainly for the poll tax, at the age of 14.[1] This removed the possibility that taxes were being paid for young children, and eliminated the insuperable difficulty of obtaining data on which to base estimates of infant and child mortality. Our entire population is therefore comprised of men more than 14 years old, and our survival and mortality rates serve for the men of the population from the age at which they may be considered to have reached sufficient maturity to engage in productive activity, the age at which they were taxed by the government. The separate and combined tabulations of these tax payments served as controls, to reveal any biases which the nature of the taxes themselves might introduce into the data.

As it turned out, the conclusions from all these separate calculations were remarkably similar. The survival rates remained virtually the same, whether we tabulated only those individuals for whom we were absolutely certain of identification, or added to them the individuals for whom certainty was not achievable; only the range of probable error decreased as the quantity of data was supplemented. Similarly, the results were much the same whether we tabulated the taxes separately or in various combinations; the only differences apparent were in the estimates of probable ranges of error, which were smaller when more of the data was used in a tabulation.

2.4 Limitations of the Data

The results and the methods of analysis are discussed in Chapters 4 and 5. It is perhaps well to note here, however, what comments and reservations we may have about the element of the population that is represented, and what possible bias might exist in the data.

We deal only with males, and so these statistics cannot be used to estimate female vitality; not enough females appear among the payers, and the use of

1. Wallace, *Taxation*, pp. 105 ff. Neither death rate nor graphs depend upon this common assumption. Since we have included all taxpayers attested over more than one year, the graphs and death rates remain the same regardless of the age at which payments began. A shift in inception age merely shifts the graphs to begin at that age. Similarly, any uncertainty about 62 as the terminal date is inconsequential, as receipts in later life are so rare, and none in fact require more than 62 years of life.

female data might well introduce a serious bias, since where they do pay tax, they have presumably outlived their husbands and represent only the longer lived of the females.

Secondly, as we have said, these figures serve only for that segment of the population above the age of 15. It is very useful to know what life expectancy and survival rates are for those who live to enter into active life, and it is only for these that our statistics offer conclusions. No conclusion can or should be drawn about early mortality.

Finally, we judge that the sample is more or less representative of the population as a whole. The capitation taxes, including poll tax, would have been paid by all members of the population in upper Egypt,[2] and there are attested among payers a number with clearly Roman names. If the population sampled is only one class, it is clearly the lowest, and we thus have, for the first time, a sample which is definitely from that group which must have made up the bulk of the population. If, as we think, our sample is from the whole male population, then our conclusions need no adjusting. If, on the other hand, it is limited to the lower classes, there may be some difference between these figures and figures which could be obtained for the entire population, but that difference would be minimal, since the lower class would certainly have outnumbered the higher many, many times in the area around Thebes in upper Egypt.

No officials were included in the tabulations, *qua* officials. Terms of office were affected by factors other than longevity, and therefore we excluded all attestations of named officials collecting taxes, signing receipts, and the like. We thus have a sample of the tax-paying population around Thebes.

One bias may exist in the data, but it would have a very small effect. Insofar as the population might have been mobile, there would be a shortening of duration of activity. People moving into the area would begin to be attested later in life, but would disappear from the population after a misleadingly short time; people moving away would also disappear early.

The possibility of immigration, in any case, is taken into account in the statistical theory, so that unless it was large, its effect would be negligible. But there seems in fact to have been very little mobility. It is common to find fathers, sons, and grandsons, all paying taxes in their own names as the years go on. Families can be assembled from discrete receipts, and the various members are often found repeatedly over the years. The evidence of nomenclature itself shows stability; names characteristic of lower Egypt, or the names peculiar to Elephantine upriver, rarely if ever appear at Thebes, and few peculiarly Theban names can be found elsewhere. This was a peasant population, tied to the land, and few moved from the land which they, their fathers, and their grandfathers

2. Wallace, *Taxation*, p. 128, points out that there is no evidence for a privileged upper class in upper Egypt.

before them, farmed. Such bias which might be inherent in the data from the factor of mobility would tend to exaggerate the mortality rate and thus the shortness of life, but this exaggeration would be minimal, if in fact it really existed at all.[3]

3. It is difficult to determine whether the mobility adduced by H. Braunert, *Die Binnenwanderung*, Bonn, 1964, applies as readily to upper Egypt as Braunert's texts, primarily from the downriver districts richer in papyri, suggest for lower Egypt. That people from one place pay taxes to officials of another may lend support to Braunert's conclusion of great population mobility between villages (*Binnenwanderung*, p. 266), but there is nothing in Theban texts nor in Braunert's sources to indicate any significant residence change for tax purposes among the peasants around Thebes.

Section Three

Conclusions

3.1 Results of the Analysis

The detailed description of the procedures used is set forth in section 4 below, and the results achieved are best shown by consultation of tables in section 6. Table 6.3 shows the estimates of survival rate (assuming it is constant) after the age of 15. The estimates are given for individual taxes as well as groups of taxes and all taxes together, and the confidence limits are given as well. The survival rate for all taxes is 0.937; it is lower, but not significantly so, for taxes taken individually.

A visual presentation of the effects of the survival rate may be found in the graphs, and a precise statement of expected longevity after age 15 may be seen in Table 6.4. Using the figures for all money taxes (c) in Table 6.3 (see note to table), we find a survival rate of 0.933, which yields in Table 6.4 an estimate of a mean of 14.4 additional years of life expected after age 15. The significance of this mean is, essentially, that beginning from any particular age, on the average, each member of the population will live for 14.4 years; expressed differently, it means that a man of 15 can expect to live to reach 29.4 years of age.

The effect of this survival rate on a stable population, shown in the graphs, appears in graph 6.1 for all money taxes. The population is halved, roughly, every 10 years. Of all the people who reach age 15, only 1/2 will reach the age of 25, only 1/4 will reach the age of 35. Very few indeed will reach 55, and, although the data is scarce in the upper years, it is clear that we are safe in saying that only 1/16 of the population at age 15 will reach that age.

This mortality rate is shown consistently however we divide the data or take it together. We have very much the same rate for all taxes, for all money taxes, and for individual taxes. The results of the analysis can be stated with some confidence, within the parameters of the confidence limits given in the tables or imposed by the data itself: the Theban ostraka show consistently a very high death rate after the age of 15. Whatever the population or survival rates are under the age of 15, no more than half the population is over the age of 25,[1] no more than 1/4 over the age of 35. For 15-year olds, the mean age at death is 29.4 years.

1. The number of the deaths under the age of 15 would be at least at the same rate, and infant mortality enormous, so that the greatest portion of the population by far would have been under 30.

3.2 Historical Implications of the Results

It is not our purpose to do more here than suggest some implications of these results, if they are correct, and to point out areas of investigation which might be fruitful in light of this study. In the first place, it is well to point out that our evidence suggests a far younger population than most of the other studies, although for 15-year olds, our mean age at death is not strikingly lower than the mean age at death shown by the evidence of physical anthropology,[2] or indeed by the studies of Hombert-Préaux.[3] But it is lower, and in comparison with the evidence of epitaphs, it is lower than any category other than epitaphs from Rome.

We think that we are safe in taking these results as a clear confirmation of the Hombert-Préaux conclusion that the population of Egypt in the Roman period was a young one. Life was probably even shorter than they had thought, and the death rate more drastic. Instead of a population halved every 20 years, the Hombert-Préaux result (above, p. 14), we find a population being halved every ten years. The social and economic implications of this are manifold. Few fathers – no more than half – would live to see their sons to maturity, a situation which easily can explain the many difficulties with land-tenure found in the papyri. It would be necessary for people to assume adult responsibility at a very young age. The whole realm of human activity, involving such matters as capital accumulation or planning for the future, would be geared to a relatively short expectation of life. And these effects would not be limited to one time, but rather, if they are valid for Egypt in the Roman period, probably prevailed in Egypt throughout classical antiquity.

It would be interesting to examine some indicators of economic life in Egypt from the standpoint gained by these results for life expectancy. One effect that such a high death rate should have would be to militate against ready accumulations of capital in private hands: even if most children did not survive infancy, early deaths of fathers would tend toward rapid turnover and distribution of property. In light of this, it would be fruitful to examine the kinds and amounts of property distributed in wills.

Outside Egypt, these results may have broad implications if they can be taken as any kind of indication of survival rates in the Greco-Roman world. In general, we should regard historical conclusions which depend upon great longevity of some figure as inherently improbable, unless there is independent evidence to suggest such longevity. Also, political institutions may be seen in a different light. For example, the age qualification of 30 for the Spartan Apella may be very restrictive, as may also be the 30 year qualification for the senates and magistracies in Bithynia established by the *Lex Pompeia* (Pliny, *Ep.* 10.79). The economic implications would be similar to those we have already noted for Egypt, and may be responsible for some of the characteristics of antiquity which

2. See above, p. 000.

3. See above, p. 000.

have already been discussed by others. Rostovtzeff has pointed out[4] that working people generally had very low incomes, and that even the average bourgeois was not very wealthy in the Hellenistic period. He observed a general decline in wealth among the middle bourgeoisie throughout the Hellenistic world, after the infusions of capital brought by Alexander's conquests.

Low survival rates have implications for private affairs and family law.[5] Guardianship, land tenure, inheritance would be affected to a significant extent. It would be interesting to discover how many people, like Demosthenes, lost their fathers before maturity.

We have attempted only to sketch very briefly some of the possible implications of the high death rate which seems to be indicated by the Theban ostraka. We should like to stress that the results can be taken with confidence as valid only for Thebes. They may also be valid for Egypt in general, in the Roman period or all through Greco-Roman antiquity, and they may have bearing on life expectancy in antiquity in general, but this must remain a hypothesis. The most important factor affecting the evaluation of these results is that they are generated by an entirely new and different source of data. We now have an independent source of information revealing life expectancy in antiquity, and these results can be used to check, supplement, or correct other conclusions.

4. M. Rostovtzeff, *Social and Economic History of the Hellenistic World,* II, 1941, the point summarized on p. 1204.

5. Some of the aspects have already been studied by M. Miller, *Studies in Greek Genealogy,* Leiden, 1968, based on a population model with a death rate much like that reflected here.

Section Four

Statistical Theory

4.1 Introduction

Before giving a formal description of the statistical methods used to obtain information about longevity from the tax receipt data we shall first give a general description of the methods, using the money tax receipts to illustrate the discussion. The general theory in subsequent sections is also illustrated with references to the tax receipt data. However, the theoretical results are applicable in any situation where we have incomplete information about individuals, provided certain assumptions about the loss of information are valid. In particular, the methods developed may be applicable in conjunction with capture- recapture methods used in the study of animal populations and we are currently studying this possibility. A survey of such methods is given in Cormack.[1]

The data used is for those persons for whom payment of money taxes can be attested in at least two distinct years. For example, Table 6.1 indicates the years in which payments were attested, and the number of payments attested in each such year for No. 90. If we assume that money tax payments were compulsory in each year from age 14 onward, then we know that the age at death of No. 90 was greater than or equal to 46. We shall refer to 46, the minimum age at which he could have died, as his pseudo-age at death.

In order to see how information about longevity may be obtained from such data we must first consider the case where the data is complete and we know the true age at death. Assume that there are n_0 persons who are age zero and that after x years have elapsed there are n_x survivors for x = 1,2,. . . . If we define a survival rate a_x for the population by

$$a_x = \frac{\Pr(\text{age at death} \geqslant x+1)}{\Pr(\text{age at death} \geqslant x)} \quad ,$$

then we may use $\hat{a}_x = n_{x+1}/n_x$ as an estimate of a_x based on the history of the

1. R.M. Cormack, "The Statistics of Capture–Recapture Methods," *Oceonogr. Mar. Biol. Ann. Rev.* 6, 1968, pp. 455-506.

n_0 persons. For such a population we may also define λ_x, the mean number of additional years of life given survival to age x. In the simple case when $a_x = a$, a constant, for all x, then $\lambda_x = \lambda$ for all x, and a plot of log n_x versus x will be approximately linear. Thus, given the ages at death of the n_0 persons, we may compute the n_x's, examine the plot of log n_x versus x, and, if it is approximately linear, obtain estimates of a and λ and their standard deviations using the methods to be discussed in Section 4.2.

Suppose now that we use the pseudo-age at death instead of the true age at death for all persons. Then we may define n'_x = number of persons whose pseudo-age at death is greater than or equal to x and a corresponding pseudo-survival rate a'_x. It is easily shown that, if the pseudo-age at death is one less than the true age at death for all persons, then $a'_x = a_{x+1}$. Similarly, if the pseudo-age at death is k less than the true age at death then $a'_x = a_{x+k}$. These are artificial situations, and a more realistic situation may be envisaged as follows: the population is divided at random into a number of subpopulations, and in the kth subpopulation the pseudo-age at death is k less than the true age at death for k = 0,1,2,. . . . Then it is shown in Section 4.4 that a'_x is a weighted average of a_x, a_{x+1}, a_{x+2}. . . . i.e. $a'_x = v_0 a_x + v_1 a_{x+1} + \ldots$ where $v_0 + v_1 + \ldots = 1$ and the v_i's depend on x. In this situation, (i) if a_x is a constant a for all x, then $a'_x = a$, (ii) if a_x decreased with increasing x so will a'_x, and (iii) if the v_j's decrease rapidly with increasing j than a'_x will depend chiefly on the first few of a_x, a_{x+1} . . . and will give a good indication of the true survival rate.

To see how this situation could arise in practice we consider the following probabilistic model for the loss of the receipts: Let the probability be p that at least one tax payment is attested in any year in which tax payments have been made, and assume that events in different years and for different people are independent. Then for this simple model for the loss of the receipts (or the information on them) we have a situation which is equivalent to the situation discussed above i.e. the envisaged probabilistic mechanism for the loss of the receipts has the effect of dividing the population up into groups as described above and hence a'_x is a weighted average of a_x, a_{x+1}, ... A more realistic model leading to the same results is obtained by assuming that p varies from person to person, as long as the choice of value for p for any person is independent of his age at death.

This same situation could also arise as follows. Assume that there is no loss of tax receipts and that death occurs at the end of the final year in which a tax payment is made, that the population is divided into subpopulations, and that in the kth subpopulation all of the individuals were immigrants to the whole population at age k (k= 0,1,2,. . .). In the kth subpopulation, the pseudo-age at death will be k less than the true age at death and, again, a'_x will be a weighted

average of a_x, a_{x+1}, ... A combination of loss of receipts as above and immigration also results in such a subdivision of the population.

There is an additional complication which arises in dealing with the money taxes since payments were not necessary beyond the age of 62. Thus, in principle, no pseudo-age at death exceeds 62 and hence the pseudo-survival rate a'_x must decline to zero when x = 62. In this case it may be shown that a'_x is a weighted average of a_x a_{x+1}, ... times a factor which is close to unity in value provided that x is not too close to 62.

4.2 Statistical Methods for Complete Data

For a population of n_0 persons age 0 we define n_x = number of persons of the original n_0 whose age at death is greater than or equal to x; a_x = survival rate = Pr(age at death $\geqslant$ x+1 | age at death $\geqslant$ x) for x = 0,1,2,.... We will assume that events involving a specific person are statistically independent of events involving other persons in the population. The likelihood function is then proportional to

$$\begin{aligned}&(1-a_0)^{n_0-n_1}\cdot[a_0(1-a_1)]^{n_1-n_2}\cdot[a_0a_1(1-a_2)]^{n_2-n_3}\cdots\\ &=[(1-a_0)^{n_0-n_1}\,a_0{}^{n_1}]\cdot[(1-a_1)^{n_1-n_2}\,a_1{}^{n_2}]\cdots\end{aligned}\tag{1}$$

If we assume that $a_0 = a_1 = \ldots = a_{k-1} = a$, then the miximum likelihood estimate $\hat{a}$ of a is given by

$$a = \frac{n_1 + n_2 + \ldots + n_k}{n_0 + n_1 + \ldots + n_{k-1}}\tag{2}$$

Using the fact that the distribution of n_i given n_{i-1} is binomial with parameters n_{i-1} and a, straightforward algebra yields the following results:

$$E(n_0 + n_1 + \ldots + n_{k-1}) = n_0(1-a^k)/(1-a)\tag{3}$$

$$\operatorname{cov}(n_i,n_j) = n_0a^j(1-a^i)\,,\ i\leqslant j\tag{4}$$

$$\operatorname{var}(n_0 + n_1 + \ldots + n_{k-1}) = \frac{n_0a}{(1-a)^2} - \frac{n_0}{1-a}\left[(2k-1)a^k + \frac{a^{2k}}{1-a}\right]\tag{5}$$

$$\operatorname{cov}(n_0 + n_1 + \ldots + n_{k-1}\,,n_k) = n_0a^k[k-1 - a(1-a^{k-1})\,/\,(1-a)]\tag{6}$$

Since $\hat{a}$ is a ratio estimate we may employ the above results to obtain the usual approximation to var($\hat{a}$):

$$\operatorname{var}(a) \doteqdot \frac{a(1-a)^2}{n_0(1-a^k)}\tag{7}$$

This approximation will be satisfactory and the bias in $\hat{a}$ will be small relative to the standard deviation of $\hat{a}$ if CV, the coefficient of variation of $n_0 + n_1 + \ldots + n_{k-1}$, is small.[2] CV is given by

$$(CV)^2 = \frac{a}{n_0}\left[\frac{1-(1-a)(2k-1)a^{k-1}-a^{2k-1}}{(1-a^k)^2}\right]. \tag{8}$$

Let us assume that $a_0 = a_1 = \ldots = a_{K-1} = \beta_0$, $a_K = a_{K+1} = \ldots = a_{2K-1} = \beta_1$, etc. To test the hypothesis that $\beta_0 = \beta_1 = \ldots = \beta_{L-1} = \beta$ against the alternative that these β_j's are not all equal we may use the likelihood ratio criterion LR given by

$$\begin{aligned} LR = -2\Big[&(n_0 - n_{LK})\ell n(1-\hat{\beta}) + (n_1 + n_2 + \ldots + n_{LK})\ell n\,\hat{\beta} \\ &- \sum_{j=0}^{L-1} (n_{jK} - n_{(j+1)K})\ell n(1-\hat{\beta}_j) \\ &- \sum_{j=0}^{L-1} (n_{jK+2} + n_{jK+1} + \ldots + n_{(j+1)K})\ell n\,\hat{\beta}_j\Big] \end{aligned} \tag{9}$$

the distribution of which is approximately χ^2 on L-1 degrees of freedom. In the expression for LR, $\hat{\beta}$ and $\hat{\beta}_j$ are given by

$$\hat{\beta} = \frac{n_1 + n_2 + \ldots + n_{LK}}{n_0 + n_1 + \ldots + n_{LK-1}}$$

$$\hat{\beta}_j = \frac{n_{jK+1} + n_{jK+2} + \ldots + n_{(j+1)K}}{n_{jK} + n_{jK+1} + \ldots + n_{jK+K-1}}.$$

When the survival rate a_x is a constant a for all x, then $E(n_x) = n_0 a^x$ and we would expect a plot of $\ell n(n_x)$ versus x to be linear. Also λ_x, the mean number of additional years of life for a person who has survived to age x, is also a constant λ. The following formula gives λ as a function of a:

$$\begin{aligned} \lambda &\doteq -1/\ell n\, a \\ &\doteqdot 1/(1-a) - 1/2 \end{aligned} \tag{10}$$

The approximation $1/(1-a) - 1/2$ for λ may be used with a relative error of less

2. W.G. Cochran, *Sampling Techniques*, New York, 1963, Sections 6.4 and 6.5.

than 0.1 per cent for $0.9<a<1$. Since λ is a monotone function of a, confidence limits for λ may be obtained by substituting the corresponding confidence limits for a in (10). We note that the average life span estimated directly from the data is approximately

$$\left[(n_0-n_1)\frac{1}{2} + (n_1-n_2)(1+\frac{1}{2}) + (n_2-n_3)(2+\frac{1}{2}) + \ldots\ldots\ldots\right]/n_0$$

$$= \frac{1}{1-\hat{a}} - \frac{1}{2},$$

where $\hat{a} = \dfrac{n_1 + n_2 + \ldots}{n_0 + n_1 + \ldots}$, in agreement with (10).

4.3 Probabilistic Models

For each person in the population and for each tax (or group of taxes) we define the following quantities:

s = span = (last year in which tax is paid) − (first year in which tax is paid),

r = range = (last year in which tax payment attested) − (first year in which tax payment attested),

where we assume that the years are numbered in an increasing sequence. The range will be defined to be zero if either (i) a tax payment is attested in only one year, or (ii) no tax payments are attested. For a person with span s, the range r may take any of the values 0,1,2, . . . , s depending upon loss of tax receipts or loss of information on the receipts through illegibility.

For each tax (or group of taxes) we define

$$n'_x = \text{number of persons with range } r \geqslant x.$$

The quantity n'_x resembles n_x and we might think of the original n'_0 persons as belonging to a pseudo-world in which pseudo-age is measured from the first year in which a tax payment is attested and pseudo-death occurs at the end of the final year in which a tax payment is attested. A pseudo survival rate a'_x could then be defined as follows:

$$a'_x = \Pr(\text{range} \geqslant x+1 \mid \text{range} \geqslant x) = \Pr(\text{range} \geqslant x+1) \mid \Pr(\text{range} \geqslant x) \qquad (11)$$

All the considerations of Section 4.2 could then be applied to the pseudo-population.

Study of the pseudo-population is of interest only if we can demonstrate that information about a'_x yields useful information about a_x, the actual survival rate. If, for example, we knew that for all persons $r = s-1$, and it is safe to assume that death takes place at the end of the last year in which tax is paid, then we would have $a'_x = a_{x+1}$. The situation we are considering is, of course, much more complicated than this but the following analysis demonstrates that under weak assumptions a'_x may be thought of as a weighted average of $a_x, a_{x+1}, \ldots$.

Assuming that a probabilistic model may be used to describe the survival in the population and the relationship between r and s, we define the following probabilities:

$$\begin{aligned} P(x) &= \Pr(\text{age at death} = x \mid \text{survival to age } 0) \\ P'(s) &= \Pr(\text{span} = s) \\ P(r \mid s) &= \Pr(\text{range} = r \mid \text{span} = s) \\ Q(r) &= \Pr(\text{range} = r) . \end{aligned}$$

[Note that in the definition of P(x) and in the subsequent theory the ages are *relative* ages measured from some origin. For the money taxes, for example, it is convenient to take the origin at 14 years in which case P(x) means Pr(true age at death = x + 14 | survival to true age at 14).] We then have

$$Q(r) = P(r|r)P'(r) + P(r|r+1)P'(r+1) + \ldots + P(r|T)P'(T) \qquad (12)$$

where T is the maximum value of the span which may be observed. For the money taxes, for example, the first year of payment is (true) age 14 and the last is (true) age 62, so that T = 48. If we assume that the (relative) age at death is s for $s < T$, then we have

$$\begin{aligned} P'(s) &= P(s) , \quad s < T \\ P'(T) &= P(T) + P(T+1) + \ldots \end{aligned} \qquad (13)$$

The quantities P(r | s) will now be given for several models for the loss of tax receipt information. These models will prove useful in illustrating the subsequent theory and in Section 5.2 we shall give evidence that suggests that model (C) is a realistic choice for the problem we are considering.

Model (A): For each $s \geqslant k$, we assume that $r = s-k$ where k is a constant; for $s < k$ we take r = 0. We then have for $s \geqslant k$

$$\begin{aligned} P(r|s) &= 1 , \quad r = s-k \\ &= 0 , \text{ otherwise.} \end{aligned}$$

Model (B): Let the probability be p that at least one tax payment is attested for a particular person for a year in which at least one payment may have been made by that person. We assume that p is the same for all persons and for all

years, and that events in different years, whether for the same or different persons, are statistically independent of each other. We then have

$$P(0|s) = (1-p)^{s+1} + (s+1)p(1-p)^s$$

$$P(r|s) = (s-r+1)p^2(1-p)^{s-r}, \quad r \geqslant 1.$$

Model (C): This model is similar to model (B) except that now we assume that for a fraction γ_i of the population $p = p_i$ for $i = 1,2,\ldots$, where $\Sigma\gamma_i = 1$. We then have

$$P(0|s) = \Sigma\gamma_i[(1-p_i)^{s+1} + (s+1)p_i(1-p_i)^s]$$

$$P(r|s) = \Sigma\gamma_i(s-r+1)p_i^2(1-p_i)^{s-r}, \quad r \geqslant 1.$$

Model (D): Denote each year in which at least one receipt is attested for a particular person by a 1 and each other year by a 0. Then we can think of the sequence of 1's and 0's which describe the survival or non-survival of the information as a realization of a two state homogeneous Markov chain with transition matrix $P = p_{ij}$, and with stationary distribution given by

$$\{\pi_0,\pi_1\} = \{1-p,p\}.$$

For $r \geqslant 1$ we have

$$P(r|s) = p\, p_{11}^{(r-1)}\, p_{10}\, p_{00}^{s-r-1}$$

$$+ (s-r-1)(1-p)p_{01}\, p_{11}^{(r-1)} p_{10}\, p_{00}^{s-r-2},$$

$$+ (1-p)p_{01}\, p_{11}^{(r-1)} p_{00}^{s-r-1},$$

(where the n step transition probabilities are denoted by $p_{ij}^{(n)}$).

4.4 Relationship Between True and Pseudo Survival Rates

We now obtain expressions for a_x and a'_x in terms of the probabilities $P(x)$ and $P(r|s)$ defined above. We first define

$$U(x) = \Pr(\text{age at death} \geqslant x)$$
$$= P(x) + P(x+1) + \ldots,$$
$$V(x) = \Pr(\text{range} \geqslant x)$$
$$= Q(x) + Q(x+1) + \ldots + Q(T).$$

Then

$$a_x = U(x+1)/U(x), \tag{14}$$

and $$a'_x = V(x+1)/V(x). \tag{15}$$

Applying the expression for Q(r) in (12) above we obtain

$$\begin{aligned} V(x) &= P(x\,|\,x)P'(x) + [P(x\,|\,x+1) + P(x+1\,|\,x+1)]P'(x+1) \\ &\quad + \ldots + [P(x\,|\,T) + P(x+1\,|\,T) + \ldots + P(T\,|\,T)]P'(T) \\ &= P(x\,|\,x)P(x) + [P(x\,|\,x+1) + P(x+1\,|\,x+1)]P(x+1) \\ &\quad + \ldots + [P(x|T) + \ldots + P(T\,|T)]\,[P(T) + P(T+1) + \ldots] \end{aligned} \tag{16}$$

The relationships between a_x and a'_x will now be shown to be relatively simple when the probabilities P(r|s) have the following property:

> Property (P): P(r|s) for $r \geqslant 1$ depends on r and s only through the difference s−r. In this case we shall write P(r|s) = F(s−r).

For models (A), (B) and (C) discussed above the probabilities P(r|s) have property (P). For model (D) the probabilities P(r|s) will have property (P), approximately, when r is large enough so that $p^{(r-1)} \doteq p$ the limiting value as $r \to \infty$ . .

Assuming property (P) we obtain from (16) that

$$\begin{aligned} V(x) &= F(0)P(x) + [F(1) + F(0)]P(x+1) \\ &= + \ldots + [F(T-x) + \ldots + F(0)]\,[P(T) + P(T+1) + \ldots] \\ &= F(0)U(x) + F(1)U(x+1) + \ldots + F(T-x)U(T) \end{aligned} \tag{17}$$

Substituting this expression in (15) we find that

$$a'_x = \frac{F(0)U(x)a_x + F(1)U(x+1)a_{x+1} + \ldots + F(T-x-1)U(T-1)a_{T-1}}{F(0)U(x) + F(1)U(x+1) + \ldots + F(T-x-1)U(T-1)} \cdot G(x,T) \tag{18}$$

where $$\begin{aligned} G(x,t) &= \frac{F(0)U(x) + F(1)U(x+1) + \ldots + F(T-x-1)U(T-1)}{F(0)U(x) + F(1)U(x+1) + \ldots + F(T-x)U(T)} \\ &= 1 - \frac{F(T-x)}{F(0)}\,\frac{V(T)}{V(x)} \end{aligned} \tag{19}$$

Thus we have expressed a'_x as a weighted average of $a_x, a_{x+1}, \ldots, a_{T-1}$ times a factor G(x,T) which we shall show in Section 5.3 is close to unity in value when T − x is sufficiently large in the case of the money taxes.

We may also obtain an expression for a_x in terms of $a'_x, a'_{x+1}, \ldots, a_{T-1}$. We first write

$$\begin{aligned} U(x) &= a_0 V(x) + a_1 V(x+1) + \ldots + a_{T-x} V(T) \\ &= a_0 F(0) P(x) + [a_0 \{F(0) + F(1)\} + a_1 F(0)] P(x+1) \\ &\quad + [a_0 \{F(0) + F(1) + F(2)\} + a_1 \{F(0) + F(1)\} + a_2 F(0)] P(x+2) \\ &\quad + \ldots . \end{aligned}$$

Using the definition of $U(x)$ we see that the coefficients of $P(x), P(x+1), \ldots$ must each be unity and hence the a_i's may be obtained by solving the following system of equations:

$$\begin{aligned} a_0 F(0) &= 1 \\ a_0 F(1) + a_1 F(0) &= 0 \\ a_0 F(2) + a_1 F(1) + a_2 F(0) &= 0 \\ \cdot \quad \cdot \quad \cdot & \quad \cdot \\ \cdot \quad \cdot \quad \cdot & \quad \cdot \\ \cdot \quad \cdot \quad \cdot & \quad \cdot \end{aligned} \tag{20}$$

Using (14) we obtain

$$a_x = \frac{a_0 V(x) a'_x + a_1 V(x+1)\, a'_{x+1} + \ldots + a_{T-x-1} V(T-1) a'_{T-1}}{a_0 V(x) + a_1 V(x+1) + \ldots + a_{T-x-1} V(T-1)} \cdot G'(x,T), \tag{21}$$

where

$$G'(x,t) = [1 - a_{T-x} F(0) U(T)/U(x)]. \tag{22}$$

which is of the same general form as (18) except that now some of the weights may be negative. For model (B), for example, we have $F(i) = (i+1)p^2(1-p)^i$ and hence $a_0 = 1/F(0)$, $a_1 = 2(1-p)/F(0)$, $a_2 = (1-p)^2/F(0)$, and $a_j = 0$ for $j > 2$.

We now examine the relationship between a'_x and a_x in detail for various special cases and for models (A), (B) and (C):

(i) Using (18) and (21) we see that if $T = \infty$, then a'_x is constant if and only if a_x is constant. When $T = \infty$, $G(x,T) = G'(x,T) = 1$ for all x.

(ii) For model (A), $F(k) = 1$ and $F(i) = 0$ for $i \neq k$ and hence $a'_x = a_{x+k}$ if $x \leqslant T - k - 1$. Here, $G(x,T) = 1$.

(iii) For model (C) with a constant survival rate a we define

$$\begin{aligned} H(k) &= F(0) + F(1)a + \ldots + F(k-1)a^{k-1} \\ &= \Sigma \gamma_i p_i^2 \left\{ \frac{1-\beta_i^k [1 + (k-1)(1-\beta_i)]}{(1-\beta_i)^2} \right\} \end{aligned} \tag{23}$$

where $\beta_i = (1-p_i)a$. Then $G(x,T) = H(T-x)/H(T-x+1)$, and the sum of the first k weights in the factor consisting of a weighted average of a_x, $a_{x+1}, \ldots, a_{T-1}$ appearing in (18) is greater than $H(k)/H(\infty)$. Numer-

ical values for $G(x,T)$ and $H(k)/H(\infty)$ will be considered in Section 5.3.

(iv) If the survival rate a_x is a decreasing function of x, then $G(x,T)$ and the sum of the first k weights will both be closer to unity in value than in the case where the survival rate is a constant a.

We have expressed the pseudo-survival rate as a weighted average of values of the survival rate provided that property (P) holds and that the factor $G(x,T)$ in (18) is close to unity in value. It is unlikely in practice that we would be in a situation where we would know precisely the appropriate probabilistic model for the loss of information, and hence numerical values for the weights cannot be obtained in general. This imposes a limitation on the inferences about the survival rate which may be made from observed values of the pseudo-survival rate.

Although we have developed the theory for the survival rate we could also have done this for a quantity closely related to λ_x, the mean number of additional years of life given survival to age x. For, if we define $\mu_x = E[s|s \geqslant x]$ and $\mu_x' = E[r|r \geqslant x]$, then it can be shown that μ_x' is a weighted average of $\mu_x, \mu_{x+1}, \ldots$ minus a quantity which is relatively small if $T - x$ is sufficiently large.

Section Five

Statistical Analysis of the Data

5.1 Introduction

We shall now make use of the theory of Section 4 for a statistical analysis of the tax receipt data. The analysis is divided into three parts: (i) A statistical study of the lengths of the intervals between years in which payments are attested and of the number of receipts obtained in each year in order to assess the adequacy of various models for loss of the receipts. (ii) Estimation of survival rate and mean number of years of additional life. (iii) A discussion of sources of error. The main emphasis will be on the analysis of the data for money taxes, since, for these taxes, there is greater likelihood that payments began at age 14 than there is for the grain taxes.

5.2 Assessment of Models for Loss of the Receipts

A number of probabilistic models for loss of the receipts were given in Section 4.3. It is important to know if any one of these is suitable for our data since each one possessed property (P) which, we have shown, ensures a simple relationship between the pseudo-survival rate and the actual survival rate. For one of the taxpayers, No. 90, there is a large amount of data and we begin our study with an analysis of this data.

The money tax data for No. 90 is given in Table 6.1. If Model (B) or Model (C) is suitable for the loss of the receipts, then the z_i's can be considered as a sample of size 25 from the geometric distribution with probability mass function

$$f(z) = p(1-p)^{z-1}, (z = 1,2, \ldots) . \qquad (24)$$

A χ^2 goodness-of-fit test yields a value of 0.93 for the goodness-of-fit statistic on 1 degree of freedom and no departure from the assumed model is indicated. The runs test provides an alternative to the χ^2 test which may be applied in cases where there is less data and we shall now describe its application.

If we denote each year in which no payment is attested by a zero and each year in which a payment is attested by a one and if we record these in their order of occurrence then for No. 90 we would obtain the following

10111101100111111100111011111111

To this string of 0's and 1's we may apply a runs test but we first exclude the two digits at the extreme ends since they will always be 1's. Thus we apply the test to the sequence:

01111011001111111001110111111111

We define

N_1 = number of 0's,
N_2 = number of 1's,
U = number of runs.

A description of the runs test is given by Bradley[1] and tables for carrying out the test are given in Owen[2] for the case when $N_1 \leqslant 20$ and $N_2 \leqslant 20$. If either of N_1 or N_2 is greater than 20, we may use a normal approximation to the null distribution of U with

$$E(U) = \frac{2N_1N_2}{N_1 + N_2} + 1$$
$$\text{var}(U) = \frac{2N_1N_2(2N_1N_2 - N_1 - N_2)}{(N_1 + N_2)^2(N_1 + N_2 - 1)} \qquad (25)$$

unless one of N_1 or N_2 is very large and the other very small, in which case it is better to work out the exact null distribution of U, formulas for which are given by Bradley, p. 254.

For No. 90 we have $N_1 = 7$, $N_2 = 24$ and U = 10 with E(U) = 11.8 and var (U) = 1.88 and no departure from our model is indicated. If for No. 90 we assume that (i) a large number of payments were made in each year, (ii) the probability of any one being attested is small and is the same for each receipt, and (iii) the receipts survive or are lost independently of each other, then the y_i's may be considered as a sample from a truncated Poisson distribution with probability mass function

$$g(y) = \frac{m^y e^{-m}}{y!(1-e^{-m})}, \quad (y = 1,2,\ldots). \qquad (26)$$

The mean of this distribution is $m/(1-e^{-m})$ and an estimate $\hat{m}$ of m may be obtained by solving the equation $\bar{y} = \hat{m}/(1-e^{-\hat{m}})$ for $\hat{m}$ where $\bar{y}$ is the sample mean. For No. 90, $\bar{y} = 2.269$ and $\hat{m} = 1.94$ and a χ^2 goodness-of-fit test gives a χ^2 value of 1.68 on 3 degrees of freedom, and no significant departure from the model (26) is indicated. The observed and expected values for this test are given in Figure 15 where the expected value is given by $\frac{26(1.94)^y e^{-1.94}}{y!(1-e^{-1.94})}$ for $y \leqslant 4$ and the

1. J.V. Bradley, *Distribution-Free Statistical Tests*. Englewood Cliffs, N.J., 1968.

2. D.B. Owen, *Handbook of Statistical Tables*. Reading, Mass., 1962.

entry for y = 5 is chosen so that the sum of the expected values is the sample size, 26.

In equation (24), p is the probability that at least one payment is attested in a given year and this should be related to m of equation (26) according to the equation

$$1 - p = e^{-m}. \tag{27}$$

An approximate 95 per cent confidence interval for p using the z_i's is

$$\{1/(\bar{z} + 2s_{\bar{z}}),\ 1/(\bar{z} - 2s_{\bar{z}})\} = \{0.66,\ 0.96\}$$

where $\bar{z} = 1.28$ and $s_{\bar{z}} = 0.12$ and this is in good agreement with an approximate 95 per cent confidence interval for $1 - e^{-m}$ obtained using the y_i's; which is

$$(1 - e^{-m_1},\ 1 - e^{-m_2}) = (0.66,\ 0.93),$$

where m_1 and m_2 are the solution of the equations

$$\bar{y} \pm 2s_{\bar{y}} = m/(1 - e^{-m}).$$

Here $s_{\bar{z}}$ is the sample standard deviation of the mean given by

$$s_{\bar{z}} = \left\{ \frac{\sum_{i=1}^{n} (z_i - \bar{z})^2}{n(n-1)} \right\}^{\frac{1}{2}}$$

where n is the sample size.

Figure 15:
Observed and expected values for χ^2 goodness-of-fit test for money tax data for No. 90. Computed value is 1.68 on 3 degrees of freedom.

y	Observed number of years in which y payments attested.	Expected number of years in which y payments attested using truncated Poisson model.
1	9	8.46
2	10	8.21
3	4	5.31
4	1	2.57
5+	2	1.45

For the whole population we might expect model (C) to be adequate since it is, in effect, model (B) applied to individuals with p permitted to vary from person to person. There is much less data for taxpayers other than No. 90 but we can apply the runs test individually to the data from some of these but not the goodness-of-fit test for the truncated Poisson distribution (partly because there is so little data, partly because some taxpayers may have made only a small unknown number of payments in each year invalidating the Poisson model). Since it is difficult to obtain reliable estimates of parameters when fitting models which are mixtures of distributions as in model (C), it does not appear to be worthwhile

Identifying Number of Tax Payer	N_1	N_2	U	Approximate Statistical Significance Level
6	22	2	3	—
13	2	3	3	—
18	6	2	5	10%
22	27	4	7	—
23	12	4	7	—
26	32	3	7	—
28	11	5	4	5%
29	35	4	5	10%
31	5	2	3	—
32	2	7	3	—
34	8	8	8	—
35	14	3	6	—
36	2	10	5	—
37	17	3	7	—
39	2	3	3	—
41	17	2	5	—
42	7	3	6	—
43	8	2	5	—
48	7	2	5	—
49	10	2	3	—
65	19	2	4	—
68	28	2	5	—
72	66	7	6	—
79	16	8	8	—
85	15	4	6	—
89	8	2	3	—
90	7	24	10	—
92	31	3	7	—
112	9	6	4	5%
116	1	6	3	—
128	5	6	5	—
142	8	2	2	10%
134	13	3	6	—
168	6	4	9	5%

Figure 16:
Results of runs tests on occurrence and non-occurrence of payments in the years between those years in which first and last payments are attested, for the 34 individuals with 4 or more years in which payments have been attested.

N_1 = number of years in which no payment attested

N_2 = number of years in which at least one payment attested (excluding the first and last of these years)

U = number of runs

to attempt fitting models to the pooled data for all the taxpayers.

Figure 16 gives the results of applying the runs test to the data for individuals with payments attested in at least four years. Of the 34 tests, six yield results significant at the 10 per cent level and, of these six, three are significant at the 5 per cent level. The tests, considered collectively, do not indicate any appreciable departure from Model (C), since the number of significant results at the various levels of significance do not differ appreciably from the expected number of significant results in 34 independent tests of significance: the probability of observing 6 or more significant results at the 10 per cent level is 0.13, and of observing 3 or more at the 5 per cent level is 0.25.

The above analysis suggests that model (C) may be appropriate for the loss of the receipts. However, the analysis is necessarily limited because of the small amount of data and because we have no way of examining the intervals between age 14 and the first payment attested and between the last payment attested and death and they may have different statistical properties than the ones we have been examining although they would not have different properties if model (C) is valid. In particular, for an emigrant the interval between the last payment attested and death would be longer on the average than is predicted by model (C).

We have applied the runs tests to the data for the 34 individuals who have money tax payments attested in at least four years since we need at least this much data and preferably more for the runs test to be useful. However, we cannot estimate survival rate using only the data for these 34 individuals since the condition: 'given that tax payments are attested in at least four years,' upsets the relationship between the range, r, and span, s, demanded by property (P). The condition 'given that the range is greater than or equal to one,' which is equivalent to the condition 'given that payments are attested in at least two years,' does not have this effect since

$$a'_x = \frac{\Pr(\text{range} \geqslant x+1)}{\Pr(\text{range} \geqslant x)}$$

$$= \frac{\Pr(\text{range} \geqslant x+1 \mid \text{range} \geqslant 1)}{\Pr(\text{range} \geqslant x \mid \text{range} \geqslant 1)}$$

In the next section, estimates of survival rate will be made assuming property (P) and using the data for those individuals with range greater than or equal to one.

5.3 Estimation of Survival Rate and Mean Number of Additional Years of Life

In applying the theory of Section 4 we shall use absolute rather than relative ages. If property (P) is valid, then equation (18) gives the relationship between the pseudo-survival rate, a'_x, and the survival rate, a_x. Let us temporarily assume that

$G(x,T) = 1$ for $x = 15, 16, \ldots, 44$ for the money taxes where $T = 62$. If this is so, then q_x is a weighted average of $a_x, a_{x+1}, \ldots$ for $x = 15, 16, \ldots, 44$. Since we might expect a_x to be constant or a decreasing function of x as x increases, if our data suggests that a'_x is constant for $x = 15, \ldots, 44$, then we might infer that a_x is also constant for at least the same range of x values, since if a_x decreased so would a'_x. We begin our analysis, then, with an examination of a'_x and following that we will study the possible values of the factor $G(x,T)$, for if its value is appreciably different from unity for the range of x values under consideration, then inferences about a_x would be much more difficult to make.

If the pseudo-survival rate a'_x is constant we would expect a graph of $\log n'_x$ versus x to be approximately linear. Graphs of $\log n'_x$ versus x for various tax types are given in Graphs 6.1 to 6.9 and they are roughly linear especially for $x = 15, 16, \ldots, 44$. Using the likelihood ratio test of Section 4.2 we may make formal tests of significance of the constancy of a'_x. For the money taxes we adopted the following procedure: Since local fluctuations of a'_x are of little interest and because of the small amount of data we shall assume a'_x is constant over 5 year periods and test the equality of the pseudo-survival rates over successive 5 year periods. Hence we use the test statistic LR given in (9) with $K = 5$ and $L = 9$ but we must adjust the formulae associated with the test in the following way: for all x replace n_x by n'_{x+15} and a_x by a'_{x+15}. For example,

$$a_0 = a_1 = \ldots = a_{K-1} = \beta_0 \quad \text{becomes}$$

$$a'_{15} = a'_{16} = \ldots = a'_{K+14} = \beta_0 \quad \text{and}$$

$$\hat{\beta} = (n_1 + n_2 + \ldots + n_{LK}) \,/\, (n_0 + n_1 + \ldots + n_{Lk-1}) \quad \text{becomes}$$

$$\hat{\beta} = (n'_{16} + n'_{17} + \ldots + n'_{LK+15}) \,/\, (n'_{15} + n'_{16} + \ldots + n'_{LK+14}).$$

The value of LR for the money tax data using the data in column 1 of Table 6.2 is 13.2 on 8 degrees of freedom and no departure from a constant value is indicated.

Since a'_x must approach zero as x approaches T, we might have expected the above significance test to indicate a non-constant a'_x, but there are very few survivors for the larger x values where we expect a'_x to be small and hence our significance test is not very sensitive to departures from constant a'_x.

We will now assume that a'_x and a_x are constant for $x = 15, 16, \ldots 44$ and proceed to estimate a and λ, still assuming that $G(x,T) = 1$. We will employ (2), (7) and (10) with n_x replaced by n'_{x+15} for all x. The results are given in Tables 6.3 and 6.4 for various tax types for $k = 30$ and, for the money taxes, we have also obtained estimates using $k = 20$. The estimates are remarkably consistent and for the money taxes there seems to be no essential difference between estimates

based on 20 and 30 years of data, and our choice of k = 30 for making estimates, though somewhat arbitrary, does not seem to be critical. In comparing results for different tax types, it is necessary to keep in mind, however, that the estimates may not be independent: for example, dike, bath, and poll taxes are each special types of money taxes, and "first poll to last receipt of any kind" computes the range as the difference in date of the last receipt (money or grain) and the date of the first poll tax receipt and hence both money and grain taxes are employed. Evaluations of CV using (8) indicate that we are justified in neglecting bias in our ratio estimates of $\hat{a}$ and that (7) gives a satisfactory variance estimate. For example, for the money taxes based on 30 years of data, we obtained CV = $0.76/\sqrt{n_{15}}$.

In order to obtain some indication of the magnitude of the factor G(x,T) appearing in (18), for the money tax data we shall assume that the survival rate is a constant, a, and that Model (B) is adequate. This is an oversimplification but it can still yield useful results for the following reasons: If G(x,T) is almost unity in value, then we may consider a'_x as a weighted average of a_x, a_{x+1}, . . . and inferences about survival rate will be easier to make. Hence, we shall look at numerical values for G(x,T) using extreme values for a and p (large for a, small for p) which will tend to make G(x,T) small, and hence will give us some indication of the values of G(x,T) in possibly the worst situation we will encounter. Certainly the extreme choices of a and p will yield a situation worse than that in which a_x decreases with increasing x and Model (C) is appropriate.

Using the money tax data and tentatively taking G(x,T) = 1, a 95 per cent confidence interval for a is (0.915, 0.943) and a value of $a = 0.96$ would seem to be a suitable extreme value. See Table 6.3. Using the values of $\bar{z} = 5.10$ and $s_{\bar{z}} = 0.39$, obtained by pooling the z_i's for all 120 persons with money tax payments attested in at least two years, a suitably representative value for p is $1/(\bar{z} + 3s_{\bar{z}}) \doteqdot 0.16$. Now G(x,T) is given by

$$G(x,T) = \frac{1-\beta^{T-x}[1 + [(T-x-1)(1-\beta)]}{1-\beta^{T-x+1}[1 + (T-x)(1-\beta)]} \tag{28}$$

where $\beta = (1-p)a$; see (iii) of Section 4.4. Using the above values for a and p we see that a suitably low value for β is $\beta = 0.81$.

Using $\beta = 0.81$, we obtain

$$\begin{aligned} G(x,T) &= 0.939, \text{ if } T - x = 10 \\ &= 0.989, \text{ if } T - x = 20 \\ &= 0.998, \text{ if } T - x = 30 \end{aligned}$$

In view of the extreme choice in value for β, we are probably safe in assuming that G(x,T) is effectively unity for values of x as large as 44 (or values of T−x as small

as 18). Also, if we use $\beta = 0.81$ we see that values for a lower bound for the sum of the first k weights in the expression for a'_x as a weighted average of a_x, $a_{x+1}, \ldots$ are given by 0.671, 0.932, and 0.988 for k = 10, 20, and 30 respectively; see (iii) of Section 4.4. If a_x is changing slowly with x, then we are probably safe in considering a'_x as an average of a_x values over about 20 years. We have, however, ignored the effect of immigration on the weights which we assume to be negligible: see section 2.4.

In the above argument we first estimated a assuming G(x,T) = 1, then examined values of G(x,T) using the estimate of a obtained. There is the *possibility* that a_x is nearly unity and the value of a'_x is just G(x,T), and that the above argument is not valid. If, however, we take $a = 1$ and p = 0.16, then $\beta = 0.84$ and G(x,T) = 0.995 for T−x = 30. Hence, G(x,T) $\geqslant$ 0.995 for x = 15,16, . . . 32 and this does not agree with the observed values of a'_x which are much smaller. Hence, for small x values, it would appear that we are justified in making inferences about a_x using the values of a'_x.

5.4 Sources of Error in the Estimates

If the probabilistic model for the loss of the receipts is valid, then the statistical analysis enables us to some extent to assess the magnitude of the errors in our estimates of survival rate. However, we have very little data for assessing the validity of the model, we are not in a situation where we have a designed experiment, and the model does not take into account such things as the effect of emigration. Hence, there are many sources of uncertainty in our estimates whose effects are difficult to assess. Sources of these are discussed below and in Section 2.4.

(i) The methods we are using are vulnerable to systematic changes in the loss of information in the time period of interest. For example, because we have no receipts beyond a certain period of time, and relatively few in the years nearest the ends of this period of time the individuals who were between the ages of 14 and 62 at or near either end of this period of time will appear to have shorter lives. To assess the effect of this a separate estimate of the survival rate was made using the money taxes but using the receipts only for those individuals whose entire taxpaying period lies within the central range of years for which we have data and in which we have relatively large numbers of receipts. The estimates are given in Tables 6.3 and 6.4 in the line labelled 'Money (c)' and are seen to be consistent with the other estimates.

(ii) If the survival rate is not constant but decreases with increasing age, our estimate of λ_x, which we have taken to be independent of x, may be too

large for large x and too small for small x.

(iii) We do not know how representative of the population are the taxpayers for whom we have data.

(iv) Any errors in suppositions about the tax laws at the time in question may result in biased estimates.

An independent study using other historical data and possibly different methods to get estimates for comparison is perhaps the only way we can assess the effects of these and other sources of error.

Section Six

Tables and Graphs

Table 6.1: Money Tax Data for No. 90

i	Date of year in which payment(s) attested t_i	Number of payments attested in the year y_i	Number of years until next payment attested $z_i = t_{i+1} - t_i$
1	A.D. 118	1	2
2	120	1	1
3	121	2	1
4	122	2	1
5	123	3	2
6	125	2	1
7	126	1	3
8	129	1	1
9	130	2	1
10	131	3	1
11	132	1	1
12	133	2	1
13	134	4	1
14	135	1	3
15	138	3	1
16	139	1	1
17	140	1	2
18	142	1	1
19	143	2	1
20	144	6	1
21	145	8	1
22	146	2	1
23	147	2	1
24	148	3	1
25	149	2	1
26	150	2	

Table 6.2:

For each tax or group of taxes the table records n'_x, the number of persons with pseudo-age at death greater than or equal to x.

x	1	2	3	4	5	6	7	8	9
Pseudo-age	Money	Money*	Dike Bath Poll	Dike	Bath	Poll	Poll to last of any kind	Grain	All taxes
15	120	83	61	22	38	31	57	68	150
16	113	79	59	21	36	29	53	61	142
17	105	73	54	19	33	26	49	55	135
18	101	71	54	18	32	25	46	52	131
19	91	63	47	15	31	18	39	45	121
20	86	60	45	14	28	18	37	39	114
21	73	51	41	10	24	17	33	36	101
22	69	49	38	10	22	14	29	31	96
23	66	47	37	9	21	13	27	29	91
24	63	45	35	8	18	13	26	27	86
25	56	42	28	5	14	10	22	25	78
26	48	37	26	3	14	9	21	24	71
27	46	35	24	3	13	7	19	19	68
28	44	33	22	3	13	6	16	19	64
29	40	29	19	3	11	6	15	18	59
30	39	28	19	3	10	6	15	17	57
31	36	25	18	3	9	6	14	16	54
32	30	22	15	3	8	4	11	13	47
33	27	20	12	3	6	3	9	11	42
34	27	20	12	3	6	3	9	10	41
35	26	19	12	3	6	3	9	9	40
36	24	17	10	3	4	3	8	9	36
37	22	15	10	3	4	3	8	7	33
38	22	15	10	3	4	3	8	6	33
39	20	14	7	2	3	3	8	6	31
40	18	13	6	1	3	2	8	6	30
41	16	12	6	1	3	2	8	6	27
42	16	12	5	0	2	2	8	5	26
43	15	12	5		2	2	6	3	23
44	15	12	5		2	2	6	2	23
45	15	12	5		1	2	6	2	21
46	12	10	5		1	2	6	2	17
47	9	8	4		1	1	5	0	14
48	9	8	4		1	1	5		14
49	8	8	4		1	1	5		12

x	1	2	3	4	5	6	7	8	9
Pseudo-age	Money	Money*	Dike Bath Poll	Dike	Bath	Poll	Poll to last of any kind	Grain	All taxes
50	7	7	4		1	1	5		10
51	5	5	3		1	1	3		7
52	4	4	3		1	1	3		7
53	4	4	3		1	1	3		6
54	4	4	2		1	1	3		6
55	3	3	1		0	1	2		5
56	2	2	1			1	2		4
57	2	2	1			1	2		4
58	1	1	0			1	2		3
59	1	1				1	2		3
60	1	1				1	2		3
61	1	1				1	1		3
62	0	0				0	0		2
63									0

* Uses all money tax payments for individuals for whom last receipt is after A.D. 77 and first receipt is before A.D. 168.

Table 6.3:
Estimates of survival rate assuming survival rate is constant after age 15

Taxes	Estimate of survival rate[1] a	Estimate of standard deviation of a $sd(a)$	Approximate 95% confidence limits for a	
			Lower limit a-2sd(a)	Upper limit a+2sd(a)
Money[2] (a)	0.929	0.007	0.915	0.943
(b)	0.927	0.007	0.913	0.941
(c)	0.933	0.008	0.917	0.949
Dike, bath and poll	0.924	0.010	0.904	0.944
Dike	0.887	0.023	0.841	0.933
Bath	0.912	0.014	0.884	0.940
Poll	0.900	0.017	0.866	0.934
First poll to last of any kind	0.918	0.011	0.896	0.940
Grain	0.902	0.012	0.878	0.926
All taxes	0.937	0.005	0.927	0.947

1. All estimates are based on the first 30 years of data i.e. on n'_{15} to n'_{45} except for money (b) which is based on the first 20 years of data.

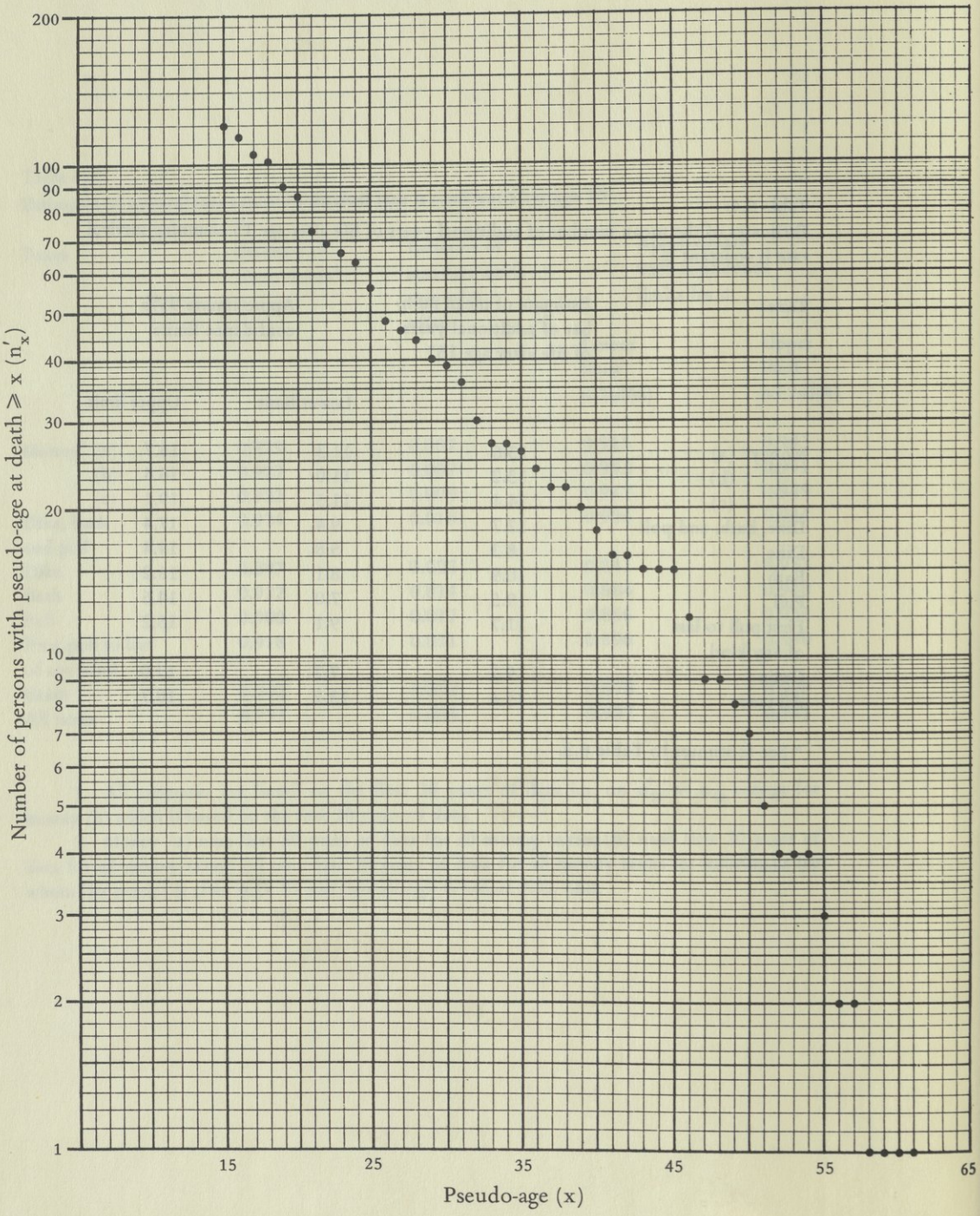
2. Money (a) uses first 30 years of data for all money taxes; (b) used first 20 years of data for all money taxes; (c) uses first 30 years of data for all money taxes for individuals for whom last receipt is after A.D. 77 and first receipt is before A.D. 168.

Table 6.4:
Estimates of the mean number of additional years of life after age 15 assuming survival rate is constant

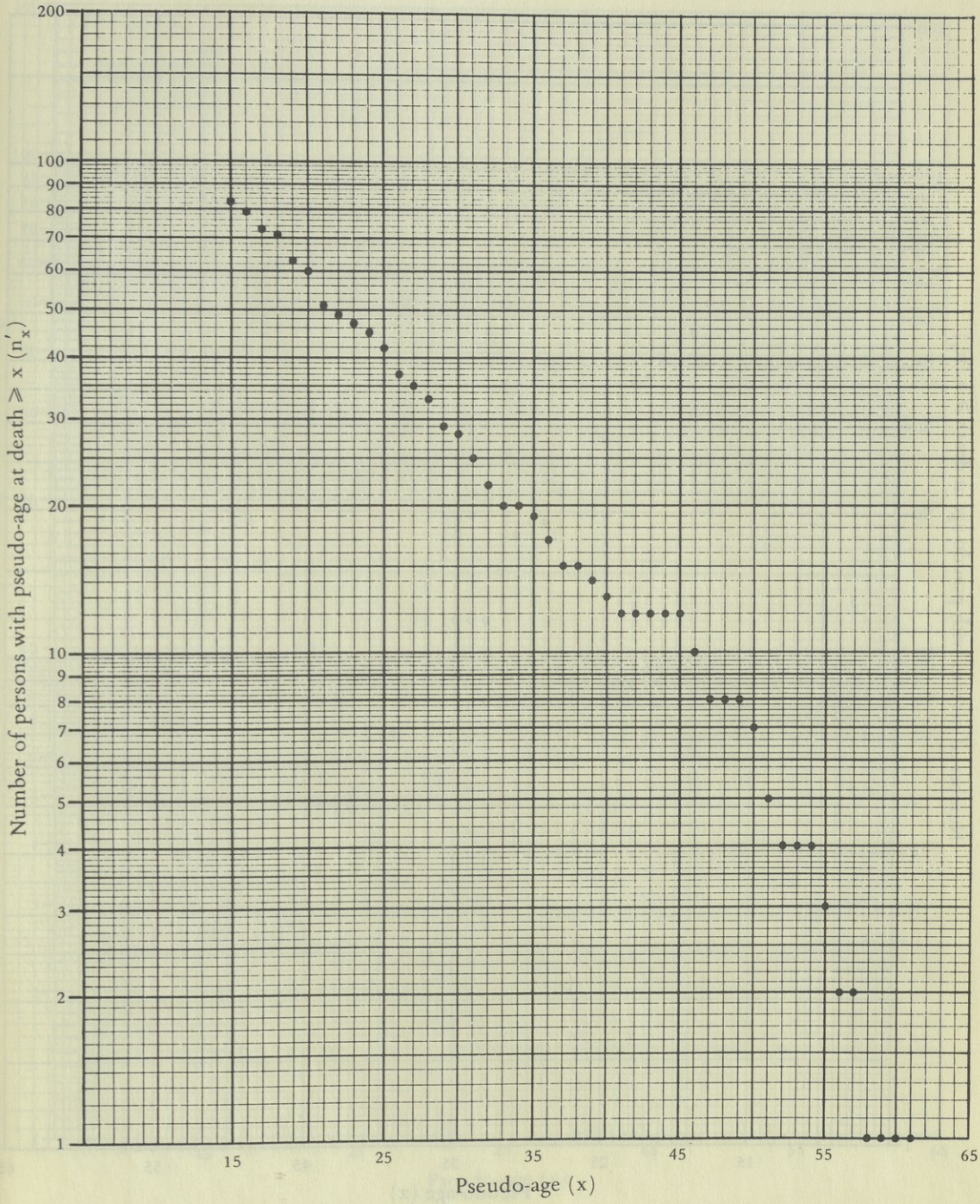
Taxes	Estimate of mean number of additional years of life after age 15*	Approximate 95% confidence limits	
		Lower limit	Upper limit
Money* (a)	13.6	11.3	16.7
(b)	13.2	11.0	16.4
(c)	14.4	11.5	19.1
Dike, bath, and poll	12.7	9.4	17.4
Dike	8.3	5.8	14.4
Bath	10.9	8.1	16.2
Poll	9.5	7.0	14.6
First poll to last of any kind	11.7	9.1	16.2
Grain	9.7	7.7	13.0
All taxes	15.4	13.2	18.7

* See footnotes to Table 6.3.

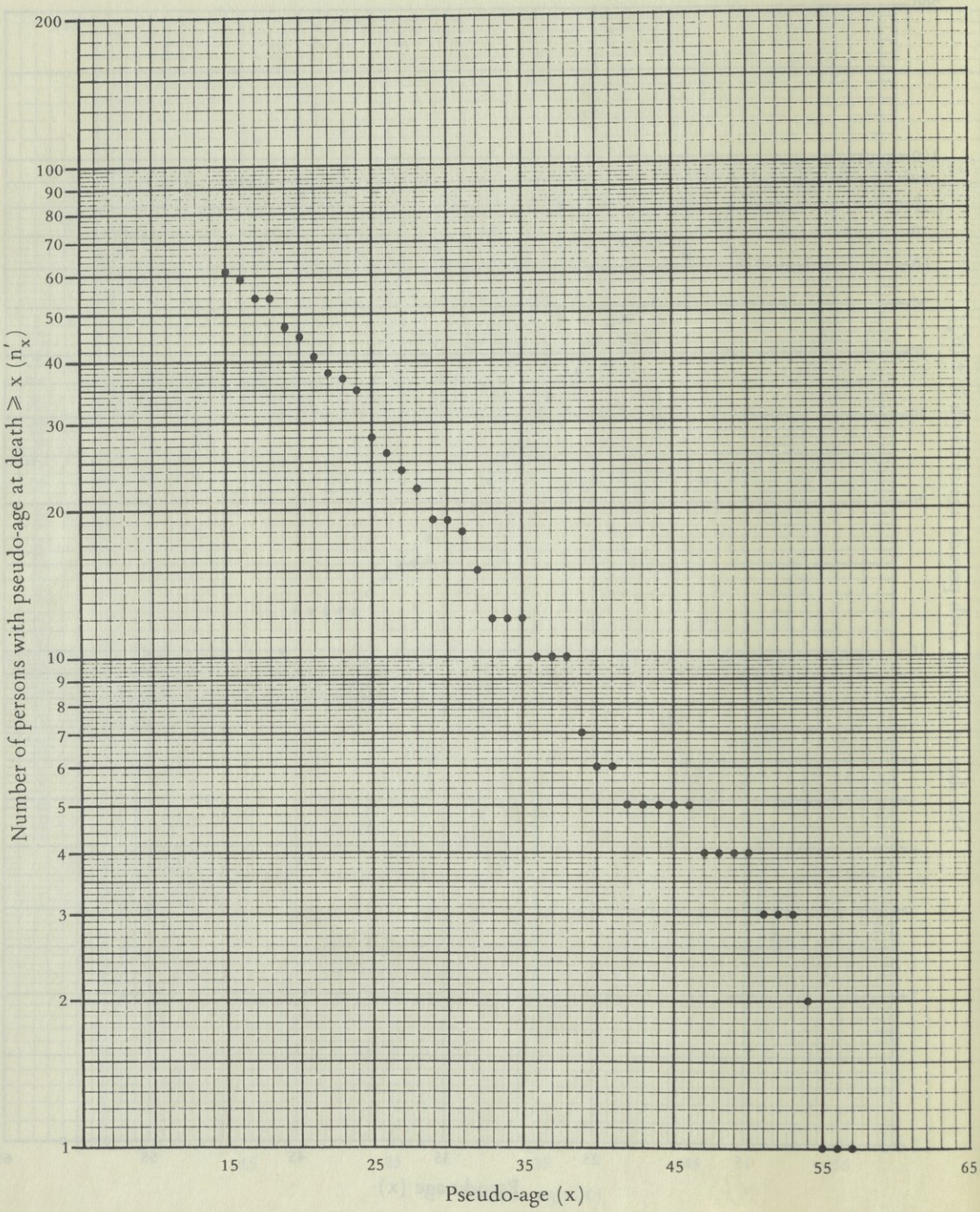
Graph 6.1: All Money Taxes
See Column (1) of Table 6.2



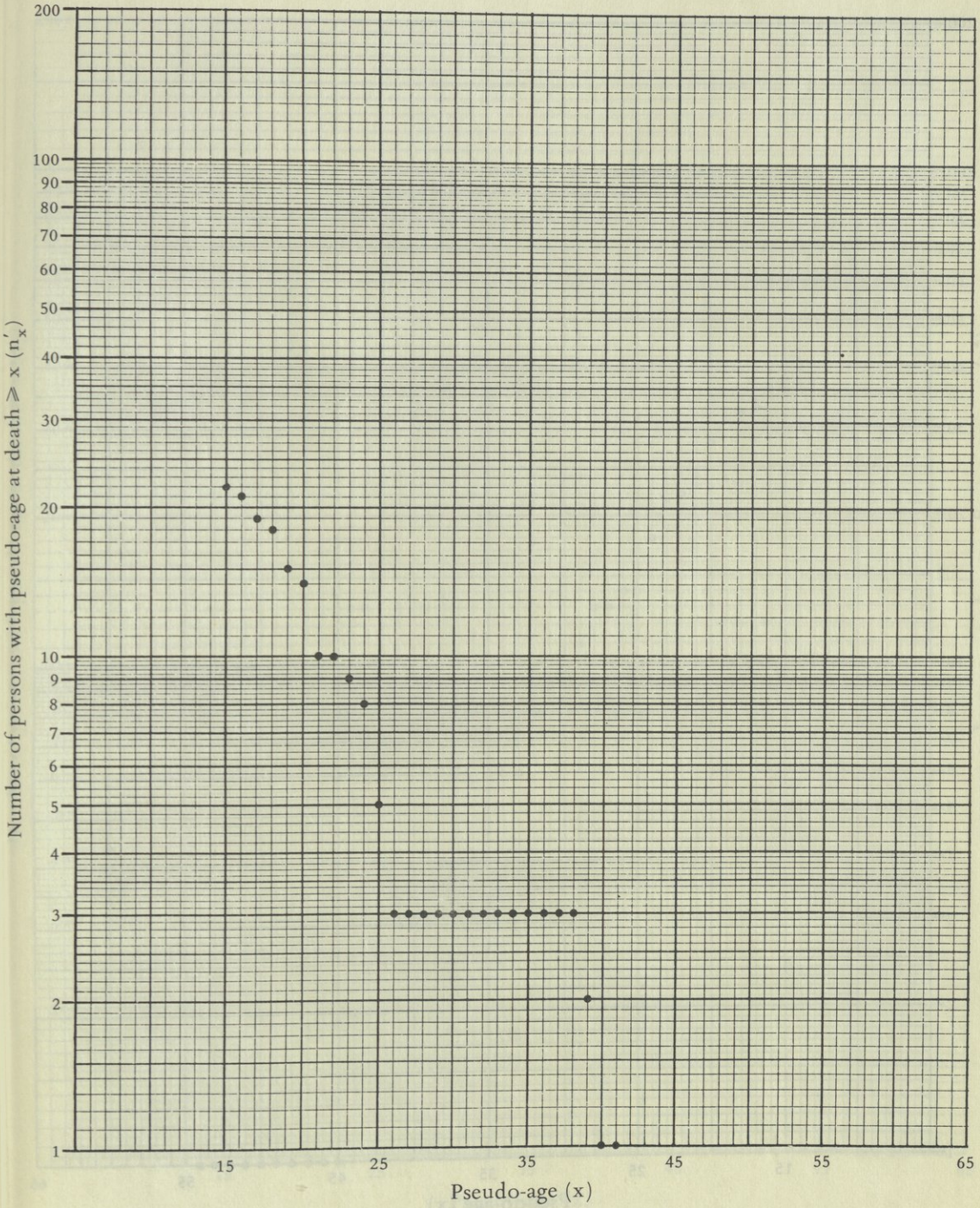
Graph 6.2: Money Tax, 77 A.D. – 168 A.D.
See Column (2) of Table 6.2



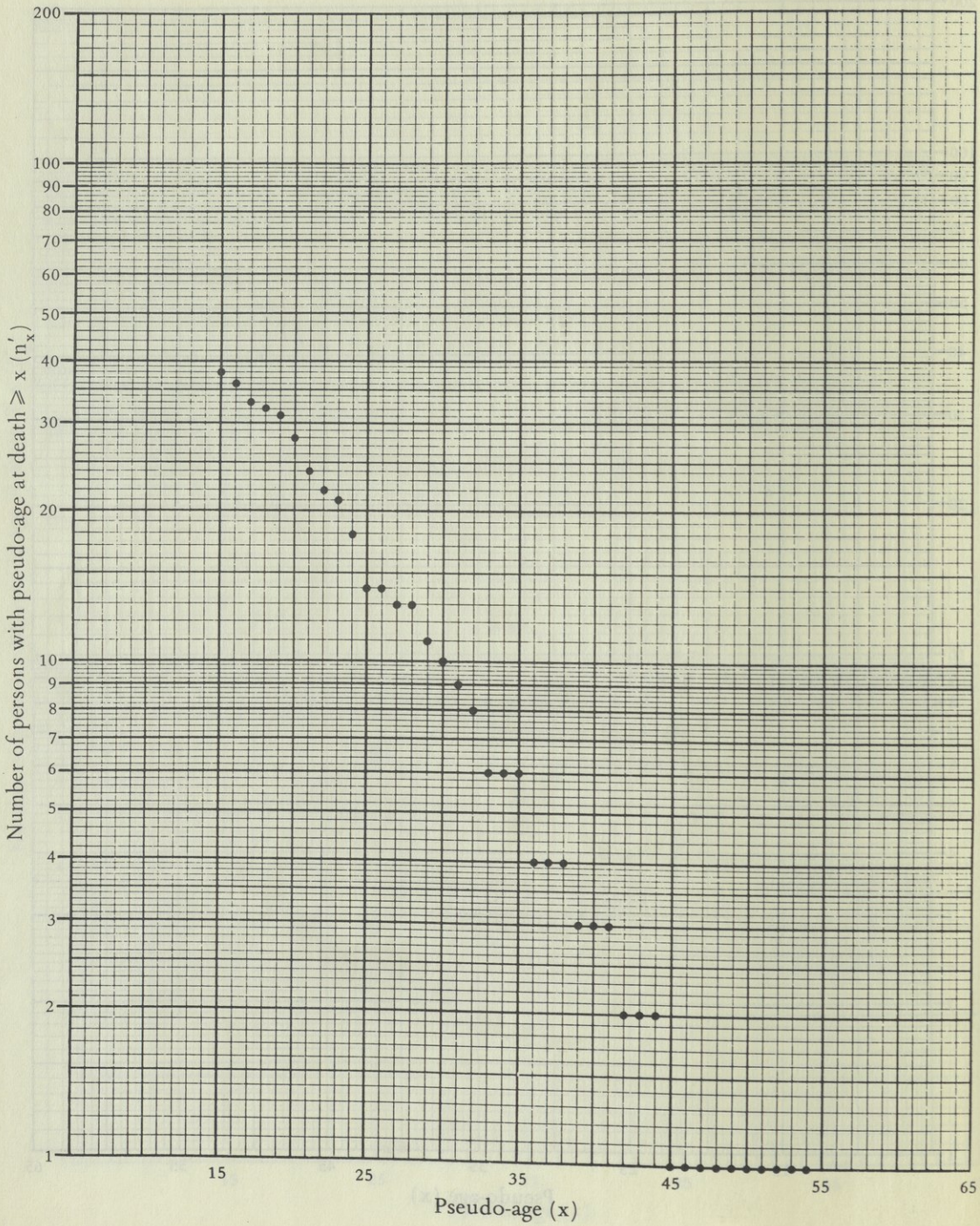
Graph 6.3: Dike, Bath, and Poll Taxes
See Column (3) of Table 6.2



Graph 6.4: Dike Taxes
See Column (4) of Table 6.2

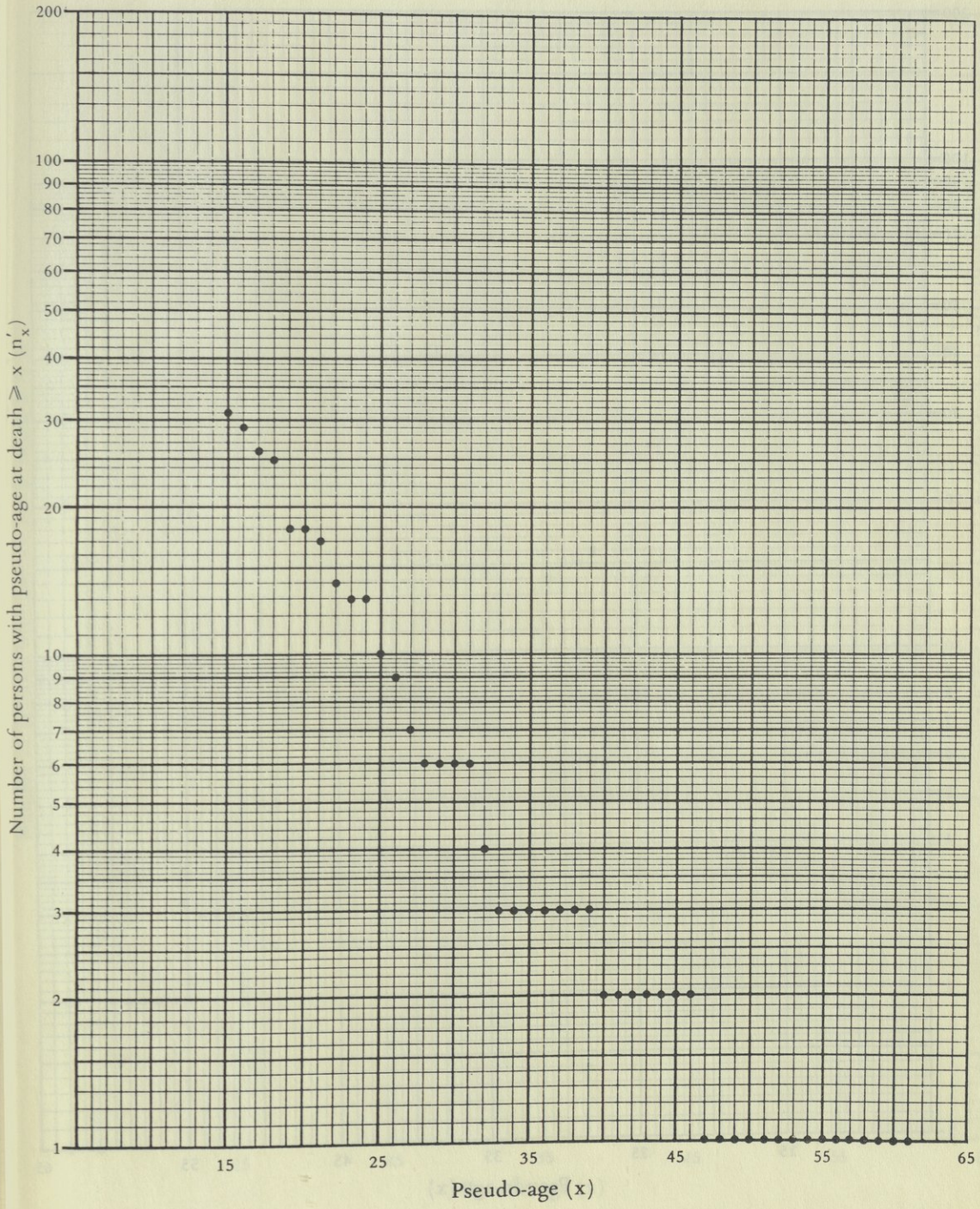


Graph 6.5: Bath Tax
See Column (5) of Table 6.2

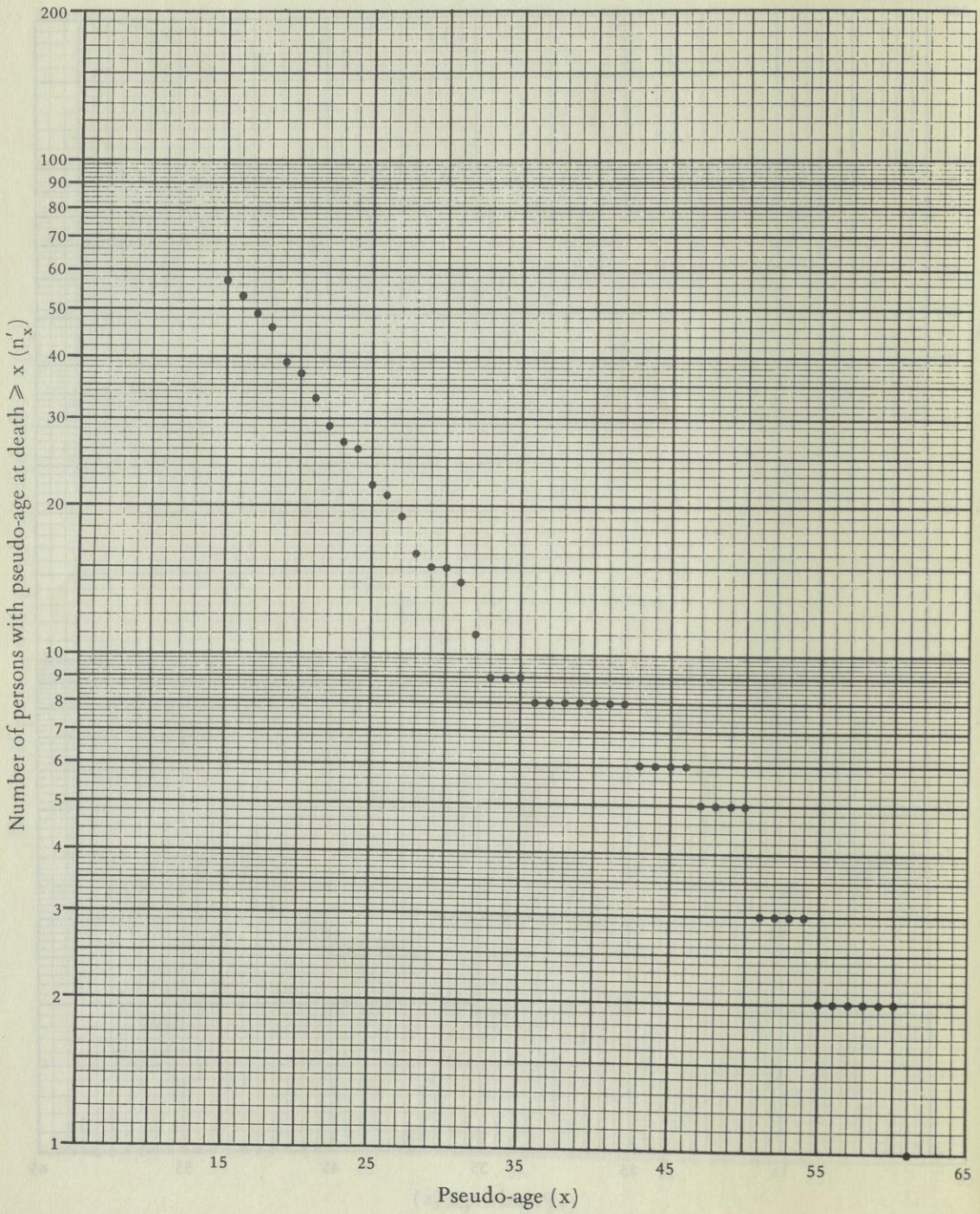


Number of persons with pseudo-age at death ⩾ x (n'_x)

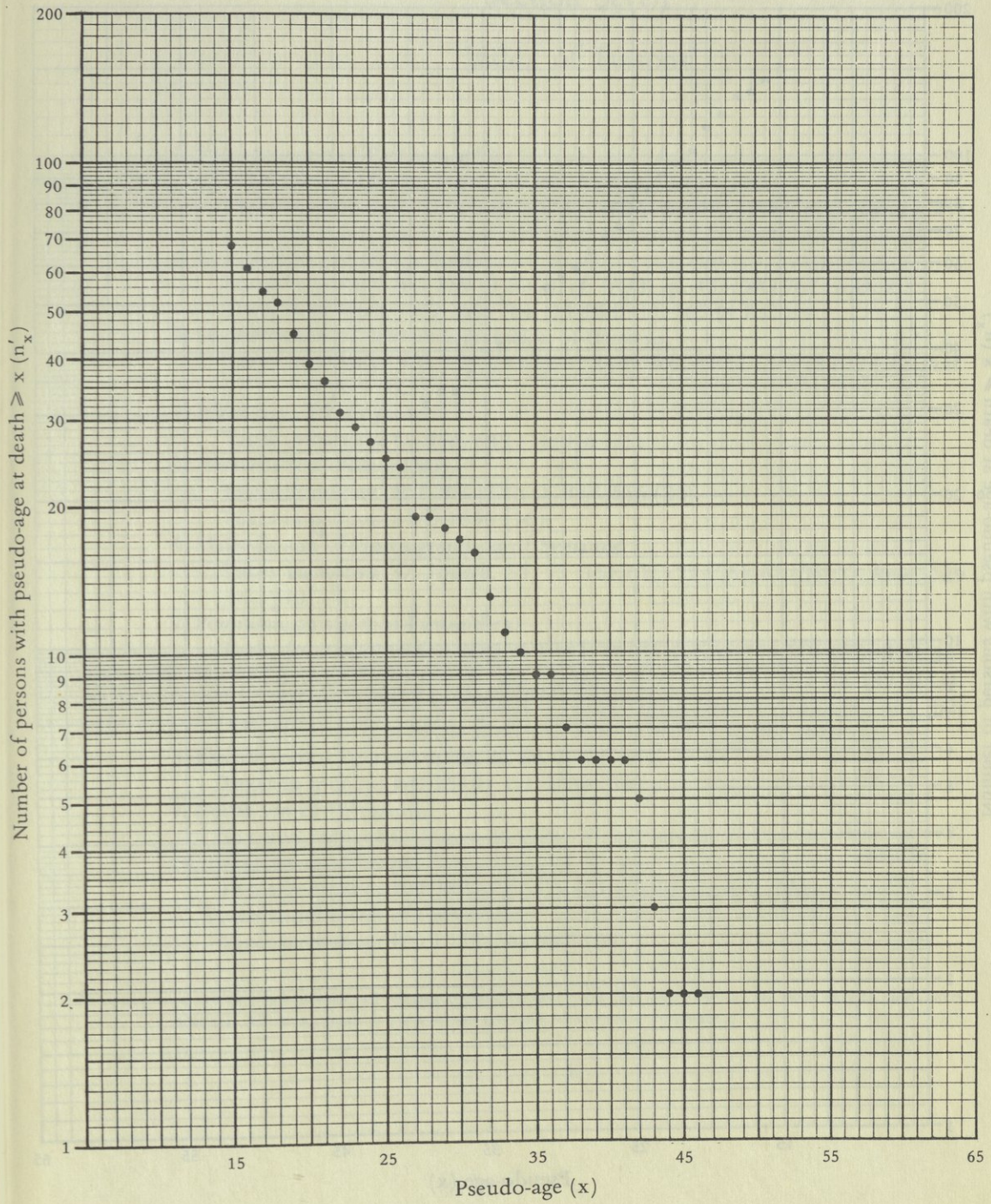
Graph 6.6: Poll Tax
See Column (6) of Table 6.2



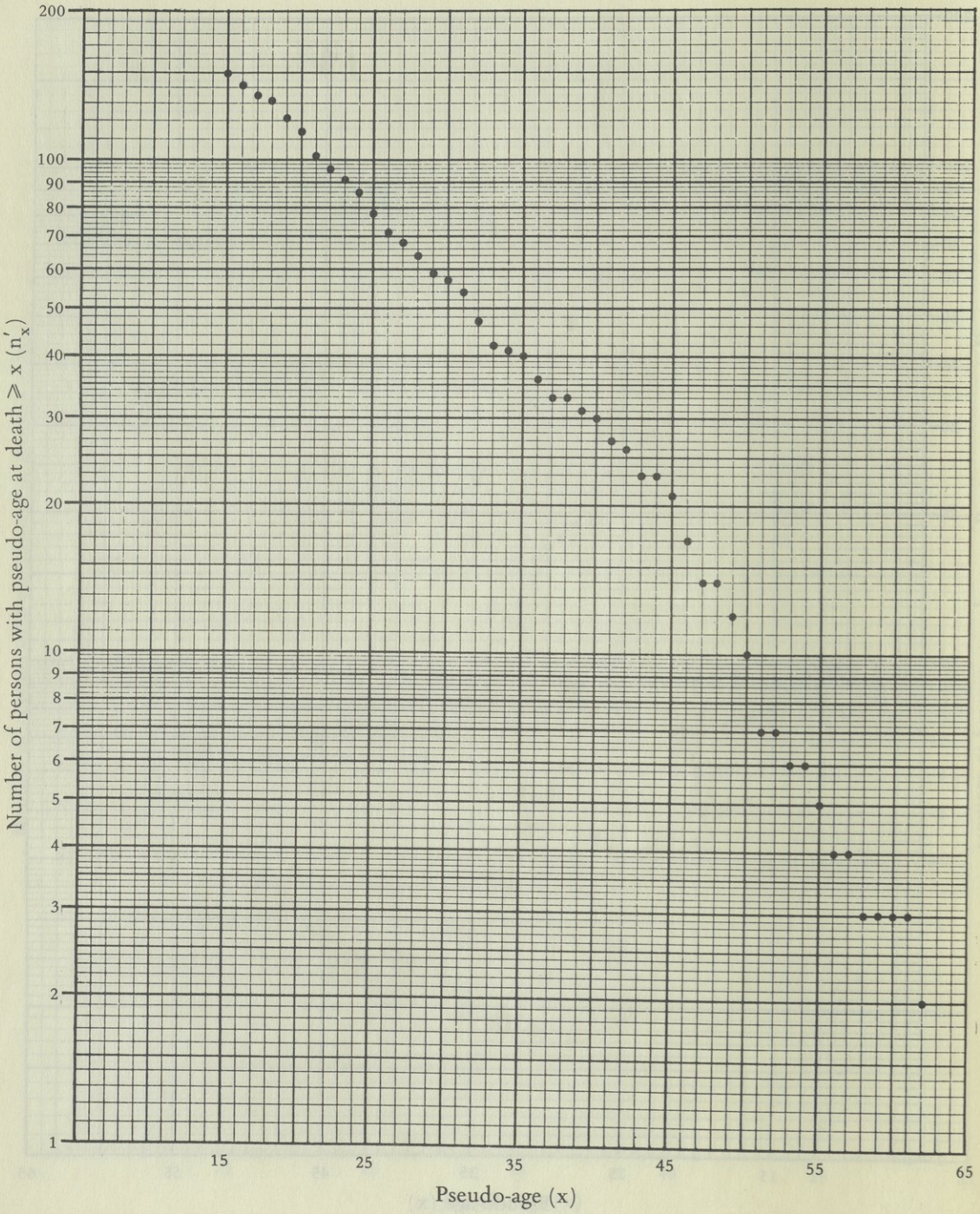
Graph 6.7: Poll to last tax of any kind
See Column (7) of Table 6.2



Graph 6.8: Grain Tax
See Column (8) of Table 6.2



Graph 6.9: All Taxes
See Column (9) of Table 6.2



Section Seven

Index of Persons*

1. Harthotes son of Petemenophis.
   Taxes in money: *O. Strassb.* 49; 51 (9 B.C.); 53 (8-7 B.C.).
   Taxes in produce: *O. Strassb.* 46 (13 B.C.); *O. Bruss.-Berl.* 6; *O. Strassb.* 47; 779 (11 B.C.).
2. Lysimachos son of Apollonios.
   Taxes in money: *WO* 359 (9 B.C.), cf. *WO* II, p. 433; *WO* 767 (A.D. 2).
   Taxes in produce: *WO* 760; 761 (11-10 B.C.); 765 (4 B.C.).
3. Nepheros son of Peteminis grandson of Harsiesis.
   Taxes in money: *WO* 1542; *O. Ash.* 24 (9 B.C.); *WO* 1543 (8 B.C.); *O. Bod.* 1141 (6-5 B.C.).
4. Pikos son of Dionysios.
   Taxes in money: *O. Bod.* 649 (7); 946 (35).
5. Harsiesis son of Peteminis.
   Taxes in money: *PSI* 261 (12); *O. Bod.* 656 (22).
   Taxes in produce: *WO* 1546 (16).
6. Maieuris son of Horos grandson of Seeianos.
   Taxes in money: *O. Strassb.* 54; 55 (15); 61; 179 (35); 62 (36); *O. Rein.* 129 (40).
7. Petemenophis son of Pamonthes.
   Taxes in money: *WO* 1548; 369 (32) cf. *BL* 2.1, p. 57; 379 (37); 394 (45) cf. *WO* II, p. 434, *BL* 2.1, p. 58; *O. Bod.* 479 (49); *WO* 400 (49-51) cf. *BL* 2.1 p. 58; 1323 (50); *SB* 2133 (50); *O. Bod.* 957 (52); *WO* 401 (52) cf. *BL* 2.1, p. 59; *O. Bod.* 482 (53-4 ?); 487 (58); 961 (67).
8. Phaeris son of Petemenophis, cf. *BL* 2.1, p. 119.
   Taxes in money: *WO* 1549 (33); 1554 (38).
9. Horos son of Permamis.
   Taxes in money: *O. Meyer* 36 (33); *WO* 1383 (44).
10. Herieus son of Paapis.
    Taxes in money: *WO* 370 (33); 374 (34); 375 (34); 377 (35).
11. Petemenophis son of Haryothes.
    Taxes in money: *WO* 1033 (34); 409 (58).

* The list includes all persons attested in more than one text; citations are given only to dated texts, however. All dates, given in parentheses, are A.D. unless noted otherwise.

12. Kemois son of Psenchnoumis.
    Taxes in money: *O. Bod.* 464 (34); 661 (40).
13. Ptollis son of Psenenouphis.
    Taxes in money: *O. Bod.* 591 (36); *WO* 380 (38); 381 (39); 382 (40); 1377 (42); 1555 (42).
14. Pechytes son of Aronnophris.
    Taxes in money: *O. Bod.* 643 (36); *WO* 1553 (38); *O. Bod.* 962 (67).
15. Seeianos son of Horos.
    Taxes in money: *O. Strassb.* 180 (37); 66 (38); 67 (40 ?); 68 (41).
16. Eponychos son of Phatres.
    Taxes in money: *O. Bod.* 948 (43).
    Taxes in produce: *WO* 769 (37).
17. Epikrates son of Ammonios.
    Taxes in money: *WO* 1387 (50).
    Taxes in produce: *WO* 769 (37).
18. Pikos son of Petepsais.
    Taxes in money: *O. Bod.* 472 (40); *WO* 1376 (42); *O. Bod.* 597 (45); 600 (49-50); 950 (49).
19. Onnophris son of Kemois.
    Taxes in money: *O. Bod.* 1694 (42); 606 (68).
20. Pamonthes son of Haryothes.
    Taxes in money: *WO* 387 (42); 404 (53); 1393 (60).
21. Kametis son of Pachrates.
    Taxes in money: *WO* 392 (44); 395 (47); 397 (47); 1327 (78).
22. Osoroueris son of Phatres.
    Taxes in money: *O. Bod.* 475 (45); 565 (57 ?); *O. Leid.* 103 (65); *O. Bruss.-Berl.* 11 (74); *O. Meyer* 86 (75); *O. Leid.* 110 (75); *O. Bod.* 428 (77).
    Taxes in produce: *O. Bod.* 1175 (68); 1176 (69).
23. Maieuris son of Petearpochrates.
    Taxes in money: *O. Strassb.* 264 (46) cf. *BL* 2.2, p. 150; 70 (46); 74 (53); 75 (54); cf. *BL* 2.2, p. 147; 80 (56) cf. *BL* 2.1, p. 27; 83 (59); 267 (63).
24. Pasion son of Phthomonthes grandson of Pikos.
    Taxes in money: *O. Theb.* 97 (46) but cf. *BL* 2.1, p. 38; *WO* 1623 (63).
25. Amenothes son of Petechonsis.
    Taxes in money: *WO* 398 ([49]); 403 (53); 1324 (56).
26. Panameus the elder son of Hermias and Senpoueris, grandson of Harpechis.
    Taxes in money: *O. Bod.* 486 (56); 423 (59); 489 (68). Also perhaps *O. Bod.* 480 (50); *WO* 773 (69); 1049 (86).
27. Nechthmonthes son of Thoteus.
    Taxes in money: *O. Leid.* 36 (52).
28. Pibouchis son of Pateesis.
    Taxes in money: *WO* 402 (52); 413 (63); 414 (63); 415 (64); 416 (65); 417 (67); 418 (67); 420 (68); 421 ([69]) cf. *BL* 2.1, p. 60.

29. Eponychos son of Horos grandson of Eponychos.
    Taxes in money: *O. Bruss.-Berl.* 26 (56); *O. Bod.* 499 (84); *WO* 1410 (85); 1413 (88); *O. Bod.* 676 (89); *WO* 1415 (96).
30. Pikos son of Petechonsis.
    Taxes in money: *O. Bootle* 1 (57); *O. Bod.* 571 (93?).
31. Psenptouthis son of Petemarsnouphis.
    Taxes in money: *O. Heid.* 108 (58); 107 (59); 257 (59); *O. Meyer* 39 (62); *O. Heid.* 258 (63); *O. Meyer* 37 (67).
    Taxes in produce: *O. Meyer* 42 (77).
32. Hermeias son of Eponychos grandson of Tauron.
    Taxes in money: *O. Bod.* 1053 (62); *O. Bruss.-Berl.* 27 (63); *WO* 1394 (64); *O. ROM* 9 (64); *O. Bod.* 1055 (65); *WO* 1395 (66); 1565 (67) cf. *BL* 2.1, p. 121; *O. Bod.* 603 (67); 605 (68); *WO* 1402 (71); 1404 (72) cf. *BL* 2.1, p. 108.
    Taxes in produce: *O. Bod.* 1178 (72?).
33. Petechonsis son of Petemenophis.
    Taxes in money: *O. Bod.* 1056 (67); 566 (69); 522 (108).
34. Kametis son of Petearpres grandson of Amphiomis, and Tasemis daughter of Paontis.
    Taxes in money: *WO* 419 (67); 422 (68); *O. Petr.* 86 (68); *WO* 428 (70); 429 (70); 431 (71); 430 (71); 432 (72); 435 (72-3); 434 (73); 433 (73); 438 (75); 441 (76); 439 (76); 447 (78); 448 (78) cf. *BL* 2.1, p. 61; 463 (84-5).
    Taxes in produce: *WO* 774 (70-71).
35. Kametis son of Kametis grandson of Petearpres great-grandson of Amphiomis.
    Taxes in money: *O. Bod.* 672 (69); *WO* 774 (70-1); 1281 (80) cf. *BL* 2.1, p. 100; 461 (84); 465 (86); 1284 (87).
36. Psensentithoes son of Pibouchis grandson of Pateesis.
    Taxes in money: *WO* 437 (75); 442 (76); 440 (76); 444 (76); 445 (77); 450 (78-9); 449 (79); 452 (80); 455 (82); 1283 (83); 460 (84); 466 (86); 472 (87); 1285 (88).
37. Psenamounis son of Harphmois grandson of Maieuris.
    Taxes in money: *O. Theb.* 43 (76); 44 (78); *O. Bod.* 963 (81); *O. Theb.* 49 (86) cf. *BL* 2.1, p. 36; 50 (86) cf. *BL* 2.1, p. 36; *O. Bod.* 511 (97).
38. Psenchonsis son of Osoroueris grandson of Phatres.
    Taxes in money: *O. Strassb.* 93 (77); 94 (79?); *O. Bod.* 609 (81).
39. Maieuris son of Harphmois.
    Taxes in money: *O. Theb.* 44 (78); 45 (80); *O. Bod.* 963 (81); *O. Theb.* 47 (82); 48 (84) cf. *BL* 2.1, p. 36.
    Taxes in produce: *O. ROM* 34 (105); *O. Theb.* 120 (126).
40. Pachoites son of Ammonios.
    Taxes in money: *WO* 446 (78); 454 (82).
41. Apollos son of Arnouris.
    Taxes in money: *WO* 451 (80); 467 (86); 477 (88-9); 493 (100).

42. Nepheros son of Pechytes.
    Taxes in money: *O. Bod.* 674 (80); *WO* 457 (83); 458 (83); 468 (87); 782 (90); 1414 (91).
43. Panameus son of Phthouminis grandson of Psenchnoubis.
    Taxes in money: *WO* 456 (82); 462 (85); 475 (89); 484 (93).
44. Chesthotes son of Maieuris.
    Taxes in money: *O. Bod.* 568 (82-3).
    Taxes in produce: *O. Bod.* 1212 (118).
45. Pachrates son of Amenrosis.
    Taxes in money: *O. Bod.* 698 (122).
    Taxes in produce: *WO* 778 (87).
46. Pikos son of Ptollis grandson of Pamonthes.
    Taxes in money: *WO* 1563 (87); 499 (109).
47. Horos son of Mesoeris.
    Taxes in money: *WO* 469 (87); *O. Bod.* 1128 (94).
48. Panameus son of Nepheros grandson of Pechoites.
    Taxes in money: *WO* 470 (87); 782 (90); 482 (93); 487 (97). N.B. *WO* 479 (92) for a Panameus son of Nepheros grandson of Kametis; either *WO* 470 or 482 or both may be attributable to him.
49. Pekysis son of Nepheros grandson of Pechoites.
    Taxes in money: *WO* 782 (90); 787 (96); *O. Bruss.-Berl.* 31 (97); *O. Ash.* 27 (97); *WO* 1053 (103) cf. *BL* 2.1, p. 91.
    Taxes in produce: *WO* 1328 (87).
50. Petechonsis son of Charon grandson of Pamonthes.
    Taxes in money: *WO* 474 (89); *O. Bod.* 507 (93).
51. Pikos son of Aristippos.
    Taxes in money: *O. Bod.* 677 (89).
52. Psenchnoumis son of Kametis grandson of Psenmeinis.
    Taxes in money: *O. Bod.* 613 (90); 615 (94).
53. Kametis son of Horos grandson of Psenminis.
    Taxes in money: *SB* 9117 (90-1 and 101).
54. Psenchonsis son of Petechonsis grandson of Archias.
    Taxes in money: *O. Bod.* 509 (93); 571 (93?); 786 (95).
55. Pamonthes son of Pamonthes grandson of Phatres (?).
    Taxes in money: *O. Petr.* 94 ([96]); *O. Theb.* 93 (113).
56. Chestphnachthis son of Pamontechysis grandson of Chestphnachthis.
    Taxes in money: *O. Petr.* 91 + 97 (97) cf. *O. Bod.* III, p. xv; *O. ROM* 12 (97); *O. Petr.* 146 (105) cf. *O. Bod.* III, p. xv.
57. Pachoites son of Phthouminis.
    Taxes in money: *O. Osl.* 7 (97); *WO* 796 (102).
58. Abos son of Inaros and Senimouthes grandson of Pikos.
    Taxes in money: *O. Bod.* 623 (108); 697 (121); 1021 (145).
    Taxes in produce: *O. Bod.* 1184 (97).

59. Psenminis son of Onnophris and Tapoueris (?) grandson of Psenminis.
Taxes in money: *O. Strassb.* 187 (112); 190 (113); *O. Bod.* 431 (116); 693 (116); 750 (116?).
Taxes in produce: *O. Strassb.* 335 (97) cf. *BL* 2.2, p. 151; *O. Bod.* 1273 (128).
60. Pekysis son of Heras.
Taxes in money: *O. Bod.* 515 (100).
Taxes in produce: *O. Bod.* 1190 (103).
61. Pikos son of Papontos grandson of Pikos.
Taxes in money: *O. Strassb.* 103 (101); 108 (103).
62. Sachomneus son of Psenchnoumis.
Taxes in produce: *WO* 793 (101); 800 (104-5).
63. Psenamounis son of Phthoumonthes grandson of Psenamounis.
Taxes in money: *O. Bod.* 687 (102); *WO* 516 (118).
64. Psenenouphis son of Pisais grandson of Psenenouphis.
Taxes in money: *O. Bod.* 619 (104).
Taxes in produce: *O. Bod.* 1221 (119?);
65. Phatres son of Bechis grandson of Bechis great-grandson of Phaeris.
Taxes in money: *WO* 1567 (105); 529 (122); *O. Bod.* 886 (126); 889 (127).
Taxes in produce: *WO* 802 (108); *O. Bod.* 1244 (124); 1249 (125); 1253 (125); 1248 (125); 1650 (126).
66. Horos son of Phatres grandson of Phmois.
Taxes in money: *O. Bod.* 519 (105).
Taxes in produce: *O. Bod.* 1310 (133).
67. Psenamounis son of Kephalos and Senamounis grandson of Psenamounis.
Taxes in money: *O. Bod.* 520 (105); 523 (109).
68. Bechis son of Bechis grandson of Phaeris.
Taxes in money: *WO* 1567 (105); *O. Bod.* 1071 (117); *O. Bod.* 894 (130); *WO* 576 (136).
Taxes in produce: *O. Bod.* 1197 (108); *WO* 802 (108); 1568 (114); *O. Bod.* 1204 (116); 1219 (119); 1223 (120); 1217 (122 [or 119?]).
69. Peophis son of Peophis.
Taxes in money: *O. Strassb.* 204 (105) cf. *BL* 2.1, p. 28; 191 (113).
70. Pekysis son of Pikos the younger grandson of Petepsais.
Taxes in money: *O. Bod.* 689 (106); 823 (106); 824 (106); *WO* 497 (107).
71. Pikos son of Apollodoros grandson of Amenothes.
Taxes in money: *O. Bod.* 574 (106); 964 (138).
72. Pikos the younger son of Apollodoros grandson of Pikos.
Taxes in money: *O. Bod.* 622 (107); *O. Strassb.* 186 (111); *O. Bod.* 525 (112); *O. Bod.* 827 (113); *O. Petr.* 100 (113); *O. Bod.* 832 (114); *O. Strassb.* 197 (117); *O. Meyer* 26 (118); *O. Bod.* 528 (120); *O. ROM* 21 (121).
73. Postomos son of Theon.
Taxes in produce: *O. Theb.* 118 (107); *O. Wilb.* 62 (139).

74. Harpochras son of Pollios.
    Taxes in money: *O. Bod.* 575 (108); 830 (113).
75. Petosiris son of Petosiris (grandson of Psentkerebis?).
    Taxes in money: *O. Strassb.* 184 (109); *O. Bod.* 669 (152).
76. Permamis son of Permamis and Thaesis grandson of Horos.
    Taxes in money: *O. Bod.* 826 (109); 576 (110).
    Taxes in produce: *WO* 1431 (139).
77. Phmois son of Ammonios and Thaubasthis grandson of Apollonios.
    Taxes in money: *O. Bod.* 624 (110); *O. Theb.* 51 (119).
78. Psensenamounis son of Harbethis.
    Taxes in money: *O. Strassb.* 277 (111); *O. Bod.* 1036 (120-1).
79. Eponychos *alias* Apathes son of Herakleios grandson of Apathes.
    Taxes in money: *O. Bod.* 625 (112); 834 (115); *O. Strassb.* 199 (120); *O. Bod.* 1078 (129); *O. Rein.* 135 (129); *O. Strassb.* 210 (129-30); 208 (130); 213 (130-1); 218 (133); 220 (133); 221 (133); 222 (133); 223 (134); 228 (135) cf. *BL* 2.2, p. 149; 224 (135); *O. Rein.* 137 (135); *O. Strassb.* 225 (135-6) cf. *BL* 2.1, p. 28; 226 (136); *O. Bod.* 841 (136); 856 (137).
    Taxes in produce: *O. Strassb.* 353 (127); 447 (150) cf. *BL* 2.2, p. 152.
80. Chesphmois son of Phthouminis.
    Taxes in produce: *WO* 805 (112); 872 (144).
81. Psenamounis son of Patphaes grandson of Psenthyntasemis.
    Taxes in money: *O. Theb.* 37 (113-4).
    Taxes in produce: *O. Theb.* 119 (114).
82. Petechonsis son of Phthomonthes grandson of Hatres.
    Taxes in money: *O. ROM* 18 (113); *O. Theb.* 36 (113).
83. Petechonsis son of Horos grandson of Heras.
    Taxes in money: *O. Bod.* 829 (113); 1207 (117); 586 (120).
84. Pasemis son of Psenamounis grandson of Phaeris.
    Taxes in money: *O. Petr.* 101 (114); *PSI* 269 (138).
85. Pachnoumis son of Paouphtheious grandson of Paous.
    Taxes in money: *WO* 807 (114); *O. Wilb.* 45 (122); *WO* 539 (129 and 130); *O. Wilb.* 10 (131); 16 (131); 11 (134); 35 (135); *WO* 569 (135); 571 (135); 572 (135); 573 (135).
    Taxes in produce: *O. Wilb.* 53 (123); 54 (128); *WO* 830 (129 or 131?); *O. Bod.* 1291 (131); *O. Wilb.* 56 (132); *WO* 847 (133); *O. Wilb.* 58 (134); 59 (135).
86. Samanouphis son of Pamonthes.
    Taxes in money: *O. Bod.* 692 (115); *WO* 522 (120).
87. Herieus son of Pikos grandson of Phaeris.
    Taxes in money: *O. Bod.* 579 (115); *O. Strassb.* 352 (126); 207 (129).
88. Kametis son of Herieus grandson of Petechonsis.
    Taxes in money: *O. Bod.* 582 (117?); 695 (119?).

89. Panisneus son of Horos grandson of Phthouminis.
Taxes in money: *O. Bod.* 838 (118); 841 (122); 627 (123); *WO* 538 (129).
Taxes in produce: *WO* 813 (120).
90. Amenothes son of Harbechis and Senchesthotes grandson of Amenothes.
Taxes in money: *WO* 517 (118); 523 (120); 525 (121); 526 (121); 528 (122) cf. *BL* 2.1, p. 64; 1242 (122); 843 (123) cf. *BL* 2.1, p. 80; 532 (123); 1244 (123-4); 1245 (125); *O. Bod.* 531 (125); *WO* 535 (126); 541 (129); 543 (130); 544 (130); 834 (131); 546 (131); 547 (131); 552 (132); 845 (133); 553 (133); *O. Strassb.* 254 (134?); *WO* 849 (134); 564 (134); 566 (134); 853 (135); 582 (138); 585 (138); 586 (138); 590 (139); 864 (140); 610 (142); 871 (143); 614 (143); 615 (144); 616 (144); 617 (144); 618 (144); *O. Leid.* 35 (144); *O. Bod.* 634 (144); *WO* 882 (145); 619 (145); 620 (145); 621 (145); 622 (145); 623 (145); 624 (145); 625 (145); 885 (146); 626 (146); 627 (146); 631 (147); 632 (147); 633 (148); 635 (148); 636 (148); 1584 (149); 638 (149); *O. Bod.* 861 (150); *WO* 642 (150).
Taxes in produce: *O. Bod.* 1225 (120); *WO* 865 (140); 866 (141); 889 (147).
91. Pamonthes son of Harbechis and Senchesthotes.
Taxes in money: *WO* 519 (118); 524 (120); 818 (124).
92. Psenamounis son of Theodoros grandson of Phmois.
Taxes in money: *WO* 515 (118); 562 (134); 863 (139); 1443 (151); *O. Bod.* 779 (153).
93. Herieus son of Imouthes.
Taxes in money: *O. Bod.* 696 (119); 706 (129).
94. Pikos son of Pachrates.
Taxes in money: *O. Bod.* 527 (119); *WO* 1580 (140); *O. Leid.* 106 (166).
95. Phaeris son of Bechis.
Taxes in money: *O. Bod.* 892 (128), *WO* 1423 (130).
Taxes in produce: *O. Bod.* 1219 (119); 1223 (120); *WO* 1571 (124); *O. Bod.* 1278 (129); *O. Bruss. Berl.* 52 (133).
96. Kointos Spoleios Haterios.
Taxes in produce: *O. Bod.* 1232 (122); *O. Strassb.* 358 (130); *O. Bod.* 1288 (131); *O. Bod.* 1297 (132); *O. Strassb.* 361 (132); *O. Bod.* 1307 (133); *O. Strassb.* 363 (135); 366 (138); 370 (139); *O. Bod.* 1340 (139); *O. Strassb.* 369 (139); *O. Bod.* 1339 (139); 1342 (139?).
97. Bassos son of Psenamounis.
Taxes in money: *O. Petr.* 102 (128).
Taxes in produce: *O. Petr.* 149 (123); *O. Leid.* 78 (123); *O. Bod.* 1313 (134); *WO* 1582 (141); *O. Bod.* 1362 (143); *WO* 880 (144): *O. Bod.* 1373 (145).
98. Psenamenophis son of Paoupsais grandson of Paous.
Taxes in money: *WO* 533 (123).
Taxes in produce: *O. Ash.* 54 (150).

99. Phaeris son of Krouris grandson of Phaeris.
    Taxes in money: *O. Bod.* 1130 (125).
    Taxes in produce: *O. Bod.* 1243 (124).
100. Panameus son of Psenthotes.
    Taxes in money: *O. Bod.* 889 (127).
    Taxes in produce: *O. Bod.* 1244 (124); 1249 (125); 1258 (125); 1253 (125); *O. Wilb.* 55 (129).
101. Esoueris son of Kametis.
    Taxes in produce: *O. Leid.* 80 (125); 81 (125); *O. Bod.* 1245 (125); 1247 (125); 1269 (128).
102. Abos son of Herieus.
    Taxes in money: *O. Bod.* 532 (126); 751 (132).
103. Petechespochrates *alias* Apollonios son of Apollonios.
    Taxes in money: *O. Bod.* 886 (126); 889 (127); 890 (127); *WO* 1577 (132).
    Taxes in produce: *O. Bod.* 1244 (124); 1253 (125); 1248 (125); 1259 (125).
104. Psenchonsis son of Psenchonsis grandson of Petemenophis.
    Taxes in produce: *O. Bod.* 1267 (127); 1303 (132); 1312 (133).
105. Phthouminis son of Dioskourides.
    Taxes in produce: *O. Bod.* 1270 (128); 1300 (132); 1353 (141); 1377 (146); 1378 (146).
106. Inaros son of Patotes grandson of Inaros.
    Taxes in money: *O. Bod.* 629 (128?).
    Taxes in produce: *O. Bod.* 1363 (143).
107. Chempneus son of Inaros.
    Taxes in money: *O. Bod.* 797 (128); 1021 (145); *WO* 1444 (154).
108. Horion son of Amonios.
    Taxes in produce: *O. Wilb.* 54 (128); *WO* 830 (129); *O. Wilb.* 58 (134); 59 (135).
109. Panameus son of Dioskourides.
    Taxes in money: *WO* 1574 (129); 1575 (130); 1576 (131).
    Taxes in produce: *WO* 905 (158); 907 (159).
110. Pikos the younger son of Archias grandson of Petemenophis (?).
    Taxes in money: *WO* 605 (142); 612 (143); 613 (143); 637 (148).
    Taxes in produce: *O. Bod.* 1280 (129).
111. Kephalon gymnikos.
    Taxes in money: *O. Strassb.* 213 (130-1); *O. Rein.* 136 (135); *O. Lips.* 73 (136).
112. Paoukales son of Pachnoumis grandson of Paouphtheious.
    Taxes in money: *O. Wilb.* 17 (correct name of gf.) (131); *WO* 551 (132); 560 (133); *O. Wilb.* 46 (133); *WO* 565 (133-4); *O. Petr.* 103 (134); *O. Wilb.* 18 (134); *WO* 572 (135); *O. Wilb.* 21 (135); 24 (144); 47 (145); *WO* 629 (147).
    Taxes in produce: *WO* 841 (132); *O. Wilb.* 60 (138); 64 (144-5); *WO* 890 (147); 894 (152).

113. Horos son of Archias.
Taxes in money: *O. Bod.* 752 (132); *O. Strassb.* 219 (133).
114. Petenobdois son of Psenamounis.
Taxes in produce: *WO* 848 (133); 850 (134); 587 (138); *O. Bod.* 902 (140).
115. Petepsais son of Porieuthes.
Taxes in money: *WO* 559 (133); 1291 (148).
Taxes in produce: *WO* 909 (159).
116. Abos the elder son of Petosiris and Senpikos.
Taxes in money: *WO* 558 (133); 563 (134); 568 (134); 570 (135); 575 (136); 583 (138); 856 (138); 589 (139); 862 (139); 597 (140); 598 (140); 608 (140-1); 601 (141); 602 (141); 1290 (141-2) cf. *BL* 2.1, p. 101; 609 (141-2).
117. Chatabous son of Phthouminis.
Taxes in money: *O. Wilb.* 35 (135).
Taxes in produce: *WO* 826 (127); 840 (132); 881 (144).
118. Eponychos son of Abos.
Taxes in money: *O. Bod.* 771 (135); *WO* 640 (149).
119. Psenamounis son of Petemenophis grandson of Psenamounis.
Taxes in money: *O. Bod.* 770 (135); 630 (138); *PSI* 278 (153).
120. Phatres son of Krouris grandson of Maieuris.
Taxes in money; *O. Bod.* 853 (136); 740 (151); 990 (167).
Taxes in produce: *O. Bod.* 1663 (160).
121. Horos son of Phatres grandson of Bechis.
Taxes in money: *WO* 1428 (136); 857 (138); 855 (138); 607 (142).
Taxes in produce: *WO* 869 (141).
122. Psenamounis son of Apollodoros grandson of Pikos.
Taxes in money: *WO* 578 (137); *O. Bod.* 1133 (149).
Taxes in produce: *O. ROM* 35 (145).
123. Psenchonsis son of Paoupsais grandson of Paous.
Taxes in money: *WO* 581 (138).
Taxes in produce: *O. Wilb.* 62 (139); 63 (140); *WO* 879 (144).
124. Pamonthes son of Inaros grandson of Patotes great-grandson of Inaros.
Taxes in money: *WO* 1430 (138-9); *O. Bod.* 1019 (142).
Taxes in produce: *O. Bod.* 1363 (143).
125. Heriophmois son of Petemenophis.
Taxes in grain: *WO* 1260 (138-9); 881 (144); *O. Bod.* 1425 (153?).
126. Memphres son of Horos grandson of Memphres.
Taxes in money: *O. Heid.* 260 (139); 262 (140).
127. Panameus son of Psenamounis.
Taxes in money: *O. Ash.* 34 (139); 36 (142); 37 (142).
128. Pekysis son of Psenmonthes grandson of Pamontsnos.
Taxes in money: *O. Bod.* 788 (139); 773 (139); 540 (139); 646 (139?); 717 (140); 756 (140); 789 (142); 758 (142); 632 (142); 647 (143?); 793

(143-4); 760 (144); 545 (144); 638 (149); 546 (149); 639 (150); 548 (151).
Taxes in produce: *O. Bod.* 326 (138); 1390 (147); 1413 (150).

129. Phatres son of Phatres grandson of Phmois.
Taxes in money: *O. Bod.* 745 (139); *O. Strassb.* 246 (139).

130. Psais son of Thinphthoumontes.
Taxes in money: *P. Sorb.* 66 (139-40); *PSI* 271 (141).

131. Pebrichis son of Herakles.
Taxes in money: *O. Heid.* 263 (140).
Taxes in produce: *O. Heid.* 264 (141).

132. Dioskourides alias Psansnos son of Phthouminis.
Taxes in produce: *O. Bod.* 1346 (140); 1353 (141).

133. Ouestinos son of Thinpsenamounis.
Taxes in produce: *O. Camb.* 66 (140); *PSI* 276 (151); 277 (152).

134. Theon son of Bassos grandson of Psenamounis.
Taxes in money: *WO* 1437 (144); 1438 (145); 634 (148); 1442 (150); *O. Bod.* 866 (161).
Taxes in produce: *O. Wilb.* 63 (140); *WO* 1582 (141); *O. Bod.* 1362 (143); *WO* 880 (144).

135. Psais son of Psais grandson of Straton.
Taxes in produce: *O. Bod.* 1353 (141); 1376 (146); 1383 (147); 1398 (149).

136. Pikos son of Pekysis grandson of Phaeris.
Taxes in money: *O. Bod.* 775 (141).
Taxes in produce: *O. Bod.* 1352 (141); 1365 (143); 884 (144-5); 1374 (145).

137. Petechespochrates son of Phatres grandson of Psenasouchis.
Taxes in money: *O. Bod.* 908 (145); 911 (148); *O. Leid.* 101 (148).
Taxes in produce: *O. Bod.* 1357 (141); 1653 (142); 1367 (144?); 1396 (149); 1397 (149); 1416 (151); 1424 (152).

138. Antiphilos son of Kronios grandson of Psenetymis.
Taxes in money: *O. Bod.* 860 (143).
Taxes in produce: *O. Bod.* 1351 (141); *WO* 1433 (141).

139. Petemenophis the elder son of Phthoumonthes.
Taxes in money: *O. Bod.* 719 (142); *WO* 1587 (153).
Taxes in produce: *O. Bod.* 1430 (154).

140. Pamonthes son of Xenon.
Taxes in money: *O. Bod.* 914 (153).
Taxes in produce: *O. Bod.* 1358 (142).

141. Petosiris the younger son of Psentkerebis and Tikos.
Taxes in money: *WO* 606 (142); 762 (144); 668 (145); *O. Min. G* 1 (146).

142. Porieuthes son of Herakleios grandson of Apollodoros.
Taxes in money: *O. Bod.* 633 (143); *O. Bod.* 549 (152); 648 (153); *WO* 1588 (154); *O. Bod.* 995 (154); 996 (154).
Taxes in produce: *O. Bod.* 1422 (152); *O. Bruss.-Berl.* 61 (153); *O. Bod.* 1658 (153).

143. Papystis son of Pamonthes.
Taxes in money: *O. Bod.* 989 (144); 1693 (150).
144. Kleopas son of Bassos grandson of Dekmos.
Taxes in money: *WO* 1438 (145); 1442 (150); 1448 (161).
145. Petosiris son of Psentkerebis and Tikos grandson of Petosiris.
Taxes in money: *O. Strassb.* 233 (146-7?) cf. *BL* 2.2, p. 149; 237 (150); 253 (150); 440 (152); 486 (152).
146. Patotes son of Inaros.
Taxes in money: *O. Bod.* 636 (147-8); 777 (150); 729 (161).
Taxes in produce: *O. Bod.* 1388 (147).
147. Melanion son of Petemenophis.
Taxes in money: *O. Bod.* 741 (151).
Taxes in produce: *O. Bod.* 1391 (147).
148. Cholmis son of Amenothes.
Taxes in money: *WO* 631 (147).
Taxes in produce: *O. Bod.* 1478 (169?); *WO* 947 (181).
149. Psenminis son of Psais grandson of Straton.
Taxes in produce: *O. Bod.* 1383 (147); 1398 (149).
150. Psansnos son of Anoubion.
Taxes in produce: *WO* 887 (147); 911 (159); 913 (159).
151. Permamis son of Petechonsis.
Taxes in money: *O. Bod.* 725 (154).
Taxes in produce: *O. Bod.* 1395 (148?); 1403 (149).
152. Nepis son of Horos.
Taxes in produce: *WO* 1451 (164); *O. Strassb.* 385 (178).
Other: *O. Bod.* 1700 (150).
153. Phatres son of Phatres grandson of Psenasouchis.
Taxes in money: *O. Bod.* 749 (152-3).
Taxes in produce: *O. Bod.* 1415 (151); 1417 (151); 1440 (159).
154. Petosiris son of Psensenyris.
Taxes in money: *WO* 919 (162).
Taxes in produce: *WO* 902 (158); 909 (159); 915 (160); 1552 (186).
155. Pikos son of Senpikos grandson of Pikos.
Taxes in money: *O. Bod.* 640 (159); 864 (159).
156. Zmenimouthes son of Petemenophis.
Taxes in money: *O. Bod.* 920 (166).
Taxes in produce: *O. Bod.* 1444 (159); 1467 (165); 1572 (166).
157. Paoupsais son of Paous.
Taxes in produce: *O. Bod.* 1447 (160); 1468 (165).
158. Pasemis son of Pikos grandson of Pamonthes.
Taxes in produce: *O. Bod.* 1457 (161); *O. Leid.* 87 (163).
159. Bechis son of Apollodoros grandson of Bechis.
Taxes in money: *WO* 656 (164).
Taxes in produce: *WO* 1589 (161); *O. Bod.* 1473 (167).

160. Psensenmouthes son of Kametis.
Taxes in produce: *O. Bod.* 1472 (166); *O. ROM* 41 (167).
161. Dionysios the elder son of Pasemis.
Taxes in produce: *O. Bod.* 1472 (166); *WO* 925 (167).
162. Panameus son of Psenmonthes grandson of Amenrosis.
Taxes in money: *O. Lips.* 76 (168); *O. Strassb.* 489 (168).
Taxes in produce: *O. Bod.* 1481 (171); *O. Strassb.* 429 (175-6?); *O. Bod.* 1501 (180).
163. Inaros son of Inaros grandson of Horos.
Taxes in money: *O. Camb.* 47 (178); *O. Bod.* 553 (186); *O. ROM* 29 (188-9).
Taxes in produce: *O. Camb.* 68 (Tait-149, 172 cf. p. 114); *O. ROM* 50 (185-6); *O. Belf.* 14 (190).
164. Herakles son of Herakles.
Taxes in produce: *O. Bod.* 1669 (173); 1575 (201).
165. Paous son of Senpephis.
Taxes in money: *O. Bod.* 734 (174); 736 (184).
166. Lolous son of Patormouthis.
Taxes in money: *O. Bod.* 997 (175?); 998 (175?).
Taxes in produce: *O. Bod.* 1517 (184).
167. Haryothes son of Eponychos.
Taxes in money: *O. ROM* 28 (175?); *WO* 1067 (178).
168. Dekmos the elder son of Heraklas.
Taxes in money: *WO* 691 (181) cf. *BL* 2.1, p. 71; 1264 (183?); *O. Wilb* 40 (183-4); *WO* 700 (185); 659 (187); *O. Wilb.* 42 (190); 39 (192).
Taxes in produce: *WO* 940 (177); 946 (180); 967 (190); 969 (191); *O. Bod.* 1560 (193); *WO* 972 (193); 977 (194); *O. Bod.* 1571 (199).
169. Paous son of Senpetemenophis.
Taxes in produce: *O. Bod.* 1504 (181); 1519 (185).
170. Petechespiseichis son of Petechespiseichis.
Taxes in produce: *O. Bod.* 1510 (182); 1525 (187).
171. Pebrichis son of Pebrichis grandson of Herakles.
Taxes in money: *O. Heid.* 274 (186?); 278 (188?); 284 (192?); 285 (192).
Taxes in produce: *O. Heid.* 271 (182); 272 (182); 279 (189); 280 (189); 282 (190); 283 (192).
172. Phthouminis son of Tithoes.
Taxes in produce: *WO* 951 (183); *O. Theb.* 122 (197); *WO* 983 (199).
173. Anoubion the elder son of Isidoros.
Taxes in money: *O. Wilb.* 40 (183-4?); 41 (187); 42 (190).
174. Petemenophis son of Pekysis grandson of Phatres.
Taxes in money: *O. Petr.* 128 (189).
Taxes in produce: *O. Petr.* 163 (184); *O. Bod.* 1552 (191).
175. Horos the younger son of Psenchonsis and Tarmouthis.
Taxes in produce: *WO* 1458 (185); *O. Bod.* 1541 (190?); 1548 (190?).

176. Pikos son of Maieuris.
Taxes in produce: *O. Strassb.* 389 (186); *O. Bod.* 1537 (189).
177. Horos son of Diogenes.
Taxes in money: *WO* 664 (191).
Taxes in produce: *WO* 956 (187); *O. Bod.* 1554 (191).
178. Haryothes son of Senchonsis.
Taxes in produce: *WO* 957 (187); *O. Bod.* 1555 (191).
179. Permamis son of Phthouminis.
Taxes in money: *O. Theb.* 59 (189); 62 (191).
180. Petemenophis son of Senpetemenophis.
Taxes in money: *O. Theb.* 54 (189-90); 61 (191); 60 (191); *O. Bod.* 1030 (194).
181. Spotous son of Imouthes.
Taxes in produce: *O. Bod.* 1551 (191); *O. Strassb.* 393 (192); *O. Leid.* 94 (206); *O. Bod.* 1589 (209); *O. Bod.* 1610 (220).
182. Besis son of Horos grandson of Diogenes.
Taxes in money: *WO* 664 (191); 1073 (194); *O. Bod.* 1099 (197?).
183. Petemenophis son of Phthouminis.
Taxes in money: *O. Bod.* 1029 (193); *O. Theb.* 64 (193); *O. ROM* 32 (194).
184. Psais son of Onnophris.
Taxes in money: *O. Strassb.* 145 (195); 146 (199); 147 (199).
Taxes in produce: *O. Strassb.* 394 (193) cf. *BL* 2.1, p. 30.
185. Phatres son of Tikos.
Taxes in money: *O. Bod.* 1031 (195); *O. Ash.* 44 (196).
186. Phaeris son of Germanos.
Taxes in produce: *WO* 979 (196); *O. Bod.* 1577 (202).
187. Kales son of Pete( ) grandson of Patsebthis.
Taxes in produce: *O. Bod.* 1574 (201); 1585 (206).
188. Psentphous son of Psais grandson of Onnophris.
Taxes in money: *O. Strassb.* 435 (213).
Taxes in produce: *O. Strassb.* 398 (206); 430 (211); 401 (216).
189. Pasemis son of Hatres.
Taxes in produce: *O. Strassb.* 454 (211); *O. Theb.* 111 (215).
190. Abos son of Chemtsneus.
Taxes in money: *O. Petr.* 136 (232).
Taxes in produce: *O. Strassb.* 406 (236).
191. Kametis son of Archias grandson of Psenamounis.
Taxes in money: *O. Bod.* 1114 (233?).
Taxes in produce: *WO* 1592 (240); *O. Petr.* 170 (241); *WO* 1593 (242).

PART TWO: TAXES

OSTRAKA IN THE ROYAL ONTARIO MUSEUM

1. Receipt for Salt and Wool Tax

ROM Inv. No. 906.8.595 8.6 x 6.0 cm. 19 July probably 229 B.C.

This ostrakon has text on both convex and concave sides. On the convex side appear 3 lines of Greek, so blurred that it would be difficult, perhaps impossible, to read them without the 3 lines of Greek on the concave side, which are in turn followed by 3 lines of Demotic. The two Greek texts seem to be identical, and we conclude after some hesitation that the scribe found his first text blurry, probably because of the slip on the sherd, and so turned the piece over, and began again. This suggestion draws considerable support from the appearance of the Demotic on the concave side. It has not yet been possible to read the demotic.

For the salt tax, cf. F. Uebel, "Die Frühptolemäische Salzsteuer," *Atti XI Cong. Int. Pap.*, Milan, 1966, pp. 325-368. Uebel's full discussion, with extensive bibliography, was followed by his subsequent publications of salt tax receipts, and discussion thereof, in *Archiv* 19, 1969, pp. 62-67; cf. also Uebel, *Die Kleruchen,* Berlin, 1968, index 3b, p. 425. For the wool industry in Egypt, albeit of the Roman period, cf. E. Wipszycka, *L'Industrie Textile dans l'Egypte Romaine,* Warsaw, 1965, pp. 27 ff. The tax itself, *ἐρέα*, was not uncommonly paid along with the salt tax; cf. e.g., *O. Bod.* 14 and 16. Préaux, *Economie Royale,* p. 112, mentions the tax *en passant.*

Concave side (Ἔτους) ιη Παῦνι δ ἀλικῆς
ἐρεᾶ δι' Ἀπολλωνίου
3 Τιγῆς ⋐c
3 lines of demotic

Convex side (Ἔτους) ιη Παῦνι δ̄ [ἀλ]ικῆς
..... δι' Ἀπολ̣[λ]ω̣νίου
Between lines ....
3 Τ̣ι̣γ̣ῆς ⋐c

Year 18, Pauni 4. Salt tax, wool tax, through Apollonios, Tiges 5 obols 1/2.

1. Tait ascribes *O. Bod.* 25 to "268 or 230 B.C." but we are reluctant to claim the early date for our text. Still, it is palaeographically possible. Except for the year, the concave side is so blurred that we would have difficulty reading without the clue of the other text. Because of this bad condition, we have dotted only those letters of which we cannot confidently make out the forms even with aid from the other text.

2. In *O. Bod.* 25 an Apollonios also appeared as agent, and Tait claimed him to be the Apollonios in *WO* 1624. But the name is common. Between lines 2 and 3 are some marks, about one-third of the height of the letters in the text, which we take as the blurring which caused the scribe finally to abandon the convex side.

3. Tiges has not been hitherto attested, so far as we know, but the reading seems quite clear.

2. Granary Receipt

ROM Inv. No. 906.8.594 2 frags., total: 11.5 x 7.4 cm. 23 July 141 B.C.

The hand is clearly of the mid-second century B.C., and the ostrakon is almost certainly to be dated to the reign of Euergetes II. The same taxpayer appears paying the same tax for the 32nd year, in *O. Theb.* 25, dated by Milne to 149 or 138 B.C. The signer, Kratinos, appears in *O. Bod.* 203 and 204, both dated in 142 by Tait because he also appears in *O. Aberd.* 74, dated in the 37th year (133 B.C.). For his other appearances and dating, cf. *Chronique d'Egypte* 28, 1953, pp. 329-330.

The grain tax receipts have been most recently studied by Z.M. Packman, *The Taxes in Grain in Ptolemaic Egypt,* American Studies in Papyrology 4, 1968; examining all the receipts from Diospolis Magna in the period 164-88 B.C., Packman has been able to suggest amounts and seasons of payment, and, considering all the receipts, concluded that although there were a number of different formulae used in describing the payments, there were in fact only three differing kinds of grain taxes paid into the Diospolis Magna granary: (1) those marked in superscript as *ἱεροῦ πυροῦ* or *ἱερᾶς κριθῆς*; (2) those described as paid for some fraction of an artab; (3) those noted as paid for the topos or assessment for the topos, for a place, or for a tax year without any special tax phrase.

(Ἔτους) κθ Παῦνι λ με(μέτρηκεν) κθ ⟨(ἔτους)⟩ Με(μνονείων) Ἁρυώτης
Ψεμμώνθου (πυροῦ ἀρτάβας) δύο d (γώνται) Bd Δυ..( )
3 Κρατῖνος (πυροῦ ἀρτάβαι) Bd

3. Κράτωνος: Milne

Year 29, Pauni 30. Paid for the 29th (year) for the Memnoneia: Haruotes son of Psemmonthes, artabs of wheat two and 1/4, that is, 2 1/4. (Signed) Du..( ) Kratinos, artabs of wheat, 2 1/4.

1. We see no trace of or room for the expected sign for ἔτους after the second κθ.

2. Milne read Δυμν( ), but we are not confident of this or any other readings. We cannot find a name which could fit the traces in any signer found with Kratinos in any of the texts cited above.

3. Granary Receipt

ROM Inv. No. 906.8.590 10.3 x 6.6 cm. 28 June 123 B.C.

Ἔτους μ̣ζ̣ Παῦ̣νι θ̄ με(μέτρηκεν)
μ̣ζ̣ (ἔτους) Μεμ(νονείων) Ἐ...ῳ̣.ς̣ Ψενα-
πάθου πυροῦ μ̣ίαν (γίνεται) (πυροῦ ἀρτάβη) α Κρ( ).

1. μς Παῦνι θ Milne 2. Ἐ..μωθος Milne

Year 47, Pauni 9. Paid for the 47th year for the Memnoneia: E..... son of Psenapathes one (artab) of wheat, that is, artab of wheat, 1. (Signed) Kr.....

1. Milne read Παῦνι θ̄ undotted, and the year as μς. But the *zeta* seems clear, while by now all but the *iota* and the *theta* of the month-date have worn off, and even these are faint.

2. Milne read E..*μωθος*, and while the abraded traces of the ῳ̣.ς̣ are compatible with Milne's reading, *mu* and *theta* are difficult to reconcile with what appears on the sherd. The letter after the *epsilon* is blotted, perhaps from erasure. Ἑρμεῖ̣ος is possible.

4. Granary Receipt

ROM Inv. No. 906.8.524 6.3 x 5.9 cm. 10 August 118 or 117 B.C.

[Ἔτους ν.] Ἐπειὶφ κ̄γ̄ με(μετρήκασιν) εἰ[ς τὸν ἐν]
[Διὸς πόλ(ει) τῆι] Μεγά(λῃι) θη(σαυρὸν) ὑπὲρ τοῦ νβ (ἔτους?) [
] Κολλούθης Χεσθώ(του) καὶ
]ιήσιως (πυροῦ ἀρτάβας) δύω (γίνονται)
(πυροῦ ἀρτάβαι) β....

Year 52?, Epeiph 23. Paid into the granary at Diospolis Magna for the 52nd year: Kollouthes son of Chesthotes and (. . . son of)...iesis, artabs of wheat, two, that is artabs of wheat, 2.

1. The date may be the year for which the tax is paid (52) or the year following.

2. The formula of this piece does not appear to follow the normal ones completely, and the reading is quite secure. Packman's Group One[1] does not have *ὑπὲρ τοῦ* before the year in this spot, and her Group Two[2] has *ὑπὲρ τοῦ τόπου* before the year. We have too much for I and too little for II. We incline to think that this belongs in fact to Group II, with the word *τόπου* accidentally omitted.

4. Milne read Ἀρσ]ιήσιος. There are traces of a signature after the final numeral, but no name can really be made out.

1. Packman, *op. cit.*, p. 15. 2. *Ibid.*, p. 19.

5. Granary Receipt

ROM Inv. No. 906.8.92 7.6 x 6.9 cm. Second Century B.C.

Ἔτους ις Φαμενὼθ ε̄ με(μέτρηκεν) εἰς τὸ
αὐτὸ (ἔτος) Θοτσύτης Πετσαρά(πιος)
(πυροῦ ἀρτάβην) μίαν (γίνεται) α
4 Κέρ̣δ̣(ων)

Year 16, Phamenoth 5. Paid for the same year: Thotsutes son of Petsarapis artab of wheat, one, that is, 1. (Signed) Kerdon (?).

2. Πετσαρά(πιος): the same compound as Πετεσορᾶπις, *NB* with variations. Cf. *P. Mich.* 123 recto 17.12 for the form Πετσερᾶπω. We are grateful to Youtie for the suggestion.

4. The *rho* is probably right, but the supralinear *delta* is made with a vertical, and two parallel strokes inclining towards the upper right. We know of no signer of this name.

6. Account

ROM Inv. No. 906.8.6 7.8 x 10.4 cm. Third or Second Century B.C.

This two line text is of uncertain character. It mentions neither tax nor character of goods indicated by the numeral. It may be an account; it may be a memorandum; it may be a private receipt. The hand is typical of the last third of the third century B.C., but the second century is probably not excluded.

(Ἔτους) γ Θὼυθ ια
2 Ἁρπαῆσις ω

Year 3, Thoth 11, Harpaesis, 800 (?).

2. What we read as *omega* is that letter, clear and fully formed, written much larger than the letters of the name. It is possible that the writer intended to write more, perhaps the patronymic beginning with *omega*, but never finished his text; this would remove the presence of 800 here – an uncommonly large numeral. But there is no sign of the room necessary to finish a name in letters the size of the *omega*, and we incline to think that we are, in fact, dealing with a numeral. Perhaps it referred to copper drachmas.

7. List of Names

ROM Inv. No. 906.8.511 5.1 x 6.7 cm. Second Century B.C.

This list of twelve names is written in a very neat, upright, unligatured hand. Where the surface is intact there is not the least difficulty in reading. The letters

are about 0.3 cm. high, and the lines are about 0.2 cm. apart. Eight of the names, Ptolemaios, Philon, Ax(e)ine, Hermias, Matielos, Daimachos, and Harmiusis, are found on *WO* 1189, a longer list with numerals appended to names, but Wilcken found no explanation of his list.

Δημήτριος
Πτολεμαῖος σκορ( )
Φίλων
Ἀξίνη
Ἑρμίας
Ματιῆλος
Ἡρηκλίδης υ$^{\epsilon}$( )
Σαραπίων
Ἀπολλ̣ώ̣ρ̣ι̣ο̣ς̣
Ψενπτιηχόις
Δαίμαχος
Ἁρμιῦσις

2. The abbreviation probably designates Ptolemaios' occupation: something to do with garlic. A list of landholders designated as σκορδοπωλῶν (along with lists under other occupations) appears in *P. Teb.* 833.23 ff. (early II B.C.), and another occupation, translated by *LSJ* as "worker in the garlic fields" is attested by the appearance of σκορδευτής in *BGU* 1504.6 (III B.C.).

7. The spelling of Herakleides here is not paralleled, so far as we know, but the first four letters are clear. The *upsilon-epsilon* after the name may be taken, on analogy to line 2, as an occupation. Possible are ὑαλουργός (cf. *LSJ* s.v.; ὑελουργός, *P. Got.* 7.4) or other compounds. There is a ὑαλοπώλης in *O. Bod.* 1752, a list similar to the Toronto ostrakon.

10. We have not found this name in another text.

8. Receipt for Dike and Bath Taxes

ROM Inv. No. 906.8.598 10 x 9.9 cm. 1 September A.D. 46

The ostrakon is written in clear black ink, on a reddish brown surface. From the upper right, the top layer of clay has cracked away, carrying off the remainder of the payer's name, plus decreasing parts of lines 2 and 3. It has not yet been possible to read the Demotic.

Διαγέγρ(αφε) Φθου[
χω(ματικοῦ) ς (ἔτους) (δραχμὰς) ἓξ τετρό[β(ολον)] κ̣α̣ὶ̣
[βαλ(ανευτικοῦ) τετ]ρ̣[όβ(ολον) c]
(γίνονται) (δραχμαὶ) ζ = c καὶ προσδ(ιαγραφόμενα) ἐξ – c
στ[ατῆρος]

(ἔτους) ζ Τιβερίου Κλαυδίου Καίσαρος
Σεβαστοῦ Γερμανικοῦ Αὐτοκράτορο[ς]
μη(νὸς) Σεβαστοῦ δ
2nd hand μη(νὸς) Σε(βαστοῦ) δ Πικ(ῶς)
Two lines of Demotic

Paid: Phthou-, for dike tax, for the 6th year, drachmas six, four obols, and for bath-tax, four obols and 1/2, that is: drachmas 7, obols 2 1/2, and additional amounts at the rate of 1 1/2 obols per stater. Year 7 of Tiberius Claudius Caesar Augustus Germanicus Imperator. Month Sebastos 4. (2nd hand) Month Sebastos 4, Pikos.

2. We have restored the amount of bath tax to make the total, line 3, tally with the six drachmas, four obols, of dike tax. The same combination of amounts is attested elsewhere, e.g. *O. Wilb.* 14.

3. The full formula, *καὶ προσδιαγρα(φόμενα) ὡς τοῦ ἐνὸς στατῆρος ἐκ–*c, appears in *O. Strassb.* 54, and an abbreviation similar to that here, *ἐκ–*c *τοῦ στατῆρος*, is found in *O. Strassb.* 71. As the surface is broken away after the down stroke from the *rho* of the second *τετρ(όβολον)* in the preceding line, it is not possible to determine whether *στ[ατῆρος]* or *στ[(ατῆρος)* should be read; as there would have been sufficient room for the full word, we choose the former. As Préaux pointed out (note to *O. Wilb.* 14, citing previous discussions), the tax, payable in silver, required a supplement of 1 1/2 obols per stater.

7. Pikos is well known as a signer of receipts. We identify our Pikos, without patronymic here, with the Pikos son of Kephalos in: *O. Strassb.* 60; and *O. Bod.* 560 (A.D.32); *O. Bod.* 948 (A.D. 35); *WO* 1553 (A.D. 38); *O. Strassb.* 68 and *O. Bod.* 474 (A.D. 41); *WO* 394 (A.D. 45); *WO* 397 (A.D. 47); he is suggested for *O. Bod.* 479 (A.D. 49). He must have been a mature man at the time of writing our text, if the *Κέφαλος Πικῶτος*, in *O. Strassb.* 71, which is from the same year and month as the Toronto ostrakon, is his son.

9. Receipt for Unspecified Tax

ROM Inv. No. 906.8.509 10.4 x 6.9 cm. February-April, A.D. 64

Receipts of this type are titled "supposed to be taxes on trades" at the heading to *O. Bod.* 1048-1063. Characteristically, they mention a specific month or months without naming a specific tax, and usually also without specifying a sum.

Σαχομν(εῦς) Ψενμώνθ(ου) καὶ μέτοχ(οι)
Ἑρμείας Ἐπωνύχ(ου) χαίριν ἀπέχο(μεν)
τὸ τέλ(ος) Φαμενὼτ καὶ Φαρμοῦθ(ι)
τοῦ ι (ἔτους) Νέρωνος τοῦ κυρίου

2. Ἐπονύχ(ου) Milne

Sachomneus son of Psenmonthes, and his partners, to Hermeias son of Eponychos, greetings: we have received the tax for Phamenoth and Pharmouthi of the 10th year of Nero the Lord.

1. For Sachomneus son of Psenmonthes see *O. Bod.* 1054 (A.D. 64) and the description of the British Museum Ostrakon 18719 in *CR* 18, 1904, p. 3 note 2 (where the date must be corrected to A.D. 61). Both documents are tax-receipts; in the former the tax is not specified, and the latter is described (*loc. cit.*) simply as "a receipt for taxes . . . ."

2. Read Ἑρμείᾳ Ἐπωνύχ(ου) χαίρειν. This man is attested paying money taxes over a period of 32 years (see above, p. 00, No. 00). The father's name is usually spelled as we have read it; Milne orginally transcribed it as Ἐπονύχ(ου), but the reading of an *omega* is more probable, although an *omicron* is not impossible.

10. Receipt for 2 per cent Toll

ROM Inv. No. 906.8.599 11.7 x 8.2 cm. 23 August A.D. 72

This text may be compared with *O. Bod.* 1082-93, among which can be found all the clauses in the present text, though no single one of the Bodleian texts is an exact parallel. The upper right part of this ostrakon is washed out, but not broken.

For a discussion of customs taxes in the Fayum, cf. Samuel, *JJP* 13, 1961, with list for the Fayum; cf. also now the discussion and list provided by Sijpesteijn in *ZPE* 6, 1970, pp. 78 ff.

Ἡρακ(λείδης) καὶ μ(έτοχοι) τελ(ῶναι)′ ν̄ τοῦ [δ (ἔτους)]
Οὐεσπασιανοῦ τοῦ κυρ[ίου]
Πεχω( ) Οὐαρ( ) χα(ίρειν) ἀπέχ(ομεν)
τέλ(ος) ἐξαγ(όντων) . [. .]. . . πεντήκ(οντα) (γώνται) ν
(ἔτους) δ̣ Οὐεσπα̣σ̣ι̣α̣νο̣ῦ τοῦ κυρίο̣υ
Μεσο(ρὴ) λ̣

Herakleides and his partners, farmers of the 1/50, for the 4th year of Vespasian the lord, to Pecho. . . son of Var. . . greetings: we have received the tax for the export of . . . . . fifty, that is, 50. Year 4 of Vespasian the lord, Mesore 30.

1. Herakleides is known from *O. Bod.* 1086, where the editors' dating to the first century is confirmed by our text.

4. There are too many possibilities provided by parallel texts for the words following ἐξαγ(όντων) for us to say what might be read. There are very exiguous traces of ink.

11. Receipt for Poll Tax

ROM Inv. No. 906.8.513 12 x 8 cm. 24 April A.D. 86

Διαγέ(γραφεν) Ὧρος Θοτεῦτ(ος) Ψεναμο(ύνιος)
ὑπὲρ λαο(γραφίας) Χά(ρακος) ϵ (ἔτους) (δραχμὰς) ι ἄ(λλων)
α – c κ(αὶ) προ(σδιαγραφόμενα) (ἔτους) ϵ
Δομιτιανοῦ τοῦ κυρίου
Φαρμ(οῦθι) κθ̄ Πτο(λεμαῖος) σ(εσ)η(μείωμαι)

Paid: Horos son of Thoteus, son of Psenamounis, for poll-tax of Charax, for the fifth year, drachmas 10, for others, 1 drachma, 1 1/2 obol and additional amounts. Year 5 of Domitian the lord. Pharmouthi 29. I, Ptolemaios, have signed.

2. It would be possible to read the second tax as β(αλανευτικοῦ), and we are aware of the frequent combination of poll and bath taxes (cf. *O. Wilb.*, pp. 37-38). But βαλανευτικοῦ is rarely so compressed, and the parallels of *O. Bod.* 491, 499, 507, and 509 are much closer: it is much more characteristic in this formula to omit the sum of the payments than it is in the formula which specifically names bath tax.

12. Receipt for Poll Tax

ROM Inv. No. 906.8.267 9.0 x 5.9 cm. 30 January A.D. 97

The meaning and purpose of αἱ κ(αὶ), and the relationship between that and the terms ὑπαρός and προσδιαγραμόμενα have been much discussed. Indeed, the significance of the actual abbreviation αι^{κ} as αἱ καὶ rather than αἱ κ(αθήκουσαι) was raised by Milne, *O. Theb.*, pp. 90-92, and *Annals of Archaeology and Anthropology* 7, 1914-16, pp. 51-66. Tait, in a long note on *O. Petr.* 79, accepts the conclusion that all three terms mean the same thing, and that the tax was exacted when payment was made in debased currency. Tait alluded to the phrase "pour le versement à Alexandrie" which serves for the expression. Wallace, *Taxation*, p. 325, thought that this explanation was not satisfactory, and Schuman examined the matter again in *Chronique* 38, 1963, pp. 315-317. His conclusion was that the three terms were indeed serving the same purpose, and that this 6 1/4 per cent rate was imposed on tax payments made in bronze rather than billon. The payment, Schuman suggested, served to defray the costs of transport when payment was made in the bronze currency, which, he concluded, was almost 7 1/2 times as heavy as payment made with tetradrachmas.

Δια(γέγραφε) Χεστφνάχ(θις) Παμοντεχ(ύσιος) ὑπ(ὲρ)
λαο(γραφίας) Ε. . ( ) ις (ἔτους) (δραχμὰς) δ αἱ κ(αὶ) γ ⌈ c (ἔτους) α

Νέρουα Καίσαρος τοῦ κυρίου
4 Μεχ(εὶρ) ε̄

Paid: Chestphnachthis son of Pamontechusis, for poll tax of E . . . of the 16th year drachmas 4, counted as 3 drachmas 4 1/2 obols. Year 1 of Nerva Caesar the lord, Mecheir 5.

1. For this taxpayer see above, p. 00 No. 00. For the patronymic see *O. Bod.* III, p. 15.
2. The place name appears most like an *epsilon* followed by a long stroke. Such a place is attested in e.g. *O. Bod.* 1286. In *O. Petr.* 91+97, in which the same taxpayer appears, Tait conjectured that the lost place name was probably either the Memnoneia or Notos and Lips. Tait's conjecture for the lost place name is not excluded by our reading of E. . ( ) even if the taxpayer is the same, since in a number of cases, the same man is associated with more than one place. But a reading of Ἑρμώνθις here could not be associated with the same man who appears in connection with Theban place-names. While Ἑρμ(ώνθεως) is certainly not excluded palaeographically, the reading would hardly be compelled. Tait read variations of E. . in *O. Bod.* 1267, 1286, and 1291. The nomenclature in those receipts seems comfortably Theban, as in this text and in *O. ROM* 15. In *O. Bod.* 1291 the name Ἐρ. . ( ) appears along with a number of references to Charax, and this alone would seem to justify the reading of a place with a name beginning with *epsilon* as part of Theban geography, and a name separate from Hermonthis.

13. Receipt for Bath Tax

ROM Inv. No. 906.8.35 10.9 x 5.6 cm. 21 May A.D. 98

Ἀπίων] καὶ μ(έτοχοι) τελ(ῶναι) θη(σαυροῦ) ἱερῶν
Ψεναμούνιος Ἑριωφμόις χα(ίρειν)
ἔχω τὸ βαλ(ανευτικὸν) τοῦ α (ἔτους) Τραιανοῦ
4 τοῦ κυρίου Παχὼ(ν)κ̄ς̄

Apion and his partners, tax farmers of the treasury of the temples, to Psenamounis son of Heriophmois greetings: I have received the bath tax for the 1st year of Trajan the lord, Pachon 26.

1. Apion may safely be restored on the basis of other documents in which he appears as farmer of the treasury of the temples: *O. Bod.* 679 (9 November A.D. 92 or 93); *WO* 786; *WO* 1415 (26 May A.D. 96); *WO* 789 (18 May, A.D. 98); *O. Bod.* 681 (A.D. 98). In the note to *O. Bod.* 679 Tait notes that a dating formula presenting the year after θησαυροῦ ἱερῶν (as also in *O. Bod.* 681 and *WO* 789) is unusual in the receipts of the temple treasury. The more normal formula appears in the present text as also in *WO* 786 and 1415.

14. Receipt for Poll Tax

ROM Inv. No. 906.8.16 11 x 9 cm. 8 May A.D. 100

Διαγ(έγραφεν) Ἑριωφμόις Ἑρμᾶτος ὑπ(ὲρ) λαο(γραφίας)
Χά(ρακος) γ (ἔτους) (δραχμὰς) δέκα (γίνονται) ι καὶ
προ(σδιαγραφόμενα) (ἔτους) γ Αὐτοκράτορος
Καίσαρος Τραιανοῦ Σεβαστοῦ Παχ(ὼν) ιγ̄
4 Ἀσ( ) σ(εσ)η(μείωμαι)

Paid: Heriophmois son of Hermas, for the poll tax of Charax for the 3rd year, ten drachmas, that is, 10 (drachmas), and the additional amounts. Year 3 of Emperor Caesar Trajan Augustus, Pachon 13. I, As . . . . . have signed.

3. Τραιανοῦ fits the context best on the basis of parallels. The reading is allowed but scarcely compelled by the writing.

15. Receipt for Poll Tax and Dike Tax

ROM Inv. No. 906.8.447 12,8 x 12.1 cm. A.D. 100-101?

The writing on this piece is so faded that virtually everything of significance must be regarded as conjecturally read. We are uncertain of the names, which we do not dot in every instance, as the writing is visible but very cursive; we are very dubious of the name of the emperor, which is very badly faded. The last two lines, which we have read as part of the receipt, are so faded, and appear so different from the rest of the text, that we are tempted to believe that they are the remnants of an earlier text which was washed from the sherd. The sherd seems complete.

Διέγρ(αψε) Παμώνθ(ης) Πασήμιο(ς) Ἀρσιήσιο(ς) μη(τρὸς)
Σ̣ε̣ν̣χ̣ε̣. . Καμῆτο(ς) ὑπ(ὲρ) λαο(γραφίας) Ε̣ . . γ (ἔτους)
(δραχμὰς) δ
[(ἔτους).] Τ̣ραιανοῦ τ̣οῦ̣ κυρίου Μ̣ε(χεὶρ) δ̄
[ὁμο(ίως)] ι̣η̄ (δραχμὰς) δ ὁμο(ίως) κη̄, (δραχμὰς) δ
ὁμο(ίως) Φαρμο(ῦθι) ϛ̄
5 [(δραχμὰς)] δ̣ ὁμ̣ο(ίως) κ̄ϛ̄ (δραχμὰς) δ ὁμο(ίως) δ̣ (ἔτους)
[ ]. . . . χ̣ω(ματικοῦ) (δραχμὰς) δ. . . . . ὁμ(οίως)
χω(ματικοῦ) (δραχμὰς) δ
7 . . . . . Ἀθύρ.

Paid: Pamonthes, son of Pasemis, son of Harsiesis, mother Senche–, daughter of Kames, for poll tax, of E. . , for the 3rd year, drachmas 4. Year . of Trajan the lord, Mecheir 4. Likewise, 18th, drachmas 4; likewise, 28th, drachmas 4; likewise, Pharmouthi 6, drachmas 4; likewise, 26th, drachmas 4; likewise, for the 4th year ?, for dike tax ?. drachmas 4 . . . likewise, for dike tax, drachmas 4 . . . Hathur.

1. There is a Pamonthes, son of Pasemis, named as the father of the taxpayer in *O. Bod.* 896, of year 20 of Hadrian. If that man is the same as the Pamonthes of our text, our Pamonthes of the reign of Trajan would be in the proper generation.

2. The name of the place escapes us. Sawtooth writing, ending in an upward stroke tipped by a circle, could be read in almost any way – *αγο*, *ανω*, *απο*, *ερμο*, etc. We choose E. . ; cf. *O. ROM* 12.

16. Receipt for Poll Tax

ROM Inv. No. 906.8.452 8 x 7.5 cm. 15 April,?, 18 July, 4th year of ?

Διέγρα(ψε) Ψεναμο(ῦνις) Πεκύσω(ς) Ψ[
ὑπ(ὲρ) λαο(γραφίας) Μεμνο(νείων) δ (ἔτους) (δραχμὰς)
[δ (ἔτους)
τοῦ κυρίου Φαμενὼ(θ) . [
ὁμο(ίως) Φαρμοῦθι κ̄ (δραχμὰς) δ [ὁμ(οίως)
(δραχμὰς) δ ὁμ(οίως) Ἐπεὶφ κ̄δ̄ (δραχμὰς) δ
Demotic

Paid: Psenamo(unis) son of Pekusis, son of Ps. . . . , for poll tax of the Memnoneia for the 4th year, drachmas 4? Year . of ? the lord, Phamenoth–; likewise, Pharmouthi 20, drachmas 4; likewise, ?, drachmas 4; likewise, Epeiph 24, drachmas 4. Demotic.

2. The emperor's name is lost in the right margin, where a piece has broken off. The text must antedate the change in formula in A.D. 108; prior to that year we find a form of *διαγράφω* + taxpayer's name. After that year, the formula is "collector to taxpayer, I have received," etc.

6. It has not yet been possible to read the Demotic.

17. Receipt for Poll Tax and Dike Tax

ROM Inv. No. 906.8.406 11.5 x 10.3 cm. 29 March–25 November A.D. 108

The breaking of this ostrakon in the upper left side has removed the name of the first tax mentioned, and praktor receipts at this date are too varied in form to

allow certain restoration. The entries of subsequent payments are like those in *O. Bod.* 521, from A.D. 107.

[Name καὶ μ(ἑτοχοι) π]ρ(άκτορες) ἀργ(υρικῶν)
[μη(τροπόλεως) ? name] Πασήμιος
[tax, place? ια (ἔτους)] (δραχμὰς) δ (ἔτους) ια Τραιανοῦ
[Καίσαρος τοῦ κυρ]ίου Φαρμοῦθ(ι) γ̄ ὁμοίως κ̄γ̄
5 [(δραχμὰς) δ] ὁμοίως Παχ(ὼν) η̄ ὑπ(ὲρ) λαογρ(αφίας) δραχ(μὰς)
τέσσαρ(ας) (γίνονται) (δραχμαὶ) δ
[ὁμοίως date δραχ(μὰς)] τέσσαρ(ας) (γίνονται) (δραχμαὶ)
δ ὁμοίως κ̄ε̄ (δραχμὴν) α ⌢
[month]. ῑε̄ χω(ματικοῦ) (δραχμὰς) δ αἱ κ(αὶ) (δραχμαὶ) γ ⌢ ὁμοίως
Φαῶφι ῑη̄ χω(ματικοῦ) (δραχμὰς) δ
8 [ ]. ὁμοίως Ἁθὺρ κ̄.(δραχμὰς) β–c αἱ κ(αὶ) (δραχμαὶ) β=

X and his partners, collectors of money taxes for the metropolis(?), to Y, son of Pasemis: for poll tax of ? for the 11th year, drachmas 4. Year 11 of Trajan the lord, Pharmouthi 3; likewise, the 23rd, drachmas 4; likewise Pachon 8, for poll-tax, drachmas four, that is, drachmas 4; likewise . . . . drachmas four, that is drachmas 4; likewise 25th, drachma 1, 3 obols. . . . . 15th, for dike tax, drachmas 4 counted as drachmas 3 obols 3; likewise Pahophi 18, for dike-tax, drachmas 4 . . . Likewise Hathyr 2 . , drachmas 2 and 1/2 counted as drachmas 2, obols 2.

4. Pharmouthi 3 = 29 March; Pharmouthi 23 = 18 April.
5. The reading of ὑπ(ὲρ) λαογρ(αφίας) is made with some hesitation. The writing does not preclude the reading, but certainly does not compel it. We do not know what else could fit here, however, and still be compatible with both palaeography and formulae.
7. Phaophi 18 = 15 October.
8. Hathyr 20 to 29 = 16–25 November.

18. Receipts for Poll and Dike Taxes

ROM Inv. No. 906.8.506 12.1 x 17.5 cm. 5 April and 19 December A.D. 108

Πετοσῖρις πράκτωρ ἀργ(υρικῶν) Με(μονείων)
Πορτιοῦς Καμήτιος λαο(γραφίας) Φωτ( )
δραχ(μὰς) ὀκτὼ (γίνονται) (δραχμαὶ) η (ἔτους) ια Τραιανοῦ
Καίσαρος τοῦ κυρίου Φαρ(μοῦθι) ῑ
5 ὁμοίως Μεσ(ορὴ) ῑς̄ χω(ματικοῦ) (δραχμὰς) β= αἱ κ(αὶ)
(δραχμαὶ) βc δ′ . . . .

VACAT

Πετοσῖρις πράκτωρ ἀργ(υρικῶν) Με(μνονείων) Πορτιοῦς
Καμήτιος ἔ̣σ̣χον ὑ̣π̣(ὲρ) λ̣α̣ο(γραφίας) κ̣α̣ὶ̣ χω(ματικοῦ)
Φωτ( ) ια (ἔτους)
(δραχμὰς) α ⊨ αἳ κ(αὶ) α ⊢ c (ἔτους) ιβ Τραιανοῦ Καίσαρος
9 τοῦ κυρίου Χοιὰχ κ̅γ̅.

Petosiris, collector of money-taxes of the Memnoneia, to Portious son of Kametis for poll tax of Phot–, drachmas eight, that is, drachmas 8, 11th year of Trajan Caesar the lord, Pharmouthi 10; likewise Mesore 16, dike tax drachmas 2, obols 2, counted as drachmas 2, obols 1/2. . . .

Petosiris, collector of money-taxes of the Memnoneia, to Portious son of Kametis: I have received for poll-tax and dike-tax of Phot– for the 11th year, drachma 1, obols 5, counted as drachma 1, obols 4 1/2, 12th year of Trajan Caesar the lord, Choiak 23.

1. Petosiris the collector is known from other texts. His father's name was Πετεαρπ(ρῆς), attested in *O. Cam.* 33, *O. Strassb.* 277 and *O. Meyer* 30a. In the last text Petosiris operated with a colleague, Psenmonthes son of Amphion. The text here published is the earliest in which Petosiris appears and his subsequent activities are attested in 109 by *O. Theb.* 34, *WO* 1613, in 110 by *O. Theb.* 35, *O. Strassb.* 276, in 111 by *O. Cam.* 33, *O. Strassb.* 277, and in 112 by *O. Meyer* 30a. He is last attested in 114 by *O. Theb.* 82.

2. Portious son of Kametis is unattested. However, *O. Strassb.* 278, a poll tax receipt written in 111 by Petosiris' colleague as praktor of Memnoneia, is addressed to one . . . θηι Καμήτιος, and since the place is read as Φ. . . ( ) we have surely to reckon that text as involving the same family. This text lends support to the supposition that this place is the same as that read as Φωτρ( ) in *O. Theb.* 33, a poll tax receipt of the second year of Vespasian.

5. The letters at the end are difficult. *Delta* is clear; it could stand for διά (cf. *O. Strassb.* 276, διὰ Λιλοῦς), or it could be a correction. The letters below the *delta* could well be εσαψ or εσεφ, but we know of no such name. To read σεση( ) would be forcing the palaeography, but we suppose it possible.

7. The formula with the tax names should be considered most doubtful where the letters are dotted. ε̣σ̣χ is a wiggly line with χ above; υ̣π̣λ̣α̣ is badly distorted by bumps on the surface. κ̣α̣ι̣ is formed by a downstroke which rises to move off to the right, followed by a short diagonal from upper right down to the left.

19. Receipt for Poll Tax

ROM Inv. No. 906.8.139 13.4 x 10.2 cm. 1-17 April A.D. 113

This text was first mentioned by Milne in connection with the publication of *O. Theb.* 36. Through it we may trace something of the careers of the people involved. The text here published is the earliest in which Herieus son of Pa-

monthes, *πράκτωρ ἀργυρικῶν* of Memnoneia, appears. The date of the first receipt is Pharmouthi 6 of the 16th year of Trajan (1 April A.D. 113). Herieus is collecting poll tax, as also in *O. Theb.* 36, later in A.D. 113, and in A.D. 113-114 from Phaophi 4 of the 17th year (*O. Theb.* 37) to Tybi 4 of the 18th year (*O. Theb.* 38). In these texts other taxes are also recorded. In *O. Petr.* 101, of 11 January 114, only the dike tax is extant on the ostrakon. The last appearance of this collector is *O. Theb.* 99, of the 2nd epagomenal day of year 19 (25 August A.D. 116).

The taxpayer, Petechonsis son of Pthomonthes makes at least two payments of four drachmas for poll tax on this receipt; in *O. Theb.* 36, which immediately follows the present text in time, he makes two more payments of four drachmas and three payments of two drachmas for the 16th year. Milne, summarising these receipts in his examination of poll tax (*O. Theb.*, p. 119) took all three payments mentioned on the present receipt to have been made by the same man, thus producing a list of payments ranging from Pharmouthi 6 of the 16th year to Hathyr 18 of the 17th year. The payments of poll tax for the 16th year total 24 drachmas.

Ἑριεὺς Παμώνθου πράκ(τωρ) ἀργ(υρικῶν) Με(μνονείων) διὰ Παμ̣ώ̣νθου
υἱοῦ Πετεχώνσε(ι) Φθομώ̣ν̣θ̣ο̣υ Ἀτρήους ὑπ(ὲρ)
λαογρα(φίας) Με(μνονείων) ις (ἔτους) δραχ(μὰς) τέσσερ(ας)
(γίνονται) (δραχμαὶ) δ (ἔτους) ις
Τραιανοῦ Καίσαρος τοῦ κυρίου Φαρμοῦθ(ι) ϛ̄
παρὰ τούτου Φαμ(ενὼθ) λ̄ μερισ(μὸν) ἀνακ(εχωρηκότων) = ⸗
Φαρμοῦθ(ι) κ̄ ὀνό(ματος) . . . . . λαο(γραφίας) δραχ(μὰς)
τέσσερας (γίνονται) (δραχμαὶ) δ κ̄γ̄
ὀνό(ματος) Πετεχώ(νσιος) Φθομ̣ώ̣(νθου) δραχ(μὰς) τέσσερας
(γίνονται) (δραχμαὶ) δ

3, 6, 7, *l.* τέσσαρας

Herieus son of Pamonthes, collector of money-taxes of the Memnoneia through his son Pamonthes to Petechonsis son of Pthomonthes son of Hatres: for poll tax of the Memnoneia for the 16th year drachmas four, that is, drachmas 4, year 16 of Trajan Caesar the lord, Pharmouthi 6; from him, Phamenoth 30, *merismos anakechorekoton*, 2 obols 4 chalkoi; Pharmouthi 20, in the name of . . . . . for poll tax, drachmas four, that is, drachmas 4; 23rd, in the name of Petechonsis son of Pthomonthes, drachmas four, that is, drachmas 4.

1. Pamonthes, acting as agent for his father, also appears in *O. Petr.* 101 (11 January A.D. 114).

3. Milne, in a note to *O. Theb.* 36, chides Herieus for his spelling of *τέσερας* ("habitually misspelt"); in *O. Petr.* 104 appears *τέσ̣σ̣ά̣ρ̣ε̣ς*, but the orthography here, quite clear in line 3, makes us doubt that he really got it right in the Petrie text.

5. We know of no parallel to this line, although of course the tax is well known and is attested as early as this by *O. Bod.* 665 of 5 August A.D. 114. We think the reading is probably right up to the actual name of the *merismos*, but thereafter, due to the rapidity of the writing, our confidence fails us. Following what we read as *ανακ*, we have strokes like this: ⸗ ⸗. We take the first stroke as a mark of abbreviation, and the remainder as 2 obols 4 chalkoi (= ⸗). Although the formulation here is unparalleled, so far as we know, and the chronological sequence is broken, the *merismos* paid is appropriate to the receipt if, as we suppose, the taxpayer is insisting on record of a payment made earlier, perhaps forgotten on an earlier receipt, or one to be transferred for convenience to this receipt.

6. Milne (*O. Theb.*, p. 119) read *Φαρμοῦθι κ̄α̅*. This is possible, but we think *κ̄* is better. Also, Milne took the name to be Petechonsis. We do not see this. What is visible looks like a rapidly written *Φθομώνθου*, with the first letter followed by a stroke, and that by an apparent theta, as we have seen the name written elsewhere. The whole name might be read as *Φθομώνθ(ου) Ἀτρήους*, a guess which the forms, insofar as they are visible, support, and which the reasonably clear initial *phi* brings to mind. We suppose that Milne took the initial *omicron* of *ὀνό(ματος)* for the *alpha* of *κ̄α̅* and the *νο* for *Πε(τεχώνσιος)*, but we do not think that this can be read.

20. Receipt for Poll Tax

ROM Inv. No. 906.8.565 12 x 9 cm. 10 December, 19 February, 10 March, 21 April, 20 May A.D. 119-120

Πα(μώνθης) πρ(άκτωρ) ἀργ(υρικῶν) Μεμνο(νείων) δ(ιὰ)
Ψενεντ(ήριος) γρα(μματέως)
Παμοντπῶτο(ς) Ἀρπαή(σιος) Φα.ρ. .ο( )
ἔσχ(ον) ὑπ(ὲρ) λαογρα(φίας) (δραχμὰς) δ (ἔτους) δ Ἀδριανοῦ τοῦ
κυρίου Χοί(ακ) ῑγ̄ Μεχεὶρ κ̣δ (δραχμὰς) η Φαμ(ενὼθ)
5 ῑδ̄ (δραχμὰς) δ Φαρμ(οῦθι) κ̄ς̄ (δραχμὰς) δ Παχ(ὼν) κ̄ε̄
(δραχμὰς) η ⋐
6] (δραχμὰς) δ . . . . . .

Pamonthes, collector of money taxes of the Memnoneia, through the scribe Psenenteris, to Pamontpos son of Harpaesis, son of Pha . . . . . : I have received for poll tax drachmas 4, year 4 of Hadrian the lord, Choiak 13; Mecheir 24, drachmas 8; Phamenoth 14, drachmas 4; Pharmouthi 26, drachmas 4; Pachon 25, drachmas 8, obols 5 . . . drachmas 4 . . . . . .

1. Pamonthes is also known from *O. Bod.* 885 and 1036, in both of which the same scribe appears. In *O. Bod.* 885 his name is given as *Ψεν. . ητ( )*, in 1036 as *Ψεν . . . ( )*. We read the first *nu* with some confidence, but the two letters following with rather less. But *Ψενεντῆρις* is the only name we know with the beginning required by what we have here.

2. The remaining traces are evidently the grandfather's name, but none of it can be read with much confidence. The first letter is probably a *phi*, followed by an *alpha*. What comes

between that and the dubious *rho* we cannot say. The traces are consonant with reading either Φατρήους or Φαήριος, but scarcely encourage either reading.

6. The left side of the ostrakon is chipped, after which there is a space with no traces; then comes what we have read, followed by 2 cm. of very faint traces and the remains of several letters somewhat better preserved but not readable.

21. Receipt for Poll Tax

ROM Inv. No. 906.8.518 7.4 x 6.6 cm. 29 March A.D. 121

Χεσφμόις πράκ(τωρ) ἀργ(υρικῶν)
Πικῶς νεω(τέρῳ) Ἀπολώδωρος
ἔσχων ὑπ(ὲρ) λαο(γραφίας) ὑπ(αρὰς) δραχ(μὰς) [δώδεκα]
(γίνονται) (δραχμαὶ) ιβ (ἔτους) ε Ἁδριανοῦ τ[οῦ κυρίου]
Φαρμοῦτι γ̄ Ψεν[

3. *l.* ἔσχον

Chesphmois, collector of money taxes, to Pikos the younger son of Apollodoros: I have received for poll tax bronze drachmas twelve, that is, drachmas 12. Year 5 of Hadrian the lord, Pharmouthi 3. I, Psen . . . .

1. Chesphmois was praktor for the metropolis, cf. *O. Theb.* 94 (A.D. 119); *O. Bod.* 526 (A.D. 118); 527 (A.D. 119); 528 (A.D. 120) where he acknowledges receipt of 12 drachmas from the same Pikos; 582 (A.D. 117); 585 (A.D. 118?); 586 (A.D. 120); 839 (A.D. 121). He appears first as praktor on 17 February, 118 in *O. Bod.* 526 and last on 30 June, 121 in *O. Bod.* 839, so that the present text comes toward the end of his attested career. For Pikos the younger son of Apollodoros see above, p. 67, No. 72.

2. As happens frequently, oblique cases are rendered by the nominative, Πικῶς for Πικῶτι, Ἀπολώδωρος for Ἀπολλοδώρου.

22. Receipt for Poll Tax

ROM Inv. No. 906.8.596 10.5 x 9.1 cm. 2 March - 28 April (?) A.D. 131

Παμώνθ(ης) πράκτωρ ἀργ(υρικῶν) Με(μνονείων)
διὰ Πετεαρ( ) γρα(μματέως) Μενέστεως Πετε[αρ-]
ουῆρις ἔσχ(ον) ὑπ(ὲρ) λαο(γραφίας) ιε (ἔτους) (δραχμὰς)
δ (ἔτους) ιε Ἁδ[ριανοῦ]
τοῦ κυρίου Φαμ(ενὼθ) ς̄, ὁμ(οίως) ῑ̄θ̄ (δραχμὰς) δ
ὁμοίως Φαρ(μοῦθι) ῑ̄ (δραχμὰς) δ ὁμοίως[
ὁμοίως Π[ά]χ(ων) γ̄ (δραχμὰς) δ

Pamonthes, collector of money taxes for the Memnoneia, to Menesteus son of Petearoeris: I have received for poll tax of the 15th year drachmas 4, year 15 of Hadrian the lord, Phamenoth 6; likewise 19th, drachmas 4; likewise Pharmouthi 10, drachmas 4; likewise . . . . . ; likewise Pachon 3, drachmas 4.

1-2. The praktor Pamonthes is attested. Tait, in a note to *O. Camb.* 46 pointed out that a praktor of the Memnoneia named Pamonthes appears in years 5 and 6 of Hadrian, and another in years 14 and 15. The Pamonthes of the present text is the second. His receipts, *O. Bod.* 537 for poll tax of year 14 and *PSI* 995 of year 15 (tax unread), show him collecting through scribes, whose names are read as Πετ . . . . ( ) in the case of *O. Bod.* 537 and Πε . . . . . ( ) in *PSI* 995. On the basis of this text, and more clearly in *O. ROM* 24, we read Πετεαρ( ) and suggest this for the other two texts. In *PSI* 995.2 we read δ as δ(ιά).

2. Youtie's suggestion, for Μενεσθέως; the second *epsilon* is faint and blurred with the *sigma*, and the final *epsilon* could well be an *eta*.

6. The reading of the month is very doubtful. What we read as part of a *chi* could be a mark of abbreviation following an *upsilon*. We have settled uncomfortably on Pachon, since this is the next month in sequence, but even that guide may be affected by whatever came after the break in line 5.

23. Receipt for Poll Tax

ROM Inv. No. 906.8.610 8.9 x 8.4 cm. 1 March A.D. 132

Although much of this text has been lost after the break at the right, it can safely be restored almost in its entirety on the basis of the text of *O. Theb.* 83, of 13 July 132, which has the same praktor and the same payers.

Φθομώ[(νθης) π]ρ[άκ(τωρ) ἀργ(υρικῶν) Ἑρμώνθεως]
Ψενταση̣μ[ει Ψεμώνθεως καὶ Πετεχώ(νσει)]
υἱῷ ἔσκον ὐ[π(ὲρ) λαο(γραφίας) ις (ἔτους) ῥυπ(αρὰς)?
(δραχμὰς)? εἴκοσι]
(γίνονται) (δραχμαὶ) κ (ἔτους) ις Ἀδρι[ανοῦ Καίσαρος
τοῦ κυρίου]
Φαμ(ενὼθ) ε̄ [
(ὁμοίως) Φαρμ(οῦθι) ξ̄ [
[ ]

3. *l.* ἔσχον

Phthomonthes, collector of money taxes of Hermonthis, to Psentasemis son of Psemonthes and Petechonsis his son: I have received for poll tax for the 16th year, bronze drachmas (?) twenty (?), that is, drachmas 20. Year 16 of Hadrian Caesar the lord, Phamenoth 5, likewise, Pharmouthi 7 . . . .

2. A stroke descending from the line above, and crossing the *eta*, must come from the *rho* of πράκ(τωρ) in line 1.

3. The restoration ῥυπ(αρὰς) is entirely hypothetical, but follows rigidly the formulae of *O. Theb.* 83. (δραχμὰς) could well be included here, though omitted there.

6. There was probably more text after this line, lost after the horizontal break. A sum would be expected after this line.

24. Receipt for μερισμὸς τελωνικῶν

ROM Inv. No. 906.8.451 6.5 x 5.4 cm. A.D. 133-134

Although the ostrakon is broken at the right, enough remains of the name of the tax to identify it, and to help identify the collectors, who are known as collectors of this impost from another document.

Κρο̣ῦ̣ρις καὶ Φατρῇ̣[ς ἀπαιτ(ηταὶ) μερισμ(οῦ)]
τελωνικ(ῶν) τοῦ ιζ̣ [(ἔτους) Ἁδριανοῦ τοῦ]
κυρίου ὑπ(ὲρ) Ν̣ότ̣(ου) ̀...΄ὀνόμ(ατος) Π̣[
Ψεν̣αμούνιο(ς) διὰ̀ Ἠετεαρ.( )΄Φ[
5 κέρ(ματος) δραχ(μὴν) μιᾶς [
6 (ἔτους) ιη Ἁδριαν[οῦ τοῦ κυρίου

5. *l.* μίαν

Krouris and Phatres, collectors of the *merismos telonikon* for the 17th year of Hadrian the lord, for Notos, . . . ?, in the name of P . . . , son of Psenamounis, through Petear . . . son of Ph . . . , drachma of copper, one. Year 18 of Hadrian the lord.

1. The restoration is made on the analogy of *O. Petr.* 110, where Krouris and Phatres also figure as collectors.

3. The interlinear text is too cramped to read, and there are strokes which may have been intended as marks of cancellation. There are not many parallels proffering receipts for this tax, and none of them shows what might have been in this position. καὶ Λίβος of course comes to mind, but reading it would be an act of faith, not palaeography.

4. We read the supralinear text after διὰ, because of its position over and after that word.

25. Receipt for Tax on Dates

ROM Inv. No. 906.8.46 8.5 x 9.0 cm. 13 November and 21 January A.D. 144

The ostrakon is brownish-red in color, and contains the receipt in its upper

half. It has lost a piece from the upper left-hand side; the break, at its broadest and longest points, measures approximately 2.0 x 3.5 cm. The letters are smallish and fairly well formed. The writing begins about 1.7-2.0 cm. from the left-hand edge and continues to the right-hand edge, even to the point of squeezing the letters in.

[Κα]ροῦρις καὶ Πετεχ(εσποχράτης) οἱ ἀπαι(τηταὶ) κ(αὶ)
μέτ(οχοι) ἐπιτη(ρηταὶ) κτη(μάτων)
γενη(ματογραφουμένων) μη(τροπόλεως)
[Πε]τεψάιτι Πανκάμη(τιος) Φθουμί(νιος) ἔσχ(ομεν) εἰς
πρόσθ(εσιν) ⟨ὑπὲρ⟩
[τιμ(ῆς)] φοινίκ(ων) γενή(ματος) ζ (ἔτους) ὀυπ(αρὰς)
(δραχμὰς) ὀκτὼ (τριώβολον) (γίνονται)
(δραχμαὶ) η (τριώβολον)
(ἔτους) η Ἀντωνίνου Καίσαρος τοῦ κυρίου
5 Ἀθὺρ ιζ Καροῦρ(ις) Ἄ(λλας) Τῦβι κς ὁμοί-
6 ως ὀυπ(αρὰς) δραχ(μὰς) ὄκτω (τριώβολον) (γίνονται)
(δραχμαὶ) η (τριώβολον) Καροῦρ(ις)
(Demotic) P3-dǐ-Ḥr

Karouris and Petechespochrates, collectors, and their partners, overseers of the farm produce of the metropolis to Petepsais, son of Pankametis son of Phthouminis: we have received toward the extra payment for value of dates of the harvest of the 7th year bronze drachmas eight, obols three, that is, drachmas 8, obols 3. Year 8 of Antoninus Caesar the lord, Hathur 17. Karouris. Tybi 26, likewise other bronze drachmas eight, obols three, total drachmas 8, obols 3. Karouris. (Demotic) Petegris.

1. These collectors occur in *O. Bod.* 989 (17 November 144) and 1693 (16 January 150). In the former the second name is Πετεχε̣σ̣π(οχράτης), which should probably be read here, though the name is more abbreviated. The formula in this text is clearly irregular in having οἱ ἀπαι(τηταί) intruded between the collectors' names and κ(αὶ) μέτ(οχοι), and our reading fits both the highly compressed writing and the sense of the usual formula. We are not certain of μη(τροπόλεως) at the end of the line, where the letters are very squashed, but have followed the analogy of the other receipts. If the lines all begin at the same point on the left side, as seems probable, there is not room for it at the beginning of line 2.

3. The ὑπέρ must be inadvertently omitted, as it always occurs with this tax. It could possibly have been inserted at the beginning of line 4, but just barely, if the lines have a uniform starting-point.

8. As in *O. Bod.* 989, Karouris' signature is followed by a second signature in Demotic. The reading is by R.J. Williams.

26. Receipt for Bath Tax

ROM Inv. No. 906.8.589 7.2 x 7.1 cm. 23 (?) June A.D. 151

Πορι̣εύθης κ̣α̣ὶ̣ μ(έτοχοι) τελ(ῶναι) θησ(αυροῦ) ἱερῶ(ν)
Ἁρυώθης Πε( ) Φθ̣ουμένω(ς)
ἔσχο(μεν) τίμη(ν) (πυροῦ ἀρτάβης) ι′β′ εἰς λόγο(ν)
βαλ(ανευτικοῦ)
τοῦ ιδ (ἔτους) Ἀντωνίνου Καίσαρος
τοῦ κυρί̣ο̣υ̣ Π̣α̣ῦ̣νι̣ κθ̄

Porieuthes and his partners, tax-farmers of the treasury of the temples, to Haruothes son of Pe . . . . . son of Pthoumenis: we have received the price of 1/12 artab of wheat for the account of the bath tax of the 14th year of Antoninus Caesar the lord, Pauni 29.

1. Porieuthes and his partners appear receiving the same tax in *O. Bod.* 740 (26 June 151) and *O. Bod.* 741 (24 July 151). There is a Porieuthes collecting bath tax with a Pamonthes in A.D. 140 (*O. Theb.* 62) and this may be the same man, although the identification can hardly be considered secure. He also appears in *O. Leid.* 22 (on which see *BASP* 6, 1969, p. 69 and *BASP* 8, 1971).

2. In *O. Bod.* 1406 (26-27 July A.D. 149) there appears a Ἁρυ̣ώθο(υ) Πε̣τ̣ε̣( ), and in *O. Bod.* 716 (2 June A.D. 140) bath tax is paid to the temple treasury by a Πε̣τ̣ε̣ύριο(ς) Φθουμί(νιος) Πε̣τ̣ε̣αρπρήο(υς). This Peteuris son of Phthouminis could well be the father of the Haruothes grandson of Pthouminis in the present text, and in line 2 we might be justified in reading Πε(τεύριος).

5. The month name is virtually obliterated and the reading is uncertain. Only the *theta* of the date is clear.

27. Receipt for Weavers' Tax (?)

ROM Inv. No. 906.8.532 4.2 x 8.1 cm. A.D. 159-160

Since the text on the extant fragment best fits the formulae in receipts for weavers' tax, we have restored on analogy to those. The collector Horos may be the same man as the collector of weavers' tax in *O. Theb.* 57 of A.D. 156, *O. Bod.* 1021 of A.D. 145, *O. Manch.* 4 of A.D. 140 and the undated *O. Camb.* 58. If the identification is right, there is support for our interpretation of the text.

Ὧρος καὶ μέτοχ(οι) τε̣[λ(ῶναι) γερδ(ιακοῦ) name]
Π⟨ω⟩κῶς ἔ̣σχον [παρὰ σοῦ]
ὑπὲρ τέλ(ους) Ἀθὺρ κ[αὶ Ἀδριανοῦ?]
ὑπ(αρὰς) δραχμὰς τέ̣[σσαρας
(ἔτους) κγ Ἀντωνεί[νου Καίσαρος]
τοῦ κυρίου [month and day]

Horos and his partners, farmers of the weavers' tax, to . . . . . son of Pikos: I have received from you for the tax of Hathur and Hadrianos bronze drachmas four. Year 23 of Antoninus Caesar the lord (month and day).

1-3. For an analogy to our restorations see e.g. *O. Theb.* 57. We assume the piece lost from the right to be about 3.0 to 4.0 cm. wide, enough to accommodate eight to ten letters. If this is correct, the name missing from line 1 should be short.

28. Receipt

ROM Inv. No. 906.8.9 11.3 x 9.2 cm. 13 November A.D. 175 ?

Ἁθὺρ ιᾱ τοῦ ις (ἔτους) ὀνό(ματος)
Ἁρυώθης Ἐπωνύ(χου)
ὑπ(ὲρ) μ(ερισμῶν) ιε (ἔτους) Νό(του) (δραχμὰς) δύω
(γίνονται) (δραχμαὶ) β Ὡρ( ) σ(εσ)η(μείωμαι)

Hathur 17 of the 16th year, in the name of Haruothes son of Eponuchos, for *merismoi* for the 15th year for Notos, drachmas 2, that is, drachmas 2. I, Hor . . . . have signed.

2. The first letter of the patronymic is abraded. The final stroke, which we read as trailing off for abbreviation, looks rather like a *sigma*. There is a Haruothes son of Eponuchos in *WO* 1647, of Pauni 25 of the 18th year of Marcus Aurelius (19 June 178), and if ours is the same man as that in the Wilcken text, our date becomes firm.

3. This line is badly abraded, and virtually gone at the beginning. Only faint traces of ink remain where we have read the name of the tax, following the formulae of e.g. *O. Bod.* 801. There is no room to read more than we have printed here. Despite the abrasion, we are confident of the number of the year and reasonably so about Νό(του). The end of the line is clear.

29. Receipt for Ἐπικεφάλαιον

ROM Inv. No. 906.8.21 7.0 x 10.1 cm. A.D. 188-9

On the basis of *O. Theb.* 136, Milne argued (*O. Theb.*, p. 153-4) that the ἐπικεφάλαιον, which had been taken as poll-tax, was in fact a tax on trades. *O. Theb.* 136, an account ἐπικεφαλείων, lists payments as μη(ναῖα), clearly showing that the ἐπικεφάλαιον could not there be taken in the sense of λαογραφία. Wallace, *Taxation*, p. 411, accepted Milne's conclusion that the term could have the meaning of χειρωνάξιον, and citing *P. Oxy.* 1438, to show that ἐπικεφάλαια could include λαογραφία, μεφισμοί, χωματικόν and other taxes imposed on

individuals, concluded that "it is frequently impossible to tell what tax is meant by *ἐπικεφάλαιον*."

The chronology of the use of *ἐπικεφάλαιον* at Thebes is very uncertain because of the absence of the imperial name from nearly all examples of the tax. The present document is, apart from a peculiar receipt of A.D. 103 (*O. Strassb.* 107), the earliest known ostrakon receipt which admits of secure dating, preceding *O. ROM* 31 of A.D. 189 and *O. Bod.* 434 of A.D. 190. There are, however, numerous receipts whose regnal placement is uncertain, particularly some with years over 20 but under 25. These may perhaps antedate the present receipt by as much as five to seven years.

Φα( ) κε̄ το[ῦ] κθ (ἔτους) [ὀνό(ματος)]
Ἰναρῶτο(ς) ὁμ(οίως) Ὥ[ρου? ὑπ(ὲρ)]
ἐπικ(εφαλαίου) κθ (ἔτους) Ἀγο(ρῶν) (δραχμὰς) [τέσσ(αρας)]
4 (γίνονται) (δραχμαὶ) δ Α( ) σ(εσ)η(μείωμαι)

Pha . . . . 25 of the 29th year, in the name of Inaros son of Inaros son of Horos (?), for head tax for the 29th year for Agorai drachmas four, that is, drachmas 4. I, A . . . . , have signed.

1. The abbreviation mark is a straight line over the *alpha*; Phaophi, Phamenoth and even Pharmouthi are therefore all possible resolutions.

2. The ὁμ(οίως) is read on the analogy of other texts. The writing is in fact a mere scrawl. But an Ἰναρῶς ὁμ(οίως) Ὥρου appears in four other receipts, all from Agorai. They are *O. Camb.* 68, a granary receipt from 172; *O. Camb.* 47, without the grandfather's name, a receipt for poll tax from 178; *O. Bod.* 553, a receipt for poll tax from 186; and *O. Belf.* 14, a granary receipt from 190. The form of the name seems to indicate that this is the same man (see the commentary to *O. ROM* 50).

3. This receipt thus joins the minority of *ἐπικεφάλαιον* receipts in which the tax is paid for the current year. This is the case with some seven of the twenty-five known receipts, and most of them fall late in the year. The month of our receipt cannot, unfortunately, be ascertained.

4. A . . . . is probably the signatory to *O. Bod.* 434 and *O. ROM* 31.

30. Receipt for Dike Tax

ROM Inv. No. 906.8.399 11 x 6 cm. 18 June A.D. 189

The form of this receipt is standard for this period, and is discussed in *WO* I, p. 97; a supplementary list appears in *O. Wilb.*, p. 49. Receipts for dike tax are rare at this late date. The only such receipt later than the present text is *O. Strassb.* 144, from 23 July of the same year.

Παῦνι $\overline{κθ}$ τοῦ κθ (ἔτους) ὀνὸ(ματος) Κ[
Σποτοῦτο(ς) ὑπ(ὲρ) χω(ματικοῦ) κθ (ἔτους) Ἀγο(ρῶν)
(δραχμὰς) ἑπτὰ[
καὶ [ὀ]νό(ματος) Κύσιως . . ( ) ἀδε(λφοῦ) δρ(αχμὰς) ἑπτὰ[

Pauni 24 of the 29th year, in the name of K . . . , son of Spotous, for dike tax for the 29th year for Agorai, drachmas seven . . . And in the name of Kusis, . . . brother . . . . , drachmas seven . . .

1. $\overline{κθ}$ The scribe appears to have first made a κη, thought better of it, and altered the figure.

31. Receipt for 'Επικεφάλαιον

ROM Inv. No. 906.8.476 10.8 x 4.8 cm. 23 September A.D. 189

On the receipts for ἐπικεφάλαιον see the introduction and commentary to *O. ROM* 29, above.

Θὼθ $\overline{κς}$ τοῦ λ (ἔτους) ὀνό(ματος) Φατρ̣ή̣ο(υς)
Φθουμώ(νθου) ὑπ(ὲρ) ἐπικ(εφαλαίου) κθ (ἔτους) Ἀγο(ρῶν)
(δραχμὰς) τρεῖς χ(αλκοῦν)
(γίνονται) (δραχμαὶ) γ χ(αλκοῦς) καὶ ὀνό(ματος) Κύσιω(ς)
Σ̣ω̣σ( ) (δραχμὰς) τρεῖς χ(αλκοῦν)
(γίνονται) (δραχμαὶ) γ χ(αλκοῦς) Α( ) σ(εσ)η(μείωμαι)

Thoth 26 of the 30th year, in the name of Phatres son of Phthoumonthes, for head tax for the 29th year for Agorai, drachmas three chalkous 1, that is, drachmas 3, chalkous 1, and in the name of Kusis son of Sos . . . , drachmas three, chalkous 1, that is, drachmas 3, chalkous 1. I, A . . . . . have signed.

2. We take the *chi* which ends this line and appears elsewhere as the sign for one chalkous on analogy to *O. Theb.* 35 etc., where it is written χ^{a}.
3. We are uncertain of the reading of the patronymic, but these letters seem to fit the traces best.

32. Receipt for Weavers' Tax

ROM Inv. No. 906.8.542 8.7 x 11.6 cm. 6 December A.D. 194

Πρεμαῶς καὶ μ(έτοχοι)
ἐπιτ(ηρηταὶ) τέλ(ους) γερδ(ίων) [[Φατρῆς]]

Πετεμενῶφις Φθου-
μῖνις ἐσχήκ(αμεν) ὑπ(ὲρ) Ἀθὺρ
τὸ κ(αθῆκον) τέλ(ος)
(ἔτους) γ Ἀδριανοῦ
ι

Premaos and his partners, overseers of the weavers' tax, to Petemenophis son of Pthouminis: we have received for Hathyr the due tax, year 3, Hadrianos 10.

1. Premaos and his partners appear in *O. Theb.* 60 and *O. Ash.* 43 (both of 1 April A.D. 191); *O. Theb.* 61 (27 April A.D. 191); *O. Theb.* 63 (24 February A.D. 192); *O. Bod.* 1031 and 1032 (both of A.D. 195); and *O. Ash.* 44 (January-February A.D. 196).

2. Petemenophis pays weavers' tax also in *O. Theb.* 64 (25 May A.D. 193) and *O. Bod.* 1029 (November A.D. 193). The name Φατρῆς has been stricken with an ink line.

33. Receipt for Crown Tax

ROM Inv. No. 906.8.416 8.0 x 7.0 cm. Late Second or Early Third Century

This receipt conforms to the general pattern of receipts for crown tax, on which see A.K. Bowman, "The Crown Tax in Roman Egypt," *BASP* 4, 1967, pp. 59-74, to which this new piece of evidence should be added. Four drachmas is the amount most commonly paid for this tax in receipts on ostraka, though it is impossible to say what proportion of the annual dues it may represent. The frequency of occurrence of these receipts becomes marked towards the end of the second century and continues to the reign of Severus Alexander. This ostrakon is to be dated to the late second or early third century and may be compared with *O. Bod.* 1105-15, particularly 1109-12 (dated respectively to the 4th, 3rd, 5th and 7th years of a reign).

Θὼθ ιγ τοῦ ζ (ἔτους) ὀνό(ματος)
Ὥρου Χαβονχό(νσιως)
ὑπ(ὲρ) στε(φανικοῦ) χρή(ματος) Ἀγο(ρῶν)
(δραχμὰς) τέσερας (γίνονται) (δραχμαὶ) δ

4. *l.* τέσσαρας

Thoth 13 of the 7th year, in the name of Horos son of Chabonchonsis, for the crown money for Agorai, drachmas four, that is, drachmas 4.

34. Granary Receipt

ROM Inv. No. 906.8.539 — 11.5 x 8.3 cm. — 22 June A.D. 105

Μεμέτρη(ται) εἰς τὸν θησ(αυρὸν)
ἱερα(τικῶν) Ἄνω (τοπαρχίας) γενήμα(τος) η (ἔτους) Τραιανοῦ
τοῦ κυρίου Παῦνι κ̄η̄ ὀνόματος
Μαιεύριος Ἁρφμόιτος (πυροῦ ἀρτάβην) μίαν
(γίνεται) (πυροῦ ἀρτάβη) ᾱ Π . . . σεση(μείωμαι) ἄλ(λην) ὀνόμα(τος)
Ἐσουή(ριος) Ἐ̣ρ̣ιέως (πυροῦ ἀρτάβην) α γ̄η̄
(γίνεται) (πυροῦ ἀρτάβη) α γ̄η̄ Π . . . σεση(μείωμαι)

Paid to the granary of the temples of the upper toparchy from the produce of the 8th year of Trajan the lord, Pauni 28, in the name of Maieuris son of Harphmois, artab of wheat one, that is, artab of wheat 1. I, P . . . have signed. Another in the name of Esoueris son of Herieus, artabs of wheat 1, 1/3, 1/8, that is, artabs of wheat 1, 1/3, 1/8. I, P . . . have signed.

2. Although the formula of the description of the granary differs slightly from the expected, the reading seems clear. The more common pattern is *εἰς τὸν τῶν ἱερατικῶν θησαυρόν*.

4. Μαιεύριος Ἁρφμόιτος. Men with this name appear as early as the tenth year of Vespasian, A.D. 78 (*O. Theb.* 44) and at least as late as A.D. 126; cf. our forthcoming discussion of the family, with new evidence, in *O. ROM* II.

35. Granary Receipt

ROM Inv. No. 906.8.245 — 9.0 x 7.0 cm. — 31 May, 8 July (?) A.D. 145

Μέ(τρημα) θησ(αυροῦ) μη(τροπόλεως) γενή(ματος) η
(ἔτους) Ἀντωνί̣ν̣ο̣υ
Καίσαρος τοῦ κυρίου Παῦνι ξ
ὑπ(ὲρ) Νό(του) ὀνό(ματος) Ἐπικράτους Ἐπωνύχο(υ)
δ[ιὰ] Ψ̣ε̣ν̣αμο(ύνιος) Ἀπολλ.( ) πυροῦ
τεταρ(τὸν) τ̣ε̣τ̣ρ̣α̣κ̣αιεικ(οστὸν) (γίνεται) (πυροῦ ἀρτάβης)
d κ δ′ Ἐπικ(ράτης) σ(εσ)η(μείωμαι)
[ἄλ(λας)] Ἐ̣π̣ε̣ὶφ ιδ (πυροῦ ἀρτάβας) τρεῖς τρίτον ὄγδοον
[(γίνονται) (πυροῦ ἀρτάβαι) γ γ]η ′καὶ ὀνό(ματος)
Φανο( ) π̣υ̣ρ̣ο̣ῦ̣ π̣έ̣ν̣τ̣ε̣ ἕκτο(ν)
[(γίνονται) (πυροῦ ἀρτάβαι) ες ′Ἐπι]κ(ράτης)
σ(εσ)η(μείωμαι).

Payment to the granary of the metropolis from produce of the 8th year of Antoninus Caesar the lord, Pauni 7, for Notos, in the name of Epikrates son of Eponuchos, through Psenamounis son of Apoll . . . . , one quarter and one twenty-fourth of wheat, that is, artabs of wheat 1/4, 1/24. I, Epikrates, have signed. Epeiph 14, additional artabs of wheat three, one-third, one-eighth, that is, 3, 1/3, 1/8, and in the name of Phano . . . . . artabs of wheat five and one-sixth, that is, artabs of wheat 5, 1/6. I, Epikrates, have signed.

4. The writing is very badly faded on the left-hand side of this and the two subsequent lines, and in places has almost completely disappeared. A Psenamounis son of Apollodoros occurs in *O. Bod.* 1133, of the twelfth year of Antoninus, and in *WO* 578, of the twenty-first year of Hadrian. The final letter of the father's name in our receipt looks more like an *omega* than an *omicron* but it might be possible to read Ἀπολλο(*δώρου*) or Ἀπολλοδ(*ώρου*), so that an identification may be hazarded. On the basis of the hand, however, the most obvious reading would probably be Ἀπολλω(*νίου*).

5-6. Only traces of letters remain at the beginning of the line but *-αιει-* is perfectly clear and the numeral signs confirm the reading. Epikrates appears as a signatory in *O. Bod.* 1374-8, 1384, 1389-90 at this period. He is one of the few officials who uses *πυροῦ* written out in full.

6-8. There is a diagonal break at the beginning of these lines which has removed some letters. The name Φανο( ), perhaps Φανο(*ῦφις*), is not absolutely certain. The commoner name Ψανσ(*νῶς*) might be preferred. We are aware that the reading which we have adopted anomalously excludes a patronymic here, but Epikrates' formula demands *πυροῦ* and the word which immediately follows the name looks much more like *πυροῦ* than does the next word. However, since the writing is faded and rather crabbed at this point, it is impossible to be sure. We are more confident of ἕκτο(*ν*). The missing piece would just about accommodate the necessary siglae and numerals. The readings of lines 7-8 must, however, be regarded as tentative.

36. Granary Receipt

ROM Inv. No. 906.8.244 9.2 x 7.1 cm. July-August A.D.157

The receipt is written on a piece of brown, ribbed pot, across the ribbing in a clear firm hand. The ink is black and clear for the most part, but has been abraded at some points on the ribbing, most notably at points 3 cm. from the right-hand edge of the sherd.

Μέ(*τρημα*) *θησ*(*αυροῦ*) *μη*(*τροπόλεως*) *γενή*(*ματος*) *κ* (ἔτους)
Ἀντωνίνου Καίσαρος
τοῦ κυρίου Μεσορή . ὑπ(ἐρ)
Ἀγο(*ρῶν*) *ὀνό*(*ματος*) Σενχώ(*νσεως*) Φμόιτος καὶ
Σενφμόιτο(ς) ἀδε(λφῆς)
(*πυροῦ ἀρτάβης*) *τετρακαιει*(*κοστὸν*) (*γίνεται*) (*πυροῦ ἀρτάβης*) $\overline{κδ}$
Ὧρος *σ*(*εσ*)*η*(*μείωμαι*)

Payment to the granary of the metropolis from produce of the 20th year of Antoninus Caesar the lord, Mesore – for Agorai, in the name of Senchonsis daughter of Phmois and her sister Senphmois, artab of wheat one twenty-fourth, that is, artab of wheat 1/24. I, Horos, have signed.

3. The numeral after Μεσορή is too badly abraded to be read; there does not seem to be room for two letters.

5. For the name and persons, see *O. ROM* 53.

7. Probably the same signer as in *O. Bod.* 1438A and 1443 of the twenty-first and twenty-second years of Antoninus.

37. Granary Receipt

ROM Inv. No. 906.8.592 7.9 x 6.5 cm. 2 June A.D. 159

Μέ(τρημα) θησ(αυροῦ) μη(τροπόλεως) γενή(ματος) κβ (ἔτους)
Ἀντωνίνου
Καίσαρ(ος) τοῦ κυρίου Παῦ(νι) η̄ ὑπ(ὲρ) Ἀγο(ρῶν)
ὀνό(ματος) Ἐσουήριος Πε̣τεμενώφιο(ς)
(πυροῦ ἀρτάβης) τρίτον δωδέκατ(ον) (γίνεται) (πυροῦ
ἀρτάβης) γιβ̣ . .
σ(εσ)η(μείωμαι)

Payment to the granary of the metropolis from produce of the 22nd year of Antoninus Caesar the Lord, Pauni 8, for Agorai, in the name of Esoueris son of Petemenophis, artab of wheat one-third, one-twelfth, that is, artab of wheat 1/3, 1/12. I, ... have signed.

3. If Ἐσουήριος Πετεμενώφιος is to be read, the man may be the same as the Ἐσουήριος Πετε( ) in *O. Bod.* 1394, of the 11th year of Antoninus (A.D. 148). The reading of the father's name is, however, uncertain. What is read as a *pi* looks rather more like a peculiar *iota omicron* or *iota delta* and, in fact, a proper name can not easily be made out of the writing, which is perfectly clear. The reading we have adopted seems to render the writing in the most likely way.

38. Granary Receipt

ROM Inv. No. 906.8.236 12.3 x 8.3 cm. A.D. 161

[Μέ(τρημα) θησ(αυροῦ) μητροπ(όλεως)?] γ(εν)ή(ματος) α
(ἔτους) Αὐρηλίου Ἀντωνίνου

[καὶ Οὐήρου] τῶν κυρίων Σεβαστῶν
[month ¯]¯ ὑπ(ὲρ) Νό(του) ὀνό(ματος) Ἰμούθης Ἰμούθ(ου)
[διὰ Ψ]εναμούνιος Φαήριος πυροῦ
5 [μί]αν (γίνεται) (πυροῦ ἀτράβη) α Αυ( ) σ(εσ)η(μείωμαι)
(πυροῦ ἀρτάβην) α

Payment to the granary (of the metropolis?) from produce of the 1st year of Aurerius Antoninus and Verus the lords Augusti, (date), for Notos, in the name of Imouthes son of Imouthes, through Psenamounis son of Phaeris, artab of wheat one, that is, artab of wheat 1. I, Au . . . , have signed for 1 artab of wheat.

1. Read Αὐρηλίου. The closest parallel to the formula here is Αὐρήλιος Ἀντωνῖνος καὶ Αὐρήλιος Οὐῆρος οἱ κύριοι Σεβαστοί, cited by Bureth, *Tit. Imp.*, p. 78, as securely read in a number of texts of the first year, and once doubtfully (*BGU* 240.9) in year eight. There does not seem to be room to read the second Aurelius in the break at the beginning of line 2. There is also the formula Ἀντωνῖνος καὶ Οὐῆρος οἱ κύριοι Σεβαστοί attested in year 1.

3. Imouthes son of Imouthes is known from *O. Bod.* 1429 (Notos, 154), where he also pays grain.

4. The intermediary, Psenamounis son of Phaeris, appears in O. Theb. 57 paying weaving tax in 156.

39. Granary Receipt

ROM Inv. No. 906.8.249 9.3 x 9.6 cm. 30 June A.D. 163

This reddish-brown ostrakon is complete and contains a receipt for payment of grain into the granary of the metropolis. The hand is firm and clear.

Μέ(τρημα) θησ(αυροῦ) μη(τροπόλεως) γ(εν)ή(ματος) γ (ἔτους)
Ἀντωνίνου καὶ Οὐήρου τῶν
κυρίων Σεβασ(τῶν) Ἐπεὶφ ζ ὑπ(ὲρ) Νό(του)
ἀ(πὸ) Πε̣τ̣ε̣ . . ( ) Πικῶ(τος) δ(ιὰ) γ(εωργοῦ) Φα-
5 μίνιος Ψανσνῶ(τος) (πυροῦ ἀρτάβης) ἕκτο(ν) κ δ′
6 (γίνεται) (πυροῦ ἀρτάβης) ς κ̄δ̄ Ἀμώ(νιος) σ(εσ)η(μείωμαι)

Payment to the granary of the metropolis from produce of the 3rd year of Antoninus and Verus the lords Augusti, Epeiph 7, for Notos, from Pete . . . son of Pikos, through the lessee Phaminis son of Psansnos, artab of wheat one-sixth, one twenty-fourth, that is, artab of wheat 1/6, 1/24. I, Amonios, have signed.

4. There is a fault in the pot here which obscures the final letters in Πετε . . ( ), and which seems to have caused the pen to go awry in writing the name. Depending on how one interprets the results, the name could be read as one of many normal names with this beginning.

There is a line over the beginning of Φαμένιος here, as if the scribe had intended to abbreviate the name, but thought better of it, and continued. ἀ(πὸ) is an attested variant of the formula with ὀνό(ματος); cf. e.g., *O. Bod.* 1456.4.

4-6. Phaminis, son of Psansnos, appears as a payer in *O. Bod.* 1461 (16 July 162). The signatory Amonios also appears in that receipt, and in others of the same period. The editors thought that *O. Bod.* 1461-3, all of which contain his signature, were probably in the same hand; the present receipt should also be in his hand.

40. Granary Receipt

ROM Inv. No. 906.8.176 4.4 x 5.2 cm. 3 January A.D. 164

This ostrakon appears to be the upper right corner of the original piece.

[Συναίρε(μα) θησ(αυροῦ) . .]γενή(ματος) δ (ἔτους) Ἀντω(νίνου)
[καὶ Οὐήρου τῶν] κυρίων Σεβαστῶν
[? τῶν μεγίστων Τῦ]βι ς̄ ὀνό(ματος) Πεχ.( )
[καὶ . . . ( ) ἀμ]φοτ(έρων) Πετεχω( )
5 [ ]

Total payment into the granary of ? from produce of the 4th year of Antoninus and Verus the lords, greatest Augusti, Tubi 6, in the name of Pech . . . . and ?, both sons of Petecho . . . .

1. We restore the first line on the analogy of *O. Bod.* 1409 and 1460, q.v. for references to parallels, not exactly the same. The reason for the restoration is that in line 3, we feel sure that a numeral precedes ὀνό(ματος) κτλ. Such is not the case in normal receipts of the μέτρημα formula, which have the location in this place. But *O. Bod.* 1409 and 1460 have this formula.

41. Granary Receipt

ROM Inv. No. 906.8.131 + 906.8.89 2 fragments, totalling 9.8 x 8.1 cm. 31 March A.D. 167

This receipt, for payment ὑπὲρ συναγοραστικοῦ λόγου, joins the small number of receipts on pottery or papyrus which involve this payment. *O. Bod.* 1395; 1414; 1472; *O. Strassb.* 336; 337; 349 are examples of Theban ostracon receipts, while *P. Teb.* 369 and 394, and *P. Oxy.* 1541 attest the account in lower Egypt.

The συναγοραστικὸς πυρός (wheat and barley are both attested) was the grain requisitioned for the army, the *frumentum emptum* (cf. Wilcken, *Grundzüge*, p. 359, and A.C. Johnson, *Roman Egypt*, pp. 620 f.). The

acquisitions were handled by local magistrates, and Johnson (*op. cit.*) suggests that any prices paid must have been insufficient to prevent the collections from becoming a burden.

Μέ(τρημα) θησ(αυροῦ) μη(τρο)πόλ(εως) γενή(ματος) ς (ἔτους)
Ἀντωνί̣ν̣ο̣υ̣
καὶ Οὐήρου τῶν κυρίων Σεβαστῶν
Φαμ]ε̣νὼθ ζ τοῦ ζ (ἔτους) ὑπ(ὲρ) συναγο(ραστικοῦ)
λ̣όγου το(ῦ) αὐτ(οῦ) ς (ἔτους) Ἀγο(ρῶν) ὀνό(ματος) Ε̣ . . . ιτο(ς)
5 Ὥρου διὰ Ψενσενμο(ύθου) Καμήτι(ος)
6 (πυροῦ ἀρτάβης) [ὄ]γ̣δοον (γίνεται) (πυροῦ ἀρτάβης) η̅ Π.θ.
σ(εσ)η(μείωμαι)

Payment to the granary of the metropolis from produce of the 6th year of Antoninus and Verus the lords Augusti, Phamenoth 7 of the 7th year, on behalf of the synagorastikos account of the same 6th year, for Agorai, in the name of E . . . . . son of Horos, through Psensenmouthes son of Kametis, artab of wheat one-eighth, that is, artab of wheat 1/8. I, P . . . , have signed.

4. Ε̣ . . . ιτο(ς): the ink is all clear on the sherd, except for the second letter, but we have been unable to find any known name here.

5. Psensenmouthes son of Kametis acts as agent in the same year, for the same account, in the same place, for Zmenimouthes son of Petemenophis, in *O. Bod.* 1472.

6. We are not able to read the name of the signer, which, clear but cursive, must be the same name that troubled the editors of *O. Bod.* 1471.

42. Granary Receipt

ROM Inv. No. 906.8.196 7 x 5.5 cm. A.D. 167/8

This ostrakon is of standard form but broken off at the right, where about a third of the original piece is missing.

Μέ(τρημα) θησα(υροῦ) μη(τροπόλεως) γεν(ήματος) η (ἔτους)
[Ἀντωνίνου]
καὶ Οὐήρου τῶν κυρίω[ν month and day ὑπ(ὲρ) place]
3 ὀνό(ματος) Ψένσνιο(ς) Πενα[

Payment to the granary of the metropolis from the produce of the 8th year of Antoninus and Verus the lords . . . . . for . . . in the name of Psensnis son of Pena . . .

3. We take Ψένσνιο(ς) to be an incorrect genitive of Ψενσνεύς or Ψενσνῶς, which are reasonably common alternates of Ψανσνῶς.

43. Granary Receipt

ROM Inv. No. 906.8.146 — 7.7 x 6.1 cm. — A.D. 161-169

Μέ(τρημα) θησ(αυροῦ) [μη(τροπόλεως) γ(εν)ή(ματος) ? (ἔτους)
Ἀντωνίνου]
καὶ Οὐήρου τῶν [κυρίων Σεβαστῶν month]
κε ὑπ(ὲρ) Νό(του) ὀνό(ματος) Παχ̣[
Φατρήους Ὥρου (πυροῦ ἀρτάβας) δώδ[εκα τρί(τον)]
5 (γίνονται) (πυροῦ ἀρτάβαι) ιβ γ καὶ ὀνό(ματος) Ὥρο̣υ̣ Πε̣χ̣[
6 ἥμισυ ὄγδο(ον) (γίνεται) (πυροῦ ἀρτάβης) ∟ η Πα̣( )
σ[(εσ)η(μείωμαι)]

Payment to the granary of the metropolis from produce of the – year of Antoninus and Verus the lords Augusti, (month) 25, for Notos, in the name of Pach . . . . . son of Phatres son of Horos, artabs of wheat twelve, one-third, that is, artabs of wheat 12, 1/3, and in the name of Horos son of Pech . . . . . artab of wheat half and an eighth, that is, artab of wheat, 1/2, 1/8. I, Pa . . . . . , have signed.

5. Ὥρο̣υ̣. The *omega* is blotted, and the *omicron* is a connector between adjacent letters.
Πε̣χ̣. *Epsilon* could be read as *alpha*, and the *chi* is broken, but the left side of the letter remains. We have not identified any of the persons in this text.
6. The name of the signer is cursive, but this seems the best reading. A Παμώ(νθης) is known from *O. Bod.* 1437 (158), a Πανα(μεῦς) from *O. Bod.* 1465 (165), a Π.( ) from *O. Bod.* 1478 (169?).

44. Granary Receipt

ROM Inv. No. 906.8.86 — 7.4 x 6.5 cm. — 13 October A.D. 174

This slightly ribbed sherd is broken at the bottom, leaving only traces of the latter part of the second payment. It is impossible to tell whether the second payment was followed by a third, or by the signature of the official.

Μέ(τρημα) θησ(αυροῦ) μη(τροπόλεως) γ(εν)ή(ματος) ιδ (ἔτους)
Αὐρηλίου
Ἀντωνί̣ν̣ο̣υ̣ Καίσαρος τοῦ κυρίου
Φαῶ̃(φι) ις τοῦ ιε (ἔτους) ὑπ(ὲρ) Νή(σων) ὀνό(ματος)
Ἀτρ̣[η̃]ς Ὥρου Σ̣π̣οτοῦτος
5 (πυροῦ ἀρτάβης) τρίτ(ον) κ δ΄(γίνεται) (πυροῦ ἀρτάβης)
γ΄κ΄δ΄καὶ ὑπ(ὲρ) Χ̣(άρακος)
ὁμοίως (πυροῦ ἀρτάβης) ἥμισυ τρ̣[ίτ(ον)]
7 τετρ[ακ(αιεικοστὸν)] (γίνεται) (πυροῦ ἀρτάβης) ∟ γ΄κ΄δ΄

Payment to the granary of the metropolis from produce of the 14th year of Aurelius Antoninus Caesar the lord, Phaophi 16 of the 15th year, for Nesoi, in the name of Hatres son of Horos son of Spotous, artab of wheat one-third, 1/24, that is, artab of wheat 1/3, 1/24, and for Charax likewise, artab of wheat one-half, one-third, one twenty-fourth, that is, artab of wheat 1/2, 1/3, 1/24.

6. The beginning of the last word is faded, but the *tau* is clear, and traces of the *rho* can be seen. A diagonal piece has broken off the right-hand corner which has removed the rest of the word.

7. The bottom parts of the letters of the numeral have been broken away, as have those of the *siglae* ʃ and ƨ. Of the final numeral, only the tops of letters survive, with the stroke above them denoting the numeral.

45. Granary Receipt

ROM Inv. No. 906.8.204 6.9 x 4.1 cm. 23 May A.D. 176

Only a fraction of the text remains after breakage.

Μέ(τρημα) θησ(αυροῦ) μη(τροπόλεως) γ(εν)ή(ματος) ις
(ἔτους) [Μάρκου]
Αὐρηλίου Ἀντωνῖνου [Καίσαρος]
τοῦ κυρίου Παχὼ(ν) κη̄ [
[ ]τ̣ε̣χ( ) Χαβον[
[ ] . . . . [

Payment to the granary of the metropolis, from produce of the 16th year of Marcus Aurelius Antoninus Caesar the lord, Pachon 28 . . . .

46. Granary Receipt

ROM Inv. No. 906.8.591 10.5 x 8.7 cm. 9 July A.D. 178

Μέ(τρημα) θησ(αυροῦ) μη(τροπόλεως) γ(εν)ή(ματος) ιη (ἔτους)
Αὐρηλίων Ἀντωνίνου καὶ
Κομμόδου Καισάρων τῶν
κυρίων Ἐπεὶφ ιε ὑπ(ὲρ) Ἀγο(ρῶν) ὀνό(ματος)
Πεκύσιο(ς) Ὥρου (πυροῦ ἀρτάβης) ἥμισυ
δωδέ̣κ̣α̣(τον) (γίνεται) (πυροῦ ἀρτάβης) ∟ ιβ⁻
Ἀμ(ώνιος) σ(εσ)η(μείωμαι)
Demotic: 3bd 3 smw 16 (or 15?) sw? 1/2 1/12

Payment to the granary of the metropolis from the produce of the 18th year of the Aurelii Antoninus and Commodus Caesars the lords, Epeiph 15, for Agorai, in the name of Pekusis son of Horos, artab of wheat one-half and one-twelfth, that is, artab of wheat 1/2, 1/12. I, Amonios, have signed. (Demotic:) Month 3 of Shom (= Epeiph) day 16 (or 15?) 1/2, 1/12 (artab of) wheat.

5. A Pekusis son of Horos appears as Πεκύσιο(ς) *ὁ καὶ* Νε.μενο( ) Ὥρου, in *O. Bod.* 1869, dated tentatively ca. 120 (?). That date is of course too early for our man, unless the Bodleian ostrakon may be dated later.

9. The demotic has been read by R.J. Williams.

47. Granary Receipt

ROM Inv. No. 906.8.261 8.3 x 9.4 cm. 15? August, A.D. 178

This granary receipt is written on a brown, concave piece of sherd in a firm, somewhat inky hand. The piece bears no sign of any previous writing. There is some fading at the ends of the second and third lines, and heavy smudging at the ends of the fourth and fifth lines. The piece is complete.

Μέ(τρημα) θησ(αυροῦ) μη(τροπόλεως) γ(εν)ή(ματος) ιη (ἔτους)
Αὐρηλίων Ἀντων(ίνου) καὶ
Κομμόδου Καισάρων τῶν
κυρίων Μεσ(ορὴ) κ̣β̣ ὑπ(ὲρ) Ἀγο(ρῶν)
5 ὀνό(ματος) Σεντοῦτο(ς) Ὥρου (πυροῦ ἀρτάβην) μί-
αν ἥμισυ ιβ̄ (γίνεται) (πυροῦ ἀρτάβη) α ∟ ιβ̄
7 Ἀμώ(νιος) σ(εσ)η(μείωμαι)
Demotic: 3bd 4 smw sw 22(?) sw(?) w 1/2 1/12

Payment to the granary of the metropolis from produce of the 18th year of Aurelii Antoninus and Commodus Caesars the lords, Mesore 22?, for Agorai, in the name of Sentous daughter of Horus, artabs of wheat one, a half and a twelfth, that is, artabs of wheat 1, 1/2, 1/12. I, Amonios, have signed. (Demotic:) Month 4 of Shōmu (= Mesore) day 22 (?) one 1/2 1/12 (artabs of) wheat.

2. There is a fault in the pot which has caused the *upsilon* of Αὐρηλίων to come out as a large black blob of ink.

3. All but the upper part of the *delta* of Κομμόδου has been removed by a chip in the sherd.

4. The day of the month is obscured by severe smudging. Despite an initial tendency to read *iota*, followed perhaps by *delta*, we read κβ on the basis of the Demotic.

6. Amonios is known as the signatory of receipts for granary payments at this period, cf. e.g. *O. Bod.* 1479-1521.

7. The preceding receipt, *O. ROM* 46, as well as *O. Bod.* 1496, both of the same year, were written by the same Amonios, and all three have a line of demotic at the end. The demotic has been read by R.J. Williams.

48. Granary Receipt

ROM Inv. No. 906.8.242 7.0 x 7.6 cm. 21 January A.D. 179

The ostrakon is reddish in colour. The writing is faded in places and difficult to read in the last two lines where the writer had to cope with ridges in the pot. The sherd contains two separate versions of the same receipt written in different hands. The first is clearly a short version, bearing none of the conventional formulae and lacking the date and signature of the official. The second is the "authentic" version. We consider that the first version may have been a temporary receipt or record of information, which later was available for re-writing in the proper form.

Θ . . . ( ) ὑπ(ὲρ) Χά(ρακος) ὀνό(ματος) Ὥρου
τοῦ καὶ Φατρήο(υς) Τεῶτος
Αρ . . θ( ) (πυροῦ ἀρτάβην) α $\overline{\gamma\eta}$
μέ(τρημα) θῆσ(αυροῦ) μη(τροπόλεως) γ(εν)ή(ματος) κ
(ἔτους)
Κομμόδου Καίσαρος τοῦ κυρίου Τῦβ(ι)
$\overline{\kappa\epsilon}$ ὑπ(ὲρ) Χά(ρακος) ὀνό(ματος) Ὥρου τοῦ καὶ Φα-
τρήο(υς) Τεῶτο(ς) Αρ . . θ( ) (πυροῦ ἀρτάβην) μίαν
τρίτ(ον) ὄγδο(ον) (γίνεται) (πυροῦ ἀρτάβη) α $\overline{\gamma\eta}$
Ἀμῶ(νιος) σ(εσ)η(μείωμαι)

. . . . . for Charax, in the name of Horos also called Phatres, son of Teos, son of . . . . . , artabs of wheat 1, 1/3, 1/8. Payment to the granary of the metropolis from produce of the 20th year of Commodus Caesar the lord, Tybi 25, for Charax, in the name of Horos also called Phatres son of Teos son of . . . . . , artabs of wheat one, a third, an eighth, that is, artabs of wheat 1, 1/3, 1/8. I, Amonios, have signed.

1. Under water, the first letter is clearly a *theta*. It would be possible to read what follows as *μη* to present a formula of *θ(ησαυροῦ) μη(τροπόλεως)*, but the palaeography is not sufficiently compelling to make us read this with confidence. The difficulty is further compounded by the fact that the writer of the receipt either was ignorant of the proper formulae or chose to disregard them.

2 and 6. In *O. Bod.* 1488, of 175, there appears a Φατρήους Τεῶτο(ς) who is probably the same man without the *alias* unless the preceding Ὥρου . . . . το( ) διά is to be read as Ὥρου τοῦ καί.

3 and 7. The name of the grandfather should follow here. In line 3 one could read Ἀρυώθ(ης), but the verschleifung leaves only *alpha, rho, theta* clear; in line 7 the same name does not fit the strokes well. In the latter case, however, the ribbing of the pot might easily be responsible for distortion.

49. Granary Receipt

ROM Inv. No. 906.8.265 9.3 x 5.8 cm. 30 September A.D. 181

Μέ(τρημα) θησ(αυροῦ) μη(τροπόλεως) γ(εν)ή(ματος) κα
(ἔτους) Κομ[μόδου]
Ἀντωνί(νου) Κ̣α̣ί̣σ̣α̣ρ̣ο̣ς̣ τοῦ̣ κ̣υ̣[ρίου Φαῶ-]
φι γ̄ τοῦ κβ (ἔτους) ὑπ(ὲρ) Χά(ρακος) ὀν[ό(ματος)
διὰ Σποτοῦτος (πυροῦ ἀρτάβας) . . .
Ἀμώ(νιος) σ[(εσ)η(μείωμαι)]

Payment to the granary of the metropolis from produce of the 21st year of Commodus Antoninus Caesar the lord, Phaophi 3 of the 22nd year, for Charax, in the name of . . . . through Spotous, artabs of wheat . . . . I, Amonios, have signed.

4. This line is so faded that no reading can be considered secure. However we think we can see each letter read. The reading assumes that the piece has been broken at the right.

50. Granary Receipt

ROM Inv. No. 906.8.169 6.6 x 5.3 cm. A.D. 185-6

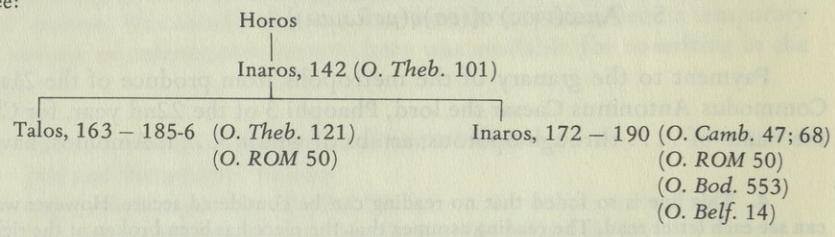
Μέ(τρημα) θησ(αυροῦ) μη(τροπόλεως) γ(εν)ή(ματος) κς
(ἔτους) Κομμ[όδου]
Ἀντων̣(ίνου) Καίσαρο(ς) τ(οῦ) κ̣υ̣ρ̣(ίου) Ἐ̣π̣[εἰφ. .]
ὑπ(ὲρ) Ἀγο(ρῶν) ὀνό(ματος) Ἰναρῶτο̣(ς)[
καὶ Ταλῶτο(ς) ἀδε̣[λφῆς]
(πυροῦ ἀρτάβης) δωδέκα̣[τον

Payment to the granary of the metropolis from produce of the 26th year of Commodus Antoninus Caesar the lord, Epeiph (?) –, for Agorai, in the name of Inaros . . . . . and Talos his sister, artab of wheat one-twelfth . . . . .

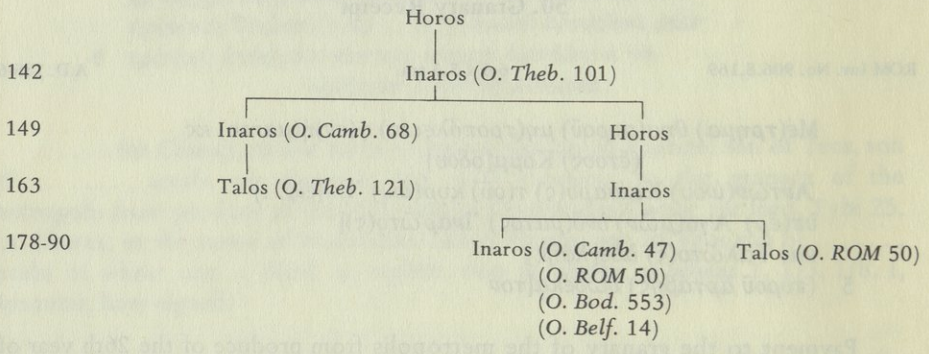
2. That there is some part of the original piece broken from the right seems certain, but we cannot be sure how much. We have restored on the assumption that the loss is progressively greater – thus perhaps no more than a few millimeters at the top to as much as two centimeters at the bottom. We are not confident of our reading of the end of line 2, but the maximum error would only affect the month name. The writing is quite cursive, and our reading is certainly compatible with what can be seen. We have assumed extensive but traditional abbreviation. It is also possible to read the end of the line with more of the strokes attributed to the writing of *κυρίου*, so that the strokes before the break, which we read as Ἐ̣π̣ could be taken as the *rho* of *κυρίου*, but this seems less likely. It is also possible to read a *pi* for Pauni, though again with less likelihood.

3-4. The names in these lines appear in a number of other texts: *O. Theb.* 101 (142, Inaros, son of Horos); *O. Camb.* 68 (149, Inaros son of Inaros son of Horos); *O. Theb.* 121 (163,Talos daughter of Inaros); *O. Camb.* 47 (178, Inaros son of Inaros); *O. ROM* 50 (185-6, Inaros and Talos); *O. Bod.* 553 (186, Inaros son of Inaros son of Horos); *O. Belf.* 14 (190, Inaros son of Inaros son of Horos). Tait, publishing *O. Camb.* 68, suggested that the Inaros in that text might have been the same man as in *O. Belf.* 14, but the range of 41 years for the man is difficult. If the date of *O. Camb.* 68 were 172, not 149, this would be avoided, and the imperial titulature would fit 172 as well as 149.

On this hypothesis, we suggest that the Inaros of *O. Theb.* 101 (142) was the father of the Inaros of all the other texts, and of Talos the sister of Inaros, to produce the following family tree:



An alternative scheme, not assuming a mis-dating by Tait, and accepting as part of the hypothesis some unattested members of the family, would have:



The palaeography at the end of line 4 is difficult. The character read as *epsilon* can hardly be read as anything but that, although it looks more like the beginning of a *mu*. ἀδελφῆς should perhaps be resolved as ἀδελ(φῆς) by analogy to *O. Bod.* 1321, 794, 1957, or ἀδελφ(ῆς) as in *O. Bod.* 1247. It is written out in memoranda and accounts (e.g. *O. Bod.* 340, 1789, 1964, 2471) and the drastic abbreviation αδ( ) in *O. Bod.* 1444 raises at least the possibility of a different interpretation of the last letter before the break.

51. Granary Receipt

ROM Inv. No. 906.8.538 9.8 x 7.2 cm. 13 July A.D. 186

Μέ(τρημα) θησ(αυροῦ) κω(μῶν) γ(εν)ή(ματος) κς (ἔτους)
Κομμόδου Ἀντων(ίνου)
Καίσαρος τοῦ κυρίου Ἐπεὶφ ῑ̄θ̄ ὑπ(ὲρ) [[Χαρ]] Ἀγο(ρῶν)
ὀνό(ματος)
Φθουμώ(νθου) Ἀσκλᾶτο(ς) (πυροῦ ἀρτάβην) μίαν ἥμισυ
(γίνεται) (πυροῦ ἀρτάβη) α ∟
καὶ ὑπ(ὲρ) Νό(του) ὁμο(ίως) (πυροῦ ἀρτάβας) τέσσαρας
(γίνονται) (πυροῦ ἀρτάβαι) δ Ε( )
σ(εσ)η(μείωμαι)

Payment to the granary of the villages from produce of the 26th year of Commodus Antoninus the lord, Epeiph 19, for Agorai, in the name of Phthoumonthes son of Asklas, artabs of wheat one and one-half, that is, artabs of wheat 1 1/2, and for Notos likewise, artabs of wheat four, that is, artabs of wheat 4. I, E . . . . . , have signed.

2. Milne read ιη for the day of the month, but the *theta* is clear. There has been a correction of the place of payment from Χαρ to Αγο.

3. Phthoumonthes son of Asklas appears also in *O. Bod.* 1543, of 4 July 190, paying for Agorai and with his name abbreviated just as in this text.

52. Granary Receipt

ROM Inv. No. 906.8.172 5.6 x 5.9 cm. 7 September A.D. 186

The ostrakon is small, and almost intact, but the small portion broken off at the lower left leads to a slight uncertainty about the amounts involved.

Μέ(τρημα) θησ(αυροῦ) μη(τροπόλεως) γ(εν)ή(ματος) κς (ἔτους)
Κομμ(όδου) Ἀντωνίνου Καίσαρος
[τ]ο̣ῦ̣ κ(υρίου) Θὼθ ῑ̄ τοῦ κζ (ἔτους)
[ὑ(πὲρ)] ὀνό(ματος) Παήριος Παῶ̣ντιος
[(πυροῦ ἀρτάβης) ἥμισ]υ̣ (γίνεται) (πυροῦ ἀρτάβης) ∫
. σ(εσ)η(μείωμαι) (πυροῦ ἀρτάβης) ∫

Payment to the granary of the metropolis from produce of the 26th year of Commodus Antoninus Caesar the lord, Thoth 10 of the 27th year, for (place), in the name of Paeris son of Paontis, artab of wheat one-half, that is, artab of wheat 1/2. I –, have signed for artab of wheat 1/2.

5. We read the faint traces of writing after the signature as the acknowledgement of the sum, as in *O. Bod.* 1550, 1554, 1558, etc.

53. Granary Receipt

ROM Inv. No. 906.8.593 8.4 x 6.8 cm. 28 May A.D. 191

Μέ(τρημα) θησ(αυροῦ) μη(τροπόλεως) γενή(ματος) λα (ἔτους)
Κομμόδου Ἀντωνίνο(υ) Κ̣α̣[ίσ(αρος)]
τοῦ κυρίου Παῦ(νι) γ̄
ὀνό(ματος) Σενχ(ώνσεως) Φμόιτο(ς) καὶ
Σενφμοίτο(ς) ἀδελ(φῆς)
(πυροῦ ἀρτάβης) ὄγδο(ον) (γίνεται) (πυροῦ ἀρτάβης) η̄
Παν(ίσκος) σ(εσ)η(μείωμαι).

Payment to the granary of the metropolis from produce of the 31st year of Commodus Antoninus Caesar the lord, Pauni 3, in the name of Senchonsis daughter of Phmois, and Senphmois her sister, artab of wheat one-eighth, that is, artab of wheat 1/8. I, Paniskos, have signed.

2. Milne read the end of the line as Καις. Only traces remain, and these are compatible with Κα.

4-5. These women appear also in *O. ROM* 36, from 157. Senphmois is not listed in the *NB*, but is an entirely reasonable formation, and there can be no doubt of the reading in the two texts, which Milne's notes also record.

6. For Paniskos as signer at this time, cf. *O. Bod.* 1536 (4 June 189); *O. Belf.* 14 (21 June 190); *O. Bod.* 1544 (14 July? 190); 1550 (18 March 191); 1551 (17 May 191); 1552 (17 May 191); 1554 (27 May 191); 1555 (29 June 191); 1556 (12 July 191); 1557 (191).

54. Granary Receipt

ROM Inv. No. 906.8.250 7.5 x 7.7 cm. Reign of Commodus

Μέ(τρημα) θησ(αυροῦ) μη(τροπόλεως) γ(εν)ή(ματος) κ̣ (ἔτους)
Κομμ̣ό̣δ̣ου Ἀν̣τ̣ω̣ν(ίνου) Καίσαρος
το(ῦ) κυρί(ου) Ἐπειὶφ ῑη̄ ὑπ(ὲρ) Νό(του) ὀνό(ματος)
Λολοῦτος Τ̣ηιονχώ̣ν̣σ̣ω̣ς
(πυροῦ ἀρτάβην) μίαν (γίνεται) (πυροῦ ἀρτάβη) α
Ὡρ( ) σ(εσ)η(μείωμαι)

Payment to the granary of the metropolis from produce of the 20th (?) year [c] Commodus Antoninus Caesar the lord, Epeiph 18, for Notos, in the name of

Lolous son of Teionchonsis, artab of wheat one, that is, artab of wheat 1. I, Hor( ), have signed.

1. There is a chip off the surface which has removed most of the numeral. Any number in the twenties would be possible, but perhaps *kappa* alone is the best reading.

3. Τηιονχώṇσιος: there are not enough strokes for the *nu-sigma*. For the family, see our forthcoming discussion with new evidence in *O. ROM* II.

55. Granary Receipt

ROM Inv. No. 906.8.237 7.8 x 5.0 cm. 4 July A.D. 194

Μέ(τρημα) θησ(αυροῦ) μη(τροπόλεως) γενή(ματος) γ̣ (ἔτους)
Λουκί̣ο̣υ Σ̣ε̣π̣[τίμιου]
Σεουήρου Ε̣ὐσεβ(οῦς) Περτ̣ώ̣ακος̣
Καίσαρο(ς) τοῦ κυρί̣ο̣υ̣ Ἐπ(εὶφ) ῑ ὑπ(ὲρ) Νό(του) κ̣α̣ὶ
[Λ(ιβὸς) ?]
ὀνό(ματος) Πετεχε( ) Χαβονχώνσι(ος)
(πυροῦ ἀρτάβης) ἥμισυ δωδέκατον (γίνονται) (πυροῦ
ἀρτάβης) L ιβ̄
[[ ]]
[[ ]]

Payment to the granary of the metropolis from produce of the 3rd year of Lucius Septimius Severus Pius Pertinax Caesar the lord, Epeiph 10, for Notos and (Lips ?), in the name of Peteche . . . son of Chabonchonsis, artab of wheat one-half, one twelfth, that is, artab of wheat 1/2, 1/12.

1. The ostrakon is written very cursively and is quite abraded at the right. The year numeral is chipped, but the remains look most like *gamma*. We cannot tell whether the remainder of Σ̣ε̣π̣[τιμίου is chipped off the edge, or whether the name simply disappears in the scrawl.

3. The museum number has been written over the end of this line where the ink is in any case badly faded. Λ(ιβός) is the most probable restoration; Ὠφιήο(υ) (cf. *O. Bod.* 917) is the less likely alternative.

6-7. From the blurring of the ink we take it that the intended erasure is ancient. It was successful and little can be read, save that in the last line the traces seem to be of numerals.

56. Granary Receipt

ROM Inv. No. 906.8.229 10.4 x 8.5 cm. 16 July A.D. 194

Μέ(τρημα) θησ(αυροῦ) μη(τροπόλεως) γενή(ματος) β̄ (ἔτους)
Λουκίου Σεπ(τιμίου)

Σεουήρου Περτίνακ(ος) Καίσαρ(ος) τοῦ κ(υρίου)
Ἐπεὶφ κ̄β̄ ὑπ(ὲρ) Χά(ρακος) ὀνό(ματος) Ψεν( ) Πλ̣ήνι̣ο̣ς
Πεκ̣ύ̣σ̣ι̣(ος)
διὰ Παψιο(ῦτος) [[π]] Χεμπνέως (πυροῦ ἀρτάβας) τρεῖς
(γίνονται) (πυροῦ ἀρτάβαι) γ. Πα( ) σ(εσημείωμαι)

Payment to the granary of the metropolis from produce of the 2nd year of Lucius Septimius Severus Pertinax Caesar the lord, Epeiph 22, for Charax, in the name of Psen . . . son of Plenis son of Pekusis, through Papsious son of Chempneus, artabs of wheat three, that is, artabs of wheat 3. I, Pa( ), have signed.

1. We are not absolutely certain of the year. To the left of the numeral is a horizontal stroke which connects with the numeral, and we take this to mark the abbreviation of the preceding word. There are traces of erased writing above line 1.

3. The writing is perfectly clear and dark, but we still feel some doubt about these names.

5. The signer is perhaps Paniskos, for whom see *O. ROM* 53.

57. Granary Receipt

ROM Inv. No. 906.8.243 9.7 x 8.1 cm. 19 August A.D. 198

Μέ(τρημα) θησ(αυροῦ) μη(τροπόλεως) γ(εν)ή(ματος) ς̣ (ἔτους)
Λουκίου Σεπτ̣ι̣μ̣ί̣ο̣υ̣
Σεουήρου Εὐσ̣ε̣β̣οῦ̣ς̣ Περτί̣ν̣α̣κ̣ο̣ς̣
Ἀραβικ(οῦ) Ἀδιαβη(νικοῦ) Παρθικοῦ Μεγίστου
καὶ Μάρκο̣υ̣ Αὐρηλίου Ἀντωνίνου
Σεβαστῶν Μεσ(ορὴ) κ̄ς̄ ὑπ(ὲρ) Νό(του) ὀνό(ματος)
Ἰμούθο̣υ̣ ὀμ(οίως) διὰ Χαβονχώ(νσιος) Ὥρου πυροῦ
μίαν τέταρτο(ν) κ̣δ̣ (γίνονται) (πυροῦ ἀρτάβη) α d κ̄δ̄ A.
σ̣(εσ)η̣(μείωμαι)

Payment to the granary of the metropolis from produce of the 6th (?) year of Lucius Septimius Severus Pius Pertinax Arabicus Adiabenicus Parthicus Maximus and Marcus Aurelius Antoninus Augusti, Mesore 26, for Notos, in the name of Imouthes son of Imouthes, through Chabonchonsis son of Horos, (artabs) of wheat one, one-fourth, 1/24th, that is artabs of wheat 1, 1/4, 1/24. I, A . . . , have signed.

1. In general, the writing is so faded and blurred that we dot only those letters which have virtually disappeared. The year numeral can barely be seen – the stroke that remains is

consonant with the reading, and we choose it because *O. Bod.* 1570, with the same imperial formula and signed by the same A . . . , is dated in this year.

58. Granary Receipt

ROM Inv. No. 906.8.251 6.5 x 7.3 cm. A.D. 198-9

This sherd is the left part of what was originally a piece at least twice as wide. The writing occupies the upper part of the sherd, leaving 4 cm. at the bottom untouched.

Μέ(τρημα) θησ(αυροῦ) μη(τροπόλεως) γ(εν)ή(ματος) ζ (ἔτους)
[Λουκίου Σεπτιμίου Σευήρου]
καὶ Μάρκου Αὐρηλίου Ἀντω[νίνου Σεβαστῶν month and date]
3 ὑπ(ὲρ) Νή(σων) ὀνό(ματος) Καλήους Αἰλ[

Payment to the granary of the metropolis from produce of the 7th year of Lucius Septimius Severus and Marcus Aurelius Antoninus Augusti, ... , for Nesoi, in the name of Kales son of Ail . . . . . .

3. We find no other reference to this payer.

59. Granary Receipt

ROM Inv. No. 906.8.270 10.2 x 7.5 cm. March-April A.D. 213

This ostrakon is broken at right and bottom, and at present consists of two pieces glued together. There are remains of dried glue on the bottom edge of the sherd, raising the hope that another piece may have been attached at some point since its discovery. But a search in the Royal Ontario Museum failed to disclose its whereabouts. The writing on the ostrakon is quite faded.

Μέ(τρημα) θη(σαυροῦ) μη(τροπόλεως) γ(εν)ή(ματος) κα
(ἔτους) Μ[άρκου Αὐρηλίου
Σευήρου Ἀντωνίνου Καίσαρος [τοῦ κυρίου month and day]
ὑπ(ὲρ) Ἑρμ(ώνθεως) ὀνό(ματος) Ἡρακλᾶτο(ς)
Αἰλουρ[ίωνος ? διὰ γεωργοῦ? E-]
σουήριω(ς) Πανα(μέως) καὶ ὀνό(ματος) Φίλω(νος) Δ[
5 Πεκῦσι(ς) σ(εση)μείωμαι (πυροῦ ἀρτάβας) ι [
ἄλ(λας) Ἐπεὶφ ιᾱ ὑπὲρ Ἑρμ(ώνθεως)[
7 . . . . . .

Payment to the granary of the metropolis from produce of the 21st year of Marcus Aurelius Severus Antoninus Caesar the lord, (date), for Hermonthis, in the name of Heraklas son of Ailourion, (through the lessee) Esoueris son of Panameus, and in the name of Philon son of D . . . . . I, Pekusis, have signed: artabs of wheat. 10? . . . Others, Epeiph 11, for Hermonthis . . .

3. There may be a fair amount missing to the right here, including perhaps an amount paid.

5. Pekusis seems to us to fit the traces best, but other names might possibly be read.

60. Receipt for πρόσθεσις to Grain Tax

ROM Inv. No. 906.8.609 10.5 x 6.2 cm. 10 June A.D. 214?

The πρόσθεσις to the taxes in grain appears on some 17 Theban receipts aside from the present text. It was discussed briefly by Wilcken (*WO* I, pp. 288-9) and Milne (introduction to *O. Theb.* 114). The payment appears to have been an additional payment of grain beyond the regular σιτικά for the year. It was, it seems, an emergency measure, used only in crisis periods when more grain was needed for a particular occasion. There is an isolated receipt in 113 (*O. Bod.* 1216), then one in 128 (*O. Bod.* 1276). A cluster falls around the years 131 (*WO* 834; *O. Bod.* 1295 and 1296) and 132 (*WO* 839 and 841). There are none known between 132 and the latter part of the century.

The later receipts are difficult to treat because of the habitual omission of the name of the emperor. Receipts are known from 192 (*O. Theb.* 114; *O. Bod.* 594, undated, is given by a Sarapion, perhaps the grain official of that name attested in *O. Bod.* 982, from A.D. 192) and 193 (*WO* 973). There are no securely datable receipts after this time, but it is probable that most of those lacking an imperial name are Severan. This assumption would result in the following chronological sequence: 194 (*O. Ash.* 70), 196 (*O. Bod.* 1592), 197 (*O. Bod.* 1597), between 203 and 211 (*O. Bod.* 1599), 206 (*O. Bod.* 1596 and *O. Camb.* 74), and 217 (*O. Strassb.* 455).

The date of our document is probably 10 June in the 22nd year. The absence of the emperor's name makes the year 138 unlikely, since all receipts near that date have the emperor's name. Another possibility, 159, is not attractive because of the absence of other πρόσθεσις receipts near that date. The remaining possibilities are 182 and 214. If we accept the hypothesis suggested above of a Severan series, 214 appears to be the better choice. Because of the omission of imperial names, we do not place the series in the reign of Marcus Aurelius and the early part of Commodus' reign.

The *πράκτωρ σιτικῶν* appears in twelve of the seventeen *πρόσθεσις* receipts previously known, including all of the earlier ones. He rarely appears outside them, however, cf. *O. Bod.* 1494 (A.D. 178); *O. Bod.* 974 (A.D. 116); *O. Bod.* 1206 (same year); *O. Bod.* 1350 (A.D. 141). The name on our receipt is certainly not any of those previously known and specified as a *πράκτωρ σιτικῶν*, nor does he appear collecting grain taxes normally.

The formula of the receipt does not quite follow any of those elsewhere attested, and is peculiar especially in the apparent repetition of *γ(εν)ή(ματος)*.

Μονκο̣(ρῆς) Μονκο(ρήους) κ̣α̣ὶ̣ μ(έτοχοι) πράκ(τορες) σιτι̣κ(ῶν)
μ̣(ητροπόλεως?)
ἔσχον ε̣ἰ̣ς̣ πρό(σθεσιν) γ(εν)ή(ματος) ὀνό(ματος) Παχράτης
Παν̣κ̣[.] .( ) Αμ̣ω̣(νίου) γ(εν)ή(ματος) κ̣α̣ (ἔτους) πυροῦ
ἀρτάβ(ης)
δωδέκατον (γίνεται) (πυροῦ ἀρτάβης) *ιβ* (ἔτους) κ̣β̣ //
Παῦ̣(νι)
5 ι̅ς̅

Monkores son of Monkores and his partners, collectors of the grain taxes of the metropolis (?): I have received for the extra charge on the produce, in the name of Pachrates son of Pank . ( ) son of Amonios, from produce of the 21st year, artab of wheat, one-twelfth, that is, artab of wheat, 1/12. Year 22, Pauni 16.

61. Granary Receipt

ROM Inv. No. 906.8.523 7.4 x 6.1 cm. 28 June A.D. 215

Μέ(τρημα) θησ(αυροῦ) μη(τροπόλεως) γενή(ματος) κγ (ἔτους)
Μάρκου Αὐρηλί[ου Σε]ουήρου
Ἀντωνίνου Καίσαρος τοῦ κ̣υ̣ρί̣ο̣υ̣
Ἐπείφ δ̅ ὑπ(ὲρ) Ν(ότου) ὀνό(ματος) Λολοῦ(τος)
5 Τανεχάτιος (πυροῦ ἀρτάβην) μ̣[ίαν ἕ]κτο[ν]
6 (γίνεται) (πυροῦ ἀρτάβη) ας Ἀ̣ὐ̣ρ̣ή̣λ(ιος) Α[ ]
σ̣(εσ)η(μείωμαι)

Payment to the granary of the metropolis from produce of the 23rd year of Marcus Aurelius Severus Antoninus Caesar the lord, Epeiph 4, for Notos, in the name of Lolous son of Tanechatis, artabs of wheat one and one-sixth, that is, artabs of wheat 1, 1/6. I, Aurelius A . . . . , have signed.

62. Calligraphic List

ROM Inv. No. 906.8.533 10.2 x 7.1 cm. First or Second Century

Νικόστρατος
Ξενόδοχος
Ὀλυμπίας
Πετρώνιος
5 Ῥωκίνιος
6 Σωτήριχος

This sherd is brownish in colour, with the writing on the left-hand side. The writer has attempted to write in a book-hand of very much the same kind as that in *P. Lond.* 141 (II, p. 181 = C.H. Roberts, *Greek Literary Hands*, 1956, No. 12a). He does not attempt to differentiate the size of his letters, which are all approximately 0.5 cm. high. The first name occupies 4.5 cm. The first four letters of each of the first four names are rather severely smudged, but still legible. There is a break of approximately 0.6 cm. between the *mu* and the *pi* of Ὀλυμπίας.

The piece is probably to be dated to the first or early second century. Various indications lead to the conclusion that this list was copied as a writing exercise: it is alphabetical, the strokes of the letters are made with an unsure hand, and while there is no attempt to differentiate the sizes of the letters, two occurrences of the same letter may differ quite markedly, e.g. the two *sigmas* of Νικόστρατος. The *rho* of Ῥωκίνιος is formed quite differently from that of Σωτήριχος, the former consisting of a down-stroke and a semicircle, the latter, made of one stroke starting at the bottom. Nor is any regularity discernible in the writing of the *omicron*. The *delta* of Ξενόδοχος is a particularly good example of a letter written by a hand which is painstaking, yet inexperienced and unsure of itself.

For the name Ξενόδοχος see Plutarch, *vita Alexandri* 51. The name is to be found in the more usual form Ξενόδοκος in the *NB*. For the name Ῥωκίνιος we have found no parallel (Ricinius is to be found in the index of *CIL* VI).

63. Calligraphic List

ROM Inv. No. 906.8.557 5.7 x 6.3 cm. Second or Third Century

Θάλλων
2 Πρεμτκά ‘μ’ ιος

The ostrakon is brick-red in colour. The writing is in the upper third of the

sherd, the remainder being completely blank. While it is impossible to be sure of the purpose behind it (perhaps a marker of some sort or merely a *graffito* written in an idle moment – see below, No. 72), it seems to be an attempt to write carefully and regularly, though the names are written in letters of different sizes. The upright letters of the name are approximately 0.6 cm. in height, those of the patronymic 0.4 cm., and the longer patronymic overlaps the name only by the final *sigma* and half of the *pi*, although the *mu* was originally omitted and then written above the line. Particularly noticeable is the slight thickening of the strokes in the *alpha* and the first *lambda* of the name. The writing is impossible to date with any accuracy, but it must be put in the second or third century.

In the name an attempt has been made to write in large, regular letters, the only deviation from regularity being the smaller size of the second *lambda*. In the patronymic some of the letters are more cursively formed, notably the *rho*, the *kappa* and the *sigma*. The inserted *mu* is represented in a very abbreviated form.

This insertion probably caused the smudging which is observable in the area of the *kappa* and the *alpha*. There appears to be a ligature between the *omicron* and the *sigma*.

The name Θάλλων does not appear in the *NB*. It occurs in *CIG* III 4345.15.2 (from Side, an inscription of the third century). The name Πρεμτκᾶμις occurs in *O. Petr.* 324 ("Roman Period") and 370 ("Second or Third Century A.D.").

64. Mathematical Exercise

ROM Inv. No. 906.8.505 16.5 x 9.0 cm. Third or Fourth Century
Published: Milne, *JHS* 28, 1908, p. 131.

This text was published by Milne in *JHS* 28, 1908, p. 131 (No. 16) as one of a group of texts connected with education which he had found on ostraka. It consists of a list of ordinal numbers from first to twelfth, almost all misspelled. The last entry, twelfth, was crammed in between two other lines when space ran out. The grammatical form of the adjective differs from number to number, being mostly feminine and varying between nominative and genitive.

The exercise is written on the concave side of a thick sherd. The convex side also contains traces of writing which have been washed out. There are apparently the remains of eight lines at the left side and three more at the right. Only the bottom line on the left yields any readable letters, which are μα. The ostrakon is broken at the bottom, but it is impossible to say how much is missing, since only a small amount of writing has been lost. The top and both sides are intact. The hand is a very crude one, best described as consisting of spindly capitals. There are superfluous marks and strokes in various places, as well as a gratuitous *trema* in two places.

πρότη τευτέρα
τρίτη τίταρτο
πέμτης ἔκτης ἐβτό-
μης ὀκτούης ἐννάτης
5 τετκάτης ἐν-
'δοδηκάτη'
6 τεκάτη[

1. The *tau* in both instances in τευτέρα has a slanting stem rather than the upright one used almost everywhere else where a *tau* occurs. The same is true of the *tau* which begins τετκάτης and those in ἐντεκάτη and ἐβτόμης. It is possible that this is a very ill-formed *delta*, though the writer could make that letter, as is evident from δοδηκάτη. On the other hand, if he could spell the latter, it is curious that misspelled the others.

2. τιταρτθ, Milne. But the *omicron* is identical with that in ὀκτούης and ought to be read as such.

3. πεμτη, Milne. The *sigma* is very small and squeezed in at the end of the word, possibly as an afterthought. The possibility that it is a stray ink mark cannot be completely ruled out, but we think it unlikely.

4. We think there is a *sigma* visible at the end of ἐβτόμης, but it is very faint. The reading ὀκτούης is quite clear; Milne's reading of ὀκτώης is impossible.

5. On the first *tau* see the note on line 1. The second is very puzzling. Milne thought it had been partially erased but it is no fainter than the other letter. It is, however, much larger and extends far below the other letters in the word. It may be a previously existing mark and hence not intended as part of the word, or it may simply be the worst error in the text.

6. This belongs at the end of line 7, but was squeezed in after the latter was written and there was apparently no more room left. There may have been a *sigma* at the end of the line, but no trace remains.

7. On the first *tau* see the note on line 1. There may have been a *sigma* at the end in the missing portion.

65. Alphabet

ROM Inv. No. 906.8.522 8 x 6.2 cm.
Published: Milne, *JHS* 28, 1908, p. 121

This ostrakon contains an alphabet written in two vertical columns, with the first half of the alphabet written through *mu*, then the rest written backwards against the first half. The large, careful letters, about .5 cm. high, are diverted out of line by the sloping margin of the ostrakon. The writing might be that of a child.

Abecedaries are not uncommon, and a number are known from Graeco-Roman antiquity. Although most alphabets are school texts, Williams point out[1] that they have magical functions and are common in the Eastern Mediterranean

1. Williams writes: "It is recognized that these have magical functions, and are very wide-spread throughout the eastern Mediterranean area.

"The earliest known to me were found at Ras Shamra (Ugarit), dating to the 14th century B.C. Two may be found in G.R. Driver, *Semitic Writing*, 2nd ed., 1954, p. 236, and another in *Les Annales archéologiques de Syrie* 6 (1956), 93. Still others

area. But this text is peculiar in format, arranged as it is with the second half of the alphabet written in reverse order against the first. The shape of the sherd by no means calls for this arrangement; although more than one column would have been needed for the alphabet, normal order would certainly have been possible. Milne, in publishing the text originally (*JHS* 28, 1908, p. 121) noted that ". . . the curious *boustrophedon* arrangement adopted in this instance is quite unusual." He suggested that the principle might have been Quintilian's dictum that students ought to recognize the alphabet in any order – but that purpose would not seem to be well served by this text. Milne cited as the nearest parallel an inscription at Sparta (*BSA* 12, 1905-6, p. 476) in which an alphabet is cut in six vertical rows. But that inscription follows an organized format, making a neat box, and all letters in the rows are in order.

It may be that the arrangement here is seen as facilitating the magical aspect of the alphabet. But it also is possible that we have a key to a simple substitution code. A number of codes are known; Grenfell deciphered a code which used distorted and inverted letters as substitution symbols.[2] *PGM* II, p. 184, cites a late code with substitution of letter groups, and *Monastery of Epiphanius* II, No. 616, is another late code, rather complex, using a letter substitution cypher "formed by breaking the alphabet into four unequal parts which are shuffled and then inverted." But simple codes akin to this (if it is a code) are also known, and Suetonius, *Augustus* 88 reports one which simply substitutes the adjacent letter.[3]

	Column I	Column II
	ΑΩ	ΙΠ
	ΒΨ	ΚΟ
	ΓΧ	ΛΞ
	ΔΦ	4 ΜΝ
5	ΕΥ	
	ΖΤ	
	ΗΣ	
8	ΘΡ	

are mentioned in *Syria* 31 (1954), p. 27, n. 5.

"The oldest Hebrew example, the 'Masons' Alphabet,' is dated to ca. 600 B.C. by Driver, but to the early 8th century by Albright (see Driver, *op. cit.*, p. 166, fig. 70). Biblical literature has a number of poems which are alphabetic acrostics, either the first letter of each line (Nahum 1, Pss. 25, 34, 111, 112, 145, Prov. 31:10-31), the first letter of each strophe (Pss. 9-10, 37, Lam. 1, 2, 4), the first letter of each stanza or section (Pss. 119), or each individual line of a strophe begins with the same letter, and the strophes are in alphabetical order (Lam. 3).

"An Aramaic example from the Wadi Hamammat in Egypt can be dated to the 5th century B.C. (*Rev. d'assyriologie* 41, p. 105).

"There is also one instance in South Arabic from the 4th or 3rd century B.C. discovered at Timna.

"For Greek examples cf. F. Dornseiff, *Das Alphabet in Mystik und Magie* (= *Stoicheia* VII, 1922, 158-68), 2nd ed., 1925. The earliest seems to be ca. 700 B.C."

2. *Proc. Brit. Acad.* 15, 1929, p. 129.

3. For further discussion of cryptograms, cf. Gardthausen, *Gr. Pal.*, pp. 231-242.

66. Account

ROM Inv. No. 906.8.597 10.2 x 12.2 cm. Second Century

This account reports quantities of grain paid by four different people. We are not certain of the purpose of the account, although it appears likely that it served an official purpose. The entries follow the usual formula for designating payers in tax-receipts. The hand is a practised cursive typical of the best receipts and the abbreviations are of the normal sort. There is a totalling which seems to suggest that this text forms part of a group.

. (*πυροῦ ἀρτάβαι*) *μθ* $\overline{κδ}$ $\overline{μη}$
ὀνό(ματος) Πανα(*μέως*) Ψανσ(*νῶτος*) (*πυροῦ ἀρτάβαι*) *ιγ*
ὀνό(ματος) Σαραπάμμω(*νος*) Ὥρου (*πυροῦ ἀρτάβαι*) *ι* d $\overline{φβ}$
ὀνό(ματος) Θέων(*ος*) Σαραπάμμω(*νος*) (*πυροῦ ἀρτάβαι*) *η μη*
5 *ὀνό(ματος)* Ὥρου Παχνου( ) Ψενα( ) (*πυροῦ ἀρτάβαι*) *β*
6 (*γίνονται*) (*πυροῦ ἀρτάβαι*) *οδ* ∟ *κδ*

1. The trace of a letter seems to be below the line. Youtie's suggestion of $\underset{ο}{λ}$ (= λο(*ιποί*) is attractive.

4. This line causes some difficulty, for what we have read as *η μη* in reality looks like *υπερ*, and there is no stroke above it as in the case of the other fractions. We have proceeded on the assumption that the amounts recorded against the four names should, when added to the amount in the first line, make up the total in the last line. If we add the amounts in lines 1, 2, 3 and 5, the total is 74 and 19/48 artabs of wheat. The amount in line 4 should therefore be 7/48 artabs of wheat, i.e., 1/8, 1/48.

67. List of Names

ROM Inv. No. 906.8.561 8.4 x 6.5 cm. Second century

Ἐπώνυχ(*ος*) Ψάιτος
Φατρῆς *πρ*(*εσβύτερος*) Ἀπάθ(*ους*)
Ψε[*νεθ*]ώτης *ὁμ*(*οίως*)
Σαβῖνος Ἐπω[*νύχου*]
5 Π[. . . .]*νθ*( ) Π[
Π[. . .]χ̣ω( ) Δ[
Ἐπώνυχ̣[ος
Πικῶ̣[ς
9] . . [

1. A man of the same name occurs in *O. Petr.* 168 (A.D. 210), but there is no evidence to connect them.

3. I.e. "son of father with the same name," cf. *WO* I, p. 819, note 2.

68. List of Names

ROM Inv. No. 906.8.546 10.3 x 9.8 cm. Second or Third Century

This ten-line text has been written on a piece from which an earlier text has been almost completely erased. At the left and on the lower part are traces of the earlier text in a hand about 0.25 cm. high, much smaller than the main text, the letters of which average 0.5 cm. in height. The hand is skilled. There is some abrasion of the surface in the centre, and the last letters of line 9 and 10 are either illegibly crowded in or chipped off.

Παμώνθης
Σαραπίων
Παμώνθης παιδί(ον)
Ἰσίδωρος ὁ καὶ Ἀπολλῶς
Πετεχῶν Διοσκόρου
Πετεχεσ( ) Βήσιος
Παναμεῦς
Παμφίλου
Πανίσκος
Πρίσκο[υ]

2. It may be that we should read Σαραπίων(ος), although the writer makes no omissions of genitive endings, and there is plenty of room here.

6. The most common name for the resolution of the abbreviation is Πετχεσποχράτης. The father's name is probably Βήσις, but the traces of the *beta* are very faint.

9-10. The hand is smaller here, and degenerates into a scrawl, as the writer crowds in his writing. What we read as *kappa* is more like a *mu*, although not like a *mu* of this hand. The last letters of line 10 are almost completely faded away.

69. Uncertain Text

ROM Inv. No. 906.8.288 9.8 x 6.5 cm. Second or Third Century

This text may be the broken remainder of an account or receipt, or, more likely, an unofficial note or memorandum.

Παχὼ(ν) κᾱ (πυροῦ ἀρτάβαι) λς ∂

Pachon 21, artabs of wheat 36 3/4.

70. Uncertain Text

ROM Inv. No. 906.8.435 6.6 x 5.5 cm. Second or Third Century

Ἀγο( ) Θερμούθω(ς) Πα̣[
2 Ἀγο( )Θαήσω(ς) Ἀρφμό̣[

1. The most obvious resolution of Ἀγο( ) is Ἀγο(ρῶν).

71. Memorandum

ROM Inv. No. 906.8.415 6.4 x 8.4 cm. Second or Third Century

The text must be a private receipt, account, or memorandum, but while the contents are readily understandable, they do not offer much information.

Ὥρου (πυροῦ ἀρτάβης) ∫ $\overline{κδ}$̣

From Horos, artab of wheat 1/2, 1/24.

72. Uncertain Text

ROM Inv. No. 906.8.588 10.5 x 19.7 cm.

We are puzzled by this text. The letters are not written in ink, but scratched coarsely into the surface of the clay. There are three lines of text, and individual letters are about 3 cm. high by 1 cm. wide. It is difficult to know the purpose of the text. A number of the Karanis ostraka (*O. Mich.* I, pp. 169 ff.) have such texts. Youtie (*TAPA* 72, 1941, p. 457) calls them "name tags, ostraca placed on sacks of wheat, bags of chaff, etc., to identify them as the property of the person whose name they bear." Such may be our text, although it is larger than any of these, and indeed is larger than the 8.7 x 6.3 cm. *O. Mich.* 641, which Amundsen described as "bigger than those used as identification tags(?). Perhaps only a writing exercise."

The crowding of the *upsilon* and obvious connection between lines 2 and 3 make it certain that the side margins are intact. It may be that the text is simply practice writing for a later inscription, or practice work by an apprentice.

The writing is so crude that we would not venture to date the hand.

Ταῆσι
ἀπελε ὐ-
3 θήρα

INDICES

I. SOVEREIGNS AND DATES

A. *Ptolemaic Kings*

Ptolemy VIII Euergetes II

ἔτ. κθ 2.1
ἔτ. μζ 3.1,2
ἔτ. νβ 4.2
ἔτ. [ν.] 4.1

Unassigned

ἔτ. γ 6.1
ἔτ. ις 5.1
ἔτ. ιη 1.1, v.1

B. *Roman Emperors*

Claudius

(a) Τιβερίου Κλαυδίου Καίσαρος Σεβαστοῦ Γερμανικοῦ Αὐτοκράτορος

ἔτ. ς (–) 8.2
ἔτ. ζ (a) 8.4

Nero

(a) Νέρωνος τοῦ κυρίου

ἔτ. ι (a) 9.4

Vespasian

(a) Οὐεσπασιανοῦ τοῦ κυρίου

ἔτ. δ (a) 10.[1],5

Domitian

(a) Δομιτιανοῦ τοῦ κυρίου

ἔτ. ε (a) 11.2
ἔτ. ις (–) 12.2

Nerva

(a) Νέρουα Καίσαρος τοῦ κυρίου

ἔτ. α (a) 12.2

Trajan

(a) Αὐτοκράτορος Καίσαρος Τραιανοῦ Σεβαστοῦ
(b) Τραιανοῦ Καίσαρος τοῦ κυρίου
(c) Τραιανοῦ τοῦ κυρίου

ἔτ. α (c) 13.3
ἔτ. γ (a) 14.2; 15.2
ἔτ. δ (–) 15.5
ἔτ. η (c) 34.2
ἔτ. ια (b) 17.3; 18.3; (–) 18.7
ἔτ. ιβ (b) 18.8
ἔτ. ις (B) 19.3
ἔτ. . (c) 15.3

Hadrian

(a) Ἀδρι[ανοῦ Καίσαρος τοῦ κυρίου]
(b) Ἀδριανοῦ τοῦ κυρίου

ἔτ. δ (b) 20.3
ἔτ. ε (b) 21.4
ἔτ. ιε (b) 22.3 (–) 22.3
ἔτ. ις (a) 23.4 (–) [23.3]
ἔτ. ιζ (b) 24.2
ἐτ. ιη (b) 24.6

Antoninus Pius

(a) Ἀντωνίνου Καίσαρος τοῦ κυρίου

ἔτ. ζ (–) 25.3
ἔτ. η (a) 25.4; 35.1
ἔτ. ιδ (a) 26.4
ἔτ. κ (a) 36.1
ἔτ. κβ (a) 37.1
ἔτ. κγ (a) 27.5

Marcus Aurelius (with Verus, Commodus)

(a) Αὐρηλίου Αντωνίνου [καὶ] Οὐήρου τῶν κυρίων Σεβαστῶν
(b) Ἀντωνίνου καὶ Οὐήρου τῶν κυρίων Σεβαστῶν
(c) Ἀντωνίνου [καὶ Οὐήρου τῶν] κυρίων Σεβαστῶν [τῶν μεγιστῶν]

ἔτ. α (a) 38.1
ἔτ. γ (b) 39.1
ἔτ. δ (c) 40.1
ἔτ. ς (b) 41.1 (-) 41.4
ἔτ. ζ (–) 41.3
ἔτ. η (b) 42.1
ἔτ. . (b) 43.1

(d) Μάρκου Αὐρηλίου Ἀντωνίνου Καίσαρος τοῦ κυρίου
(e) Αὐρηλίου Ἀντωνίνου Καίσαρος τοῦ κυρίου

ἔτ. ιδ (e) 44.1
ἔτ. ιε (–) 28.3; 44.3
ἔτ. ις (d) 45.1; (–) 28.1

(f) Αὐρηλίων Ἀντωνίνου καὶ Κομμόδου Καισάρων τῶν κυρίων

ἔτ. ιη (f) 46.1; 47.1

Commodus

(a) Κομμόδου Ἀντωνίνου Καίσαρος τοῦ κυρίου
(b) Κομμόδου Καίσαρος τοῦ κυρίου

ἔτ. κ (a) 54.1 (b) 48.4
ἔτ. κα (a) 49.1
ἔτ. κβ (–) 49.3
ἔτ. κς (a) 50.1; 51.1; 52.1
ἔτ. κζ (–) 52.3
ἔτ. κθ (–) 29.1,3; 30.1,2; 31.2
ἔτ. λ (–) 31.1
ἔτ. λα (a) 53.1

Septimius Severus (with Caracalla)

(a) Λουκίου Σεπτιμίου Σεουήρου Περτίνακος Καίσαρος τοῦ κυρίου
(b) Λουκίου Σεπτιμίου Σεουήρου Εὐσεβοῦς Περτίνακος Καίσαρος τοῦ κυρίου

ἔτ. β (a) 56.1
ἔτ. γ (b) 55.1 (–) 32.6

(c) Λουκίου Σεπτιμίου Σεουήρου Εὐσεβοῦς Περτίνακος Ἀραβικοῦ Ἀδιαβηνικοῦ Παρθικοῦ Μεγίστου καὶ Μάρκου Αὐρηλίου Ἀντωνίνου Σεβαστῶν

(d) Λουκίου Σεπτιμίου Σεουήρου καὶ Μάρκου Αὐρηλίου Ἀντωνίνου Σεβαστῶν

ἔτ. ς (c) 57.1 ἔτ. ζ (d) 58.1

Caracalla

(a) Μάρκου Αὐρηλίου Σεουήρου Ἀντωνίνου Καίσαρος τοῦ κυρίου

ἔτ. κα (a) 59.1 (–) 60.3 ἔτ. κγ (a) 61.1
ἔτ. κβ (–) 60.4(?)

Unassigned

ἔτ. δ 16.2 ἔτ. ζ 33.1

II. MONTHS

(References in round brackets ( ) give the date without repeating the month-name.)

Θώθ ι 52.3; ια 6.1; ιγ 33.1; κς 31.1
Φαῶφι γ 49.2; ις 44.3; ιη 17.7
Ἀθύρ 15.7; 27.3; 32.4; ιζ 25.5; 28.1; κ 17.8
Χοίακ ιγ 20.4; κγ 18.9
Τῦβι ς 40.3; κε 48.5; κς 25.5
Μεχείρ δ 15.3; ε 12.4; ιη (15.4); κδ 20.4; κη (15.4)
Φαμενώθ 9.3; 16.3; ε 5.1; 23.5; ς 22.4; ζ 41.3; ιδ 20.4; ιθ (22.4) λ 19.5
Φαρμοῦθι 9.3; γ 17.4; 21.5; ς 15.4; 19.4; ζ 23.6; ι 18.4; 22.5; κ 16.4; 19.6; κγ 17.4; (19.6); κς (15.5); 20.5; κθ 11.4
Παχών γ 22.6; η 17.5; ιγ 14.3; κα 69.1; κε 20.5; κς 13.4; κη 45.3
Παῦνι γ 53.3; δ 1.1, v.2; ζ 35.2; η 37.2; θ 3.1; ις 60.4; κη 34.3; κθ 26.5; 30.1; λ 2.1
Ἐπείφ 50.2; δ 61.4; ζ 39.3; ι 55.3; ια 59.6; ιδ 35.6; ιε 46.4; ιη 54.3; ιθ 51.2; κβ 56.3; κγ 4.1; κδ 16.5
Μεσορή 36.3; ις 18.5; κβ 47.4; κς 57.5; λ 10.5
Ἀδριανός [27.3]; ι 32.6
Σεβαστός δ 8.6,7
Φα( ) κε 29.1
unassigned dates ιε 17.7; κε 17.6; 43.3

III. PERSONAL NAMES

br. = brother
d. = daughter
f. = father
gd. = granddaughter
gf. = grandfather
gs. = grandson
m. = mother
s. = son
sr. = sister

Αἰλουρίων
– f. of Ἡρακλᾶς 59.3

Αἰλ[
– f. of Καλῆς 58.3

Ἀμώνιος
– signer 39.6; 46.6; 47.6; 48.9; 49.5
– f. of Πανκ[60.3
– gf. of Παχράτης 60.3

Ἀξίωη
– 7.4
Ἀπάθης
– f. of Φατρῆς πρεσβ. 67.2
Ἀπίων
– τελώνης θησαυροῦ ἱερῶν 13.1
– and μέτοχοι 13.1
Ἀπολλινάριος
– 7.9
Ἀπολλώνιος
– agent 1.2, v.2
Ἀπολλῶς see also Ἰσίδωρος ὁ καὶ Ἀπολλῶς
Ἀπολλ( )
– f. of Ψεναμοῦνις 35.4
Ἀπολώδωρος
– f. of Πικῶς νεωτ. 21.2
Ἀρ. .θ( )
– f. of Τεῶς 48.3,7
– gf. of Ὧρος ὁ καὶ Φατρῆς 48.3,7
Ἁρμῦσις
– 7.12
Ἁρπαῆσις
– s. of Φα.ρ..ο( ) 20.2
– f. of Παμοντπῶς 20.2
– 6.2
Ἁρσιῆσις
– f. of Πασῆμις 15.1
– gf. of Παμώνθης 15.1
Ἁρυώθης see also Ἁρυώτης
– taxpayer, 26.2; 28.2
– s. of Ἐπώνυχος 28.2
– s. of Πε( ) 26.2
– gs. of Φθουμῆνις 26.2
Ἁρυώτης see also Ἁρυώθης
– taxpayer 2.1
– s. of Ψεμμώνθης 2.1
Ἁρφμόις
– f. of Θαῆσις 70.2
– f. of Μαιεῦρις 34.4
Ἀσκλᾶς
– f. of Φθουμώνθης 51.3
Ασ( )
– signer 14.4
Ἀτρῆς
– taxpayer 44.4
– s. of Ὧρος 44.4
– f. of Φθομώνθης 19.2
– gs. of Σποτοῦς 44.4
– gf. of Πετεχῶνσις 19.2
Αὐρηλιος Α[
– signer 61.6
Αυ( )
– signer 38.5
Α( )
– signer 29.4; 31.4

Βῆσις
– f. of Πετεχεσ( ) 68.6

Δαίμαχος
– 7.11
Δημήτριος
– 7.1
Διόσκορος
– f. of Πετεχῶν 68.5
Δυ..( )
– signer 2.2
Δ[
– f. of Π[...]χω( ) 67.6
– f. of Φίλων 59.4

Ἐπικράτης
– taxpayer 35.3
– signer 35.5,[8]
– s. of Ἐπώνυχος 35.3
Ἐπώνυχος
– s. of Ψάις 67.1
– f. of Ἁρυώθης 28.2
– f. of Ἐπικράτης 35.3
– f. of Ἑρμείας 9.2
– f. of Σαβῖνος 67.4
– 67.7
Ἑριεῦς
– πράκτωρ ἀργυρικῶν Μεμνονείων 19.1
– s. of Παμώνθης 19.1
– f. of Ἐσουῆρις 34.6
Ἑριοφμόις
– taxpayer 14.1
– s. of Ἑρμᾶς 14.1
– f. of Ψεναμοῦνις 13.2

Ἑρμᾶς
– f. of Ἐριοφμόις 14.1
Ἑρμείας see also Ἑρμίας
– taxpayer 9.2
– s. of Ἐπώνυχος 9.2
Ἑρμίας see also Ἑρμείας
– 7.5
Ἐσουῆρις
– γεωργός? 59.3
– taxpayer 34.6; 37.3
– agent of Ἡρακλᾶς (?) 59.3
– s. of Ἐριεῦς 34.6
– s. of Παναμεῦς 59.3
– s. of Πετεμενῶφις 37.3
Ε. . . ω.ς
– taxpayer 3.2
– s. of Ψεναπάθης 3.2
Ε. . .ιτο(ς)
– taxpayer 41.3
– s. of Ὧρος 41.3
Ε( )
– signer 51.4

Ἡρακλᾶς
– taxpayer 59.3
– s. of Αἰλουρίων 59.3
Ἡρακλείδης see also Ἡρηκλίδης
– τελώνης πεντηκοστῆς 10.1
– and μέτοχοι 10.1
Ἡρηκλίδης see also Ἡρακλείδης
– νε( ) 7.7

Θαῆσις
– d. of Ἀρφμόις 70.2
Θάλλων
– 63.1
Θερμοῦθις
– d. of Πα[70.1
Θέων
– s. of Σαραπάμμων 66.4
Θοτεῦς
– s. of Ψεναμοῦνις 11.1
– f. of Ὧρος 11.1
Θοτσύτης
– taxpayer 5.2
– s. of Πετσαρᾶπις 5.2

Ἰμούθης
– taxpayer 38.3; 57.6
– s. of Ἰμούθης 38.3; 57.6
– f. of Ἰμούθης 38.3; 57.6
Ἰναρῶς
– taxpayer 29.2; 50.3
– s. of Ἰναρῶς 29.2; 50.3
– s. of Ὧρος 29.2
– br. of Ταλῶς 50.3
– f. of Ἰναρῶς 29.2; 50.3
Ἰσίδωρος ὁ καὶ Ἀπολλῶς
– 68.4

Καλῆς
– taxpayer 58.3
– s. of Αἰλ[58.3
Καμῆς
– f. of Σενχ. . . 15.2
– gf. of Παμώνθης 15.2
Καμῆτις
– f. of Πορτιοῦς 18.2,7
– f. of Ψενσενμούθης 41.5
Καροῦρις
– ἀπαιτητὴς καὶ μέτοχοι ἐπιτηρητὴς κτημάτων γενηματογραφουμένων μητροπόλεως 25.1
– and Πετεχεσποχράτης 25.1
– and μέτοχοι 25.1
– signer 25.5,6
Κέρδων
– signer 5.4
Κολλούθης
– taxpayer 4.3
– s. of Χεσθώτης 4.3
Κρατῖνος
– signer 2.3
Κροῦρις
– ἀπαιτητὴς μερισμοῦ τελωνικῶν 24.1
– and Φατρῆς 24.1
Κρ( )
– signer 3.3
Κῦσις
– taxpayer 30.3; 31.3
– s. of Σωσ( ) 31.3
– s. of . . .( ) 30.3
Κ[

– taxpayer 30.1
– s. of Σποτοῦς 30.1

Λολοῦς
– taxpayer 54.4; 61.4
– s. of Τανεχᾶτις 61.4
– s. of Τηιονχῶνσις 54.4

Μαιεῦρις
– taxpayer 34.4
– s. of Ἀρφμόις 34.4
Ματιῆλος
– 7.6
Μενεστεύς
– taxpayer 22.2
– s. of Πετεαρουῆρις 22.2
Μονκορῆς
– *πράκτωρ σιτικῶν μητροπόλεως* 60.1
– s. of Μονκορῆς 60.1
– f. of Μονκορῆς 60.1

Νικόστρατος
– 62.1

Ξενόδοχος
– 62.2

Οὐαρ( )
– f. of Πεχω( ) 10.3
Ὀλύμπιας
– 62.3

Παῆρις
– taxpayer 52.4
– s. of Παῶντις 52.4
Παμοντεχῦσις
– f. of Χεστφνάχθις 12.1
Παμοντπῶς
– taxpayer 20.2
– s. of Ἀρπαῆσις 20.2
– gs. of Φα.ρ. .ο( ) 20.2
Πάμφιλος
– f. of Παναμεῦς 68.8
Παμώνθης
– *πράκτωρ ἀργυρικῶν* Μεμνονείων 20.1; 22.1
– *παιδίον* 68.3
– taxpayer 15.1
– agent of Ἐριεῦς *πρ. ἀργ.* 19.1
– s. of Ἐριεῦς 19.1
– s. of Πασῆμις 15.1
– s. of Σενχε. . 15.1
– f. of Ἐριεῦς 19.1
– gs. of Ἀρσιῆσις 15.1
– gs. of Καμῆς 15.1
– 68.1
Παναμεῦς
– s. of Πάμφιλος 68.7
– s. of Ψανσνῶς 66.2
– f. of Ἐσουῆρις 59.4
Πανίσκος
– signer 53.6
– s. of Πρίσκος 68.10
Πανκαμῆτις
– s. of Φθουμῖνις 25.2
– f. of Πετεψάις 25.2
Πανκ[.].( )
– s. of Ἀμώνιος 60.3
– f. of Παχράτης 60.3
Πασῆμις
– s. of Ἀρσιῆσις 15.1
– f. of Παμώνθης 15.1
– f. of (?) 17.1
Παχνου( )
– s. of Ψενα( ) 66.5
– f. of Ὧρος 66.5
Παχράτης
– taxpayer 60.2
– s. of Πανκ[.].( ) 60.2
– gs. of Ἀμώνιος 60.2
Παχ[
– taxpayer 43.3
– s. of Φατρῆς 43.3
– gs. of Ὧρος 43.3
Παψιοῦς
– agent of Ψεν( ) 56.4
– s. of Χεμπνεῦς 56.4
Παῶντις
– f. of Παῆρις 52.4
Πα( )
– signer 43.6; 56.5
Πα[

– f. of Θερμοῦθις 70.1
Πεκῦσις
– taxpayer 46.5
– signer 59.4
– s. of Ψ[16.1
– s. of Ὧρος 46.6
– f. of Πλῆνις 56.3
– f. of Ψεναμοῦνις 16.1
– gf. of Ψεν( ) 56.3
Πενα( )
– f. of Ψένσνις 42.3
Πετεαρουῆρις
– f. of Μενεστεύς 22.2
Πετεαρ( )
– γραμματεύς 22.2
– agent of Παμώνθης πρ. ἀργ. 22.2
Πετεαρ.( )
– agent of Π[24.4
– s. of Φ[24.4
Πετεμενῶφις
– taxpayer 32.3
– s. of Φθουμῖνις 32.3
– f. of Ἐσουῆρις 37.3
Πετεχεσποχράτης
– ἀπαιτητὴς καὶ μέτοχοι ἐπιτηρητὴς κτημάτων γενηματογραφουμένων μητροπόλεως 25.1
– and Καροῦρις 25.1
– and μέτοχοι 25.1
Πετεχεσ( )
– s. of Βῆσις 68.6
Πετεχε( )
– taxpayer 55.4
– s. of Χαβωνχώνσις 55.4
Πετεχῶν see also Πετεχῶνσις
– s. of Διόσκορος 68.5
Πετεχῶνσις see also Πετεχῶν
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– s. of Φθομώνθης 19.2,7
– s. of Ψεντασῆμις 23.2
– gs. of Ἀτρῆς 19.2
– gs. of Ψεμώνθης 23.2
Πετεχω( )
– f. of Πεχ.( ) 40.4
Πετεψάις
– taxpayer 25.2
– s. of Πανκαμῆτις 25.2
– gs. of Φθουμῖνις 25.2
Πετε. .( )
– taxpayer 39.4
– s. of Πικῶς 39.4
Πετοσῖρις
– πράκτωρ ἀργυρικῶν Μεμνονείων 18.1,6
Πετρώνιος
– 62.4
Πετσαρᾶπις
– f. of Θοτσύτης 5.2
Πεχω( )
– taxpayer 10.3
– s. of Οὐαρ( ) 10.3
Πεχ.( )
– taxpayer 40.3
– s. of Πετεχω( ) 40.3
Πεχ[
– f. of Ὧρος 43.5
Πε( )
– s. of Φθουμῆνις 26.2
– f. of Ἀρυώθης 26.2
Πικῶς
– f. of taxpayer 27.2
– signer 8.7
– f. of Πετε. .( ) 39.4
– 67.8
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– taxpayer 21.2
– s. of Ἀπολώδωρος 21.2
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– s. of Πεκῦσις 56.3
– f. of Ψεν( ) 56.3
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– τελώνης θησαυροῦ ἱερῶν 26.1
– and μέτοχοι 26.1
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– taxpayer 18.1,6
– s. of Καμῆτις 18.1,6
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– ἐπιτηρητὴς τέλους γερδίων 32.1
– and μέτοχοι 32.1
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Πρίσκος
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Πτολεμαῖος
– σκορ( ) 7.2
– signer 11.4
Π.θ.
– signer 41.6
Π[. . .]χω( )
– s. of Δ[67.6
Π[. . . .]νθ( )
– s. of Π[67.5
Π. . .
– signer 34.5,7
Π[
– taxpayer 24.3
– s. of Ψεναμοῦνις 24.3
– f. of Π[. . . .]νθ( ) 67.5

Ῥωκίνιος
– 62.5

Σαβῖνος
– s. of Ἐπώνυχος 67.4
Σαραπάμμων
– s. of Ὧρος 66.3
– f. of Θέων 66.4
Σαραπίων
– f. of Παμώνθης (?) 68.2
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– s. of Ψενμώνθης 9.1
– and *μέτοχοι* 9.1
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– d. of Ὧρος 47.5
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– taxpayer 36.5; 53.5
– d. of Φμόις 36.5; 53.5
– sr. of Σενχῶνσις 36.5; 53.5
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– d. of Καμῆς 15.2
– m. of Παμώνθης 15.2
Σενχῶνσις
– taxpayer 36.4; 53.4
– d. of Φμόις 36.4; 53.4
– sr. of Σενφμόις 36.4; 53.4
Σποτοῦς
– agent of (?) 49.4
– f. of K[30.2
– f. of Ὧρος 44.4
– gf. of Ἀτρῆς 44.4
Σωσ( )
– f. of Κῦσις 31.3
Σωτήριχος
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– *ἀπελευθέρα* 72.1
Ταλῶς
– taxpayer 50.4
– d. of Ἰναρῶς 50.4
– sr. of Ἰναρῶς 50.4
Τανεχᾶτις
– m. of Λολοῦς 61.5
Τεῶς
– s. of Αρ . . θ( ) 48.2,7
– f. of Ὧρος ὁ καὶ Φατρῆς 48.2,7
Τηιονχῶνσις
– f. of Λολοῦς 54.4
Τιγῆς
– taxpayer (?) 1.3, v.3

Φαῆρις
– f. of Ψεναμοῦνις 38.4
Φαμῖνις
– *γεωργός* 39.4
– agent of Πετε. . ( ) 39.4
– s. of Ψανσῶς 39.4
Φανο( )
– taxpayer 35.7
Φατρῆς see also Ὧρος ὁ καὶ Φατρῆς
– *ἀπαιτητὴς μερισμοῦ τελωνικῶν* 24.1
– taxpayer 31.1
– s. of Φθουμώνθης 31.1
– s. of Ὧρος 43.4
– f. of Παχ[43.4
– [[32.2]]
Φατρῆς *πρεσβ.*
– s. of Ἀπάθης 67.2
Φα.ρ. ..ο( )
– f. of Ἁρπαῆσις 20.2
– gf. of Παμοντπῶς 20.2
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– taxpayer 59.4
– s. of Δ[59.4
– 7.3
Φμόις
– f. of Σενφμόις 36.4; 53.4
– f. of Σενχῶνσις 36.4; 53.4
Φθομώνθης see also Φθουμώνθης
– Πράκτωρ ἀργυρικῶν Ἑρμώνθεως 23.1
– f. of Πετεχῶνσις 19.2,7
Φθουμῆνις see also Φθουμῖνις
– f. of Πε( ) 26.2
– gf. of Ἀρυώθης 26.2
Φθουμῖνις see also Φθουμῆνις
– f. of Πανκαμῆτις 25.2
– f. of Πετεμενῶφις 32.3
– gf. of Πετεψάις 25.2
Φθουμώνθης see also Φθομώνθης
– taxpayer 51.3
– s. of Ἀσκλᾶς 51.3
– f. of Φατρῆς 31.2
Φθου[
– taxpayer 8.1
Φ[
– f. of Πετεαρ( ) 24.4

Χαβονχῶνσις
– agent of Ἰμούθης 57.6
– s. of Ὧρος 57.6
– f. of Πετεχε( ) 55.4
– f. of Ὧρος 33.2
Χαβον[
– f. of]τεχ( ) 45.4
Χεμπνεῦς
– f. of Παψιοῦς 56.4
Χεσθώτης
– f. of Κολλούθης 4.3
Χεστφνάχθις
– taxpayer 12.1
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X. EGYPTIAN NAMES

The numbers in the following index refer to the numbers given to the taxpayers in Section Seven, Index of Persons. The entries below are coded with punctuation to indicate those names of individuals actually appearing in Section Seven, and indexes their fathers' and grandfathers' names as well. The system may best be illustrated by using an example, number 3, Nepheros son of Peteminis grandson of Harsiesis. There would be three entries for those names:

Nepheros s. of Peteminis gs. of Harsiesis. 3 (main entry).

Peteminis. s. of Harsiesis, f. of Nepheros 3 (the period after the name Peteminis shows that the name does *not* begin an entry in Section Seven, and the entry number following Nepheros without a period indicates that the preceding name, Nepheros in this case, is the name which begins entry number 3).

Harsiesis. f. of Peteminis, gf. of Nepheros 3 (the use of the period is the same as in the preceding example, the only difference being that this example shows the entry for the grandfather's name instead of the father's).

In this index, a dash indicates a repetition of a name, and it may be followed by a period in usage consistent with the above examples.

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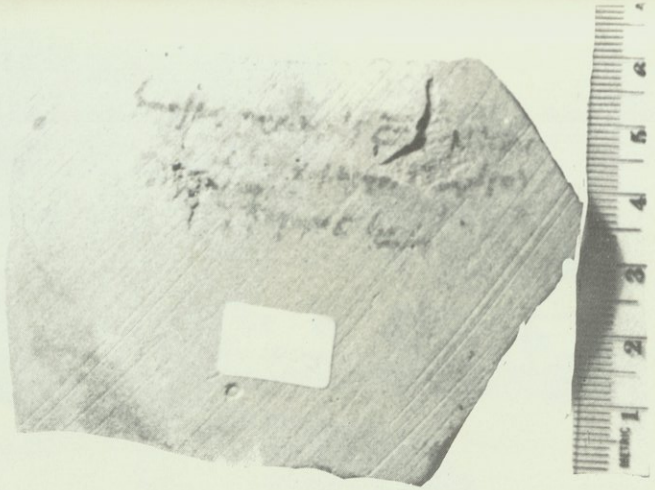

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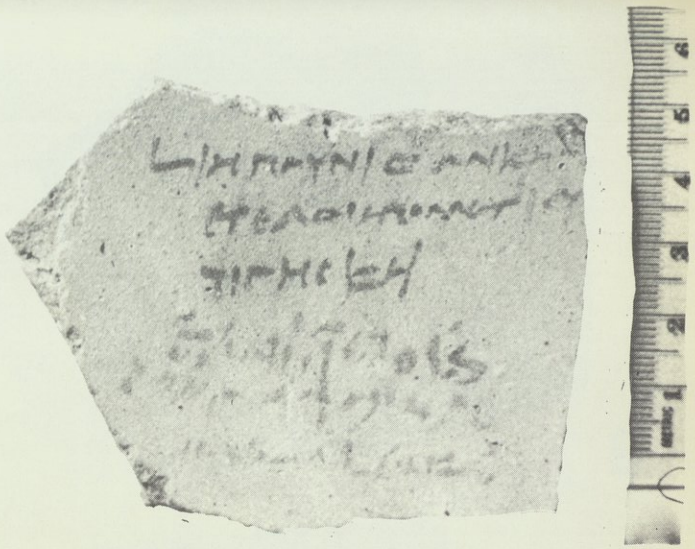

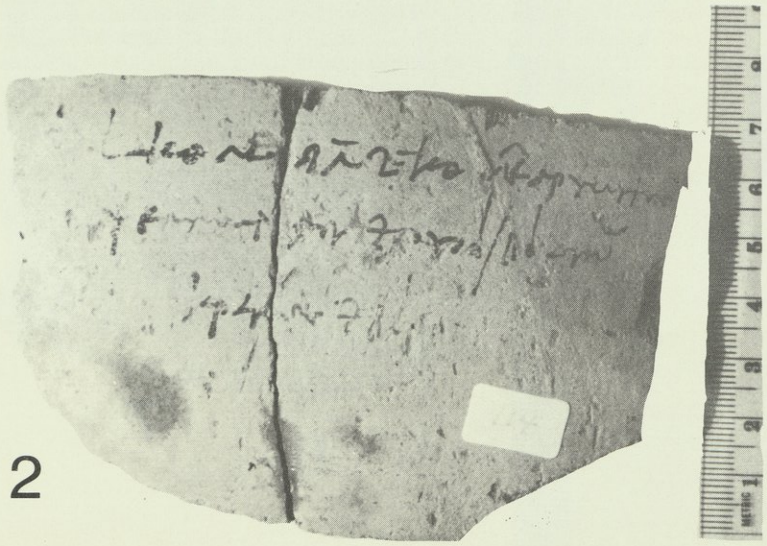

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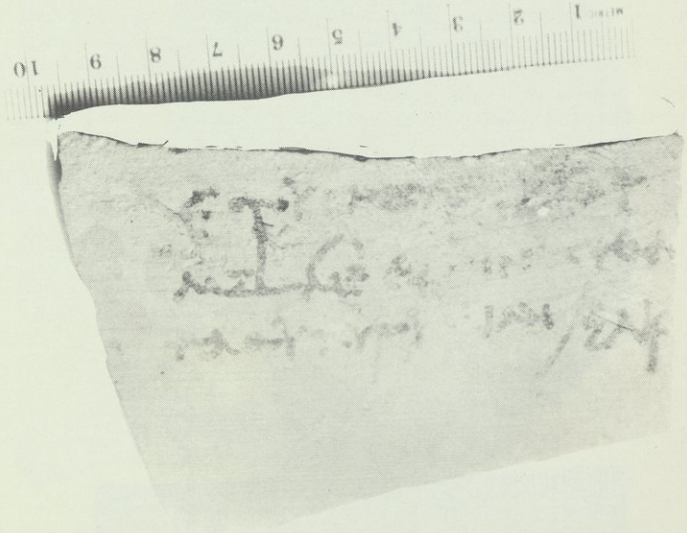

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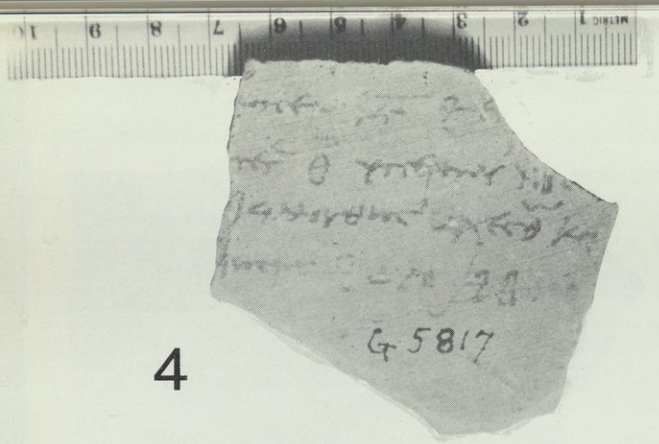

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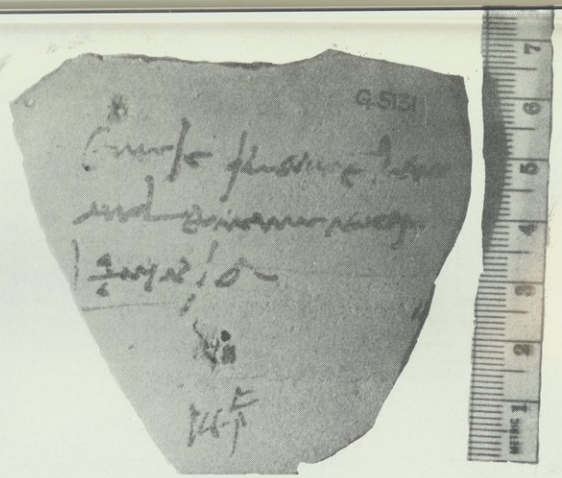

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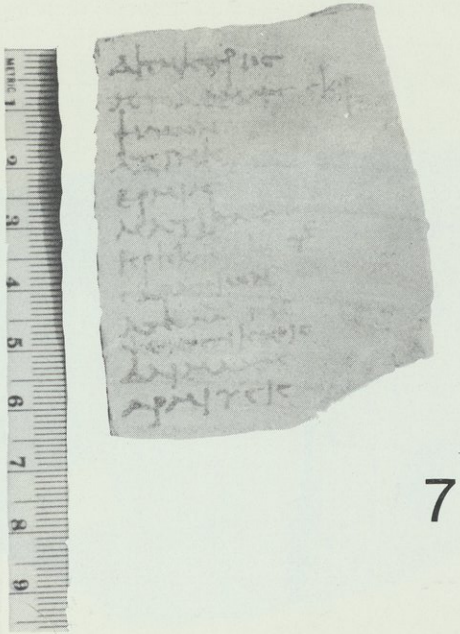

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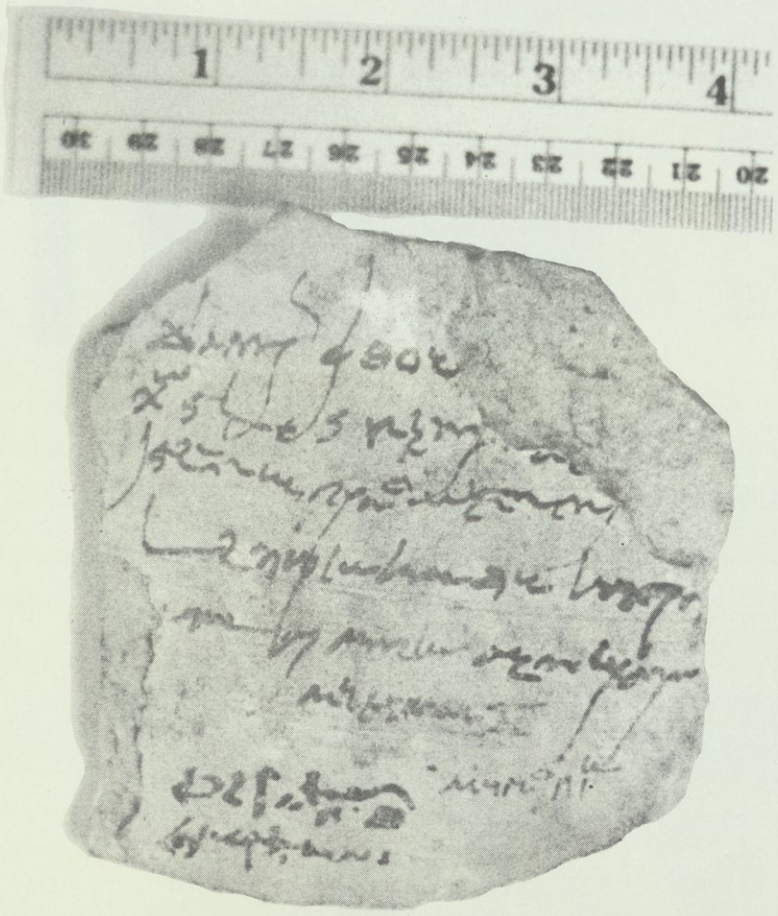

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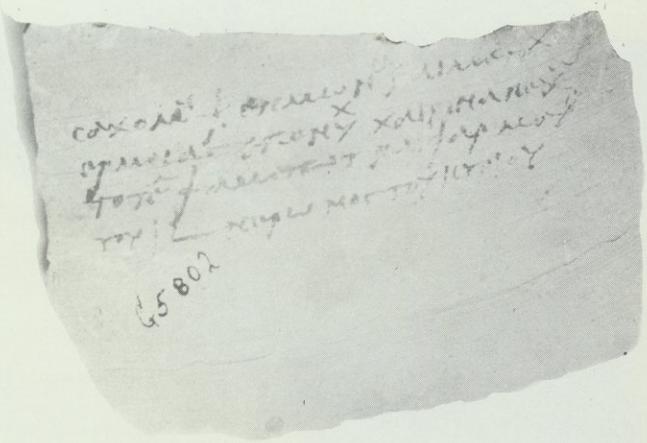

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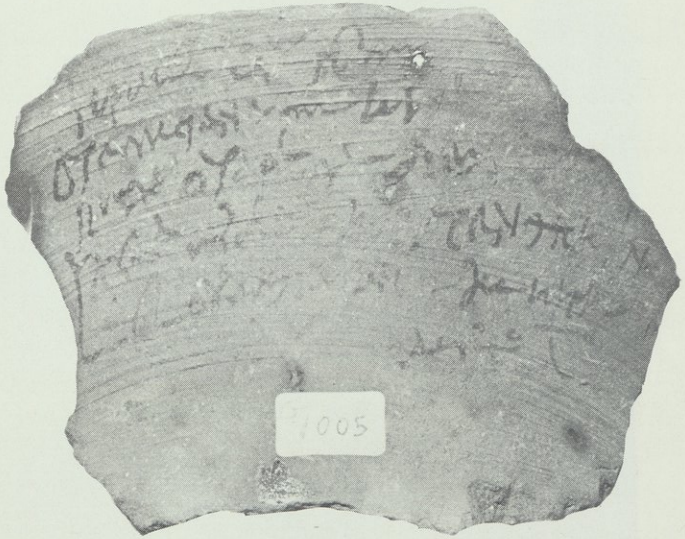

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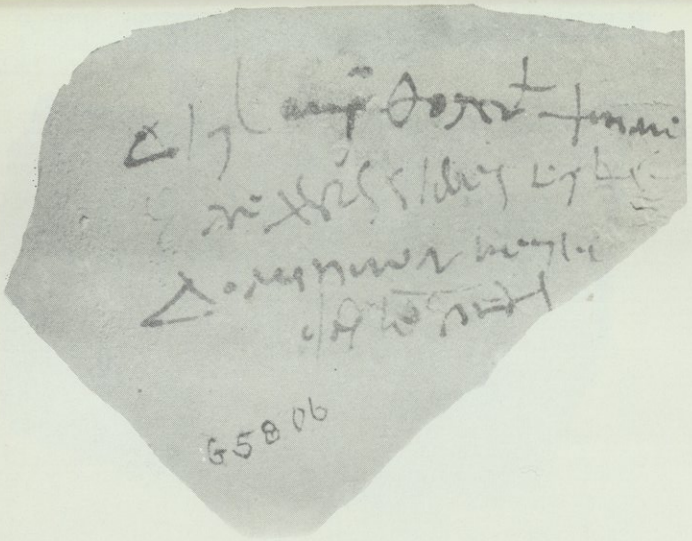

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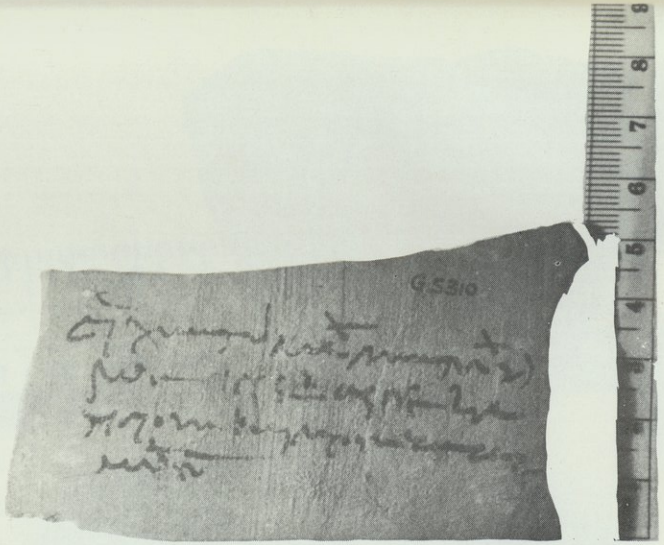

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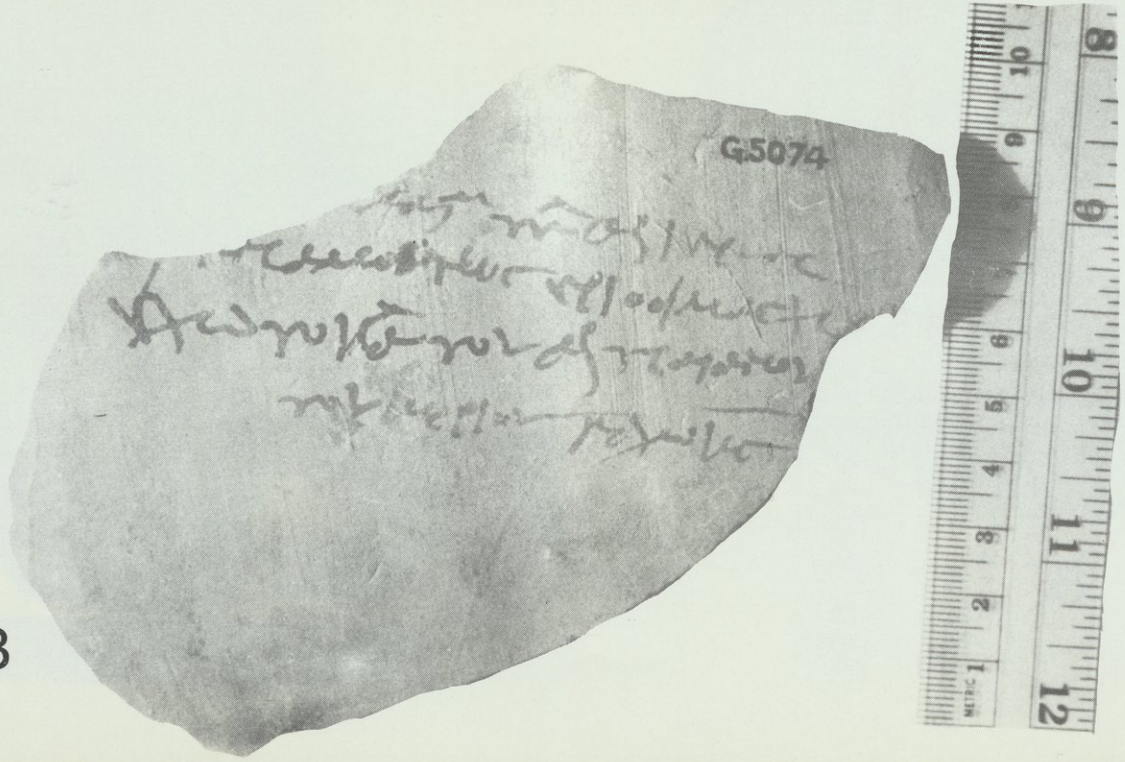

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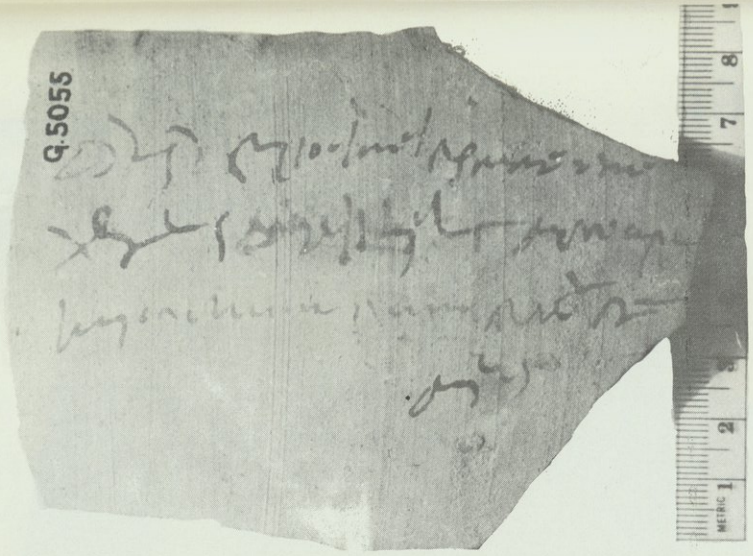

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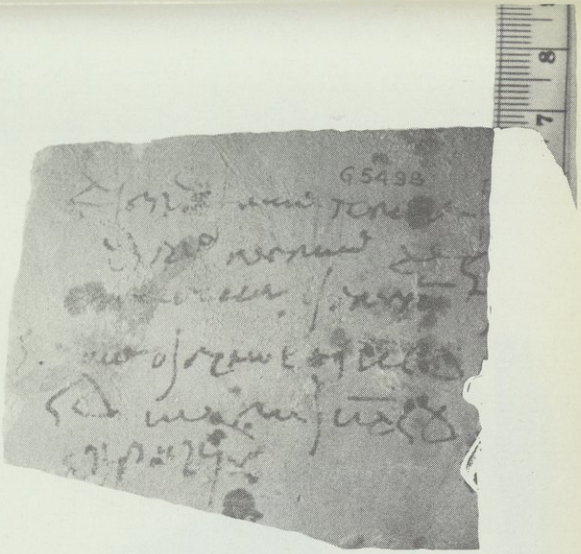

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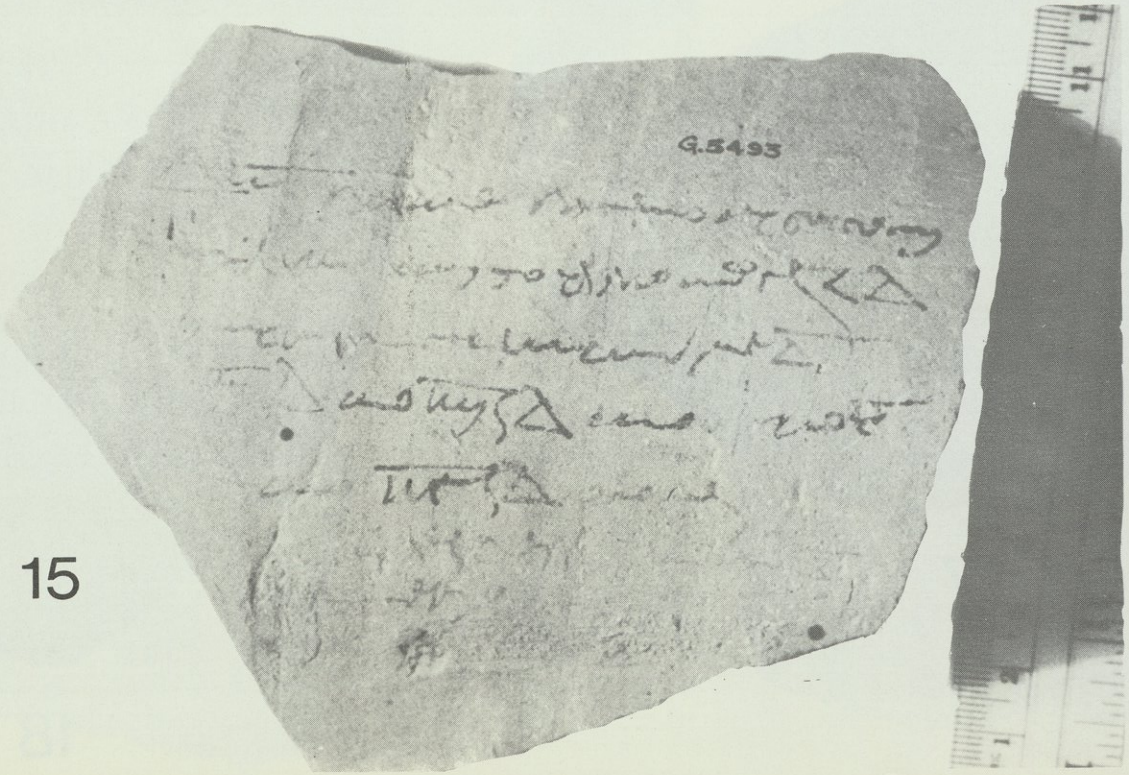

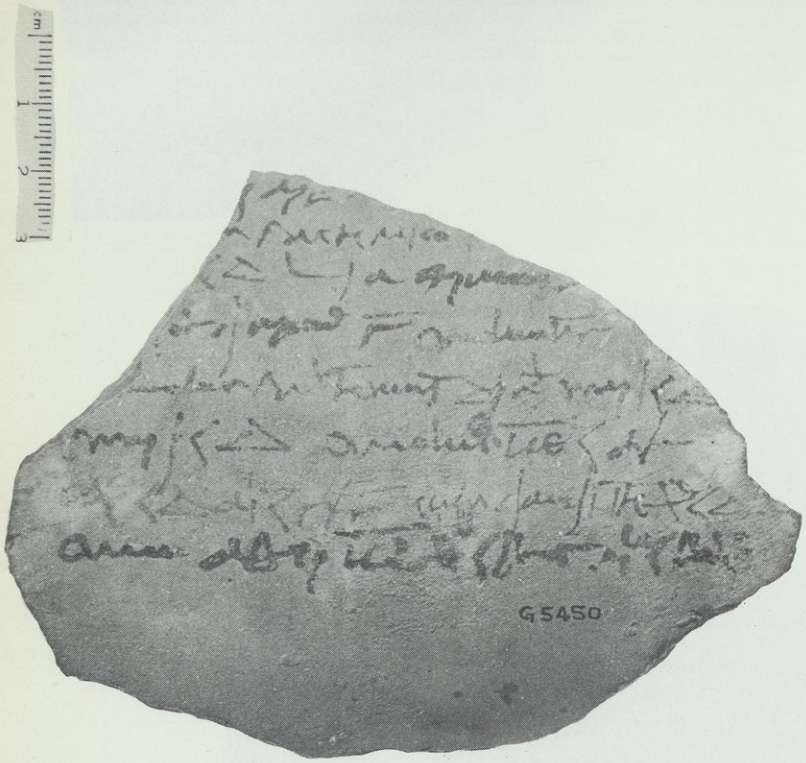

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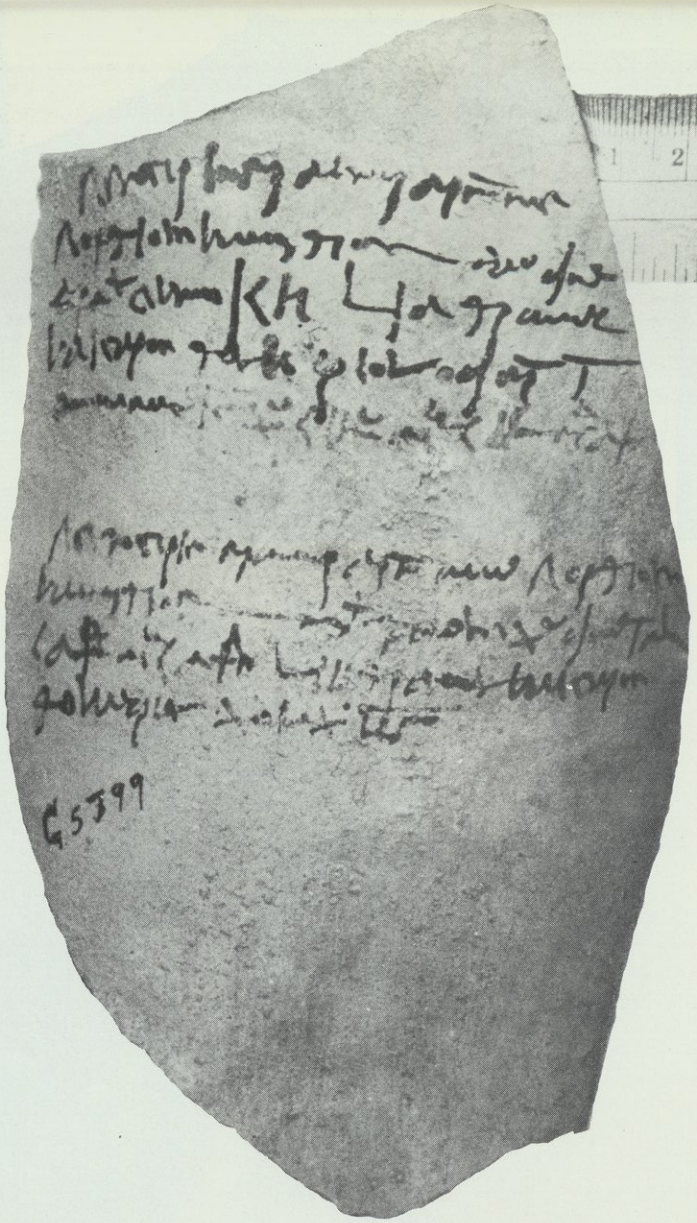

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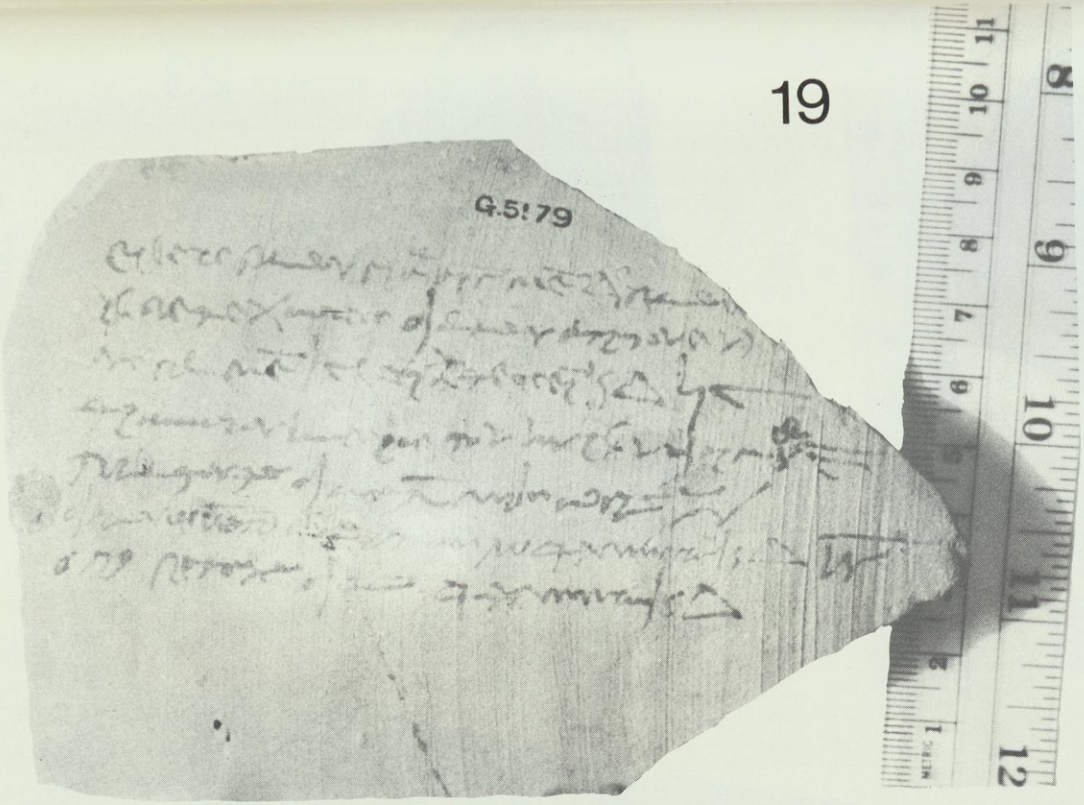

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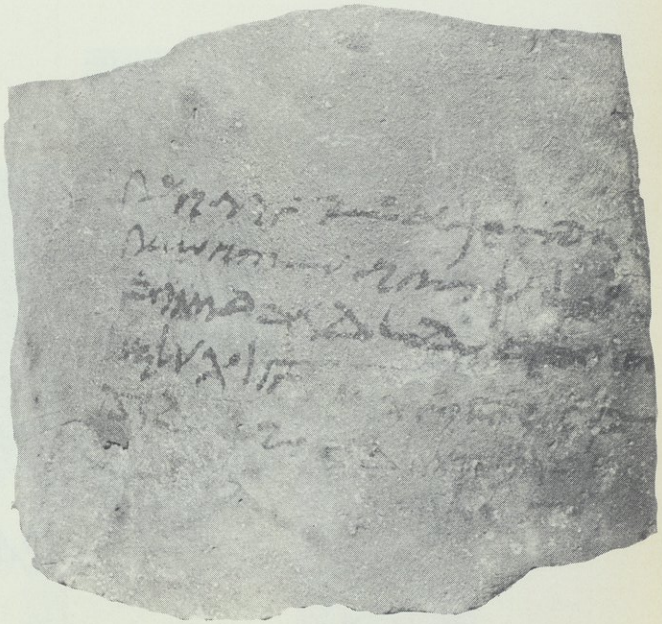

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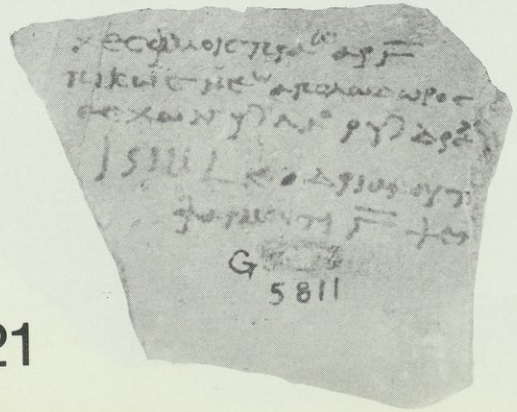

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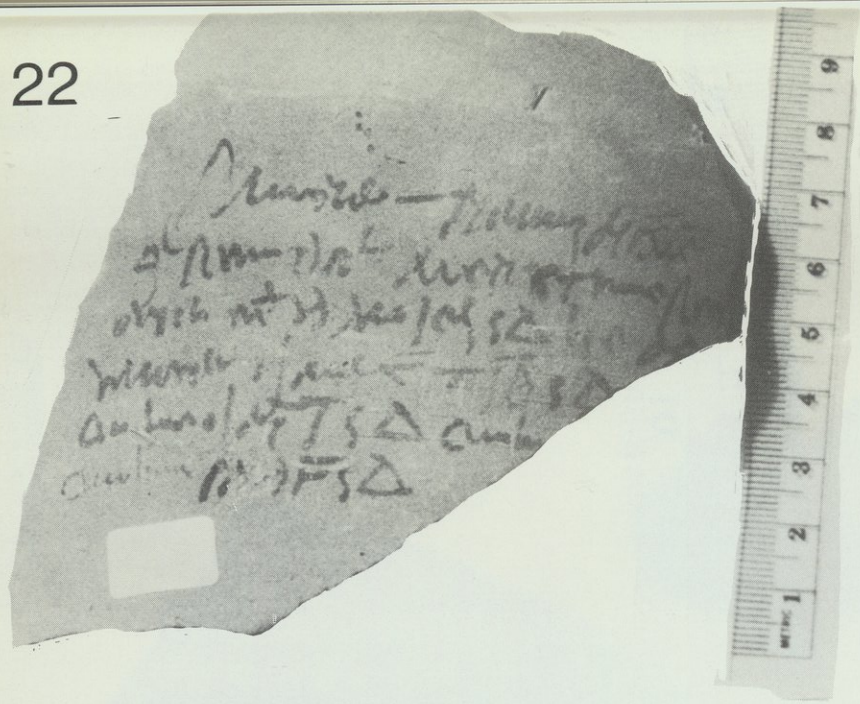

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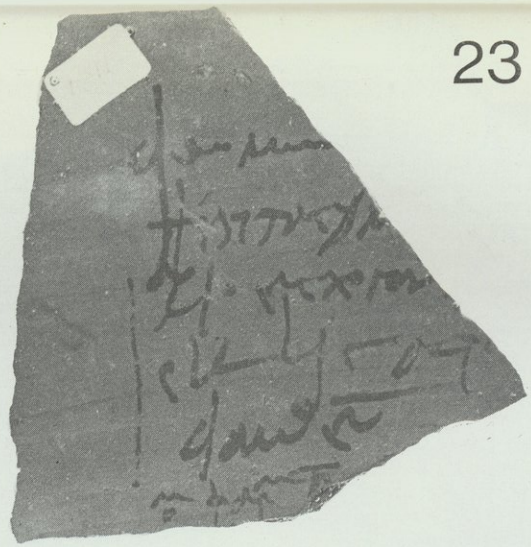

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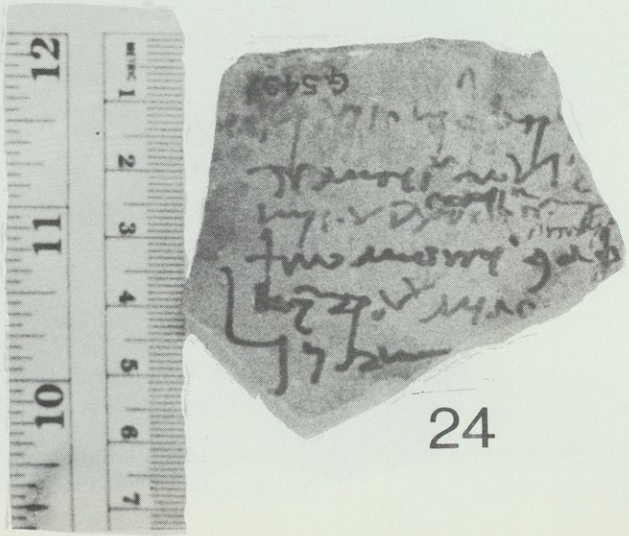

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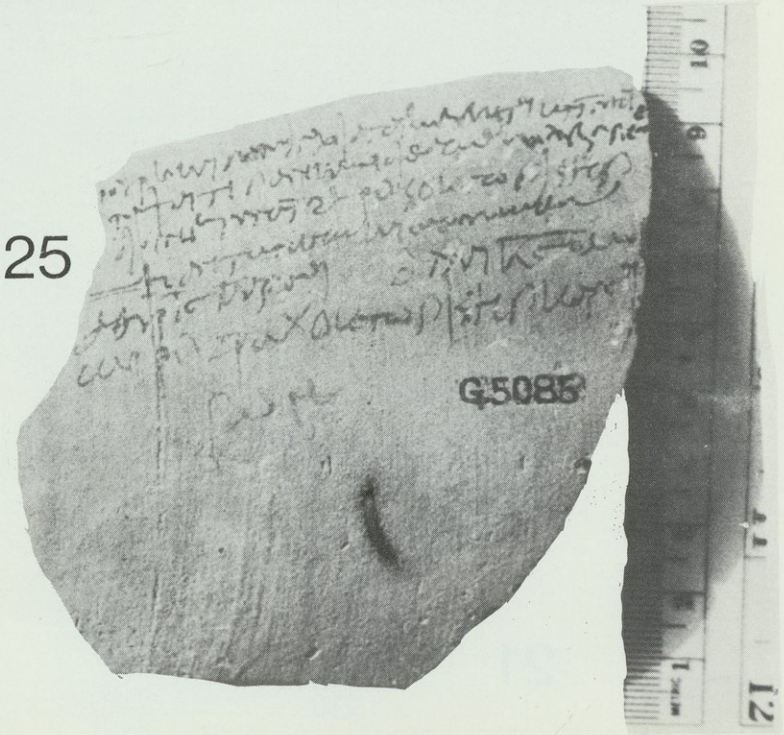

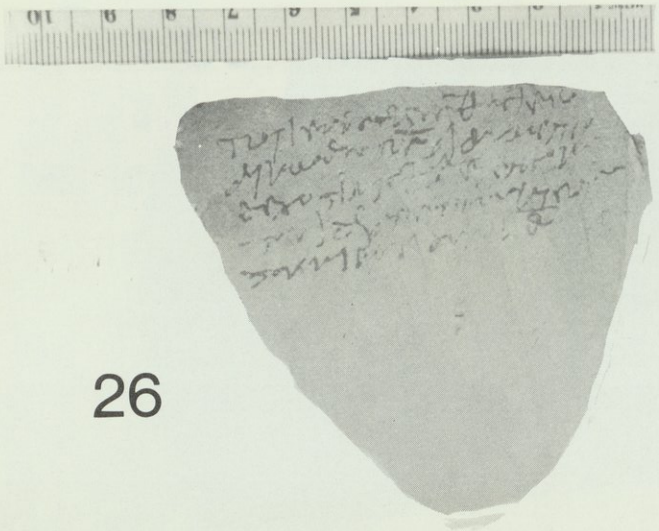

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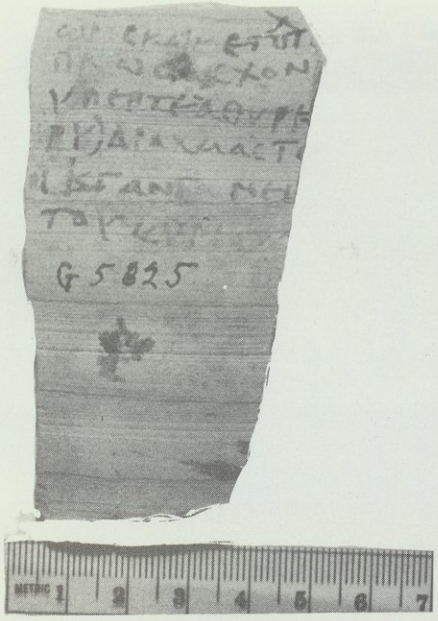

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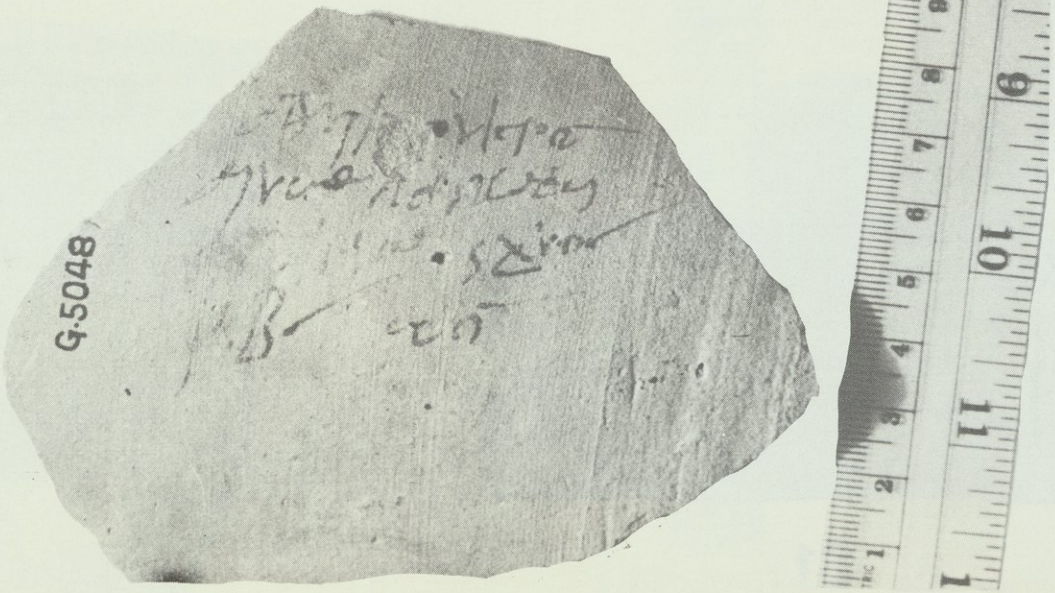

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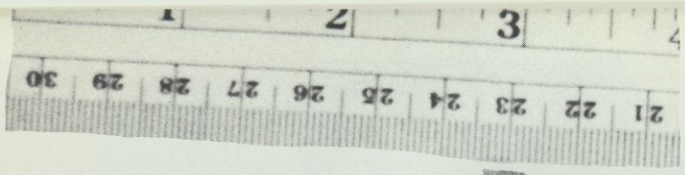

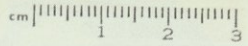

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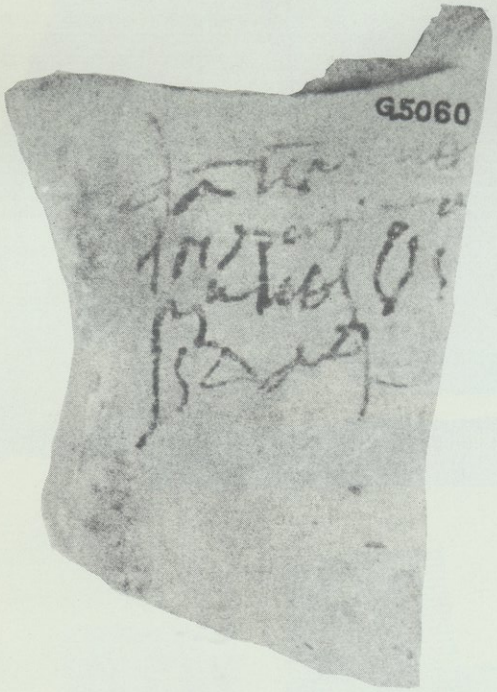

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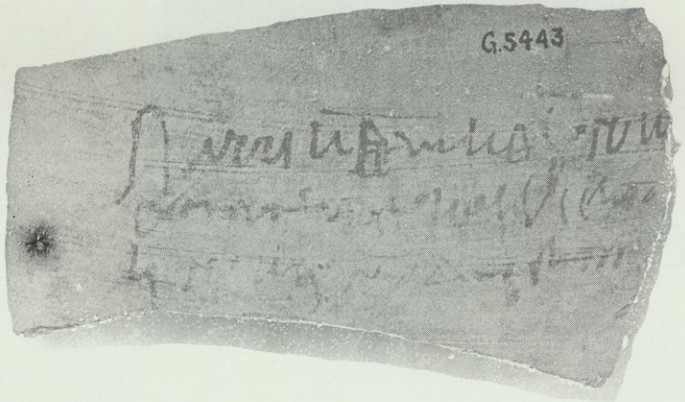

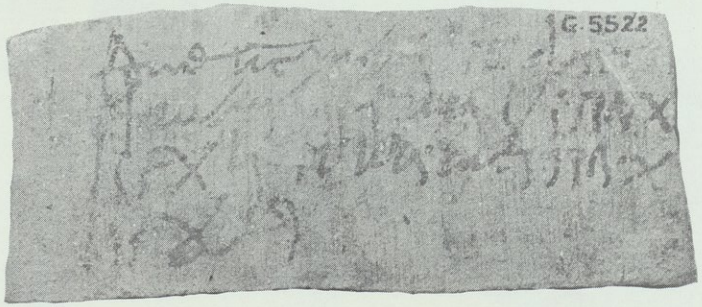

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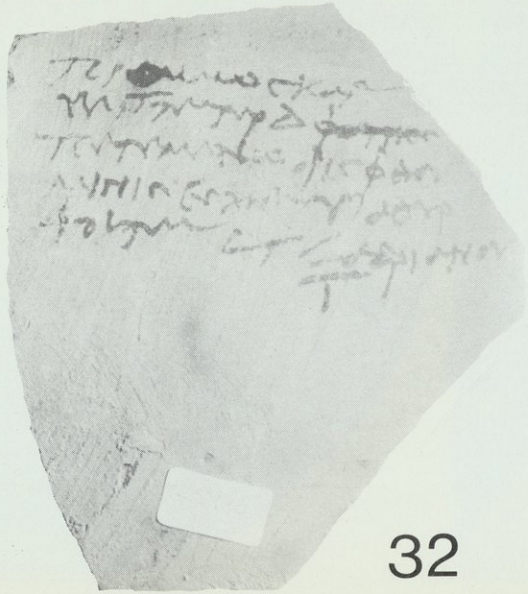

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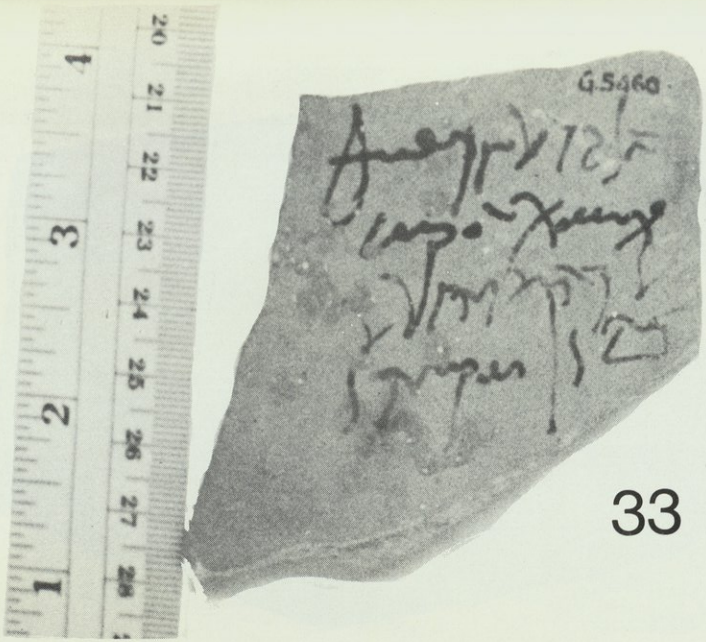

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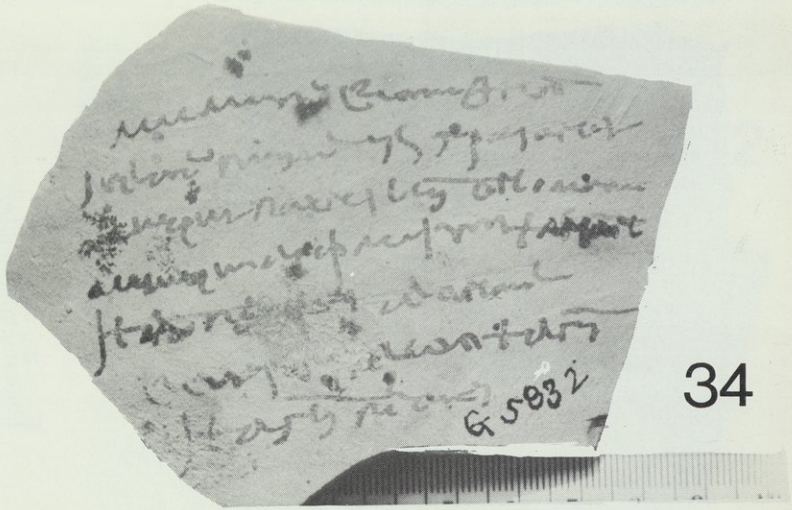

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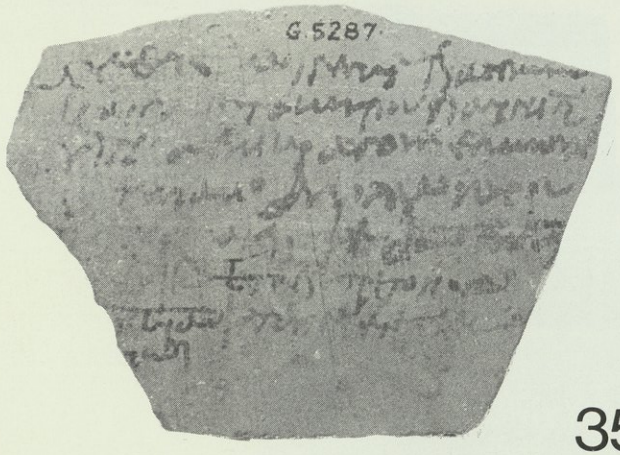

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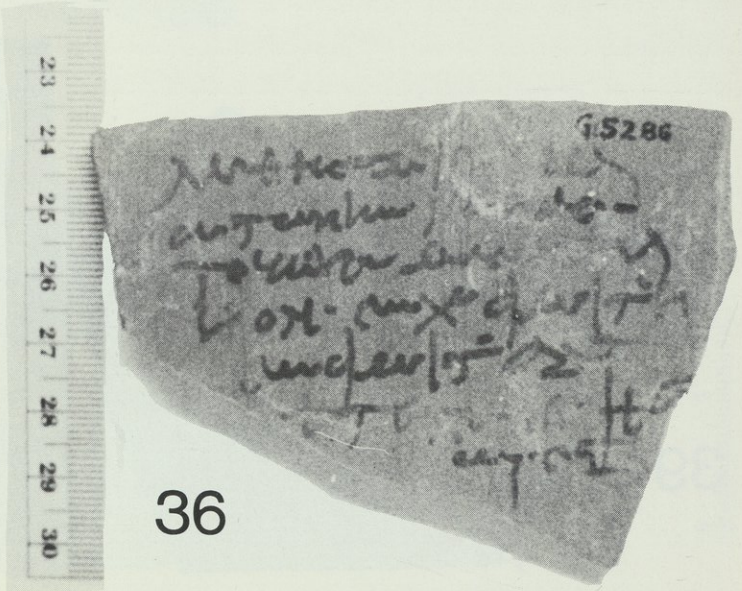

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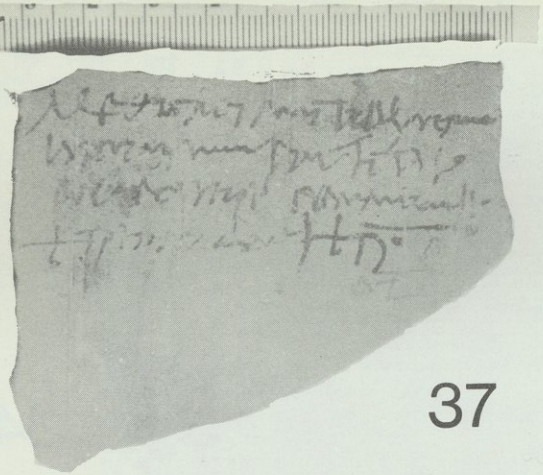

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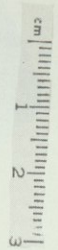

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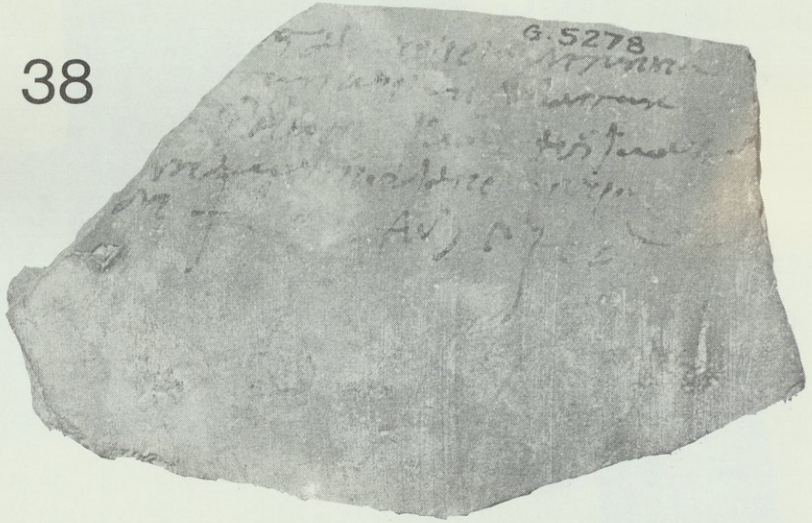

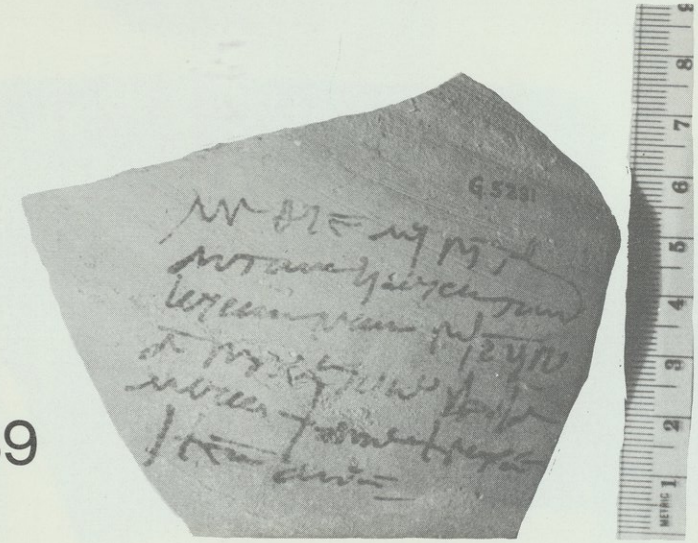

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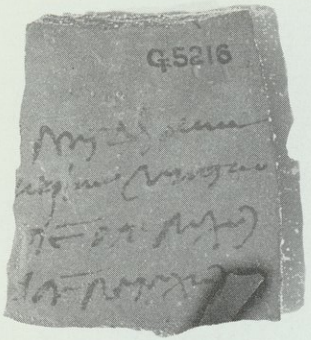

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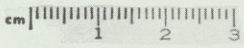

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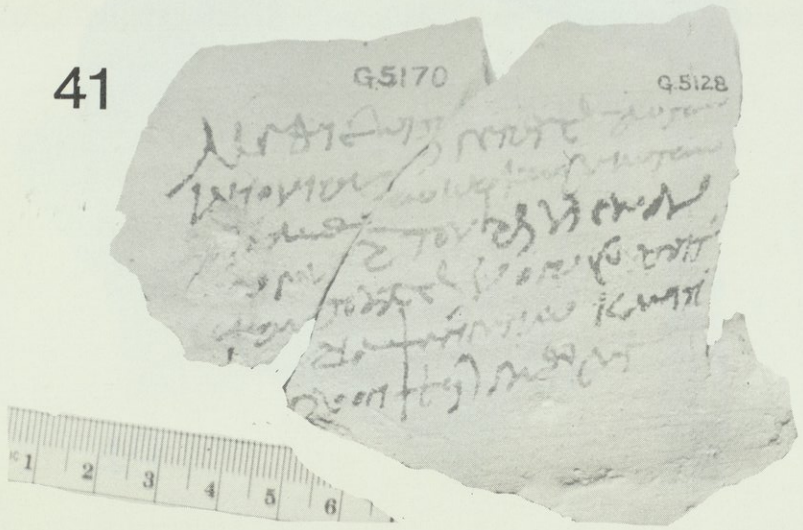

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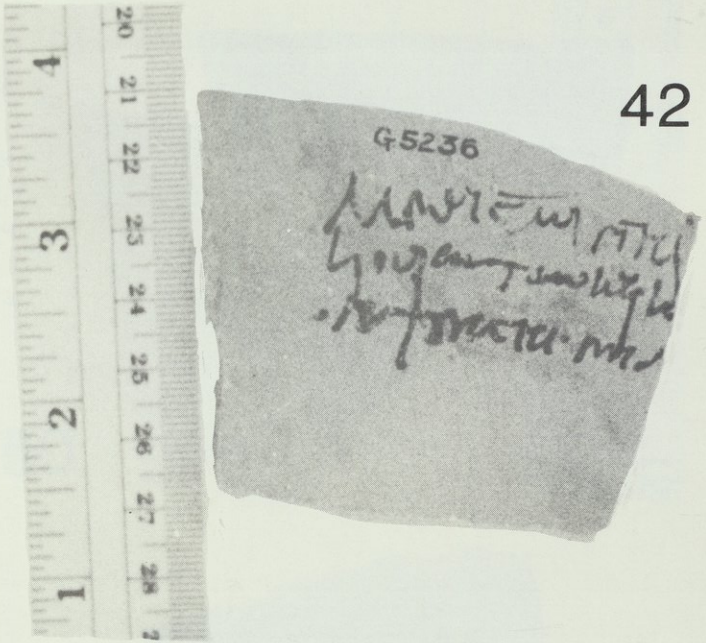

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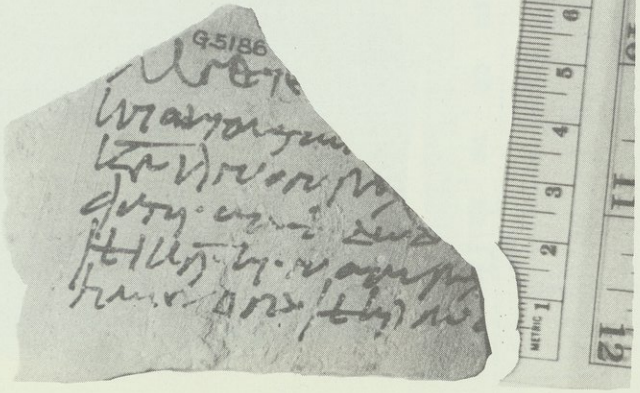

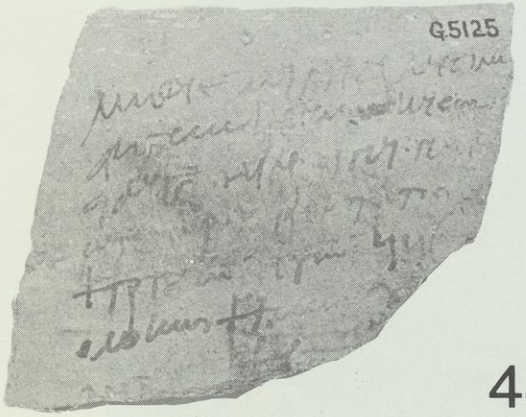

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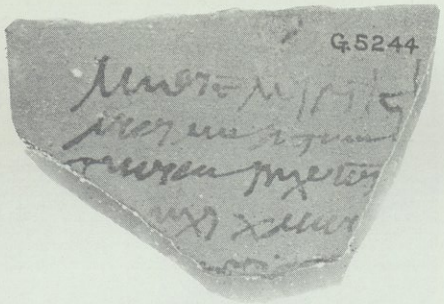

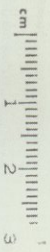

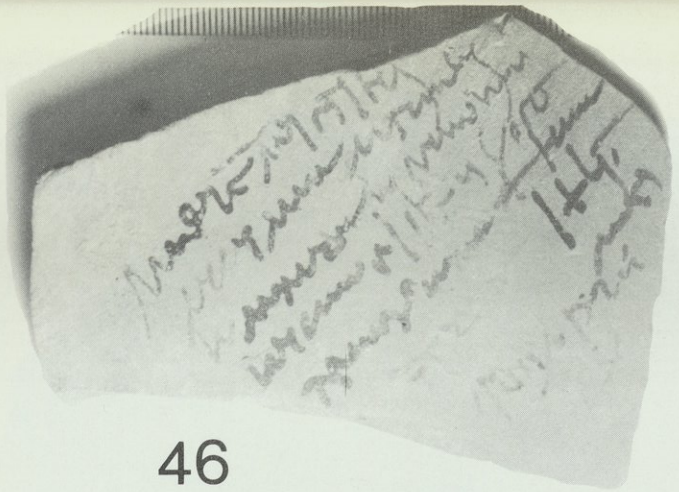

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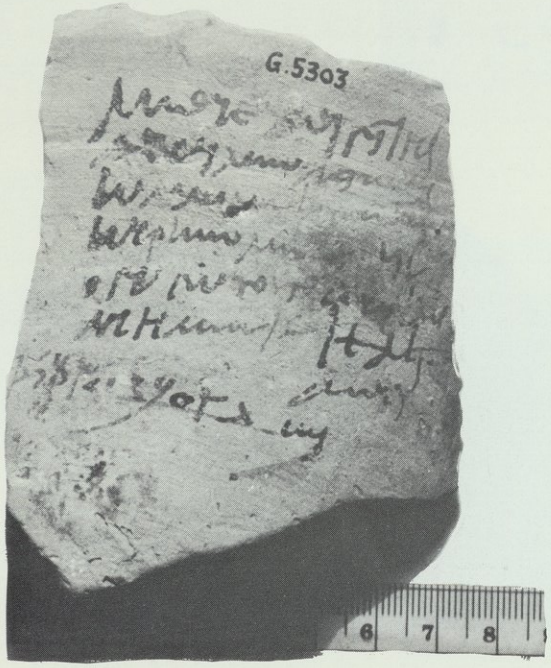

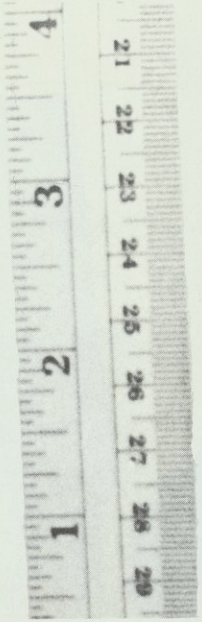

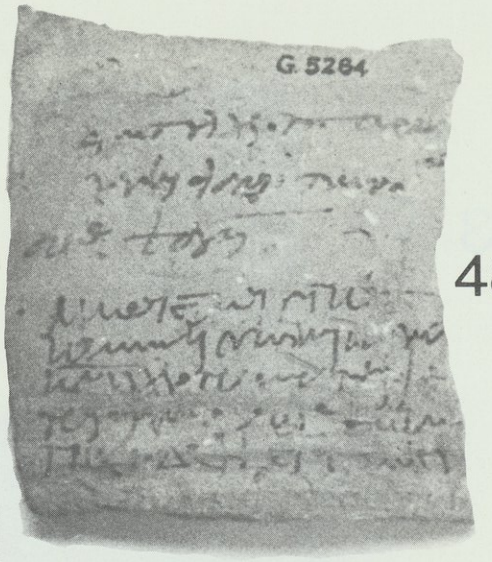

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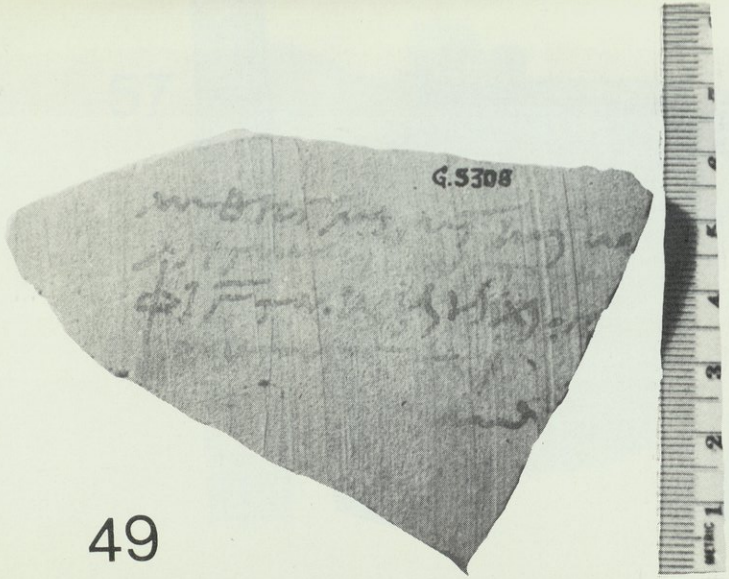

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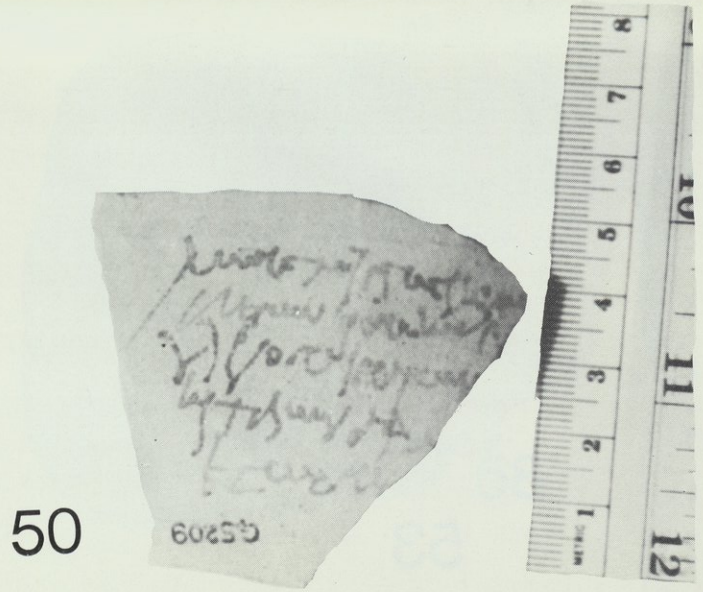

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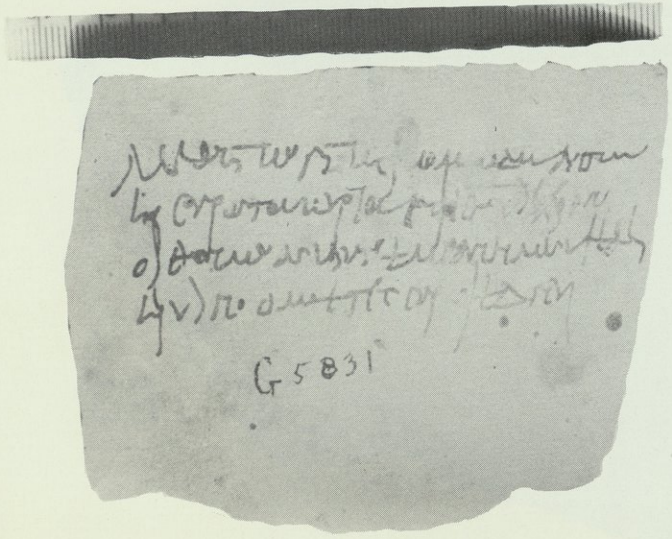

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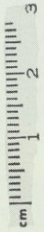

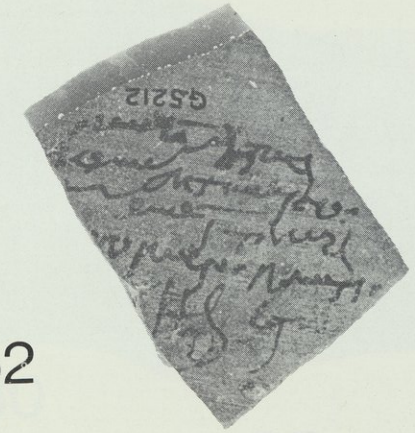

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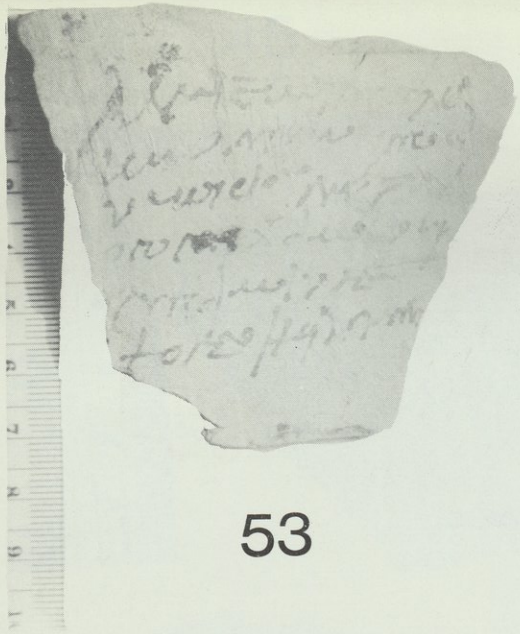

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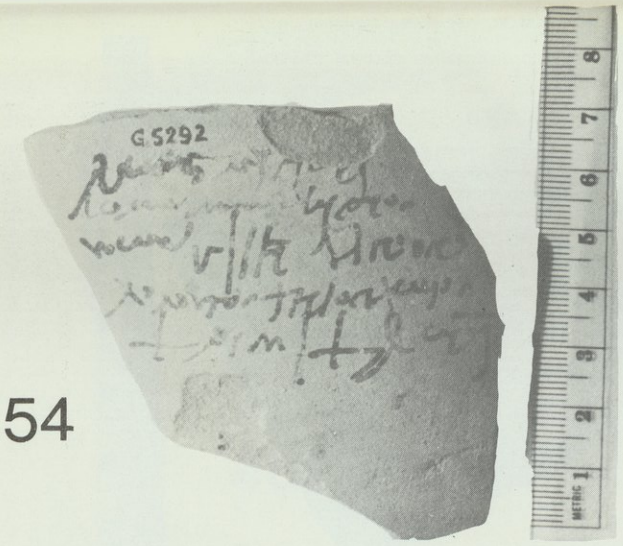

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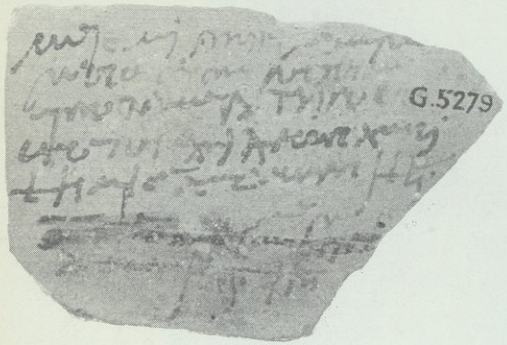

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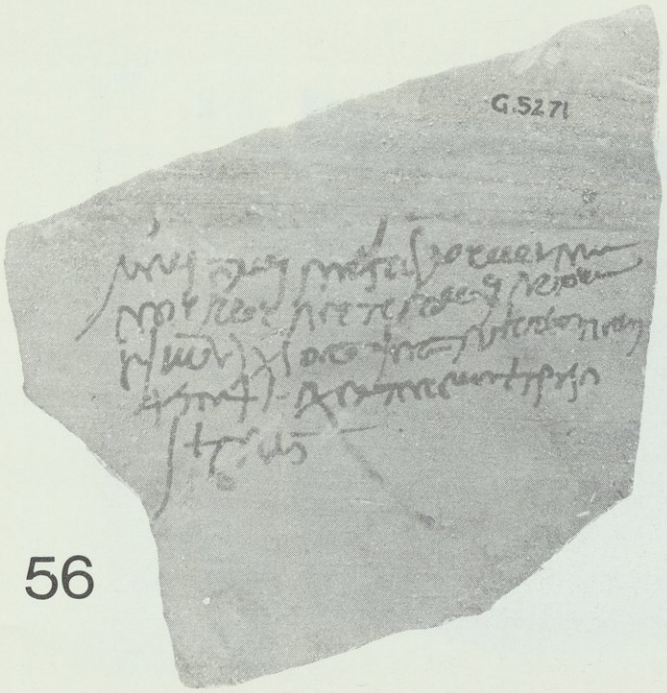

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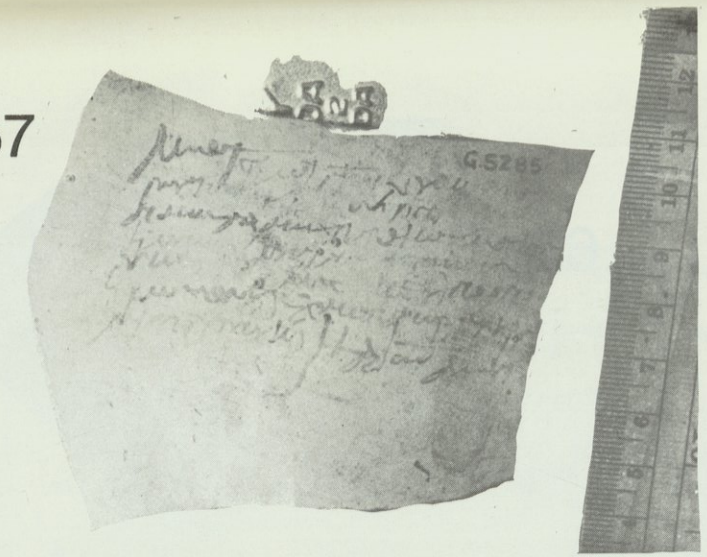

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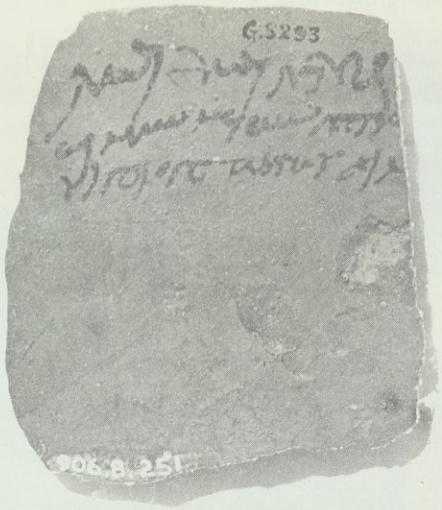

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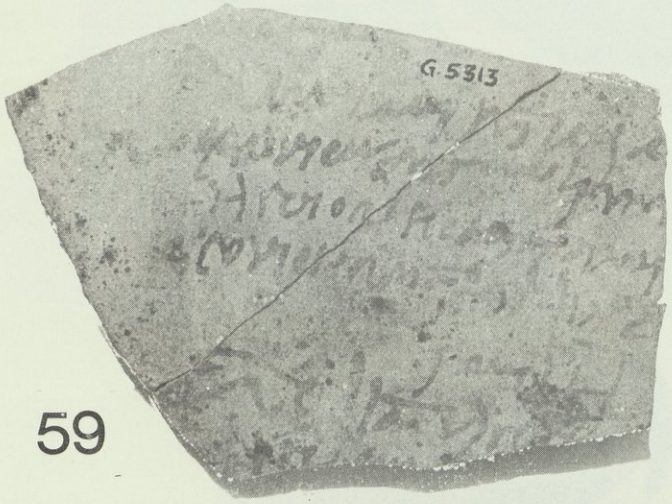

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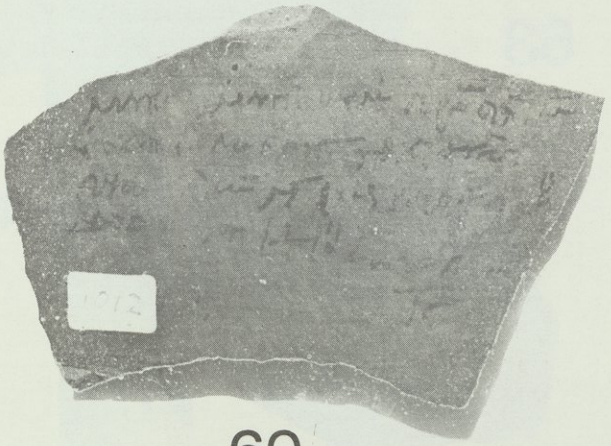

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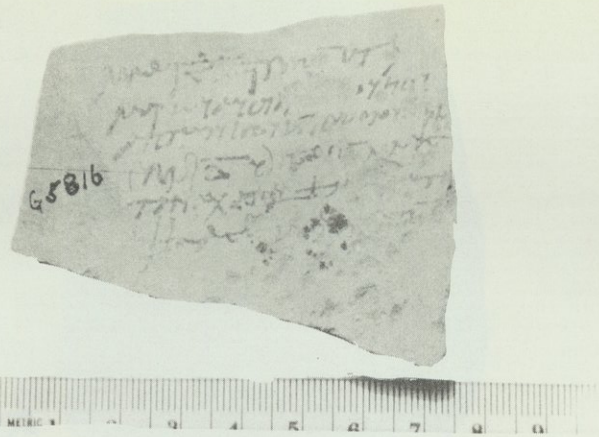

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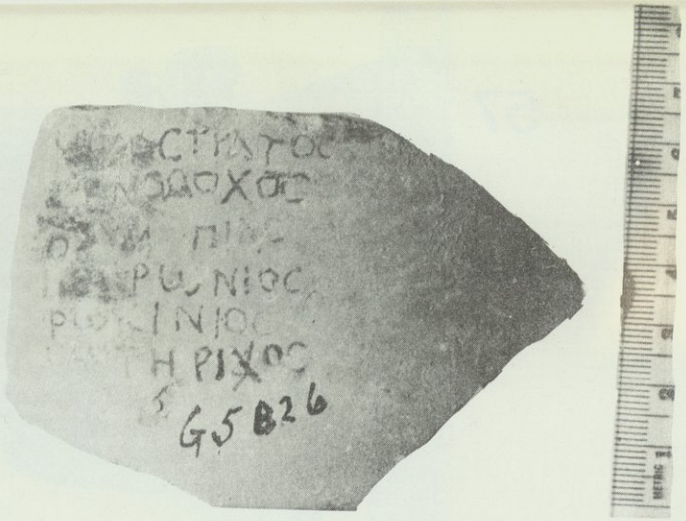

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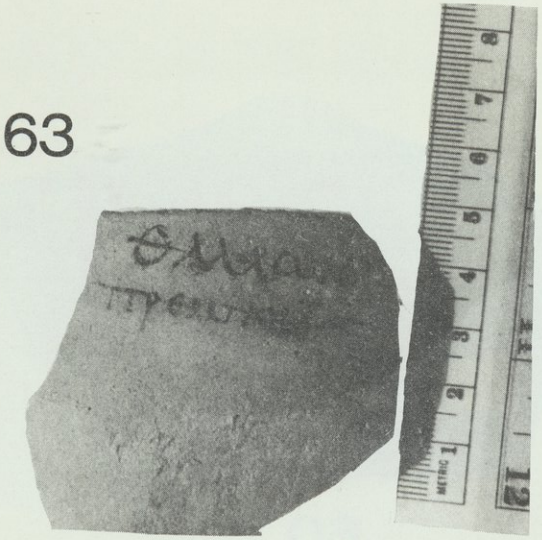

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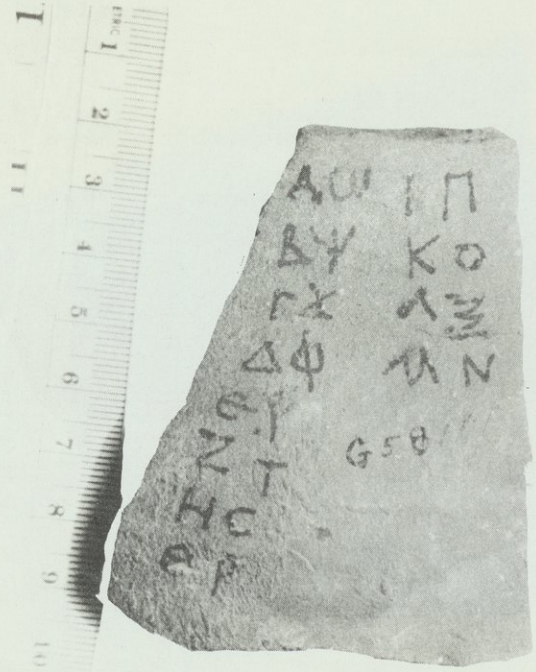

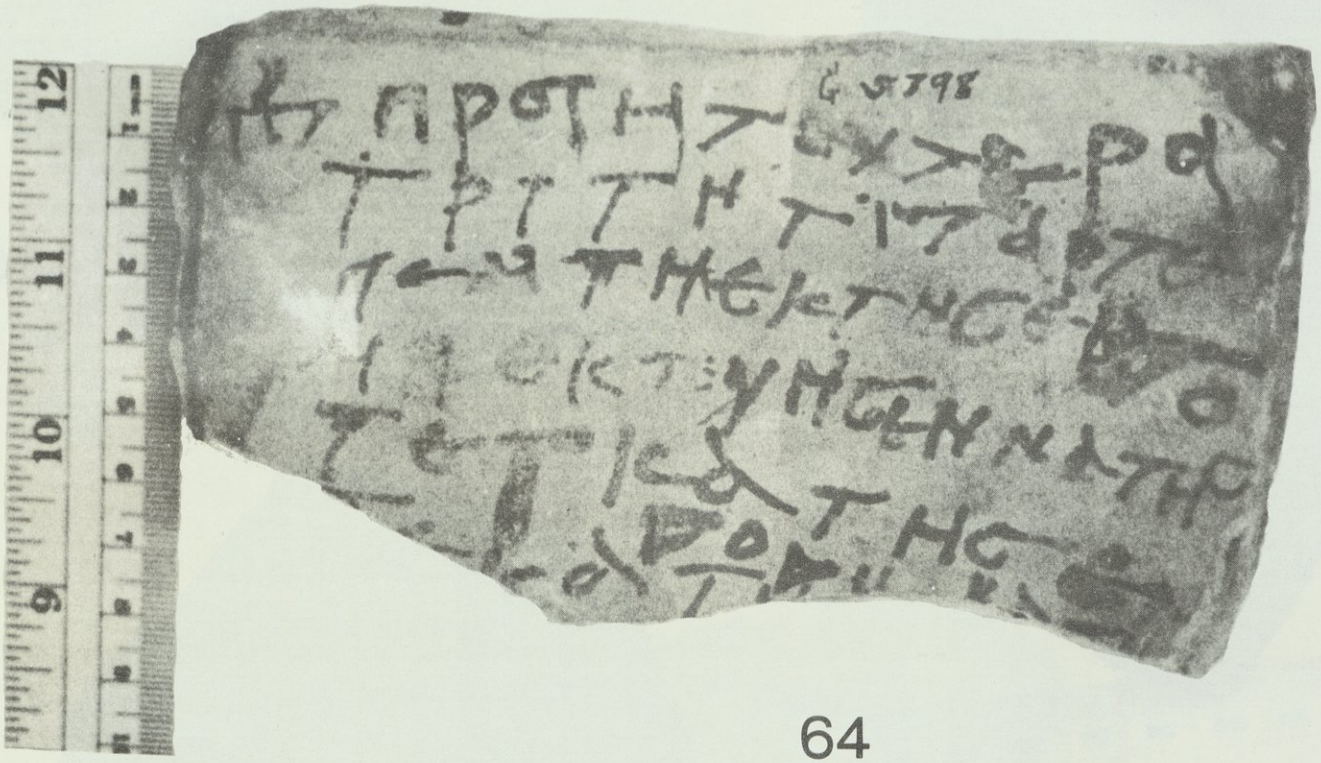

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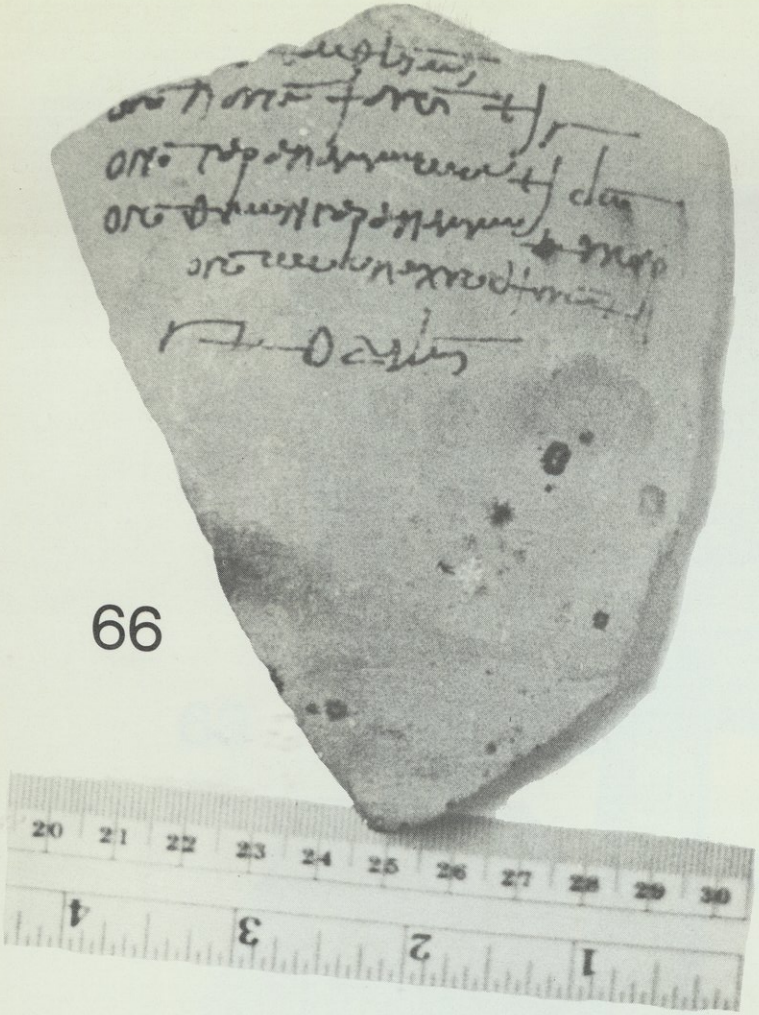

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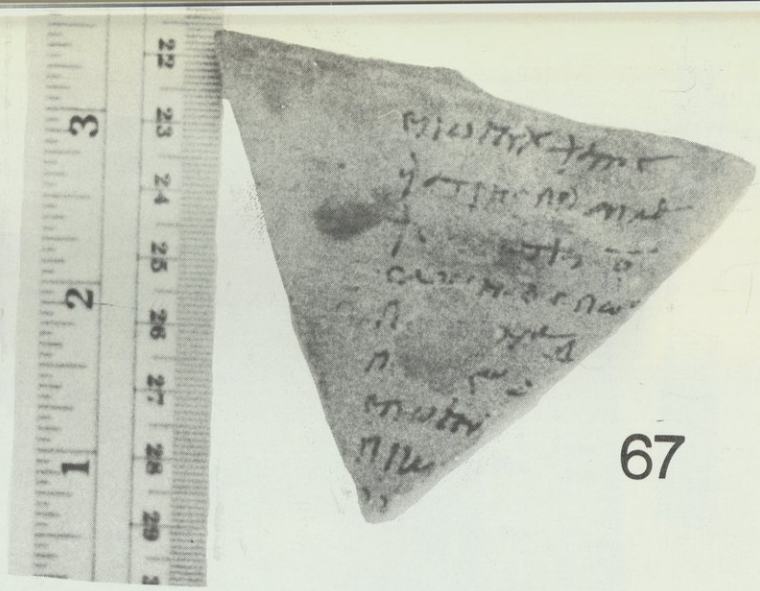

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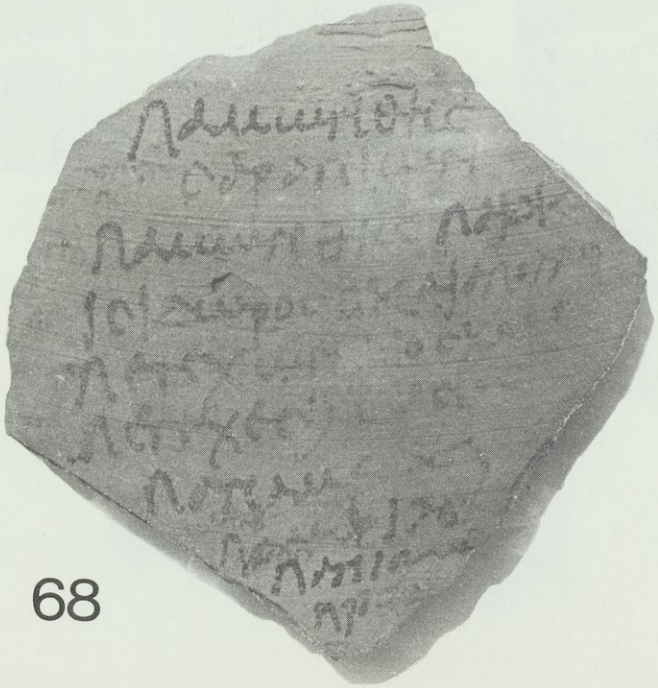

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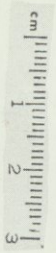

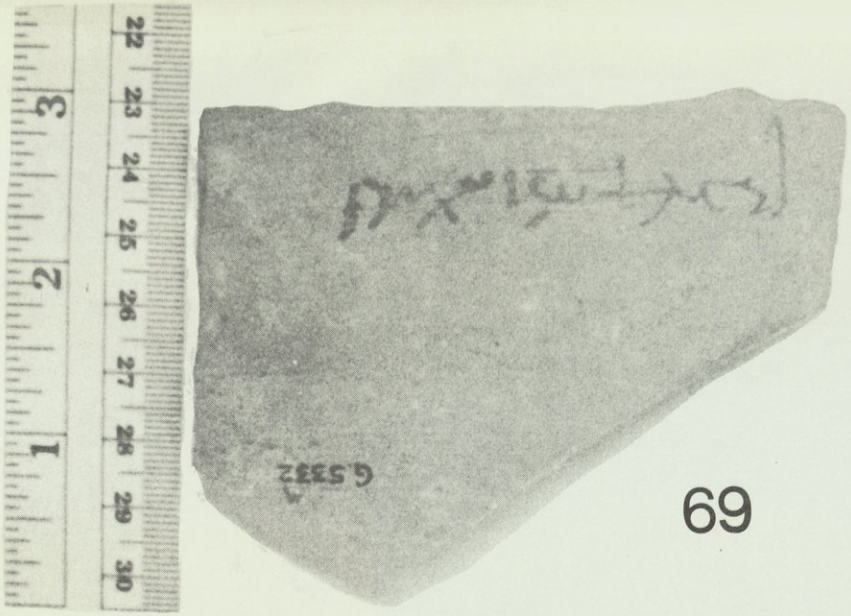

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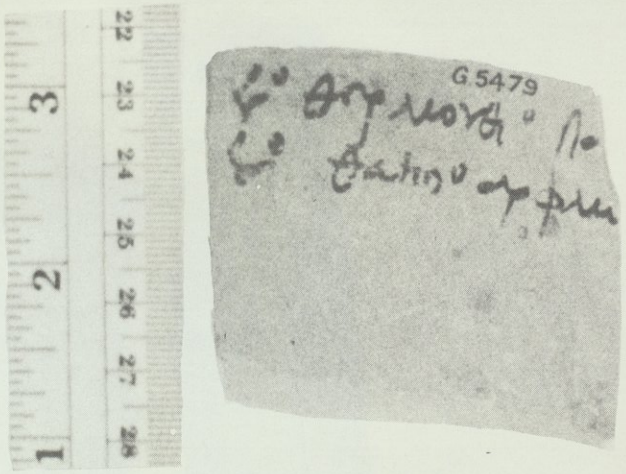

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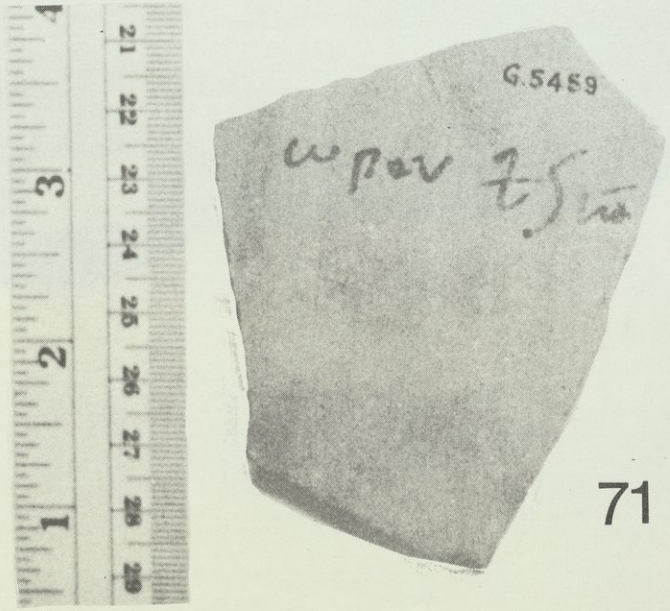

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