

## SEMATOGRAPHY OF THE GREEK PAPYRI.<sup>1</sup>

THE conclusions stated in the following pages are based upon the examination of the Greek documents of about three hundred papyri, the large majority belonging to the British Museum. For reference to authorities, I have principally used the following: Kenyon, *Greek Papyri in the British Museum*; Mahaffy, *On the Flinders Petrie Papyri*, 1891, 1893; Grenfell, Hunt, and Hogarth, *Fayum Towns and their Papyri*; Grenfell and Hunt, *The Oxyrhynchus Papyri I. and II.*, 1898, 1899. Also the facsimiles and lists published by Schow, Karabacek, Wessely, Thompson, Montfaucon (Book V. of the *Pal. Graec.*) Wilcken (*Observationes ad Historiam Aegypti Prov. Rom. depromptae e pap. Berol. ined.* 1885); as well as other works by the authors above-named, viz., Kenyon, *Class. Texts, &c.*; Grenfell and Hunt, *Gk. Pap. Ser. I. and II.*; *Rev. Laws of Ptol. Phil.*; and lastly the ostrakon-literature dealing with the same symbols, especially Wilcken's many publications (esp. *Griech. Ostraka*, 1899); Revillout and Wilcken in *Rev. Egypt.*; Birch and Sayce in *Proc. Soc. Bibl. Arch.* To Dr. Kenyon I owe also the hearty expression of my indebtedness for very helpful counsel in the prosecution of these and other researches and the publication of their results. Further as an Editor of this *Journal*, he has read my manuscript, and as he has kindly given me the benefit of that reading privately, I have been enabled to reconsider certain of my statements, and diminish by so much the labours of subsequent criticism. To Mr. G. F. Hill also I am indebted for some important observations.

The general thesis which has to be maintained and illustrated herein is the following. The symbols or compendious representations of commonly recurring expressions are the results of a quite natural process, analogous to the process by which the epigraphic capitals were rounded into uncials, and these still more in the cursive hands.<sup>2</sup> The cursive not gaining in its full alphabetic representation sufficient brevity to satisfy the scribe, to whom the repetition *in extenso* of obvious words sometimes became, no doubt, insufferable, was soon abbreviated by the omission of parts of words, an inclusion-mark being drawn over the letters which made up the

<sup>1</sup> The lack of uniformity in the representation of the signs in the following pages is to be explained by the fact that printer's types have been used wherever possible, while blocks have been cut for the rest.

<sup>2</sup> Apart from these, there is a small group of characters whose origin is older than the papyri. These in some cases are epigraphic forms retained, but others may have had a manuscript origin.

abbreviation, or an apostrophe (of which our own is a diminutive descendant) taking the place of those which were omitted. Next, in certain very common names (of money, measures, etc.), these parts of words were simplified in form, the barest outline or fragment remaining—a natural order of development, like that of the oldest alphabetic capital from the more complex hieroglyph. Succeeding generations adopted these forms in a mechanical way, and soon they appear as quite irrational symbols. But the process was applied only as the need was felt, so that we find some overlapping and rivalry of various forms, and but a small number of true symbols, probably not a hundred, even including the ordinary numerals and the signs or marks of reference, paragraphs, total, etc. Many papyri have no symbols at all, not even in dates and equally obvious places.

On the other hand the practice of natural abbreviation, by omission of the latter parts of words, is overwhelmingly more common than in any modern writing and printing.<sup>1</sup> The Greek scribes of all the earlier papyri relied on the perspicacity of the reader's intelligence, and abbreviated so much that in some places little more than half the full number of letters are recorded. The mark of abbreviation—a horizontal, or a (normally) vertical stroke—and compendious scribblings of the end syllables (*e.g.* B.M. Pap. xcix. (1) 31 et passim) of a common or recurring word were together almost sufficient for all the demands that were made, and in the end saved far more space and labour than elaborated systems of abbreviation, both shorthand and other, have done for modern printing or manuscript. As regards formal systems of abbreviation, it may be observed that any method of reducing labour and time in writing, to be of actual, as opposed to potential usefulness, must proceed quite naturally, only one step at a time, each step being in every way just that which hand and mind expect, in advance of the stage of abbreviation already reached. Having *καλ*, it is easy to write Kappa with a flourish, while only the most rigid watchfulness at first will attain the habit of introducing an extraneous sign. Here the good sense of the ancient Greek-speaking people showed itself, and it is surprising to observe how little the later Greek copyists gained by the elaborate abbreviation and use of signs which they affected, how much more ornamental than useful were many of the compendia which later still were copied in printers' type, and how often they seem to choose quite the wrong groups (tested by the ancient practice) for the application of their abbreviations.<sup>2</sup> Be that as it may, allowing for the general ancient tendency, we shall not expect to find any carefulness on the part of the scribes of the papyri to introduce unmistakable symbols, much less to invent them, and must be prepared to find the whole of a formula, made up of abbreviated words written in the cursive hand of

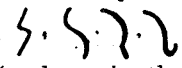
<sup>1</sup> It is surprising that hundreds of common words have not been forced into abbreviated form in modern English. As for perspicuity, who could possibly mistake the meanings of: wh., c<sup>d</sup>, w<sup>d</sup>, etc., in any context? As regards economy the mere saving in type, time, and

space would be enormous.

<sup>2</sup> Cp. the habit of Mediaeval writers of Tironian notes, who supplied signs for word-endings where the ancients had left the *notae* abbreviated.

one generation, appearing as the symbol of the next. It will follow as a corollary, that there will be no borrowings from formal tachygraphy in the papyri. As a matter of knowledge gained by a laborious search through nearly the whole of the published papyri, and the study *ad hoc* of the hands themselves of nearly three hundred manuscripts, I can assert that there is hardly a single indubitable occurrence of a borrowed tachygraphic sign in use in ordinary Greek literary,<sup>1</sup> or non-literary<sup>2</sup> papyri, and, as I hope these pages will demonstrate, there is *only a very small number of symbols which do occur, which cannot be traced to a cursive origin or, in some few cases, back to epigraphic characters.*

Concerning one of those irreconcilable symbols there is an interesting and important observation to be made. The †-shaped drachma-symbol, one of the chief symbols of the papyri, appears in the oldest Petrie papyri.<sup>3</sup> This fact is interesting to the student of symbols for its own sake, since it follows that if it had, like the rest, an alphabetic or an epigraphic origin, it must be *older than all the papyri.* But its general importance in palaeography is still greater, as it would confirm the more recent opinions of scholars (vide Thompson, *Gk. and Lat. Pal.* p. 115; Kenyon, *Pal. of Gk. Pap.* p. 9) that Gk. cursive writing has a long history behind the earliest facts yet known to us from any manuscript. It is not that the symbol is merely puzzling, like the equally early ρΑ-symbol for 'holder of one hundred arouras' in Pet. Pap. XI., for in such a case the explanation may lie in some fact of *contemporary* social history at first overlooked by the investigator. But the clear and bold outline, and its uncompromising contrast with the contemporary cursive (cp. Pet. Pap. XII. and XIII. fr. 2 of the reigns of the second and third Ptolemies) point to a matured development, possibly coeval with the use of the drachma itself, so carrying back our glance well into the classical period.

Another observation of general value, not only to palaeography, but even to archaeology, is that symbols are the safest depositories of the oldest forms. The numerals Stigma=6, Sampi=900, Sigma of the epigraphic shape=200, Koppa=90; the series formed of special use of Alpha, Beta, etc.=1000, 2000, etc.; the curve, a degenerate Mu=10,000: these keep their ancient forms and meanings through centuries of palaeographical change. The epigraphic Sigma, in that brief form  which already appears even in the inscriptions themselves (at least in the Chalcidian alphabets of Euboea and her colonies) survives, as I shall endeavour to show, in the

<sup>1</sup> Concerning the nature of the abbreviation used in the 'Αθηναίων Πολιτεία of the British Museum, and two or three others like it, which stand apart from the ordinary literary papyri written in careful uncials, judgment may be at this stage wisely suspended. See Gitlbauer, *Tachygraphische Spuren im Papyrus der aristotelischen 'Αθηναίων Πολιτεία*, in the *Archiv*

für *Stenographie* July-Dec. 1901. In this learned contribution the 'special pleading' for formal tachygraphy is undisguised. I attempt a less *ex parte* estimate in a forthcoming contribution. See note at end, p. 173.

<sup>2</sup> For a doubtful exception, vide *infra* p. 148.

<sup>3</sup> And also in Attic inscriptions from the fifth century B.C. onwards.

various similar forms for the fraction 'one-half' in the earliest of the Ptolemaic,<sup>1</sup> and down to the latest of the Byzantine Papyri.<sup>2</sup>

In the following pages, any numbers of papyri quoted, not specially distinguished by the name of the collection, always refer to the papyri of the British Museum.

### THE SYMBOLS OF THE PTOLEMAIC NON-LITERARY PAPYRI.

1. Of the history of symbols in early Greek writing, the non-literary papyri of the Ptolemaic period furnish an interesting chapter. In these records, symbols are to be observed at all stages of condensation and petrification. Some are to be seen in a form which gives no hint of their original formation; others can be clearly traced from a simple ligatured cursive to a quite conventional symbol. In the case of

Ε. ε. / . Γ . ο . ς . ς . ζ . ς . ς .  
 ρ 4 . ς . ε . α . β γ δ . Σ . δ . L<sup>trunc</sup>.

we can here trace the life history of each symbol; in regard to

π . κ . ρ . c

obvious inferences may be securely made; for

∫ . } . c . L . - . =

reasonable conjectures may be submitted; while for

Π . ς . L . L - L ( = ς ) . Λ

no conclusive explanation can be given, probably because our acquaintance with Greek handwriting does not go far enough back.

(1) *The symbols of Ptolemaic papyri are not, in origin, arbitrary, but are the results of abbreviation of words.*

(2) *There is no trace in this period of borrowing from a system of tachygraphy.*

It will follow from the establishment of this position, that explanations of the various symbols will consist in tracing them from their earliest

<sup>1</sup> In Pet. Pap. XXXIII (a) 24 early 3rd cent. B.C.

<sup>2</sup> In B.M. Pap. CCCXCIII, 3 (saec. VI-VII). So the '10,000'-symbol which occurs

among the Petrie-symbols, occurs more than 8 centuries later in Oxyr. Pap. CXXVII recto (late sixth).

departures from the ordinary script, through its more cursive developments, to the stage of the quite arbitrary symbol. Consequently, the distinction between symbols, and the nearest similar formations of the common characters, will be psychological, as well as formal. The enquiry to be made at each stage is, How far had the scribe in mind, at the time of writing, the original true form of the symbol, or, in the case of the composite symbols, the elements composing it? This has no direct relation with his possible knowledge of such origin. For illustration, the scribe who wrote in Brit. Mus. Pap. CCCCII. 31 the large 2-shaped character for the number 1000, must almost certainly have known that it was a circumflexed Alpha, yet if it is not, according to his ordinary hand, a plain Alpha surmounted by a circumflex, which he feels he is writing, then the character is already in one of the early stages of a symbol; just as an Englishman in writing £ for 'pounds' is writing a common symbol, although he may be well aware that it is L crossed with two bars. One sign of such feeling is that the scribe deviates as little as possible from the conventional form of the symbol-letter; and thus it comes to pass often that an alphabetic letter used as a symbol appears as quite another thing, when compared with the corresponding letters of the manuscript in which it occurs.

In order to maintain the first-stated position that the symbols of Ptolemaic papyri are not arbitrary, it will be necessary to examine in detail every symbol occurring, or as many of them as are capable of explanation; and then to show that these are sufficient for the purposes of the inductive argument.

The Metretes-symbol  $\overline{\epsilon}$ . This is demonstrably a monogram for Mu-Epsilon. The abbreviation which sometimes takes its place is printed by the editors as two letters without comment, but for our present argument there is to be observed a curious distinction between the monogram-symbol, and the ordinary collocation. The difference may be studied in Brit. Mus. Pap. XVII. (B.C. 162). where in lines 38, 46, *et passim*, Mu-Epsilon occurs as a syllable in ordinary words, and it will be seen that in every case the right-hand perpendicular curve of the Mu is present, as well as the bow of the Epsilon; whereas in the Metretes-symbol (41 and 39) the Mu is reduced to an undulating line; or, to put the same fact differently, the Epsilon is reduced to two horizontal bars written against a cursive Mu, thus  $\overline{\epsilon}$ . In line 58 there occurs the symbol, in which we may trace the Mu, with its horizontal bar made straight; in line 57 we have a mutilated form of the same, and finally, in lines 51 and 54 occur two of the familiar symbols, as variants of the monogram (cp. Pap. XV. fr. 8 line 9), one in which the lower curve of the Epsilon still lingers, and one of the ultra-conventional type. The circumstances that this MS. is an official document, that it is written by three hands, each of which gives the same testimony, that it is clearly dated and in good condition, add peculiar reliability to its witness. For the formation we may compare that of  $\tau\acute{\epsilon}$ ( $\tau\alpha\kappa\tau\alpha\iota$ ) viz.,  $\overline{\tau}$ , B. M. Pap. DCLXXV. 101 B.C. and that of the symbol for  $\kappa\epsilon\rho\acute{\alpha}\mu\iota\omicron\nu$ ,  $\kappa$  (vid. p. 144 infra).

The common symbol  $\rho$  = 'total.' Scholars have long recognised<sup>1</sup> the identity of this symbol with the initial letter of  $\gamma\acute{\iota}\nu\epsilon\tau\alpha\iota$  (- $\omicron\nu\tau\alpha\iota$ ): B.M. Pap. XVIII. contains a pretty demonstration of the fact, as follows :

line 4:  $\gamma\acute{\iota}\nu\omicron\nu\tau\alpha\iota$   $\omicron\lambda\upsilon\rho\omega\nu$   $\alpha\rho\tau\alpha\beta\alpha\varsigma$   $\nu\varsigma'$

line 18:  $\rho$   $\omicron\lambda\upsilon\rho\omega\nu$   $\alpha\rho\tau\alpha\beta\alpha\varsigma$   $\nu\bar{\varsigma}$

line 16:  $\rho$   $\omicron\lambda\upsilon\rho\omega\nu$   $\rho\tau\alpha\beta\alpha\varsigma$   $\lambda\bar{\epsilon}$

cp. ib. verso line 2: B. M. Papp. XXIX. 4; XXX. 7, 13, 15, 21; III. 36, 43; Fay. Pap. XIV. 5.

The group of symbols  $\rho$ ,  $\rho$ ,  $\rho$ ,  $\rho$ . These prove one another. Beginning with  $\rho$  = 'the city' which we find in B.M. Papp. LI. (A) and III. and Pet. Pap. II. no. XXVIII. passim,<sup>2</sup> we see, on close examination, that the dot was in each case written as an Omikron, as distinguished from the diacritic *punctum* (which is very rare in Greek cursive of this period; in a circumflexed Delta, B.M. Pap. L. 14, there is perhaps an instance). In the first instance, the symbol occurs almost isolated, owing to the mutilation of the papyrus, but there is little doubt of the reading (Kenyon). The top part of the curve has been scratched, and so flattened; the Omikron within it is reduced to a tiny cup still quite as large as the common Omikron of that shape.<sup>3</sup> In the second (Pap. III. 37) the reading is more certain, and here the dot beneath the curve is actually in the MS. as large as that which represents the Omikron of the preceding word. This slight indication helps to fortify the reasonable assumption that we have in the curve of the symbol a Pi, worn down from its angular shape by its frequent use as a symbol, exactly into the shape assumed by the Pi in ordinary writing in Roman, and occasionally earlier, cursive alphabets. As additional corroboration, there is the analogous later use of the Pi, with Omikron within it (=  $\rho\acute{\iota}\eta\mu\alpha$  Pap. CXXI. 385; and =  $\rho\acute{\iota}\eta\tau\eta\varsigma$  in the Bankes Homer). The symbol then is the time-worn initial of  $\rho\acute{\omicron}\lambda\iota\varsigma$  (or a case) with the second letter written subscript.

The symbol  $\rho$  =  $\rho\acute{\eta}\chi\epsilon\iota\varsigma$  is written over and enclosing the alphabetic numerals, which give the number of  $\rho\acute{\eta}\chi\epsilon\iota\varsigma$ . It is only a variant use of Pi, its significance being given by its position. Its shape is seldom a perfect semicircle, more often resembling an angular cursive Pi of third cent. MSS. Cp. Pap. XV. 5, 7, 17, 18. I cannot find it in the Petrie Papyri, and it is also apparently absent from the Ostraka: cp. Wilcken Gr. Ostr. I. 818-9.

A similar explanation applies to the symbol for 'remainder':  $\rho$  =  $\rho\epsilon\rho\acute{\iota}\epsilon\sigma\tau\iota$ . This is sometimes identical in shape with the foregoing, though always standing by itself and detached from the numerals of the remainder.

<sup>1</sup> Wilcken mentions it, in his *Dissertatio ad summos honores* written in 1885. Dr. Kenyon gave it to me last year as the accepted opinion, so that it has survived a long period of criticism.

<sup>2</sup> Once in this papyrus followed closely by  $\mu\epsilon = \mu\epsilon\gamma\acute{\alpha}\lambda\eta$  (?): apparently the metropolis,

Crocodilopolis (Mahaffy II p. (87). M. elsewhere quotes  $\epsilon\kappa$   $\kappa\rho\kappa\omicron\delta\iota\lambda\omega\nu$   $\rho$  from the heading of an account dated 20th year of Ptolemy III (226. B.C.).

<sup>3</sup> Cp. Fay. Pap. XVII. 1. Here, however, it is further distinguished by the ordinary horizontal inclusion-sign.

In other places it is a more fragmentary part of the semicircle, pitched obliquely towards the right, or even thrown right over into the vertical, in that reminding one of the variations of Sigma toward the end of the first cent. and at the beginning of the second (Kenyon, *Pal. Greek Pap.* pp. 44, 45). It need hardly be regarded as a variant, the increased carelessness of formation being in proportion to the greater frequency of employment, and to the more certain corrective of a familiar formula. Cp. *Pap. XXX.* 3, 24, 25. It is found in Roman papp. e.g. *Fay. Pap. CI. r.* (iii.) 4; *ib. v.* (i.) 10. Professor Mahaffy gives it this value (= 'remainder') in the *Petrie Papyri*, with the remark that he does not know its origin (*Part II. p.* 39).

The origin of  $\int = \acute{\alpha}\rho\acute{\alpha}\beta\eta$  is sufficiently obvious. It occurs, apparently, only in the Ptolemaic documents, where there is no instance, I think, of the common Roman equivalent, the horizontal line with an Omikron or dot under it. In *B.M. Pap. XXIII.* we may study the construction of the symbol (second cent. B.C.). The scribe of this MS. had in his mind an abbreviation as nearly like a third cent. B.C. ligatured cursive<sup>1</sup> Alpha-Rho (cp. *Pal. Soc. II.* 143) surmounted by the horizontal abbreviation-mark<sup>2</sup> as a symbol could well be; in line 48 it is somewhat obliterated, but the portions of letters would make up Alpha-Rho; in line 49 is a variant of the same; in line 71 the cursive is perfectly distinct, as it is in line 72. A curious variant occurs, an isolated example, in *CCXVIII.*, fourth or third cent. B.C. (?). If anywhere the horizontal can be found unmistakably attached to the Alpha, we have this very typical symbol-development:  $(\bar{\alpha}\rho) - \int - \int - \int$ .

Exactly similar is the formation of the symbol for Aroura, a simplified Alpha-Rho,  $\int$ , written without the circumflex which distinguishes the Artabe-symbol. It occurs very rarely, in this particular form, (*B.M. Pap. CCCCII. r.*, 5, 9, middle of second cent. B.C.), but its features may be seen in those of its descendants the two variant Roman Aroura-symbols. (See

<sup>1</sup> The Revenue Papyrus, of this century, has  $\alpha$ ,  $\alpha\rho$ , and  $\bar{\alpha}\rho$  as common abbreviations for Artabas. The *Petrie Papyri* have a conventional form  $\int$ .


<sup>2</sup> This horizontal-mark, which is found in the oldest manuscripts and onwards, probably indicates originally not so much the omission of the absent letters as the inclusion of all the letters which it covers in a compound with a special meaning. This would be necessitated by the habit of continuous writing, without division of words, etc. The reader is warned by an over-written horizontal to look for some special meaning in the included letters, which otherwise being taken in conjunction with the letters of the context might accidentally make new meanings with them. This sign contri-

butes to the formation of a system of expressing fractions, which is commonly employed, but it would seem to be of general rather than particular use, as fractions are sometimes expressed in quite another way, viz. by drawing a vertical stroke to stand directly over each member. In *B.M. CCXXIII.* (second cent. B.C.) we have this marking for one-eighth, one-sixteenth, and one-thirty-second, the one-eighth again in lines 6, 13, while (a less certain reading) *CCCCII.* 5 has other fractions which appear as vertical strokes with a formless thickening at top and bottom. It is seen again in the common 'one-quarter'-symbol (p. 147 *infra*) and probably, reduced in size, in the Roman forms of 4-chalci (*CCCCLX.* (A.D. 191) lines 2, 3, 4, 5, *CCCXII.* (A.D. 147) line 7), 'one per cent. and two per cent.' (*CCCVII.* 2).

pp. 162 *sqq. infra*).<sup>1</sup> It is exactly similar in shape to the cursive Alpha-Iota which is freely used in the same period (*e.g.* CCCCII. v., 12, 18), an identity inevitably resulting from neglect to form the loop of the Rho in this cursive syllable, ligatured, and of the third or second century B.C.

A very interesting Ptolemaic variant of this Aroura-symbol is found as a part of a composite symbol occurring Pet. Pap. XI., 13, 18, 21, and in O., 7, III. (in Professor Mahaffy's own collection). The whole compound ρζ is a part of the personal description of persons mentioned in a document, and being associated in one of the documents just mentioned (XI.) with the names of soldiers, was put down at first by Professor Mahaffy (Part I. p. (35)) as an ideograph of a soldier's helmet preceded by the numeral Rho, and so making a symbol for *ἐκατόνταρχος*. But there is more than the simple fact in the observation, that this has also had to be cast aside along with other explanations of a non-alphabetic origin for symbols, and Mahaffy (in the palaeographical notes on Pt. I. in Part II. of the memoir), accepts Wilcken's explanation of the second portion of the collocation as *merely the primitive form of the well-known sign for Aroura*. The whole thus means 'hundred-acre men,' and W. cites from an unpublished document even *εἰκοσιπεντάρουροι* as strictly analogous. The same occurs Fay. Pap. XXIII. (i) 12: κε ζ

Cognate with the foregoing is the superscript hook 4, signifying, with a Chi, the word *χαίρειν*. In Pap. XV. where it occurs (fr. 13), the regular formation of the Alpha as an ordinary letter is of a kind not noticed in

Sir E. Thompson's table of Greek Cursive Alphabets, viz. , which does

not even remotely suggest the Alpha of this hook, so that at least to this scribe (*circa* 131-0 B.C.) the hook was no longer alphabetic, but merely a convenient symbol. The variants are noteworthy: see CCCCII. v., 12, 18, 21, 22 and CCCCI., 25, 26, 27.

The same angle-shaped Alpha forms the abbreviating hook in Tra(pezites) (Pap. III., 43); and in Cha(lcus); its occurrence in the same line with *χαίρειν* in Pap. XV. is a case of mutual corroboration.

There is a large group of symbols whose formation is clear at a glance, so obviously are they cursively written words or parts of words, which are yet consciously and habitually written as something different from the same characters in the context. Of this kind is the cursive word *ανά* in B.M. Pap. XV., fr. 6, line 5. In fr. 8, line 9, it is so extremely cursive, though unabbreviated, that it is only one step removed from a symbol.<sup>2</sup>

<sup>1</sup> Cp. also Wilcken, Gr. Ostr. i. p. 819 for  $\alpha$  =  $\alpha$  (Alpha surmounted by Upsilon. W.'s own explanation) in the ostraca. Revillout, *Lettres sur les monnaies Égyptiennes*, 1895, gives (pp. 172, 3) a slightly different conventional form  $\alpha$  which he thinks to be Alpha-Rho, with the over-written bar. It occurs naturally in

Ptolemaic cursive. The somewhat injured example B.M. XV. (6), 5 is most like W.'s.

<sup>2</sup> In one place at least, Pap. XV, fr. 8, line 2  $\alpha\eta$  is used not meaning *ανά*, but something like the *σπένδιον* or *ὀψώνιον* of items in the context since it is worth  $\tau$  dr., a meaning necessary to make the total given. But note that this is



The example in CCCII. r., 5 is noteworthy not only for this word alone, but in the study of abbreviation in early papyri generally. The final Alpha is detached and over-written, though obviously it would have been easier to write it continuously. This is done in other short words, e.g. *διά* (in the Roman papyri, at least) where there is *no* abbreviation of the word. A decisive example of this tendency to economy in space merely is to be seen in  $\mu\chi = \mu\alpha\chi(\alpha\iota\rho\alpha)$ ,  $\nu\lambda\alpha\varsigma = \nu\alpha\lambda\alpha\varsigma$ , and other words in CCCII. v., B.C. 152 or 141, e.g. 11, 12, 13, 16, 18.

Apart from occurrences of very cursive and somewhat contorted forms of the word,  $\overline{\alpha}$  is the general symbol. Here we must see a mutilated cursive Alpha-Nu surmounted by a bar, perhaps the common bracketing or abbreviating sign, but more probably a reminiscence of the superscript Alpha just explained. The single horizontal and the angular Alpha occur CCCII. r. (lines 5 and 11), but it is not clear that the *meaning* in this place is *ἀνά* (Kenyon, *Cat. Glk. P.* p. 10) though the signification of the components, viz. Alpha-Nu with a superscript Alpha, is beyond question. The general significance of a superscript final letter would lead one to deny the simple meaning to this collocation, were it not that, in addition to the case of *διά* above instanced, there is the actual occurrence of the symbol, meaning certainly *ἀνά*, elsewhere (e.g. = 'at the rate of' in Pap. CXCIII., 5, etc.).<sup>1</sup>

To this class of symbol-like collocations or compounds belongs the series  $\alpha, \beta, \gamma, \delta$ , etc. = 1,000, 2,000, 3,000, 4,000, etc., resp. This series well illustrates the passage of suitable cursive forms into new symbols, even when the ordinary contraction is sufficiently brief. Alpha with a circumflex is already a satisfactory symbol for 'one thousand' and it is ordinarily not the practice to link circumflexes to numerals, yet in this series the linking is invariable, and the whole character then begins to assume strange and capricious forms.<sup>2</sup> B.M. Pap. XXIV. (lines 8 and 20) and CCCII. v. (line 31) have examples of this circumflexed Alpha. We have the simple Alpha (of that peculiar form which has the projecting arm pointing upwards to the right (e.g. *ib.* 30 and CCCII. v. *passim*) surmounted by a circumflex already an integral part<sup>3</sup> of the symbol. Cp. Delta = 4,000 in B.M. Pap. L 14 resembling the figure 8 with a dot in the upper circle; a similar Delta in Pap. XV. fr. 6, without the dot; another Alpha, in fr. 5, line 6; Beta in Pap. XXIX. lines 3, 6; *ib.* verso 6, 7, Delta in Pap. XXIX. 4, *ib.* verso 3,

(1) not the common form of the superscript Nu; (2) not the ordinary *ἀνά* of the same MS. e.g. line 1  $\alpha$ . Variants in fr. 13: CCCII. r. line 5.

<sup>1</sup> Mahaffy explains a repeated occurrence, all down a column, of the fully written word *ἀνά* as equivalent to our  $\times$  ('multiplied by') thus:  $\epsilon \alpha \nu \alpha \delta \Delta \xi \zeta \Delta$  where the arithmetic ( $15 \times 4\frac{1}{2} = 67\frac{1}{2}$ ) supports that meaning. Vide fac. of Petrie Pap. II, XXX. Of course this is almost the same thing as 'at the rate of.'

<sup>2</sup> Wilcken cites and illustrates a number in the second part of his *Observationes ad historiam Aegypti...depromptae e papyris Graecis Bero-linensibus ineditis*, 1885. But the instances seem to be drawn from Paris Papyri.

<sup>3</sup> That is to say, for instance, the scribe of Pap. Par. no. 66 in writing  $\alpha$ , or the scribe of  $\beta$  (for Gamma circumflexed) is not writing these peculiar forms as he would write the same letters in the context, even if he afterwards intended to add a circumflex.

and another Alpha in fr. 6, line 8, which is certainly there an irrational symbol, with the usual meaning. Cp. also Pap. XV. fr. 6, line 8; *ib.* 9; CCCII. v. lines 10, 27. These instances are adduced to illustrate the use of a cursive ligatured form written in a fixed form with a regularity which marks it as a symbol, as contrasted with ordinary occurrences of the same letters cursive in the context.

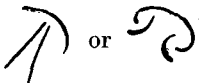
The symbol for 'talents,' a horizontal resting upon a Lambda-shaped character, can immediately, on the analogy of the artaba-sign and its cognates, be resolved into the ligatured Tau-Alpha. The proof of this, however, is inferential, and not documentary, for those instances of its occurrence in Ptolemaic cursive, whenever they are not of the common form, are still more decidedly symbol-like; cp. Pap. XV. fr. 8, lines 2, 3, where the symbol is written by drawing the pen backwards and downwards from the right end of the horizontal to the left foot of the curve. The appearance of the symbol, and the presumption in favour of Tau-Alpha, tempts one to look for a sort of monogram, formed of capitals; but this cannot be defended by any analogous formation. On the other hand the simple collocation of the earliest known cursive Tau without a right hand member, and of the equally early Alpha (Thompson's table of Gr. Cursive Alph. cols. 1 and 2) would produce such a symbol:  $\neg\triangle = \neg< = \neg = \neg$ .

Such, no doubt, was the process of the development, not only of this, but also of the Kappa-shaped symbol,  $\leftarrow$  for which Dr. Kenyon conjectures the meaning *κεράμιον* (*Brit. Mus. Pap. Cat.* p. 164; on no. XXX. passim. q.v.). Accepting this conjecture as certain, we may see in the symbol (which is seldom as printed, a simple Kappa followed by a dash) a monogram-formation exactly analogous to the metretes-symbol, already proved by documentary evidence (*supra* p. 139). This is an even more simply and naturally formed monogram than the metretes-symbol, both offering an irresistible temptation to the pen, toiling painfully behind the thought, in the tedious repetition of an almost superfluous sign; the Kappa has been written, and there stands the Epsilon half-made; what but the most rigid scrupulousness could restrain the hand from completing it by the simple addition of the middle bar? <sup>1</sup> It is to physico-psychological facts of the kind appealed to in such arguments as this, that we must look for guidance where demonstration fails; and often where demonstration is abundant. It may be only by such appeal that we can decide between two rival explanations. They are facts, however, which have behind them the whole history of alphabets, and if further digression were permissible, it would be interesting to illustrate them in detail, from *e.g.* the sematographic condensation of the ordinary cursive letters.

The symbol for 900 is a horizontal curve resting upon a vertical stroke. It may be seen, among Ptolemaic papyri, in B.M. Papp. III. 43; XV. (8) 1 and 2. It becomes common in the Roman period. But it is important to notice that the vertical stroke is never doubled in these papyri, and is always long,

<sup>1</sup> The Kappa-shaped symbol, with the horizontal bar, is, as Mr. Hill reminds me, a not uncommon monogram of  $\kappa\epsilon$  (=  $\kappa\alpha\epsilon$ ) in Imperial times.

drawn well down below the line, from the middle of the curve. It does not in any way suggest a Pi. Then again there is a variant, which appears to be even the normal form in the Petrie papyri, which makes the traditional explanation (viz. San) of the other member almost equally doubtful. This variant is conventionally printed  $\pi$  (Mahaffy from Pet. Pap. Part II. of the Memoirs) and in hand-made facsimile  $\top$  or  $\top$ , (from Pap. Par. 54 recto,

Wileken in *Observ. ad hist. Aeg.*). Further the , upon which

seems to have been based the traditional explanation<sup>1</sup> (on the strength of Hdt. I, 139) that the symbol is compounded of San (the Dorian letter corresponding to the Ionic Sigma) and Pi, does not appear until the minuscule period: indeed, Dr. Gow in 1893 states (*Companion to Sch. Classics*, p. 13) that no inscription or manuscript has it before about A.D. 900. He adds that its source is not known, and I conclude that there is no good authority even for its compound name, except the later general resemblance. I suspect that the addition of the second leg was the doing of some pedantic scribe or grammarian who decreed that the form must agree with the (supposed) origin indicated by the name. The probabilities too are against an ancient origin. Why should San (Sigma=200), and Pi (80) ever have been chosen to represent 900? The arithmetic is meaningless, whereas the early arithmetic of the symbols is quite intelligent and consistent. I conclude then that Sampi, the symbol as well as the name, is due to alterations of the original simpler  $\top$  or  $\top$ .<sup>2</sup> The latter, far from being a new letter

in tenth century manuscripts, is to be classed among the few which come into the earliest papyri already formed. For the origin we must wait until we are in possession of ante-Ptolemaic documents, or some facts to be supplied by epigraphy. Meanwhile the persistence of this symbol down to almost the latest Greek Manuscripts is a fresh illustration of the rule stated above (p. 137) that symbols best preserve the oldest forms.

$\Sigma=200$  was at one time supposed, as Professor Mahaffy says in the palaeographic notes in Part II. (pp. 39-41) of the Flinders Petrie Memoir, to be a later introduction, for clearness' sake, of the capital to represent the number. But he points out that it is regular in the third cent. B.C.<sup>3</sup> sometimes with the angles rounded, but not C. It may have been felt necessary to keep this epigraphic form, to avoid confusion with the rounded 'Stigma' (usually  $\sigma$ ) for the numeral *six*.

<sup>1</sup> Vide King & Cookson, *Compar. Gram. of Grk. and Lat.* p. 26.

<sup>2</sup> Dr. Kenyon suggests that the former of these forms may be simply an arbitrary variant of  $\top=90$ . Mr. Hill suggests that the latter is derived from the sign used for  $\sigma\sigma$  in some early alphabets; and that, if this sign followed

$\omega$  in the alphabetical sequence, it would naturally be used to represent 900. As this completes the alphabetic representation of all the numerals, it seems to me extremely probable.

<sup>3</sup> B. M. Pap. XXVIII, 8 has  $\top C$ , which is edited as 200 dr.: this is however of the middle of the second cent. B.C.

The old Phoenician letter Koppa  $\varphi$ , used for the numeral 90, is commonly shaped more like an English written 9, in these papyri (Mahaffy, *ibid.*).

The Phoenician *Vav*, which is said to survive in the digamma, and to be the numeral for 6, has in these papyri a better representative than the letter Stigma. Cp. Pet. Pap. XII. (reign of the second Ptolemy); lines 18, 20, 21, show most decided forms  $\vdash \subset$ . Line 19 has  $\vdash F$ , which the editor reads  $\vdash \angle =$ , but it may be the complete digamma—in that case a valuable example. Dr. Kenyon thinks it is Iota-Stigma, and so = 16. Stigma itself, he adds, is never found exactly in its traditional form, in the papyri, but regularly in a form which is indistinguishable from the ordinary Sigma. Thus it came about that the epigraphic Sigma was retained for '200.' Digamma of the F-shape however does occur in the papyri, in the Sappho fragment in the Oxyrhynchus papyri, and in the Alcman fragment in the Paris papyri.

The symbol for 'one-half.' The Ptolemaic form is  $\angle$ . In CCCII. r. (B.C. 152 or 141), lines 5, 9, 12, 17, *ib.* CCXXIII. 71, 8, it is sharply angular and rectilinear, but in CCCCI. (118–111 B.C.) 11, 12, 21, 27, the variant has the upper member much curved, while the lower or horizontal is [ $\subset$ ] relatively longer. Its explanation is, I believe, involved in that of the following group.

The symbols  $\left\{ \text{or} \int \right\}^1 = \frac{1}{2}$  drachma, or 3 obols,  $\subset = \frac{1}{2}$  obol,  $\angle =$  'plus

one-half' (scil. of the half-obol, and so indicating in some contexts 'quarter-obol'),<sup>2</sup> are all, like the simple 'one-half' symbol, special variants of a common sigle, the letter Sigma in some form which I assume stood in ante-Ptolemaic Greek for 'one-half.' The well established morphological affinity between SEMI- and  $\eta\mu\iota$ - would alone give probability to the theory of such a common prototype, both of the word and its symbol. The word in its oldest form undoubtedly began with Sigma (cp. Sans. SAMI). Now Sigma on Ionian and Chalcidian inscriptions has, besides its four-membered and five-membered forms, the parent-forms of the later  $\Sigma$ , also the following :



These are more than enough to account for the *forms* of the group in question which, I think, may prove to embrace some other signs also. The signs and symbols of these shapes are the most persistent of papyrus-symbols, and they are among the smaller class of those, of whose origin no explanation can be demonstrated from any of the ordinary forms of letters in any written

<sup>1</sup> Third cent. (B.C.) forms Pet. Pap. XXXIII (a), 24, and 32, which show both.  $\int$  second B.C. and later.

<sup>2</sup> Mahaffy in the Introduction to the second part of the Pet. Pap. gives this list for obols :

— or  $\subset$  (2) = (3)  $\int$  or  $\int$  (4)  $\int$  — (5)  $\int$  = ;

( $\frac{1}{2}$ )  $\subset$  ( $\frac{1}{2}$ )  $\angle$ , and remarks on the  $\frac{1}{4}$ -obol symbol: "(It) is so various that I am not sure whether it only represents one fraction." For the  $\frac{1}{2}$ -drachma symbol, Dr. Grenfell has the same shape in the index of the Revenue Papyrus.

Greek yet recovered. But how are we to account for the *uses* of these signs, some of which are quite certain? To begin with the 'half-obol' symbol, M. Revillout, in *Lettres sur les monnaies Egyptiennes* 1895, says pp. 226-7, that it is found on Attic inscriptions sometimes in the form given above, sometimes facing round the other way, and 'indiquant soit la demie, soit la demi-bole.' This is strong confirmation of my opinion that the simple original meaning of the signs is one half,<sup>1</sup> and also of the third-century Sigma-like form. Similarly Revillout gives  $\zeta = \frac{1}{2}$  drachma and explains the 4-obol in reference to it, *i.e.* not as 3+1 obols, but as  $\frac{1}{2}$  dr. + obol. Similarly for 5 obols. He quotes p. 229 the same explanation from an ancient *Tabula de mensuris ac ponderibus vetustissima* published by Hultsch in his *Metrologicorum Scriptorum reliquiae*, Leipzig, 1864. In this ancient table ('rédigé par les anciens') whose *provenance* was also Egypt, this ' $\frac{1}{2}$  symbol' is described as 'Ρωμαϊκὸν σίγμα, ζ.' No doubt the writer, unaware of its existence in Ptolemaic times, was thinking of a late borrowing from the Romans in Egypt, but it is none the less a suggestive name. If we find the Roman system of notation with this S =  $\frac{1}{2}$  (cp. HS) as a very ancient and very persistent part of that system, this certainly supports the argument in favour of a similar explanation of the corresponding symbol with the same value in the Greek notation.

The soi-disant ' $\frac{1}{4}$ -obol' symbol, attested in respect of value, for the 3rd century B.C. (vide Mahaffy II., p. 35),<sup>2</sup> is the 'one-half' Ptolemaic symbol in a special use. Its very various applications (vide *ibid.*), are illustrations of a practice which will be several times illustrated in other symbols, the practice of leaving the *special* sense of a symbol of general meaning to be indicated by the context. In  $\vdash \in \int \zeta \angle$  (Pet. Pap. XXXIII (a) 24, cp. Part II., p. 35), there is little room for ambiguity. I should read it as 5 dr. + a half-dr. + 1  $\frac{1}{2}$  half-obols. Thus the same thing is done at each stage: dr. 5  $\frac{1}{2}$  comes to acquire the meaning 5 dr. +  $\frac{1}{2}$ -dr., and the form  $\int$  of 'one-half' is thenceforth specially reserved for  $\frac{1}{2}$ -dr. So  $\angle - \zeta$  (*ibid.* 32), or 4  $\frac{1}{2}$  obols comes to mean  $\frac{1}{2}$  dr. + 1 ob. +  $\frac{1}{2}$  (ob.), the variant of ' $\frac{1}{2}$ ' being reserved for the new meaning. The general 'one-half' symbol used at the end of this series, and thus having a value (though not a signification) of 'one-quarter,' might possibly have passed into this special fixed use, had it not been successfully rivalled by the ordinary cursive symbols, one for ' $\frac{1}{4}$ ' written like other fractions having a unity-numerator, the other a Chi with a superscript Beta (= 2 chalci =  $\frac{1}{4}$  obol). The forms  $\int$  and  $\zeta$ , which Revillout mentions (*ibid.* p. 227), do not occur, apparently, in any *papyrus*. He calls it the *tétartémorion* (τεταρτημόριον, which appears to be the classical name), and specifies it as the  $\frac{1}{4}$ -obol of *silver*.

Concerning  $d = \frac{1}{4}$ , an instance may be added in support of Kenyon's explanation (*Pal. Gk. Pap.*, p. 145, n. 2), viz.  $d = o' = \Delta' = \frac{1}{4}$ , from Pap. XV., fr. 6, line 5, where the o (= 4), surmounted by a long vertical stroke is clearly

<sup>1</sup> In the same work at pp. 172-3, R. incidentally gives a fresh illustration in  $\angle = \frac{1}{2}$  *artabe*.


<sup>2</sup> It is worthy of note that Dr. Grenfell gives in his index for the Revenue Papyri the form  $\int$  for this symbol.

to be distinguished from any form of Delta, most of all from the particular example of it, boldly triangular, which stands immediately next to it. In this same line occurs another instance, equally convincing. For the vertical itself, see p. 141, n. 2 above.

This circular form of the Delta, while it need hardly be treated as a symbol requiring explanation, illustrates very well the general tendency to slovenly writing, or deliberate simplification, exhibited by letters of all kinds, when used in formulas, as parts of symbols, or in any position where the context renders differentiation unnecessary: this same small circle stands, in fractions,<sup>1</sup> commonly for 2, being a simplified form of the cursive loop, for Beta.

Similar slovenliness or simplification accounts for the second-century (B.C.) over-written Mu and Pi cited by Dr. Wilcken, from Paris Pap. 5. Cp. *Observationes ad hist. Aegypti prov. Rom.*, p. 40.


The rest of the obol-series can now be easily explained. These belong to the class, other members of which occur, in which numerals, used without expression of the monies, measures, etc. which they enumerate, depending for particular signification originally upon their position in a formula or common context, come gradually to acquire at the same time a peculiar form and a special meaning. The 'one-obol' horizontal would thus be at first an angular Alpha, the 'two-obol' symbol the same doubled,<sup>2</sup> the '4-obol' a collocation of the  $\frac{1}{2}$ -drachma symbol with the former of these, and the 5-obol similarly with the latter. As regards the omission of the word 'obols,' it has parallels,

e.g.  = 2900, which in B.M. Pap. XV., fr. 8, line I, stands for 2900 drachmas, in line 3 (*ib.*)  $\epsilon = 5000$  drachmas? So frequently after 'talents.' Apparently against this explanation, at least of the '4-obol' symbol, is its occurrence *ib.* line 9 with the upper curve detached: but this is perhaps an accidental variation of no original significance.

This series is interesting from the fact that we have here the rare occurrence of a stroke or sign, worthy of being discussed as having a possible relation with a system of tachygraphy. We have actually the Alpha of the Greek tachygraphy of the Byzantine period<sup>3</sup> (the Ptolemaic Acropolis tachygraphic fragment beginning the vowels only at Iota), in the short horizontal stroke, representing one obol. Of course, if — means  $\acute{o}\beta\omicron\lambda\acute{o}\varsigma$ , then the resemblance to the tachygraphic Alpha can only be accidental. If, on the other hand, as I think, it represents the numeral Alpha, then we have perhaps here the origin of the tachygraphic sign itself, though it yet remains to be shown how and through what medium this Ptolemaic character persisted to the later Byzantine, when we first have its tachygraphic meaning attested.<sup>4</sup>

<sup>1</sup> In  $\lambda\acute{o} = \lambda\beta = \frac{1}{3}$ . The fully formed Beta is written in CLXXI (a) 6, a Roman (102 A.D.) tax-receipt.

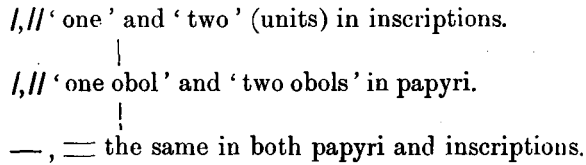
<sup>2</sup> The appearance of this symbol is very varied. In Ptolemaic papp. it is often very like the Talent-symbol, with which Forshall the early Brit. Mus. Editor actually confuses it in text of XV (13) reverse, and on reverse of

XV (14) with  = Aroura (Ken. ad loc.).

<sup>3</sup> Wessely, *Ein System altgriechischer Tachygraphie* Taf. 1; or Rainer Pap. Taf. XIII. Nr. 444, a tachygraphic papyrus of the V-VI cent.

<sup>4</sup> After this it is common in later Greek tachygraphy.

It could not be through the Roman cursive form of Alpha, and there is nothing to show that there was such a Roman tachygraphic form, Dr. Gitlbauer's reconstructions<sup>1</sup> for that period pointing to an oblique stroke, the *other* arm of the angular Ptolemaic Alpha. M. Revillout again (*ibid.* p. 228), but this time I think unconsciously, perhaps suggests an explanation, by the remark that in the Attic inscriptions already alluded to, he has found the one stroke for one obol, and the two strokes for two obols, not always horizontal, but sometimes struck at an angle ('couché ou simplement penché,' p. 229). But is this the other arm of the angular Alpha, or a simple stroke marking One? The latter is the ordinary method for 1 to 4 on the older Attic and Peloponnesian inscriptions and may very well have survived in this 1-obol symbol. A tendency in upright strokes to fall flat is to be observed in many letters and symbols in the papyri. The pros and cons seem equally balanced, and all one can say is that there is *nothing against*<sup>2</sup> the following 'genealogical tree'



And this I think the more likely.

Of the remaining Ptolemaic symbols, the commonest is  $\perp = \epsilon\tau\omicron\varsigma$  and cases.

This symbol, while it is so frequently a mere right angle as to justify the conventional  $\perp$ , is quite commonly in Ptol. MSS. of a different shape, beginning with a very prominent hook on the left side (*vide* Papp. XVIII., 1, 18, XXXV., 11, 13, XXIV., 10, 25, XVII., 44, 39, 49, 19, XLI., 23, XXIII., 56), and having, instead of a clear right angle, a distinct hook at the junction of the vertical with the horizontal, so as to give the whole symbol a resemblance to a loosely-written 2 (*vide* Papp. XVIII., 44, 39, 19, XXIV., 10, 11, 25). In addition to these, certain other divergencies from the rectangular formation may be observed at XVII., 19, XVIII., 20, 18, XXXV., 13, XXIII., 56, 64, 82.<sup>3</sup> The horizontal is originally only the connecting stroke (cp. the persistence with which the ligature is made, at XVIII., 1, 20, 18, XXIV., 11, XLI., 23, XXIII., 56, 82, 105, whenever the numeral follows the symbol as against the comparative neglect of it when it precedes).

But, as Dr. Kenyon observes, the papyri of the third century B.C. have


<sup>1</sup> *Die drei Systeme der Griechischen Tachygraphie*, Taf. 11.


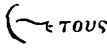
<sup>2</sup> I do not consider that the peculiar variant  $\curvearrowright$  which Dr. Mahaffy notes as occurring all through Pet. Pap. XXXIII (vide Part II, 35) is important against it, as he points it out as exceptional, in the third cent. B.C. Of course, for what it is worth, it does favour the Alpha


theory.




<sup>3</sup> There is an example in a Roman (2nd cent.) pap. B.M. CCCXXXIX, 15, which, accidentally, illustrates a possible Epsilon-stage. With such a form the development might have been




$\epsilon \rightarrow \curvearrowright$  (or ligatured  $\curvearrowright$ )  $\rightarrow \curvearrowleft$  or  $\curvearrowright$   
 $\rightarrow \curvearrowleft \curvearrowright$ , or  $\perp$ .

not this backward hook; they are rigid right angles, rising high above the line, e.g. Pet. Pap. XIII, fr. 2 and 5. If we compare with these earliest forms such occurrences of the common large initial epigraphic Epsilon as in B.M. CCCCII. recto 20 where it has a decidedly rectangular formation, and again the special uses of it for *ἔτους* as in B.M. Pap. CCCXXXII, ,

and again with the form , Pal. Soc. ii. pl. 144, and yet again  *ἔτους* (Aristotle Pap.), we have a hint which can hardly be overlooked that we

have in this symbol simply *the most characteristic fragment of an Epsilon* ,

used as an abbreviation for the whole word *ἔτους*. Fortunately, I have been able, by comparing notes with Mr. G. F. Hill, of the Department of Coins and Medals of the British Museum, to establish the explanation thus suggested. I am much indebted to him for pointing out the following references. The symbol, it appears, is common on Alexandrian coins with the same meaning, and it was formerly thought to stand for *Λυκαβάς* (see *Berl. Blätt.* iv. 145), but Mr. Head in his *Historia Numorum*, 1887, discarding this explanation, speaks of it as 'an Egyptian sign' (p. 718). Prof. Wilcken refers the symbol to a demotic origin (*Griech. Ostr.* p. 819) and Mr. R. S. Poole, in the British Museum Catalogue of Coins of Alexandria (p. xi.) thus summarizes the case: 'Symbol  for the year. The date, except on the earliest dated coins of Augustus, is universally preceded by the symbol  for 'year,' but *ἔτους* occasionally takes its place. The symbol is of uncertain origin. It first appears on coins which I have attributed to Ptolemy IV. Philopator, struck in Cyprus, etc. (Cat. Ptol. pp. 62, 63). Under Ptolemy VIII., Euergetes II., it became almost universal for all dated coins, and except on some coins of Augustus, until the Reform of Diocletian. Probably the symbol is a conventional form of the Egyptian sign for year in the demotic character.' Mr. G. F. Hill, in his monograph on the coins of the Cilician *Olba*, *Cennatis*, *Lalassis* (in the Numismatic Chronicle, vol. xix., pp. 181-207, 1899), produces evidence of forms which point us back to my explanation above given. On the coins struck by Ajax, son of Teucer, probably *ἀρχιτερεύς* of Olba in the earliest decades of the first century, occurs a rare form of Epsilon, viz. , which Mr. Hill thinks occurs on no other coins.<sup>1</sup> This is used, with a capital Tau, for dating, the two letters

being often made into a kind of monogram thus  A,  B = 'in the first year,' 'in the second year.' There can be no doubt remaining that this is an abbreviation of *ἔτους*. But what of the relation with the papyrus form ? The later date of these coins of Olba prevents us from claiming their forms as the origins of the earliest papyrus forms, but they corroborate very strongly the slighter indications of papyrus cursive forms themselves. For not only have we in Nos. 1, 7, 12, 13, the monogram arrangement mentioned, but in Nos. 2, 4, 9, 10, 11, there is a slight variant which imme-

<sup>1</sup> He quotes *J.H.S.* xix p. 15, no. 9 to prove its occurrence in lapidary inscriptions.



diately suggests the papyrus  $\sqsubset$ , viz.  $\sphericalangle$ ; and once at least, in No. 8, there is uncompromising severance of the two elements, leaving  $\sphericalangle$   $\top$  B (=  $\epsilon\tau\omicron\upsilon\varsigma$   $\beta$ ), which shows how easily the simple angle could be adopted, in the hastier writing of manuscripts, as the symbol of the word. If, therefore, a Cilician Epsilon of the form  $\sphericalangle$  could lead to a symbol  $\sphericalangle$ , would not an Epsilon of the form  $\epsilon$  easily give  $\sqsubset$ ? This, added to the testimony of occasional papyrus forms such as those above instanced, and to the probability that the ligatured Tau and following letters would make a return to the Epsilon somewhat inconvenient, so that it would tend to be left  $\sqsubset$ , is sufficient, in my opinion, for the definite conclusion that we have found in  $\epsilon$  the origin of the symbol.

The rival symbols  $\top$  and  $\sqsubset$  or  $\sphericalangle$  for 'drachmas' are both thoroughly stereotyped symbols appearing equally early, and both very early, in Ptolemaic papyri, while the former is used in Attic inscriptions from the fifth cent. B.C. onwards. But the former is the regular symbol in the early Ptolemaic papyri (Pet. Papp. XVI. (2) 7, 8; XXXIII. (a) 24; and in 2nd cent. B.C., B.M. Papp. XXX. 2, 3; XXIX. 3, 4, et passim; XXV. 2, 3). Comparison of the second with the third century forms will show that the older type is squarer, that is, has the two members more nearly equal, the horizontal bar even the longer in some occurrences. This may be accidental, or it may be a clue to the origin, which is at present unknown.<sup>1</sup> The comparatively rarer use of  $\sqsubset$  or  $\sphericalangle$  seems to suggest that these forms may be simply, the one a fragment of the regular form, and the other a modification of that fragment. Certainly the lower member is still in the papyri of second and third centuries B.C. horizontal, as distinguished from the Roman  $<$ . B.M. Papp. XLI. 23, 24; B XXIII. (3) 47, 59, 74, 77.

$\ast$ , a symbol which occurs in the following context,  $\tau\eta\varsigma \xi \ast \lambda \zeta$  (quoted by Professor Mahaffy, Pet. Pap. Pt. II. p. 37) may be 'some title for a regiment,' but nothing else is known of it. It is generally explained as =  $\delta\epsilon\kappa\acute{\alpha}\tau\alpha\rho\chi\omicron\varsigma$  or  $\delta\epsilon\kappa\alpha\tau\alpha\rho\chi\acute{\iota}\alpha$ , on the analogy of  $\xi$  =  $\acute{\epsilon}\kappa\alpha\tau\omicron\nu\tau\alpha\rho\chi\omicron\varsigma$ .

$\sphericalangle$  placed between two numerals occurs apparently in only one B.M. Pap., viz., XV. (second B.C.) fr. 8 (lines 2, 10). Here its meaning is mysterious (Kenyon<sup>2</sup> ad loc.). In both instances it separates the two elements of  $\tau\iota$  = 310 without adding anything to that meaning, which is required to make

<sup>1</sup> It is perhaps worth noting that the Phoenician letter Heth  $\Theta$  actually became  $\top$ , used as the sign of rough breathing, in Alexandrian grammars, and, at an earlier period, in some epigraphic alphabets; while, curiously enough, a fuller form (? of the drachme-symbol) viz.  $\epsilon$  is noted (Mahaffy Part II pp. 39-41 on Pet. Pap. VIII (1)) as being found 'where we should expect drachme,'  $\top$ . Lastly, to add

another element of perplexity, Plate XLVI in Part II of the Pet. Papp. has in line 15, the symbols  $\tau\kappa\epsilon \epsilon$ , which Mahaffy translates 325 $\frac{1}{2}$ .

<sup>2</sup> Subsequently, Dr. Kenyon writes: ' $\sphericalangle$  must indicate the object for which the money (10 dr. in l. 2, 85 in l. 8) is paid.' This value for the sum of drachmae removes the chief difficulty, and increases the probability that the unknown symbol is simply =  $\alpha\lambda$  = 'item' 'ditto.'



There may be exceptions among the Greek symbols of the magical papyri, but in that case the borrowings are not from Greek tachygraphy (there is one line of pure tachygraphy which will be discussed), and it is impossible to predicate securely anything concerning them, as it is also concerning the origin, rational or other, of the 'apparent gibberish' (Kenyon, *Brit. Mus. Cat. Pap.* 1893: *Introd. to Mag. Papp.*), which composes so large a part of the magical formulas. The many formulas moreover, containing symbols which are not Greek though found in the Gk. MSS., are beyond the scope of this monograph.

As regards the details of the analysis, we find in the first place a few traces of the alphabet of the early Ptolemaic period; more frequently new and non-Ptolemaic forms. Again, we have, as in Ptolemaic MSS., many symbols which have become fixed in their now irrational forms, petrified by the action of time and use; many on the other hand which can scarcely be counted as symbols at all, so conscious is the introduction of each constituent, sometimes partly mutilated or transformed: these however are the ancestors of future symbols; and again there are symbol-phrases, groups of characters, in themselves singly to be read as ordinary forms, but in the groupings barely distinguishable from symbols, such as  $\text{ΚΑΙ ΠΑΙΔΩΝ}$  = *καὶ παίδων*.

$\text{ΕΝ ΔΙΟΣ ΠΟΛΕΙ}$  = *ἐν Διὸς πόλει*.

A distinctive feature of Roman non-literary MSS. is the increase in the number of monograms. They are found, naturally, most frequently in the magical papyri, but they are by no means confined thereto. They are not generally irrational, yet the regular crossing or interlacing of certain letters gives them an entirely new value, and the combination has more than one claim<sup>1</sup> to be discussed as a symbol (*vide infra*, p. 167 *sq.*)

What survivals of Ptolemaic symbols do we find in this period? They are: the angular Alpha (third cent. B.C.) in  $\text{τρυν}^{\text{L}}(\text{τος})$  (Pap. CXXXI r. 83, 91, 152, 224, and three others in same MS.);  $\text{παρδ}^{\text{L}}$  (*ib.* 62);  $\text{λημμ}^{\text{L}}(\text{τα})$  etc., (*ib.* 6, 173, 353, *et passim*);  $\text{δι}^{\text{L}}$  = *δια* (*ib.* 566, 567, 579, *et passim*), and other numerous instances of the symbol  $\text{L}$ , representing a group of letters beginning with Alpha:  $\text{λαχ}^{\text{L}}(\text{νον})$ ,  $\text{κονι}^{\text{L}}(\text{τος})$ ,  $\text{κοβ}^{\text{L}}(\text{λευοντες})$ , etc. (*ib. passim*); the same in composition discussed in another place (*infra*); the same Alpha reduced to a simple horizontal bar, notably in the *ἀνά*-symbol;  $\text{L}$  = 'drachmae,'<sup>2</sup>

(Papp. CXIX, CXXXI *passim*); the symbol for 'talents';  $\text{L}$  = *ἔτος* and cases, (CXXXI, 23) cp. ostraka of this period: B.M. No. 14,113 = Pal. Soc. 11, 1,

<sup>1</sup> The expedient for instance is largely used in modern reporting, e.g. in 'phonography,' where e.g. *n* crossed by *t* has the meaning 'notwithstanding'; *tmp* crossed by *s* becomes 'temperance society.'

<sup>2</sup> The Ptolemaic  $\text{L}$  = 'drachmae' does not survive; the Ptol.  $\text{L}$  or  $\text{L}$  now appears in the last shape, with the horizontal lowered and bent generally.

2, all first—second cent.); the whole series for obols, and for chalci; / or  $\wedge$  = total, or for concise re-statement; the whole of the numerals, including some fractions; together with some signs or marks of abbreviation, etc., viz. a superscript horizontal, a vertical undulating line, a straight line inclining to the right.<sup>1</sup>

What new symbols first appear on papyri in this period? In the first place there is the whole group of distinctly magical symbols; then come certain symbols of weight and measure,<sup>2</sup> numeration and coinage, namely  $\overline{\gamma}$

or  $\zeta$  = *ἀρουρα*(ι) and cases;  $\varsigma$  or S = *δράχμαι*;  $\chi$ ,  $\psi$ , and  $\phi$ , with debateable meanings; some fractions;  $\perp$ ,  $\dashv$ , etc. = (*πυροῦ*) *ἀράβαι*;

$\dashv$  = *ἀράβαι*; a superscript horizontal = *Nu* over final letters;  $\xi$  = *διά*;<sup>3</sup>  $\ast$ , denarius; a number of monograms; and a sign  $\varsigma$  of varied application, to be discussed with other debateable signs; together with certain marks made by the scribe, chiefly marginal, some of which are paragraph-marks, or marks of reference, while some must remain unexplained.

Perhaps the most striking feature of the sematography of the Roman period is the prominence of that sign or mark, which appears generally as an undulating line written vertically, its bows turned the same way as that of an S, but varying, under the influence of haste and carelessness, from the vertical almost to the horizontal position, and from the rounded S-shape to the almost straight line. Its significations are very varied; it is used as the simple mark of general abbreviation commonly;<sup>4</sup> joined to a horizontal it means 'one-half,' e.g. B.M. Pap. CXXXI., 76, 41, 55; Fay. Pap. LIV., 13;<sup>5</sup> in 22, 23, of the same, it means cases of *αὐτός*; in any other places it is the loose equivalent of the old  $\zeta$  = drachma; even the strongly characteristic Ptolemaic right-angled 'year'-symbol gives place to it, e.g. in B.M. Pap. CLXXXII. b, 1, CCCLXXX.; Fay. Pap. XXVI., 7, etc. The document on the recto of the Aristotle papyrus, from which illustrations have just been taken, furnishes many examples of the confusion of form, which has fallen upon the large group of symbols

<sup>1</sup> The sweeping curve of the Roman and Byzantine periods, a semicircle with its convex side to the right, is not also Ptolemaic.

<sup>2</sup> Wessely (*Ein. Syst.* p. 8) mentions metrological *sigla*, figures and fractions, in cursive texts of Berlin and St. Petersburg. But he gives no details.

<sup>3</sup> *καί* has also been suggested as a meaning (vide *Brit. Mus. Pap. Cat.* Vol. II. Index of Symb.).

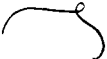
<sup>4</sup> An interesting and rather extreme example of this use is  $\Delta\gamma = \delta\iota$ , and  $\Psi = \gamma\rho$ , in CCCXV 18. Cp. variants CCCXXIX 23 (rising high above the line). Cp. also  $\zeta = \delta\iota\acute{\alpha}$  Oxyr. Papp. CCLXXXIX (1) 12, 19; CCXC, 20, 23.

<sup>5</sup> Only incidentally does it mean *ἡμιόβολον* (so Edd. of Fay. Pap. pp. 181 and 347). Vide *supra*, pp. 146 sqq.

of which the sign is an element. Compare line 55 with 63; 76 with 65; 23 with 28; 28 with 41; and again the common sign for drachmas in line 34 with the figure of S laid flat (for the same) in line 55. Here, as in Roman uses of the sign on papyrus generally, there is neither consistent distinction when the meaning varies, nor clear uniformity when the meaning is constant. Again and again the Editors have had a difficult task to decide whether the undulation, the zig-zag, the crescent, or the double-bow shape<sup>1</sup> has the best right to represent a certain written form.

What we have in the MSS. is a flourish or curved line, written very negligently or fancifully by the scribe, the meaning being securely conveyed by the formula, a formula being the almost invariable context. An illustration of this quite natural and inevitable confusion is to be seen in the occurrence of two symbols, which are conventionally printed  $\sphericalangle = \acute{\alpha}\rho\tau\acute{\alpha}\beta\eta$  (rare), and  $\sphericalangle = \acute{\alpha}\rho\tau\acute{\alpha}\beta\eta$  (rare), (Kenyon, *Pal. of Gk. Pap.* 1899, Append. IV.).

These are identical in appearance with the common drachma-symbols: their use for 'artaba' is probably a transference, accidental or very occasional (cp. Pap. XXIII. (3), line 77, where exactly the same 'slip'—Kenyon—is made in an earlier MS.). It would obviously not be convenient to use the same printer's type for all the symbols  $\sphericalangle$  and  $\sphericalangle$  ('artabae')  $\sphericalangle$ ,  $\sphericalangle$ ,  $\sphericalangle$ , ('drachmae'),  $\sphericalangle$  = 'half,'  $\sphericalangle$  =  $\acute{\epsilon}\tau\omicron\upsilon\varsigma$ , and marking abbreviation, but these all tend to run so much into one another that nothing but the context avails to differentiate them. And the prevailing degenerate form for them all is in appearance indistinguishable from the  $\sphericalangle$ -stroke.<sup>2</sup>

Often similar in appearance to the last-mentioned is the simple oblique bar =  $\gamma$  (*ivertal*), which marks the introduction of a group of symbols. It is normally straight, and inclined to the right, but has variants inclined at all degrees, to the quite horizontal, and bent and twisted variously. The occurrences are too common to be worth quoting, but a characteristic result of the free use of signs may be seen in CCCXXXIII. A.D. 166 where 

stands for  $\sphericalangle$  (Kenyon, *Text, Gk. Pap. in B.M.*, vol. II., p. 199). In some cases part of the formula becomes welded to this abbreviation-sign, forming a virtual symbol: a second abbreviation-mark, viz. the horizontal superscript (originally the mark of inclusion) is sometimes found.

Pap. CXXXI. 532, 23, 562, 22, CXXXI. 2, 19, 20, CXIX. 8, show variants of such a combination for  $\acute{\alpha}\nu\tau\acute{\omicron}\varsigma$  (case) &c., the particular case, like the general meaning, being determined by the presence and the case of the article. The value of the sign indeed is often merely *addendum quid*. Some confirmation of this opinion as regards the  $\acute{\alpha}\nu\tau\acute{\omicron}\varsigma$ -symbol may be seen in the more precise contraction of later MSS. in which the sign was felt to be

<sup>1</sup> That is, the printer's types of these shapes.

<sup>2</sup> Cp. the same stroke again in an unusual abbreviated  $\text{Ἡφαίστου}$  viz.  $\text{Ἡφ}\sphericalangle$  CXXXI r. 329, 372.

Cp. CCCXXV (a) and (b) where (a) line 5 has the sign for 'year' absolutely indistinguishable from the sign of abbreviation in (b) line 1.

too indefinite,<sup>1</sup> and the latter of the two abbreviation-strokes was replaced by a syllable giving the full case ending- $\tau\omicron\upsilon$ ,  $-\tau\phi$ , &c., resulting in  $\tau\omicron\upsilon\tau\omicron\upsilon$  &c., the bar of which was mistakenly supposed to signify *av-*. Sometimes *e.g.* CXXXI. r. 22 the same component elements are written detached from one another. In the Aristotle papyrus (*e.g.* col. IX. 8) a single stroke is found; as also in the Demosthenes scholia of it. Dr. Wessely has found it, in the fuller form (with horizontal), common in the Hermopolis Magna papyri of Vienna.<sup>2</sup>

An even more convincing pair of the same class is that which consists of the same abbreviation-sign joined to the first two or three letters of  $\chi\alpha\lambda\kappa\omicron\upsilon$  and  $\acute{\alpha}\rho\gamma\upsilon\rho\acute{\iota}\omicron\upsilon$  with the meanings 'copper drachmae' and 'silver drachmae' (cp. on  $\pi\upsilon\rho\omicron\upsilon$   $\acute{\alpha}\rho\tau\acute{\alpha}\beta\eta$  pp. 84, 85 inf.) respectively. The vertical sign in the latter is certainly not different from that which helps to form  $\acute{\alpha}\upsilon\tau\acute{\omicron}\varsigma$  and cases, in many of its occurrences (*e.g.* CXXXI. 23); and the mode of joining to the superscript vertical is the same. Cp. CXXXI. 6, 74, 173, 177, 178, 179, *et passim*. The ligature-formation is a characteristic feature of this symbol: the sign always or commonly having a distinct shape when written alone (cp. *ib.* col. 8 where the extreme right-hand col. of numerals exhibits both). In the symbol for copper 'drachmae' (*e.g.* *ib.* 28, 191, 196, 200, 213, *et passim*) the ligature-formation exists, but not quite the same; the Chi is written so that the straighter of the two cross-bars, struck from below upwards to the left, is carried on into a cursive looped, or else into an archaic angular Alpha, this into the horizontal sign of abbreviation, and this again into the descending sign in question. The formation of this pair of symbols is thus quite rational and consistent, and it may be added, in defence of the assumption that the meaning came eventually to depend upon the context, that they are quite free from ambiguity—perhaps owing to the doubling of the sign of abbreviation (cp. for the single horizontal over a similar group of letters *ib.* 187, 192 195, *ib.* 26; common in this MS.).

It may be convenient to epitomize these results:

$\nu\omega\bar{\jmath}$	$\tau\phi$ + addendum quid	$\tau\phi$ $\acute{\alpha}\upsilon\tau\phi$
	cp. $\tau\omicron$ } = $\tau\acute{\omicron}$ $\acute{\alpha}\upsilon\tau\acute{\omicron}$ ; $\tau\omicron\upsilon$ } = $\tau\omicron\upsilon$ $\acute{\alpha}\upsilon\tau\omicron\upsilon$ .	
$\delta\iota\bar{\jmath}$	$\alpha\rho\bar{\gamma}$ + addendum quid	{ $\acute{\alpha}\rho\gamma\upsilon\rho\omicron\upsilon$ νομίσματα or drachmae
$\chi\bar{\jmath}$ <sup>3</sup>	$\chi\alpha$ + " "	{ $\chi\alpha\lambda\kappa\omicron\upsilon$ νομ. or drachmae
" $\delta\circ\bar{\jmath}$	διοικ " "	διοικήσει dr. x.







<sup>1</sup> The same demand for definiteness in later days is seen in mediaeval commentaries of *Notae Tironianae*. In these we get careful restorations of case-signs and general word-endings where the earlier *notarii* had been satisfied to trust to memory and the context. The in-

creased exactness is in all these cases in inverse ratio to freshness and spontaneity, and easy familiarity with the language to be written.

<sup>2</sup> See his interesting study of the symbol in *Archiv für Stenographie*, Berlin, January, 1902.

<sup>3</sup> CXIX, 4.

The rest of the series is:—

	— + addendum quid	2 obols + $\frac{1}{2}$ (ob)
	$\chi$ )	? <i>χοίνικες</i> <sup>1</sup>
	$\alpha\bar{\nu}$ + addendum quid	<i>ἀνά</i> drachmae
	used alone before numerals	drachmae
	used alone before smaller fractions	one-half (and so $\frac{1}{2}$ -obol <i>ἡμιώβολον</i> ) <sup>3</sup>
	used alone with a numeral giving a regnal year.	<i>ἔτους</i>

As regards the latter members of the series, there are some remarks to be made. In CXIX. 10 and perhaps XCIX. (1) 21 there is the sign with the signification ' $\frac{1}{2}$ ,' but it is *reversed*, ( $\zeta$ ), as compared with *e.g.* CIX. B. 74, 75, 84. Examination shows that the ligature is responsible for such variations, just as the ligature is responsible for the common position. It is, in fact, *convenience in forming the ligature* which everywhere decides, within certain limits, the form of a sign, and sometimes a whole symbol. Cp. Fay. Papp. XLV. 8; LIII. 6; LVI. 7; with LIV. 13, where different variants of this sign are used for the half-obol.

Side by side with this sign for 'one-half' is often the simple crescent curve resting on the line on one end of its convex side as conventionally printed,<sup>4</sup> and this no doubt is the direct descendant of the acute-angled Ptolemaic 'one-half' symbol.<sup>5</sup> But certainly it is also of exactly the same form as the curve of the series under discussion. Cp. CIX. B. fr. 2, line 74 (second cent.). The formula however saves it from ambiguity, its immediate context being (1) a whole number which it follows (whereas the similar drachmae-sign regularly precedes the number), or (2) part of a compound fraction at the head of which it stands. The latter case would sometimes offer room for ambiguity, viz., when parts of the drachma had to be expressed, were it not that the latter are never represented by fractions, but by 'stereotyped' symbols for obols and chalcī.<sup>6</sup> The fact that fractions higher in value than one-half (except the exact  $\frac{3}{4}$  and the exact  $\frac{2}{3}$ ) can only<sup>7</sup> be expressed in Greek with the help of the one-half symbol standing first, has given great security to the use of a very slight mark for the latter; one might almost say

<sup>1</sup> *Χάρακος* vide p. 158 infra.

<sup>2</sup> CXIX, 5, cp.  =  $\lambda\alpha\chi$ (*ανία*).

<sup>3</sup> CCLXXXVIII, 4 et saep.; CCLXXXIX, i, 10, et saep.

<sup>4</sup> Grenfell and Hunt print it (Fay. Pap. XI, 15, p. 347, etc.) as a plain right angle.



<sup>5</sup> Which in Ptolemaic papyri has a well-

marked rounded variant.

<sup>6</sup> These are not new in the Roman papyri and have been explained under Ptolemaic (p. 146 *sqq.* supra).


<sup>7</sup> In a few places there is used a method of expressing numerator and denominator. See par. on fractions inf. p. 160 *sqq.*

that for this, as for almost all the 'addendum quid' signs just discussed, any scratch will do. Certainly it is impossible to read the non-literary papyri by tables of alphabets and of symbols however elaborate. Only perfect familiarity with the formulas, recurrent phrases, and the probable intent of the scribe in the wording of the rest can unlock the secret of the scribbled hands, as careless or as hasty then as now. But in the matter of symbols there is the additional tendency to abbreviation which has been alluded to above (p. 136) which leads away from a multiplication of distinct signs or symbols for particular words. However that may be, the fact remains that we have in this large group the repeated application of the same curve or flourish, whose commonest and simplest use is to mark abbreviation, in about a dozen different significations determined almost wholly by the formula.

To conclude this group with a consideration of . The establishment of the meaning I have given it is more difficult, as the Editor for the Brit. Mus. Trustees (Kenyon, p. 152) expresses a contrary opinion. Against his earlier reading as 'copper-drachmas' which he does not now maintain<sup>1</sup> may be set certain palaeographical facts. In the first place, CIX. B. fr. 4, col. 2, line 124, has an erasure of this symbol, with the symbol for μέτρα, which occurs in the Paris papyri and in B.M. Pap. CXIII. 9 e, written over it, in its place on the same spot. It is a clear case of deliberate substitution: they are not then variants. But the fact that 'metra' takes the place of the symbol in question, not once but several times in these same columns, is an argument against the signification 'drachmae,' and in favour of 'choenices.' Again, the meaning 'copper-drachmae' already belongs to another symbol, shown in the above illustration. Concerning the signification in that case there is no difference of opinion. That meaning is consequently impossible for the symbol in question. Dr. Kenyon, however, does not think that anything satisfactory can be made of the meaning 'choenices.'<sup>2</sup> He quotes a more probable explanation: 'Wilcken has suggested that the numbers attached to this symbol are reference numbers to a tax-register, showing the places from which the names which follow are taken. The symbols <sup>3</sup> and γ would then indicate sections of the register, the former standing for Χάρακος the name of a district in Thebes (see Pap. CXIX.) and the latter for some other district (he suggests Ἀγορά). I think this is an ingenious suggestion.' Touching the employment of the simple undulating flourish alone and detached, to signify 'drachmae,' we observe that it is, first, somewhat rarer,<sup>4</sup> secondly, it stands side by side with the Ptolemaic form<sup>5</sup> whose conventional

<sup>1</sup> Privately communicated, May 1901.

<sup>2</sup> That is to say, in this particular context. For a Chi=choenices certainly occurs, cp. Oxyrh. Pap. CCLXXXVII, 7, 8.

<sup>3</sup> A slip, I think, for .


<sup>4</sup> Its variants boldly formed however occur early. Cp. CCII, late 1st. cent.

<sup>5</sup> The common Ptolemaic † is not Roman.




representatives are < and 3 and is probably the result of confusion with the same form made loosely.


The same sign, used for L ('year'), is well attested for this period. Cp. Brit. Mus. Pap. CLXXXII. b. 1, where it occurs twice, once to mark abbreviation, once for the year. The Editor (Cat., p. 62, n.) notes that the two forms are the same, and prints both S-shaped. Cp. also CCCXXIII., 7; CXC VII., 3; Oxyrh. Papp. CCXXXVII., iv. 6; XXXIV., ii. 15. The



ordinary Roman drachma-symbol  presents no ambiguity. It is clearly the same as the Ptolemaic symbol of the same shape.

The safest place in which to look for normal forms, free from the confusion of neighbouring signs and cursive, is in a document like CLXXXI. A.D. 64, where clearly divided columns give no room for ambiguity. Studying this, and comparing it for exactly the same arrangement of the drachmae-symbols, with CXCIX., late second cent., CCLIV. verso, second cent., CLVI., early third, which together present nearly 150 examples, we may be convinced


that the normal is the simple , without other addition. Curious di-

vergencies and variations are frequent, but the majority of quite normal examples is overwhelming. There is, however, an apparent variant of great importance. It consists of the normal symbol *preceded* by a long straight bar, inclining generally a little to the right. Its occurrences with the symbol are perhaps as numerous as those of the symbol without it, but the occasions of its introduction are interesting. It may be studied in CCXCVI., 7 (A.D. 160); CCCXXIX. (A.D. 164); 8, 9, CCCLII. (A.D. 220), 5, 6, 7, 8, where the symbol is used first with and then without the upright in close succession, each concerned with the statement of the same monetary values. This method of *duplicate statement* is not confined to money sums. but is found with artabae, metretae (CLI.), etc. The usual arrangement is as follows. First the sum is stated in words at length. A contracted form of the measure or coin—artabe, drachma, etc.—and the fractional symbols are permitted here, but the principal numbers are written in full. Then an upright bar is drawn to introduce the duplicate statement all in symbols. For

example, CCCXL., 3, and CCCXII., 6, 7, respectively  εικοσι, / < κ; and

< εικοσι επτα  / κζ . (Cp. CLXX.; CCCXLVII., col. 2, lines

9, 11, 12, 14, 15; CCCXIX., 9).

It is clear that the bar belongs not to the symbol next to it, but to the whole group. It is a variant use of the common 'total'-symbol. This 'total'-symbol is identical in shape, and as an additional suggestion that they are the same in origin, there are occasional variants of each to be found which are also identical. In CCCXXX. (A.D. 164), 6, 7, there is the form .

in a variant of  $\lrcorner$ . In third century MSS. this upright bar exhibits the same tendency to fall down into the horizontal, as observed with similar signs. In CCCXLIX. the horizontal is regular: and here it sometimes stands for drachmae to the exclusion of the symbol. It may fairly be concluded that the bar in the drachmae-formula is used with the same intent and feeling as the acknowledged 'total'-symbol, viz. to *introduce a concise re-statement*. Cp. CCCCLXXVII., 6; CCCXXXIII., 28; CCCXLI., 9; CCCXLIII., 8, all second and third century, where the use is clear.<sup>1</sup>

The sign of a shape  $\lrcorner$  already found in Ptolemaic papyri and also in Roman papyri with various meanings, is used for 'deduct' or 'less.' Fay. Pap. CI., r. (iii.), 4 *ib.* v. (i.) 10 and so, often. In B.M. Pap. CCLXVII., l. 300 (first or second century) it is a large right angle, like the  $\epsilon\tau\omicron\upsilon\varsigma$ -symbol. It is at present unexplained.

A star-shaped symbol for 'denarius' occurs in the Fay. Pap. *e.g.* CV., i., 11, etc. and Oxyrh. Pap. LXXXV., ii., 17; iv., 17. This is not native to the papyri, being the Roman sign for the Roman coin, borrowed directly from the Roman notation (*Vide* Marquardt, *Privatleben der Römer*, p. 101). It is X=10 crossed by a horizontal.

We come now to the fraction-symbols. Exclusive of the ordinary numerals, the symbols for fractions do not form a large class. But apart from the symbols proper, there are found, for the expression of fractions, some interesting applications of the common methods of numeration. For one, see B.M. Pap. CCLXV. where there occur fractions with numerators (other than unity) and denominators both expressed, the *denominator being written above* the other. Dr. Kenyon (*Brit. Mus. Pap. Cat.*, Vol. II., p. 259) says that this method is not otherwise known in papyri, though it appears to be regularly used by Diophantus.<sup>2</sup>

The examination of the few symbols which are used for the most common fractions, alone belongs properly to this monograph, keeping within the limits first above set. Is there inter-relation between the common symbols for one-quarter, one-half, three-quarters? The first and second have been discussed in the Ptolemaic section, pp. 146 *sqq.* as well as incidentally among Roman symbols. Adopting Kenyon's opinion (*Pal. Gk. Pap.*, 1899, p. 156, n. 1) for the last, we have the explanation of the series, which may be briefly stated thus: the 'one-quarter' symbol is a degenerate Delta distinguished by the fraction-making (p. 141 above, note) vertical stroke; the 'one-half' symbol is the Ptolemaic angular 'one-half' rounded out a little in Roman Greek; and the 'three-quarters' is the final result of writing the two in close succession (CXIX., 2, second century, XCIX. (i.), 56, 57, CIX., A, 18, 25), that is  $\lrcorner \acute{o} = \acute{\lrcorner} = \acute{\lrcorner} \lrcorner = \lrcorner \lrcorner$  | The more cursive variations, *e.g.* CCLXVII., col. 18, line 298, are still not inconsistent with such an origin.

The symbol for one-eighth  $\lrcorner$  is doubtless an Eta of that peculiar form

<sup>1</sup> CCCCLXXVIII., 6 offers an exception.

Hultsch's review of it in *Berl. Wochenschr.* 1894

<sup>2</sup> Diophanti Alex. opera, ed. P. Tannery, and p. 805.

which is common in MSS. 50–150 A.D., but it is clearly used as a symbol, as may be seen by a comparison with the forms of the letter around it, which never attract it out of its distinctive shape as a numeral. Cp. CXIX., 52 (where  $8\frac{1}{2}$  occurs).

The occurrence of  $\beta = \frac{2}{3}$  in CCXC. (A.D. 85), 7, CCLVI. r. (early first century), 16, CLXXV., 7, is a return to the original formation of the symbol, after the corruption of  $\beta$  into o, in many examples. Cp.  $\chi^o = \chi^{\beta} = 2$  chalci<sup>1</sup> and corruption of Delta into the same form in o' = 4 chalci. Revillout, *Lettres sur les Monnaies Egyptiennes*, p. 172, prints this symbol  $\Delta$ , but gives the same explanation of it. He adds  $\bigcirc$ , to which he gives the value  $\frac{1}{3}$  of  $\frac{2}{3}$  or  $\frac{2}{9}$ . Perhaps this is a mistake for  $\frac{1}{3}$  of 2.

The ordinary numerals Gamma, Epsilon, etc., with an over-written vertical, are used for  $\frac{1}{3}$ ,  $\frac{1}{5}$ , etc. There are, however, several Roman varieties of the over-written mark. Cp. Fay. Pap. LXXXII, 16. Note the symbol for  $\frac{2}{3}$  Fay. Pap. LXXXVI., 2, resulting from the close collocation and subsequent combination of the  $\frac{1}{2}$ -symbol and the Gamma =  $\frac{1}{3}$ .

The symbols of the formula 'one per cent.' and 'two per cent.' are questionable. The appearance of the sign in CCCVII. 2, might suggest, for explanation, a reference to the vertical over-written stroke found in Ptolemaic fractions (cp. p. 146 n. above) since these 'percentages' are the fractions  $\frac{1}{100}$ ,  $\frac{1}{50}$ . But the form of the sign in the same formula in CCVI. d. (second century) 2, 3, raises a doubt, since there is the more familiar undulating vertical crossed by a horizontal bar (Kenyon, *loc. cit.* note).

As in Ptolemaic so we find in Roman papyri the character Sampi as a numeral = 900 (CXCIII., 20, CXCIV., 93 etc.) and Koppa = 90 (CXCIII., 54, CXCIV., 10). Note the form, q-shaped, in Oxy. Pap. XLIII. recto ii. 23.

The symbol  $\angle$  = (at least in some places) *ἀνά*, has been treated under the head of its Ptolemaic occurrences (p. 142 supra) and again (inf. pp. 166 sq.) in the consideration of the horizontal bar = Nu.

Rho surmounted by a small Chi occurs (= *ἐκατόνταρχος*) in Roman papyri. Vide Fay. Pap. XXXVIII., 1; CXXXII. 4. Once a symbol  $\Gamma$  replaces it in the same formula B.M. Pap. CCCXLII, 1, cp. Cat. II. p. 172. Have we here a reminiscence of the curious symbol of the Pet. Papyri (*supra*, p. 137)?

While, as already stated, the Ptolemaic right-angle for 'year' survives in Roman papyri, with no noteworthy change of form,<sup>2</sup> a chapter might be written

<sup>1</sup> The Edd. of the Fay. Pap. LVI, 5, 6 LVII, 5, resolve  $\chi$  into *χαλκοῦ ὄβολοί*. Perhaps the explanation is that when used alone, the collocation is to be read in this way, but that when following o' = 4 chalci as B.M. Papp. CCCXII and CCCLXXI, it adds 2 chalci, making up the 6 chalci.

<sup>2</sup> We have in Roman papyri the three common variants: (1) the plain right angle resting on

one side of it; (2) the same with its vertical member curved, 2-shaped; (3) the same again, but with the concave of the curve looking to the right. Both the (2) and (3) may be seen in CCLVII A.D. 94 and CCCXXIV A.D. 161. For comparison of the last with its cursive degenerates CCCXIV 25, 26. Grenfell and Hunt print other variants  $\perp$  (Oxy. Pap. Vol. I. p. 263) and  $\angle$  (ib. vol. II. p. 337).

on the very compendious formulae, equivalent to compound symbols, which are formed, in such papyri as B.M. CCLX., by the juxtaposition of numerals and this symbol, e.g.,  $\epsilon\pi\iota^{\alpha}\theta^{\iota}\delta^{\iota}\beta^{\iota}$ . =  $\epsilon\pi\iota\kappa\rho\iota\theta\epsilon\iota\varsigma\ \tau\omega\ \theta\ \epsilon\tau\epsilon\iota\ \kappa\alpha\iota\ \epsilon\nu\ \tau\epsilon\sigma\sigma\alpha\rho\alpha\kappa\alpha\iota\ \delta\epsilon\kappa\acute{\epsilon}\tau\alpha\iota\varsigma\ \tau\omega\ \bar{\iota}\beta\ \epsilon\tau\epsilon\iota$ , (cp. col. 5, lines 65-70). But such a section could do no more than repeat the conclusions of the Editor, and the difficulty lies in the interpretation of the formula rather than in the decipherment of the symbols. In the MS. just quoted, in particular, these symbols, numeral and 'year'-symbol, alike, are, though somewhat rubbed, clear enough and of the normal forms, so that, without passing beyond the limits laid down for this monograph, one would hardly be justified in devoting space to their discussion.

The 2-shaped cursive form which in Ptol. MSS. is  $\hat{\alpha} = 1000$  (sc. drachmae) recurs in CIX B fr. 2 line 45, CXIX. 6, 9, 13, 17, 29, 40, 42, 48, in a scribbled  $\acute{\alpha}\pi\acute{o}$ . Wilcken thinks that it is not a symbol, and it may be pointed out that there is in the Roman symbol a closer resemblance to that word cursively written than in the Ptol.; the Omikron is in some cases quite distinguishable, though, as it is not always found, the circle may be nothing more than an occasional flourish (cp. CXIX. 56, where the ordinary cursive word is found in the same context).

Side by side with it, 2 = 1000, B = 2000, &c. survive in Roman papyri, though in CXCVI. (second century) 27, 35, 36, 40, they are found with an addition, a hooked horizontal interlaced  $x$ -wise with the hook which was once the circumflex.


The Aroura-group. The normal type of this is no doubt better seen in the form  $\overline{\gamma}$  (CXCII in almost every line, CXCIV, 4, 5, 7, 9, 10, CXCI, 1, 33,

35, 37 *et passim*—all first century) than in  $\gamma$  (CXIX. 1, 2, 3, *et passim*, CXXI. r. 88, 95, 100, *et passim*, CCLXVII. 3, 16, 22, CIX. A. fr. 2 lines 18, 23, 25, 51, 52, *et passim*, Fay. Pap. XXIII. (a) 7, 9. For although the former can hardly be a direct descendant of the Ptolemaic symbol  $\zeta$ , so different is the general appearance, yet the same elements are perhaps to be seen, viz. Alpha-Rho, transformed however by the adoption of an Alpha of later date, which now appears mutilated, as the initial hook in both these Roman symbols. The absence from one of a final hook to the Rho-stroke would then favour its claim to be the more normal form. The horizontal bar, marking abbreviation, appears in each, but in one a ligature binds it to the tail of the Rho, so disguising both elements. This tendency to write the Rho-tail and the ligature all as one stroke is illustrated in CXIX. 1, 2, 3, where in 3 especially the whole appearance is almost that of a copy-book capital E, scil.  $\mathcal{E}$ , joined to a following horizontal; and the progress of the

mutilation is confirmed from the example in line 56 of the same papyrus, which has already (second century) lost the initial hook. A final Byzantine form which appears to be quite regular in CXIII. 8 c. (seventh century) is an

uncompromising straight vertical with a bold loop joining it at half way, where the horizontal starts; cp. below p. 172 sq. Further, the simpler, the presumably normal sign is found in MSS. which are earlier, without exception I think, than those which show the more degenerate, that is, the rounded and ligatured form: certainly the earliest (Pap. CXCV) of these first century papyri has the simpler form of the symbol, the ligature appearing first in CXXXI. (78-79 A.D.).

The symbols which are found in the familiar collocation *πυροῦ ἀρτάβας* demand a detailed investigation, as several considerations render it complicated. In the first place the two distinct symbols which originally formed the constituent parts are used inconsistently and confusedly; the whole composite symbol is found sometimes for the *πυροῦ*, sometimes for the 'artabas'; sometimes the original formation seems lost to sight and new strokes are introduced; and to add to these difficulties of application, there is the confusion of the form of this symbol, with the Ptolemaic 'metretes' in the MSS. and some overlapping of the variants in the printed lists. It will hardly be profitable to attempt an analysis of all the minor discrepancies to which these difficulties have given rise. It is better to go back to the MS. forms and endeavour to trace their development. To begin with the  $\overline{\sigma}$ , which has a history of its own, apart from the part it plays in the composite symbol. If  $\overline{\sigma}$  = *ἀρτάβη* (Fay. Pap. LXXXV. 39) is analogous to  $\overline{\sigma}$  = *οὐλή* (CCLIX. 77, 80, 89, 99 &c.) and  $\overline{\sigma}$  = *ὁμοίως* (CCLIV. v. 17, 27, 43, 44, 45, *et passim*), explanation is simple: it is a mutilated Alpha surmounted by a lengthened abbreviation-mark. This explanation receives confirmation from the fact that (*e.g.* in CCCXLVI a and b) this abbreviation is found just where an abbreviation as distinct from a symbol would naturally occur, viz. in the cursive statement of an amount which commonly precedes the duplicate statement in symbols. Compare these parallels and note the variants: B.M.

Papp. CCCXV. *πυρου αρταβας τριακοντα*  λ; B.M. Papp. CCCXLVI.

*πυρου*  $\overline{\sigma}$  *τρίς*  $\iota + \rho$ . Here clearly  $\iota + \rho$  is the symbol standing for *πυροῦ ἀρτάβας*, while  $\overline{\sigma}$  is regarded by the writer as ordinary cursive.<sup>1</sup> In another place, CCCCLXIX. b. 5, we have *οροβ*<sup>2</sup> *αρταβ* *τρεις* /  $\overline{\sigma}$   $\gamma$  where the distinct  $\overline{\sigma}$  has passed over to the symbol side. As this papyrus is late second century (Kenyon, Cat. II. p. 86), the use here of the abbreviation may be regarded as typical of what I think is the transition stage; in which we see the simple cursive  $\overline{\sigma}$  of earlier Roman MSS. used among the symbols, but without having lost its distinctive form. A little later, at the beginning of the third century, it has amalgamated with part of the mark which in various shapes introduces it,<sup>3</sup> and thus we have a symbol of the type of CCCXV.<sup>4</sup> where the simple  $\overline{\sigma}$  is still very consciously written, though the vertical already crosses

<sup>1</sup> In CXCV col. 4, line 82 it apparently is used for *ἀρταβῶν*.





<sup>2</sup> *ὀρόβου*, a kind of vetch or pulse.

<sup>3</sup> The *πυροῦ* ordinarily not being represented

among the symbols.

<sup>4</sup> This is dated 150 A.D. so that the use here is an anticipation of what became general later.



variants are sometimes unmistakeably of this same type: those e.g. in CIX. B. fr. 1 (15, 30, 32, 59, *passim*) having as their variation only the omission of any mark to represent the Omikron, or Upsilon, and occasionally a carrying-round of the lower hook into a loop joining the horizontal (e.g. 60). In CCCXV (150 A.D.) the variation has affected the other member, so that the whole appears as a simple vertical, struck through the left-hand tip of the artabe-abbreviation, this vertical having, attached to its tip, a stroke which is in some cases like a simple ligature (cp. 10, 13, 18), in others a second horizontal, written by a separate stroke of the pen (cp. *ib.* 15). This additional stroke is in many cases the mark which introduces a group of symbols commonly repeating a value already expressed in words, the *γίνεται*-stroke. Before the end of the century, the composite symbol has taken the form of a plain cross, 'plus'-shaped, (cp. CCCXLVI, a and b A.D. 194) which now, and in the third century, is preceded or introduced by new additional signs of various forms. In CCCXLVI, just referred to, it is a vertical stroke, almost straight, with a very slight hook at the top on the left and at the bottom on the right: in CCCLI (A.D. 218) it is a horizontal undulating ~-shaped (line 11) or a ragged stroke somewhat similar (line 12). In all of these there is perhaps something reminiscent of an original *πυροῦ*-symbol, now absorbed into the vertical of the cross, but in CLXXX (A.D. 228) it is a plain detached horizontal (8. 13) or a similar stroke, often ligatured to the vertical.<sup>1</sup> This additional preceding stroke, introductory to a group of symbols, has been the cause, as already explained, of considerable confusion, both in the MSS. and (consequently) in the Editions. Such an example as CLXXX, 12, shows its normal use with artabe-symbol very clearly *πυρον αρταβας τριακοντα διμυρον / +. λβ'* as contrasted with the simple 'artabas' alone, the + alone or followed by the o, as in B.M. Pap. CCCXXII where many variants enable one to estimate to some extent the probable limits of this variation. Finally, to anticipate a little, we have in fourth century papyri, strange forms such as  or , (XCIX (i) col. 2, 3, 4, and fresh confusion such as ,  (CXXV (i) 1, *et sqq.*) Other illustrations may be seen in CXCIH, CLXXV, and CXCIV, all first century, CCLIV, second century, CLXXXVIII, third century.

Pap. CCLXVI, 40, has a sign exactly resembling one form of the Artabe-symbol, a horizontal line with a small circle written beneath it. This sign here indicates that what follows is the 'net' total (Kenyon, B.M. Pap. Cat. II, 234). It is hard to imagine what the circle (or dot) could be. The horizontal however is not strange as a variant of /: there is a general tendency of vertical or nearly vertical strokes to take a more horizontal position; and the very stroke in this position, signifying 'gross' total, occurs, without the subscript, in this same papyrus, *passim*.

<sup>1</sup> The Omikron circlet attached on the under side to the right hand end of the line, reappears, and survives to Byzantine papyri. Cp. in the Abinnaeus papyri, CCCXXVIII nearly

40 occurrences, CCXLIX, 20, CCXXXVI, 4. In CCXVII, 16, (3rd cent.) it is placed above the horizontal,

The Roman forms of the Talent-symbol. These are, ordinarily  $\succ$  (Oxy. Pap. XLIX, 18; CCXLII, 28 etc.), and  $\succsim$  (*id.* CCXXXVII, iv., 14, etc.)

The latter is a more cursive development of the former, itself at a similar stage in relation to the Ptolemaic two-membered form. Still more degenerate forms may be seen at *id.* LXXXIV, 17; and perhaps LIV, 18.

$\tau$  (= *συμβολικόν*, a tax the nature of which is undetermined), is hardly a symbol, though noted by the Editors of *Fay. Towns and their Papyri*, p. 347, among the symbols. It is a Sigma of the second century, with common over-written sign.

It would be better to defer judgement on the small, faint and very cursive writing of XCIX, a mutilated and very fragmentary fourth century papyrus, which shows symbols, apparently for *νομίματα* and *κεράτια*, which are quite unfamiliar.

$\xi$  = *διά*. The earlier explanation = *καί* seemed very probable (Kenyon, *Pal. Gk. Pap.* 1899, Ap. iv), for in CIX B fr. 2, the ordinary cursive *καί* is written in such a way that the omission of the final iota actually leaves this 'symbol.' Cp. line 45 with 46; and 55 with 59. Dr. Kenyon now accepts Dr. Wilcken's explanation above given, which he thinks gives better readings.

$\wedge$  A symbol or sign thus printed in the *Cat. of Brit. Mus. papyri* is unexplained. The Editor suggests the meaning  $\pi$  (for *προσδιαγραφόμενα*). Curiously, a somewhat similar but *double* angle of this kind is also unexplained among Ptolemaic symbols. *Vide supra* p. 151.

The short horizontal over the final letter of a word, and especially of a line (XLVI., 140, 146, 150, 155, *et passim*) has sometimes the value Nu. It quite commonly indicates other letters, but not other *single* letters, except  $\delta\bar{i}$  = *διά*. I cannot produce one, and there is not one in Kenyon's 1893 *Index of Abbreviations* (*Cat. Gk. Pap. Brit. Mus.*, pp. 253-5) and the 1898 *Catalogue* has only  $\tau$  =  $\tau\eta$  (CCCXXV. a) which proves on examination to be hardly a case in point, the addition being merely a prolongation of the cross-bar of the Tau. In the case of *ἀνά* the horizontal = Alpha drawn above the Nu is undeniable, but then the Nu is much mutilated, so as to give the whole value and appearance of a symbol, and the Ptolemaic angular Alpha is replaced by a single bar apparently only when the latter is immediately followed by and joined to the vertical flourish which signifies 'drachmae.' Moreover this occurs in a common formula '@ drachmas x.'

A similar sign for a single final letter over-written is the sometimes cup-shaped angle representing Upsilon. See CCCXXV. b, where it occurs twice in the genitive ending Omikron-Upsilon, in each instance resembling a large modern 'tick.'

Quite alike often are the symbols which consist of a double horizontal, viz. for 'two-obols,' for 'Arouras,' and not infrequently for 'talents.' The 'talents'-symbol is generally easier to distinguish, but it is often loosely



written both in Ptolemaic and Roman<sup>1</sup> papyri, and the 'two-obol'-symbol tends constantly to the same shape in Roman MSS. (for extreme form CXIX., 46); the similar 'Arouras,' which is rare, is Ptolemaic only. But here again it must be observed that the meaning is commonly kept clear by the context alone.

Obol and Chalci symbols. Concerning these there is little to add to the account given of them in the Ptolemaic section, and earlier in this. Drs. Grenfell and Hunt, in indexing the Fayum Papyri, give (p. 347) three symbols each = ἡμιόβολον. Of these the first and third, as I have elsewhere explained, are properly 'one-half' signs; the middle one, printed as 6-shaped, is properly directly connected not with 'obols' but with 'chalci,' being a roughly-written cursive Delta, surmounted by a vertical stroke = 4 chalci. Thus *in practice*, though not as regards intrinsic meaning, all three are rightly described as symbols for the half-obol. These instances from the Fayum papyri are all of Roman date. All the obol series recur in the period (Fay. Papp. XLI., 11, 17; XLIV., 10, 11, 13; LXXXVII., 1, 10, 13, etc.).

A rare sign is a kind of rough breathing-mark (XLVI., 9, 60, fourth century). A species of diaeresis-sign, consisting in one MS. (*id. passim*) of a dot followed by a tiny horizontal may be a variant for the rough breathing in some places; *ibid.* 165, *ἰπό* and *ἰνα* 164, 175, 239, 265, 299, 304, CXXI., 224, 927; but cannot in others; *ibid.* 147, 201, 266, 269, 610, as it is found (only over Upsilon and Iota) in places where there is neither breathing nor diaeresis required, and where it seems to be a merely fanciful addition to the vowel. The sign is moreover omitted from most of the Iotas and Upsilons even of this MS., a magical document, and in very few papyri does it occur at all. In Pap. CX., a horoscope of the second century, it is used occasionally over every initial Upsilon and Iota, regardless of diaeresis and of aspirate.<sup>2</sup> In CCCXXXII. a bar replaces the two dots.

The two signs last mentioned, like others next to be quoted, hardly belong to the science of symbols. Such marks as *e.g.* a 2-shaped 'curve' in XCIX. (i.), col. 4, *ibid.* 19, 23, seem due to the momentary freedom of the pen.

With better right perhaps has another class a proper place here, *viz.* monograms. These are formed, like the ornamental monograms of modern and mediaeval times, by the crossing or interlacing of two or more letters. The letters, however, in ordinary papyrus-use are nearly always<sup>3</sup> the first two or three letters of a single word. They are of the nature of symbols, the more so as the type of letter employed is rigidly observed, and is often quite different from the ordinary forms of the MS. The following is a fairly exhaustive list, almost confined to magical papyri: ρ = γράφε, ρ̄ = γραφόμενον, ♯ = δεινα, and cases (which remain rigidly triangular whatever be the shape

<sup>1</sup> For the latter, see Fay. Pap. XXI, I (a) 9, 10, LXXXVII, 1, 10, 13.

<sup>2</sup> Sir E. M. Thompson remarks that the *πνεύματα* are not found in early Gk. MSS. before the 7th cent. and did not become rounded until the 12th cent. Gk. and Lat. Pal. pp. 71, 72).

<sup>3</sup> Exceptions are to be seen in the rare arrangement *e.g.* Χ̄ = δεκατάρχης (Oxy. Pap. LXIV, 1); and χ̄ = ἑκατοντάρχης (*ibid.* LXII, 1); the numeral has the MIDDLE letter of the αρχης written over it. Cp. Genev. Pap. No. 35, etc.

of the cursive Deltas around it),  $\text{Ϛ}$  = ζμύρναν,  $\text{Ϛ}$  = ζμυρνομέλανι,  $\text{ϛ}$  = νίκη, or νικητήριον,  $\text{Ϝ}$  = ποίημα,  $\text{ϝ}$  = πρᾶγμα,  $\text{Ϟ}$  (sometimes  $\text{ϟ}$ ) = πρὸς,  $\text{Ϡ}$  = χειριστής,  $\text{ϡ}$  = χρηματίζειν or χρῆσθαι,  $\text{Ϣ}$  = χριε or χρισον,  $\text{ϣ}$ ,  $\text{Ϥ}$  = πρόβατον,

$\text{ϥ}$  = διπλοῦν. Except the last three, these are almost all *magical*. Another exception is  $\text{Ϧ}$  = ἑκατονταρχία, CLXXVIII. b, a copy of a deed of A.D. 145. Of this kind (the Iota, however, not far removed from the simple subscript) is the Delta-Iota which occurs in a regular form as *e.g.* CXIX., 4, 15, 36, 44, *et passim*. More doubtful is  $\text{ϧ}$  (XLVI., 200, 217, 455), which should mean λαβέ. In Oxy. Pap. XLIII., recto, i., 1, it means λίτρα, and so often (Edd. Index in Vol. I., p. 263). Grenfell and Hunt index a similar symbol (Fay. Pap. L, 5) as ὑπέρ (?). Merely superscript or subscript letters are not included.

There remains the large class of *magical* symbols. But of these only four or five can be positively classed as Greek (see Kenyon Pal. of Gk. Papp. Append. IV.). Of this small number the symbol for ὄνομα is common. It appears generally as a small square (sometimes two squares for the plural) with or without a dot in the centre. As to its origin, I can only produce, for what it may be worth, a late example from the fourth century pap. CXXII. There a hint of its true formation may perhaps be seen in 6, 43, and 46; the construction is a roughly shaped Nu ?, surmounted by a horizontal bar, and containing a dot = Omikron.<sup>1</sup> This would be quite on the principle of the monogram plus ordinary abbreviation. Still, little can be inferred from such premises, especially as the writing of other 'onoma'-symbols in the MS. *e.g.* lines 55, 59, 60 is quite different, and negligent too.

The symbols for ἥλιος, for σελήνη, and for σκῆπτρον (or Ἐρμης) are conventional graphic representatives of the objects named. The monogram formations which occur have already been given. It has been a labour of considerable magnitude to examine in detail the remaining symbols, arranged in elaborate figures and formulae which bulk so largely in Greek magical papyri. My only regret is that the result, as far as proven Greek symbols is concerned, is very meagre. The most important is a single tiny line of tachygraphy which occurs Brit. Mus. Pap. CXXI. col. 14, line 27 (third century). For explanations *vide* Wessely, *Ein Syst. altgr. Tachygr.* pp. 9-10; Foat, on old Gk. Tachygr. in *Journal of Hellenic Studies*, Vol. XXI. 1901, Pt. II. It follows a cryptogram, and seems to complete one of the ordinary formulas (λαβων χαρτιον ιερατικον, &c.) of instruction for the preparation of a spell; the first half being written in cryptogram, and the latter half fantastically varied by use of tachygraphy; though there seems no reason for the presence of either. The existence of a similar script in the Leipzig Tachygraphic fragments (cp. Fr. 21, line 5; Fr. 22, lines 9, 10) confirms, to some extent, the tachygraphic portion; but in any event, it is a direct intro-

<sup>1</sup> CXXI, 927 has a cup-shaped dot which may be part of a conscious Omikron.



stroke would then be the ligature, which is freely used in this class of cursive: cp., e.g.,  $\Omega\tau$  =  $\pi\rho\omega\tau$  (*ibid.* 6; cp. CCCXV. 11) where the ligature between Omega and Tau is drawn as a curve exactly repeating the first two curves of the Omega. But another explanation is equally defensible. I prefer to regard the vertical undulation as an Iota, written loosely as in several other cursives, e.g., in  $\Delta = \delta\iota$   $\S = \epsilon\iota$ , of which the small papyrus last quoted gives examples.

Thus a kind of compensation for the mutilation or curtailment of cursive phrases is to be seen in the influence of ligature, which introduces *otiose* strokes and curves for the sake of a continuous script in which the pen is lifted as seldom as possible.

#### BYZANTINE SYMBOLS.

Byzantine palaeography has practically to deal with non-literary manuscripts, so far as papyri are concerned (Kenyon *Pal. of Gk. Pap.* 1899, pp. 112, 114). Their sematography adds very little to what has already been said, and very few new symbols to the general list.

In general, the same characteristics of the symbols appear, as already demonstrated of the Ptolemaic and Roman periods, and the same methods yield similar results. So that it would seem that an invented and consciously developed system of symbol writing does not find its way into ordinary Greek writing until the papyrus has given place to vellum.

**S** is the conventional shape of the printer's type used for a symbol which is seldom truly S-shaped. Cp. CXIII, 5 (c), lines 3, 5; CXIII, 7, lines 2 *et sqq.* The true S-shape has however, occasionally appeared much earlier, cp. CCII, 3, (late first cent.) CCVI b. (second cent.) *passim* where it stands for drachmas. When written proportionately with other letters, it is the perpendicular flourish, undulation, or zig-zag of Roman papyri, in an extremely broken-down form, which is sometimes as diminutive as an ordinary cedilla (in modern French) which it then very closely resembles.

In its strange variants it is easily confused with some ordinary strokes of the writing which is now sometimes very cursive, e.g. with Epsilon-Iota (CCXXXVI, 2; CCCIII, 27) with Alpha-Iota (*ibid.* 5).

Of such a form exactly is this stroke, with the meaning 'and' in CCXLIX, 10 (cp. Oxy. Pap. CXXVII, 4) and with the meaning 'one-half' in CCCXXVIII, 8, 22, 23.

Used as the simple sign of abbreviation the common vertical undulating stroke retains its use and form (*ibid.* 3; CXIII, 7, line 2) to the end of the papyrus period. Another form of it, however, seems to rival it, viz. the straight oblique inclined to the right, and struck just beneath the final letter of the unabbreviated part. In e.g., CXIII, 7, this is so bold a sign that its numerous occurrences give to the page the appearance of a heavy sloping hand. In CCXLII, 22; CXLI, 25; CCCIII, 6, this appears *doubled*,<sup>1</sup> to

<sup>1</sup> It is used apparently with a plain numeral CCXLIX, 32.

mark a numeral used adverbially. Combined somewhat fancifully with the ordinary flourished letters of the period it gives symbol-like effects, e.g.

$\pi\theta$  =  $\pi\theta\sigma$  (?) (CXIII, 8, [a]).

The same tendency to write recurring groupings of letters as phrase-symbols is to be noticed in this period also, but the prevailing elegance of the style of the period produces in such phrasing graceful intertwined effects which are often delightful to the eye, e.g. CXIII, 7, line 2:

$\delta\chi$  =  $\delta\chi\theta\acute{\epsilon}\nu\tau\alpha$ .

They are capable of becoming obscure, without losing their prettiness e.g. *ibid.* 3 et sqq.  $\kappa\gamma$  =  $\kappa\omicron\upsilon\rho$ ; *ibid.* 9 (e)  $\gamma$  =  $\alpha\iota$  or to take a formula, one *ibid.* 8 (a) 21:

$\nu\theta$  =  $\nu\theta\iota\sigma\mu\alpha\tau\alpha$   $\xi\theta$ ,  $\kappa\epsilon\rho\acute{\alpha}\tau\iota\alpha$   $\theta$   $\xi$ ,

or 69 dr.  $9\frac{3}{4}$  keratia.

The 'one-half' and the 'one-quarter' symbols  $\zeta$  and  $\xi$  (CXIII, 5, (c) line 33) have taken by this time (A.D. 600) slightly new forms. For the former, the older (Roman) vertical undulation is now sometimes<sup>1</sup> surmounted by the double dot, apparently diacritic, which plays a large part in mediaeval sematography. For the latter, the true formation of the older symbol has been lost in a (modern) Delta-shaped character, but distinguished by a cross-bar on the extended arm. The new coinage in which the last mentioned sums are reckoned, has for (?)  $\kappa\epsilon\rho\acute{\alpha}\tau\iota\alpha$  a symbol  $\gamma$  (CCCCL, 4) which is just possibly borrowed from some system of tachygraphy. The Kappa and the Epsilon of this shape are found in later tachygraphy, *not* however in that of the Rainer papyri of this period (cp. Wessely, *Ein Syst. altgr. Tach.* Taf. I, No. 9, row 11). As moreover, the symbol is quite as reasonably to be derived from a half-formed cursive Kappa, its claim to be tachygraphic may be doubted.

In B.M. Pap. CCCXCIII, 3, 2, the statement in duplicate has  $\gamma$  in the place of  $\pi\alpha\rho\acute{\alpha}$ . This, being of the sixth-seventh century, may possibly be a borrowing from the same system of tachygraphy as set forth in the Rainer tachygraphic wax-tablets. Unfortunately an example of  $\pi\alpha$  does not occur, though in the fragment numbered 3 by Wessely (*Ein Syst. altgr. Tachygraphie* Taf. II) the sign  $\gamma$  =  $\alpha\pi$  occurs. The inversion of the letters would, it would seem, be  $\gamma$  or  $\gamma$  but it would be consistent with the general methods of the system if  $\gamma$  should mean  $\pi\alpha\rho$  (Cp.  $\gamma$  =  $\alpha\iota$ ; and the circle of the Rho disappearing in  $\gamma$  =  $\alpha\rho$  Taf.). The actual occurrences of  $\pi\alpha\rho$ , etc. Taf. III, no. 10, however are inconsistent with it, so that, having at hand the simple abbreviating stroke, I should prefer to adopt it as the explanation.

$\gamma$  =  $\acute{\upsilon}\pi\acute{\epsilon}\rho$ , CCCXCIII. 2, 3, (sixth or seventh century) and an interesting variant occurs CXIII. 9, fr. e. So many monogram-formations of this kind

<sup>1</sup> CCCXXVIII for instance, one of the Abinnaeus papyri, has not the dots (8, 22, 23).

occur (cp.  $\pi$  =  $\pi\rho\acute{o}s$  where also a single stroke represents the Pi) that it would be, I fear, only a far-fetched explanation which would introduce tachygraphy.

The aroura-symbol  $\uparrow$  has lost its upper hook and is a straight, vertical bar with a bellied loop which generally is carried back to touch the bar; there is still the horizontal, regularly connected to the following numeral. Cp. p. 162 above.

The artaba-symbol. Allusion has been made (p. 165 *supra*) to some widely variant forms in the fourth century papyri. To them we must add CCXXXVI. 4, where a new but quite possibly accidental hook appears,<sup>1</sup> the form being otherwise quite normal, the small circle even being in its oldest position (cp. CCCXXVIII. nearly 40 occurrences). But CCXLIX. of the same (Abinnaeus) group, has at line 1, two strange variants of  $\uparrow$ .

There are no other occurrences, I think, to confirm them. In later examples too the small circle or dot takes new positions, while two and even three circles are found *e.g.* Oxy. Pap. CXXVII. (late sixth century).

$\uparrow$  =  $\tau\acute{\alpha}\lambda\alpha\nu\tau\alpha$ , found in the Abinnaeus group (CCCXXVII. 14) is quite new and unexplained. It may be the old 'year' symbol transferred to this meaning, or  $\uparrow$  may be a borrowing from tachygraphy. The sixth century tachygraphic fragments already quoted show  $\uparrow$  =  $a\tau$ , and  $\uparrow$  as the first of a group, which is almost certainly  $\tau\alpha$ ,  $\tau\epsilon$ ,  $\tau\eta$ , &c. The difficulty of the date is a grave one, for it would rather be likely that the tachygraphic symbols were themselves adaptations of the older symbols, there being nothing to confirm the sixth century Rainer-forms for earlier centuries.

There is the 'Sign of the Cross' now commonly found in even commercial and legal documents. It is variously shaped, its vertical being sometimes hooked, now on the left (CXIII. 4, line 18) now on the right-hand (*ibid* 28). For the plain form, see CCCCLXXXIII. line 1. In CCCXIII. it is drawn in the margin against the text  $\text{O } \kappa\upsilon\rho\iota\omicron\varsigma \text{ o } \theta\epsilon\omicron\varsigma \text{ } \phi\upsilon\lambda\alpha\acute{\xi}\iota \text{ (sic) } \sigma\alpha\iota \text{ (sic) } \dots\epsilon\rho\rho\omega\sigma\theta\alpha\iota \text{ } \sigma\alpha\iota \text{ } \epsilon\nu \text{ } \kappa\omega$ , but often the context is quite secular, legal or commercial.

In CCLII. 1-20 a Xi with the oblique line, already seen, drawn through it, represents Sextarii.

$\chi\mu\gamma$  which occurs oftener alone, but sometimes with  $\zeta\theta$ ,  $\chi\mu\gamma\zeta\theta$  (CCCCLXXXIII, (i)) seventh century is more a cryptogram than a symbol. Wessely suggests  $\chi\epsilon\iota\rho\acute{o}\varsigma \text{ } \mu\omicron\nu \text{ } \gamma\rho\alpha\phi\acute{\eta}$  for the first three letters, but Kenyon thinks this unlikely, as the letters are not in the same hand as the rest. He thinks it more probable that it is of the same form as  $\zeta\theta$  which is explained to mean  $\alpha\mu\eta\nu$  (thus  $1 + 40 + 8 + 50 = 99$  or  $\zeta\theta$ ). Other explanations are  $\chi\rho\iota\sigma\tau\acute{o}\varsigma \text{ } \mu\alpha\rho\iota\acute{\alpha} \text{ } \Gamma\alpha\beta\rho\iota\eta\lambda$ , and  $\chi\rho\iota\sigma\tau\acute{o}\nu \text{ } \mu\alpha\rho\iota\acute{\alpha} \text{ } \gamma\epsilon\nu\nu\hat{\alpha}$ .

\* In the document just quoted (line 8) and again in CXIII. 6 (a) line 10, a large six-pointed star-shaped character (a Chi with a line across it) is found as an abbreviation of  $\chi\alpha\acute{\iota}\rho\epsilon\upsilon\nu$ .

<sup>1</sup> And may be due only to a kind of attraction to such forms with ordinary ligatures as in CCXLIX, 20.

## NOTE ON THE SYMBOLS OF LITERARY POPYRI.

It is in deference to the general practice that the distinction between literary and non-literary has been preserved in this treatment of the symbols. For in the sematography the division is hardly useful, as, if we except those manuscripts (notably the 'Αθηναίων Πολιτεία, the British Museum medical manuscript, and the astronomical treatise of Eudoxus in the Louvre) which, though literary as regards the nature of their contents, are not written in a book-hand at all (Kenyon, *Pal. of Gk. Pap.* p. 56), we might fairly say that the literary popyri do not use symbols. So great, however, is the palaeographic and general importance of the literary popyri, and most of all, as it happens, of that popyrus above mentioned which uses abbreviations the most freely, that it seems better to defer these for separate consideration. Somewhat different questions are involved and Dr. Gitlbauer has, in a series of articles in the *Archiv für Stenographie*, 1901, expounded a system of tachygraphic abbreviation which he claims to trace in the 'Αθηναίων Πολιτεία, and believes to be directly related with formal tachygraphy then current in Greece. An opportunity having now been offered me to discuss the matter at length in the same *Archiv*,<sup>1</sup> I omit from these pages what might seem an inadequate treatment, the more readily because I think it has not properly a place at all here. For after a careful examination of the original popyrus forms, I am convinced that the genuine symbols peculiar to Greek literary popyri (for list of symbols and sigla see Kenyon, *Palaeography of Greek Popyri*, Appendix IV) are reducible to three, viz. / = ἐσσίν // = εἰσίν \ = εἶναι; and if any non-literary popyri yet unexamined should as I anticipate contain these three also, then this tiny list will vanish altogether. As regards their origin, I reluctantly accept them as arbitrary (perhaps related with the tachygraphic / = η); they would thus stand almost alone as pure symbols of arbitrary origin found in old Greek.<sup>2</sup>

F. W. G. FOAT.

<sup>1</sup> In the May number 1902. Dr. Kenyon, the first editor of the popyrus, has kindly read the manuscript of this article, and expresses his agreement with the general conclusion

thereof.

<sup>2</sup> Apart of course, from pure continuous tachygraphy.