The Ligatures of Early Printed Greek

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SCHOLAR working with sixteenth-century printed texts—if he
is not trained in Classics—will be more often dismayed than
enlightened when he encounters, in his Elizabethan quarto,
an embedded Greek word or expression. The Greek may be simply a
part of the running text, a happy devising of the author's to add
authority to his prose; or it may be an extended quotation from a
classical source. For one like myself, whose training is in English
literature, the difficulty is not mitigated in the latter case; for even
when an Elizabethan author identified his Greek I often had to
accept on faith that it was a fragment of "Theogn" or "Arist" or
"Herm Trism," the quotation as printed seeming no more than a
series of alien convolutions to my perplexed eye. I saw little relevance
between the Greek I had learned in school and this peculiar, cramped
typeface which I could not read and which often contained only an
occasional letter I could recognize. After much frustration of this sort
I finally decided to attempt a resolution of the problem and to teach
myself to read Renaissance Greek. I was ultimately successful, and in
the course of my *agon* I came upon a number of interesting facts about
the printing of Greek in the sixteenth century which, though hardly
new, are perhaps inaccessible to many. Therefore, though my chief
purpose in this article is to illustrate the forms which Greek ligatures
took in the sixteenth century, and hopefully thereby to provide some
aid for fellow sufferers, some preliminary comments about printing
in general may not be out of place.

My first rude awakening came with the realization that the Greek
alphabet did not have the twenty-four simple letters which my
schooling had led me to believe were inherent in the language. How
Greek was written or printed was, as I found, merely a matter of
convention at any given time. The special letter-forms and letter-
combinations which were popular during the Renaissance existed
in sufficient number to startle one's imagination. The Parisian printer
Robert Estienne, for example, recorded in the middle of the sixteenth
century that his case of Double Pica Greek, the largest of the three

Greek type sizes in his shop, comprised four hundred and thirty different kinds of characters, or 'sorts'. (A 'sort' is the technical name for all the pieces of type which contain any one specific character—a letter, a combination of letters, a symbol—and which would therefore all be 'sorted' into one specific compartment in the type case when the type was removed from the press and put away.) Had we been able to look into Estienne's type case we would have found not twenty-four but thirty-eight different varieties, or 'sorts', of lowercase single letters. We would find that three hundred sixty-seven of the characters in this fount were letter-combinations, or ligatures, of one kind or another, combinations with *sigma* alone accounting for eighty-two of them.[1] If we go back to the earliest days of printing we find the matter no simpler. Robert Proctor describes a fount designed in Venice in 1486 in which the appearance of script was consciously imitated "by an elaborate system of ligatures, two, three, and four letters being commonly cast in one piece, and in an immense variety of forms and combinations, so that the number of sorts ... exceeds twelve hundred, and even this is probably far from representing the fount in its completed state as projected."[2]

The term 'ligature' is a broad label, which we might profitably divide into subheadings. In its general sense a ligature is a series of two or more letters so designed that they are connected in varying degrees with one another. Being so connected, they must be cast on a single piece of type, which in turn necessitates a new compartment in the type case into which they can be sorted and stored. Each new ligature thus becomes an additional 'sort.' Ligatures are of two basic kinds, ties and contractions. In present-day printing one encounters almost exclusively the former: ligatures like *ff*, for example, where the letters are so designed that they touch one another, or *ct*, where they do not touch but are connected by a loop, are ties; they constitute individual 'sorts' for the modern printer, additional to the single letters f, l, c and t. In all these cases the characters are joined without distortion. A large percentage of the many ligatures in early Greek founts were simply tied sorts, like *γε*, *με*, *χλ*, *κω*, or *σω*, in which the component letters are readily distinguishable. For the present-day reader it is the contractions, much more than the ties, which cause

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[1] Victor Scholderer, *Greek Printing Types, 1465–1927* (London 1927) 11; Robert Proctor, *The Printing of Greek in the Fifteenth Century* (Oxford 1900) 145.

[2] Proctor, *Printing of Greek*, pp.12–3.

difficulty in reading. A contraction is a ligature in which two or more letters have been distorted, often drastically, to produce a composite symbol. Such figures as ⟨⟩ and ⟨⟩ represent extreme examples; each of these ligatures is a single sort, and they stand, according to their printer (Robert Estienne in this case) for ὑπερσυντελικὸς and παρακείμενος.[3] In the majority of cases, our hardships in reading early printed Greek fall somewhere between the minimal difficulty of the ties and the utter confusion of the most excessive contractions.

We can better understand the profusion of ligatures in the Renaissance by seeing the printed Greek of our own day as merely a typographical convention which has commanded general assent. We must accept that the type face which we call "Greek" would not necessarily be recognized as his own by an inhabitant of Periclean Athens. A Greek type face is, after all, designed primarily to be easily readable by persons, contemporaries of the printer and type designer, who read Greek; assuming that they publish the same works, a publisher whose Greek books are difficult to read will not sell so many books as one whose type is familiar and easily legible. All other considerations, even aesthetic ones, must eventually yield to such a basic economic fact.

This principle was successfully understood by the Venetian printer Aldus Manutius, as he showed in 1490 when he decided to design and cast his own Greek type. Some of his contemporaries, truly pioneers in the field of type designing, had produced Greek founts based on the uncial letter form found in vellum manuscripts of the period, or on the somewhat freer letter style found in liturgical tracts and prayer books. Aldus chose to ignore all styles of the older, more formal book hand: his bid for commercial success led him to adopt as the model for his type the ordinary business and correspondence Greek handwriting of his day. The scattered and undisciplined appearance of his finished type face, with its extravagantly contorted abbreviations and contractions, is simply the result of his determination to imitate the most common freehand features of everyday script. His judgement here, as elsewhere in his business dealings, was sound; but Robert Proctor, a partisan of the older letter forms, deplores Aldus' success:

With a lesser man the choice would have signified less; with

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[3] *Alphabetum Graecum.* [Lutetiae,] Oliua Roberti Stephani, MDLIIII.

> Aldus it was disastrous. The enormous vogue of his publica-
> tions and the great number of them exercised an over-
> whelming influence, affected the whole future history of
> Greek printing, and inflicted on its aesthetic side a blow
> from which it has never recovered.[4]

Had such a disparagement been uttered to his face Aldus might, like
the commercial successes of our own day, have cried all the way to
the bank. His type face carried the field precisely because of its
easy readability; and instructed by his success, other early printers
of Greek gradually abandoned their experiments with type faces of
a more formal nature.

Aldus' triumph had by the beginning of the sixteenth century laid
the foundation for a cursive Greek type; he made the popular style
resemble, as it does even today, an italic rather than a roman face.
To our modern eyes the older book-hand style may seem clearer than
Aldus' cursive type, and we may privately wonder at the exotic
literary skills of a public which preferred the Aldine fount to its
competitors on the grounds of ease in reading; but such was indeed
the case, and Aldus became further emboldened with each new
success. Individual letters were made for him in increasing varieties
of forms, and contractions were devised for newer and larger com-
binations of letters. Aldus' 1495 *Grammar* of Theodoros of Gaza is
an example of the extreme to which this practice was carried: words
like ἐνεστώς, παρατατικός and ἀόριστος were each represented by a
single, carefully devised, intricately compacted scribal abbreviation,
like the ones shown above for ὑπερσυντελικὸς and παρακείμενος.

Greek printed texts, as Victor Scholderer observes, were "in a fair
way of breaking up into a collection of ideograms."[5] Though the
making of ingenious ligatures might indeed have been exhilarating
to the type designer, it no doubt wore thin the patience of the type-
setter, who was obliged to use, and use rapidly and correctly, the
multitudes of new sorts with which his type cases were being increased.
A point of diminishing returns seems to have been reached at the
end of the century, and the cutting of ligatures stabilized at a point
somewhat below compositorial chaos.

Aldus' great commercial success in the printing of Greek encour-

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[4] Proctor, *Printing of Greek*, p.15.
[5] Scholderer p.7.

aged other printers to try their hand. Thierry Martens somehow acquired Greek type at Louvain as early as 1501, with which he printed occasional words; Gilles de Gourmont had cut his own punches and struck his own matrices in Paris by 1507, and the first wholly Greek work published in France was done at his press that year—it was a reprint of Aldus' *Theocritus*, further testimony to the Venetian printer's influence. Johannes Siberch was the first printer in England to use movable Greek type, in a number of books which he printed at Cambridge in 1521; four years earlier, however, the urge to print in Greek had impelled Wynkyn de Worde, who had no type, to cut Greek characters in wood.[6] Within a few years efforts were being made to cast Greek type in England. Richard Pynson possessed a locally-made fount of Greek in 1524, which he used in printing Linacre's *De emendata structura*. The difficulties under which he labored, however, are suggested in his address to the reader:

> Of your goodness, reader, excuse it if any of the letters in the Greek citations lack either accents, breathings, or proper marks. The printer was not sufficiently equipped with them, since Greek types have only recently been cast by him, and he had not prepared the quantity necessary for the completion of this work.[7]

We may recognize here a problem which was not confined to Pynson's founder; accents and breathings were from the first a source of difficulty, in the printing house as well as the foundry. One early solution was for the printer simply to ignore them, though this seems not to have been a widespread practice. The early type founders generally chose to include accents and breathings, but had to decide whether to cast them separate from the letters (as Pynson's founder chose to do) or to cast them on the same piece of type with the letter they covered. If accents and breathings were cast separately, smaller and more fragile than the letters, they increased the difficulty

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[6] Siberch's publications that year include an Erasmus (*STC* 10496), a Galen (*STC* 11536) and a Lucan (*STC* 16896), all of which contain words or phrases in Greek. An example of de Worde's "wooden" Greek may be found in his 1517 edition of Whittington's *Syntaxis* (*STC* 25543), sig. D⁵v. He later acquired a standard fount. Samples of the work of Siberch and others may be seen in Frank Isaac's two-volume work, *English & Scottish Printing Types* (Oxford 1930 and 1932), which surveys printers before 1558.

[7] *Lectori. S. Pro tuo candore optime lector æquo animo feras, si quæ litteræ in exemplis Hellenismi vel tonis, vel spiritibus, vel affectionibus careant. Iis enim non satis erat instructus typographus videlicet recens ab eo fusis characteribus græcis, nec parata ea copia, qua ad hoc agendum opus est.*

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of composing, increased the chance of error, and made more difficult the problem of getting an even impression on the paper. If they were cast together with the letter, then a great many more punches had to be engraved and matrices made, a time-consuming and expensive matter. Punches for vowels, and for diphthongs cast as ligatures, would have increased twelvefold. Consider the following permutations with *omega* alone: ω ὠ ὡ ὤ ὦ ὢ ὥ ὣ ὣ ὥ ὧ ὣ. A solution devised by Nicolas Jenson, a Venetian contemporary of Aldus, was to cast only the letters which contained both accents and breathings, *i.e.*, the last six of the twelve examples just listed. Then the compositor could cut away with a knife whatever portion he did not want. A breathing mark could be cut away so that only a letter with an accent remained; or an accent could be removed to leave only a letter with a breathing; or both marks could be cut off to leave a plain letter. Robert Proctor, who explains this process in greater detail,[8] points out that such typesetting practice is generally detectable in two ways. First, the type resulting from such surgery is misproportioned; the remaining accents or breathings are too far to one side or the other, or the circumflex is too high. Second, the cutting-out was rarely done well; the mark to be removed was often imperfectly cut away, or the mark which was to remain may be accidentally cut into. Sometimes a hasty typesetter would simply ignore the need for cutting-out; Proctor offers ἡνίοχὅς as an extreme example of what might, through compositorial carelessness, be found in an early printed text from a printing house using Jensonian type.

The separate casting of accents and breathings gradually took precedence on the continent, and their effective use was demonstrated by Reyner Wolfe, a London printer who held a royal patent as printer in Greek, Latin and Hebrew, and who was the first English printer to possess Greek types in any quantity. Wolfe was a native of Gelderland and apparently made regular visits to the Frankfort Fair, where matrices as well as books could be purchased. With type acquired from a foundry in Basle he printed the first entire Greek text in England, two homilies of John Chrysostom edited by John Cheke, in 1543.

At about this time, a half-century or so after the economic success

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[8] Proctor, *Printing of Greek*, pp.18–9.

of the Aldine press had determined the general form of printed Greek, the type faces were given a virtually definitive shape by Francis I of France. In 1539 Francis had commissioned a new fount of type to be used by his Printer in Greek, Conrad Neobar, in printing editions from the vast royal collection of Greek manuscripts. With Neobar's death in 1540 Robert Estienne inherited the printing commission and the new types, thereby becoming presumably the new King's Printer in Greek, though no official patent to that effect exists. The type was designed by Claude Garamond, by all accounts the finest typographical artist of the age, who engraved the punches and made the matrices between 1541 and 1544. The capitals were derived from earlier models based on Lascaris, but the lowercase letters and abbreviations were modelled on the elegant calligraphy of Angelos Vergetios, of Candia in Crete, the cataloguer and copyist of the king's Greek manuscripts in the library at Fontainebleau, to whom Francis referred as his "escripvain expert in lettres grecques."[9] The French Royal Greek types, or "*characteres regii*" as they came to be known, were used in some of Estienne's finest works in the years after 1544. They were received with universal applause and immediately became the preferred model for all European founders. Type cast from the Royal Greek matrices, or from matrices made in frank imitation of them, became prime desiderata in most large printing houses in the latter half of the sixteenth century. The success of these types paralleled, even surpassed, the earlier success of the Aldine founts in setting a European pattern. So popular were they that "the development of Greek printing was virtually arrested for quite two hundred years," with the result that "a Greek book printed in 1750 presents to all intents and purposes the same appearance as a Greek book printed in 1550."[10] Fournier, the eighteenth century type founder, believed that the French Royal Greek founts were the only ones to possess practically all the known ligatures.[11]

This brief review of the early history of the printing of Greek must serve as a necessary prologue to my main concern, the presentation

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[9] See Robert Proctor, *Bibliographical Essays* (London 1905) 95; Scholderer p.10; and Elizabeth Armstrong, *Robert Estienne, Royal Printer* (Cambridge 1954) 127–8. Miss Armstrong offers a sample of Vergetios' hand in a plate facing p.128.

[10] Scholderer p.11. For a survey of these types, see Aug. Bernard, *Les Estienne, et les Types Grecs de François Ier* (Paris 1856).

[11] Daniel B. Updike, *Printing Types, their History, Forms, and Use*[2] I (Cambridge [Mass.] 1951) 236.

of a fairly comprehensive table of these early ligatures which were so popular during the Renaissance, but which now merely confuse and sometimes alienate the reader. Lacking such a table, the student whose needs require him to translate, or to transcribe, a bit of early printed Greek will generally be at a loss where to turn. His colleagues in his own department will merely commiserate. His colleagues in Classics will probably direct him to the standard handbooks of Greek palaeography, but on examination they will be found to be of limited usefulness.[12] Bibliographers will direct him to books on early printing or type founding, which, while generally including examples of ligatures in their illustrative specimens, rarely include discussions of them, their main concerns lying elsewhere.

As it happens, the best source of information about sixteenth century Greek ligatures is to be found at the source of the confusion, in a certain class of sixteenth century books called alphabet books which printers who printed Greek issued at regular intervals. These books constituted a short introduction to Greek for students who needed to learn the elements of the language. The books were invariably of the same format and were often copied from one another. With few exceptions, they are uniformly titled *Alphabetum Graecum;* they are unpretentious, written in easy Latin, and content themselves with naming the letters of the Greek alphabet, explaining vowel quantities and classifying consonants, explaining proper and improper diphthongs, discussing accents and breathings, declining the articles as sample paradigms, offering a table of Greek numerals, and translating the ligatures into single-letter equivalents. They generally concluded with a few short samples of Greek for practice, most commonly the *Paternoster* or the *Credo.*

These books are not to be confused with the more lengthy and detailed Greek grammars or syntax books of the day, which had a larger and more scholarly audience. The features of the Greek alphabet books, including ligature tables, were usually incorporated into the first chapter or two of a grammar. T. W. Baldwin notes that the *Institutiones Linguæ Græcæ* of Clenardus was "the most frequently

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[12] The most useful of these will probably be B. A. van Groningen's *Short Manual of Greek Palaeography*[3] (Leiden 1963), for its section on abbreviations and symbols, pp.43-7, and its selective tables of MS contractions on pp.44, 45 and 46. T. W. Allen's *Notes on Abbreviations in Greek Manuscripts* (Oxford 1889) is also of interest. Edward Maunde Thompson's *Handbook of Greek and Latin Palaeography* (London 1893), a standard item in most Classics seminars, is of little use.

used in England of the Greek grammars,"[13] and records that eleven-year-old King James VI of Scotland had a Clenardus in 1576, and that he had a copy of Beza's Greek alphabet book as well, both probably sent from France. This Beza may well have been the one printed by Estienne from which some examples have already been drawn. Clenardus was indeed popular as a text: the *Short Title Catalogue* lists editions in 1587, 1590, 1594 and 1612, but the British Museum also has copies printed in London in 1582 and 1600 and eighteen other editions printed between 1543 and 1590 at such places as Paris, Antwerp, Venice, Cologne, Frankfort and Lyon.

Alternatively, the *STC* does not list, and the British Museum does not have, a single sixteenth century *Alphabetum Graecum* printed in London. John Brinsley, in his *Ludus Literarius*, a compendium of schoolroom practices first published in 1612, said nothing about Greek alphabet books, but urged that a child should begin his Greek studies with the "*Strasburge* Greeke Grammar."[14] The Greek alphabet books may have been largely a continental habit. They were much more a product of the printing house than the scholar's study; their pedagogical attractiveness is minimal by our standards, and most of us would shudder at having to learn Greek from them. But their value to us lies precisely in this home-made quality. In the days when these books were most popular, no "standardized" table of ligatures had yet been established, so the ligature tables in the alphabet books were often *ad hoc* productions. They represent a sort of compositorial free-hand exercise, each printer simply setting forth systematically the contents of his type case to establish a ligature list as best he could. For the more fully-equipped printing houses, the ligature lists would be copious, and attractive testimony of the quality of the house's other publications. Aldus had stressed the attractiveness of his ligatures by calling his table "*Abbreviationes Perpulchrae scitu*"; Robert Estienne, who used his alphabet books after 1554 to publicize the French Royal Greek types, headed his list "Short-forms and ligatures devised for elegance as well as brevity" (*Compendia literarum et nexus partim breuitatis, partim elegantiae causa reperti*). The ligature tables can therefore offer a clue to the size and distribution of types in the

[13] T. W. Baldwin, *William Shakspere's Small Latine & Lesse Greeke* I (Urbana 1944) 535, 539, 540.

[14] John Brinsley, *Ludus Literarius, or the Grammar Schoole*, ed. E. T. Campagnac (Liverpool 1917) 226.

cases of various printing houses. Estienne's alphabet books list three times as many ligatures as, for instance, a London edition of Clenardus' grammar. By collating enough of the alphabet books, we may arrive at a usable table of our own which will prepare us for most eventualities.

In the table which accompanies this article I have attempted to reproduce all those ligatures which might normally be expected to cause some difficulty for the modern reader. I have omitted the simple tied sorts, where two or more letters are connected without violence to their familiar shapes, for these are of interest only to the student of typography; and I have added variant forms of single letters when they are reasonably different from accepted modern forms. Sometimes a piece of type will contain a ligature formed by tying a single letter to a contraction, producing thereby a half-readable and half-confusing figure. At first I had thought to eliminate the clear first letter in such cases, and to list only the contraction, thereby avoiding a certain amount of duplication; but often the contraction requires the presence of a preceding letter for its own form, so I have decided to include them in their full form when I have so found them. The ligatures in the table were made by photographing the originals, which exist in a variety of type sizes, and enlarging the photographs to a more or less uniform size, then collating and transferring them to the table, and reducing the whole for printing. Slight variations in the sizes of the ligatures are the result of a failure to be mathematically exact in the original enlargements. Slight variations in thickness of line are the result of making different type sizes appear uniform.

The following alphabet books were collated to produce the table.

De literis graecis. Venice, Aldus Manutius Romanus, 1501. B.M. G.7581

Alphabetum Hebraicum et Graecum. Paris, Gilles de Gourmont, ?1508. B.M. 621.g.40(1)

De literis graecis. Tübingen, Thomas Anshelmus, 1512. B.M. 12923.b.2

Alphabetum Hebraicum et Graecum. Paris, Gilles de Gourmont, ?1516. B.M. 624.c.7(1)

Ex Aldo Manutio de literis Graecis. Cologne, Eucharius Cervicornus, 1517. B.M. T.2236(2)

Theodori Gazae de linguae graecae. Louvain, Theodoricus Martinus, 1518. B.M. 624.c.7(5)

Alphabetum Graecum. Paris, Christian Wechel, 1530. B.M. 1476.a.32(2)

Alphabetum graecum. Paris, Robertus Stephanus typographus Regius, 1539. B.M. 58.a.12

Alphabetum Graecum. Lyon, Mathias Bonhomme, 1542. B.M. 12923.bbb.39(1)

Alphabetum graecum. Paris, Robertus Stephanus typographus Regius, 1548. B.M. 236.g.38(1)

Alphabetum Graecum. Paris, Robertus Stephanus typographus Regius, 1550. B.M. 617.c.29

Alphabetum Graecum. Cologne, haeredes Arnoldi Birckmanni, 1553. B.M. 843.c.21(1)

Alphabetum Graecum. Paris, Robertus Stephanus, 1554. B.M. 622.c.38

Elementa Graecae Linguae in usum puerorum collecta. Nuremberg, Gabriel Hayn, 1556. B.M. 12924.cc.35

Alphabetum graecum. Paris, Guillaume Morel, 1560. B.M. 236.g.38(3)

Alphabetum Graecum. Paris, Thomas Richardus, 1560. B.M. 624.c.21(1)

Alphabetum Graecum. Antwerp, Christopher Plantin, 1566. B.M. 12923.aa.4(1)

Alphabetum graecum. Antwerp, Johannes Loeus, 1567. B.M. 4516.a.32(3)

Alphabetum Graecum. Paris, Joannes Benenatus, 1569. B.M. 236.g.38(2)

Alphabetum Graecum. Paris, Robertus Stephanus, 1580. B.M. 622.d.35

Alphabetum Graecum & Hebraicum. Paris, Paulus Stephanus, 1600. B.M. 12904.b.11

In the preparation of the tables which follow I was assisted by a grant from the Faculty Research Fund of the Horace H. Rackham School of Graduate Studies, the University of Michigan.

THE UNIVERSITY OF MICHIGAN
September, 1966

Ligature	Transcription
(ligature)	ά
(ligature)	αι
(ligature)	αις as in *(ligature)* δίκαις
(ligature)	αῖς as in *(ligature)* ταῖς
(ligature)	αἰτιατική
(ligature)	αλ
(ligature)	αλλ
(ligature)	αν αν
(ligature)	αν as in *(ligature)* ἡμέραν
(ligature)	ἀντί
(ligature)	ἀντὶ τοῦ
(ligature)	αξ
(ligature)	αο
(ligature)	ἀόριστος
(ligature)	ἀορίστου
(ligature)	απ
(ligature)	ἀπο
(ligature)	ἀπὸ
(ligatures)	αρ
(ligatures)	ἀρ
(ligature)	ας as in *(ligature)* ἡμέρας
(ligature)	ᾶς
(ligature)	αὐ
(ligature)	αὐτὸ
(ligatures)	αὐτοῦ
(ligature)	αὐτῷ
(ligature)	γα
(ligatures)	γαι
(ligature)	γαν
(ligatures)	γάρ
(ligature)	γας
(ligatures)	γγ
(ligature)	γε
(ligature)	γει
(ligature)	γελ
(ligature)	γελλ
(ligatures)	γεν
(ligature)	γενική
(ligature)	γενικῇ
(ligature)	γενικὴν
(ligature)	γενικῆς
(ligatures)	γερ
(ligature)	γευ
(ligature)	γην
(ligature)	γι
(ligature)	γίνεται
(ligature)	γκ
(ligature)	γλ
(ligature)	γμ

𝓎	γν	
𝓎 𝓎	γο	
𝓎 𝓎 𝓎	γρ	
	γράμμα	
	γρι	
	γρο	
	γυ	
	γυι	
	γυν	
	γω	γω
	δα	
	δαι	
	δαν	
	δαυ	
	δὲ	
	δει	
	δεξ	
	δευ	
	δευρ	
	δη	
	δην	
	δι	
	δια	
	διὰ	
	διο	

	δίφθογγον
	δίφθογγος
	διφθόγγου
	διφθόγγω
	δο
	δοτικὴ
	δρ
<	δραχμή
	δρι
	δρο
	δρω
	δυ
	δυι
	δυν
	δυς
	ἐγώ
	ει
	εῖ
"	ειν as in λέγ" λέγειν
	εῖν
	εῖν
	εῖναι
	εἰς
	εῖς as in γον῀ γονεῖς
	ἐκ

ελ		θαυ
ελλ		θε
εν		θει
εν as in μεν		θη
ἐν		θην
ἐξ		θι
ἐξάγιον		θν
ἐπειδή		θο
επευ		θρ
ἐπι		θρο
ἐπὶ		θρω
ερ		θυ
ες		θω
ες as in ὄντες		ιν as in φύσιν
ἐστι		ις as in φύσις
ἐστὶ		κα
ετο		καθω
ευ		και
εὐθεῖα		καν
ευς		κας
ἥμισυ		κατὰ
ην		κεράτιον
ῆς as in τῆς		κεφάλαιον
θα		κλητικὴ
θαι		

κϑ κο

Κ κοτύλη

κφ κρ κρ

κϱα κρα

κυ κυ

Κ κύαθος

κυ κυι

κῶ κῶν

λα λα

λ λίτρα

λλ λλ

λο λο

λω λω

μα μα

μαι μαι

μαν μαν

μαρ μαρ

μ μ μάτων as in

πϱαγμ πραγμάτων

μαυ μαυ

μϑ μϑ μεθ

μελ μελ

μελλ μελλ

μ μέλλων

μ μ μ μὲν

μ μένος

μ μέσον

μ μέσος

μ μέσου

μ μ μετὰ

μ μην

μ μνᾶ

μϑ μο

μυ μυ

μυ μυι

μυ μυν

μ μ μω μω

μ μῶν

μ ν as in μεμ μεν

ξ ξεστὴ

οι οι

οι οι οἷον

οις as in τ τοις

οἷς as in θνητ θνητοῖς

ὁλκὴ

ον

ον as in λόγ λόγον

ὄν

ὂν as in τ τὸν

ορ (see ρος)

ος

ος as in

ἄνθρωπος

ὸς as in θεός

ὅτι

ου

οὐγγία

οὐδε

οὐκ

οὐκα

οὖν

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οὺς as in τοὺς

οὗτος

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𝒢𝜔	σαῦτα		σπη
σ𝒷	σβ		σπι
σℰ	σε		σπλ
σ	σει	σει		σπο
	σθ		σπυ
	σθα		σπω
	σθαι		σσ
	σθε		σσα
	σθη		σσαι
	σθην		σσαν
	σθι		σσας
	σθλ		σσε
	σθο		σση
	σθω		σσι
σκη	σκη		σσο
σκϑ	σκο		σσω
σμμ	σμι		στ
𝒢 𝒞ο	σο		στα
σ𝒴	σου		σται
	σπ		στας
	σπα		σταυ
	σπαι		στε
	σπαν		στει
	σπε		στη

ϛ	στι		ϛαυ		ταυ
ϛο	στο		ϛαῦϑ		ταῦτα
ϛρ	στρ		τ̈		τε
ϛυ	στυ		τϸ		τερ
ϛω	στω		τ̈ τʍ		τὴν
συ	συ		τ̂		τῆς
σʍ ϲʍ	συν		τι τ̈		τι
σφ αϟ	σφ		ϑ᷎ τ ρ		το
ϟα	σχα		τ̈		τὸν
ϟε	σχε		τ̃ τϫ τϫ̃		τοῦ
ϟͷ	σχει		οͳ̃		τοὺς
ϟη	σχη		οͳ̃ͻ		τοῦτο
ϟʍ	σχην		ϟ τϟ ϝ ϝ φ		τρ
ϟͥ	σχι		τͥ		τρι
ϟͥ	σχυ		ϛ ϛ		τρο
ϟο	σχο		τ̅		ττ
ϟϟ	σχρ		τʍ		τυν
ϟͥ	σχυ		τω̈		τω
ϟʍ	σχυν		τω̈ τͥ τ̈ϟ		τῷ
ϲϟ	σω		τͷ̃ τ̈		των
ϛα τ̇	τα		ͫ		ύ
ταͥ ʃ ϛαͥ τͥ	ται		ͫ		ῦ
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ϛας	τας		ͳ̃	ῦν as in οͳ̃	οῦν

ὑπ			χθη
ὑπερ			χθην
ὑπερσυντελικός			χθι
ὑπο			χθο
ὑπὸ			χθυ
υς			χθυν
υσι			χθυς
φι			χθω
φρ			χο
χαι			χόα
χαν			χοῖνιξ
χαρ			χρ
χαρι			χρι
χας			χυν
χαυ			ψαι
χει			ψαν
χην			ψει
χθ			ῶ
χθα			~ ων as in λόγ̃ λόγων
χθαι			῀ ῶν as in τ̃ τῶν
χθας			ς ως as in ὅπς ὅπως
χθε			ῶς