

DÁNIEL BAJNOK–DÓRA PATARICZA

COMMENTS UPON TWO FRAGMENTS OF A CRYPTOGRAPHIC PAPYRUS

Summary: This short notification tries to examine the two remained fragments of a Greek magical cryptographic papyrus (POsl III, 75, and PMich inv. 534) from new aspects. Regarding the characters of the cryptographic alphabet used in the text, it seems plausible that Greek music notation had a significant effect on the development of the cipher, as far as the transformation methods are concerned. The next section draws attention not only to the uncertain parts of the present transcription but also to the problematic points of Karl Preisendanz's interpretation of the whole magic spell. It also implies a new interpretation, which does not assume that the author "confused" the names of Typhon and Osiris but suggests that the spell is addressed to much more vicious powers than Isis.

Key words: papyrus, magical, cryptographic, Greek music notation, POsl III, 75, PMich inv. 534.

1. INTRODUCTION¹

In 1920 two papyrus fragments² were purchased in Egypt quite apart from each other. One of them got to the University of Michigan, and the other one to that of Oslo. For several years both fragments lay unread since they were regarded to be illegible because of the unfamiliar shape of their letters. However, Arthur S. Hunt realised that the signs are characters of a cryptographic alphabet and after deciphering the code he read and published the Michigan fragment in 1929.³ S. Eitrem and L. Amundsen did the same in Oslo with the help of Hunt's key to the cryptograph⁴ in 1934.⁵

¹ At first we must render best thanks to our tutor and instructor, Prof. Dr. György Németh, whose knowledge and overwhelming enthusiasm have supported and facilitated our work. It is a pleasant duty to express our gratitude to him. We also offer our sincere thanks to the Papyrus Collection of the Oslo University (especially to Gunn Haaland, who was willing not only to send us the articles in *Mél. Masp.* and *Pap. Osl.* but also to make an extra photo image of the Oslo fragment for us).

² The fragments are probably parts of two sequent columns. Col. I: PGM LXXII (POsl. III, 75), Col. II: PGM LVII (PMich inv. 534). The two columns were discussed together for the first and last time: *Abrasax* pp. 83–96.

³ HUNT, A. S.: A Greek Cryptogram. *Proc. of the Brit. Ac.* 15 (1929) pp. 127–134.

⁴ To study the letters of the cryptographic alphabet, see Appendix 1.

⁵ EITREM, S.: Fragment of a Greek Cryptogram in the Oslo Collection. *Mél. Masp.* 2 (1934) pp. 113–117. and *Pap. Osl.* 3 (1936) pp. 38–40.

They noticed that their Oslo fragment is the preceding part to the Michigan fragment, which are remnants of a Greek magical papyrus from Hadrian's age.

Our present writing should be a brief notification concerning certain unexplained aspects of the papyrus that is strange in two respects. On the one hand it is particular since the relatively simple magic spell (love charm) is seemingly enforced with unusually terrible threats towards a certain superhuman power, and (perhaps because of the former peculiarity) on the other hand, the fragments are encrypted by a unique cryptographic process. Several researchers have examined them so far, still, the cause why the papyrus was ciphered, the method of the cipher and some problems of the interpretation have remained largely disregarded.

This essay wants to discover the aforementioned unexplored territories. At first we try to present the Greek notation as an analogous system for the cryptographic alphabet of the papyrus. There seems to be a conspicuous similarity in the methods of modifying the position of the alphabetic letters into music notes or cryptographic characters. The following part is rather on the text itself; we attempt to reinterpret the papyrus and call attention to some problematic points.

2. ANALOGY FOR THE CIPHER: THE GREEK NOTATION

The system of symbols used by the cryptographic papyrus is entirely unprecedented in the antiquity. The decoding of its signs gave plenty to think about even for the scientists of the 20th century. Naturally, after cracking and explaining the system the idea itself seems to be very simple: rotating certain signs 90° or 180°, bisecting others or simply transforming them by lengthening a line of the symbol.⁶ If we consider, however, that this trick is completely unique in the ancient world, an important question arises: how did the inventor of the code have the inspiration to cipher texts by the altered forms of signs?

We cannot give a determined answer to this question but we assume that the source that gave the idea could be possibly found within the Greek culture. Greek letters were applied for three things in ancient times. The most colloquial application of the letters was the alphabetical writing, but in lack of an independent number writing system the characters of the alphabet were also used for noting numbers. The third use (which supplies the least written record) was the keying of musical sounds: the notation.⁷ In our opinion this latter could give the idea to the developer of the cipher to invent a system based on modifying the forms of characters.

It may be important to note here that the Greeks used two systems of notation: one for vocal and another one for instrumental music. According to researchers this latter type was invented several centuries before the former, which emerged on the

⁶ The cryptographic 'α' is probably produced by rotating 45° (cf. instrumental notes in Appendix 2, Nos. 47–48) and lengthening a line of the letter used in the so-called uncial system of the Coptic writing; cf. JENSEN, H.: *Die Schrift in Vergangenheit und Gegenwart*. Berlin 1969³, pp. 437–438, 477–478.

⁷ 'Buchstaben-Tonschrift' in: *Brockhaus Riemann Musiklexikon*. (ed. DAHLHAUS, C. & EGGE-BRECHT, H. H.) Erster Band (A-D), Opladen 1998².

basis of the instrumental notation.⁸ The differences between the two systems can be observed in Appendix 2.⁹

There is fundamental difficulty when we try to explain the sounds of Greek songs in a present-day notation system, because ancient Greek musicians (unlike modern European ones¹⁰) often composed music based on chromatic¹¹ and enharmonic¹² scales. There occur even smaller intervals than semitones in their music.¹³ Since they did not use sharps and flats for modulating whole tones, each tone has its own symbol in the notation system. After the model of Alypius there are altogether 70 characters (and pitch-levels) both in the vocal notation and in the instrumental notation. More than three complete octaves (from D[#] to g'', quarter tones included) are covered by these signs. Since all letters of the whole Greek alphabet count less than 30 characters, the twice 70 music-notes are signalled by the modified forms of the letters and thus another pitch-level is described by this modified shape.

Considering Appendix 2 we learn that the 70 pitch-levels are grouped into 4 rows and each row consists of 4 lines. In the first line of each row we can see the numbers of identification, then the next line is occupied by the symbols of the vocal notation. The third line is evidently that of instrumental notation, and the fourth line of each row gives the suspected absolute pitch-level of the signs.

The difference between vocal and instrumental notations is conspicuous, though it is evident that both systems operate with the letters of the Greek alphabet. Still, the symbols of the instrumental notation seem to have preserved the characters of an older alphabet, hence we can notice digamma (Ϝ) that lost touch with the alphabet of the classical time. Some of the instrumental signs can be grouped by triads. For instance, the position of the instrumental symbol No. 16 is occupied by a normal 'E', then No. 17 is the same symbol *rotated* 90°, No. 18 rotated 180°. In No. 28 we encounter the aforementioned digamma (Ϝ), which is followed by a 'Ϝ' rotated 90° in No. 29, but in No. 30 we see a *vertically mirrored* 'Ϝ' instead of the same rotated 180°. Still among the instrumental notes it is worth to remark Nos. 50–51 and Nos. 53–54. According to Barbour's explanation,¹⁴ in No. 50 we can see the right part of a *vertically halved* alpha (Α), then in No. 51 the left part of the same Α. Nos. 53–54 repeat the same symbols upside down.

We have listed the three standard methods of modifying symbols in the notation system, namely rotation (90° or 180°), vertical mirroring and vertical bisection. These processes are chiefly applied in the instrumental notation but in certain instances vocal notation operates with them as well.¹⁵ The author of the papyrus surely had the possibility to know not only the systems of the notation but also the methods

⁸ BARBOUR, J. M.: The Principles of Greek Notation. *JAMS* 13 (1960) p. 4.

⁹ Appendix 2 was created with the help of Barbour's Ex. 1 in: BARBOUR, *ibid.* p. 3.

¹⁰ Nowadays most melodies are based on the so-called "diatonic scale" (C – D – E – F – G – A – B – C'), i.e., on the scale of whole tones.

¹¹ Semitones follow one another in the chromatic scale. (C – C[#] – D – D[#] – E – F – F[#], etc.)

¹² Enharmonia in the ancient Greek music meant that quartertones were included in the scale.

¹³ RIEMANN, H.: *Studien zur Geschichte der Notenschrift*. Leipzig 1878, pp. 13–14.

¹⁴ BARBOUR, *ibid.* p. 5.

¹⁵ See vocal notes Nos. 1, 2, 4–6, 12–16, 21, 22, 24, 49–54, 70.

of modifying the characters. It is plausible that the methods of the notation could give the idea of inventing the cipher in question. This probability is supported by the fact that several characters of the papyrus's cipher are present in the notation in the very same form. Appendix 3 highlights every character of the cryptographic alphabet that can be associated with the notation symbols.

It is not strikingly obvious that β of the code alphabet (\sqcup) is borrowed from a musical note, though it is important to mention that \sqcup was the corresponding character for β in an early alphabet of Argos,¹⁶ and this symbol could have been used by the instrumental notation.¹⁷ The J is the 180° rotated form of the original Γ , if we do not count the precise angle of the lateral bending. The ciphered Δ and Φ get their form (\angle and \angle) not via rotation but in the way of vertical bisection. The ciphered ξ (J) seems to have been vertically mirrored just like the aforementioned digamma in the instrumental notation. The form of the code Σ (J) emerged from the lunar shape (J)¹⁸ via the same mirroring method. Thus to our opinion the following characters are similarly in connection with the symbols or the method of notation: B, Γ , Δ , E, I, K, Λ , M, Ξ , Σ , T, Y, and Φ .

In spite of all these arguments we cannot explain every letter as a product of one of the three mentioned modifying methods applied in the notation, since we have 8 letters left (H, Θ , N, Π , P, X, Ψ , Ω)¹⁹ whose shapes either take after the original or not, but they are definitely not created by rotation, mirroring or bisection.²⁰ Still, we have seen 13 characters undergoing one of the three processes, thus we can reasonably assume that Greek notation played an important role by the invention of this cipher.

3. THE PROBLEMS OF THE INTERPRETATION

Ciphering a magic spell is not an ordinary treatment among ancient Greek papyri. The author of the papyrus must have had a strong reason to do so. It is likely that he/she wanted the writing by any means to be illegible to uninitiated people. Menacing to kill a god or goddess was highly dangerous in a world of superstitious beliefs. It is very likely that the author of the cryptographic papyrus turned to encryption in favour of his/her own safety. Such terrible threats must have gone unnoticed by unwarranted persons.

Though the cause of ciphering is clear, some points, especially in the Michigan fragment, remain contradictory. These problems are mainly of palaeographic and of

¹⁶ JEFFERY, L. H.: *The Local Scripts of Archaic Greece. A Study of the Origin of the Greek Alphabet and its Development from the Eighth to the Fifth Centuries B.C.* Oxford 1990², p. 151.

¹⁷ BARBOUR, *ibid.* p. 7.

¹⁸ JENSEN, *ibid.* p. 456.

¹⁹ It would be interesting to compare these letters to the signs of the eastern (mostly northern Semitic) alphabets, cf., e.g., the symbols for the sound 'n' in JENSEN, *ibid.* pp. 265–271. (Abb. 237), p. 278 (Abb. 252), p. 283 (Abb. 261); or the symbols used for the sound 'r' in Abb. 237. It seems to be plausible that the writer deliberately mixed letters of such eastern writings among the aforementioned majority of the 13 Greek letters.

²⁰ We consider now neither A and O, since their shapes were kept actually intact, nor Z because of its problematic being.

This figure (Appendix 4) is rather a mere sketch of the cryptographic papyrus. Naturally we do not know how many columns it consisted of but it is inevitable that the fragments are from the last two columns. The proximity of the two columns is closer than the broad margin left on the right side of the Michigan fragment, thus this

²⁴ e.g., PMich inv. 534, 9: the last letter of the line is rather + (ψ) and definitely not ζ (v).

must be the end of the scroll. If we accept Preisendanz's completion, the papyrus necessarily used to be similar to Appendix 4.

It is not likely, however, that there can be such a tremendous difference between the two columns. Col. II should not be almost twice as broad as Col. I, since there would have been enough room for two columns of the width of Col. I in the place of Col. II. Still, we must not forget that we know the actual size of Col. II and that we can only try to estimate that of Col. I. Thus we assume that the computed breadth of Col. I is not certain since it only relies on the hypothetical completion of the text by Preisendanz. This fact seriously queries the authenticity of Preisendanz's solution.

The most disputable parts are those where Preisendanz commutes the names of Typhon and Osiris,²⁵ since he claims that the writer of the papyrus erred and mixed up the names. Knowing the relationship of these two gods, this change alters not only the meaning of the sentence, but also that of the whole text. Preisendanz's solution is in closer connection with the original myth of Isis and Osiris, and at the same time he supposes that the λόγος of the spell is addressed to Isis. In this case his assumption holds on, since it is really frightening for a wife to hear that the flesh of her husband might be lost.

However, we can assume another, even more obscure version. The writer did not make a mistake when having written down the text, and indeed committed to paper what he/she intended to. Hence the λόγος may call those in alliance with Seth-Typhon. Line 8 can easily fit the latter interpretation. Preisendanz adds οὐ at the very beginning of that line, and thus the meaning of the sentence turns over.²⁶

It would be certainly easier to decide which version is more probable to stand its ground if we could interpret the following line: “σὲ κατακρύψω | ἐκ τῶν] γιγάντων”²⁷, but we do not know who is referred to as having been hidden from the giants in the mythology. However, it is only in Preisendanz's transcription where the preposition ἐκ occurs, on the contrary A. D. Nock regards μετὰ conceivable,²⁸ thus the meaning of the sentence turns entirely on the other side – the person in question is going to be concealed among the giants hence he/she must be in close connection with Typhon. It is worthy to note that in Greek mythology Typhon is the son of Gaia, as well as the giants themselves.²⁹

The name of Isis occurs once in the text: “ἀπά]γγελλε τὰ κρυπτὰ τῆς μυρι[ων]ύμου θεᾶς Ἰσιδος”.³⁰ This part of the papyrus seems to support Preisendanz's version, i.e., the λόγος is addressed to Isis, who *declares* her own secrets in

²⁵ In PMich inv. 534, 4–5. according to HUNT:

“...τὰ κρέα τοῦ Τυφῶνος ἐ[....]ον, καὶ οὐ διαρρήξω
[τὰ] δεσμὰ οἷς ἔδησας Ὅσει[ριν]...”,

whereas in PREISENDANZ's transcription:

“...καὶ | σῶσ]ω τὰ κρέα τοῦ Ὅσι[ρε]ως ἐ[μπεδ]ον, καὶ οὐ διαρρήξω | τὰ] δεσμὰ, οἷς ἔδησας Τυφῶνα...”

²⁶ HUNT, *ibid.* p. 133.

²⁷ PMich inv. 534, 8–9.

²⁸ NOCK, A. D.: A Greek Cryptogram. *Class. Rev.* 43 (1929) p. 238.

²⁹ cf. Hes. *Theog.* 819.

³⁰ PMich inv. 534, 13.

order to make the author beloved.³¹ However, it is possible that this line contains some irony. The writer wanted to achieve that the obscure authority invoked in the λόγος swindle out this secret of Isis. Thus the line should be translated the following way: “*Recite* the secrets of the many-named goddess, Isis”.³² Naturally, this would be an action against Isis, who is probably unwilling to have her secrets recited and thus unravelled.³³

Thus it is plausible that the author of the papyrus made no mistake when he/she put down the names of Typhon and Osiris; the superhuman powers forced by the magic spell are closely related to Typhon and hostile to Isis and Osiris. The possible presence of name of Nebutosualeth³⁴ in the Oslo fragment also implies that the addressed of the spell can be a power of gloomy nature.

We can conclude that Preisendanz’s version is not the only way of explaining the cryptographic papyrus. Moreover, the latter interpretation happens to be maintainable as well. Still, the question, whom the magic spell is addressed to, cannot be inevitably answered. The problematic points of the transcription contribute to the uncertainties around the text. Thus, we suggest that both fragments deserve thorough examination in the future.

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Class. Rev.	<i>The Classical Review</i>
GMPT	BETZ, H. D. (ed.): <i>The Greek Magical Papyri in Translation: Including the Demotic Spells</i> . Chicago–London 1996 ² .
Hes. Theog.	Hesiodos: <i>Theogonia</i>
JAMS	<i>Journal of the American Musicological Society</i>
LSJ	LIDDELL, H. G.–SCOTT, R.–JONES, H. S.: <i>A Greek–English Lexicon</i> . Oxford 1968.
Mél. Masp.	<i>Mélanges Maspero</i>
Pap. Osl.	<i>Papyri Osloenses</i>
PGM	PREISENDANZ, K. & HENRICHS, A. (edd.): <i>Papyri Graecae Magicae: Die Griechischen Zauberpapyri</i> . Vol. I–II. Stuttgart 1973–1974 ² .
Philol. Wschr.	<i>Philologische Wochenschrift</i>
Proc. of the Brit. Ac.	<i>Proceedings of the British Academy</i>
Suppl. Mag.	DANIEL, R. W. & MALTOMINI, F. (edd.): <i>Supplementum Magicum</i> . Vol. I–II. Papyrologia Coloniensia XVI.1–2. Opladen 1990–1992.

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³¹ cf. the translation of HUNT, *ibid.* p. 132.

³² GMPT p. 285.

³³ cf. “ἀπαγγέλλω” in: LSJ.

³⁴ POsl III 75, 9–10.

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Department of Ancient History
Eötvös Loránd University
H-1364 Budapest P.O. Box 107

5. APPENDICES

Appendix 1

ϛ	α	ω	μ
ϛ	β	ζ	ν
ϛ	γ	ξ	ξ
ϛ	δ	ο	ο
ϛ	ε	ϛ	π
×	ζ ?	ϛ	ρ
ϛ	ζ ?	ο	σ
ϛ	η	ϛ	τ
ϛ	θ	h	υ
-	ι	ϛ	φ
·	ϊ	×	χ
ϛ	κ	+	ψ
ϛ	λ	Ψ	ω

Appendix 2

1. $\overline{70}$ u' z' g''																								
2.	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69			
	u	h	X	Θ	λ	⊥	ο'	Ξ'	N'	M'	Λ'	K'	I'	Θ'	H'	Z'	E'	Δ'	Γ'	B'	A'			
	z	λ	λ	λ	λ	λ	K'	λ	X'	T'	<	Δ'	<	V'	>	Γ'	U'	⊃'	N'	/	V'			
	g'		g''	a'		a''	f'		f''	c''		c''	d''		d''	e''		e''	f''		f''			
3.	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
	Ω	Ψ	X	Φ	Υ	Τ	Ϛ	Ρ	Π	Ο	Ξ	N	M	Λ	K	I	Θ	H	Z	E	Δ	Γ	B	A
	λ	z	λ	F	L	λ	C	U	⊃	K	λ	X	λ	<	Δ	<	V	>	Γ	U	⊃	N	/	\
	f		f''	g		g''	a		a''	b		b''	c'		c''	d'		d''	e'		e''	f'		f''
4.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	⊃	⊃	*	⊃	⊃	⊃	3	⊃	⊃	⊃	⊃	⊃	⊃	⊃	⊃	⊃	⊃	⊃	⊃	⊃	⊃	⊃	⊃	⊃
	C	⊃	*	⊃	⊃	T	E	ω	3	H	⊃	⊃	⊃	⊃	⊃	E	⊃	⊃	⊃	⊃	⊃	⊃	⊃	⊃
	D#		E	F		F#	G		G#	A		A#	B		B#	c		c#	d		d#	e		e#

Appendix 3

Cryptograph	Transformation	Greek alphabet	Notation
⊃	rotating 90°	B	⊃
⊃*	rotating 180°	Γ	⊃
⊃*	vertical bisection	Δ	⊃
⊃	rotating 90°	E	⊃
-	rotating 90°	I	⊃
⊃	rotating 90°	K	⊃
⊃	rotating 90°	Λ	⊃
w	rotating 180°	M	⊃
⊃*	vertical mirroring	ξ	⊃
⊃	rotating 180° or vert. mirroring	⊃	⊃
⊃	rotating 90°	T	⊃
h	rotating 180°	Υ	⊃
⊃*	vertical bisection	Φ	⊃

The characters signalled by * have no corresponding equivalents among the notation symbols, thus the signs in the last column of the chart are other letters undergoing the same transforming method.

Appendix 4