Roman Frontier Signalling and the Order of the *fuþark*

Murray K. Dahm
Australia
murraydahm@gmail.com

The order of the runes in the *fuþark* has long puzzled scholars. The order *f u þ a r k g w / h n i j ï p z s / t b e m l ŋ o d* is, however, relatively secure. Using evidence from the Roman frontiers and Roman signalling during the period when the runes are thought to have been created, a solution can be suggested. The *Histories* of Polybius, written in the mid-second century BC, and the *Kestoi* of Sextus Julius Africanus, written in the early third century AD, describe signalling systems which have remarkable parallels with the *fuþark*. Both signalling systems would have been used in some form during the Roman Empire using the 23 letters of the Latin alphabet. Africanus' system uses three groups of eight letters which matches the division of the *fuþark* into three *ættir*. Polybius' system matches closely the cryptographical methods of encoding the runes themselves found in the *Isruna Tract*. Using this evidence, a suggestion can be made as to how the order of the runes was arrived at.

The reason for the order of the runes in the *fuþark* has long puzzled scholars. The order of the runes for *f u þ a r k g w / h n i j ï p z s / t b e m l ŋ o d* does not follow any of the traditional rules of alphabet adoption but the order occurs often enough to be secure.[1] The suggestion below offers an explanation of how that order came into existence. For what follows, I follow Henrik Williams' theory that "shape alone determines the formal origin of the runes" (Williams 1996: 214) and his derivation of 23 of the 24 runes from the form of Latin epigraphic capitals (Williams 1996: 211-21 and Williams 2004: 262-273). I also accept that the rune ᛞ was an invention. The exact derivation of individual runes from individual Latin letters

[1]There are minor variations in the order of *o* and *d* and *ï* and *p*.

is not strictly important for what follows although Williams' derivation of all but the one (invented) rune from the form of Latin epigraphic capitals is persuasive. I also assume that the creator of the *fuþark* was a single individual who had relatively extensive contact with the Roman Empire and with Latin and that the *fuþark* was created in the order in which we find it on the earliest surviving inscriptions. The changes in sound value from their Latin original in the case of various runes, could have occurred at a later time (Williams 1996: 214).

The *fuþark* was probably created beyond the borders of the Roman Empire but, with the extreme likelihood that the Latin alphabet was its parent, it is also intimately tied to Roman culture. Contact with the Roman Empire was, however, widespread and we do not need to argue at length regarding how ancient Germanic peoples might have come into contact with Latin or Roman culture in the early centuries AD.[2] Along the borders of the Roman Empire were the *limites*, the systems of defence and communication that encompassed all forms of Roman border control. In Roman Britain the remains of one such border can be seen in Hadrian's Wall. In other provinces, where no natural barrier existed, palisades and fortifications were also constructed. Two examples of this were on the borders of the provinces of Raetia and Germania. Both of these, along with Hadrian's Wall, may well be relevant to the origins of the *fuþark*; Raetia and Germania because they bordered (roughly) on the areas where the *fuþark* was created, and Hadrian's Wall because various sections of it were manned by auxiliaries of Germanic extraction (see Breeze and Dobson 2000: 256-276) who may well have returned 'home' after their term of service in the Roman army.[3] The Roman frontiers included fortifications and networks of signalling towers

[2]One simple proof is the extensive system of trade routes to and from the Roman Empire and the passion within the empire for commodities such as amber, the source for which was predominately the Baltic, and its trade route along the River Elbe. See for instance Wheeler (1954) and Spekke (1957).

[3]These are merely suggestions as to how someone may have come into (enough) contact with Latin and the Roman Empire to transport its letter forms.

which had the capability of transmitting messages back into the interior of the Roman Empire as well as along the frontier itself (Wooliscroft 2001).

Unfortunately we know relatively little about signalling systems in the Roman Empire although we can be sure they were closely guarded military secrets. Given this secrecy, our lack of information should come as no surprise. The first signalling systems about which we are reliably informed come from the Greek world. We have evidence of messages transmitted and, occasionally, actual methods of transmission in authors such as Herodotus and Thucydides and others. For more in depth information on signalling systems we rely on only a few sources. Aeneas Tacticus provides several possible ways of transmitting messages in his treatise *How to Survive Under Siege* written in the fourth century BC and the historian Polybius, writing in the second century BC, also provides a summary of the state of fire signalling in his own day. Polybius also provides evidence of two different methods of sending messages via fire and/or smoke signals (*Histories* 10.43-46). Before we examine his systems, however, there is one from later in the Roman Empire which should be addressed first.

Sextus Julius Africanus refers to a Roman signalling system in his *Kestoi*, a collection of miscellaneous information relating chiefly to magic but also on other subjects. His description contains remarkable possibilities for the *fuþark*. Africanus' *Kestoi* was dedicated to the emperor Severus Alexander (reigned AD 222-245). In chapter 77 Africanus includes this observation (translation by J. P. Wild (Wooliscroft 2001, 168):

> "The Romans have the following technique which seems to me to be amazing. If they want to communicate something by fire signal, they make the signals so: they select places that are suitable for making fire signals. They divide the fires into a right, a left and a middle fire so that they read *alpha* to *theta* from the left-hand one, *iota* to *pi* from the middle one and *rho* to *omega* from the right-hand fire. If they signal *alpha*, they raise up the fire signal on the left once, for *beta* twice and for *gamma* three times. If they signal *iota* they raise the middle fire once, for *kappa* twice and for *lambda* thrice, and if they want to signal *rho*, *sigma* or

> *tau*, they raise the right-hand signal once, twice or three times. In this way should you want to signal *rho* you do not need to raise hundreds of fire signals, but only one with the right-hand torch. Those who receive the signals then de-code them in the same way, or pass them on to the next station."

Africanus is the only ancient author to refer to such a system. The sources of Roman signalling are often difficult to interpret but Africanus' represents a fully cohesive system. Africanus' system would thus have divided the Greek alphabet in the following manner:

	Left	*Middle*	*Right*
1	Α	Ι	Ρ
2	Β	Κ	Σ
3	Γ	Λ	Τ
4	Δ	Μ	Υ
5	Ε	Ν	Φ
6	Ζ	Ξ	Χ
7	Η	Ο	Ψ
8	Θ	Π	Ω

Table 1: Africanus' letter grid.

For the remainder of this paper I have rendered this table so that row 1 equals the left column, row 2 the middle, and row 3 the right:

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	Α	Β	Γ	Δ	Ε	Ζ	Η	Θ
2	Ι	Κ	Λ	Μ	Ν	Ξ	Ο	Π
3	Ρ	Σ	Τ	Υ	Φ	Χ	Ψ	Ω

Table 2: Africanus' letter grid re-rendered.

Even though Africanus does not describe the system as a military one, a Roman signalling system, and a fire signalling system at that, should be considered in a predominately military context. Roughly 400 years before Africanus, one of the signalling systems Polybius described also used a letter grid (*Histories* 10.45.6-46.11). This divided the 24 letter Greek alphabet into five groups of

five letters, thus:

	1	*2*	*3*	*4*	*5*
Group 1	A	B	Γ	Δ	E
Group 2	Z	H	Θ	I	K
Group 3	Λ	M	N	Ξ	O
Group 4	Π	P	Σ	T	ϒ
Group 5	Φ	X	Ψ	Ω	

Table 3: Polybius' Letter Grid

Polybius noted that there would be a blank space in the last group but it presented him with no problems. He simply stated (10.45.7) that "there is one letter less in the last division, but this makes no practical difference." Polybius' practical experience as a commander (he had been Hipparch of the Achaean Confederacy prior to their defeat at the hands of the Romans at the battle of Pydna in 168 BC) gives his account great weight. Polybius describes this signalling system as the latest development (in the mid-second century BC), and one which he had refined, presumably in practice in the field. The system used 10 torches (divided into two groups of five; a left and a right) and dividing the alphabet into five groups as above. The torch on the left was lifted first to signal which letter group and then that on the right to signal which letter in the group was to be transmitted. Thus if the first letter was *kappa*, it belongs to the second group so two torches are raised on the left. Five torches are then raised on the right since it is the fifth letter in the group.

In the centuries between the systems described by Polybius (*c.*167 BC) and Africanus (*c.* AD 230) there would have been different systems and refinements. Aspects of Polybius' system may have survived into subsequent centuries. It is possible that the reduction from five groups of letters down to three was a refinement to Polybius' or a similar system. For instance, a three-letter-group system that operated along the lines of Polybius' system would be perfectly sound and operable. Unfortunately, direct evidence for such a system is lacking.

The system Africanus describes can equally well be applied to the Latin alphabet. Indeed, whilst it is natural

that, since Africanus wrote in Greek, he would describe a system using the Greek alphabet, no Roman military signalling system would have used anything other than Latin. Latin was the language of the Roman army even in non-Latin speaking provinces. As Yann Le Bohec argues (Le Bohec (1994): 231), only Latin could express commands for all units of the Roman army and 'no orders were given in Greek, Egyptian or Aramaic, the languages of defeat.' This was despite the fact that recruits could be of Greek, Semitic or other non-Roman stock who used their own languages among themselves. A Roman military signalling system would have only used the 23 letters of the Latin alphabet.[4] And thus there would be one blank space in Africanus' grid but, just as this posed no problems for Polybius's system, it should pose no problems for Africanus'. If a system similar to Polybius' continued to be used in the Roman world, it too would have been adapted to the Latin alphabet.[5] Practicable and operational systems with blank spaces do not, therefore, present any problem. Indeed, the blank space in a 24 letter grid for the 23 letters of the Latin alphabet may have proved crucial for the *fuþark* and the invention of only one rune (ᛞ). Using the Latin alphabet, Africanus' system would have appeared like this:

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	A	B	C	D	E	F	G	H
2	I	K	L	M	N	O	P	Q
3	R	S	T	V	X	Y	Z	

Table 4: Africanus' letter grid using Latin letters.

It is interesting to note that this system simply divides the alphabet into three groups of eight letters and makes no attempt to assign the least number of torch flashes to the most common letters or to encode the alphabet in any more complex way. The dividing of the alphabet into three groups of eight, however, has immediate resonance for the *fuþark*. Firstly, it matches the division of the *fuþark* into

[4]In Latin epigraphic capitals 'u' is always represented as 'V' as it is in the tables of Latin epigraphic capitals below.

[5]Using the Latin alphabet, Polybius' system would have had two blanks.

three *ættir* of eight runes each. The earliest division of the *fuþark* into *ættir* seems to occur in the fifth or sixth century (Page 1999: 82) but may reflect an earlier practice. Polybius' five-group system closely matches the cryptographical encoding of the *fuþark* where each rune can be represented by its group (1, 2 and 3) and its position in that group (1, 2, 3, 4, 5, 6, 7 and 8). Thus *c* can be represented as 1/6 as the sixth rune in the first *ætt*. The various methods used to represent the runes in a cryptographical code found in the *Isruna Tract* and elsewhere (the methods known as *isruna*, *lagoruna*, *stopfruna*, *hahalruna*, 'fish-runes', 'pig-runes' and so on) all share the group number/rune number method (Page 1999: 82-83 and Elliott 1959: 84-86). Again these cryptographical systems of encoding the runes may have come later but may equally reflect an early practice. Using Africanus' division of the alphabet into three groups of eight the match is even closer. A perfect match could be obtained by using the hypothetical three-group Polybian system mentioned above.

Woolliscroft has suggested that, in Africanus' system, the most common letters could be assigned the least number of flashes as in the Morse standard (Wolliscroft 2001: 45). While such an exact parallel may be considered unlikely, it is certainly possible that the letter 'e' for instance, the most common letter in Latin usage (Mahoney and Rydberg 2001: 58-59), would not continue to be signalled using five flashes of the left-most beacon. Using Mahoney and Rydberg's arguments for the frequency at which letters occur in Latin and then assigning the least number of flashes to the most common letters, Africanus' system would appear thus:

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	E	A	R	O	D	B	H	K
2	I	T	N	C	P	G	X	Z
3	V	S	M	L	Q	F	Y	

Table 5: Grid assigning most frequently used Latin letters to least number of flashes.

More than simply assigning the most common letters to the least number of flashes, however, it is probable that

Roman messaging systems underwent more complex encoding. Codes and ciphers were common in the ancient world. For the complexity of ancient encoding systems there are ample examples. The Spartan cipher rod (Plutarch *Lysander* 19.5-7, Aristophanes *Lysistrata* 990-994, and Aulus Gellius *Noctes Atticae* 17.9.6-15) involved a leather strap wrapped around a rod of a particular diameter and a message then written upon the strap. The message could only be deciphered by wrapping the strap around a rod of the correct diameter. The Emperor Augustus used a personal cipher system when writing where he would write B for A and C for B and, AA for X (Suetonius *Augustus* 88). According to Suetonius, when Julius Caesar wanted to write anything confidential he would write in cipher so that 'not a word could be made out.' Suetonius himself offers the solution to this cipher of substituting the fourth letter (thus D for A) (Suetonius *Divus Julius* 56.6-7). Aulus Gellius (*Atticae Noctae* 17.9.1-5), however, considered Caesar's system un-deciphered and reported that a 'very careful' treatise had been written on it by the grammarian Probus. Aeneas Tacticus (*How to Survive Under Siege* 31.16-22) describes the Astragal, a sheep knuckle bone drilled with 24 holes (corresponding to the letters of the Greek alphabet). This was then threaded in such a manner so that the letters of a message could be deciphered (by someone who knew the letter order) in reverse as the thread was withdrawn.

It is therefore highly likely that a relatively complex encoding system was used on the frontiers of the Roman empire since the messages being transmitted contained, in all likelihood, highly sensitive information which could have proved disastrous if that information fell into the wrong hands or if Roman frontier codes were broken to be used by an enemy. We have evidence of the ramifications of codes being broken and signalling information falling into the wrong hands. During the siege of Plataea in 427 BC the Plataeans seem to have broken the Spartan signalling code and could then 'jam' Spartan signals by sending contradictory messages to the Spartan allies (see Thucydides 3.22 and Polyaenus *Strategemata* 6.19.2).

It is only a small step for Africanus' system from assigning the most common letters to the least number of

flashes to some kind of more complex encoding of the letters to attempt to ensure that the secrecy of the messages being transmitted was maintained. Such an encoding system would require that the sender and receiver had some way of ensuring that they were using the same code or cipher. The easiest method would have been a tablet or letter grid distributed to all who would use it (for signalling messages along the Roman frontier each signal station which was required to decode messages must have had one). This is a similar solution to the cipher rod of the Spartans where sender and receiver had the rod and the strap on which the message was written was sent from one to the other. Thus only the party which had the correct tool for decoding the message could read it. For the Roman system discussed here, such a tablet would presumably have been changed on a regular basis to avoid any problems with codes being broken or of them falling into the wrong hands. As such there may have been several decoding tablets each with a different order of letters. A theoretical letter grid using such an encoding method could easily have looked like this:

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	F	V	D	A	R	C	X	P
2	H	N	I	G	Z	K	Y	S
3	T	B	M	E	L	O	Q	

Table 6: Randomized Latin letter grid.

From this (deliberately chosen and provocative) 'random' letter grid it is then only a very small step to consider that the creator of the *fuþark* may have had access to such a grid or tablet. Since such letter grids would have been changed regularly, the tablet which the creator in question had did not need to be current. The steps from a letter grid tablet with the form above to the *fuþark* were relatively simple. If we follow Williams' formal origins theory for the shape of the runes, the Latin letters only need to be changed into runes according to the 'rules' of rune formation (Antonsen 1978: 287-297; Williams 1996: 213; Williams 2004: 267).[6] This transformation process

[6]We can add to these rules the tendency to invert or reverse some

would provide:

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	ᚠ	ᚢ	ᚦ	ᚨ	ᚱ	ᚲ	ᚷ	ᚹ
2	ᚺ	ᚾ	ᛁ	ᛃ	ᛇ	ᛈ	ᛉ	ᛊ
3	ᛏ	ᛒ	ᛖ	ᛗ	ᛚ	ᛜ	ᛟ	

Table 7: *Futhark* rune grid.

All that would have been required, therefore, to transform this 24 letter grid into the *fuþark* is the invention of the ᛞ rune and its insertion into the blank space provided:

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	ᚠ	ᚢ	ᚦ	ᚨ	ᚱ	ᚲ	ᚷ	ᚹ
2	ᚺ	ᚾ	ᛁ	ᛃ	ᛇ	ᛈ	ᛉ	ᛊ
3	ᛏ	ᛒ	ᛖ	ᛗ	ᛚ	ᛜ	ᛟ	ᛞ

Table 8: *Futhark* rune grid with ᛞ

It should not be difficult to envisage a Roman soldier of Germanic extraction operating the system which Africanus describes or being familiar with other signalling systems which may have had similarities to Africanus' or Polybius' system. Various parts of Hadrian's Wall were operated by Germanic auxiliaries and they definitely operated signal stations along their parts of the wall. The various *limites* of the empire all had signalling stations and all would have had their systems. It is entirely possible that a system similar to the ones Africanus or Polybius describe was used in the period when the *fuþark* was created. The idea that the runes were invented in the second century AD (Williams 2004: 271) would mean that the possible time difference between the creation of the runes and the signalling system Africanus describes would be negligible. There is evidence to suggest that a signalling system similar to Africanus' using three beacons continued to be used into the fourth century (Dahm 2004: 17-25) and so it should come as no surprise if it was in use earlier, and used by an individual who took its secrets north and used it to

symbols from their parent letter.

invent the *fuþark*. There is nothing to say that the system Africanus describes was new, indeed it could have been operating in various guises for some length of time. The parallels between the runes and the signalling system Polybius describes might also suggest the survival of a system similar to the one he describes for some considerable time. Nor is it beyond the realms of possibility that a soldier of Germanic extraction would have access to a 'decoding tablet' (even if it was a discarded one) which he may have taken with him beyond the frontiers of the Roman Empire. If such an individual was the commander of a signalling unit or an officer higher in the command chain, then his access to such tablets would have been a part of his duties. What is more, it should not be surprising that the system an author describes differed from one that operated in the field; either the author did not have access to such information or 'field modifications' altered the system. The system Africanus describes need not be the system which must have been used; its lack of any form of code should convince us that there must have been other systems even if they were similar to the ones Africanus or Polybius describe. The idea of encoding messages should not surprise us either since ancient history is full of ingenious methods of encoding messages, sending them, receiving them and decoding them. With a small amount of plausible tweaking, aspects of Africanus' or Polybius' systems and Roman military signalling in general offer a context in which the Latin alphabet could have been transferred to the area in which the *fuþark* was created and in the order in which the *fuþark* has come down to us. What is more, the system of its origin may have continued to be represented in the various ways in which runes were divided into three *ættir* and cryptographically encoded throughout their history.

References

Antonsen, Elmer
1978 The graphemic system and the Germanic fuþark. In Rauch, I. and G. Carr (eds.) *Linguistic Method: Essays in Honor of Herbert Penzl*, 287-297. The Hague: Mouton Publishers.

Breeze, David J. and Dobson, Brian
2000 *Hadrian's Wall*. Fourth Edition. Harmondsworth: Penguin Books.

Dahm, Murray K.
2004 Campgate bronzes and Roman fire signalling. *CLASSICVM* 30: 17-25.

Elliott, R. W. V.
1959 *Runes*. Manchester: Manchester University.

Le Bohec, Yann
1994 *The Imperial Roman Army*. London: B. T. Batsford Ltd. (Translation of *L'Armée Romaine, sous le Haut-Empire*, 1989).

Mahoney, Anne and Rydberg, Jeff
2001 A note on scrabble in Latin. Classical Outlook 78: 58-59.

Page, R. I.
1999 *An Introduction to English Runes*. Second Edition. Woodbridge: Boydell Press.

Spekke, Arnold S.
1957 *Ancient Amber Routes and the Discovery of the Eastern Baltic*. Stockholm: M. Goppers.

Wheeler, Sir Mortimer
1954 *Rome Beyond the Imperial Frontiers*. Harmondsworth: Penguin Books.

Williams, Henrik
1996 The origin of the runes. *Amsterdamer Beiträge zur älteren Germanistik* 45: 211-218.

Williams, Henrik
2004 Reasons for Runes. In Houston, Stephen D. (ed.) *The First Writing. Script Invention as History and Process,* 262-273. Cambridge: Cambridge University.

Woolliscroft, D. J.
2001 *Roman Military Signalling*. Stroud: Tempus Publishing.