Runic cryptography in early epigraphic period (200-700)

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Abstract

Runic script is an alphabetic system based on a non-alphabetical order row. The oldest row contained 24 letters but was reduced to 16 in Scandinavia around 800, and enlarged to 28 then 31 letters in England between 7th and 10th century (See Düwel, 2008). Runic script also adopted various original encryption systems during Viking and Middle Ages. Recent and very complete studies help us to understand the way they worked, both on social and technical levels. Nevertheless, the very first uses of cryptography are probably far much older and could have even occurred since runic script is first attested, that is in the end of 2nd century. It should be emphasized that it was based on a visual effect and riddles which goal was to make guess names rather than magical formulae. Indeed, the use of magical formulae is only attested lately, in the medieval times in Scandinavia and England inscriptions, and it is clearly related to Christian prayers and Kabbala (Bauer, 2020). This article aims to provide a chronology and a typology of possible cryptography techniques used with runic script in its earliest period.

1 Introduction

Due to its various particularities, and its non-standardised letters, runic script has, for long, been seen as being either originated from a cipher alphabet or being a cipher alphabet *per se*. That is, a secret alphabet. Nevertheless, as it featured many linguistic and grammatical tools since the very beginning, we can assume it was clearly created as a real script rather than a cryptographic system, *i.e.* a dissimulating and concealing technique, which doesn't need such a complicated structure. Furthermore, runic script was constantly improved on very modern technical basis of adaptability, since it is in fact a kind of open-source system updated by its users through time. In this way it is very similar to Irish ogham script. Ogham script also has a non alphabetical order but is organized around sound values, and its users also developed cipher systems with high closeness to those used for runic script around the same period, that can be found in manuscripts such as *In lebor ogaim* written between 8th and 12th century (Derolez,1952 ; 1954, pp. 146-156). During that period, concerning the reasons why cryptography was used in runic script, we acquired new insights based on the recent and exhaustive J. K. Nordby's study (2018). He has established an inventory of runic encryption systems and detailed how they worked (substitution, permutation, visual…) with an impressive catalogue. But to conclude, he underlines that use of cryptic runes was rather a cognitive process included in the learning of script with support of ciphers and riddles. Use of cryptography was also a mark of knowledge and proficiency among carvers, with a striking effect undoubtedly based on its visual role (Nordby, 2018, pp. 229-239). Actually, runic cryptography has been developed on various levels, both in England and Scandinavia, in a literate context. Hiding texts or playing with words is a worldwide and ancient activity that took many forms (Blake, 2010). Thus, the idea of mind games remains undoubtedly valuable in the time span studied here.

Therefore, relevant inscriptions have been selected here and briefly analysed to understand the chronology and typology of possible use and development of graphic effects if not cryptography, from 3rd century until attested cryptography in 8th century. We must note that in comparison, first centuries Roman carvers often used various techniques of abbreviations, ligatures and acrostics on many supports and that alphabetical learning process included order changes in letters (Mees, 2006). Furthermore, some attested encryption techniques were already employed in the Antique world (Nordby, 2018, pp.39-43) and several new cryptography systems appeared between 4th and 8th century, mainly in the Western Christian world (Nordby, 2018, pp.44-48). Another important fact is that latin script was gradually spread among high ranking and christian germanic populations in France, England and Southern Germany since 5th century (Fischer, 2005). Although these influences were limited, they could have played a role for adopting new cryptography techniques (Düwel, 1994).

2 First attempts of cryptography ?

In epigraphy, and particularly in runic epigraphy, meaningless inscriptions are often categorized as resulting from errors and illiteracy, or as magical formulae. Several inscriptions or words from the ancient period appears to be impossible to understand either because they are not wholly legible or only written with consonants. In some cases we could find ligatures or even workers abbreviations similar to Roman ones (*f* for *fecit…*) like possibly in Northern Germany on the Thorsberg bronze umbo inscription from 3rd century, **ansgzh**. Thus, *Ansgiz* would be here the smith name and aberrant ending **h** could fit as an abbreviation for PG **handuz* adapted from latin *manu*, "has made from his hands" (Imer, 2014, pp. 72-73), as this surely happens on the Femø gold bracteate (Denmark, 5th century) with **ekfakaʀf**, "I, Fakar", ending with **f** for *fāhi*, "painted" (Nordby, 2018, p. 64). Especially, we must note that other early inscriptions, such as these from Vimose deposit (Denmark, 3rd century) are for most very puzzling compared to the contemporary deposit from Illreup. Some have only one word, mainly a name, but one of them with just consonants is read as **ttnþ** (?) on a bronze chape. Another inscription on a silver scabbard suspension fitting possibly features pseudo-runic characters. Both items are properly not luxury goods, but are related to sword equipment from high ranking and professional soldiers (Stoklund, 1995a). The Tørvika B stone (Norway, 5th-6th century) used as slab in a grave has a small and short inscription which also features ligatured or mirrored letters still not deciphered and a zigzag line as ornamentation (MacLeod, 2002, pp.117-120). These kind of para-scripts or meaningless texts continuously appeared in every regions where runic inscriptions are found, with no explainable motives for that, but as they often come with ornaments, the social context and decorative process should be considered (Graf, 2010 ; Waldispühl, 2013) rather than only the 'magic' explanation (Antonsen, 1980).

Legible early inscriptions sometimes contain owner names but have high proportion of maker names, thus alleging that workers were owning script and developed creative stylistic variants and designs they possibly shared with others. For instance, one lancehead of the Vimose deposit, with the name **wagnijo**, has an interesting design, known as mirrored letters, only adequately fitting with some characters (*e.g*: ᚹ, w = ᛏ mirrored). These having no practical uses, just aesthetics ones, that could be, in some ways, related to encryption. And this mirror effect is also found in other Danish deposits. Among nine Illerup items from the same period, we have two silver shield handles, with name **laguþewa** and worker signature **niþijo tawide**, "Niþijō made", fig.1, and two lanceheads bearing the same inscription as on the Vimose one (Stoklund, 1995a). This goes on more recently, on Nydam lance shafts 8, 9 and 10, the latter, fig.2 (5th-6th century), the only legible one, with another worker signature, **tauiteka**, *tawide eka*, "I made" (Rau & Nedoma, 2014). We also find them on the Spong Hill cinerary urn (5th-6th century), with a stamped inscription **alu** (see 3.4) and on the ending letter, **a**, of the Broadley brooch (6th-7th century), with the name **liota**, both from England (Parsons, 1999, pp.46-47, 60-62). Mirrored runes are not the only particular effects from this period. Another distinctive feature comes from the Skovgårde silver fibula inscription (Denmark, 3rd century), with two separated words, **talgida:omal**, that is "Lamo made", in opposite directions of writing which can create a step between art and encryption techniques (Stoklund, 1995b, pp. 213-214) knowing that several fibulae of Rosette type also have similar decorated patterns and inscriptions (Przybyła, 2018, pp. 29-144). A last type of very low encryption, is found on arrow shafts from Nydam deposit (Denmark, 4th century) where the word **alu** (see 3.4) is presumably written **lua**, **la** or **l** (Imer, 2014, pp. 80-81). Nearly 55 other arrows have various letters, signs or symbols that could indicate ownership (Bemmann & Bemmann, 1998, pp.416-418, fig.15). Finally, use of elided vowels could appear on the Ethelhem fibula (Sweden, 5th-6th century) which inscription has mostly consonants : **mkmrlawrtaa**, with no probing interpretation (Antonsen, 2002, p186-187 ; Imer, 2014, pp. 114, 117-118), and **rnʀ** standing for *runor*, on the Nebenstedt gold bracteate 1 (Germany, 5th century) but with no certainty (Imer, 2015, p. 187).

Figure 1 : mirrored runes on the Illerup silver shield handles

It is then difficult to establish when and if the use of cryptography really occurred with runic script in elder period, but we encounter here the very first evidences of abbreviations, ligatures and mirrored runes in the earliest inscriptions possibly only related to ornamentation or visual effects (MacLeod, 2002).

Figure 2 : mirrored runes on the Nydam lance shaft (illustr. Pia Brejnholt)

3 A mere visual effect or real cryptography ?

This chapter provides a selection of the most relevant inscriptions that could be related to the use of cryptography in order to subsequently give a chronology of its possible appearance. A first step was to define inscriptions fitting this category. The following inscriptions cannot clearly be considered as using cryptography, but they all show odd features that could not have been carved by mistake or by chance, but only with a particular purpose that must be clarified. Therefore, the possible encrypted elements are gathered by style and likeness for further studies. A noticeable fact is that the various effects appear almost all at the same period in various regions. Furthermore, we can wonder if the visual effect implied by mirrors and ligatures, decorated letters and repeated letters was not limited to ornamentation but was already suggesting riddles or mind games that gradually lead to more and more elaborated effects.

3.1 Decorated letters

At first glance not significant, this technique of carved letters, simply highlighted with two or three lines, started with the golden Gallehus horn (Denmark, 4th-5th century), but is more relevant on few other objects such as the Nydam lance shafts 9 and 10 (Denmark,5th-6th century). It worth being noticed that in this deposit, 34 other lance and arrow shafts and 3 knife handles, are decorated with interlaced motives as well as 43 lance shafts in the contemporary Kragehul deposit (Denmark, 5th-6th century), but also archery material, such as arrows, (see 2), have ornaments and scripts or para-scripts (Iversen, 2010, pp. 65-70 ; Petersen, 2020). Such a decorative technique was also applied to various runic objects of bone or wood dated around 5th-6th century, which function remains unknown and are then labelled as 'amulet' : Sorte Muld (Denmark), illegible Ødemotland (Norway) and Lindholm (Sweden) alike with two others from the Netherlands, difficult to date precisely (4th- 9th century), Britsum and Wijnaldum A (Kaiser, 2021, pp. 319-333, 395-401; Stoklund, 2005, p.362).

3.2 Meaningful sentence with meaningless words

We have here, possibly, a similar system as in the medieval period with substitution of letters (St John's College, Oxford, MS 17, 5V, ca. 1100), thus giving legible but meaningless words (Saltzman, 2018), that are found on stones which function as memorial is the more accurate. The oldest monument of this kind is the Hogganvik stone (Norway, 4th-5th century), fig. 3, with an inscription dedicated by relatives to a local leader, "Kelbaþewas stone, …, I, Naudigastiz, I Erafaz" : **kelbaþewas s[t]ainaz | aaasrpkf aarpaa inananaboz | ek naudigastiz | ek erafaz**. The two meaningless words **aaasrpkf aarpaa** are seen as a magical formula (Schulte, 2013) or at least as a coded text (Knirk, 2011). Here the repeated letter **a** and the use of the letter **p**, very scarce in the Nordic language, is of course the most puzzling and precisely indicates an unusual language.

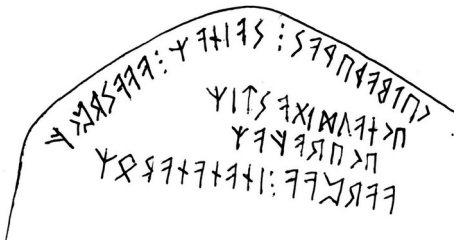

Figure 3 : Hogganvik stone

The same process occurs on the second monument, the Noleby stone (Sweden, 6th-7th century), fig.4, with a short alliterated dedication : **runofahiraginakudotojea | unaþou: suhurah: susih -atin | hakuþo**. Here the second sentence divided in 3 parts by separation marks with aberrant ending **h**, is seen as a magical formula since the preceding and last sentences in *scriptio continua* are translated as "I paint the rune provided by the powers, I prepare… Hakuþo" and thus interpreted as some kind of prayer or

curse possibly similar to the textual content of the contemporary Blekinge stones (Hellstam, 2014). Nevertheless, the social context should be considered as the most important and key factor for the inscriptions (Antonsen, 2002, pp.180-185 ; Imer, 2015, pp.191 ; Marold, 2012, pp. 83-84). The coded part could explain the reason why the stone was erected.

Figure 4 : Noleby stone

3.3 Alphabet with meaningless text or symbols

In early Christians times, Roman alphabet was, on occasions, inscribed as a consecration on churches floor or on grave stones. Eastern germanic populations were christianized since 4th century as could indicate the Breza inscriptions (Bosnia, 6th century). A latin alphabet is carved on a column from what was probably a church and on a second column is carved a runic alphabet with a five pointed star below (Looijenga, 2003, pp.50-62, 232-234). In Greek alphabet, we are aware that first and final letters, A and Ω, have a deep significance with Christ himself. Does runic alphabet refer to a similar concept when it is carved on memorial stones or jewellery ? The oldest evidence of both alphabet carved with other meaningless words is the Kylver stone (Sweden, 4th-5th century), fig. 5, used as a slab but which could be perceived as a learning tool rather than a memorial (Antonsen, 2002, pp.176-179). Furthermore it features a meaningless palindrome with variant **ѕ** letters and a tree shaped letter or symbol after the alphabet : **fuþarkgwhnijpïʀstbemlŋdo sueus** (Scholma-Mason, 2016). On the Rök stone (see 4), a different tree shape fits for letter **þ** on line 21 (Nordby, 2018, pp.199-202).

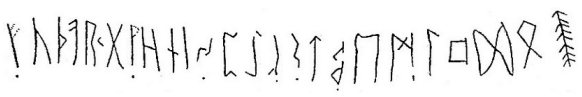

Figure 5 : Kylver stone

The Vadstena gold bracteate (Sweden, early 500) is very particular because it is considered as the first evidence of 3 separated rows of 8 letters thus allowing binary substitutions similar to those explained in the *Isruna tract* (see 5). These pendant types are luxurious objects worn by rich women. Some feature a male figure riding a horse, inspired from Roman coins and medals iconography. Of the one thousand found only two hundreds have inscriptions, some being wholly legible, but most are totally meaningless. However it is not related to encryption but rather to problem with reproduction of text models. Here the inscription reads : **tuwatuwa· fuþarkgw· hnijïpʀs· tbemlŋo** [**d**]. The repeated word *tuwa* is still unexplained (Imer, 2014, pp.107-110).

Another kind of luxurious jewel, the silver fibula, is a highly decorated typical female object but instead of visible inscriptions as on bracteates, those on fibulae are carved on the back side and unseen. The Acquicum fibula (Hungary, 6th century) has an incomplete alphabet (**fuþarkgw**), maybe indicating the first row, and the naming of the object, **klain kiŋia**, that is "fine fibula" (Düwel et al., 2020, pp. 9-19). On the Charnay fibula (France, 6th century) we have an incomplete alphabet with separated and rather unclear words : **fuþarkgwhnijïpzstblem : uþfnþaiːid dan : liano**. The possibility of a dedication with two names (*Iddan* and *Liano*) is retained, but with no certainty (Antonsen, 2002, pp.152-153, 179). Another particular case is included here with the Fonnås fibula (Norway, 6th century) which inscription is somewhat similar to Charnay but without alphabet. It is not clear if some of the characters are variants used as encryption, however the inscription remains undeciphered : **wh : b/widulti wkhu Alklʀ þArbe : iAʀ** (Birkmann, 1995, pp. 87-89). Finally, the Beuchte fibula (Germany, 6th century), fig. 6, has no real textual problems with an incomplete and incorrect alphabet row (**fuþarzj**) and a name (**buirso**), but it features an intriguing and quite unusual ornament of repeated geometric patterns with no other attested finds (Düwel et al., 2020, pp. 76-85 ; Waldispühl, 2013, pp.260-261).

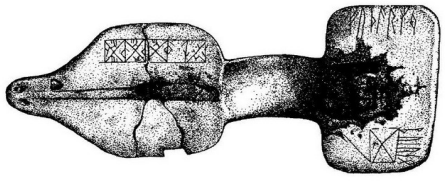

Figure 6 : Beuchte silver fibula

The following inscription is only mentioned for the record and for its similarities and continuity with previous ones, despite its time period is overlapping our selected chronology. The Malt stone (Denmark, 800-900) is one of the first stone inscriptions with the brand new 16 letters alphabet (**fuþarkhniastbmlʀ**), a tree shape symbol and human face with X on the forehead. The text, mentioning "runes of gladness and runes of eternal friendship" (**taitirunaʀ u-aivinrunaʀ**) is supposed to be related to magic but knowing "runes" means "letters" or "text", it could be a riddle or some kind of mind game as well, with meaningless words (**titultitul**) reminding the Vadstena **tuwatuwa**. (Birkmann, 1995, pp.361-372),

3.4 Repeated letters with use of ligatures

Two very different artefacts should retain our attention here because of their particular likeness in the process and in the word used as a code or just as a visual and sound effect with rhythm and alliterations (Marold, 2012, pp. 79-80) but with no apparent meaning (MacLeod, 2002, pp. 105-112 ; MacLeod & Mees, 2001). The first is a weapon, the Kragehul lance shaft (Denmark, 5th century), fig. 7, with a long inscription of decorated letters, still unclear and debated, but naming the **erilaʀ**. It is possibly the early word, only used in Migration Period, for Old Norse *jarl* and Old English *earl*. It would be then a high ranking chief warrior. However, the inscription, **ek erilaʀ asugisalas muha haite gagaga ginu gahe … lija … hagala wiju big**, has long been asserted as being a magical formula with the three times repeated **ga** letters decorated with a ligature forming a X shaped cross since ᚷ is rendering letter **g** (Antonsen, 2002, pp. 230-231 ; Imer, 2011, 2014, pp. 113-114 ; Iversen, 2010, pp. 68-69 ; Parsons, 1999, pp.18-19). And we can find exactly the same process on a jewel from England with typical Roman iconography including Romulus and Remus, the Undley gold bracteate (5th century) : **gagãga • maga • medu**. The last word, could mean "mead" and be related to a similar Old Nordic word found only in older inscriptions and often seen on the gold bracteates, **alu**, probably meaning *ale* and considered as a "magical word" (Parsons, 1999, pp.18-19, 62-67).

Figure 7 : Kragehul lance shaft

3.5 Meaningless repeated letters

On the Lindholm bone "amulet" (Sweden, 5th-6th century), fig. 8, we have the word **erilaʀ** mentioned again, with his name, *Sawilagar*, and there is a quite innovative feature in this unclear inscription carved on three sides also with decorated letters : **ekerilaʀsa[wil]agaʀ hateka | aaaaaaaaʀʀʀnn[n?][b]muttt alu**. The word **alu** (see 3.4) concluding a series of repeated letters **a**, **ʀ**, **n** and **t** is obviously assumed to point towards the idea of a magical formula. Instead, these letters could be arranged to mean something strictly related to the owner, the high status **erilaʀ** (Antonsen, 2002, pp. 187-188 ; Imer, 2014, pp. 113-115). That is probably the case on the Chessel Down I brass bucket (England, 6th century), an object originating from Byzantine workshops and found in a rich woman grave with a rather short but confusing inscription : **bwseeekkkaaa**. Here, the repeated letters added to the three first letters could be a reminding of Scandinavian personal pronoun, "I", *eka*, or could give three attested Old English names (*Becca*, *Wecca*, *Secca*), maybe relatives. It would work with a system so far considered as being imported from Scandinavia, the *-istil* code (Nordby, 2018, p.104-111), first appearing on the Gørlev memorial stone (Denmark, 9th century) and found until 12th century in epigraphy on stone monuments and various objects including graffito on churches. And it is even known from a 14th century Icelandic tale called *Bósa saga* where it concludes a curse chanted by a witch. This code is based on repeated letters, **þmk:iii:sss:ttt:iii:lll**, creating the suffix *-istill* added to each first three letters, **þmk**. Thus, these give the three following Old Norse words : *þistill*, *mistill*, *kistill*, that is "thistle, mistletoe, coffin". A riddle that echoes with the *horn*, *þorn*, *korn* formula from the Gotland Island (Birkmann, 1995, pp.356-360 ; Hines, 1991 ; Looijenga, 2003, pp.280-281 ; Parsons, 1999, pp.51-52)

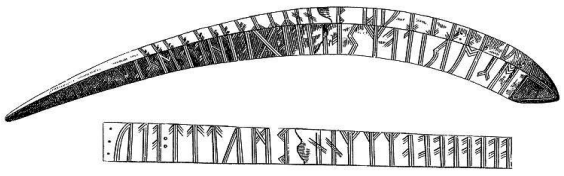

Figure 8 : Lindholm bone "amulet"

Although it is dispatched in this category, the Ellestad stone (Sweden, 6th-8th century) seems a bit different from the others. The inscriptions is

carved on a memorial stone and the lower line is ending with groups of letters ᛉ, **k** and ᛁ, **i : ekA sigimArAʀAfs… kA rAisidokA ᛁstAinA ᛁ kk.. kiiii kkk...** , "I Sigimar… raised the stone" (Imer, 2011 ; 2015, p.59). These repeated letters are looking like those on sticks from Bryggen (Norway, 1170-1250) (Nordby, 2018, pp.318-319, 332, 337-342) and from Trondheim (Norway, 1175–1275) (Nordby, 2018, pp.362-363). This kind of sequence could be a substitution system (Nordby, 2018, pp.72-73, 158-163) such as those suggested in old literature in Jón Ólafsson's *Runologia* (1752, pp.160-166) and Joh Liljegren's *die nordischen Runen* (1848, pp. 34-40). It is possibly the carver name.

Figure 9 : Ellestad stone

3.6 Only one repeated letter

Two female objects have a particular letter repeated several times either at the beginning or at the end of the inscription. The Gjersvik bone scraper (Norway, 6th century) has an incomplete and still not translated inscription which ends with letter ᚴ, **ᚴ : d--fioþilllllllll**. This letter could be related to the function of the object, used to crush fibres of flax, as this word translates as *lina* in Old Germanic and also appears on a similar object from Fløksand (Norway, 4th century) as **linalaukaR**. On the opposite, the letter on the Skabersjö bronze fibula (Sweden, 7th-8th century) has the letter ᛦ, **ʀ**, at the beginning of the inscription : **ʀʀʀʀʀʀʀʀʀʀʀʀʀʀʀʀ raþi tuk fauka fiaʀ sis in a iak asu þui launat ᛁ … auab-ksuafakat**, possibly meaning "Hráði took (fauka?) from his wealth, but therewith have I rewarded Ása". But this letter should be used to conclude words not to start them. This reminds the famous golden ring found in Danish archbishop Absalon's grave and dated around 11th-12th century, with inscription **þorKair**, *Þorger*, followed by five letters ᛦ, each inside brackets (Imer, 2011 ; 2015, pp. 94, 232).

3.7 Organized crossed letters

Reminding more of other contemporary monograms or maybe christograms (Hilberg, 2000 ; Schwab, 1998) than of cryptography, this system with four or five letters organized and crossed around a 'X' shape, or maybe letter ᚷ, **g**, is only found on two inscriptions from Germany (6th century) but was used more recently in Sweden on Södermanland Christian stones with more letters (Bianchi, 2010, pp. 142-143; MacLeod, 2002, pp. 165-166). The first one is related to a high ranking warrior, the Schretzeim IV silver sword ring (Düwel et al, 2020, pp.574-580 ; Waldispühl, 2013, pp. 304-305) and the second one, the Soest gold fibula comes from a rich woman grave (fig.10), but includes another inscription with two female names (Düwel et al, 2020, pp.587-596 ; Graf, 2010, pp.114-119 ; MacLeod, 2002, pp. 101-105 ; Waldispühl, 2013, pp. 153-171, 306-309). It is possibly the carver name or its signature.

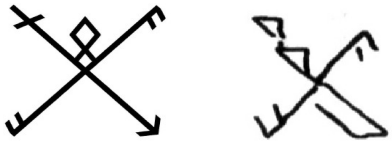

Figure 10 : Soest and Schretzeim inscriptions**ʀ**

4 Attested cryptography around 8th century

The very first evidences of cryptography emerged in England when literacy is promoted by Christianity and manuscripts. It is also linked to art and high technical level of craft. In this way, the Auzon casket (8th century), is a very unique object, combining runic script with Old English and Latin languages as well as Roman letters. The whole object is then conveying mixed cultural influences, narratives and images, enhanced by riddles and mind games, even codes with letters substitution (Page, 1999, pp. 87-88 ; Schwab, 2008, pp.73-75 ; Webster, 2012).

The Hackness cross (8th-9th century) is, of course, a Christian monument, with a Latin inscription dedicated to abbess Ethelburga, and both incomplete and worn runic inscription followed by a cryptic text using the *hahal-rune* system, which makes runes looking like tree shapes (Page, 1999, pp. 83-86). Again, we have cross-cultural techniques and scripts designed for highly literate people.

At these times, runic cryptography was preserved through manuscripts written by clergymen and copied by monks as language investigations (Zironi, 2011). The *Isruna tract* is the first tutorial with three runic codes and binary substitutions found in several European manuscripts (9th-11th century) which are closely related to the whole literacy of this period (Derolez,1954, pp. 120-169) including riddles in Old English as well as in Scandinavian so-called runic poems (Bauer, 2003; Halsall, 1981) and various riddles based on runic letters like in Exeter book (*Codex Exoniensis*, MS 3501, 8th-10th century) or poetry like with Cynewulf's signatures (Symons, 2016).

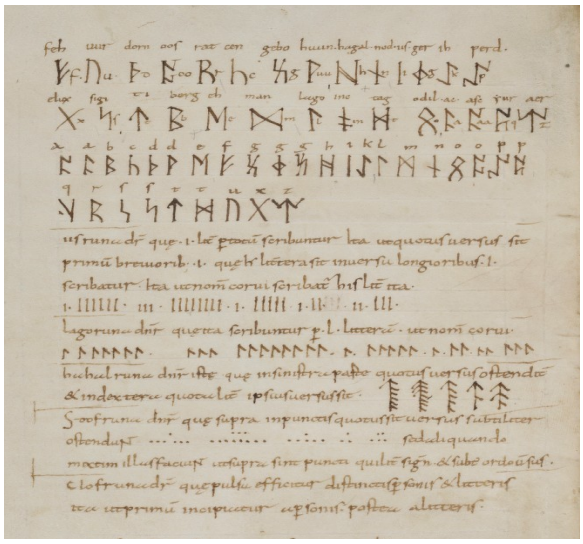

Figure 11 : *Isruna tract* fom St Gallen codex

Since manuscripts and Christianity expanded more recently in Scandinavia, we have here only monumental evidences of cryptography. As we have seen, 9th century stones offer interesting texts in Denmark, but the most striking evidence of cryptography comes from Sweden, with the famous Rök stone, which text is probably an epitaph. A question that could be answered very soon since a new hypothesis about it was proposed recently. And if it is still not offering the complete solution, however it is very close to it (Holmberg et al., 2020). The whole text, one of the longest with more than 760 letters carved on every sides, is made of riddles and cryptic runes. Here, even the older runic script is used for cryptography since the main text is carved with the brand new 16 runes row (Nordby, 2018, pp. 222-228). This indicates that the stone carver was a high skilled worker and highly literate. On a mere scriptural level, this monument enlightens us on the variability of concomitant letters, be they old or new, and the relevance of several encryption techniques.

5 Conclusion

The context of creation of runic script is presumably related to the Roman world. Since the 2nd century, qualified Germanic people have been serving in Roman army as spies (*exploratores* or *speculatores*). Thus, they should have been familiar with encryption and dissimulation of sensitive informations (Austin & Bankov, 2014, p. 191), and obviously with latin script and techniques (abbreviations, ligatures...) employed in military or civilian workshops. A knowledge that some could have shared with other people from free *Germania*. These combined techniques were possibly used in war times during conflicts in the Danubian regions and subsequently applied to the creation of the runic system so that such a script couldn't be understood by foreigners and especially Roman troops (Lund Hansen, 2003).

That is why some kind of cryptography could have been developed and enhanced since 3rd century. Nevertheless, concerning the previously selected inscriptions, innovative encryption techniques would probably start in 4th-5th century and only hide worker name in most cases and not magical or sensitive matters. Valuable objects or monuments related to high ranking people are mostly concerned and it is to be noticed that inscriptions are continuously improved as well as ornaments (Bianchi, 2010, pp. 115-164).

Although high status people, both male and female, are in some ways involved with script, this one clearly remains in the hands of craftsmen who modified and adapted it to language evolution. As the same techniques of cryptography appear at the same periods and at different locations, it could means acculturation and exchanges (Lebecq, 1997 ; Moore, 2016) rather than separated development as would prove spread of 8th and 9th century cryptography. Moreover, various goods and art styles were circulating in large areas including Scandinavia and Eastern regions since the 3rd century (Lund Hansen, 1994). And the same could be true for workers and traders who were in some cases highly mobile even before Viking period (Beghelli, 2022). However, concerning the oldest inscriptions, and with no parallels, it still remains difficult to evaluate precisely the use of cryptography and to establish which system was employed. Despite various elements available

both for a cautious typology and chronology provided here, further studies will be necessary to understand and decipher potential encryptions contained therein. But to achieve this, it would be essential to consider both visual and sound effects provided by the craftsmen of ancient societies still based on orality, remaining very different from our modern views.

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