
The Invention of the Ogom Cipher

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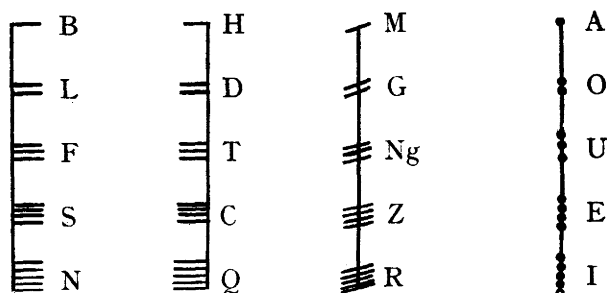


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THE INVENTION OF THE OGOM CIPHER¹

THE basic Ogom cipher consists, as is well known, of four groups (*aicme*) of five letters. These are represented by 1-5 strokes cut beside or across a central line for consonants, and of 1-5 notches or short strokes on the central line for vowels. The cipher may be shown as follows reading downwards²:



B, H, M, A are categorizing letters, and their Irish names are used to name the groups: *aicme beithe*, *aicme (h)uatha*, *aicme muine*, *aicme ailme*³. It will become clear that the four letters in each group following the categorizing letter were conceived of as two pairs. Accordingly the categories may be shown thus:

B – group: **B** / L F / S N

H – group: **H** / D T / C Q

M – group: **M** / G Ng / Z R

A – group: **A** / O U / E I

As presented here there are four categorizing letters and eight pairs. Of the pairs five consist of letters between which there is a clear phonetic relationship: D T, C Q, G Ng, O U, E I. The three remaining pairs may by contrast be referred to as non-phonetic; it will be

¹ The present article is a revised version of a discourse given to the Royal Irish Academy on the 25th of June, 1973. It may be of interest to mention that the basic theory presented here was evolved in something like its present form in 1942.

² The sound represented by Latin F did not exist in proto-Irish, and Latin had no special symbol for [w] or [v]. It will be assumed here that the inventor of Ogom based his third letter of the first group of consonants on Latin F and, consequently F will be used to represent it rather than the usual V. Note that the Romans in a sense resorted to F to supply the deficiency in their alphabet when the Emperor Claudius (10 B.C.–A.D. 54) introduced the *digamma inversum* (ϝ) for the sound [w] in order to distinguish it from U (See David Diringer, *The Alphabet* (London, 1947) p. 538).

³ Calder *Auraicept na n-Eces* (Edinburgh, 1917), p. 74.

part of the thesis of the present article to suggest how, out of a total of fifteen possible combinations, L was specifically paired with F, S with N, and Z with R. There is another obvious problem in the grouping of the letters. A is the first vowel in the Latin and Greek alphabets and B is the first consonant, and there is an analogous position in Semitic. It is thus easy to suggest a reason why A and B should function as categorizing letters. But no explanation has been offered as to why H and M have this function. It is important in the argument that follows to stress the fact that the mechanistic explanation offered as to the pairing of L F, S N, and Z R simultaneously leads to an explanation of how H and M, as well as A and B, came to be leaders of their groups. It is necessary, however, before presenting this argument to make some remarks on the present state of the question of the date and origin of the cipher.

Most of the surviving inscriptions are of the Irish pagan period, and some few, at least, may be dated on historical grounds to the early or mid-fifth century. The great majority, however, commemorate individuals of whom we have no historic record, and are thus, in any precise sense, undateable. Many of the inscriptions show very early linguistic forms, but historical or other criteria for dating these closely are entirely lacking.

In 1936 a German scholar Keller pointed out certain resemblances between the presentation of the alphabet by the Latin grammarian Donatus and the classification of letters in the Ogom cipher.⁴ Like Ogom Donatus divided the alphabet into four groups. These are as follows, the letters not used in Ogom being placed within round brackets:⁵

1. The five vowels: A E I O U
2. The seven semi-vowels F L M N R S (X)
3. The nine mutes B C D G H (K) (P) Q T
4. The two Greek letters: (Y) Z

The resemblances between the Ogom system and the teaching of Donatus lay in the following facts: (1) The division into four groups; (2) the absolute correspondence of the vowel group, ignoring, of course, the matter of order; (3) the B-class has four of Donatus' semi-vowels; (4) the H-group is comprised exclusively of consonants belonging to the Donatian mutes; (5) the last consonantal group, categorised by M, contains the Greek letter Z.

⁴ *Beiblatt zur Anglia*, Band 47, Nr. 2 (1936), pp. 33-7.

⁵ *Uocales . . . sunt . . . numero quinque, a e i o u. harum duae, i et u, transeunt in consonantium potestatem . . . Semi-uocales sunt . . . numero septem, f l m n r s x . . . mutae sunt . . . numero nouem, b c d g h k p q t . . . y et z remanent quas litteras propter Graeca nomina admisimus* (Keil *Grammatici Latini* IV, 1863 p. 467.).

I am by no means convinced that these resemblances necessarily imply the dependence of Ogom on what for the moment we may call Donatian teaching. In the first place the grouping of the five vowels could come from a less elaborate presentation of the alphabet than that of Donatus, a presentation in which letters were simply divided into vowels and consonants. The division into four categories can be coincidental. The ogomist used twenty letters; hence, since he obviously wanted even categories, the only logical possibilities were to have five categories of four letters, or four categories of five. Furthermore, if he was really impressed by Donatus' divisions he could have made a complete category of semi-vowels as well as a complete category of mutes: this would only involve an interchange of the categorizing letters of the groups, that is, to present them as B D T C Q, M L F S N, and finally the miscellaneous group, H G Ng Z R. He did not do this, and so I conclude that the influence of Donatian teaching is not demonstrably present.

Thurneysen and Vendryes, who were impressed by some of Keller's views, were careful in their phraseology; while they stressed the name of Donatus they did not state that the inventor depended either directly or indirectly on his actual Grammar⁶. But the constant association of Donatus' name with Ogom has led gradually to a position where the cipher is regarded as deriving, if not from the actual work of Donatus, at least from grammarians of the *late* Roman empire. In this connection we may mention Jackson and Hamp. The last named, indeed, put the matter very vigorously in a review of a work on the alphabet by Gelb. He associates the invention of the script with the fifth century. He says: '... the structural categories on which ogham is built were beyond reasonable doubt historically derived from Latin grammarians and late Roman schools (and surely not from Runic, or off-centre Greek, or dark Druidic sources, much less mythical and anachronistic brands of Picts)'... This common current view, that Ogom derives from late grammarians such as Donatus, has led to some difficulty. Donatus' exact dates are unknown, but he is thought to have written about 350 A.D. If he wrote his Grammar at that date it is hardly likely that it could have influenced the inventor of Ogom very much before the late fourth century. The suggestion of such a late date drew a protest from Binchy who wrote: 'Professor Jackson of Edinburgh in a recent work puts forward the view that the Ogom script was devised

⁶ Thurneysen 'Zum Ogom', *Beiträge zur Geschichte der deutschen Sprache und Literatur*. lxi (1937) 188-208; Vendryes 'L'écriture ogamique et ses origines', *Études Celtiques* iv (1948) 83-116 (based upon a lecture given to l'Académie des Inscriptions et Belles Lettres in 1938). It is to be noted that Keller (*op. cit.* pp. 33, 37) regarded Ogom as an invention of the fifth century.

⁷ *ZCP* xxiv (1954), 312.

on the basis of the Latin alphabet by one of the Irish colonists in Britain and by him brought back to Ireland some time during the fourth century. Well, though I yield to nobody in my admiration for Professor Jackson, particularly for that great work of his, *Language and History in Early Britain*, I do not believe this. I think, first of all, that if an Irish colonist returning from Britain were to bring anything back with him, he would be more likely to bring the Latin alphabet itself rather than this extremely cumbrous way of representing it. I think also that there are indications that the use of Ogam is much earlier than the fourth century⁸. . . . In the course of his comment Binchy refers to Professor O'Rahilly's belief that Ogom was actually imported into Ireland by a Goidelic people in the first century before Christ. Another scholar who opposed the idea of such a late invention was the archaeologist Eóin Mac White. He opposed the idea on fairly precise grounds, attempting a preliminary typology of the inscriptions, and holding that those inscriptions assigned to the fifth century were secondary types⁹. He also referred to an inscription on a bone, a single letter, for which Dr Raftery had suggested a date in the second century. This is in fact a highly interesting example. It is a case of bone dice in which the five numbers one, two, three, four and six are represented by the appropriate number of dots. The number 5 is represented by the Ogom letter for F, which in primitive Irish represents consonantal U, which the inscriber used for the roman numeral. Apart from the suggested early date this inscription is of importance in that it shows a certain familiarity of the writer with Roman numerals. The theory of the origin of Ogom put forward here would comfortably allow the early dating of the object.

Fortunately there is an easy solution to the chronological difficulty. The name of Donatus has been over-used in this connection, and it is quite clear that he did not invent the division of the Latin alphabet into four groups. Quintilian, writing about 95 A.D., refers in passing to the current method of teaching the alphabet. He approves of the habit of giving children carved ivory alphabetical counters, and of the subdivision of the alphabet into vowels, semi-vowels, mutes and the two Greek letters¹⁰. This is the 'Donatian' categorization and we need have no doubt but that it was in use for about a century before Christ when the Romans began to use the Greek letters Y and Z in the spelling of Greek names. Before this the Romans must have had a three-fold division to which they simply added the two Greek letters as a fourth class. This creates the following position: In terms of the common assumption that Ogom is based on the Latin

⁸ *Studia Hibernica* ((1961), 8.

⁹ 'Contributions to a Study of Ogam Memorial Stones', *ZCP* xxviii (1960-1), 294 ff.

¹⁰ *Institutiones Oratoriae* I 4 6-7, etc.

alphabet the earliest possible date for its invention is not 400 A.D., as is widely assumed today. It is rather some time within the first century before Christ, when Z was introduced into Latin as the last letter of the alphabet.

In general terms the view to which I have come on this matter is as follows. The inventor, in creating his cipher, at first approached the problem in a purely mechanistic manner, and this is perhaps a procedure that one would expect from a cipherologist or encoder. Having achieved a certain result he revised it probably in the interests of easy memorising. His thinking and procedure would have been approximately along the following lines.

First he began with the normal Latin alphabet of post-100 B.C. which had incorporated at the end the two Greek letters Y and Z. To this he added the letter Ng, which was known to Greek and Latin grammarians, and went by the Greek name *agma*. The history of this letter has been studied by Professor Richardson in an article in *Hermathena*¹¹.

Here arises a very crucial point which caused some difficulty when I first approached this problem. At what point in his Latin alphabet would our inventor place the dubious letter Ng? He might, one would think, associate it with N, and place it before or after that letter. Or he might associate it with G, placing it before or after. There is, however, another and more logical approach. An alphabet is a mnemonic whole and it would not be sound practice to introduce a new letter anywhere in the middle—it would interrupt the traditional flow. Consequently when the Romans added the Greek letters Y and Z they were placed at the end, where they have stayed till today. Similarly, as Professor Richardson has shown in an amusing and interesting aside, the ampersand in recent times was taught in Irish schools as the last symbol in the English alphabet.¹² Furthermore, *agma* is referred to by Priscian who is quoting Varro, who in turn is quoting Ion (of Chios) as the twenty-fifth letter of the Greek alphabet¹³. Its only logical place is at the end. The inventor's Latin alphabet would then consist of twenty-four letters in the following order:

A B C D E F G H I K L M N O P Q R S T U X Y Z Ng

He decided to form these letters into groups of five. Such a grouping corresponded with the number of fingers on the hand and also fitted well into the Indo-European and specifically Celtic mode which was to think in terms of 5, 10, 15, 20, etc. At this point, faced with twenty-four letters, he had two courses open to

¹¹ L. J. Richardson, 'Agma, a forgotten Greek letter', *Hermathena* lviii (1941), 57 ff.

¹² *op. cit.*, p. 64.

¹³ Richardson, *op. cit.*, p. 65.

him. He could add another letter and create five groups of five, or he could dispense with four letters and have four groups. The latter course was more economic and he chose it. He dispensed with K because it was merely a duplicate of C, with P because the sound did not exist in his language or dialect, with X either because it was a double letter and could be represented by CS or because it was regarded as a duplicate of S; the Greek Y he did not need. If he had gone further and rejected H and Z (which may have been a temptation) he would, in order to maintain categories of five, have had to drop three more letters. This would leave his alphabet weak and insufficient for his purpose. He had now, in the first stage of the creation of his cipher achieved a fairly efficient alphabet of twenty letters as follows:

A B C D E F G H I L M N O Q R S T U Z Ng

At this point it seemed to me, in my original thinking on this matter, that the cipherologist's first step would be mechanical. There are two simple ways of dividing these letters into four groups. The most obvious is to arrange the alphabet in four groups of five letters as follows:

(1) A B C D E

(2) F G H I L

(3) M N O Q R

(4) S T U Z Ng

It is clear that these four groupings have no closer relationship to the Ogom groupings than would be achieved by a purely chance dealing out of twenty alphabetical cards. We may dismiss this and experimentally look at the other mechanical course that lay open to the inventor, that is, instead of dividing 5×4 to divide 4×5 , as follows:

A B C D
E F G H
I L M N
O Q R S
T U Z Ng

This figure, which I will call the Construct, has in the vertical groups of five letters, a close relationship to the groupings in the Ogom cipher. It is likely that the significance of the resemblances can be worked out in terms of mathematical probabilities. This, however, is hardly within my competence, but I can at least point out the factors that may be weighed.

The first thing to notice is that each of the categorizing letters falls into a different group, so that in a sense we have as in Ogom an A-group, a B-group, an H-group and an M-group. We have also, in the Construct, a satisfactory theoretical explanation as to how H and M came to be categorizing letters. It is fairly clear in the existing form of the Ogom cipher (as I have already stressed) that the inventor regarded his categories as consisting of a categorizing letter followed by two pairs, such as **H** / D T / C Q. The categorizing letter was regarded as independent, and not involved in phonetic or mnemonic pairing. If we look at the Construct we see that H and M are the top letters in their respective columns which were not to be used in phonetic or mnemonic pairing. In the column in which M is found the letters R and Z, not being phonetically paired, might have been used as categorizing letters; but the inventor, we may assume, took the easy course and moved the first non-phonetically paired letter to the top of the column. Similarly in the H-column, D, being a phonetically paired letter, was not to be used for categorization. There were three possible letters H N S, but the inventor, as in the case of M, chose the letter that stood at the head of the column.

We have now seen that there are already two questions involving mathematical probabilities. First that in the Construct the categorizing letters should each fall into a separate column, two (A B) falling into top place; secondly that the other two categorizing letters (M H) are separated from the top of the column by phonetically pairing letters which could not in the inventor's general system be used as categorizing letters.

Now for the moment, in comparing the columns of the Construct with the Ogom groupings, I am ignoring the order of letters. But it will be noticed that in the Construct, including the categorizing letter, four letters of the Ogom category A are found in category A of the Construct. Three letters of the Ogom category B are found in category B of the Construct. Four letters of the Ogom category M are found in category M of the Construct. And finally two letters of the Ogom category H are found in category H of the Construct. If we 'score' this achievement as in a game we will see that the Construct has scored 13 out of 20. This phenomenally high scoring is a further matter involving mathematical probabilities. To this we may add what may be a significant feature: the groups of scoring letters in the Construct all occur in solid blocks,¹⁴ and in no case is there the intervention of non-scoring letters, as if for instance we had **B Q L U F**.

¹⁴ This has been emphasised in the Construct by printing the scoring letters in black type.

Having achieved the position which I would regard as giving a mechanical score of 13 out of 20 the inventor now proceeds to re-arrange the letters in a manner which will produce a good phonetic or mnemonic arrangement. His aim (which is incapable of full realization) is to have in each vertical line a categorizing letter followed by two mnemonic pairs.

- (1) He removes four letters from the Construct, letters for which he has special pairing plans. These are T Q C and Ng.
- (2) Since M and H are the top letters in each column not involved in mnemonic pairing he moves each to the top of its column.
- (3) He moves U over to the space left vacant by T.
- (4) He now makes the obvious pairings of G and Ng, and of D and T.
- (5) He is left with the pair C Q. He decides that, consisting as it does of stops, this pair belongs phonetically and mnemonically with D T and he accommodates them in that line, moving N S over to line 2, since being 'semi-vowels' they fit in well with F L. Here we may well have a trace of 'Donatian' teaching.
- (6) He now makes certain re-arrangements of order within each vertical column. Some comments on this order will be made below.

In this experimental process I think it likely that the inventor used carved counters of the type described by Quintilian.

It may be hard at first to accept that it may be proved or made seem likely, that moves of the type that I have described actually took place. But there is, it seems to me, fairly precise confirmation within the Ogom groupings of such a relationship to the Construct as I have suggested. To find this confirmation we must for the moment forget about the Construct and look again at the Ogom groupings.

Functionally, as I have already stated, there are three types of letter. First there are the categorizing letters A B H M. In three of the four groups the categorizing letters are followed by phonetic pairs. There are five in all: O U, E I, D T, C Q, G Ng. These are all paired in accordance with the sequence of letters in the Latin alphabet, granted our assumption that Ng was placed last. Hence, in the pairs O U and E I, O precedes U, E precedes I, etc.

Up to this point we may say that the inventor has abstracted from his alphabet four categorizing letters and five pairs, a total of fourteen. This leaves him with six letters which, following his general system,

he must regard as three pairs. Since he has selected his phonetic pairs it follows that these letters can only form pairs which are non-phonetic or minimally phonetic. Giving them in their order in the Latin alphabet they are F L N R S Z. Ignoring for the moment the matter of the order in each pair, there are fifteen ways of pairing these letters.

Had the inventor followed directly the order in the Latin alphabet his pairs would be F L / N R / S Z. This he obviously did not do. His pairs as given in the Ogom cipher are L F / S N / Z R. Now if at this point we look at the Construct we see that there F is found before L, R before Z and N before S. The pairings (if we may so regard them) in the Construct are ultimately related to the order in the Latin alphabet, but they have been mechanically modified by being selected from vertical readings. It is precisely this modification which is found in the pairings in the Ogom cipher. The decision of the cipherologist to put the elements of phonetic pairs in alphabetical order, and to put non-phonetic pairs in anti-alphabetical order is hard to understand, but it seems to be systematic. The position is as if there are eight coins, five pennies and three half-pennies. When they are tossed the pennies all turn up heads, and the half-pennies tails. Finally, in this regard, a significant aspect of the situation must be emphasised. In selecting the categorizing letters H and M the inventor exercised his free judgement. In the case of A B he did not, and these letters occupy the same positions in the Ogom cipher and in the Construct. It is clear that in creating five phonetic pairs he had similarly to exercise judgement. The six non-phonetic pairs would represent the 'left over' element about which the inventor could do nothing spectacular or satisfactory, and consequently judgement was not exercised. Consequently in the case of the 'left over' letters there is a particularly close relationship between the letter-associations in the Ogom cipher and in the Construct. The mathematician will have to calculate the chances of a well defined group of six letters being found paired in both.

It seems to me that judgement on the case I have put must be made by philologists and mathematicians. The philologist might be expected to pass an initial judgement on certain matters: first the reasonableness of the assumptions that the inventor would use the Latin F for his W/V sound and that Ng (*agma*) is to be taken as the last letter of the form of the Latin alphabet which is basic to the cipher; secondly on the validity of the observation that the creator of Ogom thinks of the group not as a sequence of five letters, but as a categorizing letter followed by two pairs.

The mathematician can then perhaps work out probabilities with regard to the significance of the Construct, there being in all five

factors. First, that the four categorizing letters fall into different columns; secondly that H and M should each be the first non-pairing letter in its column; thirdly the significance of the high 'score'; fourthly the matter of solid blocks; fifthly the occurrence of the three non-phonetic pairs in the Ogom cipher and in the Construct.

Finally, in regard to the Construct I may anticipate an objection. It may be said that it would seem likely that the inventor's first act would be to make a category of vowels. This would only make a small difference to the general theory put forward here, for, from the consonants alone one can create a Construct which will pose similar questions to those I have put. The score I have referred to as thirteen out of twenty is one of 65%. A Construct based on consonants alone would score nine out of fifteen which is 60%, and all the other questions involving probabilities would remain the same.

Up to this point I have been mainly concerned with the structure of Ogom. As to date, I have so far, by reference to Quintilian, shown that the popular current theory of invention about 400 A.D., insofar as it is based on the alleged influence of the teaching of late grammarians, cannot be sustained. The thesis I have presented would allow any date between 100 B.C. and 400 A.D. It would be reasonable to ask what point in this lengthy period of half a millenium might be considered most likely. Any answer given to this question must be tentative but, if only to further discussion, I may venture some comments. Now I have already quoted Binchy as saying that Ogom was invented much earlier than the fourth century. Possibly with approval, and certainly with respect, he quotes O'Rahilly's view that the script was imported into Ireland by a Goidelic-speaking people in the first century before Christ. I would like to say that, in the present state of our knowledge, I tend to align myself in a general way with O'Rahilly; but with the reservations that the importation might not imply an invasion, and that the date suggested, while possible, might be too early. In this matter we must give some consideration to the nature of the cipher itself, and it may be noticed that I have always referred to it as a cipher, never as an alphabet. Binchy, as noted above, has said that an Irishman living in Britain in the fourth century would be more likely to bring back the Latin alphabet to his people than this cumbrous adaptation of it. But, however far we push back the invention of Ogom this problem remains. Why should a continental Celt in the first century B.C. encourage the use of such a script amongst his people when both the Greek and Roman alphabets were known to them, and freely used? As soon as we ask this question we are faced with the problem of the whole purpose of this ingenious invention. It seems to be at least a possibility that Ogom was first devised so as not to be understood

by those who had a knowledge of the Latin alphabet. Its purpose could be to send messages, probably on wood, which, if intercepted, could not be read or interpreted. Hence, it would not have been invented by an individual who, by some mere accident, came into contact with Roman civilization, but at a time and in a place where the Roman alphabet was widely known. In this case we would regard it not as a plaything, but as something brought into being by political or military necessity. Furthermore certain possible affinities with the Runic script might suggest an area where Romans, Celts and Germanic peoples were in contact.

As is well known one of the features that Odom shares with Runic is that both systems use meaningful words as letter-names. I take what seems to me to be a common-sense if prosaic view of this matter.

In teaching an alphabet it is good practice to present the pupil with the symbol, the sound, and a standard example. Presentations of the alphabet in English often skip over the sound and teach by means of the symbol and the standard example: A is for Apple, B is for Bat, C is for Cat, etc. In early Celtic, we may, I think, assume a similar form of teaching, and by a very understandable process the standard example became so closely identified with the symbol that it in fact became a letter-name. The same explanation could hold for the Runic alphabet.

It seems that in this early Celtic alphabetical teaching the names for P and Q, were *perta* and *querta*, dialect variations of a word apparently meaning 'bush'. In the Runic system, Germanic, having few if any words beginning with P, borrowed *perta* as a letter-name and this appears in Gothic as *pertra*. Anglo-Saxon has the riming names for P and Q, *peorð* and *cweorð*. The Odom name for Q is, of course *cert* (*ceirt*).¹⁵

The Irish letter-names are constantly associated in Irish tradition with Odom symbols. Its Germanic cognates suggest that the letter-name *cert* was imported into Ireland from continental Celtic. It is quite reasonable, perhaps even necessary, to suppose that the Odom symbols were imported with the letter-names. The Odom cipher could have been used on the continent equally by users of P as by users of Q; the former need only use the P-symbol for Q, just as they would say *perta* instead of *querta* to indicate the word 'bush.' No examples of the script have survived on the continent, perhaps for the reason that it was invented as a secret code or cipher, and was never intended to reach epigraphic dignity: it could not be

¹⁵ See Marstrander 'Om runene og runenavnes oprindelse', *Norsk Tidsskrift for Sprogvidenskap*, I, (1928) p. 138 ff. For a discussion of Marstrander's views see Helmut Arntz, *Handbuch der Runenkunde*, p. 285 ff. Arntz's view that Odom was a derivative of Runic made it necessary that he should reject Marstrander's arguments.

expected to compete publicly with either the Greek or Latin alphabets.

The mechanistic theory of the origin of the Ogom cipher in the Latin alphabet put forward above was in some degree anticipated almost a century ago by Charles Graves, bishop of Limerick; Graves, it may be said, was a mathematician as well as a Celtic scholar. His approach to the problem, though differing in many respects, has affinity with the present approach insofar as a 4×5 'Construct' was created, and conclusions drawn from vertical readings. The following are Graves' comments¹⁶:

"It may not be easy to find the clew of thought which led the contriver of the Ogham alphabet to arrange the letters in the order which it exhibits. It is possible that the process may have been purely arbitrary. It seems, however, not improbable that he may have taken the following course in grouping and arranging them. He may have commenced by writing the twenty-three letters of the Latin alphabet in the following form:—

A	B	C	D
E	F	G	H
I	K	L	M
N	O	P	Q
R	S	T	V
X	Y	Z	

He might then proceed to exclude the letters which were not in use in Irish, striking out K, P, X, and Y. That P was not regarded as an Irish letter may be shown by the authority of the Uraicept: *ni bi p isin gaedilg*. He might then substitute Ng for P; that naso-palatal being an essential sound in the Celtic dialects. He might next transfer C into the place of the excluded K, as being equivalent in sound; and promote Z from the bottom, where it was standing by itself, to the top of the third vertical column. His paradigm would then stand thus:—

A ⁴	B ¹	Z ³	D ²
E ⁴	F ¹	G ³	H ²
I ⁴	C ²	L ¹	M ³
N ¹	O ⁴	Ng ³	Q ²
R ³	S ¹	T ²	V ⁴

The indices affixed to the letters in the last paradigm will direct the reader's attention to the fact that each horizontal line contains one letter out of each of the five¹⁷ *aicmes* in the Beithluisnin. As the

¹⁶ *Hermathena* (1876), 460-1.

¹⁷ A slip for 'four'.

vowels constitute a group by themselves, the alphabet-maker may have next selected them to form a first *aicme*, and proceeded to group the other *aicmes*, putting into them a letter out of each horizontal line, and doing this either quite arbitrarily or for some fanciful reason."

To the last word quoted above Graves adds a footnote: 'It is easy to see that a single change in the order of the letters both in the third and fourth horizontal lines, and a double change in the fifth line, would make the order of the indices 4, 1, 3, 2 in all the lines, and would thus separate the *aicmes*, bringing each out into a vertical column by itself.'

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