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A New Edition of The Ogham Inscriptions: The Advantages and Limitations of Computers

JOST GIPPERT

When I started my investigations into Ogham inscriptions in 1978, I did not expect that computers would so quickly turn out to be essential to my studies. In fact I had no idea at all of how to use them at that time, and the only instruments I then needed were a camera, pencils and paper. At that time my aims were restricted too: what I intended to take home from my first field trips, to Ireland (1978) and Scotland (1979), was mostly materials for documenting inscriptions which might be helpful for the academic teaching of the history of the Irish language. But working more thoroughly with the existing editions, especially with R.A.S Macalister's *Corpus Inscriptionum Insularum Celticarum*,[1] I was soon convinced that a new edition of the inscriptions was an urgent task, all the more since the state of preservation of many of them was very bad.

Things had changed a bit by 1988 when I was invited to report on my work at a conference in Eichstätt. By that time I had worked out the general outline of the new edition I intended to complete, and I was glad to be able to publish it in the conference proceedings.[2] For convenience, the preliminaries

[1] 2 vols (Dublin, 1945 and 1949) (hereafter *CIIC*); reprint of *CIIC*, I, ed. D. McManus (Dublin, 1996). Other editions of ogham inscriptions: R.R. Brash, *The Ogam Inscribed Monuments of The Gaedhil in The British Islands* (London, 1879; posthumous ed. G.M. Atkinson); S. Ferguson, *Ogham Inscriptions in Ireland, Wales, and Scotland* (Edinburgh, 1887); R.A.S. Macalister, *Studies in Irish Epigraphy*, Vols. 1–3 (London, 1897, 1902, 1907); V.E. Nash-Williams, *The Early Christian Monuments of Wales* (Cardiff, 1950). The so-called 'Pictish' inscriptions were edited by R.A.S. Macalister in his article 'The Inscriptions and Language of the Picts', in *Féilscríbhinn Eóin McNéill*, ed. J. Ryan (Dublin, 1940; repr. Dublin, 1995), 184–226. Now see also K. Forsyth, *The Ogham Inscriptions of Scotland: An Edited Corpus*, Harvard University PhD Dissertation (Ann Arbor, Michigan: UMI, 1996).

[2] 'Präliminarien zu einer Neuausgabe der Ogaminschriften', in *Britain 400–600: Language and History*, ed. A. Bammesberger and A. Wollmann, Anglistische Forschungen 205 (Heidelberg, 1990), 291–306. An announcement was published under the heading 'Towards a New Edition of the Ogam Inscriptions' in *Celtic Cultures Newsletter* 6 (Aug. 1990), 73–4.

as established then may be summarized briefly here. They comprise: (1) all information available on the history of the inscribed monuments; (2) readings as published by former investigators; (3) older graphic representations (photographs, sketches and so on) of the monuments; (4) documentation of the present state of the monuments, supplied by coloured photographs; (5) new readings of the inscriptions; (6) investigation into the relationship between linguistic and palaeographic features; and (7) verification of the readings with due consideration of linguistic, philological and historical data.[3]

By that time, computers had become a part of my work, and since then they have acquired a central rôle. As early as 1986, I had started to transfer all kinds of textual data related to the individual monuments (readings, bibliography, historical information and so on) into a computer database. The DBase-style DOS program I used for this was available until recently.[4]

Vowel letters		Consonant letters						"Forfeda"	
		B-Series		*H*-Series		*M*-Series			
A	ᚐ	*B*	ᚁ	*H	ᚆ	*M	ᚋ	*X/AE*	ᚓ
O	ᚑ	*L*	ᚂ	*D	ᚇ	*G	ᚌ	*CH/EA*	ᚔ
U	ᚒ	*V*	ᚃ	*T	ᚈ	*ŋ	ᚍ	*P/IA*	ᚕ
E	ᚓ	*S*	ᚄ	*C	ᚉ	*Z	ᚎ	*TH/OI*	ᚖ
I	ᚔ	*N*	ᚅ	*Q	ᚊ	*R	ᚏ	*PH/UI*	ᚗ

Table 1: The Ogham characters.

One problem that was not easy to solve in those days concerned the special fonts necessary for a one-to-one rendering of ogham characters both on the screen and with a printer. Using the EGA/VGA standard of DOS computers, this was restricted by the size of the small matrix of dots which these graphic interfaces used to represent individual characters. For ogham, this was a peculiar problem in that some of the characters of the ogham *beitheluisnin*, especially the ones having four of five strokes, would not fit into a matrix of 8 × 14 or 16 dots (cf. Table 1 for the ogham characters[5]). To

[3] Some of the problems involved were illustrated in my booklet *Ogam — Eine frühe keltische Schrifterfindung*, Lectiones eruditorum extraneorum in facultate philosophica Universitatis Carolinae Pragensis factae, 1 (Prague, 1992 [1993]). For a thorough treatment of ogham tradition cf. D. McManus's *A Guide to Ogam*, Maynooth Monographs 4 (Maynooth, 1991).

[4] The program developed by K. Boekels (Berlin / Bamberg) was first published under the name of 'Data Manager', later renamed 'Polydat'. It was available as freeware via the Internet until the end of 1999.

[5] For *H* and the third and fourth characters of the *M*-Series, the traditional values are given here; a different interpretation (Y, G^w, S^t) was proposed by D. McManus in 'Ogam: Archaizing, Orthography and the Authenticity of the Manuscript Key to the Alphabet', *Ériu* 37 (1986), 1–31, at 28.

overcome this problem, the wider characters had to be split into two elements which made them rather awkward to use. Of course, the font also had to comprise some additional characters for displaying Celtic language materials. The resulting VGA font can be seen in Fig. 1; a screen-shot of the database is given in Fig. 2.

Fig. 1: VGA font for ogham and Celtic

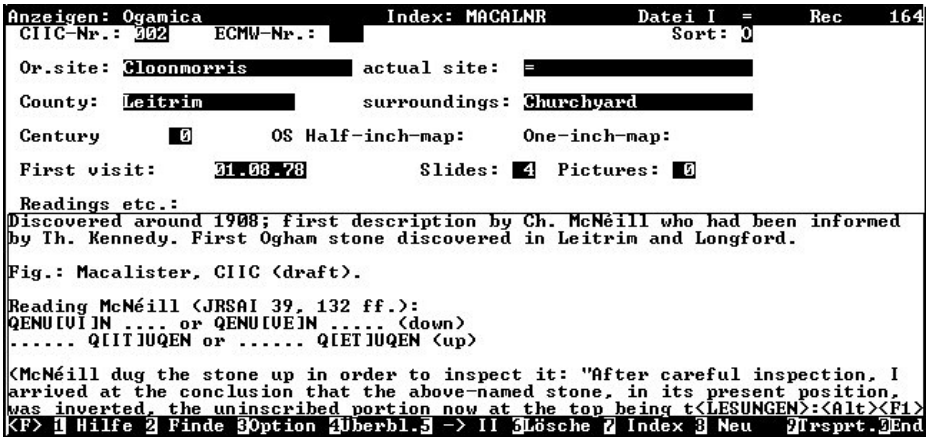


Fig. 2: The ogham database data-entry form as it appears on the screen

An equivalent font had to be generated for printing too. Although the matrices of both 24-pin dot-matrix printers and laser-jets as available at that time was not as limited as the EGA/VGA graphics card, the ogham characters had to be arranged in a similar way, to allow for a one-to-one printout. The article mentioned in n. 2 was printed using these fonts. A scalable vectorized font to be used on today's graphic-based computers was later styled according to this principle to ensure compatibility with the data collected so far (cf. Table 2). This DOS-based font was further arranged in several formats (Truetype, Postscript) to meet the requirements of different operating systems. Only recently has it become possible to convert the data

into a standardized encoding scheme, since the ogham script has now been integrated into the Unicode standard.[6]

	0										1								
	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
000																				
020														!	"	#	$	%	&	'
040	(	)	*	+	,	-	.	/	0	1	2	3	4	5	6	7	8	9	:	;
060	<	=	>	?	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
080	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_	`	a	b	c
100	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w
120	x	y	z	{	|	}	~	⌂	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ï
140	î	ì	Ä	Å	É	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü	ō	¥	Ŋ	ŋ	⊢
160	á	í	ó	ú	ñ	Ñ	ā	ē	¿	⌐	¬	ī	ū	¡	«	»	Â	Á	À	Ã
180	ã	Ð	Ê	È	ẽ	Ë	Î	Í	Ì	ĩ	Ï	Ô	Ó	Ò	Õ	Œ	Ø	Ǫ	Ş	Ţ
200	Þ	Û	Ú	Ù	ũ	Ŵ	Ý	Ŷ	ã	ă	ð	ẽ	ĩ	õ	œ	ø	ǫ	ş	ţ	þ
220	ũ	ŵ	ý	ŷ	Ÿ	ß	⊢	⊢	⊢	⊢	–	⌐	⌐	⌐	⌐	⊥	⊥	⊥	⊥	≠
240	#	#	#	θ	ɵ	¥	¥	≈	⊥	·	—	√	‿	‿	□					
	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
	0										1									

Table 2: Truetype font for printing Ogham

I entered a second level of data collection when in 1986 I started storing images in electronic form. From the beginning, I had planned that my new edition should be amply supported by photographs, since they were far from abundant in earlier editions and the state of the monuments is not improving as time goes by! Although photographs and, especially, colour slides are an excellent means of preserving visual information, electronic storage has several advantages: on the one hand, digital images can claim to have 'eternal' durability, and on the other hand, they can be handled by the computer as easily as text files, being ready for publishing, duplication, exchange, viewing, and even editing.

Digitization of images requires special equipment. The fastest method is to use a digital camera right from the beginning, i.e. when recording the original monument. Although the quality of digital images produced in this way is steadily increasing, for the fullest preservation of data conventional

[6] For the standard (Unicode 3.0), see the web pages http://www.unicode.org/unicode/standard/versions/Unicode3.0.html and http://charts.unicode.org/PDF/U1680.pdf.

photographs of a high standard should not be dispensed with altogether, all the more since they can always be used as a basis for later digitization using optical scanners.

In the course of the present project, several scanners have been used for the digitization of photographs. The choice was mostly dictated by cost (the project has never been funded), but the purposes of digitizing had to be taken into account too. A black-and-white flat-bed scanner with a resolution of 300 dots per inch may give acceptable results when a 9 × 11 cm (3 × 4") photograph is to be reproduced on a laser printer as a text illustration (the photographs accompanying the article mentioned in n. 2 were produced in this way), but a high-resolution colour scanner will be required whenever the optical data are to be stored for preservation and future analysis or when a professional printout is desired.

A special scanner is necessary for digitizing of 24 × 36 mm (1 × 1½") colour slides. Since the original images are extremely small, the resolution must be much higher than that of flat-bed scanners; a minimum of 2500 dots per inch seems necessary when the data are to be preserved 'for eternity'.[7] In my experience, high resolution scanning from colour slides yields the best results when compared with the other methods described. Incidentally, colour slide scanners can also be used for scanning ordinary negatives giving, perhaps, better results than scanning the printed photograph.

One major advantage of digitized images lies in their availability for all kinds of electronic editing. For this reason digitization is likely to develop into a principle method of epigraphic work in general. In the past epigraphists were often content to present their objects in rough sketches, drawn either from the original or from rubbings, squeezes, or even casts, thus introducing a large degree of subjectivity to what they intended to show. By comparison, photographs are usually a much better means of representing the visual impression of the original monument. The information that photography can yield depends, however, on the actual state of the monument. This is especially true in the case of ogham monuments, which are mostly not preserved in museums but have been left standing in the countryside, covered by vegetation and exposed to all kinds of weather and damage by cattle. Moreover, ogham writing itself, being arranged on the edges of the monuments, is extremely vulnerable to damage and hard to read. Under these conditions, photographs cannot always sufficiently reveal the inscription as it indeed is. Here, digitizing can help a lot: having to hand the steadily developing facilities of graphics software,[8] we can easily improve the

[7] Since 1987 the following scanners have been used in the course of the project: (1) flat-bed scanners: Xerox Datacopy 701; HP ScanJet IIp (300 dpi; b/w) / IIcx (600 dpi; colour); (2) colour slide scanner: Polaroid SprintScan 35 (2700 dpi; colour slides and negatives).

[8] In the course of the project, I used several graphic programs such as PhotoShop (Adobe), PhotoStyler (Aldus), PhotoFinish (ZSoft), or Paint Shop Professional

appearance of a given photograph by manually enhancing its contrast, saturation, luminance and so on, without depending on different methods of (automatic) film developing. Furthermore, we can improve the information provided by manually adding hints for the reader, e.g. by redrawing the strokes that constitute the ogham characters in contrast with the so-called 'stem-line' and by filtering the image thus received in order to yield the maximum contrast between the inscription and its background. Of course this too is a subjective method, but having both the original photograph and the edited one side by side, the reader can much more easily distinguish between the details on the monument and an editor's guesses, than by judging from sketches or drafts alone.

Figs. 3–12 are intended to demonstrate what can be achieved by editing digitized photographs with a view to a printed edition. The monuments in question are both to be found in Ireland. The first one, no. 54 in Macalister's corpus (*CIIC*), is now preserved in the church of Killaloe, Co. Clare.[9] Originally part of a high cross, it is a bilingual monument and contains a blessing written in late ('scholastic') ogham beside a runic inscription which denotes a Viking named ÞURKRIM who had the cross erected.[10] The second one, *CIIC* no. 104, stands in the ruined churchyard of Aghabullogue, Co. Cork, attracting attention by the large pebble attached to its top.[11] The readings that can be established in accordance with the photographs are as given below. Contrasting them with the interpretations published in Macalister's *CIIC*, we can easily see why many of the latter cannot be regarded as reliable.[12]

(JASC). Although there are differences in functions and handling, all of these are usable for the tasks implied.

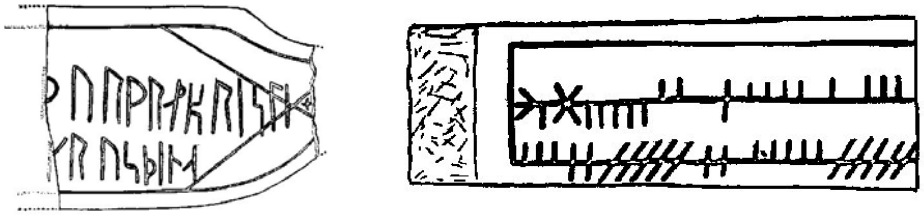
9 *CIIC*, I, 58–9.

10 The sketches are reproduced from R.A.S. Macalister, 'Further notes on the Runic inscription at Killaloe Cathedral', *Proceedings of the Royal Irish Academy* 38, C, 8-9 (1929), 237 (for the source of Fig. 6, runic inscription) and *CIIC*, I, 58 (for the source of Fig. 7, ogham inscription). See also now M.P. Barnes, J.R. Hagland and R.I. Page, *The Runic Inscriptions of Viking Age Dublin*, Medieval Dublin Excavations 1962–81, ser. B., 5 (Dublin, 1997), 53–6.

11 The drawings are taken from Brash, *Ogham Inscribed Monuments*, pl. IX (for Fig. 8) and *CIIC* I, 104 (for Fig. 9).

12 A detailed description and argument cannot be attempted here but will be found in the Internet edition introduced below.

Figs 3–5: CIIC, no. 54 (Killaloe): photograph, edited photograph and filtered photograph.



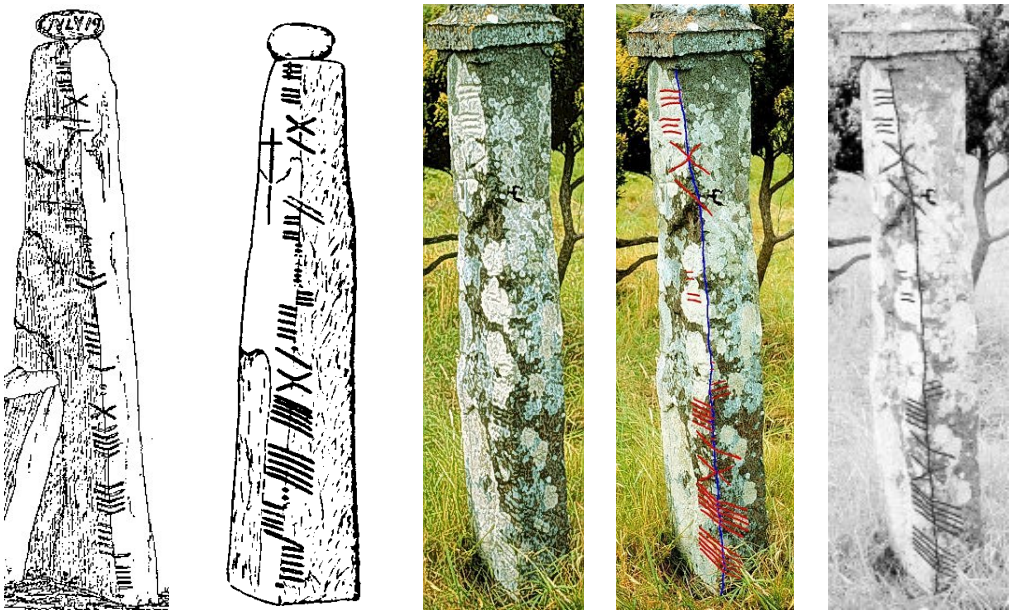
Figs. 6–7: CIIC, no. 54 (Killaloe): sketches of runic and ogham inscriptions after Macalister

Killaloe (*CIIC*, no. 54) readings (Figs. 3–7):

(runic inscription)
þurkrim risti ᛌ ᛌ krus þina
'Þorgrim engraved ᛌ ᛌ this cross.'
(Macalister: [TH]URGRIM RISTI [KR]US THINA)

(ogham inscription)
BE͡ANDACHT[ᛌ ᛌ TOROQ*R*[[13]
'(A) blessing [upon] ᛌ Þorgrim.'
(Macalister: BENDACHT [AR] TOROQR[IM])

[13] The second part of the ogham inscription is problematic. If the engraver took the ornamental frame as the stem-line for this part, the two H-letters (T, Q) have been inverted (as if V, N; cp. *VEDELMET[T] misspelt as TELEDMEV[V] in *CIIC*, no. 206, for which see further n. 14 below). The drawing in *CIIC* (reproduced in Fig. 7) is misleading on this point.



Figs. 8–12: CIIC, no. 104 (Aghabullogue): sketches by Brash and Macalister; and photograph, edited photograph and filtered photograph

Aghabullogue (CIIC, no. 104) readings (Figs. 8–12):

—*CO*RRÉ͡A MAQ V[–]D*D*[–]MÉ͡ATT
'[Inscription in the name of] Corr son of *Fedelmid'[14]
(Macalister: ANM CORRE MAQVI UDD[GLO]METT)

The value of the visual information is even greater if the images thus edited can be viewed in their original colours. It seems unlikely, though, that a full-colour printed edition of the ogham inscriptions could ever be published because of the cost. There is, however, another medium of publication that can easily be used for this purpose, viz. the international data network (the 'Internet'). Although it is still far from being accessible to everyone, even today the Internet can be used for scientific publishing with much less effort and cost than traditional printing would require.

[14] The name read (tentatively) as UDDGLOMETT by Macalister could be restored as *VEDDELMÉ͡ATT[A], thus representing the genitive of the *i*-stem name *Fedelmid*. Cf. the forms VEDDELLEMETTO attested on the stone from Pilsworth, Co. Kilkenny (discovered 1969) and, with inverted letters, *VEDELMET[T] on a stone from Kilcoolaght, Co. Kerry (*CIIC*, No. 206; for these cf. McManus, *Guide*, 75).

Internet publishing has several further advantages over a printed edition, especially with regard to epigraphic material. One of these lies in the fact that the handling of both textual and graphic materials necessary in epigraphic studies is an essential feature of Internet browsers: system-independent methods of linking texts and images were indeed developed for the very purpose of Internet publishing. All kinds of epigraphic publications can especially benefit from the so-called 'hypertext' procedures. These can be used, for example, for linking interpretations of different inscriptions, linking interpretations and an extended bibliography, or linking words appearing in the inscriptions and a dictionary, an index, a commentary and so on. Linking is even possible between text and images or between different graphic files, for example between low-resolution and high-resolution pictures or between large-scale and low-scale maps for localizing monuments and so on.

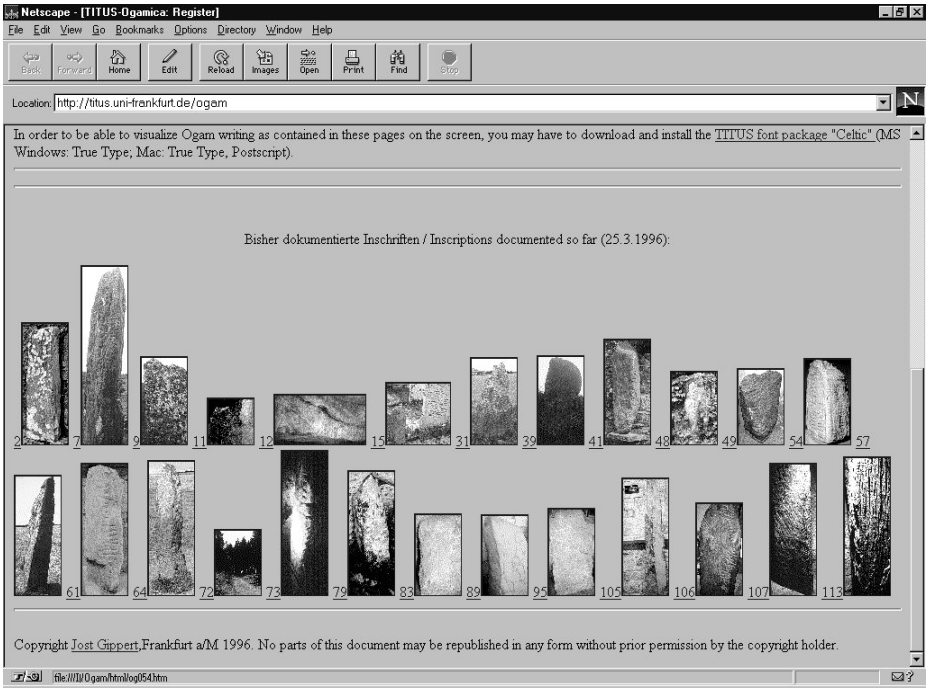
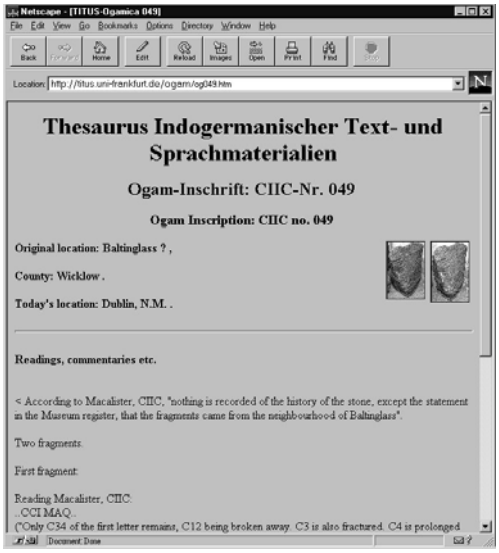
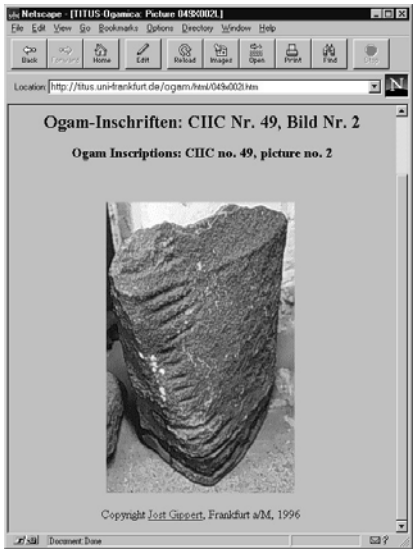


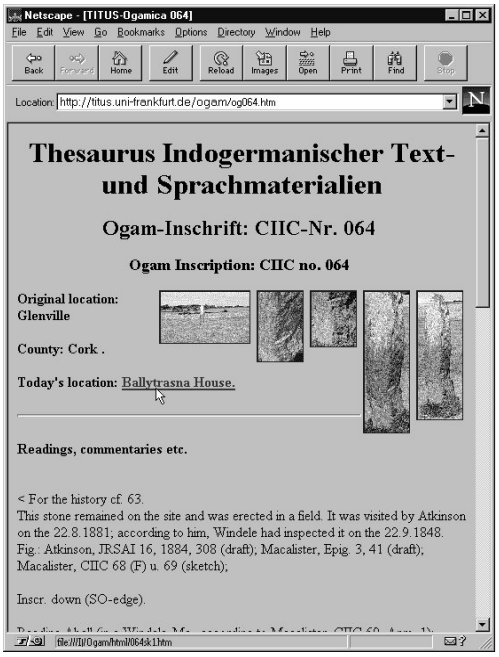
Fig. 13: Choice from a list of photographs.

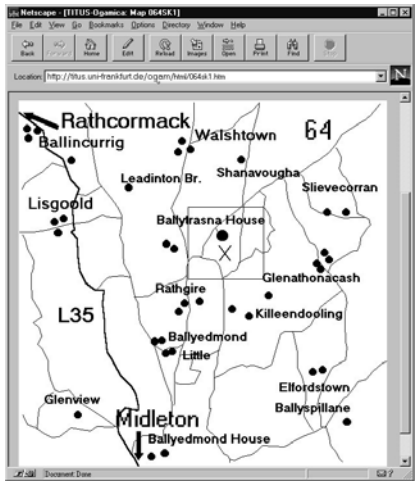
Linking facilities are demonstrated in Figs. 13–18. Starting from a page containing a picture catalogue (Fig. 13), the descriptions of documents (for example, Fig. 14: ogham monument *CIIC* no. 49) can be accessed simply by clicking on the pictures. Each description in its turn contains small-scale images (so-called 'thumb-nails') which serve as a link to their large-scale equivalents (Fig. 15). Likewise, the entry concerning the current location of the ogham monument *CIIC* no. 64, 'Ballytrasna House' (Fig. 16), is prepared as a link to the map of the area in question (Fig. 17) and so on.





Figs. 14–15: low- and high-resolution pictures.





Figs. 16–17: Linking with the map file.

Another advantage of an Internet edition is that it can be regarded as a 'living' edition. While a printed book is fixed, in the sense that it cannot easily be corrected after passing through the press, an electronic text can be updated perpetually with corrections, additions and the like. This has an interesting effect on readers and users, in that they will have to verify (and cite) not

only the year of publication but the exact date of a published text ('page'). On the other hand, an Internet editor can immediately react to readers' criticism submitted either in a conventional way, orally or in writing, or via the same medium as that used for publication, viz. the Internet. In this way, readers and users can participate in the process of publishing to a far greater extent than when printing is required.

This is why I decided to prepare the edition of ogham inscriptions as an electronic one and to make it accessible to the public via the Internet before having completed the work in the usual way. My edition is located on a special server of the Institut für Vergleichende Sprachwissenschaft, Phonetik und Slavische Philologie, Johann Wolfgang Goethe-Universität, Frankfurt am Main (cf. Fig. 18 which shows the 'homepage' of the edition; its present URL is http://titus.uni-frankfurt.de/ogam). It forms part of the so called 'TITUS' project (the abbreviation stands for *Thesaurus Indogermanischer Text- und Sprachmaterialien*) which aims to gather textual and other linguistic resources relevant to the whole of Indo-European studies.[15] Epigraphic materials represent but a minor part of what is covered by the project. The great bulk consists of textual sources, ranging from the Old Indic Rig-Veda to Icelandic sagas. But of course, Old and Middle Irish texts fall into its scope as well, and so we can envisage that the connections persisting between names mentioned in both (epic or historical) texts and ogham inscriptions will be in future be revealable using hypertext links.[16]

A number of problems have still to be solved before the Internet edition of the Ogham inscriptions can claim to have achieved its aims as outlined here. First, we still have to cope with the problem of font representation. Although the Truetype font designed for displaying ogham is available for downloading from the server (cf. the notice about the font package contained on the homepage, Fig. 18), as was stated above this can only be regarded as a temporary expedient. Another problem resides in the fact that the legal conditions of Internet publishing have not yet been clarified in detail, at least as far as authors' rights are concerned. As long as the structure of the Internet allows not only for retrieving and copying of data (which is intended in the case of a non-commercial publication) but also for easy republishing, authors cannot rely upon their intellectual, literary and artistic property being respected by everyone. Entering a copyright notice at the end of each

[15] For the TITUS project, see my 'TITUS. Das Projekt eines indogermanistischen Thesaurus', *LDV-Forum* 12/2 (1995), 35–47; 'TITUS – Von der Keilschrifttafel zur Textdatenbank', *Forschung Frankfurt*, 4/1995, 46–56; 'TITUS – Alte und neue Perspektiven eines indogermanistischen Thesaurus', *Studia Mesopotamica, Iranica et Anatolica* 2, 1996 [1997], 49–76.

[16] For the time being, many of the texts in the TITUS collection cannot be made publicly accessible from the server. This is mostly due to unsolved questions of copyright.

Fig. 18: The Ogham ' homepage'.

document is hardly sufficient to prevent misuse. A third problem which must be noted is that the transfer of larger files becomes ever more time-consuming as more and more people get connected to and use the Internet. In the present context, this concerns mostly graphic images: a colour slide digitized at a resolution of 2700 dots per inch forms a file of 2 megabytes, even if stored in a compressed format (JPG). It seems reasonable to choose lower resolutions (which means lower quality) for Internet publications, since the quality level that should be envisaged here is the one determined by good readability on a normal computer screen, not the one needed for professional printouts.

Apart from storing graphic and textual data and publishing the results in a (printed or electronic) edition, an epigraphist's work will in future be aided by computers in several ways. The development of optical devices that are able to scan not only surfaces but three-dimensional objects, will, if applied to inscribed monuments, provide an instrument for investigating carv-

ing methods as well as chronological and palaeographical features.[17] In the case of ogham writing with its peculiarities, however, we must not expect too much from such a development. The script itself leaves but scanty room for palaeographical considerations, and most of the monuments are in a state of preservation that will hardly allow for reliable results when being analysed by scanning machines. The decision whether a given stroke is part of an ogham character or a mere scratch or fissure of the stone will always remain with the epigraphist.

[17] For perspectives on computer-aided palaeographical investigations of manuscript writings, see my 'Paläographische Untersuchungen mit dem Computer', *Studia Mesopotamica, Iranica et Anatolica* 2, 1996 [1997], 77–100.