

THE CHRONOLOGY OF THE IRISH ANNALS

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ABSTRACT

The chronology of much of the Irish annals has hitherto been most uncertain, particularly from the fifth to the eighth century, which has seriously hindered their use as historical sources. This paper demonstrates that the oldest chronological apparatus preserved in these annals is the kalend-plus-ferial and, further, that the ferial data recorded in the Annals of Tigernach and Chronicon Scotorum may be restored and constitute a cogent sequence from the Incarnation up to the middle of the seventh century. When this chronology is calibrated using events for which we have independent chronological information, it emerges that thirteen kalends were removed from the Iona Chronicle between the Anno Domini years 424–664, and thus we may recover the original chronology of that chronicle. Collation of this chronology with those of the Annals of Ulster and the Annals of Inisfallen shows that both preserve derivative and corrupted chronologies; this collation has been made available on the World Wide Web at <http://www.cs.tcd.ie/Dan.McCarthy/chronology/synchronisms/annals-chron.htm>.

Introduction

In 1972 Kathleen Hughes declared of the Irish annals, ‘of all our historical sources they are the ones which most urgently need study’, and she herself went on to examine in some detail the problem of identifying the oldest constituents in the annals, concluding: ‘It looks as if a Scottish/Ulster chronicle formed the basis of our present annals. They were probably the oldest stratum of entries.’¹ This stratum she identified as continuing up to *c.* Anno Domini (AD) 740 and, following John Bannerman in referring to this material as the Iona Chronicle, she went on to examine and identify a number of the characteristics of both this chronicle and the later annal compilations that incorporated it.² However, one aspect of these annals that Kathleen Hughes did not discuss was their chronological structure, and while in her article she repeatedly cited AD years for items cited from the Annals of Ulster (AU) and the Annals of Tigernach (AT),³ the only indication she gave that there may be something untoward concerning these numbers was that she prefixed ‘=’ before all the ‘AT years’ and asserted in a

¹Kathleen Hughes, *Early Christian Ireland: introduction to the sources* (Cambridge, 1972), ch. 4, 119, 148.

²John Bannerman, ‘Notes on the Scottish entries in the early Irish annals’, *Scottish Gaelic Studies* 11 (1968), 149–70. See p. 149 for his introduction of the term Iona Chronicle.

³A list of the abbreviations used for the annals and full details of the published editions cited is given at the end of the article.

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footnote on p. 101: 'Beginning with AD 487, one year must be added to that given in the nineteenth-century edition of AU. The *Tig* date in Whitley Stokes's edition is that of AU and other sets of annals, which Stokes gives.'

As we shall see in an example below, behind this simple statement lie chronological questions of the most daunting complexity. Hughes did not have the means of even addressing these questions at the time, for the published material that dealt with any chronological aspects of the annals at all was limited to a small passage of Bartholomew Mac Carthy's introduction to the 1887–1901 edition of AU by himself and W.M. Hennessy,⁴ Eoin Mac Neill's study of the authorship and structure of AT,⁵ a brief comparative study of their chronological accuracy by Paul Walsh,⁶ a chapter discussing 'Some questions of dating in early Irish annals' by T.F. O'Rahilly,⁷ a critical discussion of the construction of the annals from AD 429 to AD 550 by Liam Ó Buachalla⁸ and, finally, Bannerman's important paper of 1968, in which he identified the monastery of Iona as the location in which the first phase of the compilation of the Irish annals was accomplished in the eighth century.⁹

As an example of the actual chronological problems facing historians, I cite below an excerpt from Whitley Stokes's edition of AT, omitting his English translations of the Irish passages:

[AU. 512. CS. 508. FM. 504].

K.iii. Muircertach mac Earca do gabhail rigi n-Erenn.

[AI. 500].

K.iii. Maccnissi .i. Aengus espoc Conndere quieuit, cuius pater Fobraech dictus est, cuius mater Cness inge Comcaide de Dáil Ceterne, a qua nominatus est Mac Cneise [CS. 508].

[AU. 512. CS. 511. AI. 503].

K.i. Quies Earc espuic Slaine .xc. anno etatis sue, de quo Patricius ait: . . . Natiuitas sancti Ciaraní filii artificis.¹⁰

Clearly the scope for chronological confusion here is enormous: a choice of three dates spread over nine years for the kingship of Muircertach mac Earca; three dates over ten years for Bishop Earc's death; and, while AT has these two

⁴Hennessy edited vol. 1, Mac Carthy the other three volumes, of which vol. 4 contains the introduction and a discussion of the chronological elements of AU (see xcii-civ).

⁵Eoin Mac Neill, 'The authorship and structure of the Annals of Tigernach', *Ériu* 7 (1914), 30–113.

⁶Paul Walsh, 'The dating of the Irish annals', *Irish Historical Studies* 2 (1940–1), 355–75, with corrigenda by E. Quin, *loc. cit.* 3 (1942–3), 107.

⁷T.F. O'Rahilly, *Early Irish history and mythology* (Dublin, 1948), 235–59.

⁸Liam Ó Buachalla, 'Construction of the Irish annals 439–66', *Journal of the Cork Historical and Archaeological Society* 63 (1958), 103–15; 'Notes on the early Irish annals 467–550', *loc. cit.* 64 (1959), 73–81.

⁹Bannerman, 'Notes on the Scottish entries in the early Irish annals', 149–70.

¹⁰Whitley Stokes (ed.), *The Annals of Tigernach*, 86. Note that this and all subsequent page references to AT in this article are to the repagination in the 1993 edition, which appears at the *bottom* of each page and is numbered continuously 1–223 (vol. 1) and 224–466 (vol. 2). In the excerpt cited above, Stokes has omitted *K.iii.*, found in the MS immediately preceding *Natiuitas sancti Ciarani*; see the footnote to entry 19.3 in Appendix I. In the excerpt cited, AU = Annals of Ulster, CS = Chronicon Scotorum, FM = Annals of the Four Masters and AI = Annals of Inisfallen.

events and the death of Maccnissi distributed over three years, CS spreads them over four years and AU has the first and the last event in the same year. This is to identify just a few of the more obvious problems. Unfortunately, this example is no exception: indeed, from the fifth to the eighth century this situation is the norm; thereafter the range of available dates narrows, but it does not disappear completely until the twelfth century. It has to be said clearly that Whitley Stokes himself was in no way responsible for this chronological chaos, for he was simply reproducing the chronological data given in the published editions of the other annals available at the time, whose editors had independently derived AD chronologies for their respective editions. It is, rather, in my view, greatly to the credit of Stokes that he did not add to this confusion by generating yet another AD chronology for his edition of AT, for, as we shall see, his MS contained a significant number of interpolated and omitted years.

In the years since Hughes emphasised the value of the annals as a historical source, a number of important contributions have been made to understanding their structure and origin, and it may be helpful here to review those that bear on chronological issues. In 1972 an exemplary analysis by A.P. Smyth of the distribution of years with no contemporary recorded events established beyond all reasonable doubt that the earliest systematic annals describing contemporary Irish events dated from *c.* AD 550 and that up until *c.* AD 740 the recording activity had been conducted in Iona; thereafter the recording site moved to Ireland.¹¹ A corollary of this result, which Smyth did not quite explicitly state, is that the initial work must have been done under the supervision, and most likely the pen, of Saint Columba, who was abbot of Iona for over three decades, from its foundation until his death in the late sixth century.¹² On this detail it is worth noting that at the very start of the Annals of Clonmacnoise (AC) Conell Mageoghagan placed Saint Columba's name first in his list of 'the names of the several authors which I have taken for this booke'.¹³ This, it seems to me, explains very satisfactorily all the details recorded in the sixth century concerning the political affairs of Columba's relatives in the northern Uí Néill and also the events in Pictland, where his major mission lay. Also in 1972, by a careful examination of the pre-Christian material, John Morris drew the important conclusions that AT preserved details of the Chronicle of Eusebius not transmitted by Jerome's Latin edition and that, at its earliest level, AT had not been copied from Bede's *Chronica maiora*.¹⁴ In 1983 Dáibhí Ó Cróinín re-examined the argument that the early annals had been derived from Paschal tables.¹⁵ In 1984 Kathryn Grabowski and David Dumville published a book that, in their own words, gave an 'elucidation of the evidential value of the earlier mediaeval Celtic chronicles by text-historical investigation'. This work led them to the conclusion that 'our studies have done nothing to disturb and much to confirm for us the hypothesis by which a "Chronicle of Ireland", extending (for our purposes) from AD 431 to the beginning of the tenth

¹¹A.P. Smyth, 'The earliest Irish annals: their first contemporary entries and the earliest centres of recording', *Proceedings of the Royal Irish Academy* 72C (1972), 1–48.

¹²Cf. *ibid.*, 42: 'There is now every reason for assuming that our earliest body of annals take their origins from the time of the saint himself.'

¹³Denis Murphy (ed.), *The Annals of Clonmacnoise*, 10.

¹⁴J. Morris, 'The chronicle of Eusebius: Irish fragments', *Bulletin of the Institute of Classical Studies* 19 (1972), 80–93.

¹⁵Dáibhí Ó Cróinín, 'Early Irish annals from Easter-tables: a case restated', *Peritia* 2 (1983), 74–86.

century and ancestral to all surviving Irish (and, in some measure, Welsh) annalistic compilations, has been reconstructed in broad outline';¹⁶ their objective, therefore, was to establish the text of the Irish chronicle as it appeared in the early tenth century. In 1991 Molly Miller examined the chronological structure of the first 140 Christian years of AT and, apparently unaware of Morris's work, concluded that AT (MS Rawlinson B 502) was derived from Bede in the eleventh century, 'a work of the period of the decline in learning'.¹⁷ In 1994 a paper by myself examined the chronological structure of AU and concluded (a) that the AD data from AU 431 to AD 1012 was an Annunciation AD changing on 25 March and had been interpolated *c.* AD 1005 and (b) that the papal succession from Xystus to Sabinian (AD 432–604) incorporating the AD 606 decree by emperor Phocas of the supremacy of the Roman church had been interpolated *c.* AD 740 and terminated with the words *Finis Cronicii Iusebii*.¹⁸ Finally, in 1997 a paper by myself and Aidan Breen surveyed all of the astronomical observations found in all of the annals. This showed that, while the records in the fifth and sixth centuries had been copied from European chronicles, the earliest Irish record of an astronomical event is that of a solar eclipse in the late sixth century. Thereafter, from AD 627 to AD 1131, there are thirty-one records of Irish observations of lunar and solar eclipses, comets, aurorae and one possible supernova, all of which reconcile closely with the descriptive and chronological details of the phenomena whenever we can check these. From this it emerged that, as far as astronomical events are concerned, the chronology of AU is accurate from AD 773 to AD 1023 and that of CS from AD 807 to AD 1133.¹⁹ Apart from these papers a considerable number of studies examining historical, grammatical and philological aspects have been published; it is remarkable, in view of the essentially chronological character of the annals, that this aspect has received less attention than others.²⁰

If, however, the above-mentioned works are examined, it will be found that none of them helps to resolve the chronological conflicts so explicitly indicated by Whitley Stokes's edition of AT; nor is the reason difficult to discover, for it is simply the case that none of these analyses undertook to examine the chronology of the Irish annals as a whole. This is quite surprising when one considers that the essential unity of the early material in particular has been noted by historians and textual scholars at least from the last century: 'It has long been recognised that all the major collections of Irish annalistic material covering the period prior to the ninth century derive ultimately from a common original.'²¹ Indeed, the cross references given in Stokes's edition of AT continually identify for readers where

¹⁶Kathryn Grabowski and David Dumville (eds), *Chronicles and annals of mediaeval Ireland and Wales* (Woodbridge, 1984), viii.

¹⁷M. Miller, 'The chronological structure of the sixth age in the Rawlinson fragment of the "Irish world-chronicle"', *Celtica* 22 (1991), 79–111. The citation is from p. 111.

¹⁸D.P. Mc Carthy, 'The chronological apparatus of the Annals of Ulster AD 431–1131', *Peritia* 8 (1994), 46–79. Note that all references thus, AU 1012, are to the MS year of AU, *not* to the editorial, i.e. marginal, year.

¹⁹D.P. Mc Carthy and Aidan Breen, 'An evaluation of astronomical entries in the Irish annals', *Vistas in Astronomy* 41 (1997), 117–38. This paper emphasises the astronomical aspects of the entries. A second paper by the same authors, 'Astronomical observations in the Irish annals and their motivation', *Peritia* 11 (1997), 1–43, emphasises historical aspects and the annalists' motives for recording the observations.

²⁰The best survey and bibliography of the Irish annals is that given by Gearóid Mac Niocaill, *The mediaeval Irish annals* (Medieval Irish History Series No. 3, Dublin, 1975). See pp 44–9 for the bibliography.

²¹Smyth, 'Earliest Irish annals', 1.

else they may find closely related versions of the entries in AT. In its original edition this material had only one chronology; what, then, can be done to recover that chronology? I suggest that we must first collate the sequence of events in all our annals, just as a prosecuting counsel examines the accounts of all the witnesses and compares closely the sequence of the details common to these accounts. However, an immediate practical problem is that we have so many witnesses; the collections AU, AT, CS, AI, AC, the Annals of Boyle (AB), the Annals of Roscrea (AR) and the 'Fragmentary annals' (FA) all contain records of events from the fifth to seventh centuries, where the chronological problems are the most severe.²² Which of these represent the most valuable witnesses to the original chronology of the annals? I suggest that those annals with the oldest chronological apparatus should be collated first, since they are likely to be closest to the original structure.

Now, when this aspect of the Irish annals is reviewed it is found that all but one of them employ the abbreviation *K* or *Kl*, standing for *Kalendae Ianuaris*, to mark the commencement of a new annalistic year; it is a most distinctive characteristic of these annals.²³ This abbreviation is then followed, regularly in AT and CS and occasionally in AI and AR, with the ferial, or day of the week, of the kalends of January, so that this ferial is therefore chronologically coupled to the preceding *K* or *Kl*, thereby accounting for its presence. Moreover, when this chronological apparatus is compared with the *latercus*, the Paschal table followed by the early British, Scottish and Pictish churches, or to the Paschal table in *De ratione paschali*, from which Sulpicius Severus derived the *latercus* in early fifth-century Gaul, it is immediately seen that they all preserve this same chronological apparatus.²⁴ To demonstrate this, I reproduce below the first three years of both of these tables.

De ratione paschali—Padua MS 27 f. 74v:

<i>Kl</i>	<i>vf</i>	<i>l</i>	<i>i</i>	<i>æq</i>	<i>Sab</i>	<i>l</i>	<i>xxvi</i>	<i>P</i>	<i>xvi kl ma</i>	<i>l</i>	<i>xviii.</i>
<i>Kl</i>	<i>vif</i>	<i>l</i>	<i>xii</i>	<i>æq</i>	<i>D</i>	<i>l</i>	<i>vi</i>	<i>P</i>	<i>kl apr</i>	<i>l</i>	<i>xiii.</i>
<i>Kl</i>	<i>S</i>	<i>l</i>	<i>xxiii</i>	<i>æq</i>	<i>iif</i>	<i>l</i>	<i>xviii</i>	<i>P</i>	<i>xi kl m</i>	<i>l</i>	<i>xvi.</i>

Latercus—Padua MS 27 f. 76r:

<i>Kl</i>	<i>S</i>	<i>l</i>	<i>xviii</i>	<i>P</i>	<i>vi kl ap</i>	<i>l</i>	<i>xvi</i>	<i>Ini</i>	<i>xiii kl m</i>	<i>l</i>	<i>vi.</i>
<i>Kl</i>	<i>D</i>	<i>l</i>	<i>xxx</i>	<i>P</i>	<i>xvi kl m</i>	<i>l</i>	<i>xvii</i>	<i>Ini</i>	<i>viii id m</i>	<i>l</i>	<i>vii.</i>
<i>Kl</i>	<i>iif</i>	<i>l</i>	<i>xi</i>	<i>P</i>	<i>vii id ap</i>	<i>l</i>	<i>xviii</i>	<i>Ini</i>	<i>Prid kl m</i>	<i>l</i>	<i>viii.</i>

As can be seen, both of these tables use the abbreviation *Kl*, standing for *Kalendae Ianuaris*, followed by the ferial on that day to mark the commencement of each tabular year, which is further accompanied by the age of the moon, or epact,

²²Note that I do not here consider the chronology of the Annals of the Four Masters because it is the result of a further and major compilation in the seventeenth century.

²³AT, CS, AU, AI and AB all systematically employ either a *K* or *Kl*, which in AU is regularly followed by the abbreviation *Ien* for *Ienai*; thus making the association with January explicit. AR has occasional marginal *K* entries with intermittent ferial data, FA has occasional *Kl* entries, and AC is the only representative lacking kalends entirely.

²⁴For discovery of the *latercus*, see D.P. Mc Carthy and Dáibhí Ó Cróinín, 'The "lost" Irish 84-year Easter Table rediscovered', *Peritia* 6–7 (1987–8), 227–42. For a photograph of the *latercus*, see p. 208 of D.P. Mc Carthy, 'Easter principles and a fifth-century lunar cycle used in the British Isles', *Journal for the History of Astronomy* 24 (1993), 204–24. For a photograph of the Paschal table of *De ratione paschali*, see p. 289 of D.P. Mc Carthy, 'The lunar and paschal tables of *De ratione paschali* attributed to Anatolius of Laodicea', *Archive for History of Exact Sciences* 49 (4) (1996), 285–320. The last two articles are henceforth cited as 'Easter principles' and 'Lunar and paschal tables'.

on that day. This identification of the year is then followed by data appropriate to the Pasch and its computation (equinox) or celebration (*Initium*). Thus can be seen that, apart from the minor textual variations of the use of the abbreviations *S* for *Sabbatum*, i.e. *feria vii*, and *D* for *Dominicus*, i.e. *feria i*, the use of *v* rather than *u* for the numeral '5' and the explicit *f* for *feria*, the chronological apparatus preserved in AT and CS conforms to that of both of these tables. Regarding the alternatives *K* or *Kl*, we will see that the evidence indicates that the latter of these was the earlier annalistic usage.

Most significantly, we know that Iona, from whence it is agreed that these annals originated up to c. AD 740, followed this *latercus* up until AD 716. These considerations strongly support the conclusion that AT and CS, both of which regularly employ *K* or *Kl* followed by a ferial, have preserved a most substantial component of the older chronological apparatus, hence are the most important witnesses and so should be the first collated. This then implies that collation of AI, which preserves only four ferial data, of AU, which has transmitted no ferial data before AU 954 and whose AD apparatus was added in the eleventh century,²⁵ of AC, which has no chronological apparatus, and AB, AR and FA, which are all very fragmented, should be deferred. Furthermore, from a textual point of view, these ferial data in AT and CS show every sign of being antique; firstly, they contain numerous scribal corruptions, as will be discussed and demonstrated in detail below, and, secondly, corresponding ferial data are found in vestigial form in AI and AR.²⁶ It is quite improbable that these intermittent ferial data, nearly all of which are properly synchronised with those found in AT and CS, could be a later interpolation into the MSS of AI and AR; they represent, rather, the vestiges of pre-existing data in the exemplars used by the scribes of these MSS. There is therefore every reason to believe that the ferial series, now found only fairly continuously in AT and CS, is a relic of the earlier, and most likely original, chronological apparatus of these annals, which has been largely, though not entirely, omitted from most of the surviving editions.

Some textual elements of this older chronological apparatus have also survived in the annals, but there is nothing that can be usefully employed for chronological analysis. For instance, when we examine the few ferial and epactal data found in AI we see that textually, e.g. AI 440, *K.ii.f.xii.l*, they match the *latercus* tradition very closely in that they regularly suffix *f* to the ferial datum and identify the epact with an *l*, which is suffixed rather than prefixed to the epact. However, when we examine the numerical values of these epacts we find that they commence at AI 437–8 with the sequence *Kl. ix.l. . . Kl.xx.l.*, showing that they derive from the Dionysiac rather than the *latercus* Paschal tradition and hence are corruptions. Similarly, the very first of the ferial data at AI 433, *Kl. Prima feria*, has also clearly been rewritten and amended. Regarding AU, I have already argued elsewhere that the gaps left following the *Kl* by Ó Luinín, scribe of the principal MS of AU (TCD MS 1282), reflected ferial and epactal data present in his exemplar and that the latter were badly corrupted; it was presumably for this reason that the epacts were likewise omitted in the archetype of AT and CS.²⁷ It is also to be noted

²⁵See Mc Carthy, 'Chronological apparatus', 60, for the date of the first ferial *in prima manu*, and 58–60 for the date of AU's AD apparatus.

²⁶For AI see Mac Airt's marginal years AI 433, 435, 439 and 440, which, together with AR's ferial data, are reproduced in the footnotes of Appendix I.

²⁷Mc Carthy, 'Chronological apparatus', 60–4.

that when the compiler of AU, Cathal Mac Maghnusa, interpolated corrected ferial and Dionysiac epactal data into the gaps left by Ó Luinín, e.g. at AU 432, *.ui.f.l.u.*, he repeatedly did so in exactly the same format as is employed in the *latercus*, suggesting thereby that such was their arrangement in Ó Luinín's exemplar. It is significant too, I suggest, that when ferial data resume in AT in the eleventh century, they are regularly accompanied by epactal data, and both this and Mac Maghnusa's fifteenth-century interpolations into TCD MS 1282 show that a knowledge and use of the chronological apparatus of the *latercus* endured in Ireland long after the use of its Paschal dates had lapsed and the use of AD had been established.

At this stage I would like to briefly consider another aspect of our annals, namely that there is a hiatus associated with the record of Patrick's advent. AI, our earliest manuscript, transmits material from the time of Abraham onward, but up to the advent of Patrick it has poor chronological accuracy, as may be shown by counting the kalends between entries that can also be dated from independent sources, such as the start of imperial reigns, and comparing these counts with the intervals implied by the independently known dates. Then, four years before Patrick's advent, a list of the reigns of forty-two Irish kings disrupts the annal sequence and thereafter a regular series of kalends and records ensues. AU simply begins with the record of Palladius's mission in AD 431, adapted from Bede's version of the entry found in Prosper's chronicle, followed by Patrick's advent. The pre-Patrician material published in Mac Airt and Mac Niocaill's edition of AU is not actually part of the MS of AU; it is normally called the 'Dublin fragment' (DF) and is closely related to AI's pre-Patrician material, though with an even more corrupt and interpolated chronology. In the case of AT, there is a large lacuna of over a hundred years from the mid-fourth to the late fifth century, so Patrick's advent is also lost in this hiatus. AC records nothing except the death of two Irish kings between a *floruit* for Saint Martin dated to AD 360 and Patrick's advent. Finally, we will see in the section below dealing with the chronological accuracy of AT/CS that CS too preserves a hiatus, far less conspicuous than all the others, though far more diagnostic. Thus all our annals show a disruption to their records and chronology around the time of Patrick's advent. This vacuum is certainly not what one would expect of a religion governed by the principle of apostolic succession, i.e. that traces all authority through its sequence of bishops back to Jesus Christ and his apostles. But what may we do to recover the chronology of the annals spanning the years of Patrick's arrival?

The only annals that have preserved records before and after Patrick's advent with any supporting chronological data are AT and CS, both of which, as already remarked, have ferial data as well as the *K* or *Kl* marking the commencement of each year. By an extraordinary stroke of good fortune the ferial sequence in CS straddles the lacuna in AT between *c.* AD 360 and AD 490, as Fig. 1 shows.²⁸ The first point to make about these ferial data is that the data up to the seventh century and the data commencing in the eleventh century come from different traditions and times. The early data are characteristically written cryptically, e.g. as *K.ui.*, whereas the later data in the fourth fragment of AT are characteristically written

²⁸It seems likely from the celebration of the Patrician entries in Mac Fírbis's text, see Pl. I, that the intention of whoever interpolated the preceding statement, *Scuirim go aimsir oile, ocus cuireadh an tigras les*, had been to include all the references to Patrick found in his exemplar, and hence he commenced at his 'birth'.

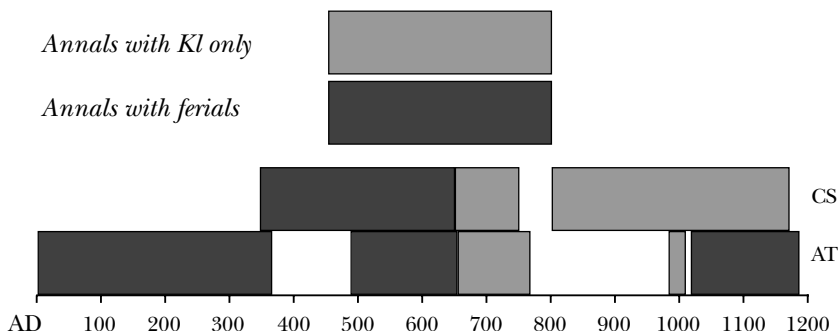


FIG. 1—A schematic view of the distribution of ferial data in AT and CS.

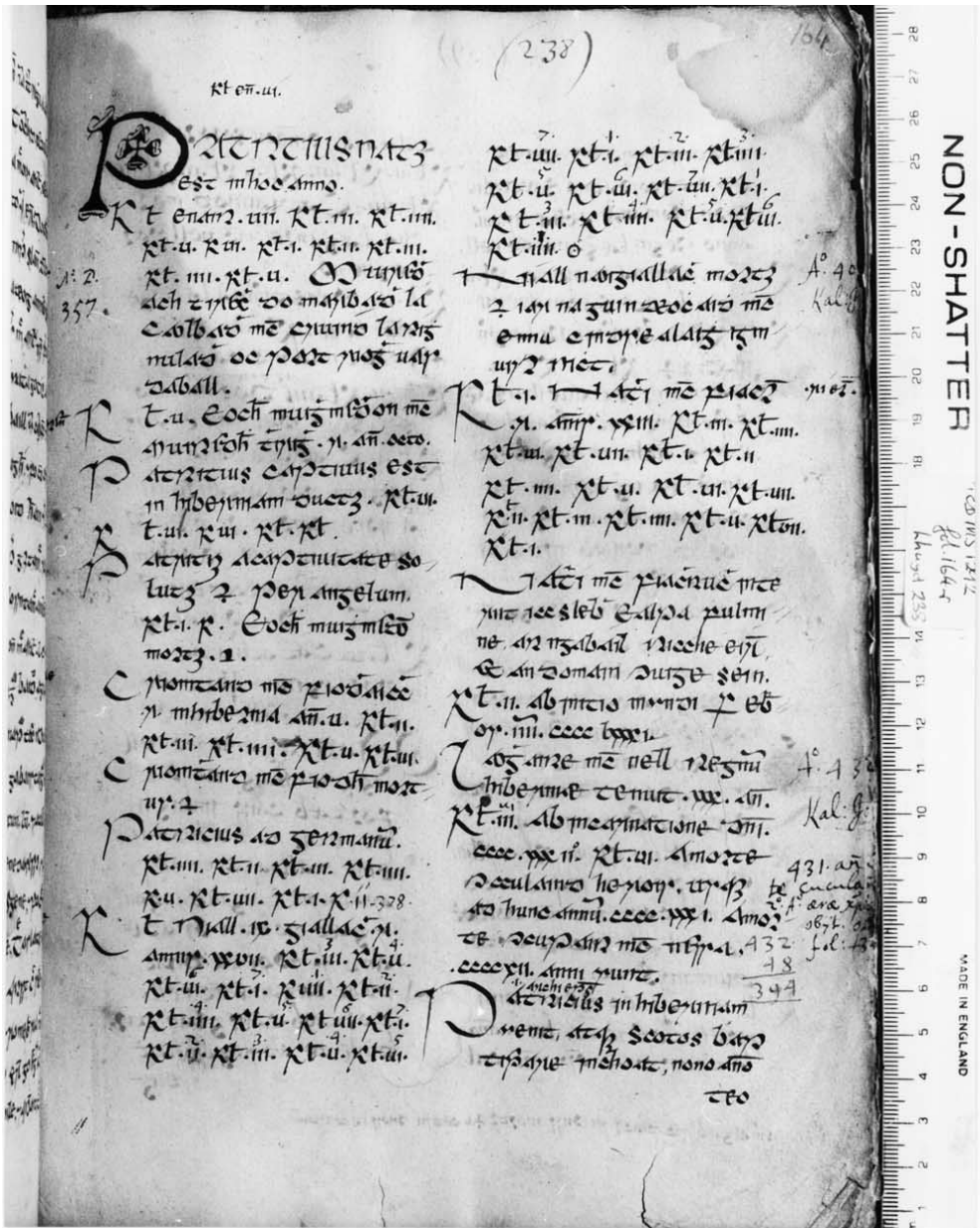
as, e.g., *Kl. sexta feria, luna .ii.*²⁹ That is, the later tradition has the ferial written as a word, *sexta*, followed by the word *feria*, followed by the lunar epact, which is frequently followed by other synchronised chronological data. As well as this the later ferial data are relatively free from scribal corruption, whereas, as we shall see, the early data contain numerous scribal corruptions. Secondly, the very fact that these early ferial data cease in both AT and CS at approximately the same time in the mid-seventh century suggests that they are at least as old as that and, as such, considerably older than any surviving MS; the oldest MS we have, that of AI, dates from the eleventh century. This fact alone warrants the collation of the ferial data in AT and CS. To do this we need to know as much as possible about the chronology of CS, and in this respect, it has to be said, the otherwise admirable edition published by Hennessy in 1866 is quite unsatisfactory. Hennessy had a MS whose chronology had been annotated on the basis of embedded chronological criteria by Roderick O'Flaherty, the seventeenth-century Gaelic scholar and student of Mac Firbis, the scribe of CS, but Hennessy effectively constructed his own 'AD' chronology by assuming that Patrick arrived in 432 and then simply counting the *Kl* entries from there onward. In addition to this he reproduced O'Flaherty's annotations as footnotes, and, since the latter were more plausible than his own marginal 'AD' interpolations, he also provided a table in his introduction correcting his own chronology.³⁰ The result is sheer chaos for the reader, and Paul Walsh's comment on this is fair: 'It must be said that Hennessy in going against it [O'Flaherty's chronology] was sinning notwithstanding the light; he knew very well that he was doing this.'³¹ In order, therefore, to give the reader a less obstructed view of the actual nature of CS, Pl. I shows the folio that preserves the start of ferial data and provides the crucial chronological link from the end of the second fragment of AT to the advent of Patrick.

If we had only AI and AU it would be easy to imagine that the explanation for the low-grade and sparse pre-Patrician chronology of AI and the pre-Patrician vacuum of AU was simply that they referred to the time before Christianity had arrived in Ireland. However, the existence of CS and particularly of AT shows us

²⁹Stokes, *Annals of Tigernach*, 250.

³⁰The table (Hennessy, *Chronicum Scotorum*, xlvii) runs from AD 353 to AD 1150, giving deviations of up to four years to be applied in order to correct Hennessy's own marginal AD chronology.

³¹Walsh, 'Dating of the Irish annals', 369.



PL. I—Folio 164r of TCD MS 1292, written by Duald Mac Firbis in the mid-seventeenth century, showing the start of the ferial sequence in Chronicon Scotorum that provides the crucial chronological link to AT, fragment 2. Note the use of numerical *u* and undotted minims, compare the width of *u* with the pitch of the minims, and see *Kl.ui.* at the end of the third row for an example of a possible misreading and hence corruption. Note the celebration of Patrick's birth and the interlinear addition of *Archiepiscopus* above the record of *Patricius venit* at the bottom right. Note too O'Flaherty's marginal AD annotations and his superlinear amendments to the ferial data in Arabic numerals.

that the early material in both AI and DF has been abstracted from a chronicle that commenced long before the time of Christ; from a chronicle, moreover, that, from the Incarnation onwards for over six hundred years, systematically used *Kl* followed by a ferial value for its chronological structure. Since all the later annals have been built on this structure it seems to me that in order to have any chance of understanding them we must first examine the structure on which they rest. Furthermore, the close textual and chronological relationship between AT and CS is well established and immediately apparent on even a casual comparison, and over the sixth and seventh centuries they share a substantial common span of years, as can be seen in Fig. 1, thereby providing a substantial basis for their joint collation.³²

For all of these reasons it was decided to collate the chronological structure of AT with CS. Paul Walsh identified the need for this in 1941, and it is worth citing his conclusion: ‘... the chronology of the older collections of Irish annals is, in practically all particulars, one and the same throughout the period at which certain dating is attainable.’³³ However, before proceeding with this collation, it is necessary to discuss some of the underlying chronological theory.

Chronological structure of the annals

As has been emphasised above, the early Irish annals used the word *Kalendae*, or some abbreviation of it such as *Kl* or just *K*, to stand for the occurrence of *Kalendae Ianuarius*, i.e. the first day of January, and hence to mark the beginning of each set of annual entries; examples of both may be seen in Pl. I.³⁴ While we have this typical example of an Irish annal in view there are two matters to which I should refer. Firstly, it is sometimes inferred that this chronological structure is rather simplistic; for example, Mac Niocaill wrote, ‘I can find no good evidence for supposing that any more elaborate notation than a simple *Kl* (Kalends [of January]) was employed’.³⁵ However, this overlooks the explicit temporal character of this chronological structure, where the sequence of *Ks* or *Ks* distributed through the annals stands as a series of timing marks locating the occurrences of the first day of each Julian year in the recorded progression of events. This may seem very vulnerable, but when, as is usual, it is combined with embedded regnal successions whose durations are independently known it is possible to detect and to approximately restore most transmission errors. When the ferial of the kalends of January is also recorded the system is further secured, for, as we shall see, it possesses some rather powerful properties that allow very precise error detection and restoration. The second matter is the question of the origin of this chronological apparatus, which, because it is unique to the Irish annals, has usually been assumed to be an Irish invention: ‘The Irish, however, devised an ingenious but troublesome dating system of their own.’³⁶ However, as

³²Hughes, *Early Christian Ireland*, 107, describes CS ‘... as a faithful though much abbreviated, copy of the MS of *Tig*’; Grabowski and Dumville, *Chronicles and annals of medieval Ireland and Wales*, 6, write that ‘CS appears to be an abbreviated copy of a text closely related to AT’.

³³Walsh, ‘Dating of the Irish annals’, 355.

³⁴The MS *Kl* employs a crossed *l* to represent the abbreviation *Kal*. Professor F.J. Byrne has also pointed out to me that because the letter *K* is not otherwise used in Latin it makes a most conspicuous mark in any MS.

³⁵Mac Airt and Mac Niocaill, *Annals of Ulster*, x.

³⁶Morris, ‘Chronicle of Eusebius’, 81.

already remarked, when this chronological apparatus is compared with the *latercus*, or with the Paschal table in *De ratione paschali* from which Sulpicius Severus derived the *latercus*, it is immediately obvious that they all preserve the same chronological tradition. Given these antecedents, it has yet to be proved that it was an Irish development to employ the notation for annalistic purposes.

What we find in Irish annals, then, is either *K* or *Kl*, which may be followed by other chronological data synchronised with this date, most typically the ferial, but occasionally the lunar epact, the *annus ab incarnatione*, the *annus Domini* or the *annus mundi*. These chronological criteria are then followed by a list of usually cryptic textual accounts of the events that are indicated as having taken place in that calendar year. However, in the early centuries it fairly frequently happens that no events are listed, which simply leaves a sequence of consecutive kalends, perhaps followed by some chronological criteria.³⁷ Such a structure as this is liable to be corrupted in transmission, either in the form of deletion of a kalend or, less often, the interpolation of an extra kalend, and in either case the chronology of all the subsequent entries is dislocated. In such situations the presence of other synchronised chronological criteria is crucial to the detection of the corruption, since their sequence will be likewise dislocated, but the dislocation may be detected once the sequence of these criteria is known.

The most useful chronological criteria in the Irish annals, and indeed the only additional synchronised criteria to regularly appear up to the eighth century, are the kalends ferial data found principally in AT and CS; the ferial was the number of the day of the week of the kalends of January, enumerated as Sunday = *K.i.*, Monday = *K.ii.*, Tuesday = *K.iii.*, Wednesday = *K.iiii.*, Thursday = *K.u.*, Friday = *K.ui.*, Saturday = *K.uii.* Note that I use the same numerical notation as the annalists, namely four as *iiii* and five as *u*, as this helps us to understand some of the scribal corruptions that arise in the transmission of these criteria. Because the Julian year, from shortly after its introduction by Julius Caesar in 46 BC, relentlessly followed a sequence of three common years of 365 days followed by a bissextile year of 366 days and because $365 = 7 \times 52 + 1$, it follows that after common years the ferial increments by one or, should this exceed *K.uii.*, that we pass to the beginning of the week again, i.e. *K.i.* (Sunday). A similar mechanism applies to the bissextile year except that, since $366 = 7 \times 52 + 2$, a double increment must be used when computing the ferial of the following year. The result of these two effects is a 28-year cycle known as the *solar cycle*, which possesses a great deal of useful numerical structure that may be highlighted by displaying it as seven groups

TABLE 1—The 28-year solar cycle.*

<i>Years</i>	<i>1–4</i>	<i>5–8</i>	<i>9–12</i>	<i>13–16</i>	<i>17–20</i>	<i>21–24</i>	<i>25–28</i>
Common	K.uii.	K.u.	K.iii.	K.i.	K.ui.	K.iiii.	K.ii.
Common	K.i.	K.ui.	K.iiii.	K.ii.	K.uii.	K.u.	K.iii.
Common	K.ii.	K.uii.	K.u.	K.iii.	K.i.	K.ui.	K.iiii.
Bissextile	K.iii.	K.i.	K.ui.	K.iiii.	K.ii.	K.uii.	K.u.

* The table gives the sequence of the ferial of the kalends of January. To obtain the ferial of any Julian year use the remainder after division by 28 to index this table. For example AD 664 = $28 \times 23 + 20$, so the remainder is 20 and hence AD 664 is bissextile with *K.ii.*; if the remainder is zero, then index 28, e.g. AD 672 = $28 \times 23 + 28$. To emphasise its distinction the *K* of a bissextile year is shown in bold.

³⁷See Pl. I for typical examples.

of four successive years, as in Table 1. We note from this table the following rules:

R1. As we go forward in time by intervals of one year (i.e. down the columns) the ferial increments by one following each common year (com.) and by two following each bissextile year (bis.).

R2. As we go forward in time by intervals of four years (i.e. across the columns) the ferial either increments by five (*u*) or decrements by two in the event that the increment by five would yield a result exceeding *K.iii*.

R3. The bissextile year occurs regularly every fourth year.

When we find a ferial sequence that satisfies these three rules we may be very confident that it is a legitimate ferial sequence; if a sequence does not satisfy all three rules, then R1 and particularly R2 provide a very powerful mechanism for detecting and correcting corrupt ferial data, for not only may errors be corrected by reference to the immediately adjacent data but also by reference to data four years before and after. As an example I evaluate the first nine ferials of the third fragment of AT in Table 2.

TABLE 2—The correction process for the first nine ferials of AT, fragment 3.

<i>Serial no.</i>	<i>MS ferial</i>	<i>R1</i>	<i>R2</i>	<i>Implication(s)</i>	<i>R3</i>	<i>Restored ferial</i>
1	K.u.	Yes	No	Corrupt and no. 2 \Rightarrow K.ui.	com.	K.ui.
2	K.iii.	Yes	Yes	Correct and \Rightarrow no. 1 \rightarrow K.ui.	bis.	K.iii.
3	K.ii.	No	Yes	No. 7 \Rightarrow it is correct	com.	K.ii.
4	K.ui.	Yes	No	Corrupt and no. 8 \Rightarrow K.iii.	com.	K.iii
5	K.iii.	No	No	Corrupt and no. 9 \Rightarrow K.iii.	com.	K.iii.
6	K.u.	Yes	Yes	Correct and no. 7 \Rightarrow bis.	bis.	K.u.
7	K.iii.	Yes	Yes	Correct \Rightarrow nos 2 and 6 bis.	com.	K.iii.
8	K.i.	Yes	No	Correct and \Rightarrow no. 4 \rightarrow K.iii.	com.	K.i.
9	K.ii.	Yes	No	Correct and \Rightarrow no. 5 \rightarrow K.iii.	com.	K.ii.

When we examine the result of applying R1 and R2 (see Table 2) we find that serial nos 2, 6 and 7 are strongly indicated as being correct (R1 = R2 = Yes), and the double increment between nos 6 and 7 implies that no. 6 and hence no. 2 are the bissextile years. This then implies that no. 3 is correct but no. 1 has lost a minim and should be *K.ui.* and, further, that nos 8 and 9 are correct; these in turn imply that nos 4 and 5 should be *K.iii.* and *K.iii.* respectively. In nos 4 and 5 we see that two minims have been mistranscribed as a *u*. In this way we find that we may correct errors even in relatively short sequences of ferial data containing corruptions; of course, the longer the sequence, the easier and more certain the correction process.

With regard to the scribal errors arising in the transmission of ferial and other numbers, the interpolation and omission of minims is quite common and understandable; however, a less obvious error to which Irish MS numbers were susceptible was the mistranscription of *ii* as *u*, two examples of which we see above, or less often the mistranscription of *u* as *ii*. This arose because the vertical strokes of the *u* were spaced at about the same pitch as repeated minims that were undotted, easily leading to confusion if a relatively light interconnecting stroke was used at the bottom of the *u* (see Pl. I). Once a MS had become worn either

misreading became quite possible, and consequently frequent, as we shall see. Since this error changes the original datum by either +3 or -3, it has a much greater impact on the ferial sequence than the loss or interpolation of a minim. However, as the example in Table 2 demonstrates, this corruption can be quite readily detected and corrected by intelligent use of R1, R2 and R3.

Until the identification in 1985 by Ó Cróinín of the copy of *latercus* preserved in Padua MS 27, the details of the Paschal tradition followed by Iona until AD 716 were quite uncertain and there could be no appreciation of the chronological apparatus employed in the *latercus*. Consequently, the importance of these ferial data in the annals has gone unrecognised; indeed, they have hitherto been rather summarily dismissed. For example, in 1913 Mac Neill, having described the kalend-plus-ferial apparatus of the third fragment of AT, concluded: 'It follows that, of themselves, the Annals of Tigernach, in the period covered by Fragment III, afford no precise basis for dating year by year.'³⁸ In 1940 O'Rahilly wrote: '...as might be expected from the corrupt state of its [AT's] text, they [the ferials] are often hopelessly confused. In the kindred Chron. Scot., likewise the ferials are noted, irregularly and incorrectly, down to 643.'³⁹ In 1942 Walsh wrote: 'The ferial numbers are partially supplied in the early christian portion of the so-called Annals of Tigernach and in the *Chronicum Scotorum*. In the latter especially, they are almost entirely wrong. They are not much better in the other compilation.'⁴⁰ The reason why all these most capable scholars set these ferial data aside is that they all *presumed* that they should have been properly synchronised with the Julian year. We will see that some of them are indeed so synchronised, but many of them are not, and for quite startling reasons.

Chronological collation of AT with CS from the fifth to the eighth century

A very useful definition of annals as 'a record of events arranged under the year of occurrence, without any necessary connexion between' was made by Mac Niocaill, and it is important to view them in this way if we are to be able to compare the chronological structure of two sets of annals.⁴¹ In his account of the comparison process Mac Niocaill suggested numbering each event within each year and then using this serial number to identify the entry, which has the advantage of great compactness. However, once numerically coded, each entry immediately loses all semantic significance, resulting in repeated reference back to the numbered annal text when making the collation and, consequently, a high probability of error. A useful compromise is to reduce each event recorded in the annals to a *record token* consisting of the first proper name encountered in the text of the entry, which may be accompanied by the first letter of the principal verb of the entry or its action. This record token is then compact relative to the actual annal entry and yet retains some semantic value, which is very useful. For example, the events recorded in the excerpt from AT cited on p. 204 of this article may be reduced in the following way:

³⁸Mac Neill, 'Authorship and structure of the Annals of Tigernach', 101.

³⁹O'Rahilly, *Early Irish history and mythology*, 239.

⁴⁰Walsh, 'Dating of the Irish annals', 359, note 1. Similarly, Hennessy wrote in his discussion of the chronological problems of CS: 'The chronology of the following chronicle is in a state of much confusion, notwithstanding the apparent regard for a regular system, indicated by the array of ferial numbers with which the Christian period of the work begins. The feriae, however, do not run on in consecutive order.' (Hennessy, *Chronicum Scotorum*, xlii.)

⁴¹See Mac Niocaill, *Medieval Irish annals*, 13, for his definition and 16 for the comparison process.

<i>AT annal record event</i>	<i>Record token</i>
Muircertach mac Earca do gabail rigi n-Erenn	Muircertach r.
Macnissi .i. Aengus espoc Conndere quieuit . . .	Macnissi q.
Quies Earc espuic Slaine .x.c. anno etatis sue . . .	Q. Earc
Natiuitas sancti Ciaraní filii artificis.	N. Ciaraní

As can be seen, the resulting tokens are small enough to be written and recorded efficiently, and in practically every case they uniquely represent the annal event, no matter how long, and yet they are easily tabulated and collated using a word-processor. Furthermore, we note that the kalend entries (*Kl* or *K*), and indeed any other chronological criteria, are themselves just records of chronological events, e.g. *Kl.iii.* is a token of an event where 1 January fell on a Tuesday. These *chronological tokens* are by their nature compact and need no further abbreviation. Thus, if we wish to represent the full chronological structure of an annal compilation we can do so by recording the full sequence of both record and chronological tokens, which we designate collectively as *event tokens*. In this way any compilation may be reduced to a compact sequence of record tokens delimited by chronological tokens; for example, the chronological structure of the entries in the above-mentioned excerpt from AT can be represented efficiently, with time running vertically, as follows:

<i>Event tokens</i>	<i>Time</i>	<i>Token type</i>
K.iii.	↓	Chronological
Muircertach r.	↓	Record
K.uiii.	↓	Chronological
Maccnissi q.	↓	Record
K.i.	↓	Chronological
Q. Earc	↓	Record
N. Ciaraní	↓	Record

When we have two chronicles that record a substantial number of common events these event tokens provide an efficient means of comparing (a) the *order* of their common record events, (b) the *structure* of their chronological events and (c) the *distribution* of the record events with respect to the chronological events. This comparison provides a most revealing perspective of the two chronicles, highlighting both their common and unique material as well as where their chronologies concur and diverge. As an example of the process, Table 3 shows event tokens from AT and CS for an interval of fifteen years, commencing with the Battle of Segais, which took place around the start of the sixth century. Looking first of all at the record events, we see that the order of the twelve events that are common to both chronicles is identical and their distribution with respect to the chronological events is such that, with the sole exception of Macnissi's death, they can all be aligned. When we apply rules R1, R2 and R3 above to the chronological events we find as follows:

AT: Its first nine ferials present a perfectly legitimate sequence, then *K.iiii.* has been omitted before *C. Arda*, then it has corrupted *K.ui.* to *K.iii.* before *Muircertach r.* then *K.ii.* has been omitted before *Q. Earc* and, finally, it has corrupted *K.iii.* to *K.uii.* before *N. Ciaraní*;

TABLE 3—Collation of record and chronological tokens abstracted from AT and CS.*

<i>AT events</i>	<i>CS events</i>	<i>Restored ferial</i>	<i>Remark(s)</i>
K.u.iii.	Kl.u.iii.	K.u.iii.	
C. Segsa	C. Seghsa		
K.i.	Kl.i.	K.i.	Bissextile year
	Kl.iii.		CS interpolates Kl.iii.
Simacus P.			
C. Droma	C. Droma		
Feargus m.	Fergus m.		
Eogan Bel r.			
K.iii.	Kl.u.	K.iii.	CS ferial corrupt
C. Inde	B. Inde		
B. Iubair	M. Ibuir		
K.iii.	K.	K.iii.	
K.u.	K.	K.u.	
K.ui.	K	K.ui.	Bissextile year
Cerban m.			
C. Manand			
K.i.	K	K.i.	
B. Bruidhi			
B. Domanguirt			
K.ii.	K	K.ii.	
C Fern Midhi	B. Fremhainne Mi.		
K.iii.	Kl.iii.	K.iii.	
	Kl.iiii.	K.iiii.	Bissextile and AT omits K.iiii.
C. Arda			
B. Lughdach	B. Lughdach		
Eochaid o.			
Cairell r. Ulad			
K.iii.	Kl.iii.	K.ui.	AT/CS common ferial error
Muircertach r.	Muircertach r.		
	Mac Cnissi q.		AT or CS resequenced
K.u.iii.	Kl.	K.u.iii.	AT or CS resequenced
Macnissi q.			
K.i.	Kl.i.	K.i.	
	Q. Broni		
	Defectus sol.		Solar eclipse of AD 512
	Kl.ii.	K.ii.	Bissextile and AT omits K.ii.
Q. Earc	Q. Erci		
K.u.iii.	Kl.	K.iii.	Stokes omits K.u.iii., AT corrupt
N. Ciaraní	N. Ciarani		
Simacus P. q.			
Hormista P.			
C. Droma	B. Droma		

* AT events abstracted from Stokes, 83–7; CS events from Hennessy, 34–8. The ferial sequence has been restored using the method illustrated in Table 2; once again, the kalends of the bissextile years are shown in bold.

CS: It has interpolated *Kl.iii.* between *Kl.i.* and *C. Droma*, then it has corrupted *Kl.iii.* to *Kl.u.* before *B. Inde* and, finally, it has corrupted *K.ui.* to *K.iii.* before *Muircertach r.* It has also lost six ferial data.

Thus we see that this collation, combined with a knowledge of the solar cycle, allows us to detect both interpolated and omitted kalends and to restore their ferial data when they are corrupt or missing. When this is done we find that all of the record events common to both annals are synchronised, i.e. they appear in the same year and in the same sequence, with the single exception of *Macnissi q.*, which is placed one year earlier in CS. This example, which is actually the most corrupt section of these annals, with five defective kalends in fifteen years, clearly demonstrates the value of collating the event sequences of the two annals.

This collation has, in fact, been carried out in full in the format of Table 3, from the first event in CS bearing a ferial, namely *Kl enair ui. Patritius natus*, through to the last event before its lacuna in the eighth century, i.e. *C. Almaine*. This collation extends to over forty-five A4 pages and is much too long to reproduce here; instead, it has been made available on the World Wide Web (see Table 7 on p. 230). This collation of the years where CS and AT preserve ferial data breaks naturally into three intervals (see Fig. 1 on p. 210): for the first interval of 23 years we have both CS and AT, for the second of 122 years we have only CS; and for the third of 152 years we have both CS and AT. Since this third interval is by far the most substantial, both in terms of years covered and events recorded, it will be treated first in the remainder of this section. This will lead to a certain amount of experience and understanding that will be used to examine the second interval, which in turn will yield a very substantial and interesting result. With this accomplished, the complete ferial sequence will be examined in the next section of this paper.

Considering, then, the third interval, where we have both AT and CS, what emerged was that the ferial sequence that we first identified from the first nine kalends of AT (see Table 2) is in fact common to both annals and continues for 152 years until the ferial data end in CS. In order to clearly document this chronological structure of AT/CS, all the MS data have been tabulated in Appendix I in groups of solar cycles of 28 years; because the ferial data in AT commence at the Incarnation, this tabulation also commences there and consequently the sequence of ferial data we are presently considering begins in the eighteenth cycle. Each successive solar cycle is labelled with a *cycle number* above the relevant column and a *serial number* running down the rows beside the restored ferial cycle, and by these means we may refer efficiently to any particular year by citing its cycle number and serial number linked by a dot. Thus the collation between the ferial sequences of CS and fragment three of AT commences at 18.5 and continues until the last CS ferial at 23.16, a total of

$$(23 - 18) \times 28 + (16 - 5) + 1 = 5 \times 28 + 12 = 152 \text{ years.}$$

In the places where we need to restore kalends, these are shown as [Kl.] with a footnote where necessary to indicate just where in the annal text the kalend should be restored; in most cases we can say exactly where it should be positioned, but occasionally it is not possible to resolve it precisely, and in these cases the limits of its position have been stated. At other points where kalends have been interpolated erroneously they must be omitted in order to restore the ferial

sequence, and again these have been identified by means of footnotes. The ferial data entered under the headings *AT* and *CS* are the values to be found in their respective MSS, and when the MS data differ from Stokes's edition this has been indicated by means of footnotes; a check of Hennessy's ferial data against the MS TCD 1292 disclosed no errors. The page reference cited in Appendix I directly under the annal heading *AT* or *CS* gives the page in the printed edition where the *first* ferial datum in the column will be found; to find subsequent data, interpolation between the consecutive page references must be used. Finally, the occasional ferial data found in *AI* and *AR* have been given in footnotes.

When we compare the ferial data of cycles 18–23 in Appendix I (pp 249–51) with the restored ferial cycle under the heading *Ferial cycle 8* in the second column of the table it is immediately apparent that the majority of the MS data are in fact correct and that those that are not have suffered typical scribal corruption. It is worthwhile comparing both of these MS sequences with the restored sequence in order to derive an understanding of what kind of corruptions have occurred in them. Table 4 tabulates these errors, classifying them either under 'trivial' or 'serious' and identifying the common classes of scribal mistakes. Looking at these results we see that 89% ((106 + 29)/152) of *AT* ferials are either correct or trivially corrupt and that of the latter a remarkably high proportion, 59% (17/29), are the *ii-to-u* corruption. Regarding *CS* we find that 60% ((75 + 16)/152) of its ferials are either correct or trivially corrupt but that there is no predominance here of the *ii-to-u* corruption. Rather, the drop in performance has been caused by the large number (55) of omitted ferial data, i.e. just a simple *Kl*. When the distribution of these omitted ferials is compared with *AT* it transpires that these usually include the places where *AT* has the corruption of *ii* to *u*, as may be seen from the low incidence of this corruption in *CS*. This suggests that these corruptions were in the archetype of *CS* but that at some stage a scribe, knowing them to be numerically absurd, deleted them along with adjacent ferial data. Another significant feature of the intervals in *CS* where the ferial has been omitted is that it is *only* there that we find the use of *K* rather than *Kl*, which is used systematically elsewhere in *CS*. This would infer that *Kl* is the older form, as the usage in the

TABLE 4—Tabulation of scribal kalend and ferial error counts in parallel sections of *AT* and *CS*, abstracted from Appendix I, columns 18.5–23.16.

<i>Category of reading</i>	<i>AT</i>	<i>CS</i>
Correct MS reading	106	75
Trivial errors		
<i>ii</i> corrupted to <i>u</i>	17	3
<i>u</i> corrupted to <i>ii</i>	5	2
interpolated <i>i</i>	5	5
omitted <i>i</i>	2	6
Serious errors		
ferial omitted	1	55
kalend omitted	9	4
non-trivial ferial error	7	2
Total kalends compared	152	152
Interpolated kalends	1	6

Padua MS also suggests, and that the bare *K* was introduced by the scribe who omitted the ferial data.⁴² It is notable, too, that CS has a relatively high incidence (six) of interpolated kalends, which, on closer examination, appear to be attempts at local repairs to the ferial sequence. Also noteworthy in CS is that these six interpolated kalends are almost counterbalanced by the four omitted kalends, so that over the 152 years CS only ‘gains’ two years, which is also suggestive of attempted repairs. There are just six errors in common between AT and CS, at 18.5, 18.27, 19.22, 19.26, 20.7 and 20.23, the last of which is the only interpolated kalend found in AT, suggesting that this corruption was in their common archetype.

The picture that emerges from this is that the ancestor of AT/CS contained a coherent ferial sequence running for at least 152 years and that at some stage in the transmission sequence a scribe unfamiliar with ferial sequences, and most likely working from a worn exemplar, corrupted a lot of *ii* pairs to *u*, which are preserved in AT. Between that stage and when Mac Firbis wrote CS somebody undertook to remove these offending ferias and in the process deleted about a third of the ferial data, interpolating a number of additional kalends as well. What has made the restoration of the sequence relatively straightforward, however, is the fact that corruption in AT and CS rarely overlaps, so that there is practically always an intact ferial sequence visible, as can be seen clearly even in Table 3, which, as already remarked, shows the most corrupt part of the whole sequence. It has never been suspected in modern times that the ferial data in the Irish annals constituted a cogent sequence, so this represents an interesting discovery in itself.⁴³ It also suggests that the sequence may well continue for longer: indeed, when we examine the ferial data in CS immediately preceding the commencement of fragment three of AT, i.e. preceding 18.5, we find that the same ferial sequence, with just occasional kalend omissions, is sustained all the way back to 16.5. This makes a total of 208 years in all. The ferial *Kl.ui.* at 16.5 is attached in CS to *Patricius in Hiberniam uenit*, but when we try to follow the ferial sequence back beyond this point we find a sudden and profound break to a completely different ferial sequence. It turns out to be easier to approach this new sequence from the opposite side, so we will defer examination of it until the next section of this paper, where we will evaluate all the ferial data from the Incarnation onward.

The fact that this ferial sequence of 208 years is not appropriate to the actual years of the events recorded is most easily seen by examining the date implied by the ferial of events for which we have an independent date. For example, the solar eclipse recorded in CS (and shown in Table 3) is a record copied from the Chronicle of Marcellinus of an eclipse that was observed in AD 512.⁴⁴ In CS this record is placed the year before a bissextile year that began on *K.ii.*, i.e. a Monday, and, as may be seen from Table 1, this should imply year 20 of the solar cycle. Thus, around the year AD 512 the two possible years are either AD 496 = $17 \times 28 + 20$ or AD 524 = $18 \times 28 + 20$, giving the possibilities of AD 495 or AD 523 for the preceding year, with resultant errors of 17 and 11 years respectively. Similar errors emerge from examining the eclipses in AD 497 (18.14), 594 (21.22) and 612 (22.17) and the

⁴²CS kalends written as a simple *K* are found in Appendix I at 17.6, 18.20–24, 21.14–15, 21.28 and 22.25; elsewhere in CS *Kl* is systematically used. It should also be noted that the actual MS usage employs a crossed *l*, cf. Pl. I; Hennessy has accurately reproduced the occurrence of both this and *K* in his edition.

⁴³Cf. the views of Mac Neill, Walsh and O’Rahilly reported above and O’Flaherty’s amendments shown in Pl. 1.

⁴⁴Mc Carthy and Breen, ‘Astronomical observations’, 11.

volcanic eruption in AD 627 (22.28); when we have examined the complete ferial sequence we will be able to see how these ferials came to be so inappropriate.

The ferial sequence of AT/CS from the Incarnation to the seventh century

The first ferial datum to be found in AT is *uii. feria*, given along with other synchronised chronological data to identify the year of the Incarnation. No ferial datum is given for the second year, but ferial data resume at the third year, so that the first six years give the sequence *K.iii.K.K.ii.K.iii.K.u.K.ui.*, showing clearly that the fourth year, i.e. *K.iii.*, is bissextile. These data all reconcile with the ferial data for the years we call AD 1–6, as may be confirmed by comparing them with Table 1, and so we find that, at its very commencement, AT's ferial data are appropriately synchronised to our AD years. At this early stage AT is the only witness to the ferial sequence; however, as it happens, we have two different MSS of AT, MSS Rawlinson B 502 and B 488, the first dating from the eleventh century, the second from the fourteenth. It is well known that Rawl. B 502 is by far the better MS; indeed, when we collate the two ferial sequences we find that Rawl. B 488 follows B 502 closely for the first forty years, after which it usually omits the ferial data—when it does not, the data is usually corrupt. For this reason I have tabulated only Rawl. B 502's ferial data in columns 1–5 of Appendix I, preceded by a column giving the reference ferial sequence starting in AD 1, which is headed *Ferial cycle 1*.

As we follow the data in Rawl. B 502 forward we find that they match ferial cycle 1 identically, except for single missing minimis at 2.1 and 2.21, up as far as 3.7, i.e. AD 63. This year it makes bissextile, so that the following year has *K.ii.* instead of the *K.i.* appropriate to AD 64; however, following this Rawl. B 502 resumes placing the bissextile regularly every fourth year. Now, in view of the fact that I have both interpolated and omitted kalends in the course of restoring cycles 16–23 above, it is worth emphasising that this error at 3.7 is of a fundamentally different character, for the only way we could maintain ferial cycle 1 would be by interpolating seventeen kalends between 3.6 and 3.7. This is out of the question both in terms of the MS evidence, since Rawl. B 488 has the same kalend and event sequence at this point, and the chronology of otherwise dateable events, as will be seen in Table 5. We are therefore forced to conclude that this error is original, i.e. that the person labelling this ferial counted only three years between the bissextile *K.iii.* at 3.4 and the 'bissextile' *K.iii.* at 3.7. For this reason I insert a new ferial cycle following column 3 in Appendix I, headed *Ferial cycle 2*, and we see that the ferial data of Rawl. B 502 follow this cycle extremely closely up until 4.6. Indeed, the only error is the repetition of *K.ii.* at 3.14, and when Rawl. B 488 is examined no such kalend is found in it, so I feel fully justified in removing it from the tabulation, which deletion is marked by a footnote at 3.14.

However, on reaching 4.11 we find that Rawl. B 502 does not make the year *K.u.* bissextile; indeed, no bissextile year occurs for eight years until 4.15. Now, like the earlier case at 3.7, this bissextile omission could only be restored by the interpolation of sixteen additional kalends, for which there is no manuscript or chronological support, so again we must accept that it was a labelling mistake by the person who first composed the sequence. I therefore insert a third ferial cycle following column 4, and we then find that Rawl. B 502 follows ferial cycle 3 closely, with just minor corruptions at 4.27, 5.2, 5.4–5, 5.10 and 5.15, and more serious corruptions at 4.28 and 5.11, which appear to be the result of attempts at local repairs.

After 5.28 we must rely on Rawl. B 488 alone, which initially has a sequence of twelve kalends interspersed with just three events; however, its thirteenth year preserves *K.u.iii.*, which does indeed synchronise with the thirteenth year of ferial cycle 3. A sequence of seven kalends and four events ensues, followed by a full resumption of ferial data at 6.21. When this is compared with ferial cycle 3 it is seen that the bissextiles in the Rawl. B 488 sequence lag behind the former by four years; while they could be realigned by simply dropping four kalends between 6.14 and 6.20, we will find below that the chronological evidence supports their retention and we conclude instead that another ferial labelling error was made between 6.14 and 6.20, resulting in ferial cycle 4, which is inserted ahead of column 6 in Appendix I. From 6.21 to 10.22, or for the next 114 years, Rawl. B 488 follows this ferial cycle, though with a much greater error incidence than that exhibited by Rawl. B 502. However, the pattern of errors is very similar to those already surveyed in columns 18–23 of Appendix I and summarised in Table 4, namely *ii* to *u* corruption at 7.3, 7.9, 9.8, 9.13, 9.24, 10.8 and 10.20, *u* to *ii* corruption at 8.16 and 10.17, omitted kalends at 7.15, 7.19, 8.12, 8.23, interpolated kalends at 8.27, 9.20, 10.2, and *u.ii* to *i* at 9.28. We therefore conclude that it has been through a similar process of scribal corruption to the sequence tabulated in columns 18–23.

Ferial cycle 4 ends at 10.22, and at 10.23–26 the ferial data appropriate to the four preceding years are repeated, following which *K.ui.* is duplicated and ferial cycle 5 commences. The only way that this could be harmonised with the preceding sequence would be by interpolating seventeen kalends between 10.26 and 10.27, but since there is no manuscript or chronological support for such an interpolation, we must again accept that the person labelling the sequence committed these duplication or dittographic errors, resulting in ferial sequence 5. This sequence continues only as far as 11.14, where we find the bissextile deferred for six years until 11.16, followed by two ‘bissextiles’ at five-year intervals, which are all of a kind with the errors committed at 10.23–27. Thus it seems clear that the person who composed this ferial labelling failed to sustain their concentration or keep a careful check on the insertion of the bissextile years. The result is ferial cycle 6, inserted ahead of column 12, and this is followed by Rawl. B 488 until fragment 2 ends at 13.22. Before this happens, however, the first ferial in CS commences at 12.28, and it is readily seen that between 12.28 and 13.22 both of these sources preserve an identical ferial sequence in spite of the relatively high rate of kalend omissions in CS. After AT ceases this ferial sequence is sustained by CS up to 15.6, at which point it defers the bissextile by two years until 15.8. However, because this bissextile deferral actually restores the ferial sequence to synchronisation with the Julian calendar, as will be shown below, I regard this as a deliberate correction rather than an inadvertent mislabelling such as all the preceding disruptions have been. Regarding the errors found in AT between 11.26 and the conclusion of fragment 2 at 13.22, the trivial errors at 12.9, 12.19 and 13.4–5 as well as the kalend omissions at 12.12 and 13.20 are typical of the error patterns previously observed, with one striking exception. The ferial sequence *K.u.ii.K.ii.K.u.ii.K.ii.K.ui.K.u.* found in the footnote at 12.22 is of a radically different character. Obviously, the sequence doesn’t observe any of the rules R1, R2 or R3 required for a legitimate ferial sequence, and accordingly we omit it; also, we will see in the section below on the chronological accuracy of AT/CS that it has a completely different significance to all the other corruptions identified in

AT. On the other hand, the errors observed in CS typically consist of omitted and interpolated kalends and a number of the corruptions deriving from confusion between *u* and *ii*.

With this last adjustment to the ferial sequence in CS at 15.6 we are brought to ferial cycle 7, and CS follows this closely until 16.4, the year before Patrick's advent, where, as we have already stated, there is a sudden discontinuity in the ferial sequence from *K.iii.* to *K.ui.* Ferial cycle 8 commences here and continues for 208 years until the last ferial in CS at 23.16. Some ferial data are given in AT over the eleven years following 23.16, but they are badly corrupted, so it is very doubtful that they relate to ferial cycle 8. Even when the ferial data end, there is still a great deal to be gained from collating the event tokens from these two annals, for it allows us to check whether any kalends have been lost, whether the event sequence has been disturbed and what events are unique to each annal. What we find in the 77 years from the last ferial in CS at 23.16 until its lacuna in the early eighth century is:

(a) AT and CS typically have 2–4 events in common and in practically every case these are in identical order.

(b) With just one exception AT and CS have the same kalends distributed amongst their events in the same way; the exception occurs at Stokes, p. 168, where AT has the Anno Mundi date *.iiim.dc.lxviii.* at the place where CS has *Kl.*

(c) AT always has as many events as CS, or more, and where it has more these tend to occur in blocks, placed variably first, last or intermediately. With textual and historical analysis it should be possible to resolve these into omissions from CS and interpolation layers into AT.

Thus we find that AT and CS maintain complete synchronism over these 77 years; this situation has been partially illustrated in column 24 of Appendix I, where the event token of the first event common to AT and CS has been tabulated for 28 years.

This completes the description of the evaluation and restoration of the ferial data found in AT and CS. To summarise: between them they preserve a sequence ranging from 1.1 up to 23.16, a total of 632 years. While this ferial sequence commences in proper synchronism with the Julian year, the sequence is disturbed by bissextile labelling errors, first at 3.7 and intermittently thereafter up to 15.6, i.e. the 398th year. At 15.8 a bissextile correction is made that restores synchronism with the Julian year, which continues until 16.4, the 424th year, at which point a complete hiatus in the sequence occurs with the result that the ferial cycle that ensues for 208 years is not synchronised with the Julian year. Thereafter the two annals run in parallel synchronism for another 77 years until the lacuna in CS. Our next task is to find out how accurate the chronology of the events distributed amongst these 632 kalends is.

The chronological accuracy of AT/CS

Thus far, in order to restore a cogent ferial sequence, I have proposed both the omission and interpolation of kalends from/into the structure of the annals. Now it is time to consider the chronological performance of the resulting structure. In other words, if, according to this structure, the chronicle says that a certain event occurred *n* years from the Incarnation, what confidence may we have that it occurred in or near that year? Of course, for many events the only chronological

information we have comes from these very annals; however, for a subset that refer to external events such as the commencement of imperial or papal reigns, or the deaths of major figures of Christian European history, we also have independent records of when they occurred. In addition to these, we can obtain independent and accurate dates for observations of some natural phenomena, e.g. by calculation for eclipses, from the substantial Chinese records for comets, and from dendro-chronology and ice-cores for volcanic clouds. In this way we may run a 'quality control' check on the chronological structure to see how well it performs on these particular events. Ideally, of course, we would find that they match identically, but in practice we must recognise that this structure and perhaps even the externally provided chronology contain some errors, so we must accept a degree of mismatch. As long as this is small and the events remain aligned on average, we can be satisfied that our chronicle maintains synchronism. If a sustained discrepancy arises, however, it is a sign that the chronicle has either interpolated or omitted years.

To make this comparison, a standard chronological apparatus is needed; for modern readers, the AD dating system is without doubt the most familiar and convenient. In order, therefore, to be able to compare events from AT/CS with AD dates and because the table in Appendix I is tabulated in cycles of 28 years from the Incarnation, I define an *annus kalendae* (AK) simply as follows:

$$\text{AK} = (\text{cycle number} - 1) \times 28 + \text{serial number}.$$

For example, the first mislabelled bissextile occurs at 3.7, so $\text{AK} = (3 - 1) \times 28 + 7 = 63$; that is, the bissextile found here should have occurred one year later in AD 64. I now proceed to tabulate the AK values for a sample of events from AT/CS against their independently known AD values, and, in order to give a clear picture of the chronological performance, I also tabulate the difference AD–AK (see Table 5).

What emerges from this comparison is that the record of imperial reigns and other events in the first and second fragments of AT (Rawl. B 502 and B 488) up to and including Julian's reign in AD 361 is quite accurate on average, with some reigns a little early and others a little late but no sustained loss of synchronism. When the second fragment of AT ends we are relying on CS, which contains no record event that we can independently date until Sixtus's death in AD 440. However, the 28 ferials running in sequence from AK 397 to AK 424 are in fact chronological events synchronised with the actual Julian ferial data for AD 397–424. Thus, up to and including the year AK 424 the chronological performance of AT/CS is well synchronised with what we know independently to be the case; furthermore, and most importantly, there is absolutely no sign of any chronological dislocation at the various bissextile disruptions up to this date, showing that, except for the last, these were just mislabellings. However, a sudden and profound discontinuity occurs with *Patricius uenit*; the ferial changes to a new sequence that is synchronised with neither AK nor AD, and from this point until the solar eclipse of AD 612 the events all fall on average seven years too early, i.e. $\text{AD} - \text{AK} = 7$. This clearly implies that seven kalends have been lost from AT/CS between AD 424 and AD 432.

Now, it may be objected at this stage that this seven-year discrepancy is merely an artifice of the reconstruction of the ferial sequence, particularly since between 13.23 and 14.7 we are relying on CS alone, the ferial sequence of which is plainly quite corrupt, requiring five kalends to be restored in these twelve years. Why

TABLE 5—Chronological performance of the *annus kalendae* (AK) of AT/CS for events with independently known AD dates.

<i>Ref.</i>	<i>Event</i>	<i>Authority*</i>	<i>AD</i>	<i>AK</i>	<i>AD–AK</i>
1.16	Tiberius reigns	EB	14	16	–2
2.11	Caligula reigns	EB	37	39	–2
2.27	Nero reigns	EB	54	55	–1
3.23	Titus reigns	EB	79	79	0
4.13	Trajan reigns	EB	98	97	1
5.4	Hadrian reigns	EB	117	116	1
5.24	Antoninus Pius reigns	EB	138	136	2
6.20	Marcus Aurelius reigns	EB	161	160	1
7.25	Severus reigns	EB	193	193	0
8.22	Elagabalus reigns	EB	218	218	0
9.21	Philip reigns	EB	244	245	–1
10.27	Probus reigns	EB	276	279	–3
11.27	Constantine I reigns	EB	306	307	–1
12.25	Constans reigns	EB	337	333	4
13.22	Julian reigns— <i>AT frag. 2 ends</i>	EB	361	358	3
15.8	Bissextile year with <i>K.i.</i>	—	400	400	0
15.28	Bissextile year with <i>K.u.</i>	—	420	420	0
16.5	Patricius uenit	Traditional	432	425	7
16.13	Death of Pope Sixtus	ODCC	440	433	7
18.5	<i>AT frag. 3 starts</i>	—	—	—	—
18.8	Anastasius reigns	EB	491	484	7
19.1	Solar eclipse—Marcellinus	M&B	512	505	7
19.15	Justinus reigns	EB	527	519	8
20.15	P. Vigilius reigns	ODCC	555	547	8
21.10	P. Benedictus reigns	ODCC	575	570	5
21.15	Mauricius reigns	EB	582	575	7
21.24	P. Gregory reigns	ODCC	590	584	6
22.8	Phocas reigns	EB	602	596	6
22.16	Heraclius reigns	EB	610	604	6
22.17	Solar eclipse of AD 612	M&B	612	605	7
22.28	Volcanic cloud of AD 627	M&B	627	616	11
23.7	Lindisfarne founded	ODCC	635	623	12
23.13	Heracleonas reigns	EB	641	629	12
23.16	<i>Last CS ferial</i>	—	—	—	—
23.23	Death of Aidan	HE v. 24	651	639	12
23.27	Death of Penda	HE v. 24	655	643	12
24.7	Solar eclipse of AD 664	M&B	664	651	13

* The abbreviated authorities listed beneath this heading are: EB = *Encyclopaedia Britannica* (1970), vol. 19, 529–39, for Roman emperors and vol. 4, 519, for Byzantine emperors; ODCC = *Oxford Dictionary of the Christian Church* (London, 1974); M&B = Mc Carthy and Breen, 'Astronomical observations'; HE = Bede's *Historia ecclesiastica*, see Bertram Colgrave and R.A.B. Mynors (eds and trans.), *Bede's ecclesiastical history of the English people* (London, 1991); the *v* here refers to the last of the five books of HE.

should not another seven kalends be interpolated in order to restore the events from *Patricius uenit* to the solar eclipse of AD 612 to synchronism with the AD year? My reasons for rejecting this and believing that seven kalends are indeed missing from AT/CS are as follows:

1. The ferial sequence from 14.17 to 15.5 is a fully legitimate sequence with four clear bissextiles and only one corruption, a kalend omitted at 14.2; for this sequence to be a continuation of ferial cycle 6, twenty-two kalends are required between 13.22 and 14.17, and there are in fact eighteen in the MS. Furthermore, all of the MS ferial data between 13.22 and 14.17 either match ferial cycle 6 exactly or contain trivial corruptions of the form *ii* to *u* or an omitted minim, excepting only 14.2. Therefore the MS evidence simply does not support the interpolation of any more kalends into this sequence.

2. Collation of AC with AT/CS shows that AC has been translated from an exemplar closely resembling AT, but the translator, Conell Mageoghagan, omitted the entire kalends structure and just supplied occasional AD dates for major events, and the AD date he twice supplied for Patrick's advent was 425: 'But he did not Land here untill . . . Anno Domini 425' and, later, 'St. Patrick came into this land the 4 years of the reign of King Lagery, in the yeare of the Incarnation 425 as before specified.'⁴⁵ Now, given that it has been believed since at least the eleventh century that Patrick came in AD 432, the very fact that Mageoghagan both wrote down and reaffirmed the year AD 425 shows that in the seventeenth century there was also a tradition regarding this date. As can be seen, this record by Mageoghagan is in accordance with the reconstruction of the ferial sequence.

3. The very fact that at *Patricius uenit* there is a sudden break in the ferial sequence to one that is appropriate to neither AD 425 nor AD 432 shows that something has happened at this point to disrupt the chronological structure. Interpolating seven kalends between 13.23 and 14.7 can neither remove nor explain this break, rather it will dislocate the 27 years from 15.6 to 16.4 so that they will no longer be synchronised with the Julian calendar. More detailed examination below suggests that the disrupted ferial sequence following AD 424 was an attempt to obscure the removal of the seven kalends.

4. Seven kalends were in fact interpolated into AT, see the footnote at 12.22, namely *K.iii.K.ii.K.iii.K.ii.K.ui.K.iiii.K.u.*; these ferial data do not satisfy any of the rules R1, R2 or R3 and so are clearly not part of the original ferial labelling. Why did someone interpolate this block of seven kalends into AT? I suggest that they were an attempt to compensate for the seven kalends missing prior to *Patricius uenit* but that the person interpolating them was unsure from where they were missing. They thus represent a medieval acknowledgement that seven kalends were missing.

5. I would also draw attention to those interpolations found in AU and AT that refer to the summing of months and days to obtain years. Both in AU 490 and AT we find, following the record of the length of Zeno's reign, *Hi sex menses & .ui.*

⁴⁵The printed edition by Denis Murphy, *The Annals of Clonmacnois*, 65, gives this first reference as 'Anno Domini 425 (432 Rather)'. However, examination of a photocopy of the oldest MS for AC, that in the Armagh Public Library, shows that the '(432 Rather)' is a marginal interpolation in the hand of O'Flaherty. This interpolation has been subsequently incorporated into the text of TCD MS F 3 19, which Murphy used for his edition. For details of the relationships between the MSS of AC see Sarah Sanderlin, 'The manuscripts of the Annals of Clonmacnois', *Proceedings of the Royal Irish Academy* 82C (1982), 111–23. The second reference reaffirming the date is in Murphy, *op.cit.*, 171.

menses Marciani addunt annum quem non numerant Cronica. At AU 527, following the record of the reign of Pope Felix taken from *Liber Pontificalis*, we find the interpolation *Iohannis & dies .xvii. & mensibus .ii. & diebus .xiii. Felix efficiunt .iiii. umannum*. Although this text is obviously corrupt, the idea of adding months and days to obtain a ‘fourth year’ is unmistakable.⁴⁶ A third, similar summation is found in AU 537 and AT.⁴⁷ These identifications of additional ‘years’ and in particular the reference to a ‘fourth year’ all make sense when understood in terms of an attempt by a later annalist to rationalise the kalends missing from the chronology of the common ancestor of all these chronicles.⁴⁸

We see, therefore, that there are quite compelling reasons to accept that seven kalends were in fact missing from this common ancestor; the further fact that the ferial data from *Patricius uenit* onwards are so inappropriate suggests that this omission was deliberate, and to explore this we start from the assumption that the kalends from *Patricius uenit* onwards originally carried feriales, like those preceding AD 424, properly synchronised with the Julian year. Consider the sequence in Table 6 : The second row (valid) of this table shows the ferial data that are appropriate to the Julian years AD 423–34, with bissextile years shown in bold; the third row (omit) shows the effect of simply omitting seven kalends from AD 425 to AD 431 so that the subsequent feriales all move back seven years. The fourth row (AT/CS) shows the restored ferial data from AT/CS, and on comparing this with the previous row we can see that after the seven years were removed the ferial data were corrupted by decrementing the year following each former bissextile year by one. In the fourth row these decremented years are shown italicised, and, as can be seen, the effect is to make *them* appear to be the bissextile years; finally, the fifth row notes the differences (diff.) between the third and fourth rows (dec. = decremented). Overall, the result of these steps is to produce a legitimate ferial sequence, but one that is synchronised to neither AD 425 nor AD 432. But is there any independent evidence to show that this hypothesis is in fact what was actually done? There is indeed. If the MS ferial data tabulated in cycles 16 to 19 in Appendix I are examined it will be seen that the MS data at the four consecutive ‘bissextile’ years 19.14, 19.18, 19.22 and 19.26 are in each case one higher than the value indicated in ferial cycle 8. All the other MS ferial data in 19.13–28 are in

TABLE 6—Corruption sequence of ferial data in AT/CS over the years AD 423–34.

	AD years												
	423	424	425	426	427	428	429	430	431	432	433	434	
Valid	K.ii.	K.iii.	K.u.	K.ui.	K.uii.	K.i.	K.iii.	K.iiii.	K.u.	K.ui.	K.i.	K.ii.	
Omit 7	K.ii.	K.iii.	K.ui.	K.i.	K.ii.	K.iii.	K.iiii.	K.ui.	K.uii.	K.i.	K.ii.	K.iiii.	
AT/CS	K.ii.	K.iii.	K.ui.	<i>K.uii.</i>	K.ii.	K.iii.	K.iiii.	<i>K.u.</i>	K.uii.	K.i.	K.ii.	K.iii.	
Diff.	—	—	—	dec.	—	—	—	dec.	—	—	—	dec.	

⁴⁶Since *Liber pontificalis* records John’s reign as 2y. 9m. 17d. and Felix’s as 4y. 2m. 13d. (see Raymond Davis, *The Book of Pontiffs (Liber pontificalis)* (Liverpool, 1989), 49–51), I suggest that the ‘calculation’ originally read: 9m. 17d. + 2m. 13d. = 1 year.

⁴⁷AU 537: *.xx.ui. dies Bonifatii & .iiii. menses & .ui. dies Mercurii & .xi. menses & dies .uiii. Agapiti efficiunt annum & .iiii. menses & .x. dies*. Stokes, *The Annals of Tigernach*, 96: *.xxui. dies Bonifacii, et .iiii. menses et .ui. dies Mercurii, et .xi. menses et [uiii.] dies Agapeti efficiunt annum et .iiii. menses et .x. dies*.

⁴⁸Mac Neill, ‘Authorship and structure of the Annals of Tigernach’, 66–9, discusses these interpolations in detail, regarding them as evidence supporting his hypothesised conversion of the annals from Eusebian tabular form to ‘paragraphs’.

accordance with ferial cycle 8. Since the chance of random corruption of four consecutive bissextile years in two distinct MSS producing results consistently one higher in their ferial value is very low, particularly when 19.26 requires corruption from *K.iii.* to *K.u.*, I conclude that whoever corrupted the rest of the ferial data from 16.5 to 23.18 skipped over this block of four bissextile years. Hence the ferial sequence in 19.13–28 is actually appropriate to the events recorded in it and it is therefore shown italicised in Appendix I. To demonstrate this: we know, for example, from independent sources that Pope Mercurius's reign commenced in AD 533, and, as may be seen, it occurs in AT in a year with *K.iii.* that is preceded by a year with *K.u.* (see Appendix I, 19.21–22). Now, if we obtain the ferial of AD 533 by referring to Table 1, we see that $533 = 19 \times 28 + 1$, i.e. it is the first year of the solar cycle, which indeed commences with *K.iii.* and follows a bissextile year with *K.u.* The ferial data in AT/CS attached to the records of the reigns of Popes John I, Felix IV, Boniface II, Agapetus I and Silverius and of the emperor Justinus may likewise be shown to be in proper synchronism with the years AD 524–40.⁴⁹

This is a most important result, for it shows us that the archetype of AT/CS originally contained appropriate ferial data, i.e. data properly synchronised with the Julian year and therefore continuous with the ferial data for the years AD 400–24. But at some stage someone removed seven kalends before *Patricius uenit*, and then there was an attempt to obscure the removal by systematically corrupting every fourth ferial value of all the subsequent data. However, they inadvertently missed the block of four bissextiles between 19.13 and 19.28, presumably skipping over either a column or a page. AT 19.13–28 occupies about one-and-three-quarter columns in Rawl. B 488 written in a rather cramped hand but incorporating some substantial later interpolations from Bede. If these latter were removed the material could be accommodated in one column. The manner of these corruptions tells us something of how they were effected and the attitude of the person responsible for them; both the removal of the kalends and the corruption of the ferial data show that the person was quite unconcerned with the chronological integrity of the chronicle. It must have been someone who was relatively indifferent to chronology but at the same time confident that their action would go unchallenged, because the corruption is easily detected and exposed.

Returning to Table 5 we see that for the sample of events we have dated independently, all the events from *Patricius uenit* to the solar eclipse of AD 612, with the sole exception of Pope Benedictus's reign, have a difference of 7 ± 1 . This tells us that the relative chronological accuracy of these 180 years is very good, and so it is clear that there are no kalends missing from these years. However, between the solar eclipse of AD 612 and the founding of Lindisfarne in AD 635 the difference rises from 7 to 12, showing that five further kalends were lost in these 23 years, and then a further kalend was lost between Penda's death in AD 655 and the solar eclipse of AD 664. Thus between the eclipses of AD 612 and AD 664 a total of six kalends have been lost, and there can be absolutely no doubt as to the reality of this, since over these years both AT and CS are intact and show identical chronological structures from 22.17 to 24.7.⁵⁰ Moreover, we have independent proof that later medieval chronologists were aware of this loss, for when AT/CS is collated with AU (to be

⁴⁹See Stokes, *Annals of Tigernach*, 89–97, for AT's records of all these reigns. CS only records John's reign, see Hennessy, *Chronicum Scotorum*, 40–41.

⁵⁰Part of this loss also shows up very clearly in the table provided by Hennessy in his introduction correcting his marginal AD interpolations, for it shows that four kalends were missing between AD 635 and AD 652, see Hennessy, *Chronicum Scotorum*, xlvi.

discussed below) it is found that the chronological structure of AU 573–663 parallels that of AT/CS except that five kalends have been interpolated into AU at the years AU 574, 634, 640, 647 and 654. From this we can see that, with the exception of AU 574, these interpolations match closely in location the chronological deficiencies that we have independently identified in AT/CS.

To summarise the results of this section: We find that the ferial and chronological evidence shows that, originally, ferials properly synchronised with the Julian year commenced at *c.* AD 400, and it seems likely that these continued at least up until the mid-seventh century. Furthermore, the identity between this chronological apparatus, namely kalend-plus-ferial, and that found both in the Padua *latercus*, which was the Paschal tradition followed in Iona until AD 716, and in *De ratione paschali*, from which the Padua *latercus* was derived, strongly support the view that this was the chronological apparatus of the Iona Chronicle, but no copy of this chronicle has survived with its chronology intact. However, at some stage after *c.* AD 645 someone deleted seven kalends between AD 424 and AD 431 and a further six kalends between AD 612 and AD 664, and subsequently nearly every fourth ferial datum from AD 425 onwards was deliberately corrupted. This is the chronological structure we find preserved in AT/CS and vestigially in AI and AR, and I will refer to it henceforth as the reformed Iona chronology or the reformed Iona Chronicle. The first of the above-mentioned kalends deletions renders intelligible the hiatus found in all the annals associated with *Patricius uenit*, while the second explains some of the difficulties Hennessy encountered with the chronology of CS and, as we shall see below, some of the idiosyncrasies of AU's chronology.

Chronology of the other annals compared with that of AT/CS

We have seen above that the ferial-based chronology found in AT/CS exhibits a number of distinctive characteristics that combine to demonstrate that it dates from at least the sixth century, and it is important to establish how the chronology of the other annals relates to it. The only way to establish this relationship with certainty is by fully collating the event tokens of these annals against those of AT/CS; given the number of annals, this is a formidable undertaking, but those I have completed to date are shown in Table 7.

When we review the chronological apparatus found in the other annal collections we find that only one, AU, has transmitted a plausible system, but it has been by far the most important influence in shaping the scholarly view of the chronology of the Irish annals. For this reason I shall examine it first and in much more detail than the other collections.

AU—*Annals of Ulster*

That AU has been regarded as the most important of the Irish annals is reflected in the fact that it is the only one to have been published twice and one of the few that has received the honour of a critical edition. There are a number of good reasons for this, of which the most prominent are:

1. Both the language and the content of some of AU's entries are clearly older and less interpolated than those of other annals.⁵¹ A particularly good example of

⁵¹These remarks, of course, are directed only at the entries in *prima manu* in the primary manuscript for AU, i.e. TCD MS 1282. In the edition of Mac Airt and Mac Niocaill these are identified by H and H¹, the latter referring to amendments made *in prima manu*. See Tomás Ó Máille, *The language of the Annals of Ulster* (Manchester, 1910), *passim*, for discussion of the age of the language of AU's entries.

TABLE 7—Status of collation of event tokens of the annals (April 1997).*

<i>Annal</i>	<i>AD range</i>	<i>Annal entries collated as tokens...</i>
AT	307–722	All chronological and record entries
CS	336–722	All chronological and record entries
AC	307–722	All record entries
AU	431–722	All chronological and record entries
AI	307–665	Record entries found also in AT/CS
AB	307–722	All record entries
AR	431–700	All record entries
DF	307–387	All record entries
FA	572–722	All record entries

* This collation, which has been implemented as a series of Word 6.0 tables, is designed to print on an A4 page and at present requires forty-five such pages; it is available, together with a nine-page introduction, on the World Wide Web at: <http://www.cs.tcd.ie/Dan.McCarthy/chronology/synchronisms/annals-chron.htm>

the latter is the papal succession from Xistus (AU 432.1) to Sabinian (AU 607.2), which consists largely of verbatim excerpts taken from the chronicle of Marcellinus, Bede's *Chronica maiora* and *Liber pontificalis*,⁵² in all the other annals these entries have been variously translated, interpolated and dismembered.

2. AU comes with an AD chronological apparatus, which makes it immediately accessible to modern readers. It is true that there is a difficulty with its AD data inasmuch as from AU 431 to AU 1012 they come from a tradition that changed the year number on the feast of the Annunciation (25 March) rather than the Circumcision (1 January), as has been the custom for the last few hundred years.⁵³ However, as the conversion is easily effected by simply incrementing the MS value by one, this doesn't present a serious obstacle to the reader.

3. The chronological accuracy of AU for events whose dates are known independently is quite good; examination of the papal reigns and of astronomical events shows that AU's typical error up to AD 672 is within ± 2 , from then to AD 773 it is within ± 1 , and up to at least AD 1024 it is in complete synchronism with the dates of known astronomical events.⁵⁴ This is not to suggest that use of AU for chronological purposes is entirely straightforward, and two problems in particular have caused repeated difficulty. The first of these is that a considerable number of duplications are found *in prima manu*, notably over the years AD 435–603, which naturally generates ambiguity and uncertainty about the dates of the duplicated events.⁵⁵ Secondly, the idea that a kalend had been lost at *c.* AD 486 has caused an additional increment to be introduced at around that date.⁵⁶ Lastly, no chronological problem

⁵²See Mc Carthy, 'Chronological apparatus', 66–73.

⁵³*Ibid.*, 54–60.

⁵⁴*Ibid.*, 62, and Mc Carthy and Breen, 'Astronomical observations', 39. Note that these error figures refer *only* to events for which we have independent dates. There are good reasons to believe that many of the events in AU up to AU 663 have been displaced, generally by small amounts, as is discussed below in relation to the chronology of the Book of Cuanu.

⁵⁵O'Rahilly, *Early Irish history and mythology*, 245–6, gives a 'fairly complete list' continuing up to AD 746 and Appendix II of this paper gives a list complete up to AU 674.

⁵⁶Mac Carthy was responsible for the suggestion that a kalend had been lost, proposing that it was at AD 486, see Hennessy and Mac Carthy, *Annals of Ulster*, vol. 4, xcvi–xcix. See Mac Airt and Mac Niocaill, *Annals of Ulster*, 54–5, for their AD increment from 487 to 489, i.e. a kalend omission assumed at AD 488, and see the discussion thereof at p. xi in the Introduction. See Mc Carthy, 'Chronological apparatus', 56, for further discussion and references.

but a great deal of speculation has been generated concerning the role of the *Liber Cuanach*, or Book of Cuanu, which is mentioned as a source thirteen times between AU 467 and AU 628.⁵⁷

For all of these reasons it is clear that there is a great deal to be learned about the chronological structure of AU by collating it with AT/CS, and such indeed proved to be the case. I can only summarise the main results here. Before beginning, because AU uses an AD chronology, it is necessary to define a comparable AD chronology for AT/CS for the purposes of discussion and comparison; since in AU all events but Palladius's dispatch to Ireland occur after Patrick's advent, a satisfactory definition is, if $AK > 424$, to set $AK' = AK + 7$. That is, we effectively restore the seven kalends removed immediately preceding *Patricius uenit* so that it is then restored to $AK' = 425 + 7 = AD 432$ in the chronology of AT/CS. Of course, this definition of AK' may only be employed up to $AK = 605$ because after that further kalends have been lost, cf. Table 5.

Overview of results

As a first approximation we may say that, for AU 431–573, AU's AD chronology trails AT/CS by one year; the most obvious example is the record of Palladius's arrival, which appears under the heading *Anno ab Incarnatione Domini .ccc.xxx.i.*, which, when converted to a 1 January AD year, gives AD 432, thereby placing it one year later than Prosper. Next, between AU 574 and AU 654 inclusive, relative to AT/CS, AU interpolates five additional kalends, as has already been mentioned, with the result that by AU 655, AU is trailing AT/CS by a total of six kalends. AU consequently completely overcomes the effect of the loss of the six kalends from the reformed Iona chronology between AD 612 and AD 664 and achieves proper synchronism with the AD year. After AU 655 both AU and AT/CS preserve essentially the same chronological structure, at least until AU 722. Thus we find that while AU starts off trailing a year behind AT/CS, by AU 655 it has properly aligned its structure with the AD year by interpolating these five additional kalends.

Now, a most important point to resolve about these two contrasting chronologies is which of them is the earlier? When we examine the five additional kalends that AU has between AU 574 and AU 654, we find unmistakable evidence that they have been interpolated into the reformed Iona chronology rather than lost from AT/CS. Consider the following details of these five interpolated kalends, the full collation of which is given in Appendix II:

1. AU 574 records a single item, the convention at Druim Ceat, which is not found in any other annal and is unrelated textually or chronologically to the record found in AC discussed below. The date inferred from this AU entry, AD 575, has long been regarded as problematical and has recently been strongly challenged by Richard Sharpe, who suggests a date of *c.* AD 590.⁵⁸

2. AU 633 records the first of eight events found under the same kalend in AT/CS and then reproduces six of the remaining seven under AU 634 in an order different from AT or CS, which both agree.

3. AU 639 similarly records the first of seven events found in AT/CS and then reproduces the remaining six under AU 640.

4. AU 647 records just a single event, *Fursu craibdhech obiit*, which duplicates the record of Fursey's death that AU already has in common with AT/CS at AU 648.5.

⁵⁷Namely AU 467.2, 468.2, 471.1, 475.1, 482.2, 489.2, 544.3, 552.3, 598.2, 600.3, 602.3, 610.3 and 628.4.

⁵⁸Richard Sharpe (ed.), *Adomnán of Iona: life of St Columba* (London, 1991), 313, note 204.

Note the obvious interpolation of *craibdhech* and that at this point both AT/CS and AU typically have two to four records under each kalend.

5. AU 654 records a single event, *Nem m. hui Birn pausat*, which is not found in any other annal, at a point where typically five to six records are found under each kalend.

The textual details surrounding these five additional kalends, which are discussed in Appendix II, show us that AU has interpolated additional entries at these points that distort and duplicate entries found uncorrupted in AT/CS. This detailed situation mirrors the contrast that we find when we compare AU and AT/CS in general over the fifth, sixth and seventh centuries. In AU, on the one hand, we find a pristine AD chronological apparatus that cannot date from before the eleventh century, together with frequent duplication of entries and explicit references to alternative sources, i.e. *Cuanu*, *alii* and *Scoti*. As Mac Niocall concluded in 1975: ‘The evidence of these two sources [Cuanu and Dubdáleithe] does however emphasise that the text of U [i.e. AU] cannot be treated as unitary: it has been carpentered together in, often, a fumbling fashion.’⁵⁹ On the other hand, when we look at AT/CS we find a chronological apparatus (kalend-plus-ferial) that is identical to the one used in the Paschal tradition followed by Iona and that is laced heavily with scribal corruption, just as one would expect for numerical data copied repeatedly across many centuries. Then, regarding duplications and alternative sources, AT/CS has scarcely any of the former and none of the latter. All of this evidence points overwhelmingly towards the conclusion that AU’s chronology was derived by interpolating the chronology we find in AT/CS, so that AU’s chronology is therefore a later and more corrupt chronology than the reformed Iona one.

I now proceed to examine the repeated references, found only in AU, to *Liber Cuanach* that explicitly show that AU’s compiler was conflating at least two sources.

AU 492–535 and the Book of Cuanu

I have stated above that, ‘as a first approximation’, the chronology of AU for the years AU 431–573 trails that of AT/CS by one year, but in fact the detailed situation is much more complex than this. Firstly, we find that AU has intermittent, random and usually minor displacement of events relative to AT/CS. Secondly, we find sustained shifts in AU’s chronology relative to AT/CS over the interval AU 492–535. The random displacements are of major consequence for the collation of AU with AT/CS, since because of them it is quite impracticable to set down the sequence of AU’s event tokens beside those of AT/CS, which are in a substantially different order. Fortunately, in the critical edition of AU by Mac Airt and Mac Niocaill each separate record is numbered under each kalend, so we may refer uniquely to each event token using this number along with the MS year; for example, AU 432.1 refers to *Patricius peruenit*.⁶⁰ Of course, the mnemonic value is gone, but since in most cases these ‘numeric’ tokens will be equated with similar tokens from AT, CS or AC, this loss of mnemonic power is not such a serious matter and the presence of the MS year in the ‘numeric’ token allows us to easily compare the chronological structure of AU relative to AT/CS. The excerpt from the collation shown in Table 8 commences at the start of the third fragment of AT and illustrates most of the issues mentioned above.

⁵⁹Mac Niocaill, *Medieval Irish annals*, 21.

⁶⁰It is absolutely essential that the MS AD year be used if the years are to be numbered sequentially; if the marginal, editorial AD year is used the number 488 will be omitted.

TABLE 8—Excerpt from the collation between AU, AT, CS and AC for AD 488–496.*

AK'	AU	AT	CS	AC	Restored ferial	Remarks
488		K.u.	Kl.u.		K.iii.	
	488.1	Q. Cianani	Q. Cianani	Kineann d.		
489		K.iii.	Kl.iii.		K.iii.	Bissextile
	489.1	Q. Maic Caille	Q. mic Caille	mcCaille d.		
	489.2	C. Cella Asnada B. Muiredhaig Eochaid r. Ulad	C. Ceall Osnaigh	B. Killosny		AU from Cuanu
490		Kl.ii.	Kl.ii.		K.ii.	
	490.1	Zeno Augustus				CS and AC omit
491		K.u.	Kl.iii.		K.iii.	
	490.2	Anastasius r.				AU resequence
	491.1, 492.4	Patricius q.	Patricius q.	Patrick d.		AU 492.4 dupl.
492		K.iii.	Kl.iii.		K.iii.	
		Trasamundus				
493		K.u.	Kl.u.		K.u.	Bissextile
	492.1	C. Sratha				CS and AC omit
		Felix P. q.		Felix P. d.		
	492.2	Gelasius P.		Gelasius P.		
494		K.iii.			K.iii.	
	493.1	C. Taillten	C. Taillten			AC omits
495		K.i.	Kl.i.		K.i.	
	494.1, 492.3	C. Graine	C. Graine			AU 492.3 dupl.
496		K.ii.	Kl.ii.		K.ii.	
	495.2	Q. Cuindedha	Q. Cuindedha			AC omits
	495.1	Defectus sol	Defectus sol			Solar eclipse 497
	495.3, 497.1	E. Duin Leathglaise	E. Dúinletglaisi			AU 497.1 dupl.
		Gelasius q.	Gelasius q.			

* Note that AU 491.1, AT and CS all agree in placing Patrick's obit under AK' = 491.

On examining this excerpt we see that over the first three years four identical events are recorded in identical sequence in AU and AT/CS. Furthermore, if we let 'AU' stand for the MS AD year recorded in AU we see that over these three years AU = AK', which means, since one year must be added to AU to convert it to a 1 January convention, that the AD year recorded in AU is one greater than that inferred from AT/CS, i.e. AU trails AT/CS by one year. The situation at AK' = 491 is very different. Firstly, AU has moved Anastasius's reign from this year back one year, so that in AU this record appears immediately following that of Zeno Augustus. Secondly, AU duplicates the record of Patrick's death, as can be seen in Table 8. The first AU reference at AU 491.1 is synchronised with the records in AT, CS and AC, and it is very helpful that the compiler of AU has identified his source for this record as *Dicunt Scoiti hic Patricium archiepiscopum defunctum*: the word *Scoiti* explicitly suggests the Iona Chronicle, cf. Mac Fírbis's title for CS, 'Chronicum Scotorum'. At AU 492.4 the compiler gives his duplication, which is evidently the entry he himself believes, since he cites no source and gives additional details of Patrick's age at death and of the duration of his mission. It appears, then, that AU 491.1 comes from an edition of the Iona Chronicle with the same chronology as AT/CS and AU 492.4 comes from somewhere else, very likely the Book of Cuanu, as we shall see. At AK' = 492 there is no record common to all annals, and AT's solitary record of *Trasamundus* appears to be a later interpolation taken nearly verbatim from Bede. At AK' = 493 and AK' = 494 we find that AU has recorded three events identically sequenced to AT/CS, but

now $AU = AK' - 1$, so, in fact, the AD chronology of both AU and AT/CS is now synchronised; it appears most likely that AU's other source dropped the empty kalend at $AK' = 492$. This shift is sustained in $AK' = 495$ and $AK' = 496$, in which AU again reproduces duplications. At $AK' = 495$ we see that AU 494.1 is synchronous with the references to *C. Graine* in both AT and CS and, moreover, matches them textually, whereas AU 492.3 is from some other source.⁶¹ Similarly, at $AK' = 496$ it is easy to see that AU's duplication at 497.1 has been added from some other source.

From the analysis of these nine years I trust it can be seen how valuable this collation is, for it enables us both to observe the precise chronological relationship between AU and AT/CS and to classify nearly all of the duplications found in AU in two distinct groups, namely those with the same chronology as that found in AT/CS and those from some other source. Regarding their relative chronologies, we find that the shift of one year in AU's AD chronology is sustained until AU 499, when another such shift appears that is sustained until AU 507. Between AU 508 and AU 531 AU's entries are scattered randomly up to two years earlier or later than those of AT/CS. Thereafter the chronology settles so that at AU 532 AU trails AT/CS by two years; the gap narrows to one year at AU 537 and remains thus up until AU 573. I summarise these average relationships, which describe the majority of AU entries, in Table 9.

It is very clear from Table 9 that over the years AU 492–536 the compiler of AU has used a source whose content was very close to AT/CS but whose chronological structure had been disturbed relative to AT/CS. Now, the compiler of AU refers on thirteen occasions to *Liber Cuanach*, at the years AU 467, 468, 471, 475, 482, 489, 544, 552, 598, 600, 602, 610 and 628, and it is immediately obvious that the largest hiatus in these references, i.e. from AU 490 to AU 543, corresponds very closely with the interval of the disturbed chronology found in AU 492–536. There is a concentration of six references to the Book of Cuanu (hereafter Cuanu) in the twenty-five years just before the disturbance starts at AU 492, and the remaining seven occur after the disturbance ends at AU 536. Moreover, when these Cuanu references are examined four of them, namely AU 467, 475, 598 and 600, refer to records found identically in AT/CS and four of them, namely AU 468, 482, 544 and 628, refer to records textually related to those found in AT/CS but placed in either a different location or sequence. Finally, the reference at AU 602.3 asserts *Omnia quae scripta sunt in anno subsequente, inueni in Libro Cuanach in isto esse perfecta*, i.e. that the items that the compiler placed under AU 603 occur in Cuanu one year earlier, making it absolutely explicit that he was conflating the chronology of Cuanu with another source and that he felt obliged to register his divergence from the chronology of Cuanu.

It seems to me that there is only one reasonable conclusion to be drawn from these details, namely that the compiler of AU was collating an early edition of the Iona Chronicle with Cuanu, which contained very similar entries, implying that it was also derived from the Iona Chronicle but contained a slightly divergent and corrupt chronology. Where similar entries appeared under different years the compiler regularly copied both of them, intermittently identifying Cuanu by name and once identifying his edition of the Iona Chronicle by referring to *Scotti*, which

⁶¹Cf. Stokes, *Annals of Tigernach*, 82, *Cath tanaiste Graine, in quo cecidit Fraech mac Fidchadha ri Laigen Desgebuir, la hEochaigh mac Cairpri [Eochaid] uictor fuit*; AU 494.1, *Bellum secundum Granairt in quo cecidit Fraech mc. Finchad*; AU 492.3, *Bellum secundum Granairt*. CS is nearly identical to AT apart from orthography.

TABLE 9—Average relationship of AU entries with respect to (w.r.t.) AT/CS over the period AU 431–573.

<i>AU range</i>	<i>AD relationship</i>	<i>AD chronology of AU w.r.t. AT/CS</i>
431–491	AU = AK'	AU trails AT/CS by one year
492–499	AU = AK' – 1	AU and AT/CS are synchronised
500–507	AU = AK' – 2	AU leads AT/CS by one year
508–531	AU = AK' ± 2	AU scattered w.r.t. AT/CS up to two years
532–536	AU = AK' + 1	AU trails AT/CS by two years
537–573	AU = AK'	AU trails AT/CS by one year

reference suggests that he relied more on his other source, i.e. Cuanu. As he approached AU 492 it appears that the differences between the two sources became very much more frequent, so he ceased making acknowledgements to Cuanu but followed it closely, continuing none the less to duplicate some entries from his edition of the Iona Chronicle. What happened in Cuanu after AU's last reference to it at AU 628? It seems to me highly probable that Cuanu itself contained the five kalends interpolated by the compiler of AU between AU 574 and AU 654, for this would explain why he trusted Cuanu between AU 492 and AU 536 and why there is no information whatsoever attached to these five kalends to show that they have been interpolated. This is not the first time that this kind of relationship has been suggested: O'Rahilly suggested it in a limited way in 1948,⁶² and in 1972 Smyth proposed explicitly that the duplications in AU arose from the conflation of the Iona Chronicle with Cuanu.⁶³ However, now that we are in possession of the reformed Iona chronology, we are able to examine the situation in much more detail.

Finally, I consider when this compilation may have been made. Both Smyth and Mac Niocaill have pointed out that the latest material in AU acknowledged to come from Cuanu contains middle Irish linguistic forms, so it cannot have been used by AU's compiler earlier than the tenth century.⁶⁴ I have already shown that the date of construction of AU's AD chronology is early eleventh century, and it is certain that the compiler of that chronology had to face the problem of the seven kalends missing from the reformed Iona chronology before *Patricius peruenit* and the six kalends missing between AD 612 and AD 664. I suggest, therefore, that this eleventh-century compiler solved the problem of the seven missing kalends before *Patricius peruenit* by simply abandoning all the pre-Patrician records except the corrupt version of Prosper's record of Palladius and then used Cuanu to restore five of the six kalends missing between AD 612 and AD 664, thereby leaving a deficiency of one kalend. Had this compiler been using a Circumcision AD that changed on 1 January, he would have found himself placing Palladius and Patrick

⁶²It is unlikely that the use of this source [*Liber Cuanach*] was confined to those occasions on which he expressly mentions it as his authority' (O'Rahilly, *Early Irish history and mythology*, 241).

⁶³The duplications in A.U. which survive in the main hand of TCD MS H.1.8 arose from a conflation of the Bangor copy of the Iona annals with copies of the same source as found in the Book of Cuanu and perhaps elsewhere' (Smyth, 'Earliest Irish annals', 46).

⁶⁴*Ibid.*, 47, acknowledges F.J. Byrne's identification that the item at AU 552 describing the enshrining of Patrick's relics by Columcille 'contains Middle-Irish linguistic forms'; Mac Niocaill, *Medieval Irish annals*, 23, asserts that the material from the Book of Cuanu is 'certainly no earlier than the tenth century'.

at AD 432 and AD 433 respectively, and the displacement of AU 431–574 by one year would surely have been realised long ago, even by himself. As it was, his use of the Annunciation AD introduced an ambiguity of one year and so masked the loss of the kalend by placing, e.g., *Patricius peruenit* under the year explicitly labelled *Anno ab Incarnatione Domini .cccc°.xxx°.ii°*. The loss of this kalend in AU has caused a great deal of trouble ever since; the epactal interpolations by its fifteenth-century compiler Cathal Mac Maghnusa in the primary MS for AU, TCD MS 1282, represent a major effort on his part to resolve its chronological problems. From this lunar data Mac Carthy declared in 1901 in his and Hennessy's edition of AU that the kalend had been lost at AD 486, and he then used this as an 'explanation' for the apparent discrepancy of one year in the AD data.⁶⁵ In the 1983 edition of AU, Mac Niocall also effectively introduced an additional kalend around this time when he incremented the marginal AD from 487 to 489. I myself, because the shift in this lunar data coincided with a discrepancy of three years between Marcellinus and Liber Pontificalis for the reign of Pope Felix at AU 481, accepted in 1994 that a kalend had been lost between AU 481 and AU 486.⁶⁶ That view can no longer stand: although of course the idea of a missing kalend is correct, its location is at least 126 years later, i.e. somewhere between AD 612 and AD 664.

To summarise: In the eleventh century a compiler with an early edition of the reformed Iona Chronicle and the Book of Cuanu who wished to 'modernise' the annals and introduce AD dating collated these two works, relying on Cuanu when the two diverged; at these divergences he frequently copied the records from both sources. It appears highly probable that Cuanu had already interpolated five kalends between AU 574 and AU 654 in an attempt to replace those deleted from the Iona Chronicle between AD 612 and AD 664 at the time of its reformation, and in this way AU achieved synchronism between its kalends and AD notation from the middle of the seventh century onwards. However, the deficiency of one kalend had the consequence that from AU 574 back to the beginning of AU the entries are typically placed one year late with respect to the AD year. As far as the pre-Patrician material is concerned, with the exception of the single entry containing a corrupt version of Prosper's record of Palladius's dispatch to Ireland in AD 431, the compiler simply omitted it. Now that we are in possession of the chronological structure of the reformed Iona Chronicle, we are in a position to resolve most of the duplications he introduced, and these are tabulated in Appendix III.

AC—Annals of Clonmacnoise

It is obvious from even a casual comparison of AC with AT/CS that they are closely related, for practically every entry is a verbatim translation of the entry in AT/CS. References in AC to any major Irish figure, e.g. Patrick, Columba, Brigid or important Irish kings, often incorporate additional material, but the AT/CS component is usually readily identifiable and represents simply a direct translation from AT/CS. One aspect of AT/CS that has not survived translation is its chronological apparatus, for AC has completely omitted all kalend references.⁶⁷ In

⁶⁵Hennessy and Mac Carthy, *Annals of Ulster*, vol. 4, xcvi–xcix.

⁶⁶McCarthy, 'Chronological apparatus', 66–8.

⁶⁷While he deleted the kalends chronological apparatus, Mageoghagan, the author of AC, did supply occasional Anno Mundi and Anno Domini data embedded in the body of his text, cf. pp 11–12 and 25 for examples of the former and pp 50, 54, 59, 61, 63–5, 69–71 for examples of the latter. In Murphy's edition the AD data prefixed intermittently and followed by a hyphen from 69 onwards, e.g. '425-', would appear to be marginal interpolations originating from O'Flaherty.

these circumstances, it is useful to collate AC with respect to AT/CS for the following reasons:

1. Collation overwhelmingly confirms the *sequence* of events found in AT/CS, for they are practically identical in all three collections. When they differ, it is of interest to see with which of them AC agrees. At AD 588, for example, AT records in the one year *Obitus Lughdach Lis moir* immediately before *Natiuitas Cumine Fota*, whereas CS records Lughdach's death in the following year; AC agrees with AT (and with AU) in placing his death earlier and hence in the same year as Cumine's birth. A similar situation at *c.* AD 619 shows that AT, AC, AU and AI agree in placing the record *Aedh Bennan quieuit* after the record of the deaths of Sillán and Fingen, whereas CS places it before their deaths. Further examples occur at AD 543 regarding Saint Giarán's death, at *c.* AD 623 regarding the relative placing of Mongán's murder and M'Áedóc's death, and at *c.* AD 630 regarding the death of Ailli. In general, when AT and CS differ, we find that AC follows AT, and when all the instances of divergence by CS from AT and AC are examined it appears most probable that they are the result of misplaced restoration of entries to CS, so that in these situations AT and AC seem to preserve the older chronology.⁶⁸

2. A corollary of the close correspondence between the sequence of events in AC and AT/CS is that we may restore the chronological apparatus of AT/CS to AC, which is very useful for the few events found there that are not in AT/CS. For example, the following events unique to AC may be 'dated' in this way:

- (a) The death of the monk John Cassian to AD 439;
- (b) the record of Hengist and Horsa's arrival in Britain to between AD 447 and AD 451;
- (c) the death of Brandon, bishop of Armagh, to AD 479;
- (d) a long account of a conflict between Roadanus, abbot of Lohra in Tipperary, and King Diarmait mac Cerbaill to AD 558;
- (e) the famous meeting at Drum Ceat [Dromkehaire] to AD 584, whereas the interpolated kalend in AU places this event at AD 575; AC's inferred date is much closer to Sharpe's deduction of *c.* AD 590, which has been further supported by Meckler's recent examination of AU's sources.⁶⁹

3. AC helps fill out AT's lacuna for *c.* AD 359–488 by both confirming CS's entries and showing what it has omitted. What we find is that between AD 358 and *Patricius uenit* AC only adds the death of the monk Anthony at *c.* AD 358 and a *floruit* for Saint Martin at *c.* AD 367. However, after Patrick's advent we find that AC preserves many of the records found in AU but not in CS, including the important entries *Probatas Patricius* and *Patricius florens* at AU 441–3.

4. A number of chronological and textual details suggest that AC has been translated from an exemplar that comes from AT's rather than CS's tradition. The most conspicuous of these are:

- (a) AC reproduces AT's duplicated record of Fursey's death at *c.* AD 654 rather than the record from five years earlier that is common to AT, CS, AU 648.5 and AI 649.2.
- (b) At AD 690 AC reproduces AT's later addition of the death of Gnathad, which does not appear in either CS or AU.

⁶⁸These resequencings by CS occur at the years AK 511, 543, 591, 595, 618, 626, 632, 651, 660 and 681.

⁶⁹Sharpe, *Adomnán of Iona*, 313, n. 204, and M. Meckler, 'The *Annals of Ulster* and the date of the meeting of Druim Cett', *Peritia* 11 (1997), 44–52.

(c) At AD 662 AC reproduces a translation of the long verbatim extract from Bede's *Chronica maiora* concerning the synod of Constantinople found in AT, which is also not found in CS or AU. Similarly the reference to Bede's *Librum magnum* at AD 712 is found only in AT and AC, and together these show that Mageoghagan's source for AC was written after the interpolation of the substantial extracts from Bede.

(d) AC reproduces in full practically all the duplicated imperial succession entries from the banishing of Justinian to Leo (AD 695–717), which were taken, along with substantial citations, directly from Bede. AT has the fullest version of these and CS has just one, proving, however, that they were also in its original exemplar.⁷⁰

It may be safely concluded that there is a great deal more to be learned from studying the collation between AC and AT/CS.

AI—Annals of Inisfallen

AI was collated over the years AD 307–664, and, while the great majority of the entries in this interval are found in AT/CS, it quickly became clear that their chronological relationship with AT/CS, and hence the Iona Chronicle, is far more complex and corrupt than that of AU. The following salient features of the chronological relationship were noted:

1. AI shares a number of AU's distinctive characteristics, e.g. *Natus Brighde* displaced by sixteen years; it corruptly reproduces AU 566.2 and 567.1 *Fecht i nIardoman* at AI 568 as *Cath I nArd Tómmáin*; and AI 529 reproduces AU 530.1 *Corpus S. Antonii*, neither of which events are recorded in the other annals.

2. Commencing about AD 569, AI reproduces a number of entries otherwise found in AT that appear to be relatively late interpolations; for example, AI 567 *Quies Gilldais*, AI 578 *Cath Locha*, AI 604.2 *Quies sanctae Sinche*, AI 631.3 *Guin Cailchíne* and AI 646.2 *Mors Oengussa Léith*.

3. Unfortunately, it emerges that no credence whatsoever can be given to the editorial AD chronology supplied by Mac Airt in the margin of the post-Patrician annals, for he freely interpolated and omitted kalends in order to try and align the chronology of AI with that of AU, which, as we have seen, is itself a corrupt version of the chronology of the reformed Iona Chronicle. The following is the list of Mac Airt's amendments between AI 432 and AI 750:

Interpolations: AI 474–9, AI 483–4, AI 490, AI 510, AI 650–1, AI 668, AI 712, AI 745–6;

Omissions: AI 560A–B, AI 747a.

This total of sixteen interpolated and three omitted kalends over about 320 years gives a fair impression of the level of corruption of AI's chronology.

AB—Annals of Boyle, AR—Annals of Roscrea, DF—Dublin fragment and

FA—Fragmentary annals of Ireland

While none of these collections has preserved any substantial chronological structure, they can all be helpful on occasion to confirm the sequence or the text of entries found in AT, CS, AC and AU; in particular, AB and DF are useful when

⁷⁰See Mac Neill, 'Authorship and structure of the Annals of Tigernach', 75–6, for a discussion of these duplicate successions. The solitary duplicate entry in CS is that for the reign of *Pilipus*, see Hennessy, *Chronicum Scotorum*, 112.

examining the pre-Patrician entries in AT, CS and AC. Although DF has been provided with a very impressive chronological apparatus consisting of Anno Mundi, ferial and epact data, the collation shows clearly that its chronology is in fact very corrupt, as might be suspected from the repeated and widely separated Passion entries appearing long after the time of Christ.⁷¹ In the post-Patrician era AR has preserved intermittent ferial data that reconcile closely with those found in AT/CS and these are recorded in the footnotes of Appendix I.

In summary, we may say of all the Irish annals discussed above that, as far as giving insight into the original chronological structure of the Iona Chronicle, AT and CS are the best, AU and AC are useful, AI is a difficult source, and the remainder are only very occasionally helpful. This finding is largely in accordance with the state of both the chronological apparatus and the condition of the texts found in these collections.

Summary and conclusions

The work reported in this article commenced from the observation that the kalend-plus-ferial chronological apparatus found in the Irish annals, best preserved in AT and CS but found vestigially in AR, AI and AU, corresponds with that used in the *latercus* or Paschal table followed by Iona up until the early eighth century. I undertook, therefore, to analyse this ferial data using the mathematical properties of the 28-year solar cycle in combination with the collation of the chronological structure of all the Irish annals. From this examination it emerged that, in contrast to earlier dismissals of the data as ‘hopelessly confused’, they actually constitute a cogent series commencing at the birth of Christ and continuing up until the mid-seventh century. Calibration of this ferial structure against the events for which we have independent AD dates disclosed the following details:

(a) Initially these ferial data are properly synchronised with the AD year, but between AD 63 and AD 306 a series of five bissextile errors disturbs this synchronisation. At AD 398, however, a further bissextile adjustment is made that restores synchronism, and this is maintained until AD 424.

(b) It appears that in the Iona Chronicle these synchronised ferial data originally continued until at least the middle of the seventh century but that at some subsequent date someone deliberately removed the seven kalends from AD 425 to AD 431 inclusive and a further six kalends between AD 612 and AD 664.

(c) Following the deletion of these kalends, nearly every fourth ferial, commencing at AD 433, was deliberately corrupted by decrementing it, thereby obscuring the bissextile years, with the exception of the four bissextile years between AD 524 and AD 536, which were apparently inadvertently omitted and so remain properly synchronised with the AD year.

This chronology, from AD 1 to AD 664, has been termed the reformed Iona chronology and was collated with the chronology of the Annals of Ulster, which disclosed that the latter preserve a composite and derivative chronology with the following salient characteristics:

(a) As a first approximation, the chronology of AU trails that of the reformed Iona chronology on average by one year from AU 431 to AU 573.

(b) AU interpolates five additional kalends in the interval AU 574–647, which,

⁷¹Mac Airt and Mac Niocaill, *Annals of Ulster*, 18–21.

when added to the one-year lag, have the effect that from AU 648 onwards AU overcomes the loss of the later six kalends from the reformed Iona chronology and achieves synchronism with the AD year. The details of these five kalend interpolations show that AU was compiled by conflating an early edition of the reformed Iona Chronicle with another source, most probably the Book of Cuanu.

(c) From AU 655 to AU 721 the chronology of AU and the reformed Iona Chronicle correspond.

(d) The detailed chronology of AU, particularly from AU 492 to AU 536, shows repeated and sometimes sustained departures from that of the reformed Iona Chronicle, which are believed to have been caused by AU having followed the Book of Cuanu.

These results have substantial implications for our understanding of the chronology of the Irish annals. Firstly, the fact that AU's chronology is a derivative and further corrupted version of the reformed Iona chronology means that AU can no longer be regarded as providing the most authoritative annal chronology, particularly over the interval AD 431–664. Rather, since it is straightforward to restore the thirteen kalends deleted from the reformed Iona Chronicle, this restored chronology should be used to determine the AD dates and detailed sequence of annal events; this has been done in the collation of the event tokens of all the annals made available on the Web. Secondly, the chronology of the reformed Iona Chronicle is based on the ferial data preserved principally in AT and CS, and there is good reason to believe that nearly all of this data and the tradition from which they come date at least from the time of Saint Columba in Iona. The chronology is therefore based on the earliest chronological apparatus found in these annals. Thirdly, as a result of collating the other annals, AC, AU, AI, AR, AB, DF and FA, with the chronology found in AT/CS, we now have a single unified chronology for all of these annals over the years AD 307–722, hitherto regarded as the most unreliable annalistic years from a chronological viewpoint. Fourthly, nearly all the duplications found in AU, so frequent in the sixth century, can now be resolved by reference to this chronology. Fifthly, the chronological condition of the reformed Iona Chronicle generates many conspicuous questions: by whom and when were the ferial series commencing at AD 1 composed; who introduced the bissextile correction at AD 398 that restored synchronism with the AD year; who deleted the seven kalends from AD 425 to AD 431 and six more between AD 612 and AD 664; and when and why did they do this? Answers to all of these questions are required before it can be said that we have a satisfactory understanding of the history of the chronology of the Irish annals.

Finally, I have two suggestions regarding the future: Firstly, that the collation by event tokens of AT, CS, AC, AU, AI, AR, AB, DF and FA, at present covering AD 307–722 and available on the Web at <http://www.cs.tcd.ie/Dan.McCarthy/chronology/synchronisms/annals-chron.htm>, should be extended to cover the entries in all the available annal collections from earliest biblical up to late medieval times. In this way a stable and unified chronology will be obtained for the entire body of annal material as well as a great deal of insight into their structural inter-relationships and histories. Secondly, with its chronological structure now resolved, there is a profound need for a critical edition of AT, i.e. Rawl. B 502 and B 488. Only this will give us a clear view of the textual and chronological affinities between this most important of annal texts, its sources and the other annals. In conclusion, I would like to observe that modern Irish scholarship owes a huge

debt to Duaid Mac Fírbis, the scribe of CS, who, with his own intellectual and cultural ethos devastated and collapsing around him, patiently and accurately copied the ferial data of his exemplar, thereby paying proper homage to the labour of his antecedents.⁷⁰ We must likewise honour the annals as a jewel of our heritage.

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⁷²Nollaig Ó Muraíle's publication, *The celebrated antiquary Dubhaltach Mac Fhirbisigh (c. 1600–1671); his lineage, life and learning* (Maynooth, 1996), is a fine and most appropriate monument to this most accomplished of Gaelic scholars. Ó Muraíle's own conclusion regarding *Chronicon Scotorum* is, 'We therefore owe a very great debt of gratitude indeed to Dubhaltach Mac Fhirbisigh for preserving for subsequent generations of scholars this valuable historical source' (see 104).

ABBREVIATIONS

AB = Annals of Boyle. A.M. Freeman (ed.), 'The annals in Cotton MS Titus A xxv', *Revue Celtique* 41 (1924), 301–30; 42 (1925), 283–305; 43 (1926), 358–84; 44 (1927), 336–61.

AC = Annals of Clonmacnoise. Denis Murphy (ed.), *The Annals of Clonmacnoise, being annals of Ireland from the earliest period to A.D. 1408* (Dublin, 1896; facsimile edition by Llanerch publishers, Felinfach, 1993).

AI = Annals of Inisfallen. Seán Mac Airt (ed.), *The Annals of Inisfallen* (Dublin, 1951; reprinted 1977).

AR = Annals of Roscrea. Dermot Gleeson and Seán Mac Airt (eds), 'The Annals of Roscrea', *Proceedings of the Royal Irish Academy* 59C (1957–9), 138–80.

AT = Annals of Tigernach. Whitley Stokes (ed.), 'The Annals of Tigernach', *Revue Celtique* 16 (1895), 374–419; 17 (1896), 6–33, 119–263, 337–420; 18 (1897), 9–59, 150–97, 267–303 (reprinted in two volumes by Llanerch publishers, Felinfach, 1993).

AU = Annals of Ulster. W.M. Hennessy and Bartholomew Mac Carthy (eds), *Annals of Ulster... a chronicle of Irish affairs... 431 to 1541* (4 vols, Dublin, 1887–1901); Seán Mac Airt and Gearóid Mac Niocaill (eds), *The Annals of Ulster to A.D. 1131* (Dublin, 1983).

CS = Chronicon Scotorum. W.M. Hennessy (ed.), *Chronicum Scotorum: a chronicle of Irish affairs... to A.D. 1135, with a supplement... 1141 to 1150* (Rolls Series, London, 1866).

DF = Dublin fragment: the pre-Patrician material published in Mac Airt and Mac Niocaill's edition of AU. It is not actually part of the MS of AU, is normally referred to as the 'Dublin fragment' and is closely related to AI's pre-Patrician material. It also appears in Whitley Stokes's *Annals of Tigernach*, vol. 2, 450–66.

FA = Fragmentary annals. Joan N. Radner (ed.), *Fragmentary annals of Ireland* (Dublin, 1978).

FM = Annals of the Four Masters. John O'Donovan (ed.), *Annála Ríoghachta Éireann: Annals of the Kingdom of Ireland by the Four Masters, from the earliest period to the year 1616* (7 vols, Dublin 1851; reprinted New York, 1966).

Appendix I

Tabulation and restoration of all the ferial data in AT and CS

The following pages tabulate all of the ferial data found in the first seven centuries of AT and CS. The data are tabulated in columns of 28 years in order to highlight their cyclic nature and to allow restoration by comparison with the prototype ferial cycles tabulated in parallel. The first column on each page displays the *serial number* of the solar cycle, cf. Table 1, which is accompanied by a prototype ferial cycle headed *ferial cycle n*, which is appropriate to the following columns of ferial data. Across the heads of these columns of ferial data are found the successive *cycle numbers*, below each of which is cited the annal acronym, i.e. *AT* or *CS*, or both *AT* and *CS* in cases where we have kalends and ferial data from both. Immediately below each acronym there is a page number that refers to the page of its published edition on which the *first* ferial datum cited in the column will be found. The purpose of this is to allow the reader to efficiently locate the tabulated ferial data in the published editions of AT and CS; data subsequent to the first tabular entry in each column may be located either by following the sequence forward from here or by interpolation between consecutive page references. If it is necessary to operate in the opposite sense, i.e. to go from the published edition to the table, this may be done by first using the page number to identify the appropriate cycle number and then by matching a sequence of at least four consecutive ferials. All references in the text to the table entries are cited in the form *cycle number.serial number*, e.g. the ferial datum attached in CS to *Patricius uenit* is located in the table at 16.5. When mislabelling errors in the ferial data change the prototype ferial cycle, these are embedded amongst the columns of ferial data as appropriate. In order to highlight the occurrence of bissextile years in the manuscript ferial data, the kalend (*K* or *Kl*) has been printed in bold; in the case of the prototype ferial cycles both the kalend and ferial datum have been printed in bold in order to emphasise that these are restored rather than manuscript data.

All of the ferial data have been checked as follows: For AT, the first 140 years were checked against the facsimile edition *Rawlinson B 502* published by Kuno Meyer (Oxford, 1909); all the remainder of AT has been checked against photostat copies of Bodleian Library, Rawl. B 488 kindly lent to me by Professor F.J. Byrne. For CS, all the ferial data were checked against TCD MS 1292. All the discrepancies between the MS and printed editions have been noted in the footnotes; as will be seen, these are very numerous in the case of Stokes's edition of AT, while on the other hand, and greatly to his credit, none were found in Hennessy's edition of CS. All amendments required to restore the ferial data are shown as follows: interpolated kalends are shown either as [K.] or [Kl.] and, where appropriate, a footnote identifies as closely as possible where in the text it should be restored. Where kalends must be deleted, the place is indicated by the footnote reference in the table, and the footnote itself cites the kalend that has been deleted and where it is located in the text. In addition, the footnotes, which are arranged in strict chronological sequence, identify other relevant details such as ferial mislabellings, ferial synchronisms and MS relationships. Note: one consequence of the strict chronological ordering of the footnotes is that when we have parallel ferial series from AT and CS, e.g. in 19.11–13, the consecutively numbered footnotes may originate from alternate ferial columns.

As discussed in the article, up until the omission of seven kalends following 16.4, an *annus kalendae* defined as

$$AK = (\text{cycle number} - 1) \times 28 + \text{serial number}$$

provides quite an accurate result relative to the Anno Domini year for all events that may be independently dated up to AD 424. Following this we must restore the seven kalends omitted preceding *Patricius uenit* at 16.5, so the definition

$$AK' = AK + 7$$

is quite accurate for independently dated events up to AD 612, i.e. 22.17. Because a further six kalends have been lost over the next 52 years and it is not clear from just where they were removed, it is not possible to state a simple formula for the years AD 613–63. Thereafter, i.e. from 24.7, we may define

$$AK'' = AK + 13,$$

which restores AT/CS events to synchronism with events recorded in AU once these are converted to a 1 January AD chronology. For example, AT *Kl. Tenebre i callaind Mai*, the eclipse of 1 May, is at 24.7, so $AK = (24 - 1) \times 28 + 7 = 651$ and hence $AK'' = 651 + 13 = 664$, cf. AU, which has the entry *Anno Domini .dc°.lx°.iii°. Tenebrae in kl. Maii*, which, when converted to a 1 January AD, also gives $663 + 1 = 664$ AD.

<i>Cycle no.</i>		1	2	3		4		5
<i>Serial no.</i>	<i>Ferial cycle 1</i>	<i>AT p. 36</i>	<i>AT p. 38</i>	<i>AT p. 43</i>	<i>Ferial cycle 2</i>	<i>AT p. 46</i>	<i>Ferial cycle 3</i>	<i>AT p. 48</i>
1	K.iii.	K.iii. ¹	K.ui.	K.iii.	K.iii.	K.iii.	K.ui.	K.ui.
2	K.i.	K	K.i.	K.i.	K.i.	K.i.	K.iii.	K.iii.
3	K.ii.	K.ii.	K.ii.	K.ii.	K.ii.	K.ii.	K.i.	K.i.
4	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.
5	K.u.	K.u.	K.u.	K.u.	K.u.	K.u.	K.iii.	K.iii.
6	K.ui.	K.ui.	K.ui.	K.ui.	K.ui.	K.ui.	K.u.	K.u.
7	K.iii.	K.iii.	K.iii.	K.iii. ⁶	K.iii.	K.iii.	K.iii.	K.iii. ¹²
8	K.i.	K.i.	K.i.	K.ii.	K.ii.	K.ii. ⁹	K.i.	K.i.
9	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.ii.	K.ii.
10	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii. ¹³
11	K.u.	K.u.	K.u.	K.u.	K.u.	K.u. ¹⁰	K.iii.	K.u.
12	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.
13	K.i.	K.i.	K.i.	K.i.	K.i.	K.iii.	K.iii.	K.iii.
14	K.ii.	K.ii. ²	K.ii.	K.ii. ⁷	K.ii.	K.i.	K.i.	K.i.
15	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.
16	K.iii.	K.iii.	K.iii.	K.u.	K.u.	K.iii.	K.iii.	K.iii.
17	K.ui.	K.ui. ³	K.ui.	K.ui.	K.ui.	K.u. ¹¹	K.u.	K.u. ¹⁴
18	K.iii.	K.iii.	K.iii.	K.iii. ⁸	K.iii.	K.iii.	K.iii.	K.iii.
19	K.i.	K.i.	K.i.	K.i.	K.i.	K.iii.	K.iii.	K.iii.
20	K.ii.	K.ii.	K.ii.	K.iii.	K.iii.	K.ii.	K.ii.	K.ii.
21	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.
22	K.u.	K.u.	K.u. ⁴	K.u.	K.u.	K.iii.	K.iii.	K.iii.
23	K.ui.	K.ui.	K.ui.	K.ui.	K.ui.	K.u.	K.u.	K.u.
24	K.iii.	K.iii.	K.iii. ⁵	K.i.	K.i.	K.iii.	K.iii.	K.iii. ¹⁵
25	K.ii.	K.ii.	K.ii.	K.ii.	K.ii.	K.i.	K.i.	K.i.
26	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.ii.	K.ii.	K.ii.
27	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.
28	K.u.	K.u.	K.u.	K.iii.	K.iii.	K.iii.	K.u.	K.u. ¹⁶

1. Start of ferial data in AT fragment 1, Rawl. B 502, f. 10r.

2. Stokes omits *K.ii.* between *K.i.* and *Initium indictionis*.

3. Stokes has *K.iii.*

4. Stokes omits *K.u.* between *Iudeós tumultuantes* and *K.ui.*

5. Stokes omits *K.iii.* between *Fames in Roma* and *K.ii.*

6. First ferial labelling error—bissextile after only three years.

7. Omit the duplicated *K.ii.* between *Linus papa .ii. annis* and *Galua*. It is not in Rawl. B 488.

8. Stokes has *K.uu.*

9. Stokes has *K.xii.*

10. Second ferial labelling error—bissextile omitted.

11. Stokes omits *K.u.* between *quieuit* and *Clemens*.

12. Omit *K.iii.* between *K.ui.* and *Aquila Ponticus*.

13. Stokes has *K.iiii.*

14. Stokes has *K.ii.*

15. Stokes has *K.iiii.*

16. Stokes has *K.ii.* End of Rawl. B 502.

Cycle no.	6	7	8	9	10	11		11
Serial no.	Ferial cycle 4	AT p. 50	AT p. 51	AT p. 53	AT p. 56	AT p. 61	Ferial cycle 5	AT p. 66
1	K.i.	K. ¹	K.i.	K.	K.i.	Kl. ¹¹	K.i.	K.i.
2	K.ii.	K.	K.ii.	Kl.ii.	Kl.	K.ii. ¹²	K.ii.	K.ii.
3	K.iii.	K.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.
4	K.u.	K.	K.u.	K.u.	K.u.	K.u.	K.u.	K.u.
5	K.ui.	K.	K.ui.	K.ui.	K.ui.	K.ui.	K.ui.	Kl.
6	K.iii.	K.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.
7	K.i.	K.	K.i.	K.i.	K.i.	K.i.	K.ii.	Kl.ii.
8	K.iii.	K.	K.iii.	K.iii.	K.ui.	K.ui.	K.iii.	K.iii.
9	K.iii.	K.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.
10	K.u.	K.	K.u.	K.u.	K.u.	K.u.	K.u.	K.ii.
11	K.ui.	K.	K.ui.	K.ui.	K.ui.	K.ui.	K.iii.	K.iii.
12	K.i.	K.	K.i.	[K.] ⁶	K.i.	K.i.	K.i.	K.i.
13	K.ii.	K.iii.	K.ii.	K.ii.	K.u.	K.ii.	K.ii.	K.ii.
14	K.iii.	Kl.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.iii. ¹⁵
15	K.iii.	K.	[K.] ⁴	Kl.iii.	K.iii.	K.iii.	K.u.	K.iii.
16	K.ui.	K.	K.ui.	Kl.iii.	K.ui. ⁹	K.ui.	K.ui.	K.u.
17	K.iii.	K.	K.iii.	Kl.iii.	K.iii.	K.iii.	K.iii.	K.iii.
18	K.i.	K.	K.i.	Kl.i.	K.i.	K.i.	K.i.	K.i.
19	K.ii.	Kl.	[K.] ⁵	K.ii.	K.ii.	Kl.ii.	K.iii.	Kl.ii.
20	K.iii.	K.	K.iii.	K.iii.	K.iii. ¹⁰	Kl.iii.	K.iii.	Kl.iii.
21	K.u.	K.u.	K.u.	K.u.	Kl.	K.u.	K.u.	K.iii.
22	K.ui.	K.ui.	K.ui.	Kl.	K.ui.	K.ui. ¹³	K.ui.	K.ui.
23	K.iii.	K.iii. ²	K.iii.	[K.] ⁷	K.iii.	K.ii. ¹⁴	K.i.	K.iii.
24	K.ii.	K.ii. ³	K.ii.	Kl.ii.	K.u.	K.iii.	K.ii.	K.i.
25	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.u.	K.iii.	K.iii.
26	K.iii.	K.iii.	K.iii.	K.iii.	K.iii.	K.ui.	K.iii.	K.iii.
27	K.u.	K.u.	K.u.	K.u. ⁸	K.u.	Kl.iii.	K.iii.	K.u.
28	K.iii.	K.iii.	Kl.iii.	K.iii.	K.i.	K.iii.	K.iii.	Kl.iii.

1. Switch to ferial data in AT fragment 2, Rawl. B 488, f. 4r.
2. Third ferial mislabelling—this bissextile is not synchronised with ferial cycle 3 and, since 6.13 is synchronised, a mislabelling has occurred between 6.14 and 6.20.
3. Stokes omits *K.ii.* between *uastauit* and *Montanus*.
4. AT omits *K.iii.* somewhere between *K.iii.* and *K.ui.*
5. AT omits *K.ii.* somewhere between *K.i.* and *K.iii.*
6. AT omits *K.i.* between *K.ui.* and *K.ii.*
7. AT omits *K.iii.* somewhere between the preceding *Kl.* and the following *Kl.ii.*
8. Omit *K.ui.K.* in AT that immediately follow *K.u.*
9. Stokes omits *K.ui.* between *Gordianus...annis.ui.* and *Iulius Africanus*.
10. Omit the AT *K.iii.* (*K.iii.* in Stokes) between *interfectus est* and *iiiiim.cc.iii.*
11. Stokes has *Rl.*
12. Omit *K. arm.* between *die Iulii* and *K.ii.*
13. Stokes has *K. sexta feria.*
14. Fourth ferial mislabelling—the ferial data for these four years appear to repeat those appropriate to the preceding four years, but at 10.27 the effect is as if an additional bissextile had occurred at 10.26.
15. Fifth ferial mislabelling—the bissextile is deferred until 11.16, which is followed by two more at five-year intervals at 11.21 and 11.26.

<i>Cycle no.</i>		— 12 —		— 13 —		14	15	
<i>Serial no.</i>	<i>Ferial cycle 6</i>	<i>AT p. 69</i>	<i>CS p. 14</i>	<i>AT p. 74</i>	<i>CS p. 14</i>	<i>CS p. 16</i>	<i>CS p. 18</i>	<i>Ferial cycle 7¹⁰</i>
1	K.u.ii.	K.u.ii.		K.u.ii.	Kl.u.ii.	Kl.iii.	Kl.u.ii.	K.u.ii.
2	K.i.	K.i.		K.i.	[Kl.]	Kl.u.	Kl.i.	K.i.
3	K.iii.	K.iii.		K.iii.	Kl.iii.	Kl.ui.	Kl.iii.	K.ii.
4	K.iiii.	K.iiii.		K.ui.	Kl.iiii.	Kl.iiii.	Kl.iiii.	K.iii.
5	K.u.	Kl.		K.ui. ⁵	Kl.u.	[Kl.]	Kl.u.	K.u.
6	K.ui.	K.ui. ¹		K.ui.	Kl.ui.	[Kl.]	Kl.ui. ⁹	K.ui.
7	K.i.	K.i.		K.i.	Kl.i.	[Kl.]	Kl.u.ii.	K.u.ii.
8	K.ii.	K.ii.		K.ii.	Kl.ii.	Kl.ii.	Kl.i.	K.i.
9	K.iii.	Kl.ui. ²		K.iii.	Kl.iii.	Kl.iii.	Kl.iii.	K.iii.
10	K.iiii.	K.iiii.		K.iiii.	Kl.iiii.	Kl.iiii.	Kl.iiii.	K.iiii.
11	K.ui.	K.ui.		K.ui.	[Kl.]	Kl.u.	Kl.u.	K.u.
12	K.u.ii.	[K.]		K.u.ii.	[Kl.]	Kl.u.ii.	Kl.ui.	K.ui.
13	K.i.	Kl.i.		K.i.	[Kl.]	Kl.i. ⁷	Kl.iiii.	K.i.
14	K.ii.	K.ii.		K.ii.	Kl.u.	Kl.	Kl.i.	K.ii.
15	K.iiii.	K.iiii.		K.iiii.	[Kl.]	Kl.iii.	Kl.iii.	K.iii.
16	K.u.	K.u.		K.u.	Kl.u.	Kl.u.	Kl.iiii.	K.iiii.
17	K.ui.	Kl.ui.		K.ui.	Kl.ui.	Kl.ui. ⁸	Kl.ui.	K.ui.
18	K.u.ii.	K.u.ii.		K.u.ii.	[Kl.]	Kl.u.ii.	Kl.u.ii.	K.u.ii.
19	K.ii.	K.i.		K.ii.	Kl.u.	Kl.ii.	Kl.i.	K.i.
20	K.iii.	K.iii.		[K.]	Kl.ui.	[Kl.]	Kl.ii.	K.ii.
21	K.iiii.	K.iiii.		K.iiii.	Kl.	Kl.iiii.	Kl.iiii.	K.iiii.
22	K.u.	K.u. ³		K.u. ⁶	Kl.	Kl.u.	Kl.u.	K.u.
23	K.u.ii.	Kl.u.ii.			[Kl.]	Kl.u.ii.	Kl.ui.	K.ui.
24	K.i.	K.i.			Kl.i.	Kl.i.	Kl.u.ii.	K.u.ii.
25	K.ii.	K.ii.			[Kl.]	Kl.ii.	Kl.ii.	K.ii.
26	K.iii.	K.iii.			Kl.	Kl.iii.	Kl.iii.	K.iii.
27	K.u.	K.u.			Kl.ii.	Kl.u.	Kl.iiii.	K.iiii.
28	K.ui.	K.ui.	Kl.ui. ⁴		Kl.iii.	Kl.ui.	Kl.u.	K.u.

1. Stokes has *K.u.ii.*2. Stokes has *Kl.u.ii.*3. Omit the seven kalends *K.u.ii.* *K.ii.* *K.u.ii.* *K.ii.* *K.ui.* *K.iiii.* and *K.u.* between *scisma oritur* and *K.u.ii.* Stokes has the penultimate kalend of this sequence as *K.u.ii.*

4. This is the first ferial in CS.

5. Stokes has *K.iii.*

6. AT fragment 2 ends

7. Omit CS *Kl.* between *Kl.i.* and *Kl.*8. Omit CS *Kl.i.* between *Kl.ui.* and *Kl.u.ii.*

9. Sixth ferial change—the bissextile is here deferred by two years until 15.8 and the effect is to restore the ferial cycle to synchronism with the Julian calendar up to 16.4. The change appears deliberate.

10. Identical with ferial cycle 1, and both are synchronous with the Julian year.

Cycle no.		16	17	—	18	—	—	19	—
Serial no.	Ferial cycle 8	CS p. 20	CS p. 24	AT p. 80	CS p. 28	AT p. 86	CS p. 36		
1	K.i.	Kl.iii.	Kl.i.		Kl.i.	K.i.	Kl.i.		
2	K.ii.	Kl.i.	Kl.ii.		Kl.ii.	[K.] ¹⁶	Kl.ii.		
3	K.iii.	Kl.ii.	Kl.iii.		Kl.iii.	K.iii. ¹⁷	Kl.		
4	K.u.	Kl.iii.	Kl.u.		Kl.u.	K.ui.	Kl.u.		
5	K.ui.	Kl.ui. ¹	Kl.ui.	K.u. ¹²	Kl.u.	[K.] ¹⁸	Kl.ui.		
6	K.iii.	Kl.iii. ²	K.	K.iii.	Kl.iii.	[K.]	Kl.iii.		
7	K.ii.	Kl.i.	[Kl.]	Kl.ii.	Kl.ii.	K.ii.	Kl.ii.		
8	K.iii.	Kl. ³	[Kl.]	K.ui.	Kl.iii.	K.iii.	Kl.iii.		
9	K.iiii.	Kl.iii.	[Kl.]	K.iii.	Kl.iiii.	K.iii.	Kl.iiii.		
10	K.u.	Kl.u.	Kl.u.	K.u.	Kl.u.	K.u.	Kl.u.		
11	K.iii.	Kl.ui.	Kl.iii.	K.iii.	[Kl.] ¹³	K.iii. ¹⁹	Kl.		
12	K.i.	Kl.i. ⁴	Kl.i.	K.i.	Kl.i.	K.u.	Kl.ii. ²⁰		
13	K.ii.	Kl.ii. ⁵	Kl.ii.	K.ii.	Kl.ii.	<i>K.ii.</i> ²¹	Kl.		
14	K.iii.	Kl.iii. ⁶	Kl.iii.	K.ii.	Kl.	<i>K.iii.</i>	<i>Kl.iii.</i>		
15	K.u.	[Kl.]	Kl.u.	K.u.	Kl.u.	<i>Kl.u.</i>	<i>Kl.u.</i>		
16	K.ui.	Kl.ui. ⁷	Kl.ui.	K.ui.	Kl.ui.	<i>K.ui.</i>	<i>Kl.ui.</i>		
17	K.iii.	Kl.iii.	Kl.iii.	K.iii.	Kl.iii.	K.iii.	Kl.iii.		
18	K.i.	Kl.i. ⁸	Kl.i.	K.i.	Kl.i. ¹⁴	<i>K.u.</i>	<i>Kl.ii.</i>		
19	K.iii.	Kl.iii.	Kl.iii.	K.iii.	Kl.u.	<i>K.ui.</i>	<i>Kl.iii.</i>		
20	K.iiii.	Kl.iiii. ⁹	Kl.iiii.	K.iiii.	K.	<i>K.iii.</i>	<i>Kl.iiii.</i>		
21	K.u.	Kl.u.	[Kl.]	K.u.	K.	Kl.u.	Kl.u.		
22	K.ui.	Kl.ui. ¹⁰	Kl.ui.	K.ui.	K.	<i>K.iii.</i>	<i>Kl.iii.</i> ²²		
23	K.i.	Kl.i.	Kl.i.	K.i.	K.	<i>K.i.</i>	<i>Kl.ii.</i> ²³		
24	K.ii.	Kl.ii.	Kl.ii.	K.ii.	K.	<i>K.u.</i>	<i>Kl.</i>		
25	K.iii.	Kl.iii.	Kl.iii.	K.iii.	Kl.iii.	K.iii.	Kl.		
26	K.iiii.	Kl.iiii.	[Kl.]	[K.] ¹⁵	Kl.iiii.	<i>K.u.</i>	<i>Kl.u.</i>		
27	K.ui.	Kl.ui.	Kl.ui.	K.iii.	Kl.iii.	<i>K.ui.</i>	<i>Kl.ui.</i>		
28	K.iii.	Kl.iii.	Kl.iii. ¹¹	K.iii.	Kl.	<i>Kl.iii.</i>	<i>Kl.iii.</i>		

1. Seventh ferial mislabelling—*Patricius uenit*. The sequence of feriales synchronous with the Julian year ends here, and this new ferial sequence continues to the last CS ferial at 23.16. Seven kalends omitted here.

2. AI has *Kl. Prima feria*, the correct ferial for AD 433.

3. AI has *Kl.iii.f.*

4. AI has *Kl.i.f.*

5. AI has *K.ii.f.*

6. AR has *K.iii.*

7. AR has *K.ui.*

8. AR has *K.i.*

9. AR has *K.iiii.*

10. AR has *K.ui.*

11. Omit the three CS kalends between *Kl.iii.* and *Kl.i.*

12. AT fragment 3 commences.

13. CS omits *Kl.iii.* between *Kl.u.* and *Cath Taillten*.

14. Omit CS *Kl.iii.* between *Kl.i.* and *Cath Droma*.

15. AT omits *K.iiii.* between *K.iii.* and *Cath Arda*.

16. AT omits *K.ii.* between *K.i.* and *Quies Earc*.

17. Stokes omits *K.iii.* between *easpoc Earc* and *Natiuitas sancti Ciarani*.

18. AT omits *K.ui.* between *Dubthach...anuinde* and *Comgoll Bendchair*.

19. Stokes has *K.iii.*

20. Omit the CS *Kl.iii.* between *K.ii.* and *Kl.*

21. The ferial data of the next sixteen years (in *italic*), apart from obvious scribal errors, are original, i.e., when shifted down seven years they are synchronised with ferial cycle 7 and hence the Julian calendar.

22. Omit the CS *Kl.i.* between *Mochteus...salutem* and *Bellum Luachra*.

23. Omit the CS *Kl.iii.* between *Aillill...quieuit* and *Natiuitas Baoithine*.

Cycle no.		— 20 —		— 21 —		— 22 —	
Serial no.	Ferial cycle 8	AT p. 97	CS p. 46	AT p. 108	CS p. 58	AT p. 121	CS p. 64
1	K.i.	K.i.	Kl.i.	K.i.	Kl.i.	K.i. ²³	Kl.i.
2	K.ii.	K.ii.	Kl.	K.ii. ⁶	Kl.ii. ⁷	K.ii. ²⁴	Kl.
3	K.iii.	K.iii.	Kl.	K.iii.	Kl.iii.	K.u. ²⁵	Kl.
4	K.u.	K.u.	Kl.u.	K.u.	[Kl.] ⁸	[K.] ²⁶	Kl.u.
5	K.ui.	K.ui.	Kl.	K.ui. ⁹	Kl.ui.	K.ui. ²⁷	Kl.
6	K.iii.	K.iii.	Kl.iii.	K.iii. ¹⁰	Kl.iii.	K.iii. ²⁸	Kl.iii.
7	K.ii.	K.u.	Kl.u.	K.u. ¹¹	Kl.	K.u.	Kl.
8	K.iii	K.ui.	Kl.iii.	K.iii. ¹²	Kl.iii.	K.iii.	Kl.
9	K.iii.	[K.]	Kl.iii.	K.iii. ¹³	Kl.iii.	K.iii.	Kl.iii.
10	K.u.	K.u.	Kl.u.	K.ii. ¹⁴	Kl.u.	K.u.	Kl.
11	K.iii.	K.iii.	Kl.iii.	K.iii.	Kl.	K.iii. ²⁹	Kl.
12	K.i.	K.ii.	Kl.i.	K.i.	Kl.	K.i.	Kl.i.
13	K.ii.	K.u.	Kl.ii.	K.u.	Kl.	K.ii. ³⁰	Kl.u.
14	K.iii.	K.iii.	Kl.iii.	K.ii.	K.	K.ii.	Kl.
15	K.u.	K.u.	Kl.u.	K.u.	K.	K.u.	Kl.u.
16	K.ui.	[K.] ¹	Kl.ui.	K.ui. ¹⁵	Kl.	K.ui.	Kl.
17	K.iii.	K.iii.	Kl.	K.iii. ¹⁶	Kl.	K.iii.	Kl.iii.
18	K.i.	K.i.	Kl.i.	K.i. ¹⁷	Kl.i.	K.i.	Kl.
19	K.iii.	K.iii. ²	Kl.	K.iii. ¹⁸	Kl.ii.	K.iii.	Kl.
20	K.iii.	K.i.	Kl.	K.iii. ¹⁹	Kl.iii.	K.iii.	Kl.
21	K.u.	K.u.	Kl.	K.u. ²⁰	Kl.	K.u.	Kl.
22	K.ii.	K.ii.	Kl.ii.	K.ii.	Kl.ii.	K.ii.	Kl.ii.
23	K.i.	K.i. ³	Kl. ⁴	K.i.	Kl.	K.	Kl.
24	K.ii.	K.iii.	Kl.	K.ii.	Kl.	K.ii.	Kl.
25	K.iii.	K.ui.	[Kl.] ⁵	K.iii. ²¹	Kl.iii.	[K.] ³¹	K.
26	K.iii.	K.iii.	Kl.iii.	K.iii. ²²	Kl.iii.	[K.] ³²	Kl.iii.
27	K.ui.	K.ui.	Kl.iii.	K.ui.	Kl.	K.ui.	Kl.
28	K.iii.	K.iii.	Kl.	K.iii.	K.	K.iii. ³³	Kl.iii.

1. AT omits *K.ui.* between *Gein Chaemáin Léith* and *K.iii.*
2. Omit the AT *K.* between *Cluain ferta* and *Ascensio Brenaind.*
3. Omit the AT *K.i.* between *Aedhan . . . obit* and *Mo Laissi . . . obit.*
4. Omit the CS *Kl.* between *Edan . . . quieuit* and *Molaisi . . . quieuit.*
5. CS omits *Kl.iii.* between *Fergus ocus Donnall* and *In hoc anno.*
6. Stokes omits *K.ii.* between *hAinmire mac Setna* and *Iugulacio Fergusu.*
7. Omit the CS *Kl.iii.* between *Oena . . . quieuit* and *Ite Cluana.*
8. CS omits *Kl.u.* between *Moenu . . . quieuit* and *Occisio da hu.* AR has *K.u.*
9. AR has *K.ii.* 10. AR has *K.iii.*
11. Stokes omits *K.u.* between *Garbáin ceciderunt* and *Brenaind mac Brian.* AR has *K.ii.*
12. AR has *K.iii.* 13. AR has *K.iii.*
14. Stokes omits *K.ii.* between *rig Condacht* and *Quies Uinnian.* AR has *K.u.*
15. AR has *K.ii.* 16. AR has *K.iii.* 17. AR has *K.i.* 18. AR has *K.iii.*
19. AR has *K.iii.* 20. AR has *K.u.*
21. Stokes omits *K.iii.* between *ante secretarium* and *Cath Eudhuind.*
22. Stokes has *K.iii.* and AR has *K.iii.* 23. AR has *K.i.* 24. AR has *K.ii.* 25. AR has *K.iii.*
26. AT omits *K.u.* between *Cluana Lethengadh* and *Bemenda Branduib.* 27. AR has *K.ii.*
28. AR has *K.ii.* 29. Stokes omits *K.iii.* between *crucis abstulerunt* and *Bass Fiachrach.*
30. Stokes has *K.ii.* 31. AT omits *K.iii.* between *libriss Etimologiarum* and *Cath Chind.*
32. AT omits *K.iii.* between *Bas Colgan maic Cellaig* and *Bass Fergna.* 33. AR has *K.iii.*

Cycle no.		— 23 —	—	—	24	—
Serial no.	Ferial cycle 8	AT p. 139	CS p. 80	AT p. 155	Common entry ¹⁰	CS p. 94
1	K.i.	K.i. ¹	Kl.i.	K	M. Ceallaigh	Kl.
2	K.ii.	K.ii.	Kl.ii.	K.	Dima dup m.	Kl.
3	K.iii.	K.iii. ²	Kl.	K.	Ob. Fináni	Kl.
4	K.u.	K.u.	Kl.	K.	Tomini q.	Kl.
5	K.ui.	K.ui. ³	Kl.ui.	K.	Cumine Foda	Kl.
6	K.iii.	K.iii.	Kl.iii.	Kl.	Guaire m.	Kl.
7	K.ii.	K.ii.	Kl.u.	Kl.	Tenebrae ¹¹	Kl.
8	K.iii.	K.iii.	Kl.iii.	Kl.	Mortalitas magna	Kl.
9	K.iiii.	K.iiii.	Kl.iiii.	K.	M. Oililla	Kl.
10	K.u.	K.u. ⁴	Kl.	Kl.	Mortalitas abbates	Kl.
11	K.iii.	K.iii.	Kl.	Kl.	Nav. Colmáin	Kl.
12	K.i.	K.i.	Kl.i.	Kl.	Ob. Cuimini	Kl.
13	K.ii.	K.ii.	Kl.ii.	Kl.	G. Maelidúin	Kl.
14	K.iii.	K.ui. ⁵	Kl.iii.	Kl.	M. Ossu	Kl.
15	K.u.	K.u.	Kl.	Kl.	B. Dungaile	Kl.
16	K.ui.	K.ui. ⁶	Kl.ui. ⁷	Kl.	G. Domangairt	Kl.
17	K.iii.	K.	Kl.	Kl.	G. Congaile	Kl.
18	K.i.	K.i.	Kl.	Kl.	B. Cindfaeladh	Kl.
19	K.iii.	K.ii. ⁸	Kl.	Kl.	Columba p.	Kl.
20	K.iiii.	K.ui.	Kl.	Kl.	Stella cometis ¹²	Kl.
21	K.u.	K.ui.	Kl.	Kl.	M. Colgan	Kl.
22	K.ui.	K.i.	Kl.	Kl.	Q. Failbe	Kl.
23	K.i.	K.ui.	Kl.	Kl.	Colman q.	Kl.
24	K.ii.	K.	Kl.	Kl.	Dún Cethirn	Kl.
25	K.iii.	K.	Kl.	Kl.	G. Cindfaoladh	Kl.
26	K.iiii.	K.	Kl.	Kl.	Dunchadh i.	Kl.
27	K.ui.	K.i. ⁹	Kl.	Kl.	Mortalitas par.	Kl.
28	K.iii.	K.	Kl.	Kl.	Uentus magn.	Kl.

1. AR has *K.i.*2. AR has *K.iii.*3. Stokes omits *K.ui.* between *Bass...o Líathmuine* and *Bass Conaing*.4. AR has *K.u.*5. AR has *K.ui.*6. Stokes has *K.iii.*

7. The last CS ferial.

8. Stokes has *K.u.*

9. Last AT ferial.

10. These record tokens are the *first* entry common to both AT and CS; in each case the version is taken from CS, as this appears to be the older.

11. The solar eclipse of 1 May 664.

12. The comet of September–October 676.

Appendix II

The interpolation of five additional kalends into AU

The following series of excerpts from the full collation of the chronological and record tokens of all the major annal collections, which is available on the Web as discussed, displays the contextual details of the five additional kalends that have been interpolated at AU 574, 634, 640, 647 and 654. The tokens of AT, CS, AC and AU are tabulated separately in the first four columns, and those of AI, AR and AB are tabulated in the fifth column, preceded in each case by a tag I = AI, R = AR or B = AB to indicate the source in question. The numbers following each tag are Mac Airt's marginal AD in the case of AI and the serial numbers in the published editions of AR and AB. In all five cases the interpolated material has been highlighted by background shading.

AU 574				
AT	CS	AC	AU	AI/AR/AB
K.u.iii. B. Conaill	Kl.u.iii. B. Conaill	Conell d.	Kl. AD 573 573.2	R:55 [K.]7 I:574, R:55
			Kl. AD 574 574.1 <i>Droma Ceat</i>	
K.u. Brenaind m. Br. ob. Scintilla leprae C. Delgon	Kl. Q. Brenaind m. Br.	Brenaynn m. Br. d. Leptosie abound	Kl. AD 575 575.4 575.2 575.1+3	R:56 [K.]2 R:56 I:577
K.iii. Tiberius Q. Brenaind Cl. ferta Aed m. Eachach Primum periculum C. Locha	Kl.iii. Q. Brenainn Cl. Fer. Aedha m. Echach Primum periculum	Brandon Clonfert d.	Kl. AD 576 576.2 576.3 576.4 576.5	R:57 [K.]3 I:562 I:578.1, R:57, B:184.2 I:578.2, R:58 I:579 I:578
			576.1 B. Telocho	

At AU 573 note that AT, CS, AC, AU, AI and AR *all* record Conaill's death, but at AU 574 *only* AU records *Droma Ceat* under a kalend not found in any other annal. At AU 575 the three events found in AT have been reordered in AU and the last of them, *C. Delgon*, has been split by AU 575.2 *Scintilla leprae* between AU 575.1 and AU 575.3, cf:

AT: *Cath Delgon a Cind tire in quo Dunchad mac Conaill, maic Comgaill, et alii multii de sociis filiorum Garbain ceciderunt;*

AU 575.1: *Bellum Telocho i Ciunn Tire;*

AU 575.3: *In quo cecidit Duncath m. Conaill m. Comgaill & alii multi de sociis filiorum Gabrain ceciderunt.*

Thus these AU 575 entries show every sign of having been both corrupted textually and reordered. Under AU 576.1, *B. Telocho*, the first element of AU's corrupt version of *C. Delgon* is found duplicated, preceding the four events AU 576.2–5 that correspond identically in order with the entries in AT and CS.

AU 634

AT	CS	AC	AU	AI/AR
K.iii. Guín mm Aeda	Kl.iii. I. ff. Aeda	Kl. ss. Hugh	Kl. AD 633 633.1	I:636.1,3
			Kl. AD 634	
Rechrann fundait		Rachrin founded	634.3	R:114.1
Cong. Saxonum		Saxon assemblies		R:114.2
Eochaid q.			634.7	R:114.3
B. Conaill	Occ. Conaill	Conell sl.	634.1	
Q. Finntain	Q. Fintani	Fintann d.	634.5	R:114.4, I:637.3
C. Seghuise	C. Seagaisi		634.8	I:636.2
C. Cuile Caelan		B. Cowlekeallan	634.2	I:637.1
			634.4 Nix magna	
			634.6 M. Gartnain	
K.u.	Kl.		Kl. AD 635	R:115 [K.]5
Guin Ernaín	I. Ername		635.1	
Effug. Carrthaigh	Effug. Cartaig		635.1	I:638.1, R:115

Subsets of the eight events found under the kalend in AT corresponding to AU 633 are found in identical sequence in CS, AC and AR; in AU, however, the first of these events is found at AU 633.1, and six of the remaining seven are placed under an additional kalend at AU 634 in a completely different order, with *C. Seghuise* apparently conflated with AU's unique record of the death of *Gartnain*, which is itself duplicated at AU 634.6, cf:

AT: *Cath Seghuise in quo cecidit Lochene mac Nechtain Cennfota & Cumascach mac Aengusa;*

AU 634.8: *Bellum Segusse in quo ceciderunt Lochene m. Nechtain Cennfotai & Cumascach m. Aengusso & Gartnaith m. Oith;*

AU 634.6: *Mors Gartnain m. Foith.*

Another unique record, *Nix magna*, has been inserted at AU 634.4. Under AU 635 the two events found in AT and CS are found identically in AU.

AU 640

AT	CS	AC	AU	AI/AR
K.ui. B. Cathrach	K.iii. C. Cathrach		Kl. AD 639 639.1	R:118 [K.]6
			Kl. AD 640	
B. Brudhi	B. Maeluidhir	640.1	R:118.2	
Loscud Maelduin	B. Bruide		640.2	
Comgan m. Guin Maile duin	Loscad Maelidúin		640.6	I:642
Q. Daghain	I. Maeliduin	Moyle Doyne kl.	640.7	
	Q. Dagain	David d.		I:641.1, R:118.1
			640.3 Domnall	
			640.4 Naufragium	
			640.5 Ob. Rithae	
K.u.	Kl.		Kl. AD 641	
Constantius r.		Constantine r.	641.3	

Analogously to the preceding case, subsets of the six events found in AT under the kalend corresponding to AU 639 are found in identical sequence in CS and AC, whereas in AU the first is found at AU 639.1 and the remainder are placed under a separate kalend, AU 640, with three unique records interspersed amongst them.

AU 647

AT	CS	AC	AU	AI/AR/AB
K.ii.	Kl.		Kl. AD 646	
Mael coba i.	Maelcoba i.		646.1	I:647.1
Bolg Luatha m.	[B.] Builg Luatha		646.3	
			646.2 Duncath i.	
			Kl. AD 647	
			647.1 Fursu ob.	
K.ii.	Kl.		Kl. AD 648	
Ragallach toitim	Guin Ragallaigh	Rogelly kl.	648.1	I:648, R:120.3
C. Cairn Conaill	C. Cairn Conaill	B. Cornie Conell	648.2	I:649.4
Q. Fursu	Q. Fursa		648.5	I:649.2, R:120.1, B:209.1
Mo Chaemóg m.	Mochaemóg m.	Mochevogus d.		R:120.2
			648.3 M. Oengus	
			648.4 Cocath Aedhain	

At AU 646 note that AT, CS and AU record the same two events in the same sequence but that AU inserts the unique record of *Duncath aue Ronain iugulatus* between them at AU 646.2; note the extremely rare use of *aue*. Then, under a separate kalend, AU inserts a unique and duplicate record of the death of Fursu at AU 647.1, *Fursu craibdhech obiit*, which corresponds neither textually nor chronologically with the record found in AT, CS, AU 648.5, AI, AR and AB. Under AU 648 three of the four events found in identical sequence in AT and CS are found, into which two unique records, *M. Oengus* and *Cocath Aedhain*, have been interpolated.

AU 654

AT	CS	AC	AU	AI/AR
K.	Kl.		Kl. AD 653	
Colman obb.	I. Conaill		653.1	
	Colman qq.	Colman dd.	653.2	R:124.1
		Dachra Lwachra d.	653.3	
Guín Fergusa	II. Fergusa	Fergus kll.	653.4	
mm. Aeda Slaine				
C. Sratha Ethairt	C. Sretha Etairt		653.5	
Aedh Roin m.	Aodh Ron m.		653.6	
Fursu p.		Furse d.		R:124.3
			Kl. AD 654	
			654.1 Nem m. Birn	
K.i.	Kl.		Kl. AD 655	
C. Flescaigh	C. Flascaigh		655.1	
C. Pante		B. Pantha	655.2	R:125.2
B. Crunnmail	M. Crundmail		655.4	I:649.3
B. Aithcen		Aihgean d.	655.5	I:654.2, R:125.1
Dunchad m.				
Laidhguen m.				
			655.3 B. Annae	

Under AU 653 the five events found in common between CS and AC are found in identical sequence in AU. All that is found under AU 654 is the unique record of *Nem m. Birn*. Under AU 655 the first four of AT's records are found in identical sequence, into the middle of which AU has interpolated the unique record of *B. Annae*.

In summary, what we find at these five points where AU has additional kalends relative to the chronology of AT/CS is that AU also presents a considerable number of unique entries that corrupt, split, reorder and distort both the chronology and the meaning of some of its entries. It is clear from the way that some of these either disrupt the sense of, or duplicate, entries found in AT/CS that these unique entries and kalends found in AU are later additions relative to AT/CS rather than later subtractions from AT/CS relative to AU.

Appendix III

Resolution of the duplications *in prima manu* in AU 435–667

In the table below, the AU entry under AT/CS is the one synchronous with the entry found in AT/CS at the year cited under AK'. The other duplicate(s) are interpolations from another source, most probably the Book of Cuanu. It seems clear from the presence in AU of the three duplicate entries *Fecht in Iardomn*, *Fecht Orc* and *M. Scannlain*, which are not found in AT/CS, that the alternative source itself preserved duplicates that the eleventh-century compiler of AU faithfully propagated, resulting in two cases of triplication, namely *C. Inde* and *Comgall ob.*

AK'	AT/CS	AU duplicate(s)	Event token
436	436.1	435.1	Bresal R. m.
439	—	452.1, 456.1	N. Brigidae
458	457.2	461.2	D. senis Patricius/Q. Patricius
471	470.1	467.1	Feis Temhra
475	475.1	478.1	Bri Ele
491	491.1	492.4	Patricius q.
495	494.1	492.3	C. Graine
496	495.3	497.1	E. Duin Leathglaise
500	501.1	498.2	C. Segsa
502	500.1	497.2, 499.1	C. Inde
502	500.1	499.2	B. Iubair
509	507.1	506.1	C. Arda and B. Lughdach
524	525.1	523.2	D. Brigde
531	532.3	536.1	C. Eiblinde
533	534.2	538.2	C. Luachra moire
537	537.3	541.1, 544.2	Comgall ob.
538	538.1	535.3	Perditio panis
542	542.2	546.1	C. Sligighe
557	557.1	554.2	I. Colmáin
557	558.1	554.3	Bennchair fund.
559	559.1	557.2	B. Gabrain
560	560.1	559.3	C. Chuile Dremni
561	561.1	560.3	C. Cuile Uindsenn
562	562.1	561.2	C. Mona Daire
565	565.1	564.3	C. Gabra Life
—	—	566.2, 567.1	Fecht in Iardomn
574	575.1+3	576.1	C. Delgon
578	579.1	580.1	C. Droma
579	580.3	579.2	C. Manand
—	—	579.2, 580.3	Fecht Orc
580	581.1	582.3	C. Manann
580	581.2	582.4	M. Fergna
581	582.1	583.3	M. Fearadhaigh
589	590.1	591.3	Defectio sol
598	599.1	598.2	Q. Caidich
600	600.3	601.1	Comgoll q.
600	600.3	601.2	C. Cuile
600	600.3	601.3	C. Cuile Cáil
600	600.3	601.4	B. Uatach
601	602.2	601.5	C. Eachrois
649	648.5	647.1	Q. Fursu
667	666.1	667.1	Mortalitas
—	—	673.3, 674.5	M. Scannlain