



Holme I (Seahenge) and Holme II: ritual responses to climate change in Early Bronze Age Britain

David Alexander Nance 

Accepted: 22 March 2024
© The Author(s) 2024

Abstract Holme I and II were contemporary, adjacent Early Bronze Age (EBA) oak-timber enclosures exposed intertidally at Holme-next-the-sea, Norfolk, England, in 1998. Holme I enclosed a central upturned tree-stump, its function and intent unknown. Holme II is thought a mortuary structure. Both are proposed here best explained as independent ritual responses to reverse a period of severe climate deterioration recorded before 2049 BC when their timbers were felled. Holme I is thought erected on the summer-solstice, when the cuckoo traditionally stopped singing, departing to the ‘Otherworld’. It replicated the cuckoo’s supposed overwintering quarters: a tree-hole or the ‘bowers of the Otherworld’ represented by the tree-stump, remembered in folklore as ‘penning-the-cuckoo’ where a cuckoo is confined to keep singing and maintain summer. The cuckoo symbolised male-fertility being associated with several Indo-European goddesses of fertility that deified Venus - one previously identified in EBA Britain. Some mortal consorts of these goddesses appear to have been ritually sacrificed at Samhain. Holme II may be an enclosure for the body of one such ‘sacral king’. These hypotheses are considered, using abductive reasoning, as ‘inferences to the best explanations’

from the available evidence. They are supported with environmental data, astronomic and biological evidence, regional folklore, toponymy, and an ethnographic analogy with indigenous Late Iron Age practices that indirect evidence indicates were undertaken in EBA Britain. Cultural and religious continuity is supported by textual sources, the material record and ancient DNA (aDNA) studies.

Keywords Timber circles · Early Bronze Age · Climate Change · Cuckoo · Sacred king · Folklore

Introduction

‘Archaeology addresses itself to a world of bare material things, which are quite separate from the realm of meaning and value... the archaeological record is understood as an array of dead substance... they arrive at patterns of understanding which exclude significant dimensions of human existence.’

Julian Thomas, 2004, *Archaeology and Modernity*, pp. 233–4.

General introduction

Thomas recommended that this modernist approach to archaeology should be complemented with alternative methods of interpreting the past. Although

D. A. Nance (✉)
Department of Geography and Environment,
School of Geosciences, University of Aberdeen,
St. Mary’s Building, Elphinstone Road, Aberdeen,
Scotland AB24 3UF, UK
e-mail: davidnance@live.co.uk

folklore can help provide meaning and value (Gazin-Schwartz & Holtorf, 1999), its use in archaeological research remains marginal and often mistrusted (Paphitis, 2014, p. 4). There is also a long tradition of neglect or disapproval regarding archaeoastronomy by archaeologists in Britain (Hutton, 2022, p. 315) where archaeology is not considered a scientific discipline but a branch of the humanities. Here, archaeological investigations generally ignore both the sky (Henty, 2016) and archaeoastronomy (Ruggles, 1999, p. vii) which is not regarded as a useful subsidiary of archaeology (Polcaro, 2016, p. 1). Moreover, the purely humanistic training of the ‘vast majority of archaeologists (especially in Europe) makes it difficult for them to consider as conclusive the evidence that archaeoastronomers present in support of their arguments.’ (Polcaro, 2016, p. 2) This is unfortunate as, when compared to the other ancillary sciences of archaeology, only archaeoastronomy is considered by some to give information about the symbolic world of those who constructed prehistoric monuments (Polcaro & Polcaro, 2009).

Despite these restrictions, a body of scholarship demonstrates that an interdisciplinary approach is not only complementary but synergistic; for example, between archaeology and folklore (Gazin-Schwartz & Holtorf, 1999) and between archaeology and archaeoastronomy with the development of skyscape archaeology, concerned with the relationships between material culture, the sky and human societies (Henty, 2016; Silva, 2015).

The contribution of folklore, including rituals and social customs, ‘weather wisdom’ and the world-views of present-day indigenous societies also provides alternative conceptions of climate change; for example, those of Inuit (Henshaw, 2003), Amazonian (Eisenstadt & Jones West, 2017) and Melanesian peoples (Balick et al., 2023). While people generally readily adapt to minor or seasonal climatic fluctuations, significant long-term, local and global changes pose problems to which the options, responses and adaptations of such diverse societies have been varied and localized (Hassan, 1994). However, the rituals and social customs of prehistoric societies associated with earlier climate change events, with few traces in the archaeological record, can rarely be ascribed. These illiterate societies remember such events as orally-transmitted myths and legends.

This article combines archaeology and archaeoastronomy through the thematic focus of the folklore associated with the common (formerly European) cuckoo (*Cuculus canorus* Linnaeus, 1758), hereafter ‘cuckoo’, to infer the intent and functions of two contemporary Early Bronze Age (EBA) adjacent timber-circles in Britain. Here they are considered to be currently best-explained as independent, magico-religious attempts to resolve a period of extreme climatic deterioration at the close of the third millennium BC.

Holme I and II

Holme I, popularised as the misnomer ‘Seahenge’, and Holme II are two of over 100 known timber-circles constructed predominantly in Late Neolithic (LN) and EBA Britain (Gibson, 2005, p. 65). They were erected in a coastal-marsh habitat protected from the sea by sand dunes. Such temporary constructions or those fabricated from degradable materials usually remain, at best, as traces but these monuments were covered and preserved in anaerobic conditions until exposed shortly before excavation in 1999 in the now intertidal-zone of Holme-next-the-Sea, Norfolk (Brennand & Taylor, 2003; Fig. 1). It was determined using dendrochronology that their timbers were felled in the spring of 2049 BC (Tyers, 2014). The remaining timbers of Holme I were removed and preserved while those of Holme II, approximately 100 m to the east, were left in place.

Holme I was a six-by-seven-metre oval enclosure on a north-west to south-east axis encircling an upturned oak stump that had been placed in a pit (Fig. 2). The outer palisade of vertically-split oak-posts was fabricated from particularly gnarled, knotty trees that would have been difficult to work. They had their bark surfaces directed outwards with the exception of timber 30 (Fig. 3). They are sections of a maximum of 25 trees between 100- and 150-years-old that dendrochronology confirmed came from the same woodland (Tyers, 2014). The timbers designated ‘other’ in Fig. 3 are much larger than the split posts from elsewhere within the oval. They are not half-splits but divided in unusual ways, some with heartwood and sapwood removed. Some are derived from the same tree as the central tree-stump that was 250 to 350 years old when it was toppled or blown-over before having all of its bark and side roots stripped off (Robertson et al., 2016).



Fig. 1 Location of Holme-next-the-Sea, Norfolk, England

The depth of buried sections suggested that the palisade timbers protruded two to three metres above ground level. It is unlikely to have been a defensive structure or a stock enclosure, being comparatively small with no obvious entrance. Two timbers in the

south-west, numbered 35 and 37 (Fig. 3), proved upon excavation to be one forked-timber giving a narrow, 0.2-m access. This opening was then blocked by timber 36. The excavators suggested that these posts and the diametrically opposite post 65 composed the

Fig. 2 Holme I timber enclosure with central inverted oak stump. Photo: Mark Brennand



inaugural settings with azimuths that broadly correspond with sunrise and sunset on the summer and winter solstices. As the timbers were felled in the spring it was considered most probable that these timbers were aligned with sunrise on the summer solstice (Brennand & Taylor, 2003, p. 68). There may be other celestial orientations of both monuments but without ethnohistorical evidence, any proposed alignments (an intentional orientation) would be an assumption of intentionality, considered a flaw of some archaeoastronomy studies (Silva, 2020). In addition: ‘*the circumference of [Holme I] is far too small for an accurate alignment to be taken utilising particular timbers.*’ (Brennand & Taylor, 2003, p. 68).

Holme II is 13.2 m in diameter, twice that of Holme I but still relatively small by the standards of the period (Gibson, 1994, p. 206). It has a distinctive, closed architecture: an eccentric oval with no definitive axis of symmetry (Brennand & Taylor, 2003, p. 70) consisting of an outer palisade of vertically-split posts of large oak trees, set side-by-side with a possibly incomplete inner-arc of oak posts set at intervals approximately 0.5 m inside the palisade. All the bark had been removed in contrast with the external timbers of Holme I. Two parallel, horizontal, extensive oak timbers with intact bark lay in the centre in a north-east to south-west orientation (Fig. 4), 1.4 m in length with diameters of 0.35 m and surrounded by an oval, oak-wattle fence 3.6 m long and 2.5 m wide.

These central timbers had rebates cut for an object at least 2.3 m in length, speculated as ‘*a tree trunk, a simple planked stretcher, a boat or trough, or a coffin or bier*’ (Brennand & Taylor, 2003, p. 12). Its

orientation was maintained using four oak stakes (Robertson et al., 2016, Fig. 4). This, and evidence from other prehistoric monuments, strongly suggests an astronomic alignment.

The structures are significant. They are the only known British monuments erected together; two of only three timber-circles with surviving timbers and the only timber-circles to have been dated directly. There were no associated artefacts.

There is no direct indication whether Holme I was constructed for a single function or to be used repeatedly, although it appears not to have been maintained (Brennand & Taylor, 2003, p. 32) suggesting the former. The features associated with Holme II have been found in other timber-circles that have been linked with graves; hence, it is thought likely that Holme II was a mortuary monument (Robertson et al., 2016).

Folklore

The study of folktales, that includes myths and legends, can reveal insights and provide a broader understanding of the past (Gazin-Schwartz & Holtorf, 1999, p. 5) as they contain much consistently reported, verifiable information. It is claimed that this has been widely recognised in North America by anthropologists but not by most archaeologists (Whitely, 2002, p. 412). Folktales associated with prehistoric monuments have also proved useful in determining both the intent and beliefs of the societies that erected them (Gazin-Schwartz, 2011). Nevertheless, relating folklore to monuments can make both archaeologists and archaeoastronomers uneasy

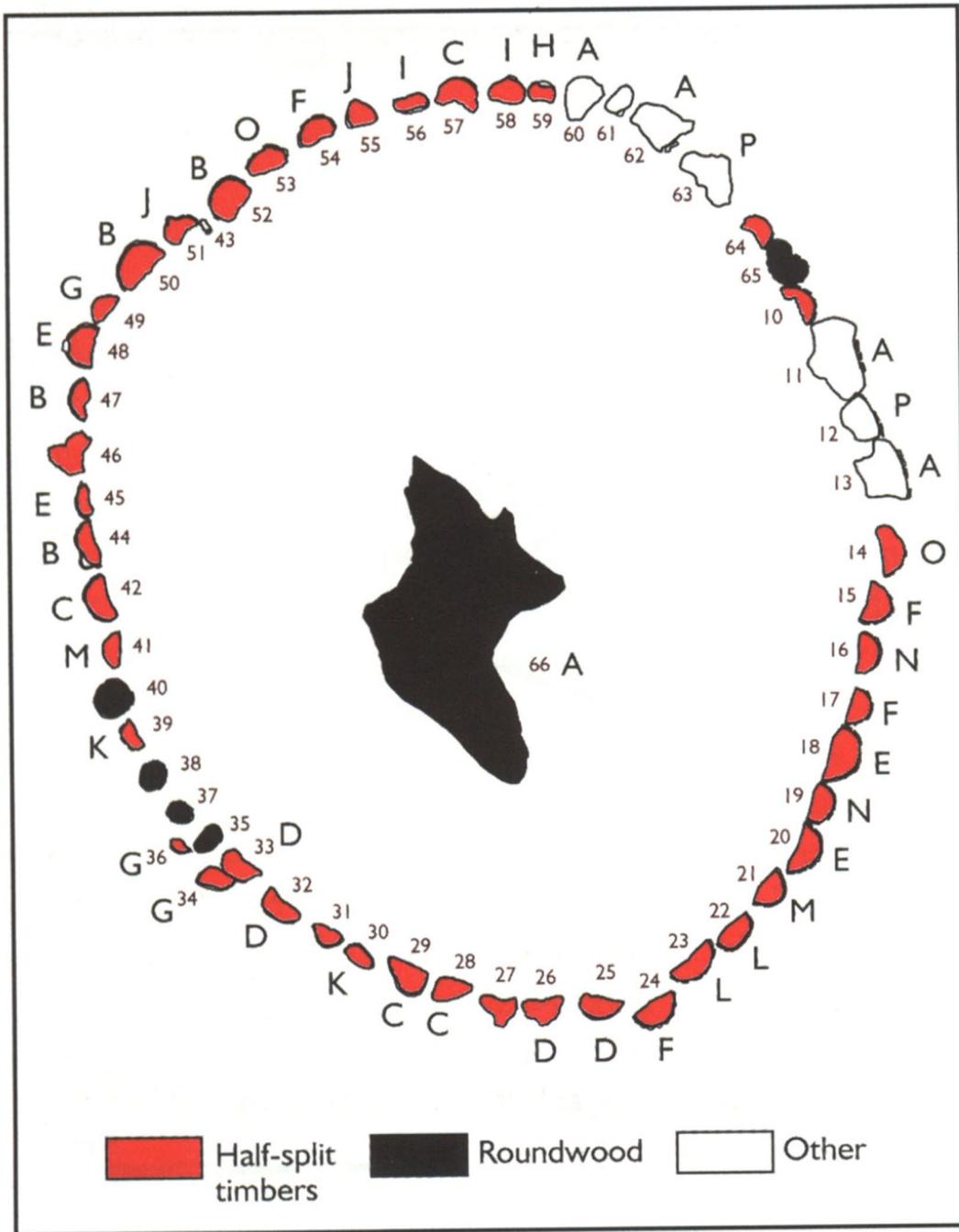
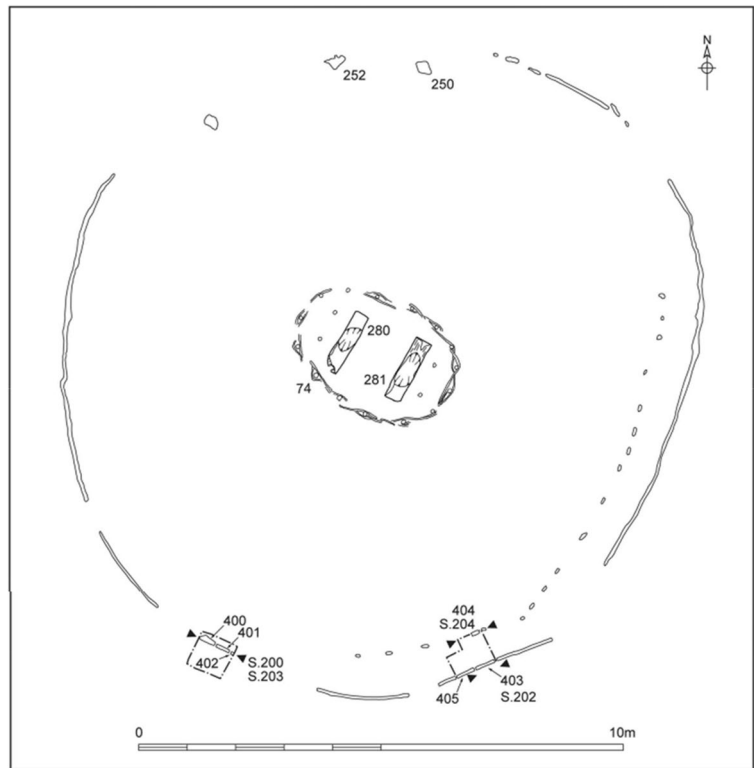


Fig. 3 Plan of Holme I (from Brennard & Taylor, 2003)

but it should be considered (Kelley & Milone, 2005, p. viii) as myths, and therefore the belief systems of which they were a part, were central to the planning of monuments (Bradley, 1998, p. 108). The uncertain

authenticity and accuracy of folklore underlies this scepticism and rejection by archaeologists (Gazin-Schwartz & Holtorf, 1999). Although the convergence between some folktales and the material record

Fig. 4 Composite plan of Holme II timber circle, based on records made in 1999, 2001, 2003–8 and 2013 (from Robertson et al., 2016)



has been demonstrated (Silva, 2015), the interpretive worth of each example should be independently assessed. Whitely (2002, pp. 405–06) proposed such a middle-ground that ‘*retains epistemological rigor and the capacity of analytical judgment, while being open to enhancement by legitimate oral tradition, considered as a fund of additional evidence and explanation.*’ Studies in ethnology further suggests that the monuments themselves, especially religious ones, often represent the cosmos and many actions in myths are best interpreted as astronomical (Grigsby, 2019, p. 41).

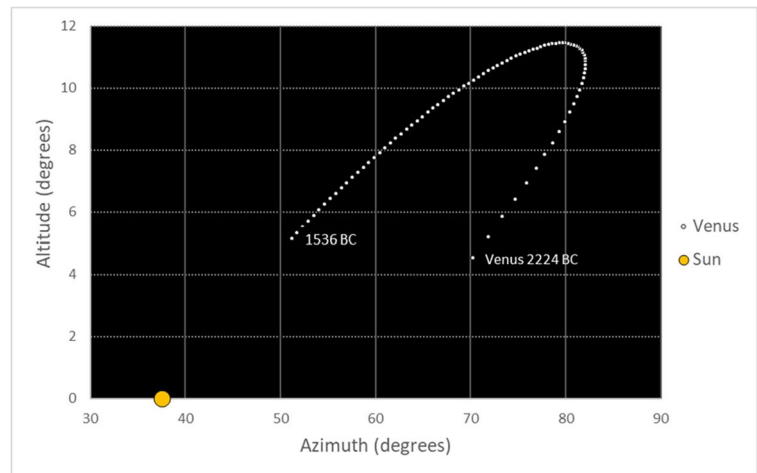
Any attempt at using folklore to assist in archaeological interpretation is, however, hampered by our inability to know accurately the time-depth of that folk belief; in particular, whether it is roughly contemporary with the archaeological remains or originated many centuries later, when beliefs may have changed. Methods from population genetics, however, can determine population structure and variation in folktales (Ross et al., 2013). They suggest some celestial myths are Palaeolithic in origin (d’Huy, 2013), while various Indo-European folktales have a Bronze Age origin (Graça da Silva & Tehrani, 2016).

Examples of the survival of folktales associated with environmental phenomena in Britain relate to the submergence and emergence of coastal areas in Scotland. They have been dated by comparison with coastal, glacial-isostatic adjustment models to at least 2107- to 8695-years BP for submergence stories and between 674- and 7120-years BP for the emergence stories (Nunn, 2022). However, Holme I and II were unknown for four millennia prior to 1998, consequently there is no associated folklore but ‘*the absence of ethnohistory of prehistoric sites does not preclude learning something about intent.*’ (Malville, 2015, p. xiii).

Horizon orientations of monuments

Many British LN and EBA monuments orientated towards the horizon are aligned (an alignment is an intentionally orientation) predominantly with solar and lunar rising and setting maxima and minima (Burl, 1983; Ruggles, 1984). The Sun reaches its extreme maximum and minimum rising and setting declinations, its standstill positions, on the summer and winter solstices. The lunar maximum (major)

Fig. 5 Position of Venus in the north-eastern sky at sunrise on the summer solstice at eight-year intervals between 2224 and 1536 BC at Calanais (from Nance, 2021a)



and minimum (minor) standstill declinations are part of the 18.6-year lunar-node-cycle. Venus also has maximum and minimum rising and setting standstill declinations that lie between the solstitial and lunar standstill limits. The most readily observable are the southerly evening extreme settings. Significantly, over 80 percent of the of these between 2000 BC and AD 2000 occurred between the 29 October and 6 November (Šprajc, 2015) bracketing the now fixed date of the cross-quarter day of Samhain on 1 November. This tentatively suggests that some Samhain traditions might be associated with this phenomenon of Venus.

Samhain, pronounced *sahwin*, is interpreted as *Samhfuin*, ‘end of summer’ (Delamarre, 2003, p. 267) or from an Indo-European root meaning ‘assembly, gathering together’ (Powell, 1958, p. 117). It was a period for gathering and feasting but also a liminal time when the spirits of the dead could return to visit their earthly homes (Danaher, 1972, p. 207).

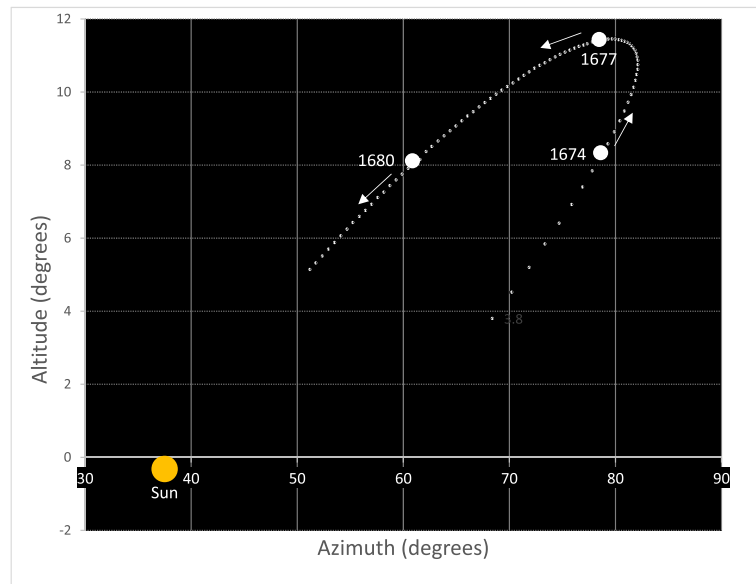
Venus and Mercury are closer to the Sun than the Earth. Consequently, they are only seen comparatively close to the horizon after sunset or before dawn. Venus, the third brightest celestial object, can often be seen before sunset and after sunrise. When viewed from the same location on the same annual date, Venus will rise or set on almost exactly the same position on the horizon (its azimuth) every eight years as thirteen Venus-years coincide with eight earth-years plus two days eight hours. This results in Venus, when viewed from the same location at the same date and time every eight years, appearing to slowly travel from the Sun in an arc reaching a southern standstill

position, where it remains for some time, and then move back towards the Sun until it is no longer visible due to the Sun’s glare (Fig. 5).

Venus will also appear at different positions on that arc on that same annual date on two other years during that eight-year cycle. At some point, an ascending Venus will be on the same azimuth as a descending Venus. The three positions of Venus in one such eight-year cycle are depicted diagrammatically in Fig. 6. Venus at sunrise on the summer solstice in 1677 BC had the same azimuth as Venus on the same date in 1674 BC. Although crossover events occur every 252 years, this particular event appears to be significant and is remembered in a myth associated with the Calanais Stones (Section “*Goddesses associated with Venus and the cuckoo*”). Venus will also appear in the evening sky on that date for three of those eight years but with different setting azimuths. Venus will not be visible on that date for two years of the cycle as it will be in, or near, superior and inferior conjunction with the Sun (for a detailed explanation see Nance, 2021a).

In addition to the dates of the solstices and equinoxes, medieval Irish texts established that the solar cross-quarter days were significant. Although Hutton (1996, p. 410) speculated that they may be medieval Irish literary inventions, other scholars considered that these are pan-Celtic festivals. In addition to Samhain, they were Imbolc, February first, Beltane, May first, and Lughnasa, August first. While quoted as the temporal mid-points between solstices and equinoxes, their dates were fixed with the adoption of Christianity and they do not currently coincide with

Fig. 6 Representation of the position of Venus at sunrise on the summer solstices during an eight-year cycle, demonstrating a crossover event



these mid-points. However, the Irish sources indicate that they did originally. Old Celtic calendars suggests that festivals associated with these solar cross-quarter dates were inter-annually variable being determined by a lunar component, such as still remembered in the variable date of the vernal equinoctial Christian feast of Easter, linked to the full moon (Hicks, 1985) which provided a universally recognisable calendric date, and provided optimum lighting for travel and nocturnal festivals.

Function and intent

It is proposed that the function of Holme I was to enclose an unfledged cuckoo. The intention was to keep it singing and thereby to extend the summer weather all year (Field, 1913; Hardy, 1879; Harte, 1986; Rawes, 1978). This was to be achieved by mimicking both locations where the bird was thought to overwinter in a hole in a tree or in the ‘fairy bowers’ of the Otherworld’, recalled in ‘the myth of the pent cuckoo’ (Section “Penning the cuckoo”). The Otherworld was described as much like this one but of perpetual youth and good health (Green, 1997, p. 68); a parallel world alongside this one; a land beyond the sea or underground (Koch, 2006, p. 1671).

It will also be proposed that the function of Holme II was as a sacred enclosure to house the body of a ritually-murdered mortal consort/champion of a goddess, a scapegoat, responsible for the maintenance

of cosmic harmony and consequent fertility of the land and its occupants. The intention was to appease a goddess associated with both the cuckoo and the planet Venus into ending a period of unusually cold climatic conditions.

While these hypotheses link both monuments and explain their functions and intent, the implied assumption is that regional folklore recorded in the sixteenth- and nineteenth-centuries regarding the cuckoo, and the documented ritual-murder of warrior-champions of the Late Iron Age societies of Ireland and northern Britain, were performed largely unchanged since the EBA. Such retrospective inferences require supporting evidence from independent sources. The proposed hypotheses are supported with environmental data from the location, astronomic and biological evidence, contiguous regional folklore, place-name studies, and an ethnographic analogy with indigenous Late Iron Age practices that indirect evidence indicates were undertaken in EBA Britain. The implied cultural and religious continuity is supported by textual sources, archaeoastronomy, the material record and ancient DNA (aDNA) studies.

The aim of this paper, therefore, is to demonstrate that the proposed functions and intentions of Holme I and II are the ‘inferences to the best explanation’ as attempts to reverse a period of exceptionally depressed atmospheric temperatures. The objectives are to determine the climatic conditions prior to the construction of Holme I and II; review the relevant

biology and folklore related to the cuckoo; investigate the orientation of the bier; provide evidence for the continuity of social structure and some aspects of religion from the EBA to the adoption of Christianity that includes a goddess associated with Venus, the cuckoo and her ritually-murdered champions/consorts.

Literature review

Climatic conditions

The monuments' timbers were felled during one of the most severe climatic events of the Holocene epoch (deMenocal, 2001). It was a 'megadrought' of dry and cool conditions referred to as the 4.2-kiloyear BP aridification event. It lasted all of the twenty-second century BC at least, although timing, duration, and progression have yet to be detailed (Bini et al., 2019). It is thought to have had significant social effects including the collapse of the Akkadian Empire (Gibbons, 1993), the Egyptian Old Kingdom and the Harappan civilization (Staubwasser et al., 2003). The onset of aridification in Mesopotamia about 2100 BC coincided with a cooling phenomenon in the North Atlantic caused by an interaction within the global ocean-atmosphere circulation system (Roland et al., 2014, p. 24) triggered by a reduction in solar radiation and resulting in southward migration of polar waters into the North Atlantic Current bringing cooler conditions to north-western Europe (Bond et al., 2001) with exceptionally strong westerly, Atlantic winds (Mayewski et al., 2004) and, presumably, associated storms.

Irish bog-oak tree-ring data confirmed that 2200 to 2000 BC was a period of depressed atmospheric temperatures (Baillie & McAneney, 2015). Holme I timbers indicated additional growth suppression between 2070 and 2068 followed by a recovery, then a swift decrease in growth-rate which did not recover prior to felling. In the growth rings of the 2050's there were cellular indications that the trees had been subjected to a series of severe winters and/or late frosts (Brennan & Taylor, 2003). The reduction in solar radiation hypothesis predicts a more widespread event. Such temperature depression appears to have been extensive as Anatolian tree-ring data also indicate a 200-year period of climatic instability culminating in

further reduced and irregular growth rings between 2055 and 2043 \pm 37 BC bracketing 2049 BC (Kuniholm, 1993) when the trees of the circles were felled.

Such conditions present existential crises for communities existing from one harvest to the next. They have an inhibitory effect on the growth and abundance of plant and animal food-source populations, domesticated and wild, reducing food supply *per capita* with possible sequences of famine, reduced nutritional status, social disturbance, war, migration, epidemics and population decline (Zhang et al., 2011). It seems probable that such events would have been regarded as orchestrated through divine displeasure and prompted rituals to appease the appropriate deity(s) to provide warmer weather.

The cuckoo and the sparrowhawk

The following is adapted, in part, from Nance (2019a). The cuckoo (Fig. 7) is a sub-Saharan species that migrates to Eurasia for a brief breeding season between May and June. They are polygamous, obligate brood-parasites. A hen cuckoo lays up to 20 eggs a season but only a single egg, closely mimicking that of the host, is laid directly into each host's nest. After hatching, the cuckoo chick immediately ejects the host's hatchlings or eggs. A few weeks after the cuckoo arrived there would be several host nests in the territory of a calling male cuckoo, each containing a single, unfledged cuckoo; consequently, as there are no cuckoo nests, easily distinguishable female birds or eggs, an observer might conclude that female hosts mated directly with the male cuckoos (Gubernatis, 1872) that were then conceived of as fertile, libidinous and with the ability to mate with any host female they chose. Consequently, the cuckoo symbolised both the summer and male fertility from Britain to China (Armstrong, 1958; Crawford, 1910; Gubernatis, 1872; Lai, 1998), strongly suggesting an origin for this association in antiquity.

The cuckoo, although a comparatively brief, summer resident, is associated with more folklore than with any other bird in Europe, with the possible exception of the raven, a permanent resident (Ingersoll, 1923, p. 154). The cuckoo was considered sacred in Britain (Gubernatis, 1872) and in continental Europe. In Finland it was believed to fertilize the Earth with its song (Crawford, 1910, p. 20) and arouse the spring with its song in Britain (Gubernatis, 1872, p. 233).

Fig. 7 The common cuckoo showing zygodactylic foot arrangement © Mike McKenzie



There could be no summer without the cuckoo; hence, its appearance in late spring was considered significant. It was one of three sacred or enchanted birds in the Hebridean Islands (Maclean, 1937, p. 113). The bird was so closely associated with the Otherworld and its inhabitants, the *Aes Sídhe*, the ‘fairies’ – the pre-Christian deities, the *Tuatha Dé Danann*—that speaking its name was taboo and in Scottish Gaelic it is referred to euphemistically as the ‘grey bird of early summertime’ or *eun sith*, ‘bird of the Otherworld’, because it was also believed to have its winter dwelling under-ground (Forbes, 1905, pp. 260, 263) in the ‘fairy bowers’ of the Otherworld (Gubernatis 1872; Maclean, 1937, p. 113). The cuckoo was also regarded as immortal as the same bird was thought to return from the Otherworld to sing from the same bush each spring (Hardy, 1879). It was also believed in Britain (Hardy, 1879) and continental Europe (Méchin, 2000) that the bird found a hole in a tree and overwintered there. Thomas of Cantimpré (AD 1200–1272), a Flemish Dominican, commented that the cuckoo ‘enters either the hidden places of the earth or the hollows of trees... and lives there in the winter.’ (*Liber de natura rerum*, Birds 5.34).

The summer solstice was fixed as 25 June in the Julian calendar, commencing at sunset on the 24 June in the Celtic calendar, and later Christianised as Saint John the Baptist’s Day. There is a widespread European folk-belief this was when the cuckoo stopped singing and departed (Méchin, 2000) taking the summer with it. It is referred to as *amutirea cucului*,

‘silence of the cuckoo’, in Romanian (Ghinoiu, 1995, p. 463) and ‘the funeral of the cuckoo’ in Russia (Méchin, 2000, p. 26). It was claimed in Germany that ‘if the cuckoo calls later than Saint John’s Day it means no good’ (Grimm, 1883, p. 1888) and in Scotland ‘On Saint John’s Day, in summer, the cuckoo goes to her winter home’ (Macdonald, 1926, p. 123). Such a widespread belief amongst Indo-European peoples suggests a Proto-Indo-European origin.

The cuckoo mimics the sparrowhawk (*Accipiter nisus*) in appearance and flight (Fig. 8). This Batesian mimicry is a defence strategy that deters hosts from attacking cuckoos (Welbergen & Davies, 2011). While cuckoos are insectivores, sparrowhawks are solitary, formidable woodland predators. Sparrowhawks approach their prey out-of-sight utilising undulations in ground level, hedgerows, buildings *et cetera*, as cover prior to the final attack when they appear to manoeuvre recklessly between trees and other obstacles and reach speeds of up to 50 kms per hour. The prey is usually killed on impact; if not, the talons are tightened to pierce and exsanguinate vital organs: ‘The attack of the *Accipiters* is extremely swift, rapid, and violent in every way.’ (McDermott, 2009).

Prior to the eighteenth century, the Linnaean concept of fixed, independent, biological species was unknown. It was widely believed by Europeans, including Anglo-Saxons and tribes from the Baltic (Gimbutas, 2001), that the sparrowhawk transformed into the cuckoo in spring, previously claimed by Pliny around AD 77 (*Natural History* X 11.27).

Fig. 8 A hen sparrowhawk pursuing a cuckoo © Simon Rix 2023. The male sparrowhawk is smaller and closer in colour to the cuckoo



The thirteenth-century philosopher Albertus Magnus considered that cuckoos were composites of the dove and the sparrowhawk (*De animalibus* 26. 6. 51–53), a belief in the transmutability of the sparrowhawk and the cuckoo still extant until recently in some areas of Britain and reported as ‘not yet extinct’ in Germany in the 1930’s (Kuntsman, 1938, p. 35). The cuckoo and the sparrowhawk, then, were considered interchangeable aspects of the same bird, a belief that is significant in the choice of the champion of a goddess (Sect. “Warrior-champions”).

The most common foot morphology of birds is anisodactyly, three toes forward and one back. However, three groups of European birds are zygodactylic—feet with two toes forward, two toes back—cuckoos, woodpeckers and some owls (Olson, 1983). The inner rear toe is not easily seen (Fig. 7). The cuckoo can be identified on artefacts by this feature.

Goddesses associated with venus and the cuckoo

There are Iron Age artefacts depicting cuckoos associated with putative goddesses that have previously been misidentified by archaeologists and art-historians. An example is plate *f* of the Gundestrup cauldron (Fig. 9) thought to have been fabricated in northern Gaul between the first centuries BC and AD (Rowlett, 1993). The plate depicts a presumed goddess in triplicate and the bird in the hand of the central figure also has the same zygodactylic foot morphology as the two heraldic cuckoos above her shoulders. The central figure may be recalled in a folktale associated with the annual cuckoo-fair at Heathfield, Sussex, where a quaintly-dressed, old lady purportedly

turns up to release the first cuckoo of summer from her basket (Tillhagen, 1978, p. 162). A related event occurs in Downton near Salisbury at another annual cuckoo fair, first recorded in 1530, held on the first Saturday in May where a cuckoo princess is crowned by a cuckoo king and the ritual of ‘opening the gate’ allows the cuckoo into the fair, ostensibly to bring the good weather (Shule, 2021) but probably originating as a fertility ritual.

The cuckoo was associated with significant Bronze and Iron Age European goddesses of communities speaking Indo-European languages. They include the Nordic and Germanic Freyja/Frigg (Guerber, 1895), Laima of the Balts (Gimbutas, 1989), Roman Juno (Hardy, 1879), Slavic Zywie (Muniz, 2010) and Greek Hera (Pausanias, *Description of Greece* 2.17.4). These deities were also variously associated with sex, love, war, fertility, mead and a deified planet Venus. Freyja and Hera, for example, like the Asiatic Inanna discussed below, were referred to as the ‘Queen of Heaven’ (Guerber, 1895; Marcovich, 1996; Powell, 1995). Hera was associated with both the cuckoo and Venus prior to Asiatic Aphrodite’s inclusion into the Hellenic pantheon (Pseudo-Hyginus, *Astronomica* 2.42). Textual evidence and artefacts that depict female figures associated with the cuckoo indicate that this association occurred in the British Isles, Scandinavia, Greece, Italy, Iberia, Bulgaria and the Baltic suggesting a common ancestral deity predating the Iron Age (Nance, 2019a). Dexter (2006, p. 147) proposed that these goddesses were Neolithic in origin. Hera, for example, is recorded in Bronze Age Mycenaean linear-B tablets, 1450 to 1150 BC, although Aphrodite is not (O’Brien, 1993), but is

Fig. 9 Plate *f* of the Gundestrup cauldron (© Kit Weis, National Museum of Denmark)



thought to have had a pre-Indo-European (Neolithic) Asiatic origin (Beekes, 2009, p. 524; Burkert, 1983).

A similar goddess appears to be remembered in a celestial myth associated with the Calanais Stones on the Isle of Lewis, Outer Hebrides. The myth asserts that at sunrise on the summer solstice ‘something’ came to the stones walking down the great avenue to the central ring heralded by the cuckoo’s call (Swire, 1966, p. 25). Only the Sun, Moon and Venus are visible at sunrise. The slight difference in position of Venus every eight years results in two of the three appearances of Venus in each cycle being on the same azimuth, but different altitudes, every 252 years, a crossover event (Section “[Horizon orientations of monuments](#)”; Fig. 6). Comparative observations of non-horizon events require three constants: date, time and location. Obvious restrictions arose determining accurate calendric dates and times in antiquity; however, sunrise on the summer solstice at Calanais accurately fixes these constants.

There are no stone row alignments with the Sun or Moon on the summer solstice at Calanais (Nance, 2021a). However, the east stone-row of Calanais is aligned with the azimuth of the crossovers of Venus. During the crossovers in 1674 and 1677 BC,

the Pleiades were also first visible on this same azimuth on the solstice, an event that occurs twice every 26,000 years due to axial precession. The stellar cluster of the Pleiades, that celestially symbolised the cuckoo in northern Europe (Méchin, 2000), also rose several hours before Venus, ‘heralding’ its appearance. Now they rise over two hours later and 35 degrees further north. The east row is probably the ‘avenue’ referred to in the myth. The 1670’s dates also accord with indirect radiocarbon dating for the erection of the east row (Ashmore, 2016, p. 952). This suggested that Venus could be the ‘something’ of the myth.

Swire (1966, p. 25) also wrote that the name of the ‘something’ was ‘*probably pre-Gaelic and from a root common to all the British group of languages [Old Brittonic] that translated as ‘the Shining, or Pure or White One’ and probably had once been the epithet of a god*’. Welsh, Cornish and Breton are derived from Brittonic and the adjective *gwen* is ‘shining, white, blessed, holy’ (Thomas, 1976, p. 1770) while in all three languages *Gwener* is the planet Venus, ‘the Shining, or Pure or White One’.

The myth appears to describe a *hieros gamos*, a divine coupling of Venus with the rising sun on the

morning of the summer solstice (Section "[Orientation of Holme I](#)"). Thurneysen (1933, p. 352) recognised parallels from Sumerian texts for the *hieros gamos* with Inanna as an inauguration ritual of Sumerian kings.

Inanna was a hypersexual goddess of fertility, love, war and political power (Marcovich, 1996, p. 45), recorded in Sumer about 3000 BC and is the earliest known goddess associated with Venus. She is thought, on linguistic evidence, to have been introduced to Mesopotamia by a Neolithic population who brought farming from the northern Zagros Mountains, where the cuckoo breeds, between 5300 to 4700 BC (Kramer, 1963, p. 40). Inanna and her descendants, Aphrodite, Ashtar, Ashtoreth and Astarte, were subsequently worshiped in Mesopotamia and the Levant where the cuckoo does not breed and it appears to have been replaced as the associate of these goddesses by the collared dove, a bird similar in shape, flight and call to the cuckoo and with which it is sometimes confused.

Some Bronze-Age Greek goddesses resemble Inanna (Wolkenstein & Kramer, 1983). Freyja has similarly been regarded as a variant of Inanna (Motz, 1982) indicating a common ancestor. In Norse mythology the cuckoo-and-Venus goddess Freyja was of the Vanir, fertility deities who battled with the Æsir sky gods suggesting that the Indo-Europeans immigrants assimilated these indigenous Neolithic deities (Gimbutas, 2001). This is supported in the archaeological record where the coexistence of incoming Indo-European speakers and descendants of Scandinavia's Neolithic farmers in Jutland occurred between 2850 and 2600 BC, permitting cultural and linguistic exchange before merging (Iversen & Kroonen, 2017).

The similarities between Mesopotamian and Irish deities have also been noted (Olmsted, 2019, p. xiv). For example, Medb (Maeve) was also a hypersexual goddess of fertility, love, war, sovereignty and political power (Ó hÓgáin, 1990, p. 294). Egeler (2012, p. 67) identified five motifs that Medb shares with the goddesses Venus, Freyja, Inanna and her descendants: warlike aspects; marked sexuality; early death of her mortal lovers and her association with kingship and birds. Egeler concluded that this parallelism discounts a medieval Irish literary invention and Medb was originally descended from a pre-Indo-European (Neolithic) goddess, as had Mac Cana (1983, p. 84). These goddesses also personified Venus which strongly suggest that Medb was also associated with Venus and that the birds on her shoulders described in

the Irish epic the *Táin bó cúalnge* were cuckoos like those on the Gundestrup cauldron and possibly the Bulgarian, Galiche phalera (Fig. 10).

A motif, noted by Egeler (2012) that Medb also shares with the other goddesses, was the 'early death of her mortal lovers'. The earliest references were hymns that detailed the high priestess of Inanna in the fourth millennium BC, choosing a young man to represent her consort, Dumuzi, in a sacred marriage (Kramer, 1969, p. 49).

Warrior champions—sacred kings

De Kay (1898, p. 53) considered that many European hero and divine myths were based on folklore of the cuckoo. Pokorny (1909) also thought that the exploits of the Irish and British heroes Cúchullain, Mongan, Finn, Gawain and Arthur were based on folklore of the cuckoo and referred to them as 'cuckoo heroes'. Gawain, for example, was one of the earliest, most primitive of Arthur's knights. In the earliest Welsh Arthurian literature Gawain was named Gwalchmai, the 'Hawk of May', identified as the cuckoo (Rhys, 1901, p. 169). He had many lovers and his title of the 'Maidens' Knight' is thought to refer to his role as a champion of a goddess (Matthews, 1990; Petrović, 2000).

The Gouk Stone (*gouk* Old English 'cuckoo') at Hatton of Fintray in Aberdeenshire has an associated legend that it was erected to commemorate a 'general' slain nearby (*The Old Statistical Accounts of Scotland* III, 1792, p. 131; *The New Statistical Account* XII, 1845, p. 122 (NSA)). The NSA further states that the 'general' had the same name as the stone: he was titled 'cuckoo' like Gawain, suggesting links with fertility and a goddess.

Other Brittonic-champions also titled after the cuckoo were recorded in the early medieval period both in northern Britain and Northern Ireland. Cruithin was the Gaelic term for the northern British, Brittonic-speaking, non-Gaelic tribes, some of whom were recorded in Ulster in the Late Iron Age (Ó Cróinín, 1995, p. 213). Their champions include the Ciuthach, pronounced 'kewach', phonetically similar to the Scottish Gaelic *cuithaig* ('cuckoo'), pronounced 'kewag', a warrior-champion of the Cruithin located in the Scottish west coast and Hebridean Isles in the tales of the Irish Fenian Cycle, and Cuchulainn, also thought to be a champion of the Cruithin (Watson, 1926, pp. 24–25).

Fig. 10 A phalera from Galiche, Bulgaria (Boev, 2018)



Ciuthach is the Gaelic title of a Brittonic warrior, ‘a hero of the Picts’ (Watson 1914, p.209). He was also referred to as the Ciofach (Watson, 1914), possibly the Brittonic title ‘Little Cuckoo’ composed of *cog* and the diminutive adjective and term of endearment *bach*. *Cogbach* lenites (softens) to *cofach*, as *g* usually lenites to zero and *b*, as a consonant between two vowels, lenites to *f* (pronounced ‘v’).

The onomatopoeic form *cwcw* is also known in Welsh place-names, Pant-y-cwcw, ‘cuckoo valley’, and Carn-cwcw, ‘cuckoo cairn’ as examples, and as *cu-cú* in Irish, pronounced ‘kukoo’. The Irish *-ín*, is a synthetic diminutive or endearment equivalent to the Welsh suffix *-yn*, (Roziak, 2019). Hence, in Irish, *cucú-in*, or *cucúlin* (using a vowel separator), would also mean ‘little cuckoo’—a direct translation from the Brittonic. Cúchullain’s association with the cuckoo is also alluded to when his lover, Emer, laments his death and ‘no wild creature comes into her thoughts but the cuckoo.’ (Gregory, 1908, p. xi).

The etiological legend of Cúchullain’s naming appears contrived. As a child named Sétanta, he killed the hound of Culann and promised a replacement. Until then he would guard Culann’s house, hence he was titled Cú Chulainn, ‘Culann’s Hound’ (O’Rahilly,

1976). This legend may have been devised by scribes who recompiled the *Táin* from several sources after the original meaning had been forgotten. In the course of the transmission of Irish manuscripts between the seventh and twelfth centuries, many texts underwent extensive changes because the medieval Christian scribes no longer fully understood what they copied (Maier, 1989, p. 14). This practice is clearly demonstrated in the *Dinnshenchas Éirenn*, a collection of legends based on oral material, the earliest written in the eleventh century, describing the speculative origins of place-names.

The slayings of the British heroes the Ciuthach, Cúchullain and Gronw Pebr in the twelfth century Welsh prose tales, *Y Mabinogion*, were, like the ‘general’ of the Gouk Stone, associated with stones. Their similarities suggest they describe a specific form of ritual murders conducted across Celtic Britain and Ireland. The Ciuthach is described as a great warrior that no man could overcome and one was killed on the Isle of Lewis using a magical sword, Mac an Luinn, probably ‘son of the spear’ as Lúin is described as a magic spear by Meyer (1910, p. 48), while his back was against the rock, Creag Ciuthach (Watson, 1914, p. 195). Cúchullain, like the Ciuthach, was of the non-Gaelic Cruithin, described

as a warrior-hero of the Ulaid,¹ not an Irish king (Watson, 1914). He too was killed by a spear while tied to a standing stone (Gregory, 1903, p. 341).

Gronw Pebr was a warrior who became the consort of the supernatural female Blodeuwedd, ‘face of flowers’, after killing her consort Lleu Llaw Gyffes (the god Lugh) with a magical spear. Lleu was restored, overcame Gronw and attempted to kill him with a spear. Gronw held a stone as a shield, but Lleu threw the spear so hard that it penetrated the stone and killed Gronw (Ifans & Ifans, 1980). This legend also parallels that of Cúchulainn who killed the king of Munster, Cú-Roi, at Samhain (Hicks & Elder, 2003, p. 317) in order to seduce Cú-Roi’s wife Blathnat, ‘little flower’ (Monaghan, 2004). This suggests that both refer to an earlier legend of attempts to gain favour with a goddess and consequent ‘kingship’ through the regicide of a predecessor.

The foregoing strongly suggests that other standing stones named after cuckoos, including the Gouk Stone, referred to these warriors, serving a similar function as sites of ritual murder, and that the ritual dated from the placement of these stones in the Bronze Age at the latest (Section "[Cuckoo place-names](#)"), contemporary with Holme I and II.

Penning the cuckoo

The following two sections are adapted from Nance (2019b). Field (1913) thought that fields named cuckoo pen, cuckoo-bush, cuckoo-piece, cuckoo-hill *et cetera* in the Chiltern Hills of southern England were situated in similar places in the landscape: close to running water, Roman roads, items of antiquity and ‘spurs’ (promontories). Rawes (1978) found fields named cuckoo-pen on maps dated between 1795 and 1800 in 33 parishes in Gloucestershire usually less than quarter of a hectare, again near running water, on, or close to, boundaries and ancient trackways. Cuckoos are not associated with cultural features so cuckoo-pens are unlikely to refer to the bird’s habitat. Harte (1986) found eight locations in Dorset named ‘cuckoo pound’ where it was thought people attempted trap the bird to guarantee good weather

all year round. A subsequent author proposed that cuckoo-pens were sacred groves or other pre-Christian cult sites (Field, 1993, pp. 56–57).

Rawes (1978) considered that the common topographic and cultural features indicated the survival of a rural, pre-Christian, seasonal ritual. Field (1913), Hardy (1879) and Rawes all thought that the field-names referred to ‘the myth of the pent cuckoo’, recorded in the English counties of Nottinghamshire, Northumberland, Somerset and Cornwall (Hardy, 1879, p. 67).

‘The basic elements of the story are that a group of village ‘wise-men’, reluctant to see the summer depart with the cuckoo, decides to try to keep it by penning a cuckoo in a thorn bush. In some versions they build a wall to hedge it in; in others they link arms around the tree. All their attempts are of no avail and the bird flies over the wall that can never be made high enough and the summer goes with it.’ (Rawes, 1978, p. 35)

Such rituals often vary within and between communities. Significantly for this article, in Somerset the ‘wise-men’ also built a high wall (a timber enclosure?) to keep in an unfledged cuckoo chick which they fed but it inevitably fledged and flew away (Hardy, 1879, p. 68).

The *Townley Plays* of around 1410 (*Oxford Dictionary of English Proverbs*, 1948, p. 716) are the earliest textual reference to rustics who spoke wisely and acted foolishly. A version of the pent cuckoo myth is recorded in the book *The Merie Tales of the Mad Men of Gotam* published in 1565 (Shule, 2021). The relationship of ‘wise fools’ and the cuckoo also occurs in mainland Europe suggesting an origin in antiquity; for example, Grimm (1883, p. 680) refers to Gauchsberg, ‘cuckoo hill’, near Kreuznach, others near Durlach and Weinsberg, and a Guggisberg in Switzerland. The associated traditions include local men talking wisely and acting foolishly. Grimm concluded these locations did not refer to the cuckoo directly but in some ‘mystic’, now forgotten, sense. This area of south-western Germany and northern Switzerland was inhabited in the Late Iron Age and Roman period by peoples who spoke Celtic languages. The ‘wise men’ who conducted rituals in the pre-Christian period were the ritual-specialists recorded by Classical authors as druids.

¹ Ulaid is an ethnonym for the people of an over-kingdom in what is now eastern Ulster, particularly counties Armagh, Down and Louth. Traditionally the ruling elite were from the Gaelic population or from the local Cruithin,

Cuckoo place-names

These previous studies were geographically limited and their suppositions untested. A wider, assessment was undertaken of the geographic and cultural features around the cuckoo place-names of Great Britain (Nance, 2019a). The methods consisted of statistical analysis and GIS geoprocessing, avoiding the temporal and linguistic constraints inherent in traditional toponymic methods that are based on etymological, historic and geographic information. Textual sources are then used to find the earliest form of a place-name, when onomastics and linguistics are used to explain its meaning, sometimes resulting in contradictory, subjective interpretations. The quantity and quality of textual evidence decreases with time and is extinguished by illiteracy. Traditional linguistic methods also cannot determine if such place-names were previously associated with the cuckoo.

The cuckoo place-names for the 2019 study were obtained from an independent source, the Ordnance Survey gazetteer. They included 25 standing stones named after the cuckoo. These are statistically significantly associated with a group of geographic and cultural features when compared with a randomly selected group of 100 other standing stones, indicating that cuckoo stones were erected with a common intent, independent of other standing stones. Another 107 cuckoo-place-names, not directly associated with stones, also including some locations named cuckoo-pen, were similarly statistically-significantly associated with those same features when compared to a set of 100 randomly selected locations. The features included a wide river valley; a small, narrow adjoining valley; running water; waterfalls; a body of standing water; a promontory and springs, often in striking, awe-inspiring landscapes. (Not all the features were associated with each location.) There was also no statistically significant difference between the features around cuckoo-stones and the other cuckoo place-names, other than springs, as standing stones were known to be used as their markers until recently. In addition to cuckoo place-names in Old and Modern English they also occur in Scottish Gaelic (*cuithaig*) and Brittonic (*cog* and the onomatopoeic *cwcw*). These locations were also statistically significantly associated with these same topographies further indicating an origin

in antiquity. An alternative hypothesis that all these language groups independently later named similar locations after the cuckoo, although not related to the habitat of the bird, is less plausible. This indicated that many cuckoo place-names, including some named cuckoo-pen, appear to have been associated with the cuckoo in some sense since the standing stones were erected, surviving subsequent cultural and language transitions.

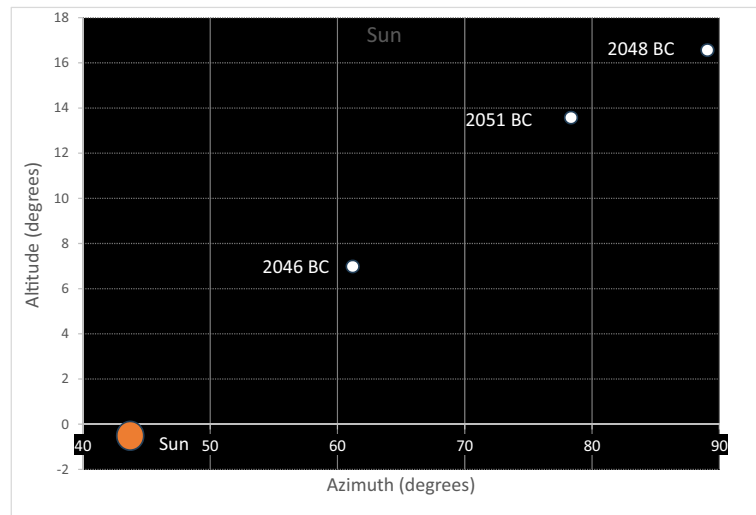
Cuckoo place-names are, as Field supposed, also statistically significantly situated near first-century AD Roman roads and forts when compared to a selection of random locations, a finding confirmed using GIS geoprocessing, initially suggesting the early Roman period for the placement of the stones; however, excavation around the Cuckoo Stone in Wiltshire, a component of the Stonehenge ritual landscape, revealed a continuously utilised location that included a Romano-British shrine, while indirect radiocarbon dating indicated that the stone was erected in the -first quarter of the third millennium (Parker Pearson et al. 2020; table 7.2) contemporary with the structures of Holme-next-the-Sea. The Gouk ('cuckoo') Stone in Aberdeenshire, also a central component of a ritual landscape, connected in a legend to the execution of a 'cuckoo hero', has been indirectly dated using an astronomic alignment with Venus to a placement in approximately 1200 BC, discussed further below. There are also two Roman marching camps less than five kilometres distant. It was considered probable that the Romans targeted these cult-sites during the conquest phase (Nance, 2019a).

Method

Holme II has now been partially eroded and the azimuths of the rebates were obtained using a protractor on Fig. 4. *Google Earth Pro 7.1* was used to calculate horizon altitude. The freeware planetarium programme *Cartes du Ciel* version 4.2 was used for astronomic calculations. The accuracy of both programmes has been discussed elsewhere (Nance, 2021a).

Horizon declinations were calculated by inputting azimuth and horizon altitude data into the freeware programme GETDEC (<https://www3.cliveruggles.com/index.php/tools/declination-calculator>).

Fig. 11 Positions of Venus at sunrise on the summer solstice at Holme-next-the-sea during eight-year cycle of 2048 BC



A note regarding dating. The calculation of dates using dendrochronology does not include a ‘year zero’ so 1 BC directly precedes AD 1, this convention was used in dating Holme I and II (Groves, 2002). Conversely, astronomic time does include year zero so 1 BC quoted for dendrochronology is equivalent to year zero astronomic time. A dendrochronology calculated date of 2049 BC is equivalent to 2048 BC astronomic time. To avoid confusion, henceforth the dendrochronological date of 2049 BC will be quoted as the astronomic date of 2048 BC.

Astronomers, and planetarium programmes including *Cartes du Ciel*, use the Julian calendar for dates prior to 1582 when the Gregorian calendar was adopted. Due to the inherent errors in the Julian, the summer solstice was on 11 July (Julian) in 2048 BC and Samhain on 17 November (J).

Results

Holme-next-the-Sea is at latitude $52^{\circ}58''$. The orientation of the Holme II rebates is approximately 114° to 294° . Assuming that the altitude in the south-east was the same as the current value of 0.46° , this corresponds to a declination of -14.1° .

Venus was visible at sunrise on the summer solstice of 2048 BC with an azimuth of 89.1° , near its extreme standstill position (Fig. 11).

The Sun rose at Samhain on an azimuth of 114.6° (declination -15.0°) at an altitude of 0.46° . Venus was still visible at sunrise at Samhain in 2048 BC; consequently, it was not visible in the evening sky.

Discussion

Continuity

The genetic, linguistic, cultural and religious continuity from the EBA to the early medieval period in Britain is discussed here. The LN to EBA transition was a time of both cultural and genetic change for the peoples of the British Isles. aDNA analysis has revealed that the initial Bronze Age immigrants around 2500 BC were from a population with Bell Beaker traditions. They had a high proportion of steppe ancestry and were genetically closely-related to a central European Bell Beaker population from the Lower Rhine area (Olalde et al., 2018). This accords with the ceramic evidence demonstrating contemporary, close stylistic relationships between the Netherlands and Britain (Armit & Reich, 2021). It was estimated that about one third of the Irish EBA genome could also be traced back directly to the steppe populations who had mixed with indigenous Neolithic populations on their migrations west through northern Europe and might have had no indigenous Irish Neolithic ancestry (Cassidy et al., 2016). The immigrants spread rapidly in the British Isles and within two hundred years the genetic content from the indigenous Neolithic farmers had been reduced to less than ten percent (Olalde et al., 2018), resolving the controversy of whether population change or cultural adoption occurred within the British Isles (Cassidy et al., 2016).

Further aDNA studies have confirmed that the Late Iron Age Irish and northern British tribes, some

of whom were later referred to as the Picts, were the direct descendants of these Beaker immigrants (Dulias et al., 2022; Margaryan et al., 2020).

The Beaker Culture existed in Britain from 2500 BC until around 1800 BC (Bradley, 2007, p. 14), bracketing the constructions of Holme I and II. The homogenous EBA aDNA data and similarity of monument construction and orientations strongly suggest that the Beaker complex societies of Britain at the end of the third millennium were similar with respect to language, religion and customs. Their direct descendants, the tribal societies of Late Iron Age Ireland and northern Britain, the domains of the Ciuthach and General Gouk, were beyond the hegemony of Rome and are thought to have remained as simple chiefdoms since the EBA (Braun, 2004). The material record indicates that they were 'flat', without elites, described as 'farmer republics' (Fraser, 2009, p. 34) that still existed in both areas into the early medieval period (Fraser, 2009, p. 124; Mac Cana, 1979, p. 445). The implication being that related aspects of their governance and religion had also developed slowly resembling those of their EBA ancestors.

The Beaker immigrants brought bronze weapons and tools, domesticated horses and wheeled vehicles (Anthony, 2007). It is probable that they would have also brought intangible aspects of culture including religious beliefs, cultural practices and an Indo-European language (Haak et al., 2015), itself a vehicle for the transmission of myths and legends (Waddell, 2018, p. 6). While there have been several hypotheses regarding the Indo-European language homeland, the Anatolian and the Armenian being the most supported (Mallory, 2013), linguistic, archaeological and recent genetic evidence has favoured the steppe origin being the most probable explanation (Kristiansen et al., 2017; Reich, 2018) rendering the other options mostly abandoned (Bomhard, 2019). The Indo-European language of the Bronze Age immigrants to the British Isles is thought to have been a Proto-Celtic language (Cassidy et al., 2016; Cunliffe, 2001; Galley, 2001; Haak et al., 2015; Silva et al., 2019).

While details of the Beaker immigrants' religion are scarce, a powerful fertile goddess and her mate form the basis of the of Celtic religion (Cunliffe, 1997, p. 186). The alignments of monuments indicate that celestial bodies also played an important role. A number of widespread, significant goddesses amongst Indo-European peoples associated with the

cuckoo and the planet Venus were venerated across pre-Christian Europe and had probably developed from a Neolithic ancestor. They included a British goddess recalled in a myth associated with the Calanais Stones that was dated to a celestial event less than four centuries after the construction of Holme I and II. This continuity indicates that a similar deity was most probably part of the intervening Beaker culture and therefore known to the communities of Holme-next-the-Sea. The symbolic association of the cuckoo with the summer and fertility was widespread in Europe and linked with these goddesses; therefore, it is probable that this included the belief that the cuckoo stopped singing and took the summer with it when it went to the Otherworld at midsummer. The orientation of the initial components of Holme I towards sunrise on the summer solstice constitutes the major, embedded alignment of the monument and probably has similarly, related symbolic significance.

Warrior-champions

The warrior-champions of the goddesses mentioned in Section "[Warrior champions - sacred kings](#)" are discussed here. It is adapted, in part, from Nance (2022). The cuckoo's association with goddesses of fertility suggest that as the chosen champions of such goddesses, Gawain, and the other warriors named after the cuckoo, symbolised male fertility. However, they were also described as indomitable warriors, protectors of their people, reflected in Gawain's original full-title of Gwalchmai ap Gwyar, 'the hawk of May, son of gore/bloodshed' (Rhys, 1901, p. 169). This presents a paradox as the patronymic does not reflect the behaviour of the secretive, insectivorous cuckoo; yet the cuckoo was also regarded as interchangeable with its mimic-model and *alter ego*, the sparrowhawk, a predator that causes fear and panic amongst other birds. The raptor also has the perceived and conceived characteristics of stealth, speed, agility, strength, courage and ferocity that inevitably concludes in the rapid and violent death of its quarry, all of which contribute to the presumed idealised, masculine characteristics of warrior-champions as both libidinous, virile lovers and fearless, merciless warriors. The transition between these split-personalities may be alluded to in the *ríastrad* or 'warp spasm' of Cúchullain before battle. It describes his transformation into a grotesque and terrifying monster with a

blind, ferocious rage whose reverse transformation to a lover was facilitated in part by being met by naked young women (Dunn, 1914).

The British warriors were not usually described as kings. Gawain was a knight, Cúchullain a warrior-champion, and the Ciuthach was referred to as a great warrior of the Picts but by the seventh century he was described as a solitary figure living in caves (Watson, 1914).

One version of a Cruithin Ciuthach appears to be referred to in a heavily Christianised twelfth-century tale from the Kings' Cycles, a body of Old and Middle Irish literature. *Buile Shuibhne*, 'The Madness of King Suibhne', describes how Suibhne, 'Sweeney', a king or warrior of Dál nAraidi, a historical Cruithin kingdom in Ulster (MacNeill, 1919), became insane after being cursed by Saint Ronan for spearing one of the saint's monks to death. Shuibhne became half-man, half-bird, exiled and condemned to live out his life in the woods, naked but growing feathers (O'Keeffe, 1913, p. 119). He fled from his human companions who eventually trap him only to meet his death by spearing, killed by a man who believed his wife had been unfaithful with Shuibhne, who was then himself killed with a spear. The tale can be explained as originally referring to a succession of sacred kings who ritually mated with a goddess, replaced by Saint Ronan as part of *interpretatio christiana*, the feathers providing a link to the cuckoo. It also suggests that they were expelled from communities with the adoption of Christianity.

The warriors represent a form of sacred kingship, scapegoats, absorbing the 'pollution' of the other members of society—the conceived moral and physical offenses to the gods. Their ritual-murder rid the people of that 'pollution' but simultaneously condemned their successor by whose hand they were often dispatched (Scubla, 2005). Such figures may have remained after Christianisation, transformed into sin-eaters that existed in Wales, Scotland and Ireland until the nineteenth century (Davidson, 1993, p. 85). They too were scapegoats, absorbing the sins of a deceased person and absolving their soul by eating food that had been placed on the body and taking a drink that had been passed across the body. A description of how they were regarded by other members of society perhaps provides an insight into the role of the medieval Ciuthach after Christianisation.

One is described living near Llanwenog, Cardigan-shire, in 1825.

'Abhorred by the superstitious villagers as a thing unclean, the sin-eater cut himself off from all social intercourse with his fellow creatures by reason of the life he had chosen; he lived as a rule in a remote place by himself, and those who chanced to meet him avoided him as they would a leper.' (Puckle, 1926, p. 69)

The British warriors have characteristics in common with contemporary, pre-Christian Irish kings. The Irish *rí* is often translated as 'king' but the term denotes a 'ruler', they were chieftains, described as sacral kings, the chosen ones of the local goddess of fertility and sovereignty and became her mortal lovers, validated by a sacred-marriage inauguration ritual, their position maintained by just rule, thereby maintaining cosmic harmony and the well-being of the land and its people (Mac Cana, 1979; Maier, 1989). Each ruled a *tuath*, a tribal territory of which there were between 150 (Mac Cana, 1979) and 300 with boundaries that closely match those of medieval baronries (Hicks, 2011). The pre-statehood, pre-Christian institution of kingship was extremely unlike the modern versions of monarchy yet Irish kingship in the ninth century appears to have been relatively unaltered due to geographic isolation and the maintenance of tradition by the *filid* (Maier, 1989), a class of scholars developed from the druids and independent of the Church (Mac Cana, 1979, p. 445).

Several pre-Christian Irish kings, the kings of Tara, for example, *'were killed on a particular day of the year, in a ritual manner, for religious reasons, and at the end of a fixed term of years or of some multiple of this term. All the principal elements of a ritual killing are thus present.'* (Dalton, 1970, p. 1) Of the 110 kings enumerated in the *Flaithiusa hErenn*, 80 were killed by their successor suggesting the ritual regicide of sacred kings (Macalister, 1917, p. 326), while others died of 'natural' causes.

The regicide and inauguration of some Irish kings occurred at Samhain (Dalton, 1970; Maier, 1989; Ramnoux., 1954). Samhain is thought to have been the most important day of the Celtic year (Dalton, 1972; Frazer, 1922) when the local goddess was united with the new tribal chieftain in a ritual that was recorded up to the fourteenth century in Ireland (Maier, 1989, p. 21). Of the fourteen known

pre-Christian ‘kings’ of Tara, seven were killed during a festival on Samhain for religious reasons in a ritual that existed until the mid-ninth century (Dalton, 1970, p. 16); and none of the others were killed at any other stated time (Ramnoux, 1954). Eight were supposedly killed at the end of a fixed term of seven years or of some multiple of this term, although there is considerable disagreement of the exact duration (Dalton, 1970, p. 3). There is a reference in the *Dinnshenchas* to a sequence of three individuals that each held the kingship for seven years each with ‘seven chieftains to wound and burn them, unless each man of them should give up the kingship at the end of his seven years’ (Stokes, 1895, p. 281). There is evidence that several later kings also abdicated after seven years to escape their fate; however, the king-lists do contain a high proportion of reigns of a year or less and ‘it is probable that a nominal king was appointed for that purpose’ (Dalton, 1970, pp. 3–4) and was killed in his stead. This is alluded to in the twelfth century *The Boyhood Deeds of Fionn* (Cross & Slover, 1936, p. 366).

‘At that time there was a very beautiful maiden in Bri Ele, that is to say, in the fairy-knoll of Bri Ele, and the name of that maiden was Ele. The men of Ireland were at feud about that maiden. One man after another went to woo her. Every year on Samain the wooing used to take place; for the fairy-mounds of Ireland were always open about Samain; for on Samain nothing could ever be hidden in the fairy-mounds. To each man that went to woo her this used to happen: one of his people was slain.’

The original regnal period, then, could have been eight years developing in its later stages to seven years and one year with a substitute. Campbell (2013) had previously suggested that the death of Inanna’s consort Dumuzi might be linked to the eight-year cycle of Venus. Choosing a substitute Samhain victim continued until the eighteenth century in Scotland and the nineteenth in Wales. The rituals in both locations involved choosing a victim from stones put in or around the Hallowe’en (Eve of Samhain) fire. By this time the victim was not sacrificed but it was thought ‘that he could not live twelve months from that day.’ (Frazer, 1922, p. 635). Ross reported that the custom existed until the First World War. However, she wrote that the substitute

in Perthshire was selected by picking a piece of blackened oatmeal-cake cooked on the Beltane fire. The selected one was forced to jump across the fire and then driven from the enclosure. Her informant who had witnessed the ritual stated ‘*He was a kind of scapegoat but in the old days he or she would have been sacrificed.*’ (Ross & Robins, 1989, p. 38).

McNeill (1956, p. 16) suggested a series for sacrificial victims: initially a totem animal, progressively followed by a ‘king’, a substitute of high rank, a volunteer temporarily invested with ‘kingship’ and finally a criminal as reported in Gaul by Julius Caesar and Strabo. To this list must be added the *Rex Nemorensis*, the ‘priest’ of Diana’s sanctuary at the northern shore of Lake Nemi, that had been reduced to being held by a slave who had killed his predecessor.

It may be considered improbable that anyone would voluntarily accept the position of a champion of a goddess and their inevitable demise. Yet this modern ethnocentric perspective ignores that ‘one society’s ‘murder most horrid’ is another’s most holy act.’ (Aldhouse-Green, 2001, p. 16) Pokorny’s ‘cuckoo heroes’ may also have had more carnal inducements.

Solinus’s *Polyhistor* was written in the third century AD. A seventh century interpolation describing the ‘king’ of the Hebrides states that ‘no woman is given to him in marriage; but he takes in turn her who pleases him at the moment.’ (Nansen, 1911, p. 160) This is a conceived polygamous behaviour of the male cuckoo that the ‘cuckoo heroes’ were thought to be modelled upon. It may describe the practices still extant in the Hebrides at the date of its insertion (Zimmer, 1889, p. 26). Similarly, in the *Life of the Martyr Dasius*, Roman soldiers garrisoned at Durostorum, Bulgaria, recorded that a ‘king’, presumably a substitute, was chosen annually and allowed to practice his ‘lawless and shameful desires’ for a month, then killed with a sword as ‘a sacrifice to nameless and unclean idols’ (Cumont, 1897).

The earlier scholars who associated some regicides with Samhain, appear to be unaware that the goddess of sovereignty associated with the kings was also associated with Venus and that four out of the five maximum evening setting of Venus over the last four millennia occurred between the 29 October and 6 November (Šprajc, 2015). The Samhain feasts at Tara, last recorded in AD 560 (Macalister, 1917,

p. 372), where Irish kings were sacrificed, were also between 29 October and 4 November (Ginnell, 1894). This suggests that, unless killed earlier through a perceived failure of his responsibilities, as proposed occurred at Holme-next-the-sea, the king was sacrificed at Samhain on a year coinciding with maximum evening setting of Venus.

It should not be concluded that the lack of any reference to regicide at the evening setting of Venus in later textual sources indicates that it did not occur. This is the ‘appeal to ignorance’ fallacy. The textual evidence for pre-Christian kingship of the continental Celts from Roman authors is quite limited as kingship was becoming obsolete in Gaul when Caesar wrote. The Irish evidence presents kingship in its final form but is not contemporary, being preserved in manuscripts dating from the twelfth century onward. They do not present a clear-cut representation of the original traditions (Maier, 1989, p. 13), they are fragmentary with the biases of monastic scribes (Mac Cana, 1979, p. 445) and manipulated genealogies (Macalister, 1917, p. 327). The original traditions were ‘*confused and misunderstood... by the ancient historians who have recorded them.*’ (Macalister, 1917, p. 324). They were also first written in the social environment of the Christian high medieval period, not the heroic societies of the Iron Age.

There is no textual evidence that the northern British warriors were also sacrificed at Samhain, but there are no indigenous texts here until the seventh century. Nevertheless, the Gouk Stone, where legend claims a warrior named after the cuckoo was slain, acts as a backsight for the Sun setting at Samhain behind the site of a stone circle, and as a foresight for the extreme evening setting point of Venus dated to approximately 1200 BC (Section "[Orientation of the timber rebates in Holme II](#)") when viewed from Donald’s Hillock. This prehistoric cairn also acts as a common backsight for solar and lunar maxima and minima horizon settings occurring behind four other prehistoric monuments, components of a ritual landscape.

The ritual deaths of several pre-Christian Irish kings also resembled those of the warriors killed against standing stones erected in the EBA. Although Ramnoux (1954) thought the Irish kings were ritually killed by a combination of iron, water, and fire, Dalton (1970, p. 16), however, claimed that the victims were tied to a stone and sacrificed with a sacred

spear on the eve of Samhain. Examples cited include Fergus Blacktooth who reigned for a year and was killed against a stone at Samhain; Lugaid mac Con who was killed by spear while leaning against a standing stone. A tale recorded in 1634 (Keating, 1908 ii, pp. 405–197) describes Eochaid mac Eanna Cenn attempting to assume sovereignty, being tied to a stone to be executed but escaping. Suibhne Menn, mentioned previously, was despatched by a spear with his back to a stone (Maier, 1989), and is thought to have occurred in AD 628 and have been the last recorded ritual killing (Dalton, 1970, p. 13).

Cúchullain, a demi-god supposedly fathered by Lugh, was both born at Samhain and killed at Samhain while bound to a stone (Haeussler, 2010, p. 201) suggesting a link with a Venus deity. Cúchullain was also described as having seven bright pupils in each eye (Kinsella, 1969, p. 156) which may allude to the seven stars of the Pleiades that celestially symbolised the cuckoo.

Maier (1989, p. 32) concluded that the practice of ritual killing seemed doubtful. Although noting the resemblances of the relationships between the kings of Mesopotamia and Inanna, and Irish kings and a goddess, he thought that no unbroken line of transmission had been reconstructed. Maier wondered if the sovereignty goddess exhibited features of a solar goddess as he, and earlier authors, appeared unaware the goddesses provided a vector for unbroken transmission through their associations with the cuckoo, Venus and mortal champions.

These ‘cuckoo heroes’ are thought to be represented on several artefacts (see Nance, 2022); for example, the central figure on plate *f* of the Gundstrup cauldron has a, possibly bird-headed, recumbent man in the crook of her left arm (Fig. 9). He has a single arm, the left is missing, with an outsized hand of four nail-less digits that resembles a claw, with the two outer digits larger than the two inner ones. The illiterate silversmiths emphasised these characteristics to identify him, as they did by omitting the tail and emphasising only one outsize foot of the heraldic cuckoos above the figure’s shoulders. Other figures depicted on the cauldron have two pentadactyl arms with well-defined nails. Perhaps the hand is a representation of a cuckoo’s foot and he represents a sacrificed Gaulish champion of the goddess. Conversely, it may be that one palm is depicted for an unknown reason but this would not address why only four digits are depicted.

The Goddess

The goddesses in Celtic societies appear to be more powerful than the gods and had a profound impact on how Irish tribes were governed (Hicks, 2011). Hicks and Elder (2003, p. 312) considered that the probable Venus deity, Medb, was associated with Samhain, that marked the beginning the season of raiding and warfare. The name Medb, ‘the intoxicated one’ (Ross, 1967), is cognate with Proto-Indo-European **medu-*, ‘drunk’, from which mead is also derived. This is thought a reference to the cup of mead Medb symbolically shared with her mortal lovers conferring kingship. Medb had a series of successive mortal kings for husbands but one principle divine lover, Fergus mac Róich, ‘man-strength [virility] son of the stallion’, and they are described in the *Táin* as having almost insatiable sexual appetites (Meyer, 1897).

Medden/Meddan, appears to be her British counterpart. Her name has the same origin and in Modern Welsh *meddwen* describes a drunken woman. Medden was syncretised as the saint of several parishes in northern Britain including Fintray, Aberdeenshire. Fergus is also the patron saint of the adjacent parish of Dyce, where the Gouk Stone stands (discussed below) suggesting a link with male fertility. Medden and Fergus were also the saints of the adjacent parishes of Glamis and Airlie in Angus. They represent a divine couple of fertility who are well represented in Celtic religion (Green, 1986, p. 95).

A British Bronze Age goddess associated with Venus and the cuckoo, identified in Calanais, seems to have been revered until the conversion to Christianity when she was syncretised as a number of founding saints, including Saint Medden, who, being mortal, the church could ‘kill off’. ‘Great shining, white, blessed, holy’ is composed of *mawr* and *gwenn* which lenites in Welsh to *mawrwen*. At least seven sixth-century British Saints were named Morwyn, her cognate Morwenna (Baring-Gould, 1914, p. 263) with saint’s days between 5 and 8 July (Nance, 2021a, p. 59). When the Julian calendar was replaced by the Gregorian in Britain in 1752, eleven days were added; hence, the 25 June, the Julian summer solstice, became 6 July. This suggests that Saint Morwenna’s feast day was Midsummer’s Eve but by 1752 her association with the solstice had been forgotten and the date fixed while Saint John’s Day remained on the solstice. One Saint Morwenna was a founding parish

saint of the Cornish parish of Morwenstow (Old English *stów* ‘holy place’) where the church is dedicated to both Saint Morwenna and Saint John the Baptist indicating their syncretisation from the divine couple of the Sun and Venus. The foregoing indicates that speculative linguistic-based claims that the name Morwenna originally represented ‘maiden (virgin)’ or ‘seawave’ are less plausible. Morwyn (*f*) describes a female virgin in modern Welsh. The evidence presented here suggests that the name derived from the title of a virgin goddess.

The feast days of Saint Fergus is 18 November (Hutchison-Hall, 2017, p. 189) and Saint Medana (Medden) is 19 November.² These Julian dates were the 7 and 8 November. Their consecutive occurrence during the period of maximum evening setting of Venus and at the end of the Samhain feasts, suggests that the sacrifice at the Gouk Stone at Samhain was dedicated to Medden, and, in addition to the midsummer association of the morning Venus and the rising sun, there was an autumnal association between the evening Venus and the setting sun, represented by Fergus.

The aversion of catastrophes by appeasement of the divine was a common pretext for human sacrifice in antiquity. The NSA XII (1845, p. 168) claims that until the seventeenth century the people of Hatton of Fintray had a silver head of Saint Medden that they would parade after flooding of the river Don in order that she would stop the rain, a recognised reason for sacrifice in Europe (Aldhouse-Green, 2001, p. 20) indicating that the earlier goddess was believed capable of controlling the climate. The greater the favour, the more valuable the sacrifice required (Aldhouse-Green, 2001, p. 169).

Parading only the head, rather than a complete idol, seems unusual. The human head was an important religious symbol of pre-Christian Celtic tribes (Ross, 1957), the site of the soul. Considering that head-ritual may have been conducted within the context of ritual-murder (Aldhouse-Green, 2001, p. 95) and its use and veneration is found repeatedly in the archaeological record and folklore of the British Isles (Clarke, 1999); it may reasonably be inferred that originally the head of a victim sacrificed at the Gouk Stone was used, paraded and proffered to propitiate the goddess into changing the weather. Cúchullain was also reportedly

² https://www.catholic.org/saints/saint.php?saint_id=5034

beheaded after being despatched while bound to a standing stone (Gregory, 1903: 336–341). This ritual at Fintray being converted into a benign folk-custom with the advent of Christianity and the substitution of a silver head of the goddess/parish saint. It parallels the proposed sacrifice at Holme-next-the-sea made to a Venus deity to change the weather.

Áine is a similar local goddess of fertility and sovereignty who was syncretised in Christian Ireland. She is also associated with midsummer and the Sun. Her name is suggestive of Venus: ‘brightness, glow, joy, radiance; splendour, glory, fame’ (MacKillop, 1998, p. 128), while fire and ‘blessing of the land’ rituals associated with her were still observed at Knockainey, the hill named after her in County Limerick, on Midsummer’s Eve in 1879 (Meehan, 2002). One of the two churches at her site is dedicated to Saint John the Baptist and the other is the Church of Our Lady of Knockainey, where, in accordance with the *interpretatio christiana*, the goddess was syncretised into a Marian cult. Kelly (2022, p. 11) identified the solar deity and concluded his article on Áine: ‘*It is he [Aengus Óg – the young sun god] that goes on to marry the earth goddess Áine and reign as king and queen of Summer. Together, they ensure the cycle of nature and safeguard the annual harvest that sustains humanity.*’

The evidence presented strongly suggests that there was a version of the pan-European goddess associated with the cuckoo and Venus in Britain since the EBA at least. The mortal consorts, warrior-champions, of these goddesses were originally sacral kings, considered responsible for the wellbeing of the land and its inhabitants. They were sacrificed to the goddess after a set period, or earlier if they did not rule well or misfortune occurred. As variants of the goddess appear to have been revered in Britain continuously from the EBA until syncretised into Christianity, it is eminently feasible that such a champion was known by the community of Holme-next-the-sea and sacrificed in response to climatic deterioration. They would appear to be the direct descendants of the sacrificed mortal consorts of the ancestral Venus goddesses indicating a continuity through the construction of Holme II until the Late Iron Age.

Monument construction

The LN British populations were in decline with depressed cereal-crop production, also through climatic deterioration (Stevens & Fuller, 2015). Nevertheless,

construction of large monuments continued into the EBA. Animal-remain analysis from Wessex monuments indicated that people travelled from a wide area to aid in their construction (Madgwick et al., 2019). Accumulating evidence suggests that some monuments were constructed, not in settled periods of plenty, but as responses to existential crises, reliant on people from widespread, small communities (Armit & Reich, 2021). The constructions of Holme I and II also fit that time-frame and model.

The EBA of southern Britain is one of the most intensively researched areas in British archaeology (Brück 1999). It might be considered that climatic change would encourage social changes detectable in the archaeological record. However, the evidence suggests that at the close of the third millennium the social structures and settlement patterns in Britain were not sufficiently large, complex or permanent enough for detectable changes (Fitzpatrick, 2015, p. 805). This suggests pastoralism but it may be that dwellings were insubstantial, tents for example, and/or settlements were small, perhaps for single families, with short-term occupancy.

Evidence from other prehistoric monuments and cuckoo place-names suggests that the location was chosen in accordance with specific criteria. Holme I was in a flat area near water, in common with cuckoo-pens (Rawes, 1978), but this location does not have some of the topographic features common to other cuckoo place-names: a deep, narrow valley off a wide river valley, a promontory. However, the higher ground in mainland Britain, where such features predominate, is in the west and north while along the east coast bordering the North Sea there are extensive regions of lower-lying ground (Fitzpatrick, 2015, p. 808) including Norfolk, where such features and megalithic monuments do not occur. Nevertheless, the area chosen near the tidal limit may also have been considered liminal, and significant from biological and environmental perspectives.

The backfill of Holme I, thought to be the material from the construction trench, contained stems of the common reed indicating a reedbed marsh on the landward side (Brennan & Taylor, 2003, p. 61). Reedbeds are the nesting habitat of reed warblers while dune systems and salt marshes are among the nesting habitats of meadow pipits (Rose, 1982, p. 29). These are the second and third most common host-species for cuckoos in Britain (Glue & Morgan, 1972). The

area probably had a high concentration of cuckoos as their density is directly proportional to that of their host species (Kosickia & Hromada, 2018). Lower altitudes and associated climatic factors result in early breeding in most bird species (Mason & Lyczynski, 1980); hence, a location with a high density of calling cuckoos in early spring could have been considered a hierophany, a manifestation of the sacred. The hall of the Germanic goddess, Frigg, a variant of the cuckoo-and-Venus deity, Freyja, was *Fensalir*, Old Norse 'Fen Halls', suggesting a religious association with bogs or swamps, also reputedly entrances to the realm of Frau Holda, a variant of Frigg (Edzardi, 1880). The marsh was probably regarded as an entrance to the Otherworld whence the cuckoo had emerged and where it would return at midsummer, and the location was chosen to pen the cuckoo for these reasons.

The monuments are imbued with symbolism in several respects. The excavators noted that *'there can also be no doubt that the arrangement and use of timber, trees and tree parts conceals a complex network of symbols.'* (Brennand & Taylor, 2003, p.71). For example, both monuments were constructed exclusively of oak, trees that have long been considered sacred across Europe. However, accurately determining what they represent is problematic as *'the lack of definition and any grounding in cognitive theory makes identifying prehistoric symbols and symbolising more art than science.'* (Coolidge et al., 2023, p. 299) The contrasting appearance of Holme I's bark exterior, a distinctive, living appearance, with that of Holme II stripped of bark and resembling oak deadwood, is suggestive of contrasting functions. It was suggested that Holme I symbolised the living while the bark-stripped palisade of Holme II symbolised the dead (Robertson et al., 2016).

The oval rather than circular design of Holme I would also appear to be symbolic. Field (1913) reported that in some versions of penning the cuckoo, the wise-men banked-in the cuckoo, suggestive of a henge, structures broadly contemporary with Holme I and II. They have been considered as ritually-charged spaces and their non-defensive structure of an outer circular bank with an internal ditch suggested they might have been constructed to keep 'something' inside (Barclay, 2005, p. 88). Furthermore, stone or timber circles often stood in the interior of henges, with many monuments of both types also deliberately oval in shape (Fitzpatrick, 2015, p. 819). One might

reasonably infer that it symbolised a bird's egg but its significance is unknown.

If penning the cuckoo was widespread then Holme I might not have been unique. Taylor noted that a similarly restricted entrances in other timber circles would not have been detectable and they would only appear to have enclosed a very large post (Brennand & Taylor, 2003, p. 30). She wondered how many massive posts on ceremonial sites were inverted tree stumps and gave examples of the huge Mesolithic post-pits in the Stonehenge car-park and the arrangement of post-holes within the Arminghall Henge, 70 kms (43 miles) to the south-east of Holme-next-the-sea. One might also consider Woodhenge, a henge containing six concentric, oval timber-circles in the Stonehenge ritual landscape, 400 m away from the Cuckoo Stone and visible from it.

Holme I function and intent

It is proposed that the intention of Holme I was to deceive a cuckoo into 'believing' it was in its winter abode where it would continue singing and thereby extend the summer by walling it in. The excavators noted that *'the numbers of inverted and non-inverted posts are roughly equal which might suggest that it was important to cancel out the effect of taper—perhaps to give the impression of a solid wall with few vertical cracks.'* (Brennand & Taylor, 2003, p. 17) Externally, it would have resembled part of an old oak tree-trunk while the internal view would mimic a hollow tree. The central tree-stump, with all its bark removed, symbolised part of an inverted Otherworld (Watson, 2005), the roots representing the 'bowers of the Otherworld', recalled in folklore as a thorn-bush. Both were believed to be cuckoo overwintering locations. It is highly improbable that a cuckoo would land by chance inside such a structure and remain there. However, as reported for the 'wise-men' of Somerset, an unfledged cuckoo chick could have been placed inside the structure and fed using the entrance between posts 35 and 37, re-sealing with 36. However, an immature bird would not sing. Perhaps it was hoped that it would sing when fledged but the bird disappointingly flew away.

It cannot be demonstrated directly that the ritual of penning the cuckoo was undertaken in the EBA. However, cuckoo place-name locations across Britain, including some cuckoo-pens and cuckoo standing-stones, have been demonstrated to be statistically

significantly associated with common geographic and cultural features. Two cuckoo stones, both components of ritual landscapes, have been indirectly dated, the Cuckoo Stone in Wiltshire and the Gouk Stone in Aberdeenshire, indicating these cuckoo-stones were probably erected in the Early to Middle Bronze Age. The evidence presented suggests that the stones were sites of ritual murder. The statistical-significantly commonly associated topographic and cultural features associated with cuckoo place-names in four known languages of Britain suggests that many other cuckoo place-names, including some cuckoo-pens, have been associated with the cuckoo in some sense at least since the stones were erected, indicating a common belief regarding the symbolic associations of the bird. Additionally, the mutual association of cuckoo place-names with traditions of 'wise men' acting foolishly from south Germany to Britain suggests they arose during the period of Common Celtic at least, possibly pre-dating the arrival of the Proto-Celtic-speaking Beaker immigrants to Britain who brought such traditions with them.

Holme II function and intent

It is proposed that Holme II was constructed to house the ritually sacrificed body of a mortal consort of the Venus deity, a sacral king, murdered at Samhain. If Holme II's function was to enclose a body then there are two obvious possibilities: the intended occupant was already dead when the timbers were felled in the spring/early summer of 2048 BC, or, it was intended for someone whose death was anticipated. As there had been a substantial investment in construction, it seems unlikely to have been erected to house the next available corpse but specifically for someone whose death could prompt an end the cold weather. It is possible that a slave or a warrior caught in battle may have been offered, but someone with suitable symbolic and socio-religious qualities would probably have been considered more suitable. The mortal consort of a goddess associated with Venus who had failed in his responsibility for the well-being and fertility of the tribe, its lands and waters; a scapegoat who carried the burden for others in the community who might have offended the gods, would appear to be the obvious candidate.

The excavators thought that a hollowed-out tree-trunk coffin was probably used to house the body as

they have been found in a number of British burial mounds (Robertson et al., 2016, p. 248); however, there was no evidence of a mound. An exposed body on a bier in a sacred enclosure suggests excarnation, one of several mortuary practices in EBA Britain (Booth & Brück, 2020), and in Iron Age Iberia. Aelian (*De Natura Animalium* X, 22) and Silius Italicus (*Punica* III, 342–348) recorded that Celtiberian tribes reserved excarnation for the warriors they regarded as heroic and full of valour. Others were disposed of by burning (Aldhouse-Green, 2001, p. 46).

Orientation of Holme I

It was considered by the excavators that the inaugural components of Holme I were aligned with the azimuth of sunrise on the summer solstice and erected on that date in 2048 BC. The sequence of celestial events on the summer solstice at Holme-next-the-sea was determined from *Cartes du Ciel*. On Midsummer's Eve the Pleiades rose at 23:27 on an azimuth of 80.9° as a waxing moon set in the south-west at 23:40 (a full moon occurred three days later). The Pleiades heralded the rising of Venus at 01:25, 53 percent illuminated, on almost the same azimuth of 80.7°. The Sun later rose at 03:20 on an azimuth of 46.1°. By this time Venus was on an azimuth of 89.1°, ostensibly directly due east, at an altitude of 16.2°. There are no obvious orientations of Holme I that could be considered alignments with these azimuths of Venus or the Pleiades.

The rising azimuths described above are currently on the sea horizon when viewed from the locations of Holme I and II. The Pleiades only becomes visible after its brightest star, Alcyone, reaches approximately 4° in altitude, its extinction angle; hence, its rising azimuth when first seen above the sea would have been dependent on atmospheric variables but greater than 80.9°. However, if Holme I and II were protected from the sea by sand dunes (Brennand & Taylor, 2003, pp. 59–61) then the Sun, Venus and the Pleiades would appear to rise from behind the dunes, and Alcyone would have been visible above its extinction angle and on the same azimuth as Venus. This is an uncommon event due to precession of the equinoxes. Considering the importance of other celestial alignments and the association of the Pleiades with Venus on the summer solstice at Calanais, it could have been considered significant. The Sun rising

behind dunes of unknown height, could account for the azimuths of the supposed initial components between 47.65° and 50.50° , that are greater than the flat horizon azimuth of 46.1° . Additionally, *Cartes du Ciel* calculates sunrise as the time when the top of the Sun is first seen: the current astronomical definition of sunrise. The study of the alignment of the east row of the Calanais Stones suggested that the constructors considered sunrise to be when the entire solar disc was visible (Nance, 2021a, p. 56) which would also increase its rising azimuth. (The Sun's disc is 0.5° in diameter.) The alignment of the east row of Calanais and radiocarbon dating indicate that it refers to a solstitial crossover event of Venus of the 1670's BC, less than 400 years after the construction of Holme I and II, suggesting the same conception of sunrise.

A similar celestial myth to that of Calanais is recorded as the marriage of Zeus and Hera, a cuckoo-and-Venus deity, with a cuckoo on her distaff (Pausanias, *Description of Greece* 2.17.4). Grimm (1883, p. 440) also recorded that 'A seated figure of the goddess [Hera] shows a cuckoo on her staff, and a bas-relief representing the wedding procession of Zeus and Hera has a cuckoo perched on Zeus's sceptre; so that this bird has got mixed up with the most sacred of all weddings.' Guthrie (1950, p. 68) considered that this wedding 'went back to the belief in a union of two great spirits of fertility which was re-enacted in ritual to ensure the abundance of the crops.' In addition, the orientations to the northeast of Phoenician temples in Iberia suggested double rituals with Baal and Astarte, representing the Sun and Venus (Escacena Carrasco, 2010, p. 111), who were also considered to be in a divine marriage (Escacena Carrasco, 2015, p. 1797). The foregoing strongly suggests that the appearance of the Sun, the Pleiades and Venus on the summer solstice was also associated with the ancestral Venus deity and represents a coupling of the Sun and Venus. It is, then, highly probable that such an event was believed to occur at Holme-next-the-sea in 2048 BC.

Venus remained visible after sunrise on the summer solstice in 2048 BC. It is not possible to determine for how long but, as a personal example, on the morning of 5 October 2023 in Aberdeen, Venus was only 40 percent illuminated but remained visible with the naked eye until 65 min after sunrise when the Sun was 7.8° above the horizon. It's reasonable to conclude that this is an example of 'ritual-time' that merges the past in the present (Bradley, 1991, p. 211) and was

sufficient time to erect the inaugural timbers of Holme I. The event may represent a re-enactment in ritual-time of a Proto-Indo-European cosmogenic myth that brought fertility to the land (see Lincoln, 1975).

Orientation of the timber rebates in Holme II

The approximate horizon azimuths of the rebates of 114° and 294° correspond with declinations of -14.1° and $+13.7^\circ$. One orientation is within one degree of the Sun's declination at sunrise on Samhain (-15.0°). Notably, they are not the declinations of solstitial sunrise or sunset ($\pm 23.5^\circ$), moonrise and moonset maxima ($\pm 28.7^\circ$) or minima ($\pm 18.1^\circ$) around 2000 BC (data from Ruggles, 1999, p. 57).

The azimuth measurement was crudely obtained and the accuracy of the drawing and the margins of errors unknown. In addition, the orientations of the assumed bier are also towards a sunrise in February and north-west sunsets in spring and late summer. These orientations coincide with the three other cross-quarter day festivals that are solar festivals so it would seem most probable that Samhain too had a solar element.

There is another solar alignment associated with Samhain, the cuckoo and a ritually-murdered sacred king recalled in a legend associated with the Gouk Stone. The stone has horizon alignments with four adjacent monuments. Two are lunar standstills: the major lunar standstill, northern rising, and the minor lunar standstill, southern setting. The two other alignments are not with lunisolar maxima or minima. One coincides with the maximum evening setting of Venus around 1200 BC, which usually occurs at or near Samhain. The other alignment is that of sunset behind the site of a stone circle at Samhain (Nance, 2021b, p. 112). These alignments could have been used to identify both the year and the date of the ritual murders at the Gouk Stone. This suggests that the regicide of sacral kings associated with a Venus deity was also practiced continuously in Britain from erection of the stone in the Bronze Age, if not earlier, probably at eight-year intervals coinciding with a maximum evening setting of Venus near the significant date of Samhain and therefore a ritual quite feasibly undertaken by the community at Holme-next-the-Sea.

In contrast to the Gouk Stone, the orientation of the Holme II rebates is towards sunrise on Samhain, not sunset. However, Venus was visible on the morning at

Samhain in 2048 BC, not in the evening, when it is proposed a sacrifice was made in response to a series of poor winters/springs. It is also proposed that during a 'standard' year, regicide would be undertaken when Venus was at its evening maximum setting.

These observations cannot confirm that a bier was aligned towards sunrise on Samhain in 2048 BC. However, a hypothetico-deductive approach can only be used to falsify hypotheses, not to confirm them (Popper, 1959), and the data presented do not falsify this hypothesis. The supplementary evidence presented suggests that this is the best, currently available explanation for the orientation.

Determining function and intent

There have been several proposed functions and intentions for Holme I. The inverted oak-stump is 'the world-tree' with Freudian-inspired hypotheses of fertility rites (Fahlander, 2018); an excarnation monument (Watson, 2005, p. 74); a mortuary table '*attempting to unite the world of men with a hidden realm*' (Hooke, 2014, p. 228); '*an attempt to transfer life from this plane to a parallel, upside-down universe... the world below the ground, which was possibly seen as the source of all life*' (Pryor, 2002, p. 271) or '*the oak itself could have been the point of veneration in the monument, which may have been a shrine to its spirit.*' (Hutton, 2013, p. 94).

These differing interpretations have no theoretical underpinnings or ethno-historical evidence presented to support them. They are conjectures rather than inferences reached on the basis of evidence and reasoning. Holme I and II are the only known monuments in British pre-history built simultaneously and their close proximity and contemporary construction dates also suggests a related intent. Robertson et al., (2016, p. 248) recognised that they should to be considered as a pair and '*The role of the inverted central tree at Holme I and the differences between the timbers used in the structures are important to any understanding of the relationship between them and speculation on how they may have been used.*' But there appears to be no attempt by others to link both monuments other than the suggestion that the monuments represented the living and the dead (Robertson et al., 2016). The presumption is that the 'living' refers to people so it does not directly accord with the hypothesis proposed here. In addition, it is not expanded to further an understanding of function or intent.

These alternative explanations have further shortcomings. Ritual monuments often have significant celestial orientations and/or associations with deities and the skyscape, aspects not fully explored; they do not explain the architecture, choice of year, or possible construction dates within it, and, more significantly for intent, the structures are not contextualised within their environmental, biological and climatic environments. These issues are all addressed by the hypotheses proposed in this article.

Despite the limitations of these alternative explanations, archaeologists are more inclined to accept those that do not include folklore in inferring the purpose and intent of monuments. This is based on the observations that, generally, folklore is unreliable; cannot be verified, does not exhibit continuity and it is assumed that folklore should agree with archaeological observations, an attitude which betrays a rather naive understanding of folklore (Gazin-Schwartz & Holtorf, 1999).

'Rather than simply rejecting folklore as unreliable and inaccurate, several authors... find that, when folklore is analysed... it sometimes does provide plausible interpretation for those materials, whether or not they can prove unbroken continuity of transmission [my emphasis].' (Gazin-Schwartz & Holtorf, 1999, p. 4)

This rejection may be based on inexperience in using inductive reasoning to assess hypotheses generated using folklore. Salmon (1976, p. 376) observed that '*disagreements among archaeologists about whether inductive or deductive methods are appropriate for establishing archaeological hypotheses are often founded in a misunderstanding of the nature of inductive reasoning.*' While this statement is dated, most archaeologists continued to employ the same reasoning they always have (Fogelin, 2007, p. 605). Fogelin further observed that while '*some processual archaeologists make vague claims to the hypothetico-deductive method, in practice it seems that hypotheses are becoming rarer-and-rarer in the archaeological literature... in recent discussion of processual-plus archaeology, where the hypothetico-deductive method is discussed mostly for its historical interest.*' Moreover, Bentley and Maschner (2005, p. 1) considered that scientific theory in archaeology has been mostly discarded and that nearly all archaeological 'theory' was not

theory at all, but methods of interpretation, explanation or critique.

In a majority of cases in the sciences, as in everyday life, the use of deductive and inductive reasoning is not applicable as true premises are unavailable or prediction and testing of hypotheses is not possible. In such instances, an explanation may be supported by the evidence, not because of its predictive ability, but because it links a particular set of facts in a wholly satisfactory manner and is better than any other proposed explanation. Such abductive or explanatory reasoning was described by Harman (1965, p. 89) as ‘The Inference to the Best Explanation’ where it is inferred that the hypothesis that provides the best explanation of the evidence, when compared with other hypotheses that have been proposed, is [probably and/or approximately] true, based on the knowledge of the other explanations. It is a component of scientific reasoning but not limited to the initial stages of scientific investigation. In practice, inferences to the best explanation can be sufficiently robust as to be accepted as true without further testing or investigation (Fogelin, 2007, p. 609). Importantly for hypotheses supported by folklore, such explanations do not require verification or proof of continuity of transmission.

The preferred hypothesis should have a greater balance of various virtues, such as explanatory scope and fewer entities (Dellsén, 2020, p. 162) – the principle of parsimony, Occam’s Razor, an essential factor that distinguishes science from pseudoscience (McFadden, 2023, p. 8).

The Inference to the Best Explanation is a four-step argument expressed in Lycan’s (2002, p. 413) formulation:

- (1) F_1, F_2, \dots, F_n are facts in need of explanation.
- (2) Hypothesis H explains the F_i .
- (3) No available competing hypotheses would explain the F_i as well as H does. Therefore,
- (4) H is [probably] true.

An abductive conclusion, in common with an inductive conclusion, does not eliminate uncertainty. The best available hypothesis may not be true, merely the best of a poor selection; hence, it is expressed as a ‘reasonable inference’ from the diverse available information: the ‘best available’ or ‘most likely’ explanation. Fogelin (2007, p. 603) considered that

‘inference to the best explanation is the most effective epistemological approach to archaeological reasoning available’ as it permits explanations for unique or infrequent archaeological phenomena by using multiple lines of evidence, as in this article. Although it has only played a small role in archaeological discussions of epistemology, it is utilised implicitly by both processual and post-processual archaeologists (Fogelin, 2007, p. 606).

The rejection by archaeologists of hypotheses supported by abductive reasoning is not mirrored in everyday experience or in scientific analysis. Examples of abduction in everyday life include a medical diagnosis that is the best explanation for the symptoms presented, or a court of law convicting a criminal on the basis of the available forensic evidence. Scientific examples include the germ theory of disease being accepted prior to ‘germs’ being observed, or evolution by natural selection that Darwin thought the best available explanation of his observations and was not tested experimentally until the mid-twentieth century by measuring the acquisition of genetic resistance to antibiotics by bacteria.

The preferred hypothesis, in addition to being the best available, should undergo ‘explanatory consolidation’ in which accumulated confirmatory information also makes it progressively more difficult to formulate a better hypothesis (Dellsén, 2020, p. 158). The proposition of evolution through natural selection, for example, was consolidated through evidence from geology, fossils, DNA, proteins, embryology *et cetera*, sufficient to become a theory, and it became increasingly less likely that a more suitable, alternative, currently unknown hypothesis would arise.

The rejection of such hypotheses also appears to be a misunderstanding or unfamiliarity with abduction. One reason for this may be that formal training in either the philosophy of science or the different variations of the scientific method have not been an integral part of archaeology or history. Consequently, most archaeologists have minimal exposure to scientific methodology, even though they may use such terms as hypothesis, confirmation *et cetera*, in their working vocabulary, an observation first noted by Smith (1977).

Nevertheless, abductive reasoning is undertaken to understand the archaeological record. Whenever a reasoned attempt is made to go beyond presenting an observational narrative of the properties of material

remains, as in this article, the result is an inference (Sullivan, 1978, p. 185). Although the original material under study was created in the past, the archaeological record is a contemporary phenomenon (Binford, 1968, p. 271); therefore, observations made on those materials are referenced to the present, as the Freudian interpretation mentioned previously demonstrates. Folklore is valuable here as it offers alternative ideas about the past that counter the biased tendency to portray everyone in all time as versions of ourselves (Gazin-Schwartz & Holtorf, 1999, p. 4). For example, the presence of prehistoric flint tools found in medieval stratigraphic contexts were, by referencing those objects to the present, assumed to be anachronistic intrusions. However, folklore provided a satisfactory, most likely, explanation as flints tools were earlier thought to be ‘thunder-bolts’ that resulted in the practice of placing them within roofs as a form of apotropaic magic against lightning-strikes (Gazin-Schwartz, 2001, p. 277–8).

‘This task of inferring knowledge about unobservable phenomena by reference to observable phenomena [as undertaken here] is not peculiar to archaeology, but characterizes science in general... Thus, the past may be unobservable, but that does not mean it is unknowable... The important question is whether or not the inferences can be supported.’ (Sullivan, 1978, p. 185)

The hypotheses proposed in this article for the function and intent of Holme I and II address the omissions, faults and modern biases of the alternative explanations. They offer a far greater balance of explanatory consolidation and scope from several lines of evidence. They link both monuments; are supported by biological and climatic evidence, archaeoastronomy and they are not falsified by horizon orientation data. There are indications of the continuity of social structure, religion and language from aDNA studies; the material record; a deity associated with Venus and the cuckoo, and the practice of sacrifice of her mortal consorts.

It is proposed that Holme I functioned to enclose an unfledged cuckoo, while Holme II enclosed the body of a sacral ‘king’ with a shared intent to end a well-confirmed, extensive period of harsh environmental conditions. They are the best explanations on the basis of the available information, and, in accordance with Lycan’s formulation of the Inference to

the Best Explanation, are probably true. Therefore, to reject these complementary best-explanations for both monuments as the most probable, without more cogent counterarguments, indicates a misunderstanding or ignorance of abductive reasoning and scientific methodology. If a preference is claimed for an inferior alternative explanation, or for no explanation at all expressed as the formal fallacy of personal incredulity, then the illogical theoretical position has been adopted that the fewer facts a hypothesis explains, the truer it is.

Conclusions

Holme I and II were constructed in 2049 BC, determined using dendrochronology (2048 BC astronomic time), by a society under stress during a proven, prolonged period of decreased atmospheric temperatures and severe winters/springs. The monuments had the common intention to end this existential threat but they had different functions. The inaugural components of Holme I were aligned with sunrise on the summer solstice when Venus remained visible symbolising a *hieros gamos* with the Sun and creating a period of ‘ritual-time’ when the inaugural components were erected. It was also the date when the cuckoo, symbolising fertility, traditionally stopped singing, returned to the Otherworld and the summer went with it. The monument’s form appears to imitate two supposed winter dwellings of the cuckoo remembered in folklore: a hollow tree or ‘the bowers of the Otherworld’ represented by the upturned oak-stump at its centre. It was recalled in folklore as the ‘myth of the pent cuckoo’ where an unfledged cuckoo placed in a thorn bush was walled-in with the intention of keeping the cuckoo singing and thereby retaining the summer.

Holme II was probably erected in the autumn of the same year. A sacred enclosure to contain the body of a warrior, a champion of a local goddess of fertility and sovereignty, associated with the cuckoo and the planet, Venus. He has similarities with the Late Iron Age sacral kings of Ireland and those in northern Britain who were titled ‘cuckoo’. The champion was deemed to have failed in his cosmic responsibility to maintain the fertility of the land and its peoples sacrificed to the goddess, in the hope that she would end the cold spell. He was probably sacrificed at Samhain, his bier orientated with sunrise on that date when Venus was still visible. In

support of this hypothesis, a number of Bronze and Iron Age European goddesses associated with the cuckoo, Venus and a mortal consort appear to be descended from a Neolithic archetype. One such British goddess is remembered in a legend from Calanais and dated using archaeoastronomy to the EBA. Both hypotheses are further supported by utilising environmental data from the location, results of aDNA studies, astronomic and biological evidence, regional folklore, place-name studies and an ethnographic analogy with indigenous Late Iron Age practices that indirect evidence from archaeoastronomy strongly suggests were undertaken in EBA Britain.

The study has affirmed the importance of an interdisciplinary approach that includes folklore and archaeoastronomy in the interpretation of function and intent of prehistoric monuments. It has provided possible insights into the cosmology, religion and reasoning of EBA societies. It may also aid interpretations of other contemporary, small timber-circles, both as cuckoo-pens and as mortuary monuments for ritually-murdered sacrifices. Additionally, other locations recorded as ‘cuckoo-pen’ might also have had similar structures erected warranting further study and other cuckoo stones may also prove to be constituents of ritual landscapes. Investigations of astronomic orientations with maximum setting points of Venus or the setting sun on Samhain might indicate that they were also used for similar purposes.

Funding There are no sources of funding.

Declarations

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors.

Conflicts of interest There are no potential conflicts of interest.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

- Aldhouse-Green, M. (2001). *Dying for the Gods*. The History Press.
- Anthony, D. W. (2007). *The Horse, the Wheel, and Language: How Bronze-Age Riders from the Eurasian Steppes Shaped the Modern World*. Princeton University Press.
- Armit, I., & Reich, D. (2021). The return of the Beaker folk? Rethinking migration and population change in British prehistory. *Antiquity*, 95(384), 1464–1477. <https://doi.org/10.15184/aqy.2021.129>
- Armstrong, E. A. (1958). *The Folklore of Birds: An Enquiry into the Origin and Distribution of some Magico-Religious Traditions*. Collins.
- Ashmore, P. J. (2016). *Calanais Survey and Excavation 1979–88*. Historic Environment Scotland.
- Baillie, M.G.L. & McAneney, J. (2015). Why we shouldn't ignore the mid-24th century BC when discussing the 2200–2000 BC climate anomaly. Conference: 7th Archaeological Conference of Central Germany October 23–26, 2014 in Halle (Saale) At: Halle (Saale), Germany Volume: 2200 BC – A climatic breakdown as a cause for the collapse of the Old World? Vol. 2 pp. 833–844. <https://doi.org/10.13140/RG.2.1.2657.8324>.
- Balick, M. J., Harrison, K. D., Kelso, N., et al. (2023). Weather Magic as Environmental Knowledge in Southern Vanuatu. *Journal of Ethnobiology*, 42(4), 383–399. <https://doi.org/10.2993/0278-0771-42.4.383>
- Barclay, G. J. (2005). The henge and hengiform in Scotland. In V. Cummings & S. Pannett (Eds.), *Set in stone: new approaches to Neolithic monuments in Scotland*. Oxford: Oxbow.
- Baring-Gould, S. (1914). *The Lives of the Saints*. John Grant.
- Beekes, R. S. P. (2009). Etymological Dictionary of Greek. In A. Lubotsky (Ed.), *Leiden Indo-European Etymological Dictionary Series*. Brill.
- Bentley, R. A., & Maschner, H. D. G. (2005). Introduction: On Archaeological Theories. In R. A. Bentley, H. D. G. Maschner, & C. Chippindale (Eds.), *Handbook of Archaeological Theories*. AltaMira Press.
- Binford, L. R. (1968). Some comments on historical versus processual archaeology. *Southwestern Journal of Anthropology*, 24, 267–275.
- Bini, M., Zanchetta, G., Perşoiu, A., Cartier, R., et al. (2019). The 4.2 ka BP Event in the Mediterranean region: An overview. *Climate of the past*, 15, 555–577. <https://doi.org/10.5194/cp-15-555-2019>
- Boev, Z. (2018). Birds in everyday life and art in Bulgaria (Thracian and Roman periods). *Historia Naturalis Bulgarica*, 27, 3–39.
- Bomhard, A. (2019). The origins of proto-indo-european: The caucasian substrate hypothesis 1. *Journal of Indo-European Studies*, 47(1–2), 1–67.
- Bond, G., Kromer, B., Beer, J., et al. (2001). Persistent solar influence on North Atlantic climate during the Holocene. *Science*, 294, 2130–2136. <https://doi.org/10.1126/science.1065680>
- Booth, T., & Brück, J. (2020). Death is not the end: Radiocarbon and histo-taphonomic evidence for the curation and excarnation of human remains in Bronze Age

- Britain. *Antiquity*, 94(377), 1186–1203. <https://doi.org/10.15184/aqy.2020.152>
- Bradley, R. (1991). Ritual, time and history. *World Archaeology*, 23(2), 209–219.
- Bradley, R. (1998). *The Significance of Monuments*. Routledge.
- Bradley, R. (2007). *The Prehistory of Britain and Ireland*. Cambridge University Press.
- Braun, P. (2004). Processes of stratification and state formation in Europe. In N. Matsumoto (Ed.), *Cultural Diversity and the archaeology of the 21st Century* (pp. 110–121). Society of Archaeological Studies.
- Brennand, M., & Taylor, M. (2003). The Survey and Excavation of a Bronze Age Timber Circle at Holme-next-the-Sea, Norfolk, 1998–9. *Proceedings of the Prehistoric Society*, 69, 1–84. <https://doi.org/10.1017/S0079497X00001250>
- Brück, J. (1999). Houses, lifecycles and deposition on middle bronze age settlements in southern england. *Proceedings of the Prehistoric Society* 65, 1–22.
- Burkert, W. (1983). *Homo Necans: The Anthropology of Ancient Greek Sacrificial Ritual and Myth*. University of California. Bing, P. trans.
- Burl, H. A. W. (1983). *Prehistoric Astronomy*. Shire.
- Campbell, J. (2013). *Goddesses: Mysteries of the Feminine Divine*. In S. Rossi (Ed.), Novato, CA: Joseph Campbell Foundation; New World Library.
- Cassidy, L. M., Martiniano, R., Murphy, E. M., et al. (2016). Neolithic and Bronze Age migration to Ireland and establishment of the insular Atlantic genome. *Proceedings of the National Academy of Sciences*, 113(2), 368–373. <https://doi.org/10.1073/pnas.1518445113>
- Clarke, D. (1999). *The head cult: tradition and folklore surrounding the symbol of the severed human head in the British Isles*. PhD thesis, University of Sheffield.
- Coolidge, F. L., Overmann, K. A., & Wynn, T. (2023). On the problem of the interpretation of symbols and symbolism in archaeology. In T. Wynn, K. A. Overmann, & F. L. Coolidge (Eds.), *The Oxford handbook of cognitive archaeology* (pp. 299–315). Oxford University Press.
- Crawford, J. M. (1910). *The Kalevala*. Robert Blake.
- Cross, T. P., & Slover, C. H. (1936). *The Boyhood Deeds of Fionn*. In *Ancient Irish Tales* (pp. 360–369). New York: Henry Holt. eds and trans.
- Cumont, D. (1897). Les actes de St. Dasius, *Analecta Bollandiana* 16, 5–16. <https://doi.org/10.1484/J.ABOL.4.03302>
- Cunliffe, B. (1997). *The Ancient Celts*. Oxford University Press.
- Cunliffe, B. (2001). *Facing the Ocean: The Atlantic and its peoples 8000 BC–AD 1500*. Oxford University Press.
- d’Huy, J. (2013). A Cosmic Hunt in the Berber sky: A phylogenetic reconstruction of a Palaeolithic mythology. *Les Cahiers De l’AARS*, 16, 93–106.
- Dalton, G. F. (1970). The Ritual Killing of the Irish Kings. *Folklore*, 81(1), 1–22. <https://doi.org/10.1080/0015587X.1970.9716657>
- Dalton, G. F. (1972). Kings dying on Tuesday. *Folklore*, 83(3), 220–224.
- Danaher, K. (1972). *The year in Ireland*. Mercier Press.
- Davidson, H. E. (1993). *Boundaries and Thresholds*. Thimble Press for The Katharine Briggs Club. ISBN 9780903355414.
- de Gubernatis, A. (1872). *Zoological Mythology or the Legends of Animals* (Vol. 2). Trübner.
- De Kay, C. (1898). *Bird Gods*. Barnes.
- Delamarre, X. (2003). *Dictionnaire de la langue gauloise: une approche linguistique du vieux-celtique continental*. Paris: Errance.
- Dellsén, F. (2020). Explanatory Consolidation: From ‘Best’ to ‘Good Enough.’ *Philosophy and Phenomenological Research*, 103(1), 157–177. <https://doi.org/10.1111/phpr.12706>
- deMenocal, P. B. (2001). Cultural Responses to Climate Change During the Late Holocene. *Science*, 292(5517), 667–673. <https://doi.org/10.1126/science.1059827>
- Dexter, M. R. (2006). The Roots of Indo-European Patriarchy: Indo-European Female Figures and the Principles of Energy. In C. Biaggi (Ed.) *The Rule of Mars: Readings on the Origins, History and Impact of Patriarchy*. Manchester CT: Knowledge, Ideas & Trends, Inc, 143–154.
- Dulias, K., Foody, M. G. B., Justeau, P., et al. (2022). Ancient DNA at the edge of the world: Continental immigration and the persistence of Neolithic male lineages in Bronze Age Orkney. *Proceedings of the National Academy of Sciences*, 119(8), 1. <https://doi.org/10.1073/pnas.2108001119>
- Dunn, J. (1914). *The ancient Irish epic tale Táin bó cúalnge, ‘The cualnge cattle-raid.’* David Nutt.
- Edzardi, A. (1880). *Volsunga- und Ragnars-Saga nebst der Geschichte von Nornagest*. A. Heitz.
- Egeler, M. (2012). Some thoughts on: ‘Goddess Medb’ and her typological context. *Zeitschrift Für Celtische Philologie*, 59, 67–96.
- Eisenstadt, T. A., & Jones West, K. (2017). Indigenous Belief Systems, Science, and Resource Extraction. *Global Environmental Politics*, 17(1), 40–58.
- Escacena Carrasco, J. L. (2010). El Carambolo y la construcción de la arqueología tertésica. In M. L. de la Bandera & E. Ferrer (Eds.), *El Carambolo. 50 años de un Tesoro*. Universidad de Sevilla.
- Escacena Carrasco, J. L. (2015). Orientation of Phoenician Temples. In C. L. N. Ruggles (Ed.), *Handbook of Archaeoastronomy and Ethnoastronomy*. Springer.
- Fahlander, F. (2018). The Relational Life of Trees. Ontological Aspects of “Tree-Ness” in the Early Bronze Age of Northern Europe. *Open Archaeology*, 4, 373–385. <https://doi.org/10.1515/opar-2018-0024>
- Field, J. E. (1913). *The Myth of the Pent Cuckoo*. Elliot Stock.
- Field, J. (1993). *A History of English Field Names*. Longman.
- Fitzpatrick, A. P. (2015). *Great Britain and Ireland in 2200 BC*. University of Leicester. Conference contribution. <https://hdl.handle.net/2381/32991>
- Fogelin, L. (2007). Inference to the best explanation: A common and effective form of archaeological reasoning. *American Antiquity*, 72(4), 603–625.
- Forbes, A. R. (1905). *Gaelic names of beasts (mammalia), birds, fishes, insects, reptiles, etc.* Oliver and Boyd.
- Fraser, J. E. (2009). *From Caledonia to Pictland: Scotland to 795*. Edinburgh University Press.
- Frazer, J. G. (1922). *The Golden Bough*. Macmillan.
- Gallay, A. (2001) *L’énigme campaniforme*. In *Bell Beakers Today. Pottery, People, Culture, Symbols in Prehistoric Europe: proceedings of the international colloquium*,

- Riva del Garda (Trento, Italy)*. Trento: Servizio Beni culturali della Provincia Autonoma di Trento
- Gazin-Schwartz, A. (2001). Archaeology and Folklore of Material Culture, Ritual, and Everyday Life. *International Journal of Historical Archaeology*, 5(4), 263–280.
- Gazin-Schwartz, A. (2011). Myth and Folklore. In T. Insoll (Ed.), *Oxford Handbook on the Archaeology of Ritual and Religion*. Oxford University Press.
- Gazin-Schwartz, A., & Holtorf, C. J. (1999). 'As long as ever I've known it ...': On folklore and archaeology. In A. Gazin-Schwartz & C. J. Holtorf (Eds.), *Archaeology and Folklore* (pp. 3–25). Routledge.
- Ghinoiu, I. (1995). Le Calendrier Populaire. *Ethnologie Française*, 3, 460–480.
- Gibbons, A. (1993). How the Akkadian Empire Was Hung Out to Dry. *Science*, 261(5124), 985. <https://doi.org/10.1126/science.261.5124.985>
- Gibson, A. (1994). Excavations at the Sarn-y-bryn-caled cursus complex, Welshpool, Powys, and the timber circles of Great Britain and Ireland. *Proceedings of the Prehistoric Society*, 60, 143–223.
- Gibson, A. (2005). *Stonehenge and Timber Circles*. Tempus.
- Gimbutas, M. (1989). *The Language of the Goddess*. Thames and Hudson.
- Gimbutas, M. (2001). *The Living Goddesses*. University of California Press.
- Ginnell, L. (1894). *The Brehon-Laws: A Legal Handbook*. Fisher Unwin.
- Glue, D., & Morgan, R. (1972). Cuckoo Hosts in British Habitats. *Bird Study*, 19(4), 187–192. <https://doi.org/10.1080/00063657209476342>
- Šprajc, I. (2015). Alignments upon Venus (and Other Planets) - Identification and Analysis. In C. L. N. Ruggles (Ed.), *Handbook of Archaeoastronomy and Ethnoastronomy*. Springer.
- Graça da Silva, S., & Tehrani, J. J. (2016). Comparative phylogenetic analyses uncover the ancient roots of Indo-European folktales. *Royal Society Open Science*, 3, 150645. <https://doi.org/10.1098/rsos.150645>
- Green, M. (1997). *Exploring the World of the Druids*. Thames and Hudson.
- Gregory, A. (1903). *Cuchulain of Muirthemne*. Charles Scribner.
- Gregory, A. (1908). *Gods and Fighting Men: The story of the Tuatha de Danaan and of the Fianna of Ireland*. John Murray.
- Grigsby, J. (2019). *Skyscapes, landscapes, and the drama of Proto-Indo-European myth*. (Ph.D. thesis) Bournemouth University. Available online: <https://www.eprints.bournemouth.ac.uk/32226/>. Accessed 7 Jun 2023
- Grimm, J. (1883). *Teutonic Mythology IV*. Bell.
- Groves, C. (2002). *Dendrochronological analysis of a timber circle at Holme-next-the-sea, Norfolk* Centre for Archaeology Reports 6/2002. English Heritage.
- Guerber, H. A. (1895). *Myths of the Northern Lands*. American Book Company.
- Guthrie, W. K. C. (1950). *The Greeks and Their Gods*. Beacon Press.
- Haak, W., Lazaridis, I., Patterson, N., et al. (2015). Massive migration from the steppe was a source for Indo-European languages in Europe. *Nature*, 522, 207–211. <https://doi.org/10.1038/nature14317>
- Haeussler, R. (2010). From tomb to temple. On the rôle of hero cults in local religions in Gaul and Britain in the Iron Age and the Roman period. In Arenas-Esteban, J. A. (Ed.), *Celtic religion across space and time* (IX. Workshop F.E.R.C.A.N. [Fontes Epigraphici Religionum Celticarum Antiquarum], Molina de Aragón, 17.–20. September 2008), Toledo, 201–226.
- Hardy, J. (1879). Popular History of the Cuckoo. *The Folk-Lore Record*, 2, 47–91.
- Harman, G. (1965). The Inference to the Best Explanation. *The Philosophical Review*, 74, 88–95.
- Harte, J. (1986). *Cuckoo pounds and singing barrows: the folklore of ancient sites in Dorset*. Dorset Natural History and Archaeological Society. ISBN-13: 978-0900341236.
- Hassan, F. (1994). Population Ecology and Civilization in Ancient Egypt. In C. L. Crumley (Ed.), *Historical Ecology: Cultural Knowledge and Changing Landscapes* (pp. 155–181). School of American Research Press.
- Henshaw, A. (2003). Climate and Culture in the North: The Interface of Archaeology, Paleoenvironmental Science, and Oral History. In S. Strauss & B. Orlove (Eds.), *Weather, Climate, Culture* (pp. 217–232). Berg.
- Henty, E. (2016). Skyscape Archaeology: an emerging interdisciplinary for archaeoastronomers and archaeologists. *Journal of Physics: Conference Series*, 685, 012003. <https://doi.org/10.1088/1742-6596/685/1/012003>
- Hicks, R. (1985). Astronomical traditions in ancient Ireland and Britain. *Archaeoastronomy*, 8, 70–79.
- Hicks, R. (2011). The Sacred Landscape of Ancient Ireland. *Archaeology*, 64(3), 40–45.
- Hicks, R., & Elder, L. W. (2003). Festivals, Deaths, and the Sacred Landscape of Ancient Ireland. *Journal of Indo-European Studies*, 31, 307–335.
- Hooke, D. (2014). Christianity and the Sacred Tree. In M. D. J. Bintley & M. G. Shapland (Eds.), *Trees and timber in the Anglo-Saxon world* (pp. 228–258). OUP.
- Hutchinson-Hall, J. (2017). *Orthodox Saints of the British Isles 4*. CreateSpace. ISBN 9781542718226.
- Hutton, R. (1996). *Stations of the Sun: A History of the Ritual Year in Britain*. University Press. ISBN 0-19-288045-4.
- Hutton, R. (2013). *Pagan Britain*. Yale University Press.
- Hutton, R. (2022). Liz Henty, Exploring Archaeoastronomy: A History of Its Relationship with Archaeology and Esotericism. *Journal of Skyscape Archaeology*, 8(2), 315–319.
- Ifans, D., & Ifans, R. (1980). *Y Mabinogion*. Lewis and Sons.
- Ingersoll, E. (1923). *Birds in Legend Fable and Folklore*. Longmans.
- Iversen, R., & Kroonen, G. (2017). Talking Neolithic: Linguistic and Archaeological Perspectives on How Indo-European Was Implemented in Southern Scandinavia. *American Journal of Archaeology*, 121(4), 511–525. <https://doi.org/10.3764/aja.121.4.0511>
- Keating, G. (1908). *History of Ireland*. Nutt.
- Kelley, D. H., & Milone, E. F. (2005). *Exploring Ancient Skies: A Survey of Ancient and Cultural Astronomy*. Springer.
- Kelly, E. P. (2022). Hic Sunt Dracones (Here Be Dragons): Áine's Fiery Form. *Irish Lives Remembered*, 59, 2–13.
- Kinsella, T. (1969). *The Táin*. Oxford University Press. ISBN 0-19-281090-1.

- Koch, J. T. (2006). *Celtic Culture: A Historical Encyclopedia. ABC-CLIO, 2006*, 1671.
- Kosickia, J. Z., & Hromada, M. (2018). Cuckoo density as a predictor of functional and phylogenetic species richness in the predictive modelling approach: Extension of Tryjanowski and Morelli (2015) paradigm in the analytical context. *Ecological Indicators*, 88, 384–392.
- Kramer, S. N. (1963). *The Sumerians, their History, Culture, and Character*. University of Chicago Press.
- Kramer, S. N. (1969). *The Sacred Marriage: Aspects of Faith, Myth and Ritual in Ancient Sumer*. Indiana University.
- Kristiansen, K., Allentoft, M., Frei, K., et al. (2017). Re-theorising mobility and the formation of culture and language among the Corded Ware Culture in Europe. *Antiquity*, 91(356), 334–347. <https://doi.org/10.15184/aqy.2017.17>
- Kuniholm, P. I. (1993). In M. J. Mellink, T. Ozguc, & E. Porada (Eds.), *Aspects of Art and Iconography: Anatolia and its Neighbors* (pp. 371–374). Turkish Historical Society, Ankara.
- Kuntsman, J. G. (1938). *The Hoopoe, a study in European folklore*. PhD thesis. University of Chicago. https://archive.org/stream/hoopoestudyineur00kunsuoft/hoopoestudyineur00kunsuoft_djvu.txt.
- Lai, C. M. (1998). Messenger of Spring and Morality: Cuckoo Lore in Chinese Sources. *Journal of the American Oriental Society*, 118(4), 530–542.
- Lincoln, B. (1975). The Indo-European Myth of Creation. *History of Religions*, 15(2), 121–145.
- Lycan, W. G. (2002). Explanation and Epistemology. In P. Moser (Ed.), *The Oxford Handbook of Epistemology*. Oxford University Press.
- Mac Cana, P. (1979). Regnum and Sacerdotium: Notes on Irish Tradition. *Proceedings of the British Academy*, 65, 443–479.
- Mac Cana, P. (1983). *Celtic Mythology* (2nd ed.). Littlehampton Book Services.
- Macalister, R. A. S. (1917). Temair Breg, a Study of the Remains and Traditions of Tara. *Proceedings of the Royal Irish Academy*, 34, 231–399.
- Macdonald, T. D. (1926). *Gaelic proverbs and proverbial sayings with English translations*. Jamieson and Munro.
- MacKillop, J. (1998). *Dictionary of Celtic mythology*. Oxford University Press. ISBN 978-0-19-280120-3.
- Maclean, A. (1937). *Hebridean Altars: The Spirit of an Island Race*. Hodder and Stoughton.
- MacNeill, E. (1919). *Phases of Irish History*. Kennikat Press.
- Madgwick, R., Grimes, V., Lamb, A. L., et al. (2019). Feasting and Mobility in Iron Age Ireland: Multi-isotope analysis reveals the vast catchment of Navan Fort. *Ulster. Science Advances*, 5(3), 19792. <https://doi.org/10.1126/sciadv.aau6078>
- Maier, B. (1989). Sacral Kingship in Pre-Christian Ireland. *Zeitschrift Für Religions- Und Geistesgeschichte*, 41(1), 12–32.
- Mallory, J. P. (2013). *The Origins of the Irish*. Thames and Hudson.
- Malville, J. M. (2015). Meaning and Intent in Ancient Skyscapes – An Andean Perspective. In F. Silva & N. Campion (Eds.), *Skyscapes. The Role and Importance of the Sky in Archaeology*. Oxbow.
- Marcovich, M. (1996). From Ishtar to Aphrodite. *Journal of Aesthetic Education*, 30(2), 43–59. Special Issue. Distinguished Humanities Lectures II.
- Margaryan, A., Lawson, D. J., Sikora, M., et al. (2020). Population genomics of the Viking world. *Nature*, 585, 390–396. <https://doi.org/10.1038/s41586-020-2688-8>
- Mason, C. E., & Lyczynski, F. (1980). The breeding biology of the Pied and Yellow Wagtails. *Bird Study*, 27, 1–10.
- Matthews, J. (1990). *Gawain: Knight of the Goddess. Restoring an Archetype*. The Aquarian Press.
- Mayewski, P. A., Rohling, E. E., Stager, J. C., Karlén, W., et al. (2004). Holocene climate variability. *Quaternary Research*, 62, 243–255. <https://doi.org/10.1016/j.yqres.2004.07.001>
- McDermott, M. (2009). *The Imprint Accipiter II: including tame hacking*. Western Sporting.
- McFadden, J. (2023). Razor sharp: The role of Occam’s razor in science. *Annals of the New York Academy of Sciences*, 1530, 8–17. <https://doi.org/10.1111/nyas.15086>
- McNeill, F. M. (1956). *The Silver Bough*. William MacLellan.
- Méchin, C. (2000). Du bon usage du coucou en hiver: Sémiotique calendaire de Cuculus canorus L. *Anthropozoologica*, 32, 23–31.
- Meehan, C. (2002). *The Traveller’s Guide to Sacred Ireland: A Guide to the Sacred Places of Ireland, Her Legends, Folklore and People*. Gothic Image Publications.
- Meyer, K. (1897). The Cherishing of Conall Cernach and the Deaths of Ailill and of Conall Cernach. *Zeitschrift Für Celtische Philologie*, 1, 102–111.
- Meyer, K. (1910). *Fianaigecht, being a Collection of Hitherto Unedited Irish Poems and Tales Relating to Finn and his Fiana, with an English Translation*. London : Williams & Norgate.
- Monaghan, P. (2004). *The Encyclopedia of Celtic Mythology and Folklore*. Facts on File.
- Motz, L. (1982). Freyja, Anat, Ishtar and Inanna: Some Cross-Cultural Comparisons. *Mankind Quarterly*, 23, 195–212.
- Muniz, A. (2010). *The Survival of the Neolithic Goddess in Polish Folklore, Myth, and Tradition*. PhD thesis, Institute of Transpersonal Psychology.
- Nance, D. A. (2019a). Plate f of the Gundestrup “cauldron”: symbols of spring and fertility. *Anthropozoologica*, 54(14), 141–150. <http://anthropozoologica.com/54/14>.
- Nance, D. A. (2019b). Gouk Stones and other Cuckoo place-names: Prehistoric Cult Sites. *Scottish Geographical Journal*, 135(1–2), 98–122. <https://doi.org/10.1080/14702541.2019.1635265>
- Nance, D. A. (2021a). A Calanais myth and an alignment of the east stone-row with both the rising of the Pleiades and crossovers of Venus at sunrise on the summer solstices. *Scottish Geographical Journal*, 137(1–4), 41–66. <https://www.tandfonline.com/doi/full/10.1080/14702541.2021.1905871>.
- Nance, D. A. (2021b). An investigation of an Aberdeenshire ritual landscape: A site of human sacrifice associated with Venus. *Scottish Geographical Journal*, 37(1–4), 173–209. <https://doi.org/10.1080/14702541.2021.2013521>
- Nance, D. A. (2022). Sacred kings of the Picts: The last cuckoos. *Scottish Geographical Journal*, 138(3–4), 271–290. <https://doi.org/10.1080/14702541.2022.2120628>

- Nansen, F. (1911). *In Northern Mists Arctic exploration in early times*. London: W. Heinemann.
- Nunn, P. (2022). *First a wudd, and syne a sea*: Postglacial coastal change of Scotland recalled in ancient stories. *Scottish Geographical Journal*, 138(1–2), 73–102. <https://doi.org/10.1080/14702541.2022.2110610>
- Ó cróinín, D. (1995). *Early Medieval Ireland 400–1200*. Longman.
- O’Brien, J. V. (1993). *The Transformation of Hera: A Study of Ritual, Hero, and the Goddess in the Iliad*. *Greek Studies: Interdisciplinary Approaches*. Rowman and Littlefield.
- O’Rahilly, C. (1976). *Táin Bó Cúailnge Recension 1*. Dublin Institute for Advanced Studies. <http://celt.ucc.ie/publicshed/G301012/index.html>.
- ÓhÓgáin, D. (1990). *Myth Legend and Romance - an Encyclopaedia of the Irish Folk Tradition*. Ryan Publishing.
- O’Keefe, J. G. (1913). *Buile Suibhne. (The Frenzy of Suibhne) Being the Adventures of Subhne Geilt, A Middle Irish Romance*. D. Nutt.
- Olalde, I., Brace, S., Allentoft, M., et al. (2018). The Beaker phenomenon and the genomic transformation of north-west Europe. *Nature*, 555, 190–196.
- Olmsted, G.S. (2019). *Gods of Celts and Indo-Europeans Revised Edition*. Innsbruck: Innsbrucker Beitrage.
- Olson, S. L. (1983). Evidence for a polyphyletic origin of the Piciformes. *The Auk*, 100, 126–133.
- Paphitis, T. (2014). *The Place of Folklore in Archaeological Landscapes Narratives and Identity in Medieval to Modern Britain*. PhD thesis, University College London.
- Parker Pearson, M., Pollard, J., Richards, C., Thomas, J., Tilley, C. & Welham, K. (2020). *Stonehenge for the Ancestors part 1: landscape and monuments*. Leiden: Sidestone Press.
- Petrović, L. (2000). Gawain: Transformations of an Archetype. *Facta Universitatis, Linguistics and Literature*, 2(7), 129–150.
- Pokorny, J. (1909). Der Ursprung der Arthursage. *Mitteilungen Der Anthropologischen Gesellschaft*, 39, 89–119.
- Polcaro, V. F. (2016). The credibility of archaeoastronomy: A suggestion from pharmacology? *Mediterranean Archaeology and Archaeometry*, 16(4), 1–5.
- Polcaro, A., & Polcaro, V. F. (2009). Man and Sky: Problems and Methods of Archaeoastronomy. *Archeologia e Calcolatori*, 20, 223–245.
- Popper, K. R. (1959). *The logic of scientific discovery*. Hutchinson and Co.
- Powell, T. G. E. (1958). *The Celts*. Thames and Hudson.
- Powell, B. B. (1995). *Classical myth*. Prentice Hall.
- Pryor, F. (2002). *Seahenge: A quest for life and death in Bronze Age Britain*. Harper Collins.
- Puckle, B. S. (1926). *Funeral Customs. Chapter IV: Wakes, Mutes, Wailers, Sin-Eating, Totemism, Death-Taxes*. Werner Laurie.
- Ramnoux, C. (1954). La mort sacrificielle du roi. Ogam. Tradition celtique 6, 209–18.
- Rawes, B. G. (1978). The Field-Name Cuckoo-pen in Gloucestershire. *Glevensis*, 11, 35–38.
- Reich, D. (2018). *Who We Are and How We Got Here: Ancient DNA and the new science of the human past*. Oxford University Press. ISBN 978-0-19-255438-3.
- Rhys, J. (1901). *Studies in the Arthurian Legend*. Kessinger Publishing.
- Robertson, D. Taylor, M., Tyers, I., Cook, G., & Hamilton, W.D. (2016). A second timber circle, trackways, and coppicing at holme-next-the-sea beach, norfolk: use of salt- and freshwater marshes in the bronze age. *Proceedings of the Prehistoric Society* 82, 227–258. <https://doi.org/10.1017/ppr.2016.3>
- Roland, T. P., Caseldine, C. J., Charman, D. J., Turney, C. S. M., & Amesbury, M. J. (2014). Was there a ‘4.2 ka event’ in Great Britain and Ireland? Evidence from the peatland record. *Quaternary Science Reviews*, 83, 11–27. <https://doi.org/10.1016/j.quascirev.2013.10.024>
- Rose, L. N. (1982). Breeding ecology of British pipits and their Cuckoo parasite. *Bird Study*, 29(1), 27–40. <https://doi.org/10.1080/00063658209476735>
- Ross, A. (1967). *Pagan Celtic Britain*. Constable.
- Ross, A., & Robins, D. (1989). *The Life and Death of a Druid Prince*. Summit Press.
- Ross, R. M., Greenhill, S. J., & Atkinson, Q. D. (2013). Population structure and cultural geography of a folktale in Europe. *Proceedings of the Royal Society B*. <https://doi.org/10.1098/rspb.2012.3065>
- Ross, A. (1957). The human head in insular pagan celtic religion. *Proceedings of the Society of Antiquaries of Scotland* 19, 10–43.
- Rowlett, R. M. (1993). North Gaulish Forms on the Gundestrup Cauldron. *Proceedings of the Harvard Celtic Colloquium*, 13, 166–182.
- Roziak, K. (2019). The Use of Diminutives by Speakers of Welsh. In Bloch-Trojnar M (Ed.), *Perspectives on Celtic Languages* (pp. 237–247). Wydawnictwo KUL.
- Ruggles, C. L. N. (Ed.). (1984). *Megalithic Astronomy A new archaeological and statistical study of 300 Western Scottish Sites* (p. 123). British Archaeological Reports.
- Ruggles, C. L. N. (1999). *Astronomy in Prehistoric Britain and Ireland*. Yale University Press.
- Salmon, M. H. (1976). Deductive’ versus ‘Inductive. *Archaeology. American Antiquity*, 41(3), 376–381. <https://doi.org/10.2307/279528>
- Scubla, L. (2005). Sacred King, Sacrificial Victim, Surrogate Victim or Frazer, Hocart, Girard. In D. Quigley (Ed.), *The Character of Kingship*. Oxford: Berg.
- Shule, J. (2021). *Forecast: A Diary of the Lost Seasons*. Bloomsbury Publishing.
- Silva, F. (2015). ‘Once Upon a Time...’: When prehistoric archaeology and folklore converge. *Journal for the Academic Study of Religion*, 28(2), 158–175. <https://doi.org/10.1558/jasr.v28i2.26595>
- Silva, F. (2020). A probabilistic framework and significance test for the analysis of structural orientations in skyscape archaeology. *Journal of Archaeological Science*, 118, 105138.
- Silva, M., Dulias, K., Oteo-Garcia, G., et al. (2019). Once upon a time in the West: The archaeogenetics of Celtic origins. In B. Cunliffe & J. T. Koch (Eds.), *Exploring Celtic Origins: New ways forward in archaeology, linguistics, and genetics* (pp. 153–191). Oxbow.
- Smith, B. D. (1977). Archaeological Inference and Inductive Confirmation. *American Anthropologist*, 79(3), 598–617.
- Šprajc, I. (2015). Alignments upon Venus (and Other Planets) - Identification and Analysis. In C. L. N. Ruggles (Ed.),

- Handbook of Archaeoastronomy and Ethnoastronomy*. Springer.
- Staubwasser, M., Sirocko, F., Grootes, P. M., & Segl, M. (2003). Climate change at the 4.2 ka BP termination of the Indus valley civilization and Holocene south Asian monsoon variability. *Geophysical Research Letters*, 30, 1425. <https://doi.org/10.1029/2002GL016822>
- Stevens, C. J., & Fuller, D. Q. (2015). Alternative strategies to agriculture: The evidence for climatic shocks and cereal declines during the British Neolithic and Bronze Age (a reply to Bishop). *World Archaeology*, 47(5), 856–875. <https://doi.org/10.1080/00438243.2015.1087330>
- Stokes, W. (1895). The Prose Tales of the Rennes dindſenchas. *Revue Celtique*, 16, 269–312.
- Sullivan, A. P. (1978). Inference and Evidence in Archaeology: A Discussion of the Conceptual Problems. *Advances in Archaeological Method and Theory*, 1, 183–222. <http://www.jstor.org/stable/20170133>.
- Swire, O. F. (1966). *The Outer Hebrides and their Legends*. Oliver and Boyd.
- The New Statistical Account of Scotland. (1845). XII: 167–174. William Blackwood.
- Thomas, R. J. (Ed.). (1976). *Geiriadur Prifysgol Cymru / A Dictionary of the Welsh Language*. University of Wales.
- Thomas, J. (2004). *Archaeology and Modernity*. London: Routledge.
- Thurneysen, R. (1933). Zur Göttin Medb. *Zeitschrift Für Celtische Philologie*, 19, 352–353.
- Tillhagen, C. H. (1978). *Fåglarna i folktron*. LTs förlag.
- Tyers, I. (2014). *Timber Circle II, Holme-next-the-Sea, Norfolk. Dendrochronological analysis of oak timbers. Research Report Series 26*. English Heritage.
- Waddell, J. (2018). Equine Cults and Celtic Goddesses. *Emania*, 24, 5–19.
- Watson, W. J. (1914). Ciuthach. *The Celtic Review*, 9(36), 193–209.
- Watson, W. J. (1926). *History of the Celtic Place-names of Scotland*. Blackwood.
- Watson, C. (2005). *Seahenge: an archaeological conundrum*. English Heritage. ISBN I 850748969.
- Welbergen, J. A., & Davies, N. B. (2011). A parasite in wolf's clothing: Hawk mimicry reduces mobbing of cuckoos by hosts. *Behavioural Ecology*, 22, 574–579. <https://doi.org/10.1093/beheco/arr008>
- Whitely, P. (2002). Archaeology and Oral Tradition: The Scientific Importance of Dialogue. *American Antiquity*, 67(3), 405–415.
- Wolkenstein, D., & Kramer, S. N. (1983). *Inanna, Queen of Heaven and Earth: Her Stories and Hymns from Sumer*. Harper and Row.
- Zhang, D. D., Lee, H. F., Wang, C., et al. (2011). The Causality Analysis of Climate Change and Large-Scale Human Crisis. *Proceedings of the National Academy of Sciences*, 108, 17296–17301.
- Zimmer, H. (1889). Keltische Beiträge II: Brendans Meerfahrt. *Zeitschrift Für Deutsches Alterthum Und Deutsche Literatur*, 33, 136–220.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.