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# An investigation of an Aberdeenshire ritual landscape: a site of human sacrifice associated with Venus

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## ABSTRACT

A group of intervisible prehistoric monuments delineate a ritual landscape of 10<sup>2</sup> kilometres near Hatton of Fintray, Aberdeenshire. They act as back and foresights on solar and lunar horizon rising and setting extremes when viewed one from another. The identities of the local deities, syncretised as parish saints, an ethnographic analogy with pre-Christian Irish chieftains and an oral tradition that one of the monuments, the Gouk Stone (Old English for 'cuckoo'), marks the location where a 'general' of that name was slain, support the hypothesis that local chieftains, titled after the bird and 'married' to the local goddess of sovereignty that personified Venus, were tied to the stone and ritually sacrificed. This occurred on the culturally significant day of *Samhain* at eight-year intervals from the Bronze Age until the late Iron Age. The interval coincided with the extreme evening setting of Venus at *Samhain*. In support of this hypothesis the stone acted as a horizon foresight for Venus setting extremes which occurred within a few days of *Samhain* and as a back sight with sunset behind a stone circle on *Samhain*. Place-names indicate the location remained an assembly/judicial site until the Medieval Period.

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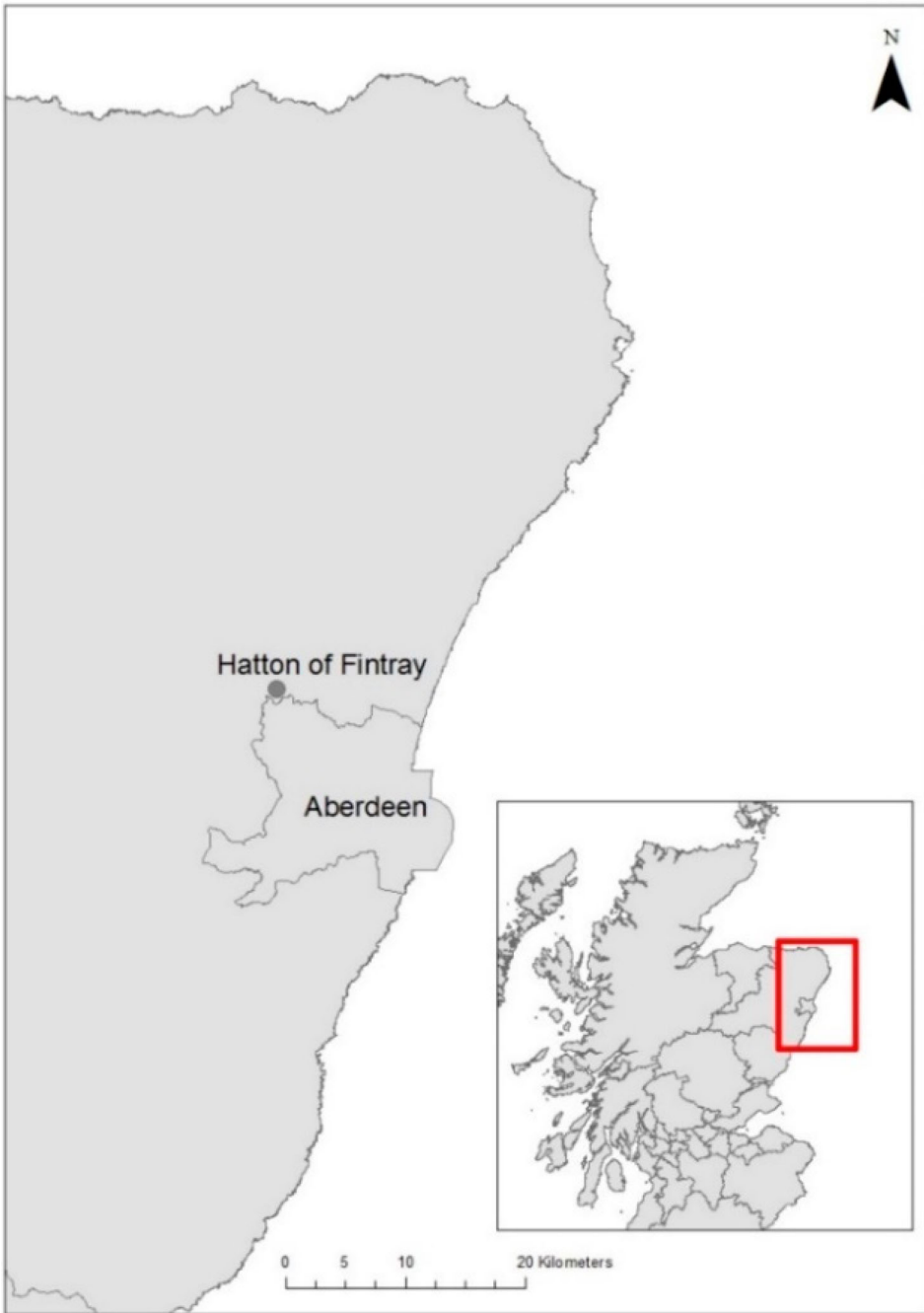
## Introduction

### General introduction

The study detailed in this paper had two objectives. First, to identify and define, using archaeoastronomy, a previously unrecognised, small ritual-landscape at Hatton of Fintray (Figure 1) in north-east Scotland. Second, to determine, using a multi-disciplinary approach, the probable intended functions and rituals undertaken there. They are combined in a single paper as the archaeoastronomy data are common to both. The study has also provided evidence of the religious beliefs of the society that constructed the monuments and a part played by its chieftains in its religion and governance. The location was a religious site where ritual-murders of chieftains associated with fertility and governance appear to have been undertaken from the early Bronze Age at least. Place-name evidence indicate that it retained its importance as a moot site into the medieval period.

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**Figure 1.** Location of Hatton of Fintray.

The study is significant as details regarding the governance and religion of Iron Age northern Britain are sparse. Textual sources north of the Firth of Forth are non-existent before the seventh century (Woolf, 2007; Fraser, 2009). Hence there are no texts that can be directly attributed to the northern tribes that were later referred to by the Romans in

the second century AD as the Picts. It is thought that Pictish society was typical of other northern European Iron Age societies with wide connections and parallels with neighbouring groups (Foster, 1998); the Picts were probably indistinguishable in their culture from the other tribes of Britain (Hutton, 1993, p. 149) and their pre-Christian religious beliefs would have followed those of other 'Celtic' peoples (Laing & Laing, 1993, p. 21).

The societies in late Iron Age northern Scotland appear to have been simple tribal chiefdoms. European societies from 2500 BC underwent major changes in social stratification from simple chiefdoms through complex chiefdoms to early states. Britain and Ireland were exceptions where simple chiefdoms existed from the early Bronze Age until the Roman Period in Britain (Braun, 2004). They had no form of kingship but were recorded as choosing their boldest warriors as non-hereditary chieftains (Cassius Dio, *Historia Romana* 77. 12; Cary, 1914). These simple chiefdoms still existed in northern Britain during the early Medieval Period when kingdoms of the Picts and the Gaels were being formed (Fraser, 2009, p. 124) and also remained preserved into the medieval period in Ireland (MacCana, 1979, p. 445). Settlement archaeology has also suggested that these Iron Age societies in northern Scotland were 'flat', without elites, so-called 'farmer republics' (Fraser, 2009, p. 34).

### ***Ritual landscapes and sacred places***

The terms ritual, sacred and ceremonial landscapes originally described concentrations of undefended funerary, ceremonial and non-utilitarian monuments constructed in Britain in the Neolithic (4000–2500 BC) and early Bronze Age (2500–1500 BC) where the evidence for contemporary settlement is often sparse or absent (Robb, 1998, p. 159). The term has since been applied to similar landscapes world-wide. They are thought to have gone out of use between 1800 and 1500 BC (Robb, 1998, p. 161; Prior, 2015) when ritual practice is believed to have changed (Cunliffe, 1993). They were replaced by smaller shrines located near rivers, marshes and springs that continued into the Roman Period (Prior, 2015). This generalisation cannot be universally applied to the British Isles; for example, the extensive Neolithic ritual landscape around Croagh Patrick, County Mayo, amongst others, has continued in use as a Christian ritual landscape (Corlett, 1998, p. 10). Ritual landscapes in Britain and Ireland include Avebury, Stonehenge (Robb, 1998), Orkney, Calanais (Ashmore, 2016) and the Boyne valley. They contain large monuments and avenues and have been identified, and their extents defined, using the criteria of circumscription, clustering, exclusivity (segregation of ritual and domestic space), linkage in space and time (Robb, 1998) and through inter-visibility (Cooney, 1990). Smaller ritual landscapes composed of groups of less grandiose monuments have been subjected to much less scholarly attention and analysis.

Prehistoric landscapes are thought to have been imbued with cosmology, ritual and religion, where the sacred and profane were closely intertwined and almost impossible to separate (Sahlqvist, 2001, p. 79). Hence, ritual landscapes contain sacred features, defined as connected with supernatural beings or dedicated to a religious purpose, which may refer to a natural feature or area of land or water having special spiritual significance to people or communities (Oviedo & Jeanrenaud, 2007). Early textual sources record that the sacred geography of the Iron Age Celtic-speaking peoples included

mountains, springs, bogs, groves, rivers and lakes (Cunliffe, 1997, p. 198), individual trees and rocks (Dowden, 2000, p. 43), hills, islands and valleys, suggesting that features within the landscape would have been deemed significant prior to monuments being erected. Some place-names named after the common cuckoo (*Cuculus canorus* Linnaeus, 1758) are statistically significantly associated with similar features (Nance, 2019a). Some are thought to be remnant pre-Christian sacred groves (Field, 1993) or cult-sites, implying an association with deities, that were linked to seasonal rituals (Field, 1913; Rawes, 1977).

### **Cuckoo place-names**

There are over 130 place-names in the Ordnance Survey gazetteer named after the cuckoo in Gaelic, Brittonic and English, including standing stones (hereafter referred to as cuckoo-stones). Many appear to be associated with the cuckoo in some symbolic sense rather than directly (Nance, 2019a). These place-names, in the three languages, have common geographic features that are statistically significantly different to those around both randomly selected locations and randomly selected standing stones, although there are no statistically significant differences between these features around cuckoo-stones and other cuckoo place-names other than with bodies of standing water (discussed below) (Nance, 2019a). This strongly suggested that some locations have been associated with the bird since the cuckoo-stones were erected and the association survived subsequent cultural and language transitions.

The associated features include a wide strath with an adjoining narrow deep-valley, a spur or promontory, proximity to running water, waterfalls and springs. Additionally, some cuckoo place-names are associated with Roman structures, an observation first made by Field (1913). The number of first century Roman forts and roads within five kilometres of cuckoo place-names were statistically significant when compared to those within the same distance of random locations. This finding was confirmed by GIS geoprocessing suggesting that these locations were still cult centres when the Romans arrived and were targeted for some reason(s) during the conquest phase (Nance, 2019a). These associated features suggested that some cuckoo place-names, in addition to being cult-sites, were components of larger ritual landscapes.

The Gouk Stone (NJ 8344 1516; Historic Environment Scotland's Canmore database ID 19481) near Hatton of Fintray is a three-metre-tall, granite standing stone. It is also a cuckoo place name (Figure 2), as gouk is Old English for the cuckoo. The stone is located near the cultural and geographic features listed above, less waterfall. It is intervisible with five other monuments and appears to be a component of a ritual landscape.

### **The monuments around Hatton of Fintray, Aberdeenshire**

The area alongside the River Don has the characteristics for localised ritual landscapes. It has a comparatively high density of Neolithic and Bronze Age monuments while vestiges of settlements are few and the prehistoric landscape is largely of burial and ritual (Gannon et al., 2007). Hatton of Fintray, a village on the north side of the river that runs west to east (Figure 3(a)), has six intervisible monuments, or their locations, nearby (Figure 3(b)). They are both north and south of the river and a distant monument to the east, Braedale Cairn, intervisible with only three others.

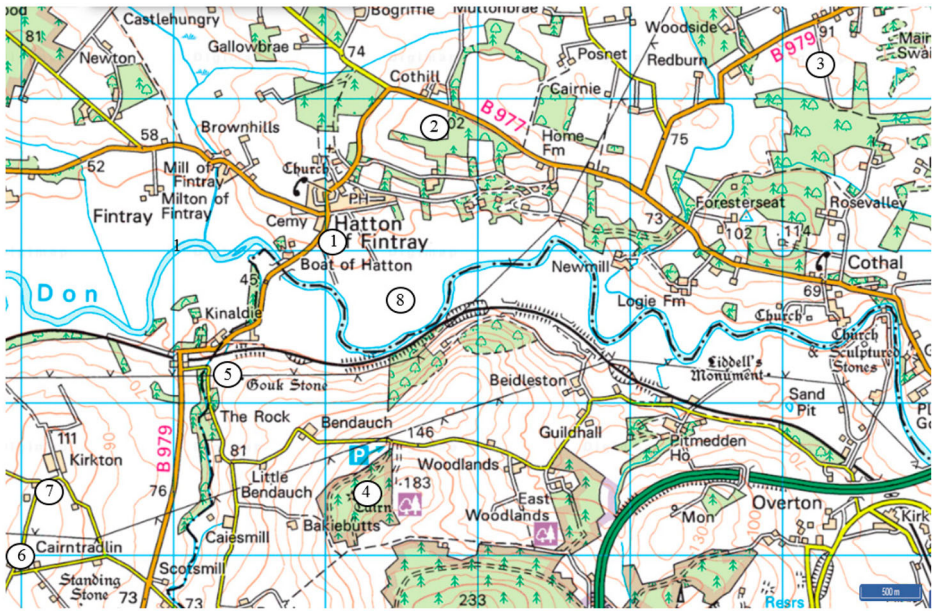


**Figure 2.** The Gouk Stone. Looking north across the strath of the River Don towards the village of Hatton of Fintray.

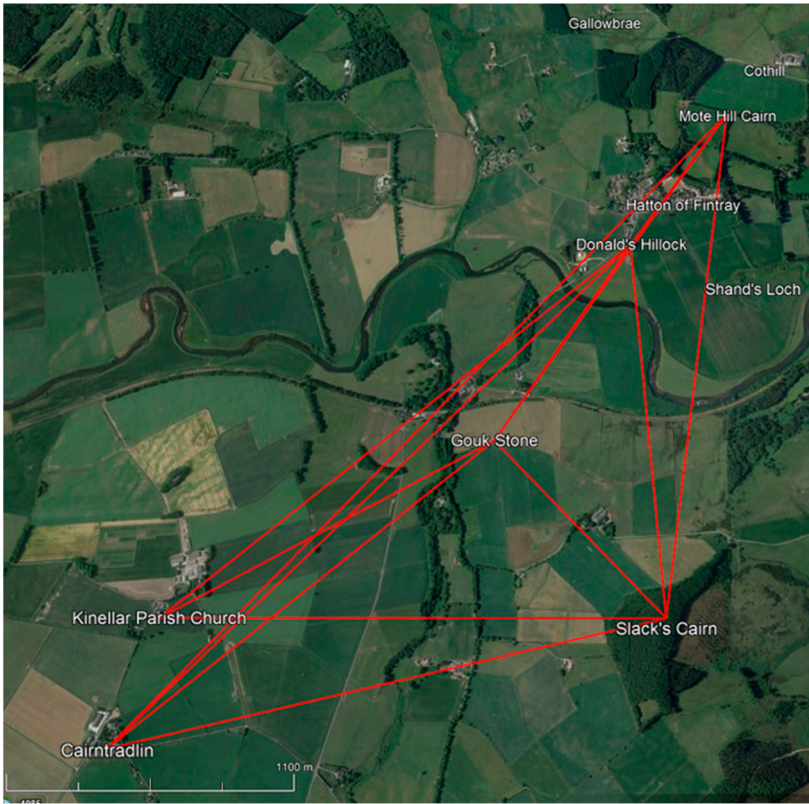
The monuments are in the parishes of Dyce, Fintray and Kinellar that meet at the confluence of the Blackburn with the River Don below the Gouk Stone. Confluences were associated with religious significance in Pictish areas (Nicolaisen, 1976). Some other cuckoo place-names in southern England are also on or near parish boundaries (Rawes, 1977). Parishes in Scotland have been in place since the arrival of Christianity in the early medieval period and in eastern Scotland they were based on earlier secular units (Clancy, 1995, p. 105). The area appears to have had some significance since the early Neolithic as a cursus monument is situated opposite this confluence (Canmore ID 83494).

There are four extant prehistoric monuments and the locations of two removed monuments: four cairns, a standing stone and a recumbent stone circle. These monuments act as horizon foresights when viewed from one other. However, one monument,





a.



b.

**Figure 3.** Hatton of Fintry monuments. (a). 1 Donald's Hillock, 2 Motte Hill cairn, 3 Braedale cairn, 4 Slacks cairn, 5 Gouk Stone, 6 Cairntradlin, 7 Site of stone circle at Kinellar parish church, 8 Shand's Loch (© Crown Copyright Ordnance Survey). (b). Sight-lines of intervisible monuments that skyline.

Donald's Hillock (NJ 84004 16087) 'probably a prehistoric barrow or cairn' (Canmore ID 183296), is not in a prominent position being situated on a low-lying terrace just above the flood plain on the north side of the river (Figure 3(a)). It is not skylined when viewed from the other monuments, although others are skylined when viewed from it suggesting it was erected for that purpose. It was surrounded by a stone wall after the First World War when a memorial was erected on it (Figure 4). The hillock measures about 17.5 metres in diameter and rises two metres in height. Before the construction of the wall the mound probably measured about 25 metres in diameter and three metres in height (Canmore ID 183296).

The other monuments are: Mote Hill cairn (NJ 8444 1675) a mound measuring 26 metres in diameter and almost four metres in height (Canmore ID 19483). Slacks cairn (NJ 8402 1445) about 23 metres in diameter by two metres in height and is a mass of small boulders and stones (Canmore ID 19558). It is now surrounded by a forestry plantation. The cairn is not on the summit of the hill but its position ensures that it was skylined when viewed from Donald's Hillock. The Gouk Stone viewed from the centre of the hillock is not skylined but points up to the horizon on the hill behind it; however, when viewed from the original ground surface next to the wall, the stone appears to 'touch' a point on the horizon (Figure 5).

Cairntradlin Farm (NJ 8202 1392; Canmore ID 19176) stands on a ridge to the south-east of the hillock. Tradlin is a native name of the pre-Reformation parish saint, Triduana (discussed below), suggesting that a prehistoric cairn stood there, possibly connected with the deity but later dedicated to the saint, although there is no physical trace left. Kinellar parish church (NJ 8215 1443) is on the same ridge as Cairntradlin and is the location of an earlier pre-Reformation church dedicated to Saint Triduana and the assumed site of a recumbent stone circle as the two flankers are in the south wall of the kirkyard (Canmore ID 19545). Braedale cairn, a stony mound 19 metres in diameter and two metres in height, is five kilometres to the north-east and can be seen from



**Figure 4.** Donald's Hillock, Hatton of Fintray, looking south. Slack's cairn is on the skyline behind the memorial but obscured by trees (photograph by author).





**Figure 5.** The Gouk Stone ‘touches’ the skyline when viewed from ground level at the south wall of Donald’s Hillock. The stone is further below the horizon when viewed from the centre of the hillock which is now two metres above ground level (photograph by author).

Cairntradlin, the Gouk Stone and the stone circle location but whether it is linked to the Fintray monuments is unknown.

### **Definitions**

All celestial objects can be imagined as being on a sphere that revolves around the Earth with its axis on Polaris, the North Star. The position of an object on this celestial sphere is defined by two coordinates: declination and right ascension that approximate with geographical latitude and longitude respectively. Only declination need be considered here. Declination is the distance in degrees that the object is north or south of the celestial sphere’s equator. The north celestial pole has a declination of  $+90^\circ$  while the south celestial pole is  $-90^\circ$ ; hence, an object’s declination can have a negative value. The position an object rises or sets on the horizon is its azimuth or bearing from true north. It is affected by other parameters including atmospheric conditions and the altitude of the horizon. The latitude of the observer’s position, azimuth and horizon altitude can be used to calculate an object’s declination.

### **Monument dating**

The construction dates of the six monuments are unknown; however, a time frame should be established as the declinations of celestial objects, and consequently their rising and setting horizon azimuths, vary over time. While stone rows in Scotland have been dated to the late Bronze Age (Higginbottom & Clay, 2016, p. 2), standing stones could have been erected at any time from the Neolithic through the Bronze Age (Bradley, 2012; Burl, 1993) and been continually used through the Iron Age; for

example, evidence from the excavated area around the Cuckoo Stone, a standing stone near Stonehenge, revealed a continuously utilised location since it was erected in the mid to late third millennium until the Roman Period (University of Sheffield, 2013). The practice of erecting standing stones as markers also continued until comparatively modern times: Martin (1716) wrote that a recently discovered spring on the Isle of Harris had a large stone erected nearby to direct strangers to it. Cairns are also difficult to date indirectly as they too have been built for different purposes over a wide time range. The construction dates of recumbent stone circles, however, are thought to be within the early Bronze Age between 2500 to somewhere between 1700 and 1500 BC (Burl, 1995, p. 9), although this is contested.

### **Skyscapes**

Landscapes do not exist without skyscapes (Campion, 2015). This reductive statement emphasises that both are complementary components of our physical and cultural environments, to the extent that some scholars consider that archaeoastronomy should be considered a component of landscape archaeology (Esteban, 2014, p. 5).

Skyscapes are constructed through human agency from the natural phenomenon of the sky (Silva, 2015a). By marking calendric events skyscapes continue to influence and temporally regulate social actions including agricultural practices and religious rituals. Like landscapes, skyscapes were conceived by many societies as populated by supernatural beings and ancestors with related myths and genealogies (Iwaniszewski, 2011, p. 31). Celestial objects *were* those supernatural beings whose conceived characteristics, movements, rhythms, positions, conjunctions, appearances and departures from the skyscape were thought to influence the lives of people, past and present.

Monuments and their horizon alignments are tangible signposts to ancient beliefs and practices. Determining the intended targets of horizon orientation, combined with ethnohistorical sources, can elaborate original intention and function. Studies of cultures that combine archaeological materials and landscapes but ignore their skyscapes and ethnohistory will only provide partial interpretations. Examining all these components proves to be not only complementary and reaffirming but synergistic, revealing a differently conceived cosmology and ontology.

### **Skyscape archaeology**

Antiquarians noted that monuments were orientated with the Sun. This interest in the orientation of monuments expanded during the second half of twentieth century with the studies of Stonehenge by Gerald Hawkins, an astronomer, and of stone circles by Alexander Thom, an engineer. These studies piqued the interest of astronomers and in the 1980s the primary method to test for alignments was through the statistical analysis of large data sets of orientations of supposed similar monuments; for example, recumbent stone circles (see Ruggles, 1984). This approach proved unsuitable for single monuments and has not been widely accepted by archaeologists (Ruggles, 1999, p. vii; Hutton, 2013, p. 150) as it is viewed by some as without any interpretive ability (Sims, 2012). Moreover, the humanistic training of most archaeologists is not thought by some to

incline them to accept the evidence that archaeoastronomers present in support of their arguments (Polcaro, 2016). This is unfortunate as, when compared to the other subsidiary sciences of archaeology, only archaeoastronomy is considered by some to give information about the symbolic world of those who built prehistoric artefacts/monuments (Polcaro & Polcaro, 2009). Studies using archaeoastronomy have been influential in producing reconstructions of past belief systems encompassing views and concepts of the cosmos (Boutsikas & Ruggles, 2011). Although methods used in archaeoastronomy have not progressed markedly over the last 40 years (Silva, 2020) an approach referred to as skyscape archaeology has been developed that is concerned with the relationships between material culture, the sky and human societies (Silva, 2015a; Henty, 2016) in order to answer questions of wider relevance relating to religion, belief, ritual, theology, ecology, social memory, cosmology and ontology (Silva & Henty, 2018). This approach can also be used where sites are examined on a small-scale, and the role and importance of artefactual evidence, the site's location within a particular ritual landscape, related ethnographic evidence and relative dating are considered (Henty, 2016, p. 685). This broader, multi-disciplinary approach also uses elements from archaeology, anthropology, history and cultural astronomy, effectively combining archaeoastronomy and archaeology (Henty, 2016). While providing insights into the culture of the people that erected and used the monuments, this method has the potential for wider applications in landscape studies, urban planning, development of cultural heritage sites and sustainability (Brown, 2015). It is the approach taken in this study.

### ***Myths and legends***

The investigation of prehistoric societies includes the study of folktales, myths and legends. Myths are associated with supernatural beings while legends are concerned with the exploits of mortals. The convergence between folktales and the material record has been demonstrated (Silva, 2015b) and it is recognised by anthropologists that oral traditions contain much consistently reported, verifiable information (Whitely, 2002, p. 412). The view regarding the validity of folklore in representing original functions or rituals associated with monuments has changed from the conflicting speculations that we will never find in folktales an accurate memory of a particular stage of culture (Eliade, 1963); archaeologists should be wary of rejecting mythological and folkloric accounts or oral history (Gavin-Schwartz & Holtorf, 1999) to an empirical assessment that concluded the methods and theory from population genetics can be usefully applied to characterise the population structure and variation in cultural packages such as folktales (Ross et al., 2013). Such methods have demonstrated that some cosmic myths are Palaeolithic in origin (d'Huy, 2013; Frank, 1993) while various Indo-European folktales have been demonstrated to have a Bronze Age origin (Graça da Silva and Tehrani, 2016).

The Gouk Stone has an associated legend that it was erected to commemorate a general who was slain there (The Old Statistical Accounts of Scotland III (OSA), 1792, p. 131; The New Statistical Account XII (NSA), 1845, p. 122). The NSA further states that the 'general' has the same name as the stone. The veracity of the legend cannot be assumed as marking the death of a warrior is not an uncommon explanation of standing stones; for example, Camies' Stone (Canmore ID 18610) seven kilometres upriver in the

adjacent parish of Kintore also supposedly marks the location of a battle where a general of the ‘Danes’ was slain and buried. He was supposedly named Camus or Cambus (OSA XIII, 1794, p. 91) although it is doubtful whether the battle ever took place or the general ever existed (OS Name Book, 1867). This stone is two kilometres distant from, and within sight of, a pronounced loop in the River Don and *camas* or *cambus* is Gaelic for a bight or bend in the river (Watson, 1926, p. 202). It is possible that the legend was conceived when Gaelic was no longer spoken here. Although that would not apply to the Gouk Stone as *gouk* is still the local Doric term for a cuckoo. Additional ethnographic and astronomic evidence will be provided in support of the Gouk Stone legend. A possible reason for the naming of a significant warrior after the cuckoo is only apparent when the symbolism of the bird is outlined.

### **The cuckoo**

The cuckoo is a summer migrant and the only central and northern-European avian brood-parasite. The sexes are alike in appearance and the eggs resemble those of the host species; hence, there are no obvious females, nests or eggs. This resulted in all cuckoos probably being regarded as male (Nance, 2019b). After hatching the cuckoo removes all the host eggs or hatchlings. Subsequently, a number of host nests with only a single cuckoo chick are found in the territory of a polygynous calling, male cuckoo, each chick thought the result of the male cuckoo impregnating the host bird (Gubernatis, 1872, p. 231). These misconceptions of its life-cycle resulted in the cuckoo symbolising male fertility across its Eurasian summer range from Denmark (Armstrong, 1958) to China where it is the symbol of both fertility and deceit (Lai, 1998, p. 530). Consequently, the cuckoo was associated with several widespread European Iron-Age triplicate goddesses of fertility including Freyja/Frigg (Guerber, 1895), Laima of the Balts (Gimbutas, 1989), the Latin Juno and Hera (Pausanias, *Description of Greece* 2.17.4; Jones & Ormerod, 1918). This is either due to lateral transmission, the association having arisen independently at least three times, or these goddesses evolved from a common ancestor. Several of these deities are also associated with mead and the planet Venus (Nance, 2019b) indicating that a common ancestor is the more probable hypothesis. One goddess associated with Venus and the cuckoo (celestially symbolised by the Pleiades), was remembered in a myth associated with the Calanais stones and can be dated to the early Bronze Age (Nance, 2021). A warrior named after the bird could be responsible for the fertility of his people and their lands.

### **The ritual ‘king’**

The legend of a ‘general’ who was slain at or near the Gouk Stone is also strikingly similar to the deaths of several Iron Age warriors mentioned in insular accounts. A warrior-champion of the Picts in the tales of the Irish Fenian Cycle, referred to in Gaelic as Ciuthach (pronounced ‘kewach’, phonetically similar to the Gaelic Cuthaig, ‘cuckoo’, pronounced ‘kewag’), that no man could overcome and could only be killed with a magical sword, *Mac an Luinn*, possibly ‘son of the spear’, while his back was to Creag Ciuthach, a standing stone on Lewis (Watson, 1914, p. 195). Also similar was the death of Cúchullain, pronounced *koo-KUL-in*, the warrior-hero of the Irish epic,



the *Táin Bó Cúailnge*, ‘Cattle Raid of Cooley’, thought to be set in the late pre-Christian Iron Age (Jackson, 1964) or even the early Bronze Age (O’Kelly & O’Kelly, 1982, p. 48). Cúchullain was killed tied to a standing stone after taking a drink from a nearby lake (Gregory, 1903, p. 341). Bearing in mind that simple chiefdoms were still extant into the medieval period in northern Britain and Ireland and both were sufficiently removed from events on mainland Europe (Bradley, 2007, p. 4) and the Romans, an ethnographic analogy from this ethnically and socially similar contemporary society in a neighbouring location may prove useful. Both peoples also intermixed as there were Brittonic speaking tribes recorded in Ulster in the late Iron Age (Ó Cróinín, 1995, p. 213); for example, the Damnonii of Connaught are considered by early Irish scholars to be Britons and even Cúchullain was thought a Briton (Watson, 1926, pp. 24–25). Nevertheless, it should be remembered that ethnographic analogies do not ‘prove’ anything.

In addition to Cuchulainn, a number of pre-Christian Irish ‘kings’ were also executed against standing stones (Maier, 1989). While the Irish Gaelic *rí* is translated as ‘king’, the pre-Christian ‘kings’ were not kings in the modern sense – a medieval Christian construct extremely unlike the pre-Christian ‘kingship’ (MacCana, 1979, p. 444). *Rí* has an early Indo-European origin and is etymologically related to the Gaulish suffix *rix*, Latin *rex* and Sanskrit *rāja* (McCone, 1998). The term denotes a ‘ruler’: they were tribal chieftains.

Early Irish texts relate that such ‘kings’ were sacral (relating to sacred rites or symbols); the chosen ones of the local goddess of fertility and sovereignty who became her mortal lovers; deemed, through their actions, responsible for maintaining the cosmic equilibrium which ensures the well-being of the land and waters, its people, crops and animals (Maier, 1989). A number of ‘kings’ were slain by their successors suggesting they were ritually killed (Macalister, 1917, p. 326) and of the fourteen known pre-Christian ‘kings’ of Tara, seven were killed during a festival on *Samhain* (*samhfhuin*, ‘end of summer’ (Delamarre, 2003, p. 267)) in a ritual manner, for religious reasons and none of the others killed at any other stated time (Ramnoux, 1954). Eight were 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). The ritual existed until the mid-ninth century AD (Dalton, 1970, p. 16).

The evidence suggests that as part of the ritual the victim was given a drugged drink which reduced him to a state of semi-consciousness; tied to a standing stone and despatched with a sacred weapon (Dalton, 1970, p. 16), like *Mac an Luinn*. It has been suggested that some Irish Iron Age bodies preserved in bogs, that had originally been shallow lakes, might have been failed candidates for kingship or deposed kings. This is based on the observations that the individuals appear to be high status and their nipples were mutilated rendering them ineligible for kingship. Suckling of a king’s nipples was an important gesture of submission by subordinates, seemingly symbolic of fertility. Breasts and nipples are stylised on the terminals of gold gorgets indicating this custom that extended back to the late Bronze Age at least (Kelly, 2006, p. 59). Similar bodies have not been discovered in northern Britain although peat is not harvested on an industrial scale here. A possible remnant of the practice occurred until recently when a substitute sacrificial victim was chosen using the *Samhain* fire as a means of selection in Perthshire and Wales as examples (Frazer, 1922).

The date of the sacrifice, *Samhain*, is thought to be the pre-Christian ‘New Year’ (Frazer, 1922; Hutton, 1996) and the most important day of the Celtic year (Frazer, 1922; Dalton, 1972). A killing on this date was a sacrifice to the deities (Dalton, 1972, p. 224) and when the local goddess was united with the new tribal chieftain in the hierogamic rite of *banais rige*, recorded as late as the fourteenth century (Maier, 1989). *Banais* is thought to derive from *bean* and *feis*, ‘woman-sleeping’, and *banais rige* must originally have contained the same sexual connotation (Carney, 1955, p. 334), possibly with a mare (described below). The tribal chieftain’s successor, the tanist, was always elected beforehand to be ready to succeed him (Hore, 1857).

If the legend associated with the Gouk Stone has any veracity, then a working hypothesis can be formulated that significant chieftains, titled after the cuckoo and symbolising fertility, linked to a local goddess of fertility and sovereignty, were ritually killed at *Samhain* by their successors at the stone. As monument orientations were used to define the timing of rituals this raises the possibility that there may prove to be an orientation associated with *Samhain*.

### **Saint Medden and Venus**

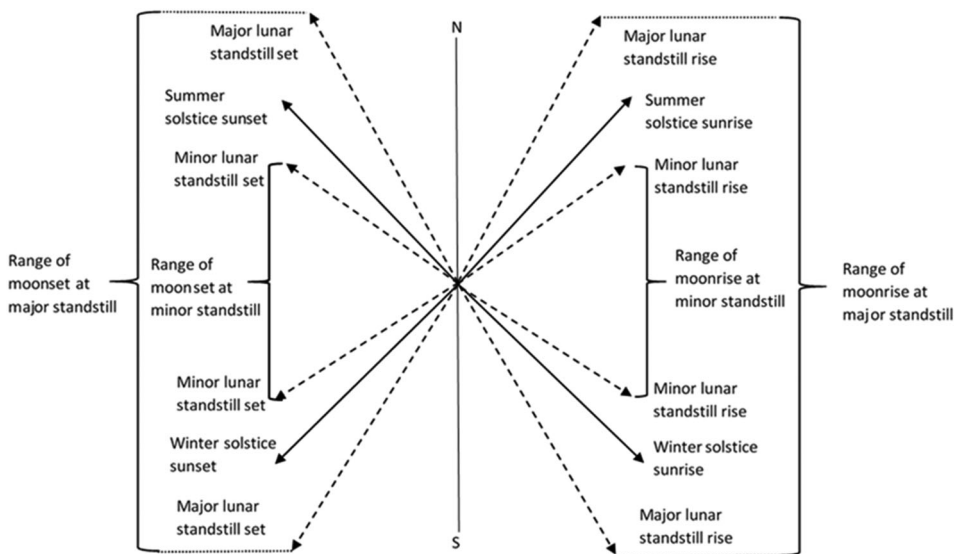
The proposed ritual landscape is located where the three parishes of Dyce, Fintray and Kinellar meet. The three pre-Reformation parish saints appear to be pagan deities that were syncretised when the parishes were formed. They are detailed in the **Discussion**; however, it is necessary to mention one at this point.

Saint Meddan of Fintray parish appears to be a syncretised equivalent of the Irish goddess Medb, a hypersexual goddess of fertility, love, war and political power. Medb is derived from the element for mead and translates as ‘drunk woman’ or ‘she who intoxicates’ associated with the cup of mead shared with a new ‘king’ as she also symbolised sovereignty – supreme power or authority (Ross, 1967). Brittonic Medden has the same root and in modern Welsh *meddwen* describes an intoxicated woman. Referring to the analogy with the Irish ‘kings’ it is probable that she was the deity associated with ritually murdered warriors. In addition, other parish saints with variants of Medden: Modwenna, Monenna (Mackinlay, 1914, p. 131) and Morwenna (Baring-Gould, 1914, p. 263) have saint’s days on the Julian date for Midsummer’s Eve and are thought to be syncretised from a goddess associated with Venus (Nance, 2021). Hence, there is also a possibility of an orientation with Venus at this location.

### **Lunar and solar orientations**

There are twelve lunar and solar maxima horizon declinations. They are the four annual solar rising and setting positions on the summer and winter solstices and the four major and four minor rising and setting lunar-standstill positions that each occur once during the 18.6-year lunar-node cycle (Figure 6).

The declinations of the solar and lunar extremes have changed less than 0.5° since 2500 BC until the present due to the slight variation of the obliquity of the ecliptic, the Sun’s apparent annual path on the celestial sphere (Hannah et al., 2017, p. 103). (For reference, the apparent diameter of both the Sun and the Moon is also approximately 0.5°.) Between 2500 and 1500 BC (the date of recumbent stone circle construction



**Figure 6.** Orientations of solar and lunar rising and setting maxima at Hatton of Fintray assuming a horizon altitude of  $0^{\circ}$ . Data obtained from the freeware planetarium programme *Carte du Ciel*.

– see *Monument dating*) that variation was only  $0.1^{\circ}$  (Ruggles, 1999, p. 57), outside the range of accuracy required for this study; consequently, the calculated lunar and solar maxima declinations for the mid-point of recumbent stone circle construction, 2000 BC, were utilised (Table 1). Even if structures were built centuries before or after this date, the change in the Sun and Moon’s apparent position is so small that the resulting differences in rising and setting azimuths would not be noticeable to the naked eye (Romain, 2019).

The determination of the probability of the monuments’ orientations with the solar and lunar maxima could be considered an assumption of intentionality, a flaw of archaeoastronomy studies (Silva, 2020). However, this choice was not based on what was observed in the data but on *a posteriori* knowledge that many late Neolithic and early Bronze Age monuments in the British Isles that are orientated towards the horizon are predominantly aligned with lunar and solar rising and setting maxima (Burl, 1993; North, 1996; Ruggles, 1984), primarily towards the southwest with the emphasis on lunar-solar pairings at winter settings (Ashmore, 1999; North, 1996, p. 489). These are principally the winter solstice sunset and the southern major or minor moonsets and the evidence for prehistoric interest in obvious astronomical events such as midwinter sunrise and sunset is almost universally accepted (Sims, 2006a, p. 3). Horizon orientations with declinations between the solar and lunar extreme limits could be connected to Venus (González-García, 2015, p. 495).

**Table 1.** Declinations of solar and lunar standstill limits in 2000 BC (from Ruggles, 1999, p. 57).

Date BC	Northern lunar major standstill rise and set	Summer solstice rise and set	Northern lunar minor standstill rise and set	Southern lunar minor standstill rise and set	Winter solstice rise and set	Southern lunar major standstill rise and set
2000	$+28.2^{\circ}$	$+23.95^{\circ}$	$+17.95^{\circ}$	$-19.6^{\circ}$	$-23.95^{\circ}$	$-29.95^{\circ}$

## Venus

By concentrating on solar and lunar alignments researchers might not have considered other possible targets for alignments particularly Venus (Ruggles, 1999, p. 149). It is the third brightest object in the sky, important in the cosmology and religion of several cultures.

When viewed from the same location Venus appears in almost the same place on the horizon, on the same date every eight years. It is a periodicity known in antiquity, recorded by the Greek Cleostratus, fifth century BC, supposedly based on the Babylonians (Webb, 1921) who used the cycle to regulate lunar and solar calendars in the third millennium BC (Tiede, 2018, p. 1).

There is evidence that the both the European and Middle Eastern goddesses associated with Venus have evolved from a Neolithic archetype (Nance, 2019b). Inanna, a deity of ancient Mesopotamia, and her descendent Ishtar (Sumerian *Inana* and Akkadian *Ištar* translate as Venus (Black & Green, 1998, p. 135, 183–184)), were symbolised by an eight-pointed star as early as the third millennium BC, presumably in recognition of this cycle. Campbell (2001, p. 47) postulated that the ritual murder of Dumuzi, the mortal lover of Inanna and equivalent to the ritually murdered kings, might be linked to the eight-year cycle. During an eight-year cycle Venus will also appear as an evening object on the same date on one or two other years but with different declinations (see Nance, 2021).

Šprajc's (2015) study of the alignments of Venus and other planets made the following points: Venus is the only planet whose extremes exhibit easily observable patterns and long-term periodicity; only the alignments that probably refer to the maximum extremes have so far been identified including architectural alignments in Mesoamerica that probably refer to the greatest extremes of the evening appearance; these extreme declinations remain limited to short spans for very long periods. There are, to the author's knowledge, no known alignments with the extremes of Venus in Europe associated with indigenous cultures.

The extreme declinations are part of the eight-year cycle which oscillate through a longer 251-year cycle referred to as the Great Venus Round by McCluskey (1983). This might have been recognised in Bronze Age Britain at Calanais where the alignment of the east row of the Calanais Stones is aligned with a crossover of Venus (Nance, 2021). Crossovers occur above the horizon every 251 years. The azimuth of the crossover of the 1670s BC coincided that of the rising Pleiades, linked with the cuckoo across central and northern Europe (Méchin, 2000). The event was remembered in a myth linking both Venus personified as a deity, and the cuckoo (Nance, 2021).

During the last four millennia, both the maximum (northernmost) and the minimum (southernmost) extreme declinations have always been reached with Venus in the evening as they are the most easily observed (North, 1996, p. 132). 81% of the southerly extremes of Venus between 2000 BC and AD 2000 were visible in the evening between the 29 October and 6 November of the current Gregorian calendar (Šprajc, 2015). This brackets *Samhain* on 1 November. The *Samhain* feasts at Tara, where the 'king' was sacrificed down to AD 560, were also held for the week between 29 October and 4 November (Ginnell, 1894) strongly suggesting an association with Venus.



## Alignments

Some claim the acceptable range from the true declination for a monument's orientation to be considered an alignment – an intentional orientation – should be  $\pm 2.0^\circ$  (Hawkins & White, 1966) while others consider it should be  $\pm 1.0^\circ$  or less (Polcaro, 2016). The probability that orientations are within  $\pm 1.0^\circ$  of the twelve lunisolar maxima by chance is 0.066 (within a specified  $24^\circ$  of  $360^\circ$ ). For an orientation to be considered significant at the 95% level it must lie within  $\pm 0.75^\circ$  of the true declination, noting that a higher precision by the builders is unlikely (Polcaro & Polcaro, 2009). Nevertheless, such statistically significant orientations alone are not sufficient to demonstrate intentionality.

The criteria required to demonstrate an astronomical alignment vary between scholars. Hutton (1991, p. 110) stated that to prove intentionality for stellar alignment the exact date of a monument's erection should be known, while Schaefer (2006) argued that two, or preferably three criteria, must be met. The first is that an alignment should be statistically significant to 99.7% level ( $3\sigma$ ). This is unlikely to be determined for single orientations as it demands a corresponding accuracy by the constructors; however, it could be determined for a group of similar monuments. Additionally, intentionality must be confirmed by archaeological evidence and, if possible, supported by ethnographic or anthropological evidence. Schaefer was discussing American structures, many providing archaeological evidence with hieroglyphs or symbols. Such obvious evidence is not present on British late Neolithic and early Bronze Age monuments although others have also confirmed that intentionality should not be argued for solely on the basis of statistical significance but should include independent evidence in the wider archaeological record and the socio-historic context of the structures being studied (Silva & Henty, 2018; Silva, 2020), while Malville (2015, p. xiii) commented that: the absence of ethnohistory of prehistoric sites does not preclude learning something about intent.

## Method

Virtual reality models incorporating GIS and planetarium programmes have previously been used in archaeoastronomy studies (Beex & Peterson, 2004; Harding et al., 2006; Liritzis et al., 2017; Romain, 2019; Tiede, 2020; Zotti & Neubauer, 2019). The freeware planetarium programme *SkyChart/Cartes du Ciel* version 4.2 was utilised for astronomic calculations (<https://www.ap-i.net/skychart/en/start>). The programme uses the NASA Jet Propulsion Laboratory, Solar System Dynamics Group's HORIZONS software (<https://www.ap-i.net/skychart/en/start>) to calculate ephemerides (trajectories) for solar system objects (<https://ssd.jpl.nasa.gov/?horizons>). (For details of the accuracy of *Cartes du Ciel* see Nance, 2021). Using the co-ordinates of Donald's Hillock to define an observatory, the night sky at that location can be viewed back to 3000 BC. By selecting a celestial object, information is displayed including declination, the then current azimuth and altitude, and its rising-and-setting times with azimuths.

The horizon azimuths and altitudes of the monuments that were intervisible and sky-lined when viewed one from another were determined using Google Earth Pro 7.1 which incorporates GIS. The accuracy of the images is dependent upon the precision of their orientation plus the quality of the digital elevation model (DEM) used (Pulighe &

Lupia, 2016; Potere, 2008). Google Earth uses DEM data collected by NASA's Shuttle Radar Topography Mission. Overall positional accuracy of Google Earth has been determined for other locations: close to one metre in the city of Rome (Pulighe et al., 2015) and a mean absolute error of 1.3 metres in a number of locations in the US when compared with GPS benchmarks (Wang et al., 2017). In Montreal the horizontal positional accuracy of Google Earth ranged from 0.1 metre in the south to 2.7 metres in the north (Goudarzi & Landry, 2017). The distance measured from Donald's Hillock to the Gouk Stone was 1085 metres. The addition of the extreme value of a 2.7 metres opposed offset at both line terminals represents an error of 0.4% which would alter the calculated declination by a maximum of 0.25°.

Azimuth and altitude values obtained in Iberia using a precision compass and a clinometer, with respective *assumed* errors of 0.25° and 0.5°, were used to calculate declinations and compared to those obtained using data from Google Earth Pro (2017) giving errors of 0.25°±1.7°, although the true values were not known (Rodríguez-Antón et al., 2018).

Another investigation of the accuracy of the elevation data from Google Earth Pro concluded that the data are accurate enough for some engineering applications but not for those using a fine scale (El-Ashmawy, 2016).

Three sets of measurements were obtained for each horizon alignment. Each set used a differently dated image in Google Earth (see Appendix 1). The mean values were used. In an attempt to reduce bias, the assumptions were made that the viewing points and rising and setting horizon points were at the centre of the monuments, that the cairn at Cairntradlin was at the centre of the farm and the stone circle was at the centre of the kirkyard at Kinellar parish church. Accordingly, measurements were taken to and from these points as determined from Google Earth.

The measurements were cross-checked where possible using a lensatic compass that is accurate to within ±1.5°. Readings of each observable orientation were taken on-site and the values corrected for magnetic declination against the Google Earth values; however, the orientations to and from Slacks Cairn were not possible due to obstruction by the surrounding forestry plantation while some other orientations are also currently obscured by trees (see **Results**). The Google Earth ruler function calculated monuments' azimuths and the distances between them (see Figure 3(b)). The ruler tool uses true north for its reference (Romain, 2019, p. 158). The horizon altitude of each line was calculated from its profile using basic trigonometry. Inputting the azimuth and horizon altitude data for each orientation into the freeware programme GETDEC (Ruggles, 1999, p. 169) calculated their declinations (<https://www3.cliveruggles.com/index.php/tools/declination-calculator>). These data were examined to determine if each monument was orientated towards the horizon positions of the lunar and solar maxima. For an orientation to be considered statistically significant ( $P = <0.5$ ) it must lie within ±0.75° of the true declination of the 12 lunar and solar maxima as  $0.75^\circ \times 2 \times 12 = 18^\circ$ , or 5% of 360°.

The declinations of Venus on *Samhain* were obtained using *SkyChart/Cartes du Ciel* version 4.2. The date of *Samhain* taken as 38 days after the autumn equinox.

Advantages of using this method include: measurements can be made remotely; local magnetic attraction and the modern obstructions of buildings and forestry can be avoided; and there is no requirement for magnetic correction.

## Results and analysis

Not all the monuments are intervisible and of those that are, some are below the horizon (Table 2). The declinations of monuments that are skylined when viewed from another and the probability that the orientation is due to chance with respect to lunar and solar maxima are tabulated (Table 3) and depicted diagrammatically (Figure 7). The azimuths obtained by compass were within  $\pm 1.5^\circ$  of those obtained from Google Earth.

Each of the three sets of measurements taken for each orientation showed some variation (Appendix 1), some of which could have been due to the different lighting conditions between the three images used. However, calculated altitudes and apparent-declination values were consistent, both having only one maximum variation of  $0.3^\circ$ . The assumption regarding viewing points being at the centre of monuments also introduced variation. The calculated declinations of the Gouk Stone when viewed from either side of Donald's Hillock, a difference of approximately 18 metres, was  $0.12^\circ$ .

Four of the intervisible monument horizon orientations are statistically significantly ( $P = 0.05$ ) within  $\pm 0.75^\circ$  of the 12 lunar and solar maxima horizon setting declinations, while eight are not (Table 3). The probability of this result occurring by chance can be calculated using Fisher's Exact Test. A random distribution would produce, on average, 18 [ $0.75 \times 2 \times 12$ ] orientations within  $\pm 0.75^\circ$  of a lunisolar maximum declination, with 342 orientations outside this range. Comparing both data sets give a two-tailed  $P$  value of  $< 0.003$ . The null hypothesis that these two classes are not different can be rejected.

Alternatively, the results can be regarded as a binomial experiment with 12 independent trials. As such, the null hypothesis can be tested using Bernoulli's probability equation (Ruggles, 1999, p. 42; Sims, 2015, p. 51):

$$P = 1 - \sum_{s=0}^{r-1} n! / s!(n-s)! x p^s (1-p)^{n-s}$$

where  $r$  is the number of target alignments found,  $n$  is the total number of possible alignment combinations,  $p$  is the proportion of the horizon occupied by relevant astronomical alignments, in this case 0.05 (the greater the value of  $p$ , the higher the probability of observing an alignment), and  $s$  is the series of repeating calculations running from 0 to  $r-1$  that must be summed. There are 12 horizon orientations ( $n$ ) of which four ( $r$ )

**Table 2.** Declinations in degrees between monuments at Hatton of Fintray.

Location	Motte Hill cairn	Donald's hillock	Gouk stone	Slacks cairn	Cairntradlin	Kinellar church RSC	Braedale cairn
Motte Hill cairn		NOH	NOH	-30.5	NOH	NV	NV
Donald's hillock	+29.3		-26.8	<b>-28.5</b>	-22.9	<b>-20.2</b>	NV
Gouk stone	<b>+27.6</b>	NOH		-17.5	<b>-19.8</b>	-14.5	NOH
Slacks cairn	NOH	NOH	NOH		NOH	NOH	NV
Cairntradlin	NOH	NOH	NOH	+8.1		NOH	NOH
Kinellar church RSC	NV	NOH	NOH	+1.1	NOH		NOH
Braedale cairn	NV	NV	NOH	NV	NOH	NOH	

Notes: Statistically significant orientations are bold. NOH: not on horizon; NV: not visible; RSC: recumbent stone circle. Statistically significant lunisolar rising and setting maxima orientations are bold.

**Table 3.** Orientation data of intervisible monuments that skyline when viewed from another at Hatton of Fintray.

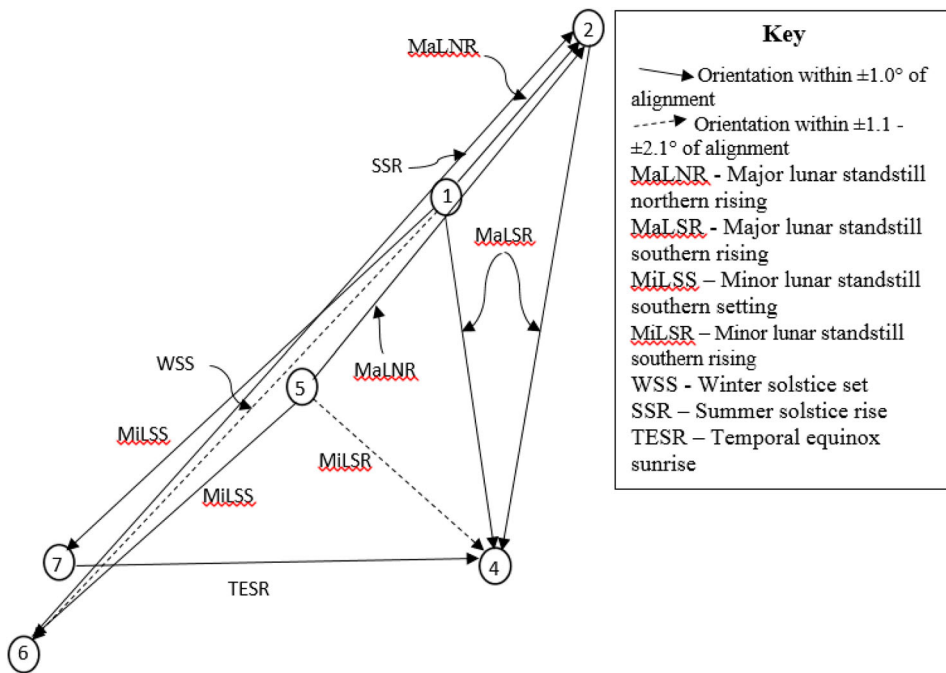
Monument	Azimuth (°)	Horizon altitude (°)	Apparent declination (°)	Nearest lunar or solar maxima rising or setting declination	<i>P</i> (difference)
Donald's Hillock to Motte Hill cairn	32.3	+3.18	+29.8	Major lunar standstill northern rising (+28.2°)	0.10 (±1.6°)
<b>Gouk Stone to Mote Hill cairn</b>	<b>31.6</b>	<b>+0.7</b>	<b>+27.6</b>	<b>Major lunar standstill northern rising (+28.2°)</b>	<b>0.04 (±0.6°)</b>
Donald's Hillock to Slacks cairn *	173.6	+4.28	-28.5	Major lunar standstill southern rising (-29.9°)	0.09 (±1.4°)
<b>Mote Hill cairn to Slacks Cairn *</b>	<b>186.1</b>	<b>+1.94</b>	<b>-30.5</b>	<b>Major lunar standstill southern rising (-29.9°)</b>	<b>0.04 (±0.6)</b>
Gouk Stone to Slacks Cairn*	135.0	+5.67	-17.5	Minor lunar standstill southern rising (-19.6°)	0.13 (±2.0°)
<b>Donald's Hillock to Kinellar church *</b>	<b>228.2</b>	<b>+1.40</b>	<b>-20.2</b>	<b>Minor lunar standstill southern setting (-19.6°)</b>	<b>0.04 (±0.6°)</b>
<b>Gouk Stone to Cairntradlin</b>	<b>229.1</b>	<b>+1.31</b>	<b>-19.8</b>	<b>Minor lunar standstill southern setting (-19.6°)</b>	<b>0.01 (±0.2°)</b>
Donald's Hillock to Cairntradlin *	222.2	+1.23	-22.9	Winter solstice sunset (-23.9°)	0.07 (±1.0°)
Kinellar church (RSC) to Slacks Cairn *	90.3	+1.82	+1.1	None. Temporal spring equinox sunrise 2000 BC (declination +1.1)	
Gouk Stone to Kinellar church (RSC) *	239.9	+1.51	-14.6	None. Sunset at <i>Samhain</i> (see <b>Discussion</b> )	
Cairntradlin to Slacks Cairn *	76.6	+1.57	+8.25	None.	
Donald's Hillock to Gouk Stone	210.7	+1.32	-26.8	None. 'Touches' horizon at extreme setting of Venus (see <b>Discussion</b> )	
<b>Below horizon</b>					
Mote Hill cairn to Cairntradlin	220.2	+0.32	-24.6	Winter solstice sunset. 0.5° below the horizon (-23.9°)	0.05 (±0.7°)
Cairntradlin to Mote Hill cairn *	40.1	-0.12	+23.7	NOH. Summer solstice sunrise (+23.9°)	0.01 (±0.2°)

Notes: (Mean values from Appendix 1). RSC: recumbent stone circle. \* = Obscured by trees. Statistically significant orientations are bold.

are within  $\pm 0.75^\circ$  of the target area of  $18^\circ$  ( $p = 0.05$ ),  $P$  is calculated as  $<0.002$ . In both analyses the null hypothesis is rejected and the alternative hypothesis, that the alignments are intentional, is supported and one of Schaefer's conditions ( $P \leq 3\sigma$ ) for intentionality is satisfied. Further, the probability that eight of the orientations are within  $\pm 2.0^\circ$  (Hawkins and White's (1966) margin of error) of the lunar and solar rising and setting declinations, where  $p = 0.13$ , while four are not, is  $<0.0001$ . They too appear to be intentional.

The declinations of Venus on *Samhain* between 2150 and 1750 BC are shown in Figure 8. Declinations below  $-23.9^\circ$  are not visible as the angle between Venus and the Sun is  $<30^\circ$  (Šprajc, 2015). There are four partial eight-year cycles depicted. There are two crossovers depicted where the declination of one cycle is increasing (going north) while that of another is decreasing and will eventually be at the most southerly position. At the crossover points the minimum declination occurs four days after *Samhain* and is approximately  $-26.2^\circ$ . The minimum declination of  $-26.5^\circ$  in 1960 BC would present on the horizon as the most southerly extreme setting of Venus. The declination calculated for the horizon position indicated by the Gouk Stone when viewed from Donald's Hillock is  $-0.3^\circ$  less than this at  $-26.8^\circ$ .





**Figure 7.** Possible lunar and solar orientations of monuments near Hatton of Fintray. 1 Donald's Hillock, 2 Motte Hill cairn, 3 Braedale cairn (not shown), 4 Slacks cairn, 5 Gouk Stone, 6 Cairntradlin, 7 Site of stone circle at Kinellar parish church.

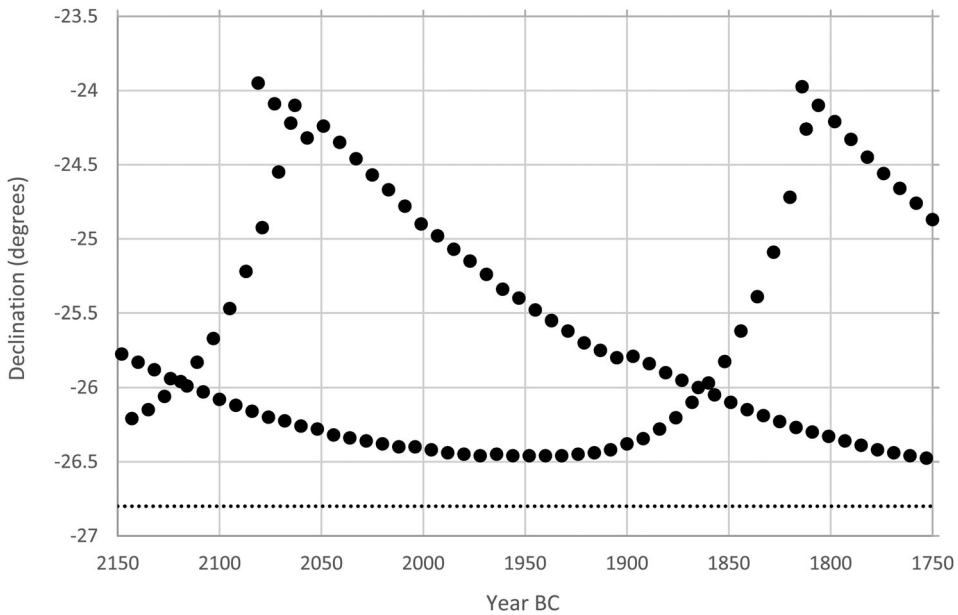
## Discussion

### Monument orientations

Four of the monuments are statistically significantly aligned with the horizon towards three of the eight lunar standstill positions: major northern rising and minor southern rising and setting, with another three orientations possibly to the same phenomena. Some researchers consider that the moon-rise or set at a standstill is a very difficult and rare event to witness (González-García, 2015). They were persuaded by the observations that the Moon's orbit has minor perturbations and that the Moon moves appreciably from its standstill positions within a day. In addition, Sims (2006b) enumerates other variables that would ensure an observer could only determine a lunar standstill on the horizon to within a degree or so.

Kinellar church (RSC) to Slacks Cairn is aligned with the horizon azimuth of the rising temporal spring-equinox sun. The recognition and relevance of equinoctial solar alignments in ancient cultures have been argued against by Ruggles (1997, 1999, 2017) whilst others have maintained that it was significant in many cultures (Belmonte, 2015) and, in the Roman calendar at least, it was this same temporal spring equinox, midway in time between the winter and summer solstices, that was favoured (González-García & Belmonte, 2006). Site visits revealed orientations with natural features but their intentionality cannot be supported. The debate regarding equinoxes and the possible orientations with natural features are therefore not considered further.

Mote Hill cairn to Cairntradlin is statistically significantly aligned with the winter solstice sunset ( $P = 0.05$ ) although it is not on the horizon but  $0.5^\circ$  below it. The back-view



**Figure 8.** Declination of Venus visible at *Samhain*, 38 days after the autumn equinox, between 2150 and 1750 BC. The dashed line represents the declination of the horizon 'touched' by the Gouk Stone when viewed from Donald's Hillock. 'Stepped' data are adjustments for the changes in date of *Samhain* in the Julian calendar.

of Cairntradlin to Mote Hill cairn is statistically significantly aligned with the summer solstice sunrise ( $P = 0.01$ ) while it too is further below the horizon. They may not be independent with one merely a consequence of the other. As they are below the horizon they have not been included in calculations. Considering that the winter solstice sunset is a focus of many other Neolithic and early Bronze Age monuments it seems unlikely that such a degree of precision is unintentional.

There is no astronomic evidence that the distant Braedale cairn was part of this ritual landscape. Although visible from three monuments, it is not skylined when viewed from them and none are skylined when viewed from it.

The monuments delineate an area of approximately ten square kilometres. In accordance with Robb's (1998) observation of ritual landscapes there is no evidence of prehistoric settlement within this area but there is a group of undated hut-circles to the south of Slacks cairn. In addition to the burials found in the, now removed, mound, there are a number of unrecorded, undated kerbed burials on the hillside to the north of Slacks cairn and also on the edge of the flood plain of the River Don to the west of the Donald's Hillock, both on the periphery of the ritual landscape. This might speculatively indicate that it was, at some period, considered an area of the dead.

The orientations of the monuments suggest they all appear positioned as components of a single, interlinked complex probably with an early Bronze Age origin that might have had functions other than purely calendric observations. The Gouk Stone is positioned at its centre. Three other standing stones have myths regarding the first cuckoo of spring landing and first calling from them (Nance, 2019a). They are thought to represent centres, *axes mundi*, in 'the world recreated' (Bayliss et al., 2007, p. 26): an area where

cosmic harmony was maintained through the correct ritual or enactment of cosmic myth. Perhaps the Gouk Stone was considered to have the same function. Pre-Christian Irish communities tended to position such religious centres at the dwelling places of their gods and goddesses (MacCana, 2011, p. 87).

### Parish Saints

Details of the three deities syncretised as parish saints may provide some insights into the culture and religion of the pre-Christian Iron Age society of the area. Saint Medden has been discussed previously. Saint Triduana (Latin ‘three days’) of Kinellar parish is probably a syncretised pagan goddess (Rendall, 2002, p. 35). In Christian hagiography she supposedly accompanied Saint Boniface, and also Saint Rule with the bones of Saint Andrew to Scotland with two other virgins (Skene, 1887, p. 230) suggesting a goddess in triplicate. The River Don was recorded by the second century AD cosmographer Ptolemy of Alexandria as *Devona* (Latin *v* pronounced *w*), ‘divine’, ‘goddess’, analogous with *Deuona*, a Gallo-Roman goddess of springs and rivers (Delamarre, 2003, p. 142); hence, the Don was considered a sacred river (Nicolaisen, 1976, p. 177). *Devona* would be *duion*, plural *duionau*, in Old Welsh/Brittonic (Watson, 1926, p. 212). *Triduionau*, ‘Three Goddesses’, is almost identical phonetically to the Christianised Triduana.

Triduana’s pre-Christian epithets include Trewell, Tradwell (Traduel), Tradlin, Trodlin and Tredwell (Tudor, 1883). She appears to be referred to in the Old Welsh genealogy tract of *Bonedd yr Arwyr*, ‘Descent of the Heroes’, where heroes are descended from Coel Hen, a semi-historical character from Sub-Roman northern Britain, and his consort Ystradwel (Bartrum, 1966, p. 91). (Around the ninth century an on-glide before s-groups, including st- to yst-, began to be used in Welsh (Jackson, 1953, p. 119). It is not found in the other Brittonic languages.) The name varies from Stradweul to Stratweul in several manuscripts dating from the early sixteenth century. Her original name in northern Brittonic was probably Stradwel, later shortened to Tradwell after the northern British language was no longer spoken and the meaning forgotten. In other Brittonic languages the Cornish *stras* (Padel, 1985, p. 212) and the Breton *strad* (Deshayes, 2003, p. 695) describe a broad, fertile valley suggesting that, as well as a progenitor of heroes, she was the goddess of the river. The belief of divinity within water was widespread in Celtic speaking communities in Europe and was closely paralleled in Scotland (Watson, 1926, p. 425). Locations associated with Triduana also include bodies of standing water: Saint Tredwell’s Loch, Papa Westray, Orkney, and Rescobie Loch, Angus, a spring at Restalrig, Edinburgh (Foster, 1953) and the narrow valley and stream of Kintradwell near Brora, Sutherland. The waters from Triduana’s sites were considered healing, especially for eye complaints (Foster, 1953), and were sites of pilgrimage where offerings were made (Brand, 1703, p. 57; Rendall, 2002, p. 35). Tradlin, the saint’s local name, remembered in Cairntradlin, might signify ‘lake (modern Welsh *llyn*) in the strath’.

Cuckoo-stones are statistically significantly close to bodies of standing water when compared to a sample of randomly selected standing stones (Nance, 2019a). The oxbow of Shand’s Loch (Figure 9), half a kilometre to the south-east of the hillock, is inside the ritual landscape, in the flood plain of the strath and might have been considered a sacred lake associated with Triduana as there are no other bodies of standing water in

the vicinity. A holy well/spring was situated 700 metres to the north-east of the hillock but has since been filled-in (Canmore ID 19482) although it still drains into Shand's Loch.

Additionally, the name appears to be an Anglicisation of the Gaelic *Loch Seunta* (pronounced 'shianda'), 'the enchanted/holy loch'. There is a sea water loch of *Loch Sianta/Seunta*, 'Holy Loch', on the Cowal Peninsula and a freshwater example of *Loch Sheanta* (NG469698) on the Isle of Skye, also fed by a sacred spring. Martin Martin (1716) described it as: '*much frequented by strangers, as well as by the inhabitants of the isle, who generally believe it to be a specific for several diseases – such as stitches, stone, consumptions, megrim* (depression)'. The foregoing strongly suggests that Shand's Loch was earlier considered a healing place of pilgrimage associated with a goddess.

A contemporary goddess in triplicate from northern Gaul, previously associated with Venus (Maumené, 2016, p. 354) is depicted on the first century AD Gundestrup cauldron (Figure 10) with two heraldic cuckoos and releasing the first cuckoo of spring (Nance, 2019b). The birds on plate *f* all have the unusual zygodactylic foot-morphology characteristic of the cuckoo with two claws facing forward. The central figure has a recumbent man in the crook of her left arm. He has an emphasised single arm with a four-clawed hand resembling the cuckoo's foot and possibly represents a ritual 'king'. All other figures on the cauldron have pentadactyl limbs usually with well-defined nails.

Medb, like Cúchullain, is a principal character in the *Táin Bó Cúailnge*. She is linked with many successive mortal 'kings' for consorts but one principle divine lover, Fergus mac Róich, 'man-strength [virility] son of the stallion'. She is described as having an almost insatiable sexual appetite taking 30 men to satisfy her or Fergus only once (Meyer, 1897). They represent a divine couple of fertility who are well represented in Celtic religion (Green, 1986, p. 95).

Fergus is also the patron saint of the adjacent third parish, Dyce, where the Gouk Stone stands. The early parish churches of Fergus and Meddan, like that of Triduana, are remote from areas of habitation and are situated downriver opposite each other across a loop of the river (Figure 3(a)). Medden and Fergus were also the saints of the



**Figure 9.** The oxbow of Shand's Loch. The River Don is to the bottom right (from Google Earth)



**Figure 10.** Plate *f* of the Gundestrup cauldron. A goddess in triplicate releasing the first cuckoo of spring holding a recumbent man in the crook of her left arm (© Kit Weiss, National Museum of Denmark).

adjacent parishes of Glamis and Airlie in Angus. Here too there is a large loch, Lintrathen, possibly a variant of Tradlin. Saints Fergus and Triduana also have an altar dedicated to them at Holy Trinity church in Saint Andrews. The foregoing strongly suggests that the three deities were linked in some way and that rituals associated with fertility were practiced here.

### **Rituals**

Alignments were not the primary purpose of monuments in ritual landscapes (Ruggles, 1999). Monuments functioned by constructing a setting for ritual while the alignments identified the timing. Rituals performed there probably involved the lighting of seasonal fires. Mote Hill cairn, in addition to acting as a foresight for the northern major lunar rising and possibly the summer solstice sunrise, was also traditionally the site of a beacon fire (Canmore ID 19483) possibly related to its function as an assembly and judicial site (discussed below) or as an echo of the fire known to be lit on the eve of the summer solstice. Fires were also lit on the cross quarter-days of *Samhain* and *Beltane* (1 May). Holy wells, usually associated with healing, were also visited at *Beltane*.

Some cuckoo place-names are thought to be associated with a seasonal ritual of ‘penning the cuckoo’ remembered in legend, where the cuckoo is hedged- or banked-in by the village ‘wise-men’ to prolong the summer but the bird always flies away (Field, 1913; Rawes, 1977). Cuckoo place-names in southern Germany and Switzerland, territories of previously Celtic speaking peoples, are associated similar myths of ‘wise-men’ behaving badly (Grimm, 1883, p. 440). Midsummer’s Eve would be the most



probable date for this ritual as it was a common European folk-belief that the cuckoo stopped singing and departed on the summer solstice, remembered in Gaelic verse: 'on Saint John's Day [Midsummer's Day] the cuckoo goes to her winter home' (Macdonald, 1926, p. 123). The forgoing suggests that a similar ritual might have been undertaken somewhere here.

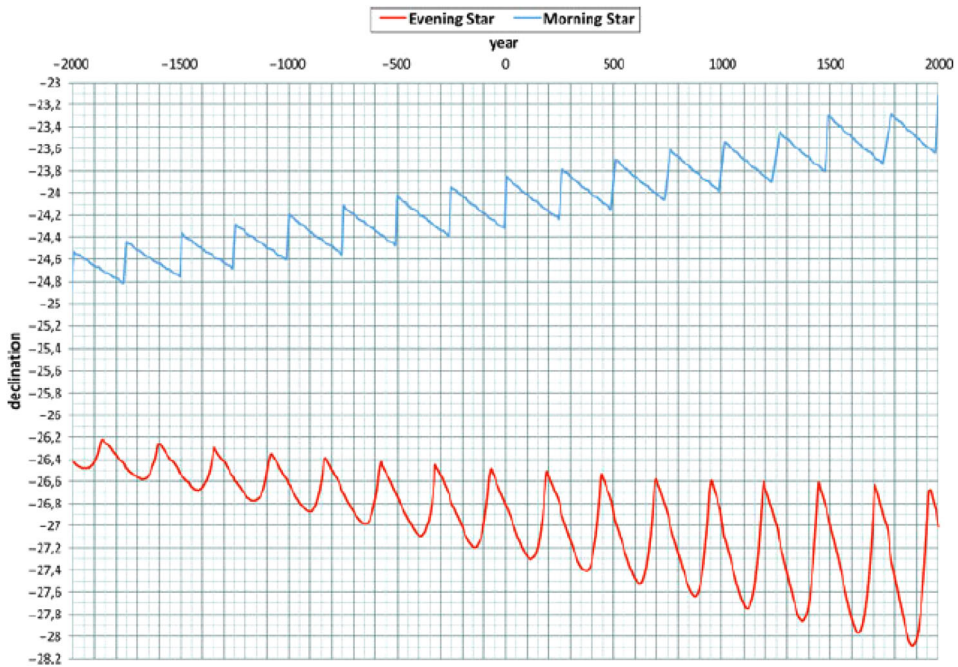
### **Alignments with sunset at Samhain and with Venus**

The foregoing suggests that the tribal chieftain – the mortal champion and chosen one of the local goddess of fertility, Medden, was sacrificed to her on *Samhain* at intervals coinciding with the eight-year cycle of Venus at the Gouk Stone. Two of the three orientations that are not close to lunar, solar or cardinal declinations are associated with the Gouk Stone and support this hypothesis. The orientation from the Gouk Stone to the former stone circle where Kinellar church now stands has an azimuth of  $239.9^\circ$  and declination  $-14.2^\circ$  (Table 3). The Sun currently sets here at *Samhain* on an azimuth of  $240.4^\circ$ , declination  $-14.3^\circ$ . This would reinforce that the legend not only refers to an Iron Age hero but to a fertility ritual that has existed since the stone was erected, if not earlier. The Sun setting over the stone circle in the autumn would have indicated *Samhain* and fixed the date in the cosmic year for the sacrifice of the 'king', but not the year.

Another of the unknown orientations is to the Gouk Stone when viewed from Donald's Hillock. This horizon point has a declination of  $-26.8^\circ$ . The extreme minimum (southerly) setting declination of Venus calculated by *Cartes du Ciel* in 1970 BC is  $-26.5^\circ$  (Figure 8). However, Šprajc (2015) has demonstrated that the minimum declination value decreases over time (Figure 11). A declination of  $-26.8^\circ$  is first reached by Venus in 1200 BC. This assumes that a value calculated using GETDEC with data from Google Earth is accurate, the margin of error is unknown, and that the stone was erected to align with an extreme setting, as Venus also reaches this declination after 1200 BC. Viewing the stone's horizon point from either side of Donald's Hillock or from the top of the mound introduces a variation in declination of  $0.1^\circ$ , equivalent to a 250-year span. While evidence from an ethnographic analogy strongly suggests an alignment with Venus only the dating of material below the stone would be conclusive and this is not available. The current evidence suggests a late Bronze Age date for the erection of the stone.

This alignment does not contradict the hypothesis that the 'king' was sacrificed at the extreme setting of Venus at *Samhain* at the Gouk Stone. In addition, it suggests that the date of the cross quarter-day of *Samhain*, 38 days after the autumn equinox, rather than the temporal mid-point of 45 days, was initially significant because of an association with the maximum declination of Venus. It also suggests that the original period for a chieftain to hold his position was eight years as, in addition to the alignment and the association of the chieftain with a personified Venus with an eight-year cycle, there is no significant cosmic cycle that repeats every seven years. Dalton (1970, p. 4) pointed out that the Irish king-lists contain a high proportion of very short reigns of one year or less and suggested they might be nominal kings that prevent the execution of the true 'king', thereby extending the duration to eight years.

A sacred landscape associated with the ritual murder of tribal chieftains would suggest it was a, if not the, religious centre of a tribal polity. Although there are hut



**Figure 11.** Variations of the minimum (southerly) declination of Venus as morning and evening star as a function of time, for the last four millennia (from Šprajc, 2015).

circles just to the south of Slacks cairn, no high-status dwellings have yet been located here; however, even very ephemeral traces of later Pictish settlements are rare in the lowlands of eastern and northern Scotland (Mitchell & Noble, 2019).

A late fourth to mid sixth century high-status complex at Rhynie, further west in Aberdeenshire, is considered a significant investment in a ‘place of special significance’. The name in early Celtic is thought to be \*riginin or \* riginin, ‘place of or associated with (-i) a great/divine (-on-) king (rig-)’ (Noble et al., 2019). ‘Place of a divine ruler’ could refer to such a chieftain.

### **A ritual authority**

There is a degree of sophistication demonstrated in planning the positioning of the monuments. The presence of a ‘ritual authority’ is suggested, a hypothesis both supported (MacKie, 2002; 2006) and disputed (Ruggles & Barclay, 2000; Barclay & Ruggles, 2002). However, there is evidence for Iron Age religious specialists from burials, shrines and from some objects (Fitzpatrick, 2007, p. 290). Such specialists are known during the late Iron Age when Julius Caesar (*De bello Gallico* 6.13) wrote that the druids held lectures and discussions on astronomy. A comment later supported by another Roman, Pomponius Mela (*De situ orbis* 3.2.18–19), who wrote in AD 45 that Gaulish druids professed to know the size and shape of the world, the movements of the heavens and of the stars and the will of the Gods. They were also a governing class more powerful than the ‘kings’ suggesting theocracies. According to Dio Chrysostom in the first century AD (*Discourses* 49; Crosby, 1946):

The most powerful nations have publicly appointed philosophers as superintendents and officers for their kings ... the Celts [of Gaul] appointed those whom they call druids ... In all these cases the kings were not permitted to do or plan anything without the assistance of these wise men, so that in truth it was they who ruled, while the kings became as servants and the ministers of their will.

Similarly, for the later Irish 'kings' this controlling function rested with a class of 'wise men', learned priests, the *filid*, that had developed from the druids during Christianity and preserved the old 'kingship' (MacCana, 1979, p. 445). They were the mediators and the manipulators of the supernatural powers which affected the 'king' and through him his people (Maier, 1989). It seems unlikely that a widespread class of priests arose in the Iron Age to accumulate such a wide body of knowledge without predecessors in the Bronze Age at least.

The Emperor Claudius banned the druids in AD 54 at the beginning of the conquest of Britain. The destruction of their centre in Anglesey in AD 58 by Suetonius Paulinus to undermine their power and authority (MacCana, 1979, p. 446) was documented by Tacitus (*Annals XIV*, 29–30) where, after defeating the fugitives and druids, the Romans demolished the sacred groves consecrated to their 'savage cults'. Lucan also describes the destruction of a Gaulish sacred grove by Caesar (*De Bello Civili III*, 399–425; Duff, 1928).

Pomponius Mela (*De situ orbis* 3.2.18–19) wrote that the Gaulish druids were taught privately in a cave or in secluded dales or defiles, locations that remain largely unidentified. The statistically significant proximity of first century AD Roman structures within five kilometres of cuckoo place-names, including gouk stones, suggested they were cult centres targeted by the Romans during the conquest phase (Nance, 2019a). There are two Roman temporary camps upriver from Hatton, at Kintore. The closest, Deers Den, is 4.6 kilometres away from the Gouk Stone and there is evidence of at least two phases of Roman activity there: the first in the late first century AD and the second in the late second or early third centuries AD, with the potential for later activity (Alexander, 2000, p. 64; Cook & Dunbar, 2008, p. 33) indicating they are associated with both the known Roman campaigns that penetrated this far north: Agricola's (AD 81–84) and that of Septimius Severus (AD 208–210). Conceivably, the small, narrow valleys associated with cuckoo place-names, including that of the Blackburn below the Gouk Stone at Hatton, were the sacred defiles or groves of the druids that were targeted by the Romans for that reason.

### **Mote hill**

Inauguration of the Irish 'kings' comprised certain rituals and was conducted at a specific location. It is thought that during the inauguration feast, the 'king' copulated with a mare, symbolically representing the goddess of sovereignty, that was then killed, cooked and eaten (Maier, 1989), a ritual with an Indian parallel indicating an early Indo-European origin (Schröder, 1927, p. 310). Irish 'kings' were usually inaugurated on a hill next to, or standing, on a stone (O'Donovan, 1844, p. 438) from the Ó Néil on the tullagh or low hill of Tullyhogue, County Tyrone (Hore, 1857) to the 'kings' of Tara by the stone of *Lia Fáil* on the Hill of Tara. Since the ninth century the Christian Kings of Scots were inaugurated standing on the Stone of Destiny on Moot Hill, Scone, formerly a Pictish centre, until the inauguration of Charles II in 1651. Alexander III's inauguration in 1249 depicts the importance of the *ollamh rígh*, the royal poet, a member of the *filid* (Figure 12). Moot Hill also denotes the location of a judicial assembly.



**Figure 12.** The coronation of Alexander III King of Scots in 1249 on Moot Hill, Scone, depicted in the fifteenth century *Scottichronicon* by Walter Bower. The *ollamh righ*, the royal poet, a member of the *filii*, stands before him. The work is in the public domain.

The most probable location for the inauguration rites at Hatton is Mote Hill with its associated cairn. These mounds and hills were used as assembly sites where barony courts were held up until the sixteenth century (O’Grady, 2008, p. i). Some are recognised by the place-name *comhdhail* from Old Gaelic *comdál* (*con*, ‘together’ and *dál*, ‘a meeting’) meaning ‘meeting’, ‘tryst’ or ‘assembly’ (Barrow, 1992, p. 220; Watson, 1926, p. 492) and commonly survive in the forms ‘Cuthill’ and ‘Cothill’ (Barrow, 1981). On the north of Mote Hill is the place-name Cothill (Figure 3(a)). O’Grady (2008, p. 128) found that the majority of settings associated with *comhdhail* names are natural hills (thirty of the fifty-six examples), Barrow (1992, pp. 225–227) noted some were associated with major prehistoric monuments, especially cairns, stone-circles and standing stones, suggesting association with ritual landscapes. In north-east Scotland their association with Pictish symbol stones suggests their appropriation of places significant to Pictish elites during the spread of the Gaelic language into north-east Scotland from the ninth century AD and that they are the main source for the location of otherwise obscure Pictish early local judicial sites (O’Grady, 2008, pp. 129–134).

Assembly sites were thought to be paired with gallow hills where those convicted at the court were executed (Gomme, 1880, p. 273). Cothill is faced by Gallowbrae (Figure 3(a)). The form of execution was ‘pit and gallows’. While convicted men were usually hanged, women were drowned: Shand’s Loch would be an obvious location.

## Conclusions

A previously unrecognised, smaller, ritual-landscape was and delineated identified at Hatton of Fintray using archaeoastronomy. In addition to archaeoastronomy, this approach used elements from landscape archaeology, oral tradition, pre-Christian

religion, medieval textual sources, place-name studies and an ethnographic analogy. This approach could be used to identify similar ritual landscapes that have been overlooked.

The methods have allowed a wider interpretation of the location including some the rituals performed there that appear to extend back into the Bronze Age at least. The significance of a fertility goddess associated with the cuckoo and with Venus in the religion and governance in the 'farmer republics' of Iron Age northern Britain has been demonstrated.

The local legend of a 'general' named after the cuckoo who was slain near one of the monuments, the Gouk ('cuckoo') Stone, is a social memory of the ritual sacrifice of a series of warriors, equivalent to pre-Christian Irish 'kings', chosen to represent the fertility of their people, their lands and waters each for a period of seven or eight years. The date and year of their deaths was determined by monument orientations with sunset at *Samhain* and the extreme setting of Venus at the same date every eight years. Place-name evidence has indicated its function as a judicial assembly site into the medieval period.

The location of the ritual landscape has a number of features that are present near other cuckoo place-names. They include the geographic features of a river and wide strath, a narrow side valley, a body of standing water, and springs. The spring in this landscape was a holy well and a place-name indicate the linked loch was regarded as sacred. Indirect evidence suggests both were regarded as healing sites associated with a local goddess. This suggests that the same features at other cuckoo place-names, particularly the other 31 that have a standing stone, were considered to have the same attributes. Should similar astronomic orientations be determined at these locations then a possible context for common elements of ritual could be confirmed with some confidence. In addition, the legend has provided a possible basis for other legends of military figures slain near other standing stones that might also be locations for ritual murder.

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No potential conflict of interest was reported by the author.

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## Appendix 1

Orientation data of intervisible monuments that skyline when viewed from another at Hatton of Fintray.

Monument	Image date	Azimuth (°)	Distance (m)	Altitude (°)	Apparent declination (°)	Nearest lunisolar alignment	<i>P</i> (difference)
Donald's Hillock to Motte Hill cairn	28/6/2018	32.2	811	+3.18	+30.0	Major lunar standstill northern rising (+28.2°)	0.10 (±1.6°)
	8/3/2018	32.1	813	+3.04	+29.8		
	1/1/2007	32.5	804	+3.14	+29.8		
<b>Gouk Stone to Mote Hill cairn</b>	<b>29/5/2021</b>	<b>31.4</b>	<b>1881</b>	<b>+0.6</b>	<b>+27.4</b>	<b>Major lunar standstill northern rising (+28.2°)</b>	<b>0.04 (±0.6°)</b>
	<b>1/3/2018</b>	<b>31.7</b>	<b>1867</b>	<b>+0.7</b>	<b>+27.6</b>		
	<b>1/5/2019</b>	<b>31.6</b>	<b>1882</b>	<b>+0.7</b>	<b>+27.7</b>		
Donald's Hillock to Slacks cairn *	1/5/2019	173.6	1682	+4.33	-28.4	Major lunar standstill southern rising (-29.9°)	0.09 (±1.4°)
	5/8/2018	173.6	1678	+4.23	-28.5		
	21/3/2003	173.8	1677	+4.23	-28.5		
<b>Mote Hill cairn to Slacks Cairn *</b>	<b>16/5/2003</b>	<b>186.1</b>	<b>2366</b>	<b>+1.94</b>	<b>-30.5</b>	<b>Major lunar standstill southern rising (-29.9°)</b>	<b>0.04 (±0.6)</b>
	<b>5/9/2016</b>	<b>186.1</b>	<b>2367</b>	<b>+1.94</b>	<b>-30.5</b>		
	<b>20/4/2020</b>	<b>186.0</b>	<b>2367</b>	<b>+1.94</b>	<b>-30.5</b>		
Gouk Stone to Slacks Cairn*	1/3/2018	135.0	1054	+5.65	-17.5	Minor lunar standstill southern rising (-19.6°)	0.13 (±2.0°)
	19/4/2020	135.0	1058	+5.68	-17.5		
	1/1/2001	135.2	1050	+5.67	-17.6		
<b>Donald's Hillock to Kinellar church *</b>	<b>8/3/2018</b>	<b>228.2</b>	<b>2484</b>	<b>+1.38</b>	<b>-20.2</b>	<b>Minor lunar standstill southern setting (-19.6°)</b>	<b>0.04 (±0.6°)</b>
	1/1/2001	228.0	2486	+1.41	-20.2		
	<b>16/5/2003</b>	<b>228.2</b>	<b>2489</b>	<b>+1.40</b>	<b>-20.2</b>		
<b>Gouk Stone to Cairntradlin</b>	<b>11/2/2018</b>	<b>229.0</b>	<b>1837</b>	<b>+1.31</b>	<b>-19.8</b>	<b>Minor lunar standstill southern setting (-19.6°)</b>	<b>0.01 (±0.2°)</b>
	<b>31/7/2020</b>	<b>229.2</b>	<b>1837</b>	<b>+1.31</b>	<b>-19.8</b>		
	<b>1/1/2007</b>	<b>229.1</b>	<b>1836</b>	<b>+1.31</b>	<b>-19.8</b>		

(Continued)

Continued.

Monument	Image date	Azimuth (°)	Distance (m)	Altitude (°)	Apparent declination (°)	Nearest lunisolar alignment	<i>P</i> (difference)
Donald's Hillock to Cairntradlin *	1/1/2001	222.1	2925	+1.23	-22.9	Winter solstice sunset (-23.9°)	0.07 (±1.0°)
	8/3/2018	222.2	2935	+1.23	-22.9		
	25/8/2006	222.4	2947	+1.23	-22.9		
<b>Monument</b>	<b>Image date</b>	<b>Azimuth (°)</b>	<b>Distance (m)</b>	<b>Altitude (°)</b>	<b>Apparent declination (°)</b>	<b>Nearest lunisolar alignment</b>	<b><i>P</i> (difference)</b>
Cairntradlin to Mote Hill cairn *	29/5/21	39.9	3735	-0.13	+23.5	Summer solstice sunrise (+23.9°)	0.03 (±0.5°)
	1/1/2005	40.3	3745	-0.12	+23.4		
	3/6/2021	39.9	3730	-0.13	+23.5		
Kinellar church (RSC) to Slacks Cairn *	16/5/2003	90.3	2044	+1.82	+1.1	None. Temporal spring equinox sunrise 2000 BC (declination +1.1)	
	8/3/2018	90.3	2041	+1.82	+1.1		
	1/1/2005	90.3	2039	+1.82	+1.1		
Gouk Stone to Kinellar church (RSC) *	1/1/2005	240.1	1496	+1.53	-14.6	None. Sunset at <i>Samhain</i>	
	28/6/2018	239.9	1497	+1.51	-14.7		
	1/12/2001	239.7	1499	+1.51	-14.8		
Cairntradlin to Slacks Cairn *	8/12/2007	76.6	2215	+1.57	+8.1	None.	
	1/12/2001	76.7	2221	+1.57	+8.1		
	28/6/2018	76.7	2221	+1.57	+8.1		
Donald's Hillock to Gouk Stone	28/6/2018	210.6	3490	+1.30	-26.8	None. below horizon but 'touches' horizon at extreme setting of Venus	
	22/3/2012	210.8	3484	+1.30	-26.8		
	18/3/2019	210.7	3479	+1.30	-26.8		
Mote Hill cairn to Cairntradlin *	28/6/2018	220.3	3737	+0.32	-24.3	Winter solstice sunset. 0.5° below the horizon (-23.9)	(±0.5°)
	21/3/2003	220.2	3743	+0.32	-24.3		
	4/5/2017	219.9	3750	+0.33	-24.4		

Notes: Three sets of values were obtained for each orientation from Google Earth using differently dated images. RSC = recumbent stone circle. \* = Obscured by trees. Statistically significant orientations are bold.