Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

Bardic Echoes:

Reconstructing Ancient Celtic Music,

Towards an Ethnomusicology; or,

An Interdisciplinary Study

of Celtic Musical Identity

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A thesis fulfilling requirements towards the degree of Master of Arts in Celtic Studies,
presented to the University of Wales Trinity Saint David

1822 - 2022
Two Hundred Years of Education

All vagabundis, fulis, bardis, ſcudlaris, and ſiclike idill pepill, ſall be brint on the cheek, and ſcourgit with wandis, except thay find ſum craft to win thair living.

– 'Laws of Scottish Kings', in Sir James Balfour, Practicks: Or, a System of the More Ancient Law of Scotland, (Balfour, 1754), c. 16 C. CE

All carroughes, bards, rhymers and common idle men and women within this province making rhymes, bringing of messages, and common players of cards, to be spoiled of all their goods and chattels, and to be put in the next stocks, there to remain till they shall find sufficient surety to leave that wicked thrade of life and to fall to other occupation.

– By decree of Sir John Perrot, President of Munster (Joyce, 2011) 1571

No, Morgan, you're wrong. They were our ancestors. They were here.

– Uncle Mick, Healer
Grimspound Stone Hut Circles on the Dart Moors, Devon, 2019

[Morgan Black at Castell Henllys Iron Age Hillfort and Village]
[Photography Lloyd Jones, used with permission]
[July 2019]

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UNIVERSITY OF WALES
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Master's Degrees by Examination and Dissertation

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1. This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Name: Morgan George Ian Black

Date: Friday 30 September 2022

2. This dissertation is being submitted in partial fulfilment of the requirements for the degree of Master of Arts in Celtic Studies.

Name: Morgan G. I. Black

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3. This dissertation is the result of my own independent work/investigation, except where otherwise stated.

Other sources are acknowledged by Harvard referencing.

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I am satisfied that this work is the result of the student's own efforts.

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CONTENTS

THE CAULDRON OF INSPIRATION

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ABSTRACT

This paper aims to begin a reconstruction of the music played in the ancient Celtic cultural horizon, from its inception in the Bronze Age to its zenith in the Iron Age, until its amalgamation into the Roman Empire, drawing from sources both earlier and later. The question is considered from a musician's gaze and informed from empirical experimental archaeological experience from: Castro el Cincho, Galicia, and Salamanca, Spain; Helsingør, Denmark; Tintignac, Corrèze, France; Iron age site of Castell Henllys, West Wales and research conducted at the Universities of Bristol and Aberystwyth. This summative study is intended to act as a theoretical guide for the process of reconstructing Celtic music, as a starting point from which further research and experimentation may be undertaken at a later time. An assertation is made of the characteristic of musical instruments with interpretations of their usage, and it is ultimately found that archaeomusicology can demonstrate aspects of shared cultural features with a parity of continuity in technologies and traditions indicating a common Celtic musical identity. An ethnos describes a nation, or people, as defined by cultural lines, while ethnomusicology, for the sake of this paper, is the study of music particular to an ethnic group. Archaeology and ethnography remain the two main sources of evidence for understanding an ancient cultural identity, and they correspond respectively to the 'material culture' of the group in question and to written attestations of their defining features. Due to the speculative nature of artistic reconstruction, this investigation begins with what is physically extant in the archaeological record, describes what is known from literary sources, and draws an interpretation based on the physical evidence. The intention is to avoid affecting the discussion with a priori assumptions, looking for physical evidence to justify preconceptions about the Celts, and instead to compare a given set of artefacts with other forms of information. Due to differing levels of evidence scarcity, this is presented relevant to the burden of proof and likelihood rather than along a chronological axis.

ACRONYMS AND FORMATTING

BCE – Before Common Era (i.e., B.C.: Before Christ)

C. – Century

c. – Circa

CC – Creative Commons Paternity (Images in public domain)

CE – Common Era (i.e., A.D.: Anno Domini)

EEF(s) – Early European Farmer(s)

PIE – Proto-Indo European (language and culture)

RCM – Royal College of Music

RQ – Research Question

UWTSD – University of Wales Trinity Saint David

Format:

All names and nouns referring to specific musical instruments are formatted in italics, to differentiate from alternative objects to which they might otherwise refer – unless quoted or translated from a primary source. For example, a reed can be a plant, a type of instrument, a component for an instrument or construction material, and so forth; a pipe may be a *reed pipe* or the component to a bronze *horn*, while not all animal horn may be made into a musical *horn*.

1. INTRODUCTION

1.1. Music: a Definition for the Mind and Society

Within a modern study of ancient Celtic culture, a paradigm shift is necessary for Celtic music reconstruction which places it in a new orthodoxy. This research has not been done before and fills a substantial gap in academic knowledge. The intention of this paper is to form a picture of music in the Celtic past from a musician's perspective, that this may in turn positively inform a contemporary appraisal of ancient Celtic identity:

> Music is found in every region on earth; it plays a part in shaping our perception of the world.' […] 'We shall take music here to mean "humanly organised sound", after Blacking (1973). […] sound may have had an altogether more metaphorical and even metaphysical significance (Wyatt, 2009, p. 11).

There exists a strong relationship between musical systems and the human brain (Wallin, 1991; Falk, 2001; Morley, 2003 and 2006, pp. 95-105; Mithen, 2005), partially explaining the role they play in shaping group identity, thus the need to define this in Celtic Studies. Music helps to maintain social structures and even affects the formation of language (Julian, 2003), pattern making and cognitive reasoning (Vandervert, 2019), along with the development of abstract thought upon which religious belief systems are founded (Tuzin, 1984, *cited in* Wyatt, 2009, pp. 11-14; Mithen, 2005). It is, therefore, a key feature for characterising cultural identity.

1.2. Objectives and Motives

Sources ancient and modern will be used to paint a clearer picture defining the instruments which came to form a broad Celtic musical identity in the past, aiming to understand the origins, dispersal and character of widespread features. This study recognises, given the broad geographical range of lands inhabited by Celtic peoples, that it is not realistic to imagine a single, united musical identity. Rather, each individual tribe will have born distinctive features as a product of the particular area they inhabited and their relationships to earlier peoples or neighbouring groups, along with their positions in trade routes allowing them to benefit from cultural influences from abroad.

Nonetheless, this should not prevent us from asking the question:

What instruments were played in the musical culture of the ancient Celts?

The objectives of the Research Question (RQ) are as follows:

- To draw on different sources with the broadest set of data possible and gain the most available insight for conceiving an ethnomusicology of the ancient Celts
- To promote methods of engaging with the given material for the purpose of recreating ancient Celtic musicality by interdisciplinary study
- To demonstrate that there exists a broad and specifically defined Celtic musical identity discernible from the surviving evidence of their instruments.

1.3. Celt as an Ethnonym: A Cultural Definition of Celtic

For the purpose of this study, Celtic is taken to serve as the ethnonym for a larger group of Western European people, whose shared identity can be recognised along cultural lines. In Celtic religion, an apparent uniformity between far flung Celtic groups can primarily be observed in a 'basic religious homogeneity' (Ross, 1986, p. 103), along with language and typography indicating 'broad structural similarities', despite variation in chronology and geography (Cunliffe, 1997, p. 184). If there is a homogeneity of religion and shared linguistic features between Celtic groups, we can expect some degree of parity on the level of music as well. In support, the *Celtic from the West* theory will be included in the framework, informing the archaeological range relevant to the discussion (Koch, 2013 and 2016). This paper does not offer an encyclopaedic compendium of conclusions and interpretations, but merely a referenced suggested method for engaging in active and dynamic reconstruction via experimental archaeology. This is by no means an exhaustive collection of information and it is intended to serve as a basis on which a further forum of discussion can be built.

1.4. Chronological and Geographical Range of Study

According to *Celtic from the West*, a reassessment of Celtic culture in the Bronze Age, before the Iron Age, is necessary to paint a picture of the European people called Celts (Pasalodos, 2012; Schrijver, 2012; Mallory, 2013; Koch, 2013 and 2016). This indicates the period thought to coincide with the development of multiple Indo-European civilisations, and this paper will focus on the Bronze and Iron Ages in Western and Central Europe, along with other relevant countries for music archaeology associated with ancient Celtic cultures. If using new theories about Celtic languages and culture in pre-history, it becomes necessary to examine archaeology from beyond the traditionally accepted Celtic period in the Iron Age; it may be that the people who played a Bronze Age crane leg bone *flute* found near Stonehenge were speakers of a Celtic language, thus such artefacts are exemplary evidence of ancient Celtic music, and this should impact our understanding of ancient Celtic culture. As an addendum to *Celtic from the West*, if Celtic develops *in situ*, so too will the previous culture have been an influence. If the Celts were so influenced by their pre-Celtic forebears, we can gain a better idea of ancient Celtic music by identifying and understanding the pre-Celtic elements within. Vocal music has been excluded to preserve the document's size, but will be explored in future music research, while the investigation at present focuses primarily on the physical evidence.

1.5. Classification of Instruments

This annotated compilation makes use of the Hornbostel-Sachs system for instrument naming conventions. This system was partially based upon an ancient Hindu philosophical grouping of musical instruments, as recorded by the Sage Bharata Muni from the 2nd C. BCE in a text called *Natya Shastra* (Mehta, 1995, pp. 19-20), dating to 500 BCE or earlier (Dace, 1963, p. 249); instruments were organised into three families, as either *Sushir* ('holed', blown), *Ghan* ('solid' percussion) or *Avanaddh* ('covered', stretched skin percussion), and *Tat*, *Vina* (stringed, usually plucked) or *Vitat* (bowed strings) (Uddhav, 2021, pp. 23-30).

The *Natya Shastra* text provides an ancient precedent for grouping instruments by type which could have had a parallel in a Celtic musical identity. Since these groups not only shared contact but also bore Indo-European ancestry in common (Reich *et al*., 2009, pp. 489-494), along with cultural features (Anthony, 2007, p. 49), we might theorise they knew a similar method for organising instruments and that this contributed to their cultural identity. This may be supported by the existence of a comparable European medieval system attested by Johannes de Muris in the 12th C. CE, including *inflatibilia* (wind), *percussibilia* (percussion) and *tensibilia* (strings) (Rault, 2000, p. 190). The ancient systems were eventually concretised and altered to take on a modern form as the classifications of Aerophones, Idiophones or Membranophones and Chordophones, as used by Erich von Hornbostel and Curt Sachs in 1914, after an initial partial adoption by Victor-Charles Mahillon in 1880 (Montagu, 2007, p. 211). This is here adapted for the paper at hand into three Chapters respectively entitled: **2. Aerophones**, **3. Rhythm** (featuring dance) and **4. Chordophones**.

1.6. Primer

Comparative European instruments, including Greco-Roman, will be mentioned throughout this study when relevant, under the assumption that their usage in proximity to where ancient Celts once lived belies a lost attestation from the same Proto Indo-European (PIE) source, as is the value of identifying cognates in linguistics, but certain non-European instruments will also be described for the sake of parallel conceptualisation. Pre-European groups will be instrumental to this discussion, including those of the Phoenician, Phrygian, Basque and Sami cultures, but especially the Etruscans, since they demonstrably influenced Celtic material culture and equally seem to have done so musically. Evidence will be presented for recognising the distinct features of a Celtic musical identity, attempting to explain their developmental origins, with continuous analysis throughout, before proposing a conclusion.

2. AEROPHONES

> Most professional woodwind and brass musicians have had only three or four instruments in their lives […] I began learning on a Selmer Gold Seal […], upgraded to a Yamaha student flute […], moved on to my professional [wooden] flute, a Rudall Carte […] as an apprentice piece. I now play an Althus silver flute with an Oxley gold head-joint because it travels better and copes with climate changes.
>
> Atarah Ben Tovim, OBE, *The Right Instrument For Your Child* (Ben Tovim and Boyd, 2012, p. 92)

2.1. Introduction: Wind Instruments

An aerophone, or wind instrument, allows the musician to manipulate concentrated air currents for focused (pitched) sound production. This grouping would generally include *whistles*, *horns*, various types of *pipes*, *reeds* and *flutes* (Sachs, 1940, p. 457 and p. 459). The earliest wind instruments are also thought to be some of the first true melodic instruments, though in their most primitive form they would be most akin to *whistles* (Stadler and Pomberger, 2018, pp. 453-470). Made from animal bone, which is sometimes a natural aerophone in the case of birds, being hollow boned, they likely had a practical role as sound-makers, used to recreate the birdsong of the creatures from whose parts they were constituted (Atema, 2014, pp. 26-34). This, perhaps in the midst of a hunt or to call discretely to each other, belies the imitative aspect hominids (H. neanderthalensis also created such instruments) recognised in the flute (Morley, 2003, p. 209), evidencing from the earliest times the close relationship, and blurred lines, between music and magic. Bone material instruments are useful for preserving the musical capabilities of instruments ‘in design and form’, while bronze survives best (Holmes and Coles, 1981, p. 280):

> Other instruments that may have existed such as drums, rattles, stringed instruments tend not to survive in the archaeological record due to the materials from which they were made (wood, horn, hide, gut etc [sic]) (Leaf, 2008, p. 23).

This is why the wind instruments provide the best impression for available notes, for the purpose of music reconstruction, which will give us approximations of actual scales and modes, even if the question of what was played on them may be, for more than any other instrument family, ‘up in the air’ [Appendix 1.1.].

Wind itself or air is associated with ancestor spirits from time immemorial in Celtic nations (Yeats, 1933, p. 454; Evans-Wentz, 1966), and Purser (2007, p. 23) relays Scottish folk beliefs about whistling, which imitates bird song, citing fairies who 'speak but little, and that by way of whistling, clear, not rough'. Bone smells of decay when wet, as it must be for cutting, and even when finished the instrument will sweat and behave as if alive (Gordon, 2019), but all instruments are affected by environmental factors and may be personified by musicians as temperamental, though few produce perspiration. Brass instruments, on the other hand, are often used to characterise heroism and honour in compositions of music and in film, and as such the Romans are often introduced gloriously with *horns* and *trumpets* in contrast to a barren and dark, simplistic musical soundscape representing the Celts (i.e., 'The Stolen Eagle' and 'An Owl in a Thornbush' [from the series *Rome*], 2004; *The Eagle*, 2011; Lysy, 2017). This chapter will introduce the archaeological and ethnographical sources for these instruments, divided into two main sections, **2.2. Woodwinds** and **2.3. Labrosones**, themselves further subdivided.

2.2. Woodwinds

2.2.1. Introduction

The *woodwind* family includes any instrument which can focus vibrating airstreams with hard edges to produce a sound, such as *flutes* and *reeds* (Sachs, 1940, p. 457 and p. 459). *Flutes* are subdivided into 'open flutes' and 'closed flutes', while *reeds* may be 'single-reed' or 'double-reed' (which are either capped or exposed).

'Open flutes' may be described as having a warmer, earthy tone – a modern example would be blowing into an empty beer bottle – in comparison to their closed flute counterparts, which may sound more shrill and piercing, like a recorder or ball game referee's *whistle*, on account of the higher air pressure. *Reeds* can have a droning, buzzing quality, and according to Carroll (1999, p. 88) can be 'very loud'.

This subsection will be separated into **2.2.2. Flutes** and **2.2.3. Reeds**. All instruments in this family are called *woodwinds* regardless of the material they are made of, which in an ancient example may be water reed, bone, or wooden although earthen varieties also exist, i.e., ceramics. Bone survives best in the archaeological record and it may be that pre-historic people voluntarily chose to forgo wood in favour of it, perhaps from a desire for increased durability of *bone flutes* to meet the evolving day-to-day needs of their musical instrument functions, suggesting more involved and complex artistic development. A symbolic meaning may have been embodied in animal bones, their spirits invoked or in some way tied to musical and ritual practice (García Benito, 2018, p. 26). Wyatt (2009, p. 13) comments that although preservation of plant material-based instruments is unlikely, 'unless in special circumstances', tubes comparable to the dimensions of the *Charavine pipe* (discussed below) are able to play 'eight distinct notes based on the principal of blowing at the end like a *ney* [Persian end-blown flute]' (Ibidem, p. 14). This is whereby air pressure alone is alternated; some hunter-gatherer societies often use *flutes* which lack finger holes in this manner (Wyatt, 2009).

In addition, it should be noted that though such tubes can play sounds, they may also be designed to fan a fire's flames, 'as was used until recently in the Lot region of France' (Wyatt, 2009, p. 14), where the *Charavine flute* was found. It could therefore be said that music metaphorically fans the flames of civilisation. With one's very breath, notes performed in Shamanic practice enact cultural agency in society, demonstrating practical application of music technology becomes a part of the lived experience, characterising cultural identity, as will be argued for in a Celtic context. From musical instruments, we can define Celtic culture.

2.2.2. Flutes

Wooden:

With the given archaeological range, the first *flutes* relevant to the RQ appear in Southern France. The Veyreau vulture wing *bone flute*, c. 2000 BCE Aveyron, near Rodez (named for the Celtic Rutenii tribe) (Nègre, 1990, p. 156), is considered a sophisticated piece from the Chalcolithic [Copper Age], cut to precision with five finger holes. This is exceptionally early for a flute functioning like a [contemporary] recorder, with comparisons of a similar full diatonic scale tonality (not chromatic, meaning five whole tones and two semitones) being drawn to a 13th C. medieval Welsh flute from White Castle, Monmouthshire, Wales, which has five finger holes (Megaw, *cited in* Scothern, 1989, p. 257). Scothern (Ibidem) considers this to be part of an ancient block and duct *flute* tradition connected to the 1500 BCE Avebury and Early medieval Malham Tarn (see below) examples. As established, the time of usage for the *Veyreau flute* coincides with Bronze Age inhabitants of France found to be the ancestors of the Gauls (Fisher, 2018 and 2022), of whom little can be said other than that they were themselves likely a development of Indo-Europeans and perhaps speakers of an hypothesised Italo-Celtic language (Schrijver, 2016, pp. 489-502). The slightly earlier *Charavines pipe*, also from the south of France (Isère) bears many similarities but predates the *Veyreau* by half a century (placed at c. 2600 BCE in the Neolithic), does not feature finger holes, and is itself made of a 42 cm long piece of elder wood. It was probably employed in firelighting, in a technique used 'until recently' in the part of France where it was found (Wyatt, 2009, p. 14). Musical tones might be achieved similarly to an overtone flute by modulating the out-going air stream with the finger or palm, using *open flute* embouchure. There are other European *overtone flutes* played this way, such as the Nordic *sälgflöj*, or *willow flute*, and Hirt (2012, xi-xii) has suggested that Gaelic folk song melodies have their origin in the Natural (or Overtone) scale provided by just such natural instruments [Appendix 1.2.].

In medieval Irish literature, an antagonist in the *Fenian Cycle* (title of scholarly invention) called Aillen (*the burner*) carries a magical *flute* and *harp* capable of putting people to sleep. He uses these to pacify and then burn down the capital settlement of Tara every year at Samhain (Halloween), with his very breath (Meyer, 1904, pp. 180-190). It is possible this connects him to elder pipes or *flutes* used to fan flames, since pipes with a dual musical/pyrodynamic function existed and can be recognised in the Celtic material culture.

There are three names for *woodwinds* in Irish sources, particularly well attested from the *Colloquy of the Ancients*, which come down to us from medieval period manuscripts but perhaps originating much earlier; *cuisle*, *buinne* and *feadán* [Appendix 1.3.]. One meaning of the name *feadán* is 'hollowed stick', and along with the *cuisle*, it was made by 'hollowing out the stalks of plants such as elder, cane, and other wild grasses and reeds' (McCullough, 2015, p. 6). Its name likely meaning 'whistler', it is the instrument played by Aillen (*the burner*) (Meyer, 1904, pp. 180-190). Aillen's story characterises him as a myth to warn against the danger of falling asleep with a fire burning due to its soothing warmth, his victims coaxed by a *flute* of similar qualities, and this matches the description of an *overtone flute*. Furthermore, Beltz (2017, iv) says: 'Generally speaking, there are three categories of music in Irish folklore: *geantraí*, the music of happiness; *goltraí*, the music of sadness; and *suantraí*, the music of sleep and meditation'. One might postulate that this tripartite division of 'the strains of music' could correlate with the three *woodwinds*: *cuisle* for joy, *buinne* for sorrow, and *feadán* for slumber. There is also a hierarchy of musical instruments in pre-Christian Ireland, which places *woodwinds* at the bottom (Buckley, 2000), and going by Bisagni's (2015, p. 44) report of the *Tech Midchúarta* texts and Old Irish legal tracts, playing them professionally was a reasonably 'low status' occupation. Because of this, we might theorise it is suggestive of pre-Celtic musical identity.

Benito (2018) and McCullough (2015) agree in the assertion that instruments made from more permeable materials such as reed and wood may have predated *bone flutes*, and the archaeology would appear to correlate with this chronology. As previously mentioned, bone survives better but may have been predated as a *flute* material by wood, and though rare, even some wooden *flutes* survive from later periods, such as the Bronze Age decorated elder *flute* from Hagnau-Burg, Southwest Germany, dated to 1050 BCE, and seemingly also without tone holes (Benito, 2018, p. 26). Southwest Germany (along with much of the rest of the modern polity) was Celtic at this time, and possibly home to the ancestors of the Celtic Tulingi and Vindelici tribes, or perhaps members the Volcae confederacy (Green, 1998, pp. 160-163).

It is intimated by Lawergren (2007) that the Etruscans likely played a *transverse flute* similar to the urn of Volumni find, Perugia, potentially called the *plagiaulos*. Given how highly the Celts were influenced by the Etruscans in other ways [as argued throughout the RQ], it is possible that the *transverse flute* may have made its way to Gaul and the British Isles beyond, but there is no certainty in this. Pomberger (2016, pp. 58-59) cites the fragment of a Vösendorf *bone flute* and her findings concur that though little is known of *flutes*, evidence again points to elder wood being the likely material conforming with the artefacts cited above:

> […] we can imagine that there existed flutes made of wood [which] might have finger holes or […] [were] only played with changing the air pressure and producing natural harmonics' (Pomberger, 2016, pp. 58-59).

Bone:

Interred near to Stonehenge with a bow c. 2300 BCE, in the Early Bronze Age, the 'Amesbury Archer' may have been active in a hypothetical cluster of ancient North-West Indo-European dialects ancestral to Italic, Germanic, Balto-Slavic and Celtic languages (Mallory, 2013, pp. 17-40). Associated artefacts may be given as proof of pre-historical travel over great distances, stressing the importance of shared ideas and music through shared contact, a useful concession to excuse the comparative lack of prehistoric British music archaeology:

> In Britain few prehistoric musical instruments have survived. […] we have a great deal of contemporary evidence from continental Europe. […] contacts, trade, and the movement of people, such as the Amesbury Archer, and the range of instruments may have been similar […] (Wyatt, 2009, 12).

This would account for the earliest syncretic European adoption and usage of pre-European Neolithic culture and sites in the Salisbury plain, where significant British archaeomusicological discoveries have been unearthed at a Wilsford site, in Wiltshire. Of note is a crane leg *bone flute*, designated Wilsford G23, which dates to 1950-1700 BCE. The pipe features two (possible) tone holes and could theoretically be played both as an open or closed *flute*, of both the end-blown and overtone varieties, but with greater versatility by the latter.

A related find from the same site is the slightly later and infamous Wilsford G58 bone tube, memorable for its identification as a human thigh bone, or femur. It has variously eluded explanation, but has been described as a *flute* or *whistle*, because of a side hole and the care taken to completely smooth it, with the interior 'scrapped out and made circular' (Thomas, 1954, p. 323). It recently benefitted from a large-scale modern carbon dating initiative and is estimated to 1745-1617 cal BCE (95% confidence) or 1731-1636 cal BCE (68% confidence); Middle Bronze Age (Booth and Brück, 2020).

Comparison has been drawn with a similar Hindu human leg bone instrument called a *kangling* in an attempt to define it, along with other G58 objects, as part of a religious specialist's regalia (including a pronged instrument as a *rattle* and a battle-axe as a sceptre), noting its application in death rites (Woodman and Needham, 2012, p. 124) [Appendix 1.4.]. It must be maintained that the later Bronze Age Hallstatt A and B cultures overlap with Urnfield C and D, and that Hallstatt C and D are themselves Iron Age Celtic, which makes these Bronze Age artefacts ancestral in the development of Celtic musical instruments. This period becomes therefore a prime candidate for hosting the early development of Proto-Celtic cultural idiosyncrasies deriving from Indo-European practices melding with earlier ones.

Leaf (2008, p. 24) questions a 'continuity of tradition between prehistoric and medieval bone flutes', but notes an uncertainty in this, and is countered by McCullough (2015), who relates Bronze Age finds in Somerset and medieval examples to other simple *bone flutes* of the same general type in Britain, Ireland, and other parts of Europe. McCullough (2015, p. 7) states that they give diatonic scales comparable to the *tin whistle* and that 'it is not unlikely that relatively sophisticated music was played on ancient bone pipes of this kind.'; thus, we need not only look to British archaeology for the music of ancient Britain. A *bone flute* from Vesterbølle, in Denmark dating to 200-100 BCE would appear to attest tone holed *flutes* in Iron Age Europe and is similar to the Malham Tarn *bone flute* from North Yorkshire (Benito, 2008, p. 27), which had mistakenly been dated to the Iron Age and is now considered 4th or 5th C. CE (Sermon and Todd, 2018, pp. 5-43) [Appendix 1.5.]. However, the *Malham Tarn flute* continues to be mislabelled, as it is now being called Anglo-Saxon (i.e., Leaf, 2008), even though this culture's arrival is dated to 440 CE and was not well-established in Yorkshire until the next century, after 560 CE (Hey, 2005).

Pan flutes:

The *panpipes* are tubes made as single-note open *flutes* with closed ends collected together to gain multiple tones. They may be lashed to one another with twine or linen, or joined with wax (Wardle, 1981, p. 138). Ancient Mediterranean *pan flutes* of antiquity were traditionally made up of seven or nine pipes, possibly in relation to the number of strings on *lyres*, and therefore the notes they produce may have baring on the viable tuning options for chordophones (Ibidem, p. 139). *Syrinx* means different things depending on the occasion and context in Greco-Roman texts, but the original Greek *surinx* referred to any pipe, stalk, or tube (giving us the modern medical 'syringe') and Roman usage exchanges it interchangeably with *fistula*, which is normally a *shepherd's flute* (Gaffiot, 1934, p. 1535; Wardle, 1981, p. 136).

Some Greco-Roman sources, such as Pollux, record the *pan pipes* 'among the Celts' (Wardle, 1981, p. 136), and others describe the Gauls sensationally, comparing them to satyrs with 'Panic' qualities (Strabo, Book V, 28), thus it benefits them to represent their enemy by an instrument they deem primitive, emblematically pastoral, and suggestive of the wild woods.

The '*Wicklow Pipes*' from Ireland, approx. 2167±30 [sic] BCE, again predate the Celtic period in the British Isles, but they may be one of the few examples hinting at the origin of the *pan flute* in a Celtic environment, being the oldest known wooden pipes in the world. The large *pipes* being difficult to play one after the other, along with a poor surface finish seemingly meant for insertion into a socket, makes it unlikely they came into direct contact with the mouth, necessitating at least some form of fipple mouthpiece into which a notch for air to escape would have been cut (Holmes and Molloy, 2006, pp. 15-40). This embouchure sets the *Wicklow Pipes* apart from other European *pan flutes* which have survived into modern traditions, generally in pastoral settings, such as the Slavic *kuvytsi*, the Georgian *soilami* and *larchemi*, and the Romanian *nai* (Chisholm, 1911).

Some of these are also fairly sizeable and grouped in a curved arrangement for ease of use, perhaps informing us as to how the Wicklows ought to be attached. Nonetheless, even in antiquity some Greco-Roman *pan flutes* were also of prodigious size and Wardle (1981, p. 139) mentions that 'Iconographic evidence of Hellenistic and Roman times shows instruments that were apparently considerably larger […] approximately 30 cm high', although he notes 'most illustrations however show smaller instruments […]'. The much smaller and later *Przeczyce Pipes* (c. 700 BCE) were made from goat or sheep bone and found as part of an 'Hallstatt Culture site' going through a transitionary phase between the Late Bronze and Early Iron Ages, in Poland (Popławska, 2005; García Benito, 2018, p. 26). They might have been used by Lusatians (Gediga, 2002, pp. 66-67).

This area is associated with Celtic tribes and the Lugii confederation, along with the Przeworsk culture, and by extension the later Vandals, all of mixed Celtic heritage alongside Germanic, prior to Slavic dominance (Wolfram, 1997, p. 42). Their territories all included the modern voivodship (province) of Silesia, where Przeczyce is located, deriving its name from the Celtic Silingi tribe who dwelt in the area. They may have been in the possession of a Priest or Shaman, their burial possibly providing a connection between 'Druidism and music' and the five-pipe structure of such *flutes* may be evidence for pentatonic tunings (Waldman and Mason, 2006, p. 159), which does conform with the 'gapped', Natural Scale. They seem to not be stopped (closed off), unless the clay mentioned in their construction was involved in sealing their extremities (Popławska, 2005). Pomberger (2016) confirms reliable evidence for Celtic *pan pipes*, noting two bronze tube pipes from Early Bronze Age Slovakia, and asserting that, despite the bone material of the Przeczyce example, 'syrinxes of wood' (p. 62) can be imagined in the latter Bronze Age Urnfield culture. Early Iron Age *pan flutes* can be observed from a number of situlae friezes (Pomberger, 2016, p. 62) and there is also some iconographic evidence for Celtic *pan flutes* from later Iron Age 'buckets', with rows of 4-7 pipes (Coles, 2015, p. 160).

Smaller examples of *pan flutes* extant in a post-Celtic world include the *Xipro de Afilador* (*Chiflu* or *Xiplu* – 'Whistler of the Knife Sharpener') of Portugal and Galicia, often featuring a handle carved into an animal's head, even into the modern era (Civallero, *cited in* Sánches, 2018, p. 20). These were worn by itinerant knife-grinder-veterinarians to signal their approach during an unspecified, past time period, but perhaps their usage implies a latent association of 'magical' smiths, barber-surgeons and metalworkers alike, with such instruments, as a distant vestige of their religious past importance. Constructed in boxwood, they are similar to a medieval Jorvik *panflute* for which there is a 2000 year-old Iron Age precedent in the Eschenz *syrinx* example, from Switzerland, Roman period Targetium (Brem, 2008, pp. 4-6).

There is also a decorated, 115 mm long boxwood rectangular set with seven air columns, from late 2nd-3rd C. CE Alesia, France (Ibidem, p. 6). Like the later Spanish *xipro*, they all have an eyelet to allow for wearing the instrument around one's neck, and, despite being Roman period, this boxwood type is unknown elsewhere in the Roman world, while a similar find in Barbing-Kreuzhof, Germany, points to its home in a Northern frontier province milieu, leading some (for example, Reinach, 1907, p. 180) to suggest a dedicated 'Gallo-Roman type' for the *pan flutes* of this species more widespread in the Celtic world (Wardle, 1981, pp. 144-147) [Appendix 1.8.].

There may therefore have been small boxwood *pan flutes* in usage by ancient Celts, but this is one of the many instruments, among many pieces of material culture, conflated with Roman 'civilisation', passing over potentially Celtic beginnings and being difficult to disentangle from imperial origins. The *Wicklow Pipes* theoretical mouthpieces seem similar to what is found in the smaller boxwood *pan flute*, with a single, unbroken and regular row of blowing apertures, but their being so very long approximates them somewhat more to *triple pipes* than typical *pan pipes* and there is some degree of overlap between *double flutes* and *double pipes* (**2.2.3**. **Reeds**). Roman accounts othering the Celts (Pritchard, 2012, pp. 8-12) might have obscured the true nature of the *pan flute*, and references to a hypothetical *syrinx gallia* could in fact be misidentifications of *double* and *triple flutes*, possibly ancestral to the later reed *triple pipes* [Appendix 1.9.].

2.2.3. Reeds

An unconventional approach might consider whether the G58 musical human bone tube instrument, if it is not quite a *flute* or *whistle*, is analogous in construction to the Greek *aulos*. This was a charismatic *reed pipe* made of cane, with bone tube segments and a twistable metal ring to alter tonality (key changes), usually played in pairs and blown simultaneously by one person (Arosemena-Ott, 2019).

The bone sections forming only part of the tube is similar to the *hornpipe*, so a British relative or descendent would be the Welsh *pibgorn*, related to the *gaita gastoreña* of Spain (Baines, 2001) and the Slavic *zhalaika* (Kroll, 1968), while the Indian *pepa* could suggest PIE origins (Barthakur, 2003, p. 116). However, it is almost certain that the Celts did possess an equivalent of the *aulos*, itself being so ubiquitous to the Mediterranean trading world they were a part of (Arosemena-Ott, 2019), and this is the main type of *reed* instrument we can expect for the culture group in this period. Evidence emerges for Celtic *auloi* in the archaeology of Central Europe, in the Hallstatt period (Early Iron Age), where they appear in the hands of bronze figures from Százhalombatta, Hungary, and Kröllkogel/Kleinklein, Styria, along with depictions on bronze sheets, such as an example from Býčí-skala cave, Moravia: 'The double aulos is the first oboe, played with one melody pipe and one bourdon-pipe and *auloi* are also the first really deep winds with tones in the bass. […] They sound very loud' (Pomberger, 2016, pp. 61-62). There are also stone carvings like those found at Sanchi temple, India (**2.3. Labrosones**). Like the *pibgorn*, these Celtic *auloi* feature a curved *bell* [the end of the instrument where the sound emanates from] made of cow horn, which would make them most like the Phrygian *elumos,* a type of *aulos* with fingerboards made from boxwood [Appendix 1.10.]. These features would make for warmer tones more akin to the oboe than the *shawm*-like sound typical of Greek *auloi* (Arosemena-Ott, 2019, pp. 12-13). They are played with circular breathing, allowing for continuous drone tones without pauses, making this the only item comparable to *bagpipes*, where the bag would come to serve the same function. Similarly to the *pan pipes*, the Athenians viewed the *aulos* in a dualistic juxtaposition with the *lyre*, the former representing wild chaos and the latter order and restraint. One Greek origin myth of the instrument involving a satyr named Marsyas may betray by his heritage a Phrygian background for the *aulos*, and the earliest archaeology for the instrument itself hails from the Neolithic (5000 BCE), in Koilada, Greece (Karazou, 2020, pp. 883-913), very much pre-European.

This juxtaposition can then, theoretically, be felt in the pitted opposition of the *Cretan/Mycenaean lyre* and the *aulos* of Asia Minor (Bucken, 1928, *cited by* Sachs, 1940). This type of instrument is ultimately distantly descended from *reed pipes* played in the first river valley civilisations of Egypt and Sumer/Babylon. However, Arosemena-Ott (2019, p. 9) says: 'The precise origins of the *aulos* remain highly contentious, with the first recorded appearances in Phrygia, Libya, Egypt, Cypriot, Anatolia, and Mesopotamia in the third millennium BCE'. Finally, one might posit that since the main type of cane traditionally used to make the *aulos* is not so readily available in the Northern Hemisphere, being the one-time Eastern plant *Arundo Donaxis* (Ibidem), a reliance more on cow horn could have led to the development of something like the Welsh *pibgorn* as a solo instrument, if only one pipe embouchure will fit in the mouth, while the typical two-part harmony tradition called for an altogether different device. It is with this in mind that we must consider ancient *reed pipes* in a Celtic context and conceptualise the now obscure *triple pipes*, a possibly ancient Celtic musical instrument featuring one pipe which drones, while two others are played somewhat like an *aulos*, with evidence from the Middle Ages and earlier in Ireland and Scotland, but also in other parts of Britain (Brown, 2016, p. 3). Some visual evidence attesting their existence survives from the 900s CE, carved upon St Muiredeach's Cross in Ireland and a Lethendy Tower Pictish slab in Perthshire, Scotland, along with an illustration in a psalter manuscript from Yorkshire, c. 1100 CE, currently housed at Glasgow University and thought to have been copied from earlier sources by monks (Ibidem) – *triple pipes* feature on five Christian crosses in total. The most notable true *triple pipe* tradition today is that of the *launeddas* in Sardinia, which play a drone against melodies in third and sixth intervals (Collinson, 1975), while in Britain the instrument is theorised to be of Celtic origin. It may have been brought during one of a series of Celtic migrations, calculating by the earliest Sardinian *launeddas* bronze votive archaeology an arrival between the 8th and 6th centuries BCE (Ibidem, pp. 65-67).

The ancient Corsi tribe of Sardinia were possibly of mixed Celto-Ligurian heritage themselves (McEvedy, 1967, p. 29; Oneto, 2002, pp. 34-36 and p. 49) and pre-Celtic Early European Farmers from the Middle East are genetically found to be highly related to modern-day Sardinians (Marcus *et al*., 2020, p. 939), also well-known in the contemporary Western musical world for their polyphonic group singing.

If the *launeddas* and *triple pipes* can both be said to combine the features of fingered simple system *fipple flutes* (since we have Celtic evidence for fipples at least, via *whistles*) with the *pan pipe* method of lashing musical pipes together, perhaps this instrument does point to a Proto-Celtic tradition [Appendix 1.11.]. There also exists in the hagiography of St Brigit, a story regarding an Irish *triple pipe* variant, the drone pipe of which she uses as her Bishop's crosier, which Brown (2016, p. 5) compares to the *launeddas*. Since this pipe is curved, it might support the notion that the *hornpipe* was somehow related, or that a longer, polytonal *pibgorn* once existed, and this connection through the Church supports an argument for the continuity of *reed pipes* from classical Antiquity to Middle Ages, likely preserved through 'religious […] piping' (Ibidem, p. 6).

The archaeological proof for Celtic *auloi* makes it feasible to include them in the evolution of the *triple pipes*, which one could conceive of as a fusion of the *aulos* and the *pan flute*, and in fact this may support the argument that Germany-based Hallstatt evidence for instruments should not necessarily confine them there. There may be gaps on the map in a proven geographical spread of attestations, both for the ancient *hornpipe* and *triple pipes*, but this range is definitely distributed along the known trade routes concurrent with the Celtic culture network (Nash, 1984, pp. 92-107; Cunliffe, 2008, pp. 254-258). Ultimately, we must find that where there are pipes, there will always be the innovation of playing more than one at a time, and it has been argued that multiple pipes serve as evidence for countermelodies and knowledge of harmony in ancient Irish music (McCullough, 2015).

There is also a wind instrument in Irish literature called *buinne*/*bunne*, which is either a *trumpet* or a reed instrument, similar to the *cuisle* and *feadán* (Kelly, 2013). McCullough (2015, p. 7) mentions specialists' disagreements whether *buinne* designates 'a type of *trumpet*', but notes '*buinnire* were seated at the King's feasts at Tara alongside the players of the corn [*trumpet*]'. Associations with *horns* is apt if this is a *hornpipe*, involving an actual cow horn, and might support this as a name for an Irish *pibgorn*. We can surmise that the *cuisle* itself was probably some variety of reed instrument related to the *aulos* with the lashed pipe principle applied from the *pan flute*, resembling the *lauddeta* and perhaps including some rich gilding or metal plating, which would be partially ancestral to the *bagpipes* but not truly, recognisably the same [Appendix 1.12.].

As for the *bagpipes*, they are, contrary to popular belief, not of Celtic origin, but in fact a Persian instrument which became popular throughout all of Europe in the Middle Ages before they arrived in England, Wales, and finally Scotland in the 1400s (Collinson, 1975, p. 135). Nonetheless, this is not to say that the often-overlooked *triple pipes* should not be considered in some way ancestral to them, and their existence pushes back the traditionally accepted date for the introduction of *drone pipes* to Britain by four centuries at the least (Ibidem, p. 65). Given that the 'pibroch' melodies performed on the *Highland pipes* were previously played on strings (Buisman, 2004; Brown, 2009, pp. 44-47), it may be possible to say that they replaced *harp* analogues as the instrument of national prestige in later Celtic societies. Brown (2016) suggests that pibroch living traditions, with a tonally limited, entrancingly minimalist style, could also reflect the echoes of sacred, contemplative music. This and their succession of *lyres* explains a continued deep respect for them today, unlikely to have been garnered for an instrument completely divorced from native tradition, so it is possible that one quite different from the later *bagpipes* but bearing some similarities could have been in use [Appendix 1.13.].

It might be worth considering that textual references to *panpipes* might themselves be a misidentification of the *triple pipes*. This occurred with the Yorkshire manuscript (Collinson, 1975, p. 67), which would also provide a precedent for a similar type of instrument in the Celtic milieu, such that the deep affection for the *bagpipe* should not have emerged from nowhere. The *bagpipes* in fact appear earlier in medieval Wales than in Scotland, with Peniarth 20 (Brut c. Tywysogion, c. 1330) explaining that there were three types of wind instrument at that time: '*Organ, a Phibeu a Cherd c. got*', 'organ, and pipes and bag music' (Harper, 2004, p.29). This might mean there was little differentiation between *reeds* and *woodwinds*, or that 'bag music' came to replace an entire category of *reeds*.

2.3. Labrosones

2.3.1. Introduction

Traditional terms for this family are 'lip reed' and 'brass', as the lips must vibrate to serve the function of a reed, while the horn shape itself, often of cast bronze or brass, acts more as a resonator and amplifier, but this can incur confusion with *reed woodwinds* and not all brass instruments are made of brass, so the terms *labrophone* and *labrosone* have been innovated for instruments sounded by vibration of the lips (Baines, 1993, p. 300). All *horns* here discussed are *natural horns*, meaning they feature no additional keys or valves and only the mouth manipulates the sound during play to modify pitch, but this can depend on the precision of the mouthpiece (Ó Foghlú, 2015, p. 51; Hirt, 2017, pp. 16-17).

Ó Foghlú (2014) identifies what was previously thought a simple Iron Age spearbutt as a mouthpiece similar to those used for modern *trumpets* and *trombones*, which allows for precise and powerful tones or blasts, confirming usage of said technology for Celtic labrosones. This is also an example of musical archaeology having been misidentified as other types of objects, many in need of reappraisal.

This subgrouping will discuss the three main types of Celtic *horns*, in three sections: **2.3.2. Horns and Dords**, including *horns* both organic and bronze; **2.3.3. Lurs (Curved and S-shaped)**, where an attempt will be made to draw from different sources to characterise a particular type of curved '*trumpet*'; and **2.3.4. Carnyces and Trumpets**, where the *carnyx* and a '*straight trumpet*' will be qualified and quantified. To avoid confusion with this hypothetical *Celtic trumpet*, the large, curved *horns* sometimes called '*trumpas*' will be referred to as *lurs*, since their most defining feature is their flower-like endplate. This is also because this study works upon and argues for the assumption, admittedly considerable but furthered in the absence of better explanation, that the Danish *lurs* influenced the development of the Irish 'trumpa' *lurs* (since relevant trade is proven), that their relationship is unmistakeable due to their distinctive endplates, and that they should be considered part of the same family.

Most of the archaeology selected is from Ireland, and we must rely on illustrations of lost finds for some *horns* discovered in Great Britain during the last three centuries (Downey, 1993, p. 89). Britain underwent more aggressive urbanisation at earlier times than did Ireland and lost artefacts have been unearthed prior to the development of more appropriate archaeological regulations (this did not, however, prevent numerous Irish examples from going missing after the fact). This does not mean only the Celts in ancient Ireland made use of bronze *horns*, and indeed the evidence we do have from elsewhere can be compared with the rich collection of Irish examples to form a clearer picture of tradition in Britain and the rest of Europe. Not only is the intended audience of *horns* public, but their playing also necessitates a social environment; it is barely feasible to blow more than one *horn* at once, and so they only truly excel in groups of players. It is only with the later church organ, like the water organ before it, that multiple brass pipes can be sounded by one person; and thusly does technology incrementally decrease the social function.

2.3.2. Horns and Dords

The first and oldest category of labrosone, which will again have initially predated Celtic development, is the simple organic cattle horn, which is called a *sounding horn*. There is some archaeological evidence for this from the traditional Celtic area 'between the River Salzach and the Danube Bend' (Pomberger, 2016, p. 59), where simple cattle horns were played without mouthpieces in the Late Bronze and Iron Ages, this being proven by surviving depictions and a small Hallstatt *horn* artefact from the Grünerwerk salt mine. It appears the cattle in the area at this time had relatively short horns, since the extant example is only 22 cm long, however the horns of aurochs [large creatures closer to the original ancestor of all European cows which still existed at the time] can measure between 50 and 60 cm, while 'Horns can be lengthened by fastening [a] bell of metal sheet on its wider end and thus deeper sounds can be played. A mouthpiece cast in bronze makes the *horn* easier to blow […]' (Pomberger, 2016, p. 60).

Multiple 'semi-brass' Bronze Age *horns* such as these are proven, as in the finds from Wismar, Germany, and Vinjivrh, Slovenia, and many *horn* playing warrior figures from the period are depicted on artefacts, such as the situlae of Arnoaldi, Bologna, and Benvenuti, Este, in Italy, on a bronze fragment from Bacchiglione, Padua, Italy, and upon votive plates of shrines in Este, Italy (Pomberger, 2016, pp. 59-60). Iron Age *sounding horns* continue to be attested by stone-reliefs, petroglyphs and mirrors, but specifically by the Idrija pri Bači bronze figure, from Slovenia, and the late La Tène Hradiště figure, from the Czech Republic (Ibidem).

Perhaps it was this said hybridisation of organic and bronze, to increase the harmonic range of natural cattle horns, which led to the development of *dords*. They are comparatively the shortest objects in this listing and are made of cast bronze, mostly in the shape of ox, bull or cow horns, and are fairly widespread archaeologically throughout Ireland in the Bronze Age (MacWhite, 1945; Harbison, 1977; Holmes and Coles, 1981; Downey, 1993) [Appendix 1.14.].

Potentially ancestral to *carnyces*, *dords* are descended from organic *horns* and may have existed alongside both, along with wooden examples, with evidence in a wide chronological range of approximately 1000-500 BCE (Ó Foghlú, 2015, p. 59). Waddell (1998, p. 235) again states they are thought to be 'an indigenous development and were essentially translations into bronze of the simple curving cattle horn', but also asserts that they are unconnected to 'very different bronze horns in Northern Europe', likely referring to *lurs*, which is matter of some debate discussed in **2.3.3. Lurs**. They may be either side-blown (like a *transverse flute* but with lips making full contact) or end-blown, producing a relatively limited range of harsh, buzzing tones from whence they derive their name – describing a medieval Irish vocal music of similar atonal character (Collinson, 1975, pp. 67-68). This possibly conforms more to the 60-30 BCE description given by Diodorus Siculus of certain continental Celtic (Gaulish) *war-horns* than later instruments such as the *carnyx* do: 'their trumpets again are of a peculiar barbarian kin, they blow into them and produce a harsh sound which suits the tumult of war' (Tierney, 1959, p. 251). This could attest similar instruments in other Celtic groups outside of Ireland and two Late Bronze Age *horns* of this type have also been found in Britain to date, one being the now lost *Sussex Trumpet* from Battle, England, an end-blown *horn* which survives only in illustrations, and the other a fragmentary mouthpiece portion betraying all the typical hallmarks of a side-blown *dord*, from Innermessan, Scotland (MacWhite, 1954, p. 90).

Finally, of little renown in the west, but worthy of more attention, are Numantian clay '*trumpets*', made by Celtiberians during the 2nd and 1st centuries BCE (Sopeña, 2005, pp. 371-373). These ceramic and clay *horns* of Spain produce a less harsh sound than both the animal and bronze *horns*, more haunting than triumphant, and feature ornately moulded animal-shaped heads with open maws bellowing from the bell (Ibidem). They might therefore suggest an earlier phase in *carnyx* development; perhaps a bronze *dord* tradition was combined with these animal-headed *horns*, resulting in said famed *war-horns*, though they seem not to predate them.

2.3.3. Lurs (C and S-Shaped Curved Horns)

Much longer *horns*, called *lurs*, also baring a name from later medieval musical tradition (of a Scandinavian wooden bugle), are associated with the Nordic Bronze Age of modern-day Denmark, but very similar instruments (and sometimes merely remnants) have also been found in a later, Celtic Iron Age context (MacWhite, 1945; Harbison, 1977; Holmes and Coles, 1981; Downey, 1993). These instruments all feature long, curving, sometimes curling, end-blown bronze pipes of varying sizes, normally with shaped mouthpieces and usually a large, decorated endplate or disc at the other end which may function as a resonator. Some had lightweight metallic bars suspended from rings, similar to wind chimes (Harbison, 1977), which would add to the sonic effect of the *horn*. This light, jingling percussive accompaniment could mirror the implied usage of *crotal bells* found with Irish *dords* (Downey, 1998). There is some extent evidence for *lurs* in Ireland and Britain, and the Irish Loughnashade '*trumpet*' was found in a group of four in 1798, the remaining three being lost today (Downey, 1993). As a 1st C. BCE example from County Armagh of a *lur* instrument type, which O'Dwyer (2015) has deemed to call '*trumpa*', it features unmistakable Celtic La Tène curvilinear repoussé metalwork decoration on the endplate and is composed of two curved tubes which fit together. A similar tube pair, now lacking an endplate (were it ever present), is the 200s BCE Ard Brin *trumpet* from Northern Ireland, missing multiple components, including the mouthpiece and segment joining boss to connect the tubes (O'Dwyer, 2015, p. 72). Certain lost items seem to hint at a one-time widespread Celtic usage in the British Isles, including Irish instruments from Bushmills, Antrim, and an endplate from Loughbrickland, Down, along with partial bronze *lur* components from Roscrea (dated to approximately 150 BCE). These can be compared with tube and segment boss rim fragments from Llyn Cerrig Bach, Anglesey, in Wales (Downey, 1993, p. 83 and p. 89), and such regrettably rarely attested segmented curving *lurs* would seem to have been largely overshadowed by their more dramatic relative, the *carnyx*.

The construction style for all correlates with a general artisanal method of Iron Age *horn* manufacture, wherein hammered bronze sheets are shaped and curved, then connected by riveted (or even soldered) metal seam strips, a costly and challenging process requiring a master's skill (Downey, 1993, pp. 83-84). It is possible the Danish *lurs* were constructed the same way (Smithers, 1989, pp. 30-31), but this goes against the traditional idea that they were cast using the lost wax method, so either the Western Celts continued the technique of using hammered bronze sheets or they adapted it in imitation of the Scandinavian variants. If, as Smithers (1989) asserts, both Nordic and Etruscan *horns* can be demonstrated to have been made in the same manner, along with their Roman descendants, it would disprove indigenous Irish development and point to a Tyrrhenian (Etruscan) influence.

Of note is the finding of certain *horns*, such as the Loughnashade and *Killfaddy Four*, in groups of even numbers, as this might be explained by a South Indian tradition wherein *kompu horns* are always played in pairs, much as is theorised of the earlier *dords* often found in groups of two (Purser, 2007; O'Dwyer, 2015). A North Indian equivalent of the *kompu*, the *sringa* or *tutari*, is associated with royal music, which is of interest in that Irish *horns* are prominently found near the site of Tara, a place of Irish Kings. The royal site of Emain Macha has also continued to have ceremonial significance, being '[…] to this day the ecclesiastical capital of Ireland—Ard Macha, or Armagh—lies only two miles to the east' (Downey, 1993, p. 86), long after its ritual destruction c. 94 BCE. The latter is a possible deposition date for the Loughnashade *horns* within the period for usage of the Ardbrin fragments of Llyn Cerrig Bach, between 200 BCE and 100 CE, and the two are described as having 'constructional similarity' (Ibidem). Ó Foghlú (2015) finds commonalities in both the Bronze Age *lurs* and Irish Iron Age *horns*, and refers to them when describing the strikingly similar South Indian paired *horns* called *kompu*, a parity which he argues can provide evidence for Tamil cultural exchange with ancient Celts via the Indian Ocean:

> […] maritime musical interaction between these distant cultures is demonstrable and should not be seen as controversial. Studying the surviving musical traditions alive in Kerala today can provide new insights into what has now been lost or replaced in parts of Europe (Ó Foghlú, 2015, p. 77).

The Gundestrup Cauldron, with its iconography so pivotal in identifying Celtic mythological and cultural features, was found in the same region as the majority of *lur* artefacts, in Denmark (Harbison, 1977, p. 24). Previously dated to 100 BCE – 300 CE, it is likely earlier because of the pre-Roman North-Western silver content, tracing its almost pure tin solder through lead isotope composition to Cornwall, Britain (Ó Foghlú, 2015, p. 62). It is supposed the glass used for eye details could be Mediterranean in origin, although enamel work is typical of high-status Celtic items, but this ignores the fact that some native glass production and 'recycling' occurred in the small pre-Roman workshops of Britain and perhaps elsewhere in the Celtic world (Allen, 1998, pp. 13-16). Harbison (1977, p. 24) finds that Irish Bronze Age artefacts exhibit significant Nordic influence, as observed particularly with these *horns* and in a cauldron trade ultimately of Eastern Mediterranean and Oriental origin, of which resulting inspired traditions in Central Europe moved westward to Ireland by way of Scandinavian Sea commerce. Unfortunately, Harbison seems not to differentiate between the Irish *lurs* and *dords*, glossing them all simply as '*trumpets*', and sidestepping the difficult question of their lineage.

From later periods, it is also possible this curved *horn* type has an example from the La Tène *Nizza horn*, Germany, while other reminders endure confirming the 'cultural contacts between the Irish Celts and their continental relatives during the Iron Age' (Downey, 1993, p. 68), including Classical Roman accounts of Gaulish war instruments and the famous marble figure recreating Atallus of Pergamon's 230 BCE bronze statue today called *The Dying Gaul*, representing the defeated people of Galatia, Anatolia. The latter has also been called 'the dying trumpeter', on account of the broken curved *horn* discernible at the feet of the 'gladiator' (Howard, 1983, p. 483).

Ó Foghlú (2015, p. 62) makes mention of the Batavi tribe ‘of Germania’ playing ‘trumpets of curved bronze’, citing the Roman poet Lucan. However, in the Roman period, the Batavi (an offshoot of the Germanic Chatti and possibly a very new tribe at the time) moved into the lands of the Eburones – who had suffered a genocide under Caesar in response to the revolt of their king Ambiorix – and assimilated them (Roymans, 2004, pp. 23-27). As new arrivals in the area, the Batavi may not have retained significant cultural parity with their originating tribe, and latterly were indeed quick to take on Roman characteristics also, such as Latin alphabet literacy (Ibidem, p. 55). Since the Batavi continued the worship of Celtic deities, such as the Goddess Exomna, ‘she without fear’, it seems they took on aspects of the previous Celtic culture, along with the survivors of the Eburonian genocide, and we must consider that this syncretic adaptation included the curved *horns* described by Lucan (Spickerman, *cited in* Kolb, 2020). Finally, it is also possible there was a Celtic equivalent to the Roman *cornu*, a thin, curled G-shaped bronze or brass *horn*, with a medium sized bell and a crossbar handle for ease of use in motion, as seen with the Gallic warrior on a Capitoline sculpture (Walser, *cited in* Ravizza, 1972) and the female dancer in a Pompeian fresco (Couissin, 1927, pp. 72–77). The Greek historian Polybius [Polýbios] (c. 200 – c. 118 BCE) interpolates both the *salpinx* [σάλπιγξ] [from lit. ‘salpigktōn’, ‘*salpinx players*’], a Greek war *trumpet* which can be interpreted as a straight *horn* similar to the Roman *tuba* and *lituus* (discussed below), and the *buccina (bykane*) [βυκάνη] [from lit. ‘bukanētōn’, ‘*buccina* players’], a *horn* almost undifferentiable from the *cornu*, recounting the battle of Telamon, when Gallic warriors employed the instruments cited (Polybius 2.29.5-6; Meucci, 1989).

All the aforementioned Roman *horns* are considered to be of Etruscan descent (Fleischhauer, 1960; Wegner, 1960; Wille, 1967) and so it is likely the Celts derived some aspects of their instruments from designs of Tyrrhenian origin also. Curved bronze *horns* can, in this way, help to characterise cultural musical identity.

2.3.4. Carnyces and Trumpets

The *carnyx* is a long and mostly straight *horn*, made of bronze or brass, with a curving end shaped like the head of an animal, played in the European Iron Age from c. 300 BCE to c. 300 CE (Hunter, 2001, pp. 95-96; Ó Foghlú, 2015, p. 52). It could be described as f shaped, normally composed of three segments, a mouthpiece pipe, a middle section, and finally the head, which may be disassembled for ease of use. Most *carnyces* are large, but some are less so, and they either have an upturned mouthpiece, to make for easier playing positions, or an end-blown funnel which requires a very specific and physically demanding technique when it is held upright, craning the neck (Ó Foghlú, 2015, pp. 55-56). Variations in size and mouthpieces suggest multiple voices or classes of *carnyx* similar to modern instruments (i.e., Tenor saxophone versus Bass saxophone) and perhaps different instruments for varying situations; some may have been used for war and others for religious rituals, but it is likely they were used for both. Of all aspects of ancient Celtic music, the *carnyx* is the most well-known. Some would say it is the most enduring Celtic cultural symbol – arguably unique to them, as the Dacian *draco* standard is different and from a later period (Swan, 2018, p. 81), depicted by the Romans themselves in triumphal propaganda iconography to represent their enemies as base and animalistic, by the beasts gaping from their *horns* of war (Ó Foghlú, 2015, p. 52).

Nonetheless, it is the totemic power of the instrument used in mischaracterisation which has allowed so many depictions of it to survive through the ages. It may be one of few ancient Celtic instruments referred to in modern English by its original name, from the Gaulish root *carno-* (‘horn’ or ‘antler’), giving the god Cernnunos, ‘the horned one’, preserved through Byzantine Greek words like κάρνον (kárnon) and κάρνυξ (kárnux) (Delmarre, 2003, pp. 106-107). This speaks to the breadth of places we may look to for evidence of the *carnyx* and where it may have been played, as a cultural signature for how far the Celts travelled throughout the world via musical identity.

There are varied representations from ancient Greece, on coinage (recalling the Celtic invasion of Brennus) from the 3rd C. BCE and earlier, and Egypt, which saw much Celtic mercenary activity (Hunter, 2001, p. 95); Hungary, brandished by a naked statuette in Kondoras (Pomberger, 2016, p. 60); Romania, depicted on a *Salistea bell* fragment (Manassero, 2013, 64), a notably musical context suggesting cross-cultural group performance; Persia (Turkmenistan), on a banquet hall ivory rhyton frieze of 1st CE Old Nisa (Ibidem, p. 61), hinting at honoured guest status; and Kazakhstan, upon a Kargaly golden diadem (Ibidem, p.66), conferring a regal setting. Finally, this pathway makes it clear how the instrument most surprisingly found its way to India, carved into a bas-relief of the Great Stuppa, at Sanchi temple. Thereupon, two *carnyx* players in Greek traveling attire, accompanied by an *aulos* player, can be seen craning their necks, lifting their *carnyces* aloft in concert with local revellers, builders and other musicians alike (Bénisti, 1960, pp. 68-69; Ó Foghlú, 2015, p. 52), perhaps during a celebration of the temple's construction. Their greatest usage was seen and heard in the Celtic heartlands of what is today Northern Italy (Cisalpine Gaul), France (Gaul), Southern Germany, and Great Britain (Britannia), which would become part of the Roman empire (Hunter, 2001, pp. 95-96). This is known from the vast amount of Roman and Celtic coins featuring them (Swan, 2018), other metalwork, such as the silver Gundestrup cauldron of Denmark (Jouttijärvi, 2009) and the La Tène pendant from France, along with carvings, ancient textual descriptions, and actual archaeomusicological instrument artefacts (Piggott, 1959; Hunter, 2001). Some fragments exist, such as those from Lienz, Austria, and the Sanzeno cult site, in Italy (Pomberger, 2016, p. 60), but the most valuable and complete pieces include a partial *carnyx* from Deskford, Scotland, found in 1816 (Campbell, 2012) and the components of seven instruments (one mostly intact), from the Tintignac Gallo-Roman sanctuary site, in Limousin (named for the Limovīcēs tribe), France, discovered in 2004 (Gilbert, 2012) [Appendices 1.16. and 1.17.].

The evidence should arguably be taken in consideration with other lost examples, such as the *horn* found in 1786 near Tattershall Ferry, Linconlshire, England, in the river Withm, 'similar to those depicted on the Gundestrup Cauldron […] made from hammered bronze sheets soldered with tin' (Downey, 1993, p. 89). It survives only in an illustration, which upon close inspection seems to depict a *lituus* with a bell shaped like the head of a fish (Kemble, 1863, pl. XIII and p. 171). It has a shaped dorsal fin but lacks eyes (from what is visible on the illustration), so perhaps the head was damaged or unfinished – Kemble does describe 'ornamented crestwork' only 'along one side' and 'an irregularly shaped mouth', considering it later than Bronze Age. If identified as such, one might consider this the first ever recorded archaeological find of a *carnyx* anywhere, effectively deposing the Deskford boar head fragment from Scotland, and it could be designated the '*River Withm Carnyx*'.

The *carnyx* has also been noted similar to the Etruscan-derived Roman *lituus*, and if so, this suggests the degree to which continental Celtic culture and music is characteristically Celtic, precisely because of its Etruscan association and not despite of it. The Scottish *Caprington horn* has many identical features to the *lituus* (Patrick, 1877, pp. 565-566), and these may owe their similarities to a *Celtic trumpet* featuring a curved bell. The *Caprington horn* has been conjectured as dating to the Iron Age or Roman period, since tradition places its unearthing at the site of a battle with King Coilus. Additionally, some research compares it to examples from Holland, Poland and Germany, and finds it identifiably the same as 'an instrument in the hands of a Gaulish cavalryman', on a Chiusi carving (Purser, 2007, p. 28).

Existence of the *carnyx* is well-proven, but less well-attested is the straighter *trumpet* from which it may have derived and been used alongside. Once again, the *carnyx* has overshadowed its other brass relatives, but we must recall the mention from Polybius of an instrument at the Battle of Telamon, which was, to his eyes, a *salpinx* (Polybius 2.29.5-6) [Appendix 1.18.].

A number of straight *trumpets* of antiquity could be related to the Greek *salpinx*, itself likely derived from an Etruscan instrument (Krentz, 1991, pp. 110-120), such as the Indian *karnal*, the Safavid *karna* and the Persian *karranay*, all similar or descended from the Babylonian *qarna* (Orel and Stolbova, 1995; Kilmer, 2002, pp. 788-796) and perhaps related to a lineage contemporaneous with the Egyptian *sheneb trumpets*, from c. 1324 BCE, found in the tomb of Pharoah Tut'ankhamūn (Montagu, 1978, pp. 133-134). Thus, the origin of the Celtic instrument may be ultimately either Etruscan, Egyptian, or European (from the *shepherd's horn*), making it likely a composite invention as influenced from multiple backgrounds.

A 'late Greek' vase features a Celtic musician playing a straight *trumpet* (Couissin, 1927, pp. 72-77), and Caesar notably refers to Celtic *horns* by the term *tuba*, which was a straight, tulip-like Roman instrument not dissimilar from a modern *coach horn*, used in military drills and functions. One straight 1.52 metre long *trumpet* is featured amongst the items in the 'Treasure of Neuvy-en-Sullias' collection from the 1st C. CE which, although postdating the beginning of Roman occupation, are considered Gaulish (Mantellier, 1864). The only well-known long, completely straight *trumpet* in Celtic archaeology proper is the Irish *Bekkan horn*, but it is very unusual and thought to be of medieval origin, as is the shorter *River Erne horn*, and are both wooden (Hirt, 2017). It is likely these should be compared against and counted amongst the ancient European *shepherd's horn*, once used for herding livestock and a part of the logic upon which Hirt determines that the Natural Scale is the basis for all European folk music (Hirt, 2017, pp. 16-17). The key to identifying the *Celtic trumpet* in archaeology would lie in reappraising the *dords* and separating the very long, straighter types into a different category.

The beast, as the bell of the *carnyx,* may have a totemic role, with animal head variants including: dragon, serpent, fish, bird, wolf, horse, mule and boar. Behn (1912) interprets these differing *carnyx* bell types as Celtic clans and chiefdoms, expressing their distinguishing features, and this could support the notion that different Celtic groups had slightly distinct music, both to differentiate themselves in battle and as a marker of individualised tribal pride. Ó Foghlú theorises '[…] it is reasonable to suggest that […] multiple locally or regionally established musical systems, scales or variants on systems existed […]' (Ó Foghlú, 2015, pp. 63-64).

The *carnyx*, perhaps more than any other instrument, acts in a role denoting Celtic cultural identity as expressed by musical pride, both at home and abroad, from its charismatic signature, left in the lands visited by its players, to the unique, if degrading, representation conferring the Celts as a people subdued upon Roman triumphal art. It appears on early Celtic coinage for symbolic cultural characterisation, seemingly conveying tributarily defined agency within the Celtic milieux, alongside the second most important Celtic musical item which might be called a national instrument; the *lyre* (**4. Chordophones**).

[Morgan Black with *Tintignac Carnyx* Reconstruction Commissioned by Yaruga Crafts]
[Photography Dave Foster, Used With Permission, Castell Henllys, 2022]

3. RHYTHM – Percussion and Dance

> One must first understand that there are two certain natures: that of rhythm and the rhythmicized substance […]. For just as the body takes on many sorts of shapes […], in like manner each of the rhythmicized substances takes on many forms, not in accordance with its own nature but in accordance with the nature of rhythm (Aristoxenus *cited in* Aristides Quintillanus, *De Musica*, *cited in* Mathiesen, 1985, pp. 161-162).

3.1. Introduction: Percussion

Anything can be a percussion instrument, as long as it can be struck, but some objects are specifically designed to capture a vibration when hit, and this family includes *idiophones* such as *bells*, *rattles* or *cymbals*, and *membranophones*, with a skin stretched over a frame of varying proportions to create a *drum* (Grove, 2001, pp. 638-649). In the traditional Indian classification, the two families of *Avanaddh* and *Ghan* respectively group percussion instruments as with membrane and without (Uddhav, 2021, pp. 23-30). For brevity, dance will also be included in the **Idiophone** section, in the sense that the human body will be considered as a musical percussion instrument for the purpose of this discussion, the individual themself becoming a vehicle for music along with cultural and spiritual expression.

The organising of percussive strikes into controlled sequences is called rhythm, which gives the time signature or *tempo* to a piece of music, and this can determine whether the measure is fast paced or slow, but also what types of melodies are possible within the confines it establishes (Cooper and Meyer, 1960, p. 6) [Appendix 2.1.]. In Ancient Greek philosophical treatments of music, rhythm is the great organising force providing structure and ordering chaos in the world (Klavan, 2021). In Indian Classical music, an oral tradition is used to teach time signatures and rhythms played on *tabla drums* with spoken or sung mnemonic syllables called *bolo*, which onomatopoeically use the voice to copy the sound of the *drum* in ‘sentences’ to be learned and repeated by the student (Singh, 1978). This is cultural capital communicated in music.

Irish music features the similar *lilting*, or *diddling*, which is thought of as a quaint and easy form of simplistic rural entertainment, by imitating the sounds of musical instruments when their absence occurs due to poverty (Sparling, 2014). However, perhaps it could be conceived of as the remnant of a Celtic system for relaying rhythmic passages, similar to learning *bolo* in Indian Classical music; thus, Celtic music conveys cultural agency by oral tradition.

Living composer Roger Steptoe gives the following formula: 'I consider music is melody, rhythm, harmony' (Steptoe, 2017). If this is accurate, then a description of rhythm solves one third in the puzzle of Ancient Celtic music.

3.2. Idiophones – Physicality, Weapons and Dance: An Overview

3.2.1. Bells and Rattles: Fertility Symbols?

There is some textual evidence for Celtiberian *hand-clappers* similar to modern *castanets*, though more block-shaped (Martialis, 3.63.3, 5.78.22–27 and 6.71.1), and these may be Phoenician and ultimately Egyptian in origin, while clay *rattles* are fairly widespread in the archaeological background from Central Europe of the ancient Celtic Urnfield culture. Pomberger (2016) calls these 'vessel rattles', noting that many of them are shaped like birds, perhaps ducks, and others are oval, egg or pot shaped: 'Most of the clay rattles were discovered in graves of children and women. Considering this amount […] it is not easy to understand why they nearly disappeared during the La Tène Culture' (Ibidem, 2016, p. 47). Celtic ceramic *rattles* do exist in the La Tène period, however, as observed in an example from Dambu Popii (Rustoiu and Berecki, 2015) and from their usage by the Vaccaei tribe of Celtic Spain, possibly as apotropaic items for warding off evil spirits (Sanz Minguez *et al.*, 2013, pp. 257–283).

Some Late Bronze Age and Early Iron Age metallic *bells* or *rattles* from Celtic Middle Europe appear potentially in continuation of the earlier and more simple *rattles*, with small circular cage-like structures holding metal balls or pebbles which jingle inside.

These have been called ‘schellen’ and may have been attached to equestrian gear and bridles, but they are also not as yet found after the Hallstatt period (Pomberger, 2016, p. 54). They are comparable to different examples of lumber adornments which may have been worn by dancers around the ankle or upper leg, which is notably similar to the Indian usage of *ghunghru* ankle *bells* (Hesse and Rayner, 2007, p. 8). The *crotal bells* of Ireland, representing testicles, were probably used by the well-established fertility/bull cults wide-spread in the Bronze Age and much of Europe throughout history (Downey, 1993, p. 76 and p. 90; Purser, 2007, p. 26). They are found alongside *dords* often deposited in pairs, providing drone accompaniment and melody (O’Dwyer, 2015), an ancient usage similar to the argument for *triple pipes* as a precursor to the *bagpipes*. They and their *cattle horn* ancestors are thought to have an important ritual function, capable of producing bull-like voices sounded with *bell* accompaniment. Whether *crotals* could have existed in other Celtic nations is uncertain, but they have also not yet been unearthed outside of the Bronze Age period. They are again expected to have followed the same evolutionary path as the other aforementioned *bells*, having also been preceded by clay *rattles* as in Central Europe but more simplistic, orb-shaped and shaken with seeds inside. Some of these were in fact empty, acting as mute musical instruments perhaps representing gelded animals and beasts of burden (Purser, 2007). Pomberger (2016) states there is no clear explanation why so many instruments seem to go out of use in the Iron Age but we might suggest that with an increase in population, more common-place artefacts became recycled and do not survive today, as explained in the noted scarcity of early Indian archaeology for metallurgy (Ó Foghlú, 2015). Despite *bells* being common in archaic period Greece and in the territory of the Scythians in Central Europe, we currently have only the *Brunnkirchen bell* from the Early Iron Age in Austria (Pomberger, 2016, p. 55), but there is textual evidence for Pictish and Northern British post-Iron Age usage of bronze *bells*, perhaps following in a European military tradition as noted by Eckhardt and Williams (2018):

> […] fifth century B.C. [sic], when Aeschylus […] describes Tydeus' shield's […] rim, "terror in their tone, clang and reverberate the brazen bells" […] bells to frighten an enemy is seen almost 700 years later, as Dio Cassius informs us that a northern British tribe, the Maeatae, had bells [(2nd C. AD)] attached to the end of their short spears […] and terrify the enemy' (Ibidem, p. 2).

However, they misquote Cassius Dio, who was originally describing the Caledonii and the Maeatae as the remaining non-Romanised tribes of Britain in general, and of them he specifically says they tie a 'bronze apple' to the end of their spears (*Roman History*, Book LXXVII, 12). Apples have a symbolic significance and would need to be hollow to resonate much at all as bronze *bells*, but if accurate this rings true with description of ornamental branches or rods in medieval Irish manuscripts (Hull, 1901, pp. 431-445), sometimes acting as a *de facto* 'symbol of office' and musical identity for 'shamen and poets' (Blamires, 1997, p. 142), which in some examples feature silver *bells* shaped like apples (Schoepperel, 1913, pp. 324-325). This either contrasts with or benefits from comparative perspectives in Norse religion, as the cult to Frey may have involved 'feminine' bellringing performed by male Priests dressed in women's clothes, so described from the story of Starkad found in the *Gesta Danorum* (Wade, 2019). Whether *bells* had a similar connotation for Celtic tribes cannot be known, but a cultic importance is clear from their usage and relation with ritual *rattles* and as a fertility symbolism, perhaps merely suggested from the phallic dressing up of the spear as a bejewelled shaft [Appendix 2.2.].

3.2.4. Female Dance

Dancers feature on the decorative silver plates of the Gundestrup Cauldron in performances which may have involved religious rituals, often flanking large god-like beings (Jouttijärvi, 2009, pp. 960-966). Some of the figures on 'External Plate 1' have a decidedly feminine shape than others but recall the Highland Fling of Scotland, where the aim is to stay in the air for as long as possible when alternating one-legged skips and hops with high jumps:

'The dancer strives to reach a maximal vertical height on each jump while only landing on a plantar flexed foot with no heel contact' (Potter, 1996, pp. 51-56) [Appendix 2.3.]. The Gundestrup figures (Grewenig, 2010) seem to jump in the air with arms raised and bodies twisting, their fists clenched while their hair or headdress flies wildly. This is one indication of women specifically in the music and ritual dance of ancient Celtic culture, but other artefacts also suggest this, such as the 'Treasure of Neuvy-en-Souillas' bronze figurines from France in the 1st C. CE which, like the aforementioned *trumpet*, are considered Gaulish (Mantellier, 1864). Furthermore, other Celtic Hallstatt pottery from Germany and France also depicts female dancers with their arms raised (Waldman and Mason, 2006, p. 159). In Irish Traditional and Stepdance, although evolving fashions and 'gimmicks' (Ibidem) restricting movements introduced by dance masters to disassociate themselves from rural forms required that arms remain rigidly pinned to the sides, some *Cèilidh*, *Sea nos* and *Set Dance* forms appear to have retained certain arm movements (Lyons, 2012, p. 170) comparable to those observed in the earlier iconography found in Celtic archaeology. Scottish Country Dance is very similar, and raised arms are also observed (MackEnzie, 1963, pp. 1-3). Pomberger and Mühlhans' (2021) experimentations set a viable precedent, if cautiously reserved, for dance reconstruction in ancient Europe from a Celtic Early Iron Age standpoint and similar efforts may be undertaken for later periods. The character of appropriate styles may be determined by comparison with relevant traditions, particularly the exotic dances of the Celtic Gaditanae women of Spain (Fear, 1991; Hayes, 2009), so famed for their skills that they were sought after in Rome for lessons as to be retained during a famine when many other tradespeople were sent away, and they have been put forward as the Celtic forerunners of Flamenco dancing (Josephs, 1983; Fear, 1991, pp. 75-79; Hayes, 2009, pp. 75-80). Fear (1991, pp. 75-79) believes the Gaditanae represent the Phoenician heritage of Cadiz, from (possibly Celtic) Tartessos, and that there is not an unbroken connection from Celtic dance through to Flamenco.

Alternatively, Hayes (2009, pp. 75-80) traces a possible continuity of flamenco dancers back to temple priestess prostitutes dedicated to Astarte, along with cave paintings and the Celtic Gaditanae of antiquity, citing Josephs (1983), but seeming to disapprove of his conclusions as to an Indian connection [Appendix 2.4.]. Thus, Spanish traditional heritage may offer pertinent perspectives for the purpose of Celtic dance reconstruction. The descriptions of women wearing black dresses and flitting edgeways as part of ritual dance mentioned in accounts from the Roman sack of Anglesey (Tacitus, in Church and Brodribb, 1942), a last heaven for refugees of the remaining free Britons during the invasions, are reminiscent of Flamenco dancer techniques, bridging a religious association between dance and groves:

> On the shore stood the opposing army with its dense array of armed warriors, while between the ranks dashed women, in black attire like the Furies, with hair dishevelled, waving brands. All around, the Druids, lifting up their hands to heaven, and pouring forth dreadful imprecations […] their groves […] were destroyed. (Tacitus, *The Annals*, 14.30).

Here, light is used in an artistic cultural context as fire enhances audio-visual art of the transcendent nature, for just as the Roman poet Lucan writes in his *Pharsalia* that fire surrounds the groves of the Druids (Leigh, 2010, p. 206), so do these 'druidesses' use fire in their ritualistic dance. This may be comparable to the 'elfin dance' described of the potentially Celtic Lusitanians (Strabo, Book III, Chapter 4), if Roman assertions of a connection between modern day Wales and Spain hold any truth (Williams, 1978, pp. 8-9).

3.3. Membranophones

3.3.1. The Drum

The *drum* sets the pace and tone in music, which could be described as a 'groove' (Senn *et al*., 2018). Much like their aerophone relatives, Celtic percussion instruments differed from and may have been influenced by their Neolithic precursors, and nowhere is an absence of proof felt more pointedly than in the archaeology of membranophones.

There is some evidence for the existence of *frame drums* (tambourine family), with animal skin drawn across a shallow circular rim or ring, alongside *hourglass* and *goblet drums* with cylindrical shells (Pomberger, 2016, pp. 55-56). However, there is substantial evidence for well-crafted clay pot *drums* in Neolithic Europe, but very little from the Bronze Age onwards, and so these instruments either disappeared entirely or evolved to suit the changing times (Aiano, 2006, pp. 31-42). It has been questioned in recent years whether the Irish usage of the *frame drum*, the *bodhran*, is endemic to the British Isles at all (Cunningham, 1999, pp. 28-32), though Geraldus of Wales mentions the 'tympanum' [*tambourine*] of Ireland in 1185 (O'Meara, 1985). This particular account may not predate the otherwise suggested introduction of Arabic instruments brought back from the crusades of c.1000 CE onwards, as a result of cross cultural contact (Tyerman, 2009, pp. 1-14), but this is certainly the case for the ensemble accompaniment of a *triple piper* carved upon the 10th C. CE Lethendy Stone from Scotland, which features a long, deep pitch, barrel-shaped *drum* (Purser, 2007, p. 36). Although the earliest mention of the word *bodhran* is from the 15th century, it likely referred to a type of tambourine already in use (Wulff, 1929, p. xxxiii). Assertions of its invention in the 19th century based on similarities to Arabic instruments can largely be attributed to a single falsely identified Irish illustration from the period, which itself does depict an Arabic *drum* and not a *bodhran* (Cunningham, 1999, pp. 28-32), but this in no way discredits the earlier instrument. The traditional account of its creation states it is simply an evolution of the native winnowing tool or skin tray called *wight*, a ring shaped sieve used for sifting wheat, and this would therefore be similar, and probably related, to the Manx *dollan*, along with the *riddle drum* or *crowdy crawn* of Britain (Southwest England, Cornwall and Scotland) (Such, 1985, p. 11). Nonetheless, with the *frame drum* being both practically primeval and global in human cultures (Montagu, 2017), existence of *drums* need not necessarily be proven archaeologically in the Celtic period because, as noted by Purser (1992), simple evidence of food vessels will suffice.

Usage of these, covered with leather to keep pests away, will naturally produce an effective membranophone, with rainfall spontaneously creating *drum* music upon pots as parts in incidental sound sculptures. The Celts' usages of advanced woodworking in clinker style ship hulls (Indruszewski, 2009, pp. 409-420) and their apparent invention of the curved barrel, according to American cooper C. C. Work (2015, pp. 5-10), could perhaps make possible a sort of '*barrel drum*'. This certainly confirms a hypothetical ability to produce wooden *drums* from approximately the Late Bronze Age, by bending hafts with hot water (Pomberger, 2016, p. 56), even if the archaeological evidence is exceptionally poor. The existence of Celtic metal pots renders evident the skill to produce large *kettle drum* shapes, themselves easily and naturally becoming effective percussion instruments. Experimental archaeology, observed empirically at Iron age site Castell Henllys, finds that small children will, unprompted, begin striking and 'playing' an upturned cauldron in a proto-musical fashion. Since some Iron Age archaeological evidence for Celtic *drums* exists (Pomberger, pp. 55-56), an interim Bronze Age drumming tradition bridging the instruments with their Neolithic precursors must be presumed but remains difficult to prove. Concretely, Bronze Age archaeology does offer some proof for this, in the form of a 130 mm high fragment of a terracotta *tubular* or *goblet drum* with a diameter of 220 mm, from a Celtic Urnfield culture burial in Inzersdorf ob der Traisen, Austria, which experimental testing estimates to have been quite loud, reaching 70-85 decibels (Neugebauer, 1996, pp. 111-178; Pomberger, 2016, p. 55). *Frame drum* iconography is subsequently found in the Early Celtic Iron Age Hallstatt period (Ripinsky-Naxon, 1993; Pomberger, 2016, p. 56), with rock art from Val Camonica in the Central Alps, Italy, depicting an antlered figure (framed by a pair of *bull-roarer* or *rattle-bar* wielding revellers or flautists) brandishing above their head a sizeable instrument, perhaps a *shaman drum* (Ripinsky-Naxon, 1993, pp. 154-155), estimated at 55-60 cm wide:

‘Frame drums [such as these] were known in ancient Greece, by the Phoenicians and Assyrians, in Egypt, Palestine as well as by the Romans’ (Pomberger, 2016, p. 56). Finally, a small, 16.9 cm high clay *hourglass drum* dating to the Celtic Late Iron Age, La Tène period, survives from Malemort, once more in Corrèze, France, with upper and lower diameters of 13.5 cm and 8 cm respectively (O’Brien, 2016, p. 25; Pomberger, 2016, p. 56). The extant half of the *Malemort drum* indicates it had a curved, cup-like body and was roughly the size of a small *tabla*, or Indian *half drum*, so it would perhaps have produced sharp, high-pitch tones if the skin was drawn very tight. It may also have had a skin drawn over both sides, making a double-ended *talking drum* comparable to the Indian *Mringdangam*, which was in legend split in two and became the ancestor of the *tabla* (Krishnaswami, 1967, p. 73).

One Roman period site attests a potential *drum* from Britain (Caruana, 1992), at the Flavian fort of Carlisle dating from c. 84 CE, which consists of a number of leather pieces which may have either been part of a *drum* or acted as the cover for one. Confusion has arisen because of the similarity to a leather bar stool, prompting the suggestion that the artefact was a cushion, but if it did involve a musical instrument, it would have been a fairly deep *frame drum*, perhaps a *cylindrical drum* (Caruana, 1992, 45-109). There is little precedent for this in Roman culture, where the *tympanum* drumhead could have a very large surface area, like the Sicilian *tamburello*, but the frame itself would not have been because it was played held up in a vertical position (Wardle, 1981, pp. 155-161) and a deep shell would impede such usage, which is likely why it is normally ring-shaped. Indeed, a shift in Roman philosophy gradually saw the development of a sentiment that music, especially drumming, was effeminate and unmilitary (McAvoy, 2017, p. 79), as a consequence of the *drum* and *cymbal* music performed by the Corybantes and the transvestite Galli Priests in their devotional rites and Phrygian cult of Cybele (Latham, 2012, pp. 96-121).

The close quarters, high density population context of a Roman military installation would suggest an interpretation that it is a sound dampener, as informed by modern professional practice. The tentative identification of the apparent *Carlisle drum* is uncertain, but if correct it would attest a type of *tom drum* in an Early Romano-British, Celtic environment, which therefore could be the first of its kind in the archaeology of Britain. What limited Roman evidence there is for the *drum* in general, and the drumstick (Wardle, 1981, p. 159), mean that these cannot have been exotic concepts for the Celts [Appendix 2.5.].

Pre-Celtic influence can be discerned in the rhythmic culture performed by the ancient Celts, which came to define aspects of Celtic musical identity. The Celtic drummer was perhaps comparable to his medieval counterpart in carrying a single long *talking* or *tubular* framed *drum* with a skin drawn over each extremity, providing accompaniment for ensembles, including the instruments discussed in this paper:

> Examples of lyres, lutes, wind instruments, and hourglass drums can be seen in sources such as the eight-century Canterbury Psalter (London, British Library, Ms. Cotton Vesp. A. I, fol. 30v.); the ninth- century Utrecht Psalter (Utrecht, University Library of Utrecht, Ms. 32); and the Lothair Psalter (London, British Library, Ms. Add. 37768, fol. 5) (Molina, 2006, p. 59).

[Utrecht Psalter, Psalms 149-150 (CC)]
[c. 850 CE]

4. CHORDOPHONES

Bum cledyf yn aghat
Bum yscwyt yg kat
Bum tant yn telyn.

I was a sword in hand
I was a shield in battle
I was a string on a harp.

Kad Goddeu, Book of Taliesin

4.1. Introduction: String Instruments

Chordophones, or string instruments, are arguably among the most sophisticated objects of the ancient world. They may have first emerged with the earliest usage of sinew for bow strings, an application of which resulted in cordage capable of high-tension, and eventually, pitched tones played upon the *musical bow*, or *bow harp* (Dumbrill, 2005, pp. 179-236 and pp. 308-310), the earliest evidence for this being a cave painting within the Grotte des Trois-Frères, France, from approx. 13 000 BCE (Water, 1988, p. 89; Altenmüller *et al*., 2013, pp. 313-335) [Appendix 3.1.].

Throughout this chapter, references will be made to attestations from medieval texts with the consideration that certain pieces of latter Celtic monastic culture may have maintained literary 'memories' of seemingly earlier traditions.

4.2. Crwth – The Celtic Lyre

> Among them are also to be found lyric poets whom they call Bards. These men sing to the accompaniment of instruments which are like lyres […], (Diodorus Siculus, Bibliotheca Historica, 5.31.2.).

As attested by contemporaneous written sources and numerous archaeological artefacts, a northern *lyre* variant was played by many European groups in Antiquity, including the Celts (Menèz, 1999, pp. 357-414; Clodoré-Tissot, 2009 and 2010; Harper, 2017; Hill, 2017; Lawson, 2019; Kollveit, 2022, pp. 208-212), but it is uncertain whether it predates the Mediterranean variety or not and even if they may both have affected one another's development.

For the purpose of discussion, the Celtic *lyre* will be referred to as the *crwth*, from the Welsh term for such instruments in the Early Middle Ages, likely descending from what was possibly the original word for chordophones in the Proto-Celtic language, **kruttos* (MacBain, and Mackay, 1911, p. 111), meaning 'string instrument', 'round object', 'womb' and/or 'vagina' (Pokorny, 1959, p. 624; Matasović, 2009, p. 228). Not to be confused with the later Welsh medieval instrument of the same name which ultimately derives from it (Parry, 1861, pp. 131-134), it is possible that the *crwth* evolved independently from the southern *lyra* and *cithara*, and they differ in some respects. Since the ancestors of the people encountered by the Proto-Celts in the Bronze Age had brought farming to Britain and themselves originated in Asia Minor where the *lyre* first emerges (Mathieson *et al.*, 2018, p.1; Brunel *et al*., 2020, pp. 3-4), it is conceivable that they also introduced ancient Western Europeans to some *yoke-lute* variant (Pasalodos, 2012) related to instruments which would become the *lyres* of Ur and greater Mesopotamia, in the 3rd Millennium BCE (Pomberger, 2016, p. 66). Going by Bronze Age stelae in the Iberian Peninsula from between the 12th and 7th Centuries BCE, this would mean that the *lyres* of the Celts and the c.1400 BCE pre-European inhabitants of Mycenaean Greece and Crete might have shared a common ancestor, but diverged from each other along different evolutionary paths, unless it came to the Celts from contact with ancient Aegean seafarers themselves, perhaps Phoenicians (Pasalodos, 2012, pp. 212-225). Nonetheless, the lack of Goidelic Celtic words for chordophones until adoption of a Brythonic one puts this into question, implying a Westwards transmission, and the archaeology would suggest an introduction of an Etruscan round-backed *lyre* called a *phorminx* into the Central European region of the Celtic Hallstatt culture in the Early Iron Age (Pomberger, 2016, p. 66 and 2020, pp. 471-482). There are vessel ornamentations of the period representing *lyres* with four to five strings from the Celtic archaeology of Hungary, Austria, the Southern Alps, Moravia (modern Czech Republic) and Slovenia, along with what is today Northern Italy (Ibidem, p. 66).

Tikhonov and Tikhonova (2019, pp. 74-84) corroborate that the *lyre* motif came into Celtic art from Etruscan influence, but Díaz-Andreu and Matolini (2018, p. 506) also identify the instrument in Spain, via the rock art style of the Iberian Mediterranean Basin called 'Levantine'. With the least ancient of these recent rock carvings and paintings dating from the 3rd Millennium BCE, in the Neolithic (Washburn, 1962, pp. 199-203), this would suggest that the *lyre* was indeed played in Europe prior to the Celtic period (in the South at least), supporting a pre-Celtic lineage particularly relevant for the *Celtic from the West* theory given this position in Spain – the location of Koch's hypothesised Celtic Tartessian culture Urheimat (Koch, 2013, pp. 101–146). The Levantine rock art may provide evidence for a continuity of *lyre* traditions from the Neolithic into the Celtic Bronze Age of Spain, with some depictions from as late as the 1000s BCE (Díaz-Andreu and Matolini, 2018, p. 506), which allows comparisons with Spanish music and archaeology from later periods going towards reconstructing the Celtic *lyre*. Whether *Celtic from the West* is proven accurate or not, music acts here as a link through time, transcending eras and cultures [Appendix 3.2.].

As an accompaniment instrument, the *lyre* is best suited to punctuate the musical phrases of a singer and much like its modern descendant the *guitar*, it lends itself ergonomically to the travelling Bard by its size and portability. We might postulate that it was a symbol for designating said ritual music professionals in and of itself, representing the Bardic order as their essential tool of the trade, since the references to *lyres* in Greco-Roman textual accounts of Celts contemporary to their culture, mention them in the usage of Bards (Diodorus Siculus, Book V, 1; Ammianus Marcellinus, Book XV, 9). Strabo does not mention the *lyre* when citing Bards, but does call them 'singers' (Book IV, Chapter 4). Because of this possible emblematic value, along with an association with high status Anglo-Saxon burials in later periods, it is considered that the *lyre* may have held great significance in relation to political functions, hierarchy and power in pre-medieval European society (Lawson, 2019, pp. 221-280).

4.2.1. Components and Construction Methods

The etymology of Welsh *crwth* indicates a hollow, bowl-backed instrument, in reference to a word meaning ‘womb’ and related to modern English ‘growth’ and ‘crescent’, with the Irish terms *cruit* and *crot* (harp) ultimately deriving from Pictish *crut*, (‘swelling’, ‘bulging out’, from Proto-Celtic *Krotto, ‘round object’) (MacBain and Mackay, 1911, p. 111; Pokorny, 1959, p. 624; Matasović, 2009, p. 228). This generally differs from the more well-known *Anglo-Saxon lyre*, which is likely descended from the Celtic *crwth* and has a more streamlined, flat backed boxwood design (Boenig, 1996, pp. 313-314). This may have developed if Germanic tribes gained the instrument from Iron Age cultural contact with ancient Celts (Ibidem, p. 313), along with many other innovations, including a vocabulary which would eventually produce the modern English word ‘iron’, from Celtic *Isarnom* (Matasović, 2009, p. 172), but recent studies point to an Eastern influence from similar *lyres* found in Kazakhstan dating to the 4th C. CE (Kollveit, 2022, pp. 208-212). While Iron Age *Celtic lyres* may have between seven and nine strings, later Germanic descendants are reduced to six and lose the bowl back, moving away from ‘classically’ shaped *lyres* (Boenig, 1996, p. 314). The *crwth*’s curved wooden body could have been lathe-tooled and made possible by Iron Age advances in woodwork technology, the development of which by Celtic groups can be observed in their invention of the barrel (Indruszewski, 2009, pp. 409-420) and their clinker hull sailing ships (Work, 2015, pp. 5-10), curving wood by heat treatment. Archaeologically, Northern Britain features the current oldest extant pieces of any chordophones in European material culture, being the two wooden *lyre* bridges from Scotland (Purser, 2019), one found on an island in Fife and the other in a cave on the Isle of Sky. Both are charred, one-time components to instruments which may have been ritually decommissioned and they prove the existence of the *lyre* in a Brythonic, Western Celtic cultural musical identity context of the Iron Age (Purser, 2019, pp. 265-280) [Appendix 3.3.].

Depictions on Celtic coins would suggest that the *crwth* may have featured a single large sound hole in the centre of the soundboard, like a *guitar*, as opposed to the familiar double clef holes either side of the strings seen on *Mediterranean lyres* (Megaw, 1991, p. 647). This has been interpreted for modern French reconstructions of the instrument (Clodoré-Tissot, 2010) in tandem with a significant find called the '[Bard with the] Lyre of Paul', a carved stone statuette from Brittany, France, dating to the La Tène period between 100-200 BCE, which represents a musician wearing a torque and holding a carefully carved *lyre* in his lap (Menèz, 1999, pp. 357-141; Pomberger, 2016, p. 67).

4.2.2. String Material

The predominant material of strings in Northern European and Greco-Roman antiquity is generally gut (Tsukamoto *et al*., 2020, p. 13), though other organic forms of cordage would also be possible from anything which can be made into string, such as the twined fibres of plants, reeds (Rast-Eicher *et al*., 2021) or sinew (likely the earliest material of bow strings), along with wool, horsehair (Parry, 1861, pp. 131-134) and other animal hair or products – even silk is used in Asia (Gong Yi, 1999, pp. 11-13). However, there is some evidence to suggest Celtic *lyres* had metallic wire strings, though Clodoré-Tissot (2009) considers this impossible. Medieval Irish texts describe historical performance practice for *harps* strung with silver and gold wire, in addition to copper-based strings of bronze or brass, and this may not only be metaphorical in nature (Evans, 2001; Heyman and Heyman, 2003; Cathcart, 2009). Recent testing has produced golden *harp* strings with superior performance to brass strings (Heyman, 2003, pp. 9-15), confirming the concept, while studies involving Goldsmiths have found that although certain densities for pure silver and bronze make for overly brittle strings by themselves, gold-based alloys, such as the modern day uncommon electrum, may be proven the most viable for *harp* strings (Cathcart, 2009, pp. 34-43).

Metal wire production by drawing may have been performed by the Persians and the Greeks of antiquity by the 600s BCE (Oddy, 1977, pp. 79-87), with techniques for doing this by hand being known to the ancient Egyptians before, perhaps as early as the 2nd millennium BCE (Shaw, 2000, p. 480). These are culture groups with which the ancient Celts certainly had interactions by trade, martial contest or mercenary work; consider the Greek colony of Massalia, established in Gaul c. 600 BCE (Boucheron, 2019, pp. 30-35) and the successive incursions to the Aegean leading to the founding of Galatia in the 200s BCE (Sartre, 2006, p. 77). They also shared musical contact (Ó Foghlú, 2015, p. 53) and there is independent evidence for Celtic gold wire production used in ornamentation, jewellery and clothing decoration. This is attested in examples from Germany and France dating from the Late Bronze Age to the Early Iron Age, and it is possible this technology ultimately derives from an Etruscan connection (Eluère, 1989, pp. 48-55). If the latter is true, this only reinforces the suggestion that Etruscan influence characterises the individuality of ancient Celtic musical idiosyncrasies. Geraldus of Wales (*cited in* O'Meara, 1985, pp. 103-104) grants an insular Celtic precedent for wire-strung chordophones, *lyres* and *harps* from c. 1185 CE in Ireland, Scotland and Wales, and when describing with bronze strings the medieval Irish *harp*, or *cruit,* (Chadwick, 2008, pp. 521-531). This is one of the earliest accounts for such technology, predating the oldest recorded historical musical wire string production, which was in Germany, during 1351 CE (Dolge, 1911, p. 124).

The Irish terms *cruit* and *crot* being, as aforementioned, etymologically derived from Pictish *crut*, giving Welsh *crwth*, confirms an ancient connection to the British mainland. If the *harp* is not native to Ireland, then the concept of a wire strung instrument might be derived from a continental Celtic *lyre* with metal strings, and since its name for the instrument comes from Britain, this may have been the case for the instruments played by the Late Iron Age tribes living there also.

Further examination would need to question whether a coiled core wire bass string would be possible at this time, along with the opposite, a single wire high pitch string. Gold thread, which was golden flat wire wrapped around a linen or woollen thread, may have been used for clothing in Ireland (McClintock, 1943, p. 3; Whitfield, 2006, pp. 8-31) and in music this would be comparable to modern metallic wound strings with a nylon core, thus composite string production methods (perhaps involving fabric or gut cordage and metal wire) must also be considered. Though wire-strung chordophones may not have been common in Europe until the Middle Ages, we might suggest that the Celts were among the first to produce them, but from when in time exactly this was possible, or likely, remains to be seen [Appendix 3.4.].

['Barde à la *Lyre de Paul*', 2nd C. BCE 'Une Odyssée Musicale' Exposition]
[Photography Caroline Lena Becker (CC), Musée Saint-Raymond, 2013]

5. CONCLUSION

In conclusion, we may observe from archaeological and ethnographical evidence that there existed a broad, widespread Celtic musical identity in the Iron Age, while in earlier periods (especially up until the Late Bronze Age), less universally attested items speak to the variety of cultures and diversity of peoples whose technologies, styles and innovations came to characterise the musical instruments which would become so important to the Celts [Appendix 4.1.]. This is relayed most characteristically in aerophones and chordophones, by the pride of place given to the *carnyx* and the *Celtic lyre*, or *crwth*, in the archaeology and ethnography which define the peoples having inhabited the regions of modern day Britain, Ireland, France and Spain, along with further, strong evidence for the origins of these features from Mediterranean and pre-European influences identified in the Celts of Central Europe. Rhythm and percussion indicate the continuity of said pre-Celtic cultures and, much like some wind instruments, they confirm but do not wholly explain a nebulous Neolithic heritage connection. There are definitely differences in isolation (notably in Ireland), but the broad similarities across North-Western Europe outweigh the particularities and characterise a distinct, unique culture, with evidence of significant importance placed in music and musical instruments. However, the general typology and evolutionary development of said instruments, if accurately surmised, does not necessarily preside over a unilateral and contiguous Celtic identity so much as confirm that the key influences known to have shaped their quintessential style, namely Etruscan, Phrygian and Phoenician, are indeed felt. Nonetheless, native styles and features both post and pre-European would appear to have born enough importance on syncretic development and foreign contact to endure, once a shared linguistic and cultural identity became established and reasserted in the Celtic La Tène heyday. We can therefore state that the music particular to the Celts had become a distinct, and specifically Celtic, art form and orthodoxy reclaimed as their own, regardless of its roots, by the time of Roman occupation.

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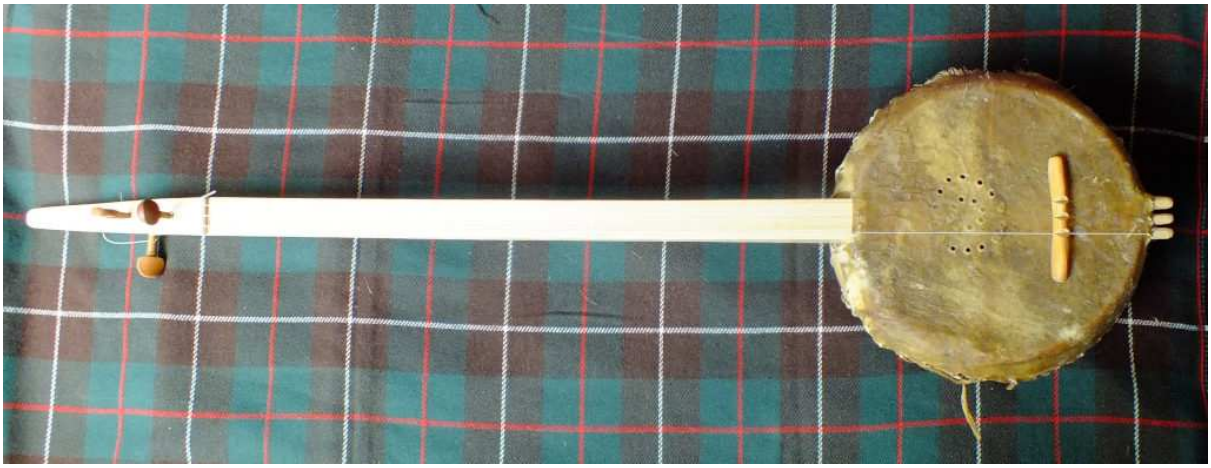
Je ne pouvais tout simplement pas accepter que quelque chose ayant survécu autant de siècles ne puisse disparaitre si facilement, juste à cause de négligence. Il est vrai, nous ne pouvons pas laisser… Ce feu s'éteindre comme ça.

[I quite simply could not accept that something having survived so many centuries should be allowed to disappear, just because of carelessness. It is true, we cannot let… This fire to go out like that.]

Alan Stivell [translated and paraphrased by Morgan Black], personal conversation with Morgan Black (pictured with a Gaulish *lyre* reconstruction by Julian Cuvilliez of Atelier Skald) at the Festival Interceltique de Lorient, 2019.

[HarpaCrafts *bowed lyre* reconstruction, played by Morgan Black at Castell Henllys, 2019]



[A Peter Shallcrass Suggested Reconstruction of the *Tiompán,* 2020, Used With Permission]

> And on the same day, in this massacre, Ó Cearbhaill, that famous timpanist and harpist, supreme in his art, mighty in precedence and excellence, lay in the grave in the same place, with about twenty other timpanists, his students. He was called Cam Ó Cearbhaill because he was one-eyed and could not see straight, but looked obliquely; and, if he was not the first inventor of the art of string music, all his predecessors and precursors, he was corrector, scholar and director.
>
> The Annals of Ireland, by Friar John Clyn, 1329 (*in* Williams, 2007, pp. 95-96)

> A 12th-century commentator on the Brehon Law Tracts stated that a timpan player who suffered a blow and lost his nail was entitled to a compensatory 'wing nail', presumably a false nail or a quill plectrum, and his assailant was fined.
>
> (Buckley, 2000, p. 169)

APPENDICES:

Appendix 1: Aerophones

Appendix 1.1. Clarification of Woodwinds

'Open flutes' rely on air blowing across a single sharp edge to split an airflow into the instrument's hollow chamber, creating a vibration when the air current meets the air column within. 'Closed flutes' are sounded by blowing into an air duct, where the flow of air is forced into and against a different sharp edge, so that the air current focused into the *flute* is interrupted and encounters the air outside, and again the sharp edge is a catalyst for different air streams meeting and vibrating inside the instrument. Reed *woodwinds* do not rely on a sharp edge for their vibration, but rather an affixed separate piece of material, often made of reed, which vibrates inside the instrument when air is blow into it.

Appendix 1.2. Hirt's Theory for the Natural Scale

The Natural scale may be the basis for all Western European folk music, harkening back to transhumance (seasonal livestock movement) and Indo-European herding instruments, though it may also have had features of the Diatonic scale, which may perhaps have been associated with urbanisation and art music based on equal temperament (Hirt, 2012, p. 207; Hirt, 2017). Gilchrist (1911, pp. 150-153) describes the 'Scottish Pentatonic', or gapped scale; C Major with the 3rd and 7th degrees omitted, possibly built on the three fifths of C/G, D/A, F/C. This would avoid semi-tones and the possibility of any perceived dissonance or false notes, which is probably an outdated reading of the Natural Scale, but the Greeks did build their scales on tetrachords (Hagel, 2009), so there may be a comparable ancient theory of music.

Appendix 1.3. Irish Aerophone Terms

The *cuisle*; a pipe, perhaps representing middling status, meaning 'artery, vein', but mainly 'pulse', which may imply rhythmic playing (MacBain and Mackay, 1911; Kelly, 2013). It is possible it may have had gold plating (Kelly, 2013), and this is very loosely supported by an etymology potentially connected to PIE *(s)kew-, '*to cover*' (MacBain and Mackay, 1911). Alternatively, *cuislenn*, from Proto-Irish '*kulsīnā (roughly meaning '[instrument made from the] stalk of a plant'), and probably designated reed pipes' (Bisagni, 2015, p.43). Next, the *Buinne/Bunne*; either a *trumpet* or reed instrument similar to the *cuisle,* notably counted among *horns* in the seating arrangement for feasts at the hill of Tara (Kelly, 2013; McCullough, 2015), potentially from Old Irish and meaning 'sprig, stalk, sapling' (Bisagni, 2015, p. 17). Finally, the *feadán/faedon*; almost definitely a *flute* if related to Old/Middle Irish *fetán*, from Proto-Celtic *winto and ultimately the same root in PIE which gives us modern English 'wind' (Bisagni, 2015, p. 9). There is also an unnamed mention of 'a small pipe/simple whistle, made from dried stem of elder twig' (Kelly, 2013), which would have parallel in the Loch Tay wood *whistle*, Scotland, so it is probably also related to this and the *feadán*.

Appendix 1.4. Description of Items at Wilsford G58

The human *bone tube* was found in proximity to Bronze Age warfare status objects ((a) dagger with detail of attached belt-hook; (b) pin; (c) whetstone; (d) knife; (e) 'pipe'), and these as 'part of the male 'warrior' costume set particularly during Period 3' (Needham, Lawson and Woodward, 2010, p. 24). 'Period 3' is in this [their] study considered to be: 1950 –1750/1700 BCE, 'Early Urnfield', with cremation, and food vessels/urns in the 'Wessex 1' and 'Willerby' styles. In Buddhism, which is itself a descendant of the only extant world religion comparable to ancient European beliefs, tantric 'chöd' practice involves the ritual usage of a *horn* or *trumpet* called *kangling*, which is also made out of a human tibia or femur, and the original notes from Thomas (1954) on Wilsford G58 do indeed posit an identification as a *horn*, were

it not for the side hole. The bone is often taken from a person who was a criminal or respected teacher in life, or who died a violent death, though the instrument may also be made out of wood, and it is sounded to summon ravenous spirits, such as the *preta*, or demons. This is an important piece for giving a magical context to musical items of Celtic paraphernalia and might be thought of more as a *horn* than was previously thought, which may indicate a very early phase in the development of the *carnyx* – which, though an opinion, might have been intended to intimidate land spirits, much like the Nordic nithing curse pole (Mallet, 1847, pp. 155–157).

Appendix 1.5. On the Malham Tarn Flute

If the Malham Tarn *flute* predates Anglo-Saxon arrival where it was found, a case could be made that subsequent 'Anglo-Saxon' *flutes* might have been based on Romano British designs and requires further discussion. Nonetheless, it appears to have a Dorian mode tuning, which was once sufficient to suggest a Greek connection on the Yorkshire Moors (Megaw, *cited in* Leaf, 2008), but it may be more useful to consider whether music theory identified in Classical Greece [in Antiquity] could have been derived from older, PIE traditions. An initial comparison can examine whether European *flutes* may bear similarities and a common ancestry.

Appendix 1.6. On The Wicklow Pipes

The full eleven pipes may or may not have been a part of one instrument, while the six most intact give a jaunty C# pentatonic scale and are very long, with corrected dimensions between 324 mm and 619 mm, and painstakingly made out of yew wood. The important reputation of the yew as a tree connected with ancestors and the otherworld in Irish mythology has been noted and, since their trunks become hollow as they age, these trees were sometimes seen as gateways or portals as a means of communicating with ancestors. The pipes were themselves skilfully hollowed out, with smoothed bores, then likely all lashed together in a row (although this makes them unwieldy and impractical), and either played like the *panpipes* familiar to us, with an open embouchure, or with the help of an ergonomic wooden grill-like mouthpiece or

connector block section, similar to a modern harmonica. They were, however, probably not a travelling musician's instrument on account of their size, possibly kept in a ritualistic, 'temple' context (Holmes and Molloy, 2006, pp. 15-40).

Appendix 1.7. On Pan Pipe Tunings

An approximative *palmus* (7.4 cm) measurement allows the calculation of their frequencies; five pipes in both Slovenian representations Magdalenska gora and Vače must sound at a natural frequency of 459 .45 Hz (B4 flat), with additional pipes tuned within the fifth octave; seven pipes in each of the Certosa and Providence depictions from Italy must have deepest frequencies of c. 386 Hz (G#4), the next pipes being within the fourth and fifth octaves. Battling *syrinx* players in music duels feature *pan pipes* of varying sizes, so there were certainly different voices and larger/smaller classes of instrument (Pomberger, 2016, p. 62).

Appendix 1.8. On Ocarinas

A related but different instrument would be the *vessel flute* (in the *ocarina* family) found within the graveyard of Hallstatt-Hochtal 98, a woman's burial from the Early Celtic Iron Age, 800-400 BC, Austria. This is a small 4.4 cm diameter clay ball with no finger holes, and the three tones D5, C5, and B4b can be played by changing the blowing angle (Pomberger, 2016, p. 59). It is not known how widespread *vessel flutes* of this type were, but there is precedent for Celtic clay aerophone instrument crafting (in Spain), so where there is such a tradition there is, again, the motive and ability, but greater evidence is lacking, and very small instruments such as these, including boxwood *pan flutes*, have often simply been called 'toys' (Reinach, 1907, p. 180).

Appendix 1.9. Defining the Duple and Triple Flute

An advantage of said structure may be the ability to sound more than one pipe at once, which can allow for simple self-accompaniment, or chords. It is the Greek *water organ* from which all modern keyed instruments ultimately descend, an apparatus which was essentially a set of large *panpipes* affixed to a box containing water used to control air pressure by 'playing' a

scale's worth of keys, though a second person was necessary to operate a crank or bellows, if lacking a pedal. If some of the rows of pipes feature tone holes, the instrument may in fact be a *double flute* instead, and even *triple flutes* also exist. It varies whether the additional fingered pipe is like a *fipple flute* or is itself an *end-blown flute* lashed to other pipes which provide drones, in which case it usually acts as the 'chanter', as with the *bagpipes*. Such instruments will feature few pipes at all since the melody is sometimes played on a single tube, and some of the oldest *flutes* in the archaeological record are found in pairs, such as the Sumerian *'Silver Pipes of Ur'*, Iraq (c. 2450 BC), and multiple Egyptian examples.

The latter were, however, not lashed together and were played chromatically, capable of melody on their own, while the *panpipes* rely on each other as an entire assemblage. Since they have no finger holes, they are quite like the individual wooden pipes identified prior – with skill, overtones could be obtained, depending on the construction. Versatile indeed, therefore, may have been the abilities of a characteristically Celtic instrument identified in the ancient world as *syrinx*, the illusive *Celtic panpipes*.

Appendix 1.10. On Reed Pipes

The Athenian creation myth for the *auloi* relates to a Phrygian satyr named Marsyas, who finds them after they are discarded by their inventor, the Goddess Athena, for making her cheeks puff out (a biproduct of storing air in the cheeks for too long when using circular breathing technique, after which they may sag). He plays them in a musical dual against Apollo and his *lyre* – which he loses, because he wishes to win the right to assault him sexually (Goldhill and Osborne, 2004). This conveys the kinship between the *aulos* and *pan pipes*, with lascivious associations of the wilderness, although the Spartans seem to have actually associated their *auloi* with Apollo instead and employed them in a martial environment reminiscent of *Highland pipes* (Cerqueira, 2016, pp. 187-205). The story hints at the likely origin of the *aulos*, as far as the Greeks were concerned, as a pre-European instrument from Asia Minor/Anatolia

(pre-Islamic Turkey), where the blood of an eponymous Phrygian Satyr was thought to have created the river Marsyas when he was strung up and flayed alive for his hubris. His heritage also betrays a Phrygian background for the *aulos*, and the earliest archaeology for the instrument itself hails from the Neolithic (5000 BCE), in Koilada, Greece (Karazou, 2020, pp. 883-913), very much pre-European.

By extension, this implicates the Early European Farmers, of Anatolian descent, who would go on to introduce agriculture to the continent and erect megalithic sites, like Stonehenge, before being subdued and likely incorporated by European peoples, along with aspects of their culture and music. This juxtaposition can then, theoretically, be felt in the pitted opposition of the Mycenaean *lyre* and the *aulos* of Asia Minor (Sachs, in Bucken, 1928, p. 25).

Appendix 1.11. Fipple Flutes

There is ample evidence for simple *bone flutes* with tone holes in the pre-European Mesolithic and Neolithic cultures of Europe, but no definitive proof whether the Proto-Indo Europeans may have adopted these from their precursors or if they already had them themselves. The *ney* is an Egyptian and Persian end-blown instrument, which would be comparable to the Slavic *svirel*, but it features an unusual embouchure which holds the *flute* in the edge of one's open mouth, and this avoids the issue of a specific block or fipple, the notched duct and mouthpiece found as part of a typical *flute*. Due to a difficulty in identifying these features, which are often missing, there has been some doubt as to whether the 'prehistoric *flute*' with set numbers of finger holes denoting scales ever existed at all, with suggestions that some 'tone holes' could simply be tooth puncture marks (Brade, 1982, pp. 138-150). Such instruments are relatively easy to play for beginners, yet deceptively sophisticated in their simplicity, and they take away some finer pitch control from the musician, so it cannot be certain that wooden *flutes* were made like this.

This study agrees with Pomberger's overview of *whistles* of wood and bone from the Urnfield, Hallstatt and La Tène phases in the assertion that '[…] there is no special development of whistles' (Pomberger, 2016, pp. 57-58), although their frequencies align with each other and indicate skill in acquiring pitch precision, which they knew how to make very loud. Pomberger (2016, pp. 57-58) says of the Bronze Age *Urnfield whistles*: the 2.9 cm long *Aspern pipe*, from Vienna, has a calculated natural frequency of 5862 Hz (F#8), playing a C7 (2100 Hz), at 102 dB, audible at a range of 170 m.; the 6.7 cm fipple bird-bone pipe of Gars-Thunau, from Lower Austria, has a natural frequency of 2537 Hz (D#7), producing an A7 (3617 Hz), at 94.1 dB, and ranging 68.46 m. As for the Iron Age Hallstatt culture *bird bone whistles*, the end-blown types even have marks, 'showing the best position for the lip'; the *whistle* from Vösendorf, Lower Austria, plays a B7 flat (3919 Hz) at 90.6 dB, ranging 45.76 m.; *The Leopoldau whistle*, from Vienna, plays an E6 (1378 Hz), at 101 dB, ranging 151.51 m. Because the Vösendorf site featured a photograph of a now lost 'bone flute with four fingerholes', we can see the ability of *whistles* to inform us on *flutes*. Of the (lost) Kalenderberg/Mödling *whistles* with fipples, from Lower Austria, their recorded sizes allow for calculated frequencies: the 7.2 cm *whistle* would play a D7/D#7 (2361 Hz); the 6.6 cm *whistle*, a D#7/E7 (2575 Hz). Of the Iron Age La Tène culture, Pomberger mentions only one windway notched (crude) deer bone *whistle* survives, producing a B6 (1864 Hz), at 93 dB, ranging 60.32 m86 (Ibidem, pp. 57-58). Nonetheless, the Loch Tay Iron Age wooden *whistle* (dog rose) from Scotland, 500 BCE (Dixon, 1984, p. 231), provides evidence for typological development of bronze-age bone instruments, being recreated in a wooden material, setting a precedent for other instruments to have seen the same. In fact, many *whistles*, made from antler, bone, or even wood, from the archaeology of the Celtic world: Spain and Poland, one from Dunagoil, Bute, made of bone, and one Iron Age example from Coddenham, Suffolk, made of antler. These make it clear that knowledge of how *fipple flutes* function was widespread, with

a shaped mouthpiece and a notch for the air to escape, but it is unclear whether this will have extended to the usage of simple-system *flutes* resembling a modern recorder. Despite the other theoretically related ancient European *flutes*, we may only say that such instruments were possible for Iron Age Celts, and likely in usage, if not as of yet necessarily proven in practice.

Appendix 1.12. On Composite Reed Pipes

There is a similar instrument in the Indian sub-continent used for snake-charming called *pungi* and this might point to an Indo-European origin, but because it employs a reservoir or gourd to funnel the air current into multiple pipes, it actually resembles a Chinese variant instead, called *hulusi*, which then becomes a more likely ancestor. The *double clarinet* from Ibiza, off the coast of Spain, called *xeremieta*, is probably related, with pipes lashed together. The fact that the Greek double *hornpipe* called *mantura* is of Cretan origin could suggest a pre-European history, matching the *launeddas*, but in construction is more like European *double flutes*, like the Bulgarian *dvoyanka* and Serbian *dvojnice*, with more than one bore (usually two) within a single body. This allows for playing multiple notes simultaneously, but because these instruments remain isolated to the Balkans this may not be widespread in Europe, other than some variants of the Ukrainian *sopilka*. Nonetheless, the Slavic *svirel* is sometimes played in pairs, as is the Georgian *salamuri*, so there is no reason this could not be done with the *fipple flutes* previously discussed. If related to the *Celtic aulos*, going by the Welsh *pibgorn*, the *cuisle* may have been a *double hornpipe* akin to the Basque *alboka*, in which case the lips make full contact with the *cattle horn* mouthpiece, but multiple notes are achieved by a *double pipe* fingerboard (Barrenchea, 1976, p. 107). This would be like the Yugoslavian *dvojnice*, analogous to the Croatian *diple* (Petrović, 2014), the only extant *woodwind* which would sound similar to the *triple pipes* – if they had no reed.

Appendix 1.13. On the Bagpipes

In Ireland, as elsewhere, *reed pipes* may have flourished in the Ancient World for their accessibility and appeal over a broad social demographic. These instruments were cheaper and louder, making them popular in public functions, but also a dichotomous nature:

> Pipes were not only associated with emboldening warriors, funeral processions, drunken parties and courtesans […]; they were also played by priests and religious ascetics who had renounced sex completely (Brown, 2016, pp. 7-8).

Hirt (2017) believes the *bagpipe* combines the ability to play diatonic scales with a retained, functional 'rural mode', as a hybrid instrument capable of playing the Natural Scale so as to remain in-tune with *natural horns* and *overtone flutes*. If so, this would characterise the *bagpipes* with native, pre-contact folkloric music features and support the notion that they are descended from a native Celtic instrument, but also that they may have served a role in bridging communities from different backgrounds and social standing. At festivities, gaudy *pipe* music can be said to have brought people together amicably. *Reed pipes* qualify as a force for social organisation across time via 'cosmic order, or musica divina', by their accompanying of life events both religious and profane, from Nuragic and Celtic Christian practice to Sardinian Sabbath dancing and the Greek dithyramb, danced in groups to the sound of a *pipe* (Brown, 2016, p. 8).

The *Small pipes* and *Uillean pipes* of Northumbria and Ireland may give an idea as to how non-reed based *triple pipes* could sound, potentially themselves having been influenced by the arrival of the *bagpipes*, but ultimately perhaps deriving from a native original type, the fusion with which could have created a new instrument. The original Persian *bagpipes* differed from modern *Highland pipes*, which retain specific Celtic idiosyncrasies. For example, the *ney anban* of Iran has a larger bag, but has a smaller pipe and lacks the multiple pipes of the Highland tradition.

Appendix 1.14. On Dords

Replicas of *dords* are today played in music reconstruction with an Australian *didgeridoo* technique, in the absence of any known specifically appropriate playing method, a lack of which previously resulted in the death of Dr Robert Ball, one of the first musicians to attempt to play them in the 19th C., from a burst blood vessel (Waddel, 1998, p. 234). In interpretation, while *didgeridoo* technique may have informed one possible way to perform a reliably musical sound with the instruments, the execution employing typically Aborigine rhythms lend a decidedly Australian sound to reconstructions at present. Perhaps identifying clear Celtic or even basic Indo-European poetic metres to be emulated in percussive blowing would make for a more authentic interpretation. Nonetheless, it is the metallic tint to their sound which produces tones distinct from their wooden Australian counterparts and the *didgeridoo* techniques on Irish *dords* make the instruments sound like bees, which may have had an important role in Celtic beliefs for their honey production (related to mead and transcendent experiences as expected by association with alcohol and droning *horns*), but most interesting is the 'tell the bees' tradition, supposing that bees were believed to travel between worlds.

Appendix 1.15. Ritual Usage of the Carnyx

Ó Foghlú (2015, pp. 62-63) cites John Kenny as the main modern expert who plays the *carnyx*, asserting the instrument has been associated with war but likely had 'ritual functions' as well, since they have been found in the context of temples. Hunter (2019, p. 63) suggests a mythological component in the function of the *carnyx*, as the dissembled head from the *Deskford Carnyx* may have been deposited as a sacrificial offering. However, this does not prevent the specialised head being 'sacrificed' as a specific animal referenced for an individual god or tribal guardian spirit, as there is evidence for other Celtic sacrificial rites and tribes associating themselves with specific creatures and dedicating unique animals to individual gods (Purser, 2007, p. 27). Ó Foghlú agrees that extant depictions of *carnyces* support the

interpretation as ‘rite and ritual’ performance contexts (Ó Foghlú, 2015, pp. 65-66). We may posit that the *carnyx*, along with the Welsh Mari Lwyd tradition (Howell, 2018, pp. 66-79), can find explanation in the Norse nithing pole practice, which is used to intimidate spirits of the land into turning against or deserting the intended target (Mallet, 1847, pp. 155–157).

Appendix 1.16. The Deskford Carnyx

The *Deskford Carnyx* bears a boar’s head, and as Kenny, its main player in the modern age, has repeated in his many presentations, the boar was a powerful beast which could outrun a horse, so to be able to kill it represented martial prowess, acquiring totemic power. The bowl-like space inside the head acts as a resonance chamber, trapping the sound to achieve a powerful and ominous reverberation, and studies have shown it was deliberately modelled to scale after a real boar’s skull. Finally, a wooden tongue was mounted on a spring in the mouth, which affected the percussive qualities of the *horn* and made it come alive, wagging when played. One could say it has a baritone voice, very capable of deep, foreboding tones which reverberate enduringly, but it is also able to produce high pitch stabbing notes. Pomberger (2016, pp. 60-61) explains that *carnyces* benefitted from the advantages of deep notes, which have longer sound waves less absorbed by air particles than the short sound waves of high pitch notes, and this means they carry greater distances and excel at signalling.

Appendix 1.17. The Tintignac Carnyx

The main *Tintignac Carnyx* (this singular title normally refers to the most complete of the group) is a very different instrument, with its long, serpentine neck ending in a mysterious, dragon-like face, contorted into a vicious snarl, as well as unusual, large ears. As an open-faced creature, this *carnyx* voice is better suited to explosive blasts than the continuous, *trombone*-like playing style of the *Deskford*, and we might say it has a tenor *tessitura*. Voice classes notwithstanding, like most large *horns* the *carnyx* excelled at producing deeper, ‘brassy’ tones. We can, from these differences, make the argument that there existed different classes and

voice types of *carnyx*. The Clogherclemin *dord*, for instance, has been described as a '*bass trumpet*', and as it would have been composed of three pieces (O'Dwyer, 2015, pp. 60-80). It is one instrument large enough to be considered ancestral to the *carnyx*, resembling somewhat a *lituus* (perhaps betraying distant Etruscan influence) and specifically comparable to the Scottish *Caprington horn*. It is a lot like an *alphorn*, and though it does not feature a decorative animal head, it is probably the best contender for suggesting what a bass *carnyx* would be like.

Appendix 1.18. Horn usage at the Battle of Telamon

The account from Polybius of The Battle of Telamon may 'communicate the idea of the Celtic troops calling up the gods of the land in their cause' (Cunliffe, 1997, p. 103). As for methods of playing, this could have been in unison, one after the other, or in harmony, and the Gundestrup Cauldron battle scenes display *carnyx* players in groups of three as part of what was possibly a warrior initiation. Caesar mainly describes *horns* used tactically by the Gauls, for troop positioning and issuing orders (Caesar, 7.17), by the Bellovacian tribe for summoning a war council (Ibidem, 8.20.2), and by Vercingetorix to signal his forces (Ibidem, 7.83.3). Ammianus Marcellinus also mentions Gallic troops retreating to the sound of *horns* (Ammianus Marcellinus, 19.6.9).

Appendix 2: Rhythm

Appendix 2.1. On Polyrhythms (and a developmental history thereof)

Master bush crafter John Fenna states 'the first music was rock music', in reference to the early rock gongs of prehistory (Fenna, 2021). Place names such as *Maenclochog* (*Stone Bell*) and legends surrounding stones in Irish and Scottish traditions which make sounds in association with coronations, may indicate a usage of *rock gongs* in Celtic communities. This ultimately belies the origin of all percussive music, that is to say, any manner of physical labour in the distant past which required multiple people striking hard objects at the same time (Killin, 2018). Early lithic production, the working of flint and the honing of other organic materials

such as bone and antler all produced rhythmic patterns, perhaps unintentionally, but the structuring power of percussion can be understood here in its relation to organised work (Vandervert, 2019). Repetitive actions and sounds, and their effect on the brain, may have played a role in tandem to develop early human community collaboration, hypnotically focusing attention on tasks at hand, as observed in primates (Remedios *et al*., 2009). Just so, this exemplifies how the music of one's time exists as an expression of the work surrounding artefact production and culture reproduction for the period. It could be said that rhythm is among the earliest sounds of society, and it is inconceivable that ancient Celts had no knowledge of it. Rhythm and dance, therefore, have the ability to teach and help to process information, which may be why rhythmic dances are often performed in rites of passage and at liminal times (Jaimangal-Jones and Nige, 2010, pp. 253-268), representing the function of percussive accompaniment for the ending and beginning of things, before a battle, or at a funeral. In this respect, rhythm is a helper in music but not a commander, as it offers guidance but might not enforce it and remains flexible in incorporating the confines of the performance.

Furthermore, it is not precisely accurate to state that any rhythmic patterns described are 'Greek', 'Indian' or 'Celtic' at all, rather they are universally recognised and practiced musical sounds, so found within nature and performed as a biproduct of the human mind processing auditive information. Binaural beats have a universal effect on the mind, and rhythm is a part of the power of music to act on the human psyche, particularly in regard to memory and development of the sense of self (Jaynes, 1990; Ramachandran, 1999; Clark, 2006).

Appendix 2.2. Panoply – War Music

The most basic but nonetheless important percussion instruments played by the ancient Celts would have been the very weapons they are described clashing together, with spears and swords striking shaped shield bosses, themselves made of wood or sometimes metal. This is noted of the Gallaecian tribes, themselves ultimately from Gaul (Tiberius Catius Silius Italicus, *Punica*

3.346), but it occurs very organically in any warrior culture and the wider musical context of weapons discussed in this chapter leaves no doubt that panoplic idiophones cannot have been confined to Spain. There are also accounts of Gauls, themselves noted by Caesar as baring similarities to Britons, performing in this way when they fought with Hannibal, in the Alps (Livius, 21.28.1; 38.17.4). Experimental archaeology carried out empirically at Castell Henllys, finds in this instance that an iron spear tip striking against an iron shield boss from atop a hill resonates loudly throughout the surrounding valley, and though more thorough experimentation is necessary, a large group of warriors doing this would undoubtedly have produced a significant din and clamour. It could also be questioned whether the idiophonic usage of swords is comparable to *bells* or *cymbals*, because they also sound like this when 'played' musically. Some other considerations can be taken into account given the recent evidence dating between 395 and 255 BCE from Leicestershire, England, that some Celtic shields may have been lightweight and bark based (Speed, 2020). Musically, this would provide a wobble-board structure possibly producing a dull, springy thud, as opposed to the muffled resonator of a leather-covered, solid wooden plank shield. This could have acted as a membranophone, much like the simple *hand drums* used by dancers, with dance itself being another indication of weapons applied as props in a musical environment.

Appendix 2.3. War, Weapon Dance and the Highland Fling

Decorative indentation on the Hochdorff chieftain's couch (a Celtic Halsttat archaeological site) depicts men in groups of two, brandishing daggers in each hand while facing each other and bending backwards (James, 1993, pp. 26–27). This appears to represent a weapon dance performance, perhaps in honour of the deceased chieftain, but if the couch was used in life such displays could have accompanied any event, and it appears to be comparable to the Scottish *Dirk Dance* (Webster, 1959, p. 33). Perhaps the most famous sword dances today are performed in the *Gille Chaluim* ['Callum's Servant'] tradition of the Scottish Highlands,

wherein the performer jumps over and between swords on the ground beneath their feet, with many similarities to similar sword-themed folk dances throughout Europe (Corrsin, 1997). It has particularly been compared to various sword dances, or *danzas de espadas*, of the Iberian Peninsula, in Galicia, Asturias and the Basque Country (Pelinski, 2011), all themselves predated by ancient precedent in Celtiberian weapon dance performances by the Arevacian warriors of Numantia, at the funeral of Tiberius Sempronius, in 133 BCE (Livius 25.17.4). In one Scottish dance, the Highland Fling, the aim is to stay in the air for as long as possible when alternating one-legged skips and hops with high jumps: 'The dancer strives to reach a maximal vertical height on each jump while only landing on a plantar flexed foot with no heel contact' (Potter, 1996, pp. 51-56). This would be identical to the warrior and courting *adumu/aigui* 'jumping dance' of the Masai tribe from Kenya and Tanzania, Africa, wherein men compete to jump the highest (Amin *et al*., 1987, pp. 43-45 and pp. 100-107), and it is possible the 'Fling' alongside other forms of Highland Country Dance may have been used as a way of selecting the strongest men for retinues and the personal guards of Kings (Scott, 2005, p. 121). Traditionally, the Fling is considered the oldest dance of Scotland and was originally a battle victory celebration whereupon men would dance around a spiked shield on the ground, their movements based on the antics of a rutting deer prancing on a mountain and their outstretched arms representing antlers (MacFadyan *et al*., 2011; Melin, 2018). There is a popular misconception that Tacitus mentions the Caledonians of Scotland in 98 CE as 'Naked youths whose sport is fling themselves about in a dance between swords and spears levelled at them', but this is in fact stated of Germanic tribesmen neighbouring the Celts beyond the Rhine, whom through this display 'have only one kind of public show, which is performed without variation at every festive gathering' (Melin, 2018, p. 42). Of these people, Melin also recounts the 'Barditus', or 'Barritus', a prophetic pre-battle war song intended to infer the outcome of conflict by the quality of the cries, accompanied by shield shaming punctuating the battlefield

in a percussive usage of the body and voice (Rance, 2015), which was also one of the supposed omen foretelling functions of a Scottish *Gille Chaluim*, should a mistake be made by the dancer which might predict their defeat (Melin, 2018, p. 42). Sword dance practices have been linked to cultic activities and men's fraternities, but also to rites for death, rebirth, and fertility (Schuster, 1870; Frazer, 1890, *cited in* Kennedy, 2021).

Appendix 2.4. Ritual Dance

This study does not claim or intend to argue that men and women did not dance together and separating the evidence for their respective practices is merely a useful means of information organisation. For community dances, the evidence points to festival activity being a likely setting. Horton (1944) mentions a recorded quote from Davies Gilbert (c. 1822) stating that the Helstone Foray is a 'specimen of Celtic music heard in Ireland and Wales, when the peoples dance round their bonfires, originally kindled in honour of the Summer solstice, although now dedicated to St John' (Horton, 1944, pp. 197-203). The author then derides this, claiming it is merely an example of 'Celtic peoples' having preserved music from the 1600s, but this remains an important reference to:

a) bonfire dancing in Celtic Isles
b) preserved music associated with ritual, and
c) a description of 'predatory' ritual procession into the country, followed by a 'triumphant return of inhabitants dancing to this air' (Horton, 1944, p. 200).

There may be some association with the 8th of May celebrations, and thus perhaps with Beltane and the god Belenos/Maponos, though possibly not Lugh/Lugus, himself celebrated more so at Lughnasadh, (Gilbert). In this regard, some surviving folk traditions in France do preserve chorus refrains mentioning the god Grannus (as a form of Belenos) in relation to harvests and 'fire festival' singing for 'la fête des brandons' (Pommerol, 1901, pp. 427-431), and herein lies the value of vernacular song analysis, which is to be developed in future publications.

Flynn (1998) asserts, with little evidence, that traces of Druidic tree veneration circle dances can be found in contemporary Irish dance;

> Among the earliest influences were the Druids who danced in religious ritual to the oak and the sun. Traces of their circular dances still survive in the ring dances of today. When the Celts came from central Europe over two thousand years ago, they brought with them their own form of music and folk dances (Flynn, 1998, p.13).

This is a novel idea, though it contradicts the usual explanation of ring dances as a devolved adoption of court dancers, which only became widespread in Europe in the Early Modern Period, and these were ultimately derived from circle dancing first performed by Ancient Greeks. However, this might support the notion of Druidic practice having pre-European features, if it can be proven that both the forebears of the Greeks and the Celts practiced such group dances. Certainly, there is no reason to imagine that Celts did not dance in circles, and the descriptions of their festival revelries around bonfires would have necessitated them to do so. Strabo, for instance, makes mention of 'chorus', or group dancing, associated with a 'full moon festival':

> […] Some say the Callaicans have no god, but the Celtiberians and their neighbours on the north offer sacrifice to a nameless god at the seasons of the full moon, by night, in front of the doors of their houses, and whole households dance in chorus and keep it up all night (Strabo, III (IV), 16).

Of note in his favourable report on the character of women in the area and their hairstyles, is a passage describing what is probably a turban, but which might also be a type of *headdress-drum*, because the word he uses is *tympanium*, literally a 'little kettle-drum'; it would apparently be curved in shape, to fit the back of the scalp, and worn on top of the head. Beating this instrument might result in a mind-altering effect on the musician, much like circular breathing for the *dord*-player, and perhaps it could be worn and played as part of dance:

> One might also class as barbaric in character the ornaments of some of the women, of which Artemidorus has told us. In some places, he says, […] the women wear round their heads a "tympanium," rounded to the back of the head, and, as far as the ear-lobes, binding the head tightly, but gradually turned back at the top and sides;[111] and other women keep the hair stripped[112] from the forepart of the head so closely that it glistens more than the

> forehead does; and still other women put a rod about a foot high on the head, twist the hair round the rod, and then drape it with a black veil" (Strabo, III (IV), 17).

Musical costumes also feature in dance, and a number of pendula, pendants, various small and light-weight metallic discs, sheets or triangles, etc., emerge in the Urnfield culture, and were attached to decorative plaques and spirals resembling hair plates or earrings, along with tutuli (pyramid-shaped miniature cowbells). They have been very well-attested in archaeology from the Early Iron Age Hallstatt culture and seem to have been worn as part of clothing and ritual headdresses, categorised as 'sounding costume components' which 'resound gently', but they are not currently found outside of this period (Pomberger, 2016, p. 52). Nonetheless, depictions of such decorations are found on the clothing of women from the kingdom (or confederacy of multiple tribes) of Noricum (modern Austria and Slovenia), famed in Rome for its metalwork (Birkhan, 1997, p. 163), and their usage might enhance physical prestation.

Appendix 2.5. On The Drum

Knowing that the Celts disposed of such instruments, the question becomes whether they used the same types over different periods. Speculative reconstruction methods must rely on earlier Neolithic ceramic *drums*, which featured shaped rings for attaching tuning ropes to stretch the skins (Aiano, 2006, pp. 31-42), while more perishable, wooden instruments are less likely to survive in archaeology (Leaf, 2008, p. 23). Speculative tuning conventions will depend on the relevant size of the instruments and take into account the animal skins most likely to have been used, just as different animals are preferred for different purposes in the organic *ghost drum* traditions of the Sami (Finland) (Pareli, 2010) and the drum-making cultures of Africa (Stosic, 1994). We might think of the ancient *drum* as more versatile than modern *drum kits* benefitting from multiple static frames, because if comparisons to Indian Classical technique are accurately pertinent, then the musician would dispose of possibly three different tones in each hand when using the full acoustic range of the drumheads, the equivalent of a walking set of six percussion notes. A modern *drum kit* makes use of different sticks, usually thick or thin, or brushes, rutes

and beaters, on numerous *drums* of varying sizes to achieve different timbres (Remnant, 1989, pp. 159–174), but the ancient percussionist will have used a more limited array of instruments (costly and arguably frivolous articles of conspicuous consumption in pre-industrial societies).

Appendix 3: Chordophones

Appendix 3.1. On Early Chordophones

The sound of early *bow harps* would have rung out in caves, and a portable resonance chamber might be made by stretching twine across bowls (Sachs, 1940). This is the same principle for the *harp*, where strings are vertical to the soundboard, and the *zither*, including instruments like the *lap harp*, which draw strings horizontally over a sound box, but these were less common in Western antiquity than the *lyre* and compose different families in their own right (Ibidem, pp. 463-467). The *lyre* is either considered its own category or a subfamily of the *lute* grouping, called the *yoke lute* (Dumbrill, 2005), as it possibly developed from it:

> The long-necked lute would have stemmed from the bow-harp and […] became the tunbur; and the fat-bodied smaller lute would have evolved into the modern Oud [...] the lute pre-dated the lyre which can therefore be considered as a development of the lute, rather than the contrary, as had been thought until quite recently (Dumbrill, 2005, pp. 305-310).

Nonetheless, the curvature of a wooden or clay bowl naturally results in variations of string length, producing simple musical scales. A true *lyre* has a yoke-supported crossbar holding tuning pegs to suspend the strings across a bridge resting upon the soundboard, itself part of a resonation chamber which amplifies the sound. The extended string suspension allows space for the hand to reach through and play or mute strings with versatility, even allowing strumming as on the *guitar*. Unlike *harps* and *zithers*, *lutes* and *lyres* have a bridge which rests directly against the soundboard, aiding in vibrational sound transmission (Sachs, 1940).

Appendix 3.2. The Lyre Across the Celtic World

The birds whose bones were made into *flutes* remain important in music, being singing animals with even their feathers employed and the quills often used as plectrums for strumming string

instruments in the ancient world (Buckley, 2000, p. 169). It is clear the *crwth* was strummed and not only plucked, from comparative usage of the Greek *kithara,* the etymological ancestor for the word '*guitar*' (Hagel, 2009, p. 12), but also by its design logic prioritising chord clarity over string number, which never exceeds nine (Pomberger, 2016). More strings would provide more notes for melodies but also make for more difficulty in stopping all of them from sounding at the same time, and this relates to the mode of play by muting most of the strings with the palm (as opposed to fretting them against the neck, like other *lutes*), whilst the rest can be struck concordantly with the free hand, producing chords. Nonetheless, only so many strings may be muted at a time with five fingers, which accounts for the number of strings divisible by ten.

As for playing positions, string muting while standing without a strap is easiest when supporting the instrument against the hip, cradled somewhat like an infant, which might again be suggestive of its symbolic association with motherhood and nurturing, from the name meaning 'womb'. It may also be that the instrument could feature a hand strap, as did the large Greek *kithara*, supporting some of the weight with the shoulder. Otherwise, as seen in ancient Celtic depictions (Pomberger, 2016), the player would be seated on a chair or stool, or alternatively upon the ground, as described of harpists in medieval Irish society (Buckley, 2000, p. 171 and p. 174). Harp-like plucking methods involving both hands become possible when seated, but Celtic similitudes with Spanish music transcend the previously discussed area of dance, for while most European schools of thought in the Middle Ages taught to pluck the *harp* with the fingertips, Celtic harping traditions employ the fingernails, which is significantly important in medieval Wales but also found in Ireland (Taylor, 2012), and this could be a technique retained from earlier *lyre* playing elites. Furthermore, a double-tonic ostinato associated with mourning in Celtic folk music forms (Dijkhuis, 2018) and similar to the Iberian cadence found in flamenco music, could also suggest that a Celtic *lyre* strumming and

fingernail plucking tradition survived both in the medieval chordophone music of Britain (Wales and Scotland) and Spain, the remnants of which might be discerned within Welsh harping, Scottish *pibroch*, and Spanish flamenco *guitar* playing. A link to flamenco would necessitate, proving that the *lyre* was played in Spain, as evidenced by Levantine rock art (Díaz-Andreu and Matolini, 2018, p. 506), that the fingernail technique is ancient and comes from a shared *lyre* tradition (which may connect to dance), and that some features unique to flamenco are not found in its traditionally theorised origin (noting that aspects such as fingernail playing is not found in Persian playing styles, where a plectrum was used, along with similar *lyre* strumming). This would indicate shared, ancient Celtic *lyre* playing traditions in Spain and Britain, and these existing prior to foreign influences, but ultimately having developed into new systems at a later time because of them. In Irish folk music education, *grace notes* are rhythmic sequences of ornamentation, sometimes including pitch changes, such as 'The Cut'/'The burl' or 'Bowed Triplet', applied as set conventions in playing the *bagpipes* and the *violin* (Slottow, 2007, pp. 485-510), which could be compared to the set named *bolo* and *swara* sentences in Indian music (Thakur, 1979, p. 1). In play style, Scottish *pibroch* melodies are performed with *bagpipes* today in *ceòl mòr* practice, but were originally played on *harps* (Buisman, 2004), hence their lilting phrases, and have been connected to Welsh and Irish harping traditions also (Brown, 1998; 2009, pp. 44-47), while the *grace note* formulas they feature, such as 'the Cut' or 'Scrunch', provide rhythmic sequences which are comparable to strumming methods found in flamenco *guitar* playing, such as *rasgueo* (Piga, 2020, pp. 40-41). We may argue that similar techniques relayed by *bagpipe* traditions were originally used for earlier Celtic string instruments and strumming (just as they are now used to great effect by violinists). 'The scrunch' acts as a pull-off trill, while 'the waterfall' allows percussive technique. Notably, medieval Irish poetry was performed to the harp strumming rhythmic, droning accompaniment (Joyce, 2011, p. 28). We may look to a chordophone in the medieval

Bardic tradition of Ireland and Scotland called *timpán/tiompán* and likely influenced by Latin ‘tympanum’, a word for *drums*, and infer beaten playing styles since this chordophone term also referred to percussion instruments (McCarthy, 2013, p. 987). However, there is some confusion as to what the *tiompán* was exactly and descriptions considering it a three stringed, somewhat malleable instrument may suggest a *lute* with a skin soundboard (Buckley, 1977, pp. 53-88; Shallcrass, 2020), resembling a *banjo*.

Appendix 3.3. On the Lyre

The bridge is an essential piece of any *lute* family instrument and it rests against the sound board to allow for the strings to be put under tension across the frame, even playing a part in sound transference (Sachs, 1940). When not made of wood, bone is another material with satisfactory vibrational qualities for making bridges, even today for modern *guitars*, and this is the most likely piece to have also been made of bone, because the tuning pegs are required to deal with torsion rather than transference, so are more likely to be made of wood or even metal. Theories for developing speculative tuning conventions will need to produce a cross-discipline study, using experimental archaeology to estimate viable string density per instrument size and approximate possible tonality. In contrast to melodic monophonic instruments, a multiple-strung instrument must have, as a pre-requisite, a tuning system which lends itself more to strumming, whilst avoiding dissonant accidentals (or ‘false’) notes and taking into consideration the width in which the average human hand-span can practically control and mute the sound – although a ‘seven string’ religious symbolism may also have influenced this developmental choice. This may be, therefore, most viable with a pentatonic arrangement of strings. We may also estimate possible tunings for *lyres* based on feasibility and approximate size of instruments relative to string tension going by density. Since the *lyre* bridges found in Scotland are regular and teeth-like in shape (Purser, 2019, pp. 265-280), the different pitches were gained by differing thickness and this should be the main avenue for research.

The *lyre of Paul* (Pomberger, 2016, p. 67; see Image 6) had seven strings and featured a crossbar-like shape passing behind them, between the arms, which eludes explanation, but may have been a hand strap or perhaps a type of capodastre for use in rapid scale transposition prior to or during play. There is some difference between earlier Hallstatt *lyres* and those of the Iron Age, as they seem to gain more strings over time, but the Gaulish examples for evidence differ little from what we have of the British ones.

Finally, if fitted with bray pins like the Welsh *horsehair harp* (Harper, 2017), or another set piece for vibrating the strings, Celtic *lyres* might have achieved a buzzing quality similar to the 'javārī' effect of Indian *sitars* (Roychaudhuri, 2000, p. 51) and the Sumerian *lyres* of Ur before them, which could emulate the soothing tones of a 'softly lowing bull' (van Dijk, 2013, p.13), with bridge fittings. If also strummed with this species of natural distortion, they might have been capable of even harsher, aggressive dynamic playing, with a sound comparable to the Ethiopian *begena*, using leather straps (Weisser, 2012, pp. 3-18). This is not impossible, considering the Welsh word for the harp, *telyn*, may be related to Irish *teilinn*, meaning 'the buzzing or humming of a bee' (Sanger and Kinnaird, 1993, p. 23). We may posit that a hypothetical capodastre mechanism was in fact a removeable bridge fitting allowing for an optional 'javārī' effect at will, perhaps clipping into place or extending from a lever as seen in harp tuning mechanisms.

Appendix 3.4. Other String Instruments

3.4.1. Harps

Whether oblique framed chordophones more suited to melody were played widely in Western Europe prior to the 8th C. CE (when possibly introduced by Scandinavians) is uncertain (Rensch, 1950, p. 18). Nonetheless, there is some evidence for *harps* in Celtic Central Europe during the Early Iron Age (Hallstatt C/D), in vessel depictions of seated women playing triangular instruments from Košariská, Slovakia, and a bronze figure of a harpist from Sesto al

Reghena, Italy, while the fragments of a harp yoke made from bone and bronze tuning pegs from Pirchboden, Austria, also confirm usage in the Late Iron Age, La Tène period (Pomberger, 2016, pp. 65-66). *Harps* differ from *lyres* as they may be strung on a diagonal axis and separate notes are mostly achieved by string length, though density can also affect this. It might simply be that the *harp* did not benefit from an office of elevated professionals, as did the *lyre* when played by the Bards, and so it may not have been mentioned as often. Perhaps it was more the tool of a storyteller, or otherwise has been overlooked and equated to the *lyre*, if played alongside it, as can be said of the following instruments.

3.4.2. Zithers

The zither, particularly in a *lap harp* form known as the *Baltic psaltery*, is so ubiquitous of Eastern European music (Muktupāvels, 2013, p. 12) that it may be hard to imagine early Indo-European music without it, so it possibly existed also in an ancient Celtic environment. As opposed to the *harp* and *lyre*, and almost combining features from both, *zithers* rest their strings directly parallel to a soundboard. An ancestor of the piano, the *lap harp*'s strings can also be struck with beaters, allowing it to perform as a melodic *dulcimer* percussion instrument (Hornbostel and Sachs, 1961, pp. 3-29). Multiple Early Iron Age ceramic and vessel decorations from Hungary, Slovakia, Austria and Germany confirm that *frame zithers* were once played by Celtic groups in Central Europe (Pomberger, 2016, pp. 64-65).

3.4.3. Lutes and Bowing

Long and *short necked lutes* are thought to have emerged in Northern Africa and the Middle East from the early river valley civilisations of Egypt and Sumer between the 3rd and 2nd Millenia BCE (Dumbrill, 1998, p. 321). They were adopted into the cultures of Central Europe, passing into traditional usage by the Gusan (gōsān), a class of Persian minstrel, eventually becoming the *fændyr* (Ossetian), as played by the Scythians (Russel, 2012, 37). This also resulted in the Greco-Roman *pandoura* by the 5th C. BCE (Sachs, 1940, pp. 136-137), and

it can only be theorised whether a similar *lute* existed in Celtic societies, and though it is not impossible that it became the *tiompán*, a hypothetical PIE *faendyr* introduced by Eastern ancestors of the Celts cannot at this time be proven. These are indirect ancestors of the *violin* (Sandys and Forster, 1864, p. 8) and while it cannot be confirmed whether bowed chordophones were played by the Celts themselves, a renewed uncertainty as to the Arabic *rebab* or Persian *kemânçe* as the originators for bowing in European string music must differ to recent reappraisals of the ancient Indian *ravanahatha* (Choudhary, 2010), an earlier, primitive string instrument bowed with a piece of wood in at least the 1st Millennium BCE. If, as theorised, Arabic groups brought the *ravanastron* to the Middle East from India in the 7th century CE (Heron-Allen 1885, pp. 37.42), this allows for an earlier introduction of bowed chordophones in Iron Age Europe from Celtic contact with India also, via a pre-established musical connection. Sandys and Forster (1864, pp. 6-9) go so far as to indicate a development of bowed instruments introduced to the Middle East '[…] from frequent intercourse with the Western and Northern' European countries, looking to the *ravanahatha,* and while Rieman (1892, p. 27) dismisses this, he ultimately also favours 'Germany, France, the Netherlands and Great Britain' for an 'origin of bowed instruments' (Rieman, 1982, p. 28). The medieval *bowed lyre* (possibly with a neck like the Welsh *crwth*) existed as the *chrotta* in Ireland (Flood, 1905, p. 9) and Venantius Fortunatus mentions a '*Chrotta Britanna'* [of Britain] in the 500s CE (Engel, 1876, p. 93).

Appendix 4: Discussion and Conclusions

Appendix 4.1. A Hyperborean Fable

In this example, music is argued as supporting the characterisation of the perplexing and mysterious Hyperboreans as Celts, by which music as cultural identity may be demonstrated as being able to characterise otherwise nebulous ethnic groups. By defining a musical identity, we may draw conclusions for characterising a culture group which were not possible before.

For example; taken together, both a description of dance and an attestation of the *lyre* further support attempts at identifying the semi-mythical Hyperboreans of Greek fable with the ancient Britons, hitherto suggested by an approximation of their 'spherical' temple with Stonehenge (Bridgman, 2005, pp. 163–173):

> […] there lies in the ocean an island […] [which] is situated in the north and is inhabited by the Hyperboreans, […] and the island is both fertile and productive of every crop and has an unusually temperate climate (Diodorus Siculus, Book II, 47-48).

This can surely only be Britain, the only sizeable temperate island in the North of Europe, stated by Caesar to produce a surplus of grain in the 1st Century BCE (Brady, 1952, p. 308), but most interestingly we may also discern a specific predilection for musical culture:

> Never the Muse is absent from their ways:
> lyres clash and flutes cry and everywhere maiden choruses whirling
> (Pindar, c. 400 BCE, in Lattimore, 1947, p. 87).

Since the archaeology of Northern Europe strongly indicates a broad musical culture common to the Celts, being the only relevant group among whom the *flute*, the *lyre* and a distinct form of female dance can be argued for, an interdisciplinary study in musicology would demonstrate that they are the only people present in the region at the time of the ancient Greeks who could have been the Hyperboreans. This musical identification may be reinforced by Caesar's other assertion that the Druids of Gaul looked to Britain for instruction (*de Bello Gallico*, 6.13), where we may observe a primacy of authority in preserving idiosyncrasies of Celtic cultural, specifically musical, identity. This evidence indicates Britain: here is found the oldest extent physical archaeology for the *lyre* in Europe; where women performed in group ritual dance at the sacred site of Anglesey; and where the *flute* can be seen to have played an important role, particularly upon the revered Salisbury plain, from before, during and after the Celtic period.

IMAGES

In main text:

1.) Front Cover: 'Vectorized British Library old book illustration of a self-entangled snake (similar to Ouroboros)' (Rankin, 2016). The 'old book' is possibly *The Novel of the Black Seal* (1895) by Arthur Machen. Image in public domain, copyright waived or expired.

Rankin, S. (2016) *Ouroboros, or, Where is the Snake Headed?* [flickr.com] 15 April. Available at: https://www.flickr.com/photos/24354425@N03/26344165992 (Accessed: 29 September 2022).

Colavito, J. (no date) 'Arthur Machen, 1895, The Novel of the Black Seal', *COLAVITO*. Available at: https://www.jasoncolavito.com/the-novel-of-the-black-seal.html (Accessed: 29 September 2022).

2.) Page 1: Morgan Black at Castell Henllys Iron Age Hillfort and Village, July 2019. Photography Lloyd Jones, used with permission.

3.) Page 5: 'The Cauldron of Inspiration', Illustration by Ernest Wallcousins (1912), in *Celtic Myths and Legends,* by Charles L. Squire (1919). Public domain.

4.) Page 39: Morgan Black with *Tintignac Carnyx* reconstruction commissioned from Yaruga Crafts. Photography Dave Foster, used with permission. Castell Henllys, 2022.

5.) Page 49: Depiction of musical trio: *drummer*, *lyrist* and *harper*. Utrecht Psalter, Psalms 149-150 (CC), c. 850 CE.

6.) Page 56: Photograph of *The Lyre of Paul*. 'Barde à la Lyre de Paul', 2nd C. BCE, photographed at 'Une Odyssée Musicale' exposition, 2013, Musée Saint-Raymond. Photography Caroline Lena Becker (CC).

Additional Images:

7.) Page 90: *Gaulish lyre* reconstruction by Julian Cuvilliez of Atelier Skald, at the Festival Interceltique de Lorient, 2019.

8.) Page 91: *bowed lyre* reconstruction commissioned from Harpa Crafts, played by Morgan Black at Castell Henllys, 2019.

9.) Page 92: Two images of a Peter Shallcrass suggested reconstruction of the *tiompán*, 2020.