Musical Instruments of the Bronze and Iron-Age Mediterranean: The Legacies from North European Culture

Peter Holmes: 22 March 2025

In Part 2 of my book entitled *Echoes of Greece and Rome: The Trumpets of the Ancient Olympics*, I set out to discuss what the title suggested I ought to. However, as things do, like Topsy, it just growed. In particular, when I wanted to look at possible derivations of instruments in use in the Mediterranean at the time in question, I kept being drawn back into earlier work I had done on northern European instruments, particularly the Irish Horns and the Bronze Lurs. However tenuous the links might have seen, they were sufficiently strong (that's in my eyes) to cause me to examine further what other types of links there might have been between the northern and Mediterranean cultures of the time.

Several problems arise in such endeavours, one arising from the divisive division between studies of the north and those from the Mediterranean. In many ways, such divisions are natural enough as the nature of the evidence from the two areas is so different. For instance, while the Mediterranean cultures offer an abundance of linguistic material for scholarly examination, comparable contemporaneous sources from the north are notably scarce.

The disciplinary division between classical and Northern European studies has reinforced distinct methodological approaches, each emphasizing a particular geographical and cultural scope. This separation has, in turn, shaped historical narratives, often privileging Mediterranean perspectives and contributing to the persistence of classical-era terminology—such as 'barbarian'—in modern discourse. The resulting academic structures have influenced how non-Mediterranean cultures are represented in scholarship, reflecting broader historiographical traditions rather than an intrinsic or deliberate exclusion of Northern European cultures.

The second issue stems from the profound cultural integration of musical instruments in the ancient world as they were not only sonic contributors to local rituals and social events but also deeply embedded within the symbolic and expressive frameworks of their respective societies. However, this raises the question of whether certain intrinsic properties of instruments—beyond their immediate social contexts—possess a fun-

damental resonance with the human condition itself. Could these properties, independent of specific cultural traditions, have been transmitted across societies with vastly different behavioural patterns, evolving over millennia, and absorbed into distinct ways of life? If so, this would suggest that the very nature of musical instruments extends beyond cultural specificity, touching upon something universal in human experience.

The third issue concerns the scope of my studies. For many years, I have focused almost exclusively on brass instruments. This does not mean that I have ignored other musical traditions; I have attended numerous conferences and workshops covering a variety of instruments. Also, in addition to my work on brass, I have also studied Greek woodwind instruments extensively and have been actively engaged in several projects aimed at reconstructing and producing playable modern analogues of these ancient instruments. Nevertheless, my primary focus has remained on brass. From the perspective of Northern cultures, this specialization has enabled me to examine the vast majority of the available evidence, both physical and iconographic, as brass instruments are overwhelmingly represented in the North, with other types being largely absent.

My deep knowledge of brass instruments in Northern cultures allows me to view them as more than mere sound-producing tools; they function as integral cultural artefacts, deeply embedded in both the technical and social fabric of these societies. Paradoxically, the wealth of documentation from the Mediterranean world can encourage a different approach to interpretation, leading scholars to apply modern assumptions to ancient instruments. This tendency risks obscuring non-obvious deeper symbolic or ritualistic meanings that may have still existed in the times studied but, since having since been lost over the following millennia, are not identified today.

If such north/south exchanges of instrumental traditions occurred, it is essential to determine whether they resulted from cultural diffusion, trade, or migration. Each of these mechanisms would leave distinct traces in the historical and material record: cultural diffusion might be reflected in stylistic similarities or symbolic motifs shared between geographically distant artefacts, trade could be evidenced through the discovery of instruments or materials in regions where they were not locally produced, and migration might be indicated by the movement of craftspeople, musicians, or entire communities who carried their musical traditions with them. Moreover, these exchanges were likely bidirectional, with influences flowing both from north to south and vice versa, shaping musical traditions across different cultures over time.

As an engineer and maker, I have found the study of manufacturing technologies behind brass instruments particularly valuable in my research. The processes involved in both casting and wrought metalwork present distinct technical challenges, and experimental archaeology has heightened my awareness of these nuances. Through hands-on engagement with historical techniques, I have gained a deeper appreciation for the skill and precision required to produce such instruments, which in turn informs my examination of surviving physical remains. Recognizing the differences in manufacturing methods has provided insights into not only the technical aspects of production but also the broader implications for how these instruments were integrated into their respective cultures.

In today's technologically advanced world, physical objects are produced in vast quantities and achieve high levels of functionality, as modern designers face markedly fewer constraints imposed by manufacturing techniques than in the past. In contrast, in the ancient world, object design was significantly shaped by the availability of the then-available manufacturing technologies, with far greater limitations than those faced today. The interaction between available manufacturing techniques and object design was more intricate than it is today, significantly influencing how objects were classified within their technological and chronological sequences. However, when establishing technological sequences, it is crucial to determine whether they represent genuine chronological progressions or regressions, rather than assuming that technological development always follows a linear trajectory of advancement.

It is also evident that receiving societies were often far more willing to adopt foreign manufacturing techniques than the objects produced by them. This raises important questions about technological transmission—while certain techniques might be assimilated into local craftsmanship, the resulting instruments may not always have been accepted or valued in the same way. Furthermore, the way we interpret these processes is shaped by the nature of our surviving evidence. Written records and iconography from some societies offer some indications of how instruments were made and used, whereas societies that left little textual or visual documentation require us to rely more heavily on material evidence. In these cases, the absence of direct historical accounts increases the likelihood that researchers will ascribe alternative, non-sonic functions to certain artefacts, underscoring the extent to which our interpretations are shaped by both the evidence at hand and the methodologies we employ.

This study is grounded in a comparative archaeological approach developed through the rigorous examination of hundreds of instruments across diverse societies over several decades. This type of analysis depends not only on methodological rigour but also on the researcher's evolving awareness. I often feel compelled to revisit the instruments I examined decades ago to reassess my earlier conclusions and address the limitations of previous research. However, such opportunities are rare due to constraints such as restricted access, institutional policies, and the fragile nature of many artefacts.

This limitation serves as a constant reminder that the quality of research is inherently dependent on the expertise available at the time, reinforcing the idea that scholarly conclusions must always be viewed as provisional and open to reassessment. Consequently, I recognize that my ability to present informed conclusions to readers and listeners has evolved over the years, and the opinions expressed here are not necessarily those I would have published forty years ago.

This shift reflects not only the progression of my own experience but also broader developments in the field, where the study of musical instruments has expanded beyond a focus on sonic characteristics to encompass their wider social and cultural significance.

The following chapter, drawn from my book *Echoes of Greece and Rome: The Trumpets of the Ancient Olympics,* examines the role of the salpinx and tuba beyond their well-known function at the Olympic Games. I carefully considered my choice of the term 'trumpets' in the title. Had I used '*salpinx*,' it would have excluded its successor in the Greek games, the tuba—and vice versa.

This highlights a fundamental challenge in studying the past: when we assign descriptive names to historical objects, we effectively freeze them in a single form, despite the reality that many such objects evolved over centuries, adapting to new materials, performance needs, or cultural influences. Both the salpinx and tuba present an additional challenge because they existed in multiple distinct forms simultaneously.

In its archetypal form, the salpinx had a cup bell, yet at the same time, there were versions that, in ancient terminology, would be described as a tuba. As a result, when we encounter the word salpinx in ancient texts, we cannot ascribe a single, fixed form to it with certainty. Further complicating the issue, one of the few surviving depictions of a brass instrument labelled salpinx closely resembles what I would describe as a cone-belled tuba (Figure 1)

Figure 1: A Salpinx from Marisa, IC140

The salpinx/tuba[1] did not emerge solely for use in the Olympics; it existed in various forms long before. This raises the question of what other aspects of these trumpets—whether ritual, symbolic, or social—were transmitted along with their physical form.

Since Greek literature offers little direct insight into these instruments' broader societal roles, we must instead examine how they were embedded in cultural practices. By tracing their derivatives in Greek, Etruscan, and Roman traditions, we can begin to reconstruct their deeper significance beyond their sonic function.

The phenomena that establish cultural links are numerous and varied. Among these, the most compelling evidence comes from materials such as amber and tin, which remain the strongest indicators of long-distance trade. Only in recent years have scientific advancements allowed researchers to precisely trace the origins of materials found in the Mediterranean back to Britain and Scandinavia, providing a rich source of evidence for identifying trade networks.

1 The terminology IC140 utilised here refers to the location of data about this object in my database of all brass instruments and references from before around 600 CE. It can be accessed online at: ***https://www.holmesbrass.com***. The term IC refers to iconographic references, SD to physical objects and fragments, SR to representations such as statuettes, etc. and DR to documentary references. Should you attempt to access this and find an entry missing, please use the *Contact Us* page and i will attempt to remedy the situation forthwith.

Decorative motifs also indicate cultural links, but they appear primarily at the endpoints of trade routes, with little or no evidence along intermediary regions. This pattern—along with the sudden emergence of large sea-going ships in northern rock art, coinciding with the first evidence of this trade—provides strong evidence for maritime contact. The absence of similar depictions along overland routes further reinforces the likelihood that these interactions were seaborne. Such ship depictions in Scandinavian rock art bear striking similarities to those found in the Aegean.

Bull-jumping rituals are well known in Mycenaean art and have been widely discussed in scholarly literature. While the corresponding Scandinavian rock art depictions are less detailed, they still clearly indicate the presence of such a cultural practice in that region during the Late Bronze Age. Crucially, these motifs do not appear elsewhere in Europe along what could have been a land-based route between the Mediterranean and Scandinavia, further supporting the idea of direct maritime transmission.

These shared cultural elements further reinforce the idea of sustained cultural interactions at these trade endpoints. The presence of such iconography suggests not just temporary exchanges but the movement and possible long-term settlement of individuals who carried these traditions with them. A striking example of this mobility is the *Boy with the Amber Necklace*, discussed below—an individual raised in the Mediterranean, buried in southern Britain, and adorned with an amber necklace that exhibits a distinct Scandinavian/Baltic origin. His burial provides compelling evidence of cross-regional movement, suggesting that these connections were not merely commercial but involved the relocation and integration of individuals into new societies.

The specialized knowledge that migrating individuals carried remains unrecorded, as does its potential impact on the societies they integrated into. A pertinent example is the application of measurement systems in manufacturing, known as mensuration. Craftsmen producing long bronze instruments required an understanding of tube dimensions, including length for tonal purposes and varying diameters to achieve desired conical or cylindrical shapes. Early bronze lurs, such as the one from Gullåkra, exhibit a design comprising multiple conical sections, each with distinct tapering angles. The precision in these early instruments suggests that visual estimation sufficed during their creation. In contrast, later lurs, like the one from Folrisdam, feature a uniform taper throughout the tube. The consistent measurements between paired instruments indicate that craftsmen likely employed precise measuring

tools, possibly adhering to standardized units.

Such measurement practices were prevalent in the Eastern Mediterranean and Middle East during this era. It is plausible that these techniques spread through trade routes, influencing manufacturing methods in regions where these instruments have been discovered.

Chapter 9:

Legacies: The North-South Connection

The question of legacies in the world of ancient brass is a complex and controversial one. While similar instruments and similar practices occur at various places in Europe over time it is difficult to establish causal links between these. Just because the practices are similar does not prove that links existed but there are sufficient seemingly universal occurrences to lead one to ask whether such events may in some way be connected.

When looking for such linkages as may have occurred there seems to be a number of different processes to consider:

1 The direct transfer of instrumental form, performance practise or integration into rituals resulting from cultur al contacts between different societies.

2. Technology transfer leading to similarities in final de sign/manufacture

3 The development of instrumental form as a result of the use of natural materials which lend themselves readily to the creation of sonic devices.

4. Similar associations of instruments being used in differ ent societies

5. Transfer of instrumental form performance practice or ritual usage resulting from the reference to either folk memory or other informational sources such as litera ture or iconography.

6. The development of performance practice or ritual use based upon intrinsic needs of individuals which gives rise to similarities between totally unrelated societies.

In this chapter, I suggest that close relationships between the two great traditions of instrument making and use existed in northern Europe during the north European Late Bronze Age and those of the then contemporary Mediterranean. The date usually assigned to both northern traditions is between 1500 and 500 BCE. Both these date spans are somewhat speculative as, although, taken together the Irish Horns and the Scandinavian/Baltic Lurs constitute a considerable proportion of the brass instruments of the ancient world, only one fragment of a lur, that from Fogdarp dated to 760 BCE has anything like a reliable date.

One clear similarity between the two northern groups is the manufacturing technology employed in both areas. Both groups were cast although the Irish Horns were predominantly cast in two-part moulds while the lurs were constructed using last-wax technology. This contrasted strongly with the instruments from southern Europe of this period in which the predominant manufacturing technology used wrought materials with some lost-wax attachments[1].

1 Holmes 1978. Available at: https://hornandtrumpet.com/journal/vol-i/revised_thesis/ or here: https://www.academia.edu/108836191/The_Evolution_of_Player_Voiced_Aerophones_prior_to_500_AD (accessed November 2024)

As the two northern traditions existed contemporaneously, as they both utilised casting technologies and as they both demonstrate clear complementary dualities in their pairing of instruments, it seems hard to avoid the conclusion that there were some forms of connection between the two cultures.

Figure 9.1: Difference in Pairing Styles between the Irish Horns and the Bronze Lurs

As can be seen in the above figure the complementary duality of the two schools is expressed in totally different ways. In the case of the Irish horns, a pair consists of one side blown and one end blown instrument whereas in the case of the bronze lurs, a pair consists of two essentially-identical instruments but with one turning to the left and one to the right. The different horns in a pair in the Irish case may represent the different horns on the male and female beast from which they are sourced, the male horns of modern Highland cattle being larger than those from the female[2]. Thus the larger end-blown instrument may have been derived from the horns of a male animal and the smaller side blown horns from the female.

Such a suggestion further supports my earlier contention that the complementarity seen in the Irish Horns is gender based.

While a pair of bronzes lurs consists of two metrologically identical instruments, the difference in winding may also represent a gender-driven imperative as there are numerous examples in the ancient world were left/right means male/female[3].

2 Personal observation from John Purser passed to me via Simon O'Dwyer

3 Holmes 2022: p. 49

In the case of the Irish Horns, the form of the instruments is relatively stable over the entire set of extant instruments. Although some are considerably larger than the others, they are still pretty-much of the same form although on the very large ones, there is a bend added to the top of the mouthpipe, presumably to facilitate blowing when holding these heavier instruments.

The stability of the instrument morphologies seen in the bronze lur provinces is quite different from that of the Irish Horns in that the bronze lurs show a lot of variations in form, this being evident in both the physical objects and the iconography. In the case of the physical objects, they show this variation in two different ways, one of these being in the external shape of the instrument. Figure 9.2 shows one of the earliest instruments from Gullåkra, Sweden compared to one, the latest, from Brudevaelte, Denmark.

Figure 9.2: The Bronze Lurs from Gulläkra (among the earliest) and Brudevaelte (among the latest)

In terms of their conicity, the bronze lurs showed similarly massive changes. Figure 9.3 shows the comparative conicities of the Gullåkra and Brudevaelte Lurs. If you're not into graphs, don't worry as what these are showing is that the tube yard of the Gullåkra Lur (Figure 9.3, left), started out nearly cylindrical (at the very left of the graph). It suddenly becomes much more conical. (seen in the steepening of the line) Next it flattens out a bit and finally flattens out more. The much-later Brudevaelte instrument, on the other hand shows very little variation from a single slope running through the entire instrument. The effect of this, and the resulting smoothly-conical bore is that the harmonic series of the instrument is much closer to the natural harmonic series on the Brudevaelte instrument than on the Gullåkra one. The gradual trend towards this increasingly accurate tube yard is difficult to explain other than by suggesting that the attainment of the natural harmonic series was an aim of the designers and makers of these instruments.

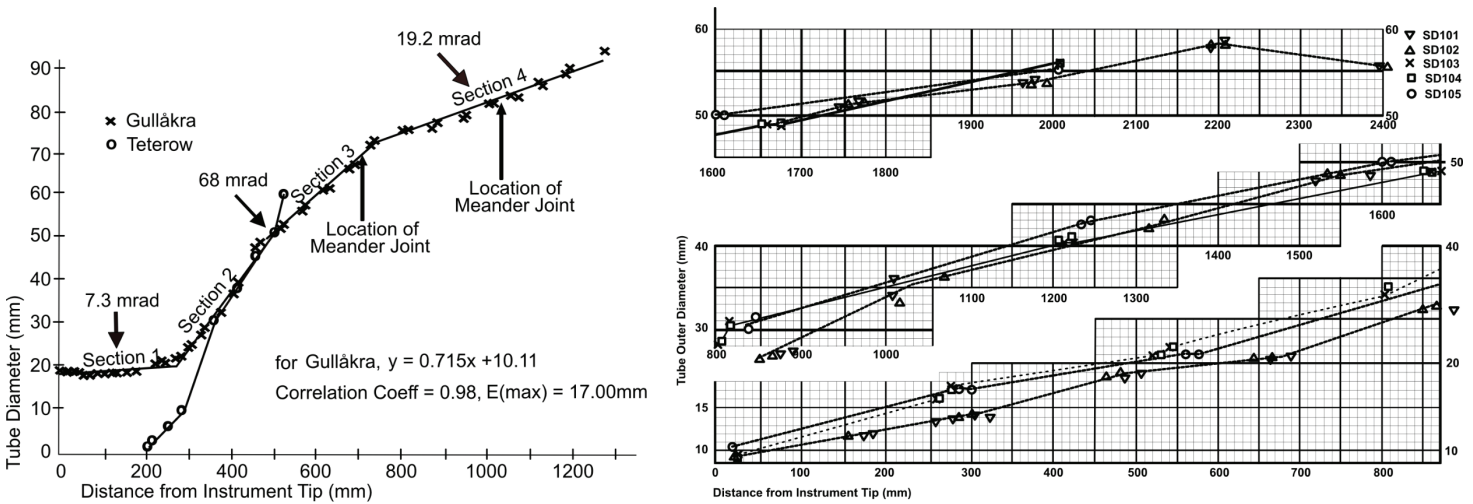
In that last sentence, I used two words: 'accurate' and 'designer' which need a bit of clarification.

The term accuracy may be used in two different contexts here, one being that the conicity of the tube yard was a close approximation to that of a truly-conical structure, i.e. one which we would today define as a simple mathematical function. However, it may also be used to refer to the closeness of a set of dimensions to a desired specification, i.e., those desired by a designer, their intentionality. There are many reasons to suspect that the lurs conformed to a mathematically-defined set of rules and these are discussed elsewhere in other publications of mine[4]. (Figure 9.3)

This emphasis on design on the part of the lurs and that of manufacturing technology on the part of the Irish Horns sets the two schools of manufacture and use apart while other aspects such as their paired complementarity, chronological proximity and manufacture using bronze casting technology suggest some form of inter-relationship.

Reference has been made to the two major Late Bronze-Age schools of brass manufacture and performance but one other school existed, albeit a much-smaller one. In the area just to the south of the lur country, three sets or parts of horn fittings or fragments of these have been found. The three horns, from Wismar (SD 221), Teterow (SD 222) and Bochin (SD 227) are generally considered to be precursors of the lurs but accepted

4 Holmes 1978: Chapter 4; Holmes 1986: pp.51-126; Holmes 2006: pp.59-70.



Gullåkra Brudevaelte

Figure 9.3: The Relative Conicities of the Gulläkra and Brudevaelte Lurs

dates for these place them as having been deposited around 1000 BCE. The three pieces are relatively simple in form, cast using lost wax techniques and, consisting as they do of simple fittings for animal horns, could well have had a local source of inspiration for their origin.

The most complete set of fragments from this area are those from Wismar which consist of three pieces: the somewhat traditional pieces one might find on any decorated animal horn. (Figure 9.4)

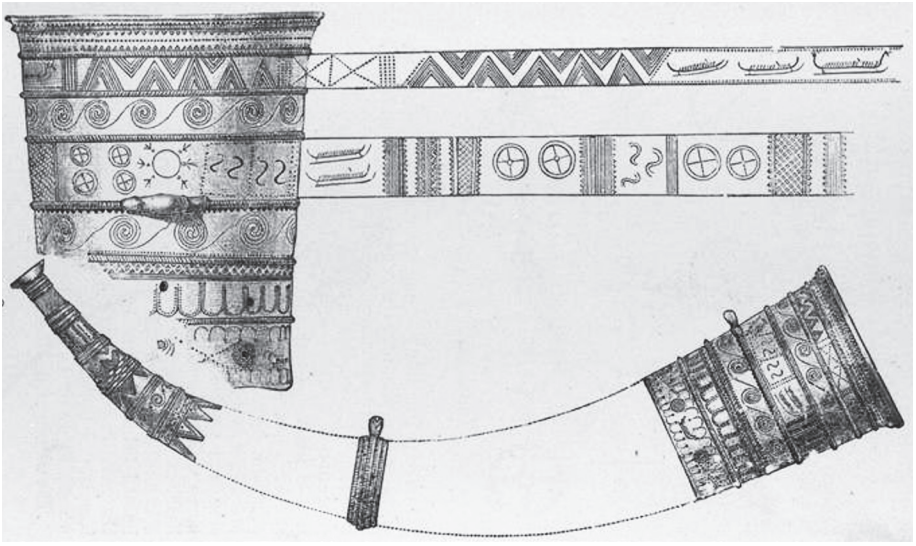


Figure 9.4: The Fittings of the Wismar Horn, shown in place on a dummy Animal Horn Instrument. (SD221)

All the three instruments are from the north of Germany with Wismar being on the coast in exactly the same area were bronze lurs are found.

If the three groups of instruments are related in any way, one would expect them to have some ancestor and, as they are dated to the Bronze Age, one would expect that ancestor to come from the Chalcolithic or perhaps the Neolithic. Also one might expect to see some closer geographical relationship between the three schools. It is possible that a widespread practice of animal-horn usage was seen right across between Ireland and Scandinavia but when this might have been is totally open to speculation.

While the North Sea now separates Britain from its continental cousins, this was not always so and flourishing cultures existed on Doggerland, the land covered by the sea as sea levels rose at the end of the Ice Age

and now lying under the North Sea. It is known that the aurochs existed there and was hunted by the residents of this land, including peoples of Neanderthal origin, so animal horn type instruments may have been in use over the continuous strip of land between the west of England and Eastern Scandinavia. However, as it wasn't until the arrival of bronze working in the various areas that horns could be embellished with bronze fittings and eventually totally replaced by metal.

The argument might be raised here that Doggerland probably disappeared around 5000 BCE some 3000 years or so before the times we're talking about here. However, this reflects a modern perspective which sees present day societies changing several times in a generation. Such was not so in the ancient world where societal structures were more stable and technical changes took place not in single years but over millennia.

In Ireland, the Late Bronze-Age side-blown horns are clearly an analogue of the natural animal horn while the end-blown horns are analogues of animal horns with a tubular attachment at the tip. The makers in Ireland had sources of the copper needed to create metallic objects during the Chalcolithic Period from Ross Island on Lough Leane in western Ireland and from Alderley Edge in Cheshire UK. However, both these ores were rich in arsenic, producing an arsenical bronze alloy directly when smelted and needing no admixture of other materials. While this was good for tools and weapons which need a sharp edge, its brittleness led to limitations in its applicability.

Trade between Britain/Ireland and Scandinavia had to be via sea but the story is not as straightforward as it might appear. This trade was conducted to and from both east and West from a distribution centre in the south west of Britain. While copper and tin were mined further West, they appear to have been transported first to a staging point somewhere on the coast, one contender for this location being Salcombe Bay in Devon where two shipwrecks have been found. One of these, discovered in 1909, which dates from between 1200 and 900 BCE contained, among other things, ingots of copper and tin. Many of the artefacts found in this were from various locations around the European mainland.

We may add a little more to the straight metallographic evidence by reference to commonalities in the brass instruments present in the northern and southern provinces. In a sense, these commonalities are a little buried in the instruments but they are there nonetheless.

In the case of the late Bronze Age Irish horns, the indigenous development of casting technology can be witnessed, progressing over time, to a high degree. At one end of the scale relatively simple and small cast instruments can be recognised while at the other, large instruments can be found. These, presumably later, instruments have thin walls, feature elements of both cast and wrought construction which are effectively braised or welded onto their tubing, processes which are not seen elsewhere at the time. Some, again presumably later [perhaps much later] appear to have elements which are lost-wax cast. There seems to be no doubt about the indigenous nature of such a process. It cannot be traced anywhere else with such precision, even though the evidence is not sufficiently dense to allow accurate sequencing to be carried out, multiple stages of the process can be distinguished[5].

One small question about the geographical range of Irish Horn manufacture is raised by the earlier existence of the Battle or Sussex Horn which was found near Battle in Sussex in 1812[6]. Figure 9.5 (below) shows the image supplied by Grose, along with the cuirass in question and a modern analogue of this. In his book, Francis Grose described:

> *A Roman lituus or military trumpet such as is mentioned by Horace in his first ode. It was found in digging a well, near Battle in Sussex, and was then filled with small shells. It is of cast brass, and bears the same proportion to the cuirass as delineated : it is now the property of Mr Rawle. A similar trumpet is engraved in Montfaucon's Roman Antiquities*[7].

The manufacturing technology of the lurs shows a similar level of development although this had a different trajectory. Such developments in manufacturing technology as took place were centred on the production of finer tubing and longer sections utilising more complex joining devices. However, it was the development in design technology which were truly noteworthy as the instruments became, over time, increasingly manufactured to a recognisable design. Unlike with the Irish horns, it is feasible to propose a sequence of developments which followed each other chronologically[8].

5 Holmes 1978: Chapter 5; Holmes 1979: pp.165-188

6 The name of the town near where the horn was found comes from its nearness to the location of the Battle of Hastings in 1066 when the tyrant later known as William the Conqueror raped England, leaving behind traces of his avarice to this day.

7 No copy of this was found for study.

8 Holmes 1978: Chapter 4; Holmes 1986: pp.51-126; Holmes 2006: pp.59-70

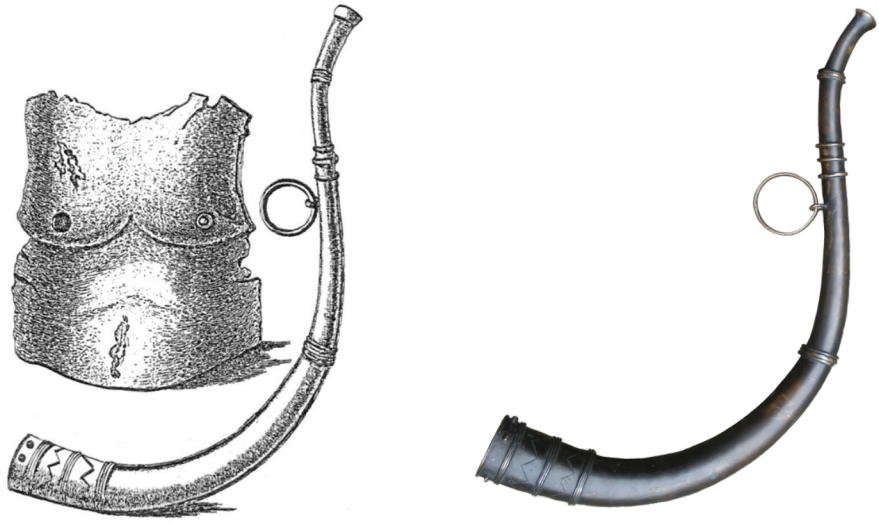


Figure 9.5: Sussex Horn, left as illustrated by Grose, right a Modern Analogue by Simon O'Dwyer, SD002

It is of course heresy to suggest that significant developmental processes may have been transmitted from north to south at this time when we are all so heavily programmed to see all good things, ideas, developments and technology having a northbound trend but, in terms of brass instruments, the flow was almost certainly a two way stream with a considerable proportion of this being north to south

During the bulk of the Bronze Age, arsenical ores were avoided and copper was alloyed with tin to produce the most-characteristic copper-tin alloy of the Bronze Age. Such a change meant that the maker had to source both copper and tin to create their alloy. Arsenic-free copper ore was available from The Great Orme in North Wales and tin from Cornwall in South West England, both just a boat ride across the Irish Sea. Because of this relatively-available source of metals the metalsmiths were free to experiment with different alloys and to develop a range of processes which were not generally in use elsewhere at the time. From our perspective, they applied these techniques to the manufacture of their horns.

Bronze was exported from Britain into Scandinavia already during the Nordic Chalcolithic, principally in the form of high tin axes and presumably these high tin bronzes, with a brittle alloy, were mimicking the metallurgical characteristics of the earlier arsenical bronzes described by Nørgaard[9]. Thus, the South West of England became a valuable source

9 Nørgaard 2019, p.20

not only of tin but also of bronze and a considerable percentage of artefacts created in Scandinavia were made directly from bronzes imported from Britain. These bronzes, imported in the form of high tin axes were broken up to form the raw material from which other objects were made. Many of these axes survived and the highest concentration of British high-tin axes outside the UK is found in Denmark. One of the products made from the British-sourced axes or what are referred to as pseudo-British axes, are devices made in the style of the ones imported from Britain but much smaller in size. However it is not only the pseudo-British forms which show a British signature in the composition of their copper but many distinctly local ones do too[10].

The British/Scandinavian trade also involved the flow of amber from Scandinavia to the Wessex area of England and Nørgaard et al report:

> *Firstly, the transport of British axes to Scandinavia from England, possibly without the involvement of Ireland, figures much more clearly than previously. This indeed makes sense because of the relatively short distances involved when opting for routes along safe coastal waters this result is visible in the combinations of data regarding elevated tin levels, low impurity copper, and isotopic signatures in western style axes. It also tallies with amber concentrations found mainly in the Wessex region. It is moreover possible that British bronze and the western connection more broadly, is underestimated in the data[11].*

So, the connections between Ireland, Britain and Scandinavia in the late Neolithic/Chalcolithic and early Bronze Ages were clear. These are demonstrated by reference to the source of both copper and tin at this time and the presence of amber in Britain, the two main commodities in the trading relationship. While the maritime route between Scandinavia and the British Isles could hug the coast quite closely, the journey from these northern parts to the Mediterranean world was a little more complex.

So, many questions arise about the possible trade between Ireland/Britain, Scandinavia/The Baltic and the Mediterranean. Theodore Wertime said of this trade in 1973[12]:

> *Tin remains the enigma of bronze metallurgy, simply because no one knows where the tin for the Early and Middle Bronze Ages in Anatolia, Mesopotamia, and Iran came from. Moreover, we have as yet no real idea*

10 Nørgaard 2019, p.22
11 Needham 2009 pp. 12 - 37
12 Theodore Wertime, writing on 'The Beginnings of Metallurgy: A New Look, Science, November Volume 182, number 4115, 1973, 884

whether the first tin to be alloyed into bronze was stannite the tin sulphide found with copper or cassiterite the tin oxide. Nor do we know where the first alloying occurred.

As late as 2017, when writing on tin isotope analysis as a way of locating the source of tin finds, the authors reported:

Tin remains as one of the knottiest problems in the archaeology of metal sources specifically with regard to the third and second millennium BCE.

In the past, there have been multiple suggestions us to where the tin came from, including the Middle East, China and Europe but nothing conclusive had come from all this speculation.

Such speculation had also been rife in the ancient world and Herodorus, writing in the 5th century BCE referred to the tin islands or Cassiterides. However, he linked tin and amber when he said all we know is that '*our tin and amber come from the most distant parts*'[13].

Another, author, Timaeus of Sicily also wrote of the source of tin around the 3rd century BCE. Although his works are now lost, Pliny quoted him a little later when he wrote:

An island called Mictis is within six days sail of Britannia, in which white load [i.e. tin] is found and that the Britons sail over to it in boats of osier, covered with sewed hides.

Even later, in the 1st century BCE, the author Diodorus Siculus referred to the tin coming from Belerium an ancient name for Land's End in Cornwall.

Other authors such as Strabo, also writing in the 1st century BCE gave strange accounts of the strange men who produced the tin and attributed its collection from the north to the Phoenicians. Such an attribution is regularly seen in early Irish writings on the origin of the Irish horns.

There was also a number of other potential sources of metals in the southern areas so it might be a good idea at this stage to take a look at the process by which metal sources might be identified.

Basically, there are two scientific techniques which may be applied to the sourcing of metals. The first one of these is to look at the impurities included in a metal sample. These arise because the ores from which metals are smelted rarely contain just one element. Copper ores such

13 Herodotus, with an English translation by A. D. Godley, ed. A. D. Godley, Medford, MA: Harvard University Press, 1920

as discussed above from Ross Island and Alderney Edge may contain arsenic and thus we may not be able to identify such ores as coming specifically from either Ross Island or Alderney Edge but the presence of arsenic in these can tell us that it did not come from the Great Orme as the ores from there and the copper they yield are arsenic free.

However, arsenic is not the only element found in copper ore and this may contain manganese, iron, cobalt, nickel, zinc, arsenic, selenium, silver, cadmium, tin, copper, tellurium, gold, lead or bismuth. Any ore body will tend to contain a mixture of these elements in specific ratios and, as with arsenic, this may be somewhat diagnostic. Unfortunately, all bodies are not necessarily uniform in their concentration of different minerals, for instance, some of the minerals in a deposit located near the surface may be leached out selectively over time, changing the relative percentage of different minerals in different sections of the ore.

Another diagnostic technique, this one a more stable one, looks at the ratio of isotopes of specific elements present in an ore sample or the metal produced from this. This is particularly effective using lead and this metal is a frequent impurity in ancient tin. The technique relies on the fact that when lead is first formed geologically it contains very specific ratios of the different lead isotopes.

These four stable isotopes, different forms of lead, have different atomic weights and three of these are constantly being produced over time by the radioactive decay of uranium and thorium which are also present alongside the lead.

The process is described by Friedrich Begemann at al so:

> *during the past decades the isotopic composition of lead has been used with advantage in tracing Chalcolithic and Bronze Age metals back to their ore sources. The method utilises the fact that three of the four stable lead isotopes, those of atomic mass 206, 207 and 208, are continuously being produced by the radioactive decay of omnipresent uranium and thorium in such a way that the isotope abundance ratios, say 208Pb/206Pb, 207Pb/206Pb, 204Pb/206Pb or also 206Pb/204Pb, 207Pb/204Bb, and 208Pb/204PB, are affected to a different degree. The result is that different ores may contain lead with distinctly different abundance ratios and since this isotopic signature is only imperceptibly changed in all subsequent metallurgical steps on the way from ore to artifact, different artifacts can also be expected to be distinguishable by the isotopic composition of their lead*[14].

14 Begemann et al 1999: p.277ff.

Using the ratios of the various isotopes in an ore or an ingot produced from that ore, enables one to estimate the age when the ore was originally formed. Where two ore samples were formed at roughly the same time, this technique will not allow differentiation between these but it will allow all samples with either much earlier or much later dates to be dismissed as potential sources.

Lead was originally chosen as the element to be tested because of the presence of other elements in that ore which decay to different isotopes of that lead. However, as diagnostic techniques improved, a technological breakthrough published as recently as 2017 now means that tin isotope ratios can also be measured directly[15].

Analysis of the lead content of the tin ingots found in a wreck off the coast of Israel gave an age estimation of 291 ±17 million years and this was enough to eliminate nine of the fifteen suggested possible sources leaving as contenders: Cornwall/Devon, the Erzgebirge Range, Spain, Massif Centrale, Brittany and Sardinia. Many of the earlier more-southerly contenders for the source, such as India and Middle East locales were thus eliminated as being either too young or too old.

The remaining pieces of the jigsaw were finally put together in 2019 in a paper reporting on later work[16]. In this study, the researchers examined tin ingots from a number of eastern Mediterranean sources. Some came from an ancient storeroom on an island just off of Crete, some from the shipwreck of Uluburun and others from the three shipwreck sites off the coast of Israel[17].

Next, the researchers examined the isotopes of tin from two of the Israeli shipwrecks and determined that they too came from the same mine. When they looked at the isotope ratios, they were able to eliminate three of the earlier locations, leaving only Erzgebirge, the Iberian Peninsula and Cornwall.

The final peace of the jigsaw came from consideration of the trace elements in the ingots. They were tested for the presence of antimony, silver, selenium, indium, tellurium, mercury and gold in particular,

15 Brügmann et al 2017 pp.103-114

16 Brügmann et al 2017 pp.103-114 Brügmann, F., Kallas K., Frank C., Marahrens J. Nessel B. And Pernicka E., Tin Isotope Fingerprintsof Ore Deposits and Ancient Bronze in The Tinworking Landscape of Dartmoor in a European Context-Prehistory to 20th Century

17 The Uluburun shipwreck occurred off the coast of Uluburun (Grand Cape), which is located about 6 miles southeast of Kaş, in southwestern Turkey while the three Israeli shipwrecks occurred off the Carmel coast of Israel.

looking at the relative amounts of these and, if ores from known sources could be located which had the same amounts and percentages of these trace elements, this would point to the sources of the tin.

Back in the north just off the coast of Devon in Bigbury Bay, during 1991, among a group of shipwrecks, a load of tin ingots of various shapes and sizes were discovered. Just a year later in 1992 the team from the south-west maritime archaeological group began surveying an area in More Sand just off the coast from Salcombe. Following several years work at this site, in 2010, they found 29 bun-shaped ingots and a few years later found another eleven. It was deemed almost certain that these tin ingots were sourced from Cornwall and were on their way to their destination outside the British Isles.

In 2016 the results of chemical analysis performed on these ingots was published providing crucial information which could relate to them to the ingots found just off the coast of Israel. Like the Israeli ingots, those from Salcombe Mall Sand were very regular in composition and had very few impurities.

The situation was summed up in a 2019 paper which analysed the new trace element data, comparing it to that found in the Israeli ingots. Their conclusion read:

> *European cassiterite mineralisations are rarely Indium-rich as well, but a major exception seems to be the deposits in Cornwall/Devon, and especially those associated with the Carnmenellis and St. Agnes granites having cassiterite with high indium content of more than 300 µg g-1. Interestingly, the Salcombe ingots found offshore the Devon coast exhibit indium contents similar to those of the Mediterranean ingots. If also antimony, lead and bismuth are considered in plotting a four element diagram (Pb/Bi vs Sb/In), many of the Israeli ingots and the piece from Mochlos match the British items*[18].

Later in the paper they go on to say:

> *by including the trace element patterns of the Mediterranean tin ingots, the potential sources can be confined further. Because the elemental composition is quite similar to those of the Salcombe ingots and the latter were certainly made from Cornish or Devonian tin ores, a British provenance of the tin from Israel is currently the most reasonable. The comparably high indium concentration in the ingots that is a typical feature of Cornish cassiterites might be the most helpful indication.*

18 Quanyu et al 2016 p.82

From this analysis it would seem reasonable to conclude at the most likely suppliers for the 13th to 12th century BCE tin ingots from Israel are Cornish tin mines. Even more specifically, due to the indium match from these two sets of ores this can be pinpointed even more precisely to the Saint Agnes and Carnmenellis regions of Cornwall.

Such a derivation of materials points to trade but, if this occurred stepwise overland, this in itself, would have resulted in no direct cultural exchanges. As we are searching here for direct evidence of cultural exchanges between the north and south, we must, therefore, seek direct cultural references as, if the pattern of trade was characterised as no more than a bunch of seafarers travelling up and down and just collecting tin and amber at one end and exchange goods at the other, whatever these were, then little or no cultural exchange would have taken place.

The literary references all, by their nature, are rather late but Herodotus, writing in 484 BCE reported that:

> *all we know is that our tin and amber come from the most distant parts*

This is an ancient link between the tin and amber trading and Pliny, who is quoting Timaeus [355 to 260 BCE] reports[19]:

> *... An island called Mictis is within six days sale of Britannia, in which white load [meaning tin] is found and that the Britons sail over to it in boats of osier covered with sewed hides.*

It seems likely that Mictis is is a reference to Saint Michael's Mount, this being a tidal island off the coast of Cornwall. The six days appears to stretch the five minute walk across to the island at low tide somewhat[20].

A further reference to Britain comes from Strabo who is quoting Posidonius [135 to 51 BCE]. He states[21]:

> *Posidonius says that tin is not found up on the surface as authors commonly relate but that it is dug up; and that is produced both in places among the Barbarians who dwell beyond the Lusitanians [western Spain] and in the islands Cassiterides; and that from the Britannic islands it is carried to Marseilles.*

19 Pliny, Nat Hist. 4.30

20 A fantastically well-researched blog post entitled: https://biblicalhistoricalcontext.com/trips/from-cornwall-to-canaan-locating-the-southern-levants-late-bronze-age-source-of-tin/. Sadly, I can't find the author's name.

21 Strabo, Geog. 3.2.9

In this quotation, a seaborne trip is being identified and not a stepwise overland one. Also, the reference to tin being found on the surface accords well with the early history of tin exploration in Cornwall which first exploited alluvial deposits, only to be replaced at a later date with underground mining.

All in all, the ancient texts, while providing tantalising glimpses into possible cultural connections, reveal little about cultural exchanges between the north and the Mediterranean. As with much of this period, we have to connect individual (apparently random) occurrences in order to hope to build up any coherent story about the past. One such occurrence being the discovery of the 'boy with the amber necklace'.

Amber beads were found around the skeleton of a boy who was buried just five kilometres southeast of Stonehenge on Boscombe Down. The skeleton was dated to 1550 BCE. The ninety beads in the necklace he wore had their provenance somewhere on the Baltic coast. What is significant about this young man is that he still had his milk teeth and isotopic analysis of these indicated that he had grown up in the Mediterranean area. This was a clear indication that population movement from south to north was taking place at this time.

The presence of the amber demonstrated that interchanges between Britain and Scandinavia were taking place around 1550 BCE while the analysis of his teeth pointed to him having travelled from the Mediterranean, presumably with his parents. If this is so then the people moving were not just engaged directly in trade as this was a family on the move.

It seems likely that the north-south trade was a composite one in which the ships travelling up from the Mediterranean returned carrying both tin and amber. For this reason, Britain was probably just a stopping point on the journey northwards with Scandinavia being the final destination.

Being pre-literate the people of Scandinavia left no written accounts of their visitors but they did leave a rich legacy of iconography in the form of rock art. This iconography is carved into roche moutonées, patches of relatively flat ice-scoured rock which has been polished as the ice which contained much debris was dragged across during a past Ice Age.

In a paper by Mörner and Lind, they draw comparisons between iconographic representations of ships engraved on the roche moutonées from Sweden and one displayed on a piece of Greek Pottery. Figure 9.6 shows their comparison between what is intended to be a realistic portrayal and a similar comparison but using stylistic representations.

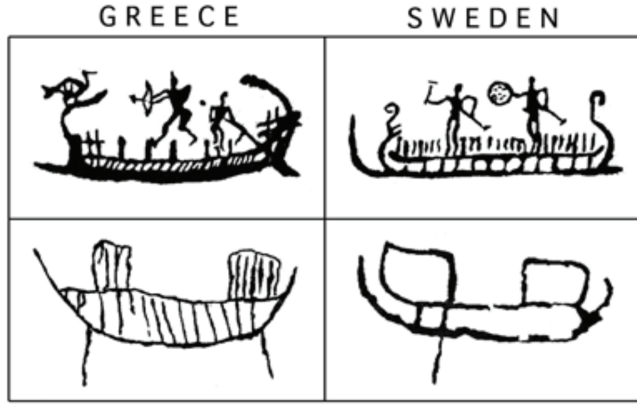


Figure 9.6: A Comparison between Swedish and Greek Iconography of Ships, after Mörner and Lind

A comparison which I find striking is one between the horn seen on one of the slabs of the Kivik grave which is dated to around 1400 BCE and that seen on a vase from the Cyclades from the early Late Helladic II Period which is dated to approximately between 1500 to 1400 BCE, a time when the Mycenaean civilization was the prominent one in that area. (Figure 9.10

Some images of activities on boats add a further intriguing element to

Figure 9.10: A Comparison of Long Curved Horns from Scandinavia and the Cyclades

the question as two of them contain depictions of acrobats leaping while performing a somersault. (Figure 9.11)

Such acrobats are not seen elsewhere in Northern Europe at this time and are found only in Crete and Egypt[22].

Female dancers in almost the same pose are seen in Egyptian depictions,

Figure 9.11: Bronze-Age Scandinavian Acrobats Performing a Somersault

although these all generally static, unlike those in Scandinavia[23]. (Figure 9.12)

The closest similarities to the Scandinavian depictions of leaping acrobats is in Minoan iconography and artefacts. These acrobats were involved in a series of bull games the activity being referred to as bull leaping. This activity

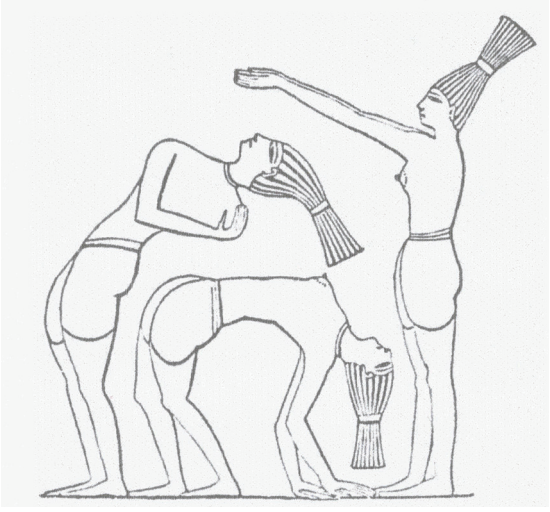


Figure 9.12: An Egyptian Acrobat. After Wilkinson

22 Rune Iversen 2014: pp. 242-255

23 J. G. Wilkinson 1878, ill.316

took place through the majority of the South Aegean Bronze Age from Minoan III to late Minoan IIIB, that's from around 2300 to 1200 BCE[24]. Figure 9.13 shows one such scene from the Traureador Frescoes from Knossos, Crete[25].

The parallels between the northern and southern bull-jumping rituals are further exemplified by a rock carving from Vytlicke Sweden in which a human figure is seen standing on the back of a bull. Such a scene would be replicated during one of the two modes of bull-jumping practice seen in the eastern Mediterranean world in which the acrobat grabs the bull's horns and somersaults over its head to land feet first on its back before jumping off. (Fig-

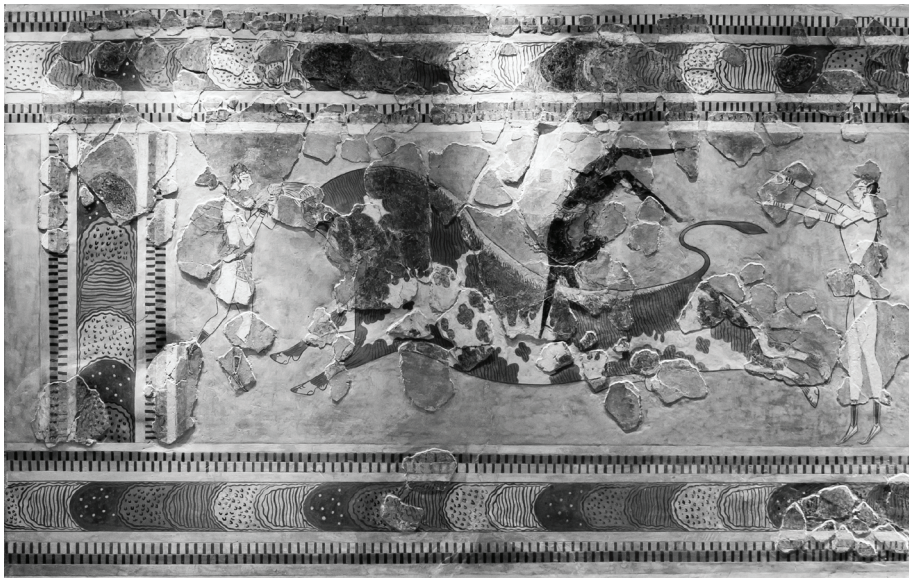


Figure 9.13: One of the Traureador Frescoes from Knossos, Crete

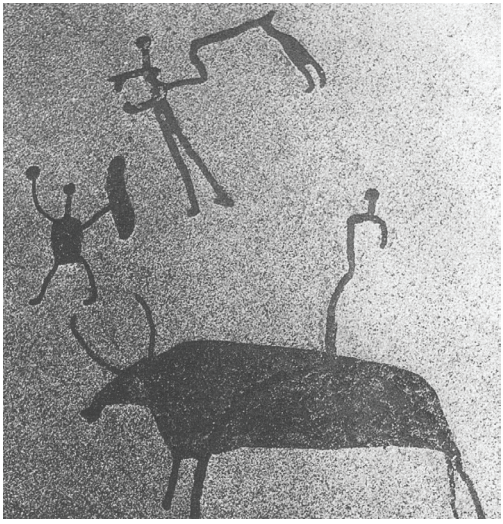


Figure 9.14: A Bull-Jumping Scene from Vytlicke, Tanum, Bohuslän, Sweden

24 Younger 1995, pp. 508-512

25 By Jebulon - Own work, CC0, https://commons.wikimedia.org/w/index.php?curid=99294843

ure 9.14)

Rock art is, by its very nature not a provider of rich detail of the bull-leaping acrobats, unlike the iconographies from the south[26]. However, considerable detail is forthcoming from a find of small cast figures which were found at Grevensvaenge in the Næstved municipality on Zealand in Denmark and several of these depicted acrobats. When these were found, around 1779, seven figures are mentioned, coming from a hoard, but, sadly, only two have survived up to the present day. Around the time of their finding, a drawing of four of the figures was made and this shows two kneeling figures wearing horned helmets and carrying axes, likely warriors, a standing woman and most intriguingly for us, an acrobatic figure in a short skirt. (Figure 9.15)

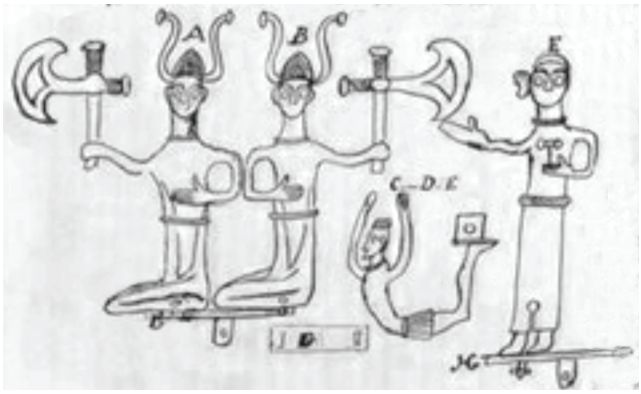


Figure 9.15: Part of an 18th Century Drawing of the Grevensvaenge Find

Several authors have compared these with petroglyphs from the same era and geographical location and suggest that the figures were probably mounted together as a single group, possibly once on a ship. As they are all provided with flanges which have holes, likely for mounting, it seems almost certain that they were designed to be attached to something more substantial, possibly a model of a ship. (Figure 9.16)


Figure 9.16: One of the Acrobats from the Grevensvaenge Figurines

It was not just athletic or artistic acts which linked these northern and south-

26 Lennart Larsen, CC BY-SA 2.5 <https://creativecommons.org/licenses/by-sa/2.5>, via Wikimedia Commons

ern areas but one decorative motif in particular provides a clear link. Figure 9.17 shows the spiral decoration on a piece of bronze jewellery from the grave of "the distant traveller" ("Villfarahögen") at Simrishamn in SE Sweden (right) and same decoration on a bronze pendant from the necropolis at Asini in Greece (left). Both objects are dated at around 1600-1700 BCE[27].

In the case of the Minoan spiral decoration, this was achieved by means of the application of round gold wire to the surface of an object and then heating this in a reducing atmosphere: the same process as was used in granulation[28]. In the case of the Scandinavian examples, the pattern is likely added as wax wire which is added to a surface prior to encapsulation of the model in the mould. This is likely the same process as was used to create the helical winding on instrument tube yards of the bronze lurs in Scandinavia and the Baltic.

Such spiral decorations are discussed below and are seen on rock surfac-

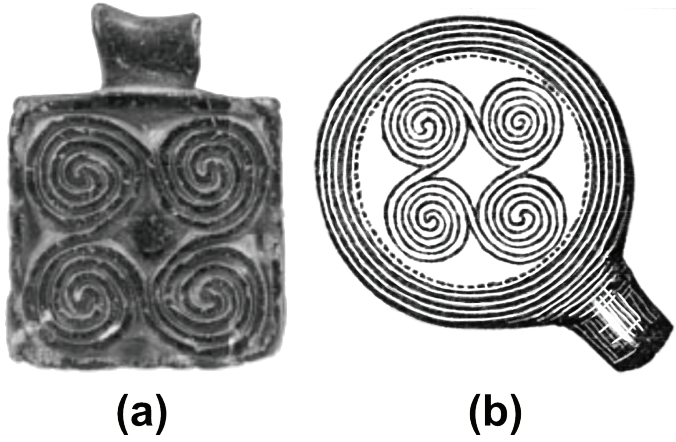


Figure 9.17: Comparison of Contemporary Spiral decorations from Sweden and Greece

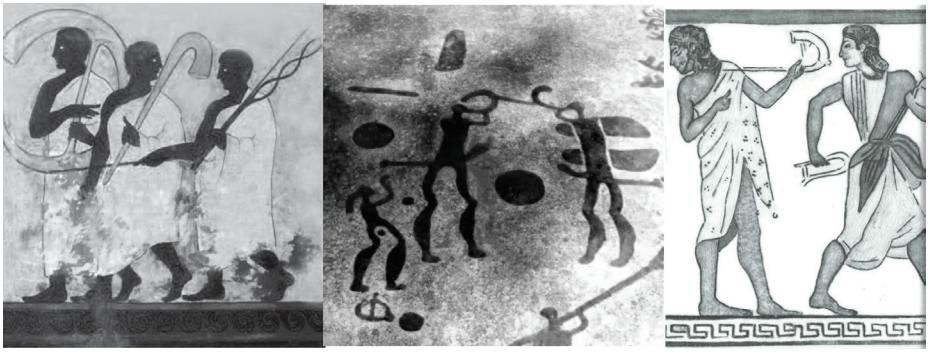
es (Figures 10.15 and 10.16). Their helical form, although shown here on a flat surface, likely carries the same meaning as that wound around the tube yard of instruments such as the bronze lurs and the Etruscan litui. It is also the same as that seen when taking an end view on a sea shell, looking from its apex. (Figure 10.14)

27 Lind & Mörner, 2015: p.133
28 Morero and Prévalet. 2014: p.66, Fig 5

If we accept that interaction did take place between the Mediterranean, Britain and Scandinavia then this could have had consequences for the types of brass instruments which they used and the exchange of ideas between the three societies. Regardless of any interchange which took place, however, there were marked difference in the way instruments developed in the two northern societies. Although each may have shared some usage of simple animal-horn instruments in the distant past, the trajectories along which these developed were quite different. In Ireland, for instance, the pattern of end-blown and side blown horns remained pretty constant from the earliest to the latest of the instruments. What did develop was the size of the instruments with them becoming larger over time.

The situation in Scandinavia was markedly different. Images like those seen on the Kivik Grave (Figure 9.10) point to the use of large curved horns which curved in a single plane with the complementarity lying in the way the instruments were held. One horn was held with the bell pointing upwards while the other was held in much the same way as a modern French horn, with the bell pointing to the side.

In other depictions, instruments are seen which, in other contexts, one might identify as a lituus. In addition to this the lituus is paired with, again what one might otherwise identify as a cornu. Figure 9.18 shows a comparison of the pairing of Scandinavian Fossum rock art with Etruscan Tomb of the Hescanas and with the Etruscan Tomb of the Monkeys.



Etruscan Tomba Hescanas, IC002 | **Scandinavian Fossum Rock Art, IC213** | **Etruscan Tomb of Monkeys, IC011**

Figure 9.18: Lituus from the Etruscan Tomb of the Hescanas (IC002), Scandinavian Rock Art at Fossum (IC213) and the Etruscan Tomb of the Monkeys (IC011)

The Fossum depiction also reveals that, by the depiction of their genitalia, both instrument players are male and that the dancer is female. Etruscan depictions indicate the gender of the players in a different way, the males being painted in dark colours and the females in white but they too indicate that the players of the lituus and cornu were always male.

The Fossum depiction differentiates between the lituus player and the cornu player, showing the lituus player in a much-more common Scandinavian form, perhaps indicating the two instruments held different positions in the musical culture. (Figure 9.19)

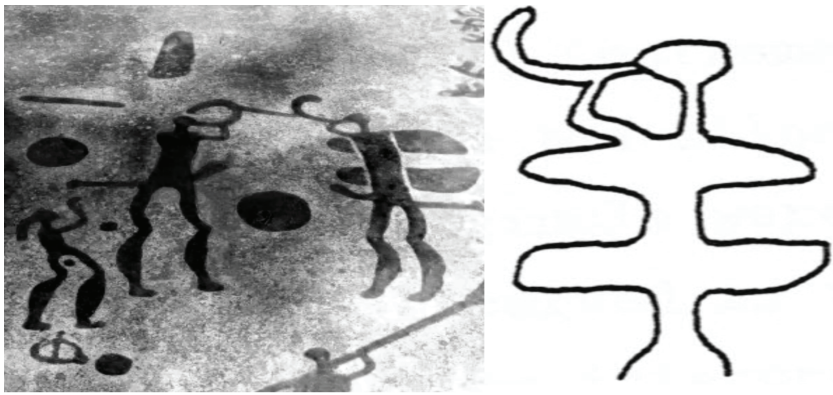


Figure 9.19: A Comparison of depictions of Lituus Players

Later, during the Iron Age, depictions of the lituus appear on Native European coins from the UK and on the Cumae Frieze[29].

A further comparison may be made between the form of the cornu and the form of such instruments from the Mediterranean world. (Figure 9.20)

There is a number of other such small, highly curved horns around the Mediterranean but the interesting detail on the Tarquinia iconography lies in the structure of the horn itself. It has every appearance of being created in segments, perhaps of metal but equally-likely of horn. Such composite horn instruments are seen in ethnographic contexts, such as on the Peruvian Wakrapuku which is made in pairs and identified as being made up of one male and one female instrument. (Figure 9.21)

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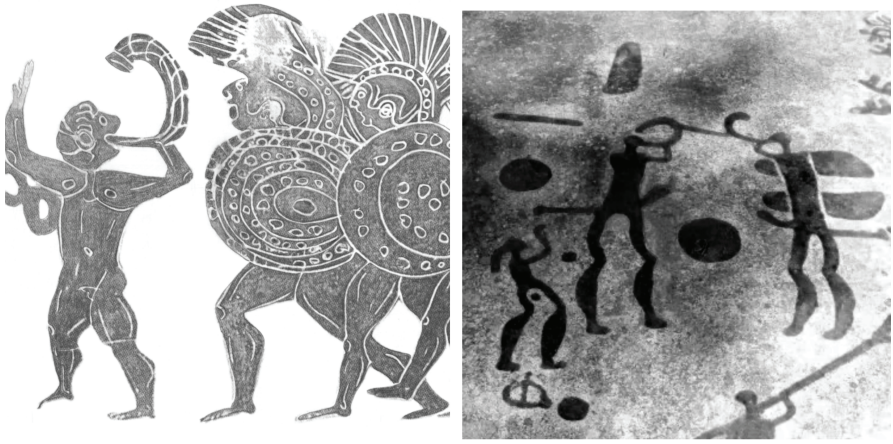


Segmented Horn from Tarquinia, IC567

Scandinavian Fossum Rock Art, IC213

Figure 9.20: Depictions of Cornua from Etruscan Tarquinia (IC567) and Scandinavian Fossum (IC213)

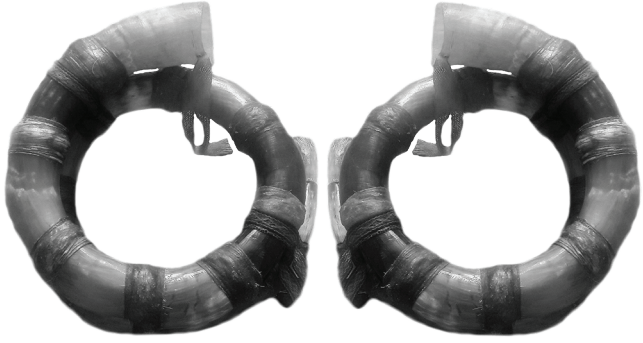


Figure 9.21: A Pair of Peruvian Wakrapuku

While Scandinavian rock art is not sufficiently detailed to show such elements as would be required to make assumptions as to the mode of manufacture of instruments, close examination of one of the earliest of the body of bronze lurs suggests that this too was made in segments. This lur, from Gullåkra curves in two planes (Figure 9.22) but, as it exists at the moment, appears to have been made in 27 segments. From my precise measurements of this, however, I would suggest that there are segments missing as the instrument, like many other ancient brass pieces I have examined, it appears to have been heavily repaired in ancient times.

Figure 9.22: Segments of the Gullåkra Lur prior to Final Assembly

The original instrument was created using lost-wax techniques but the sheets of wax which were used to make the pattern for final casting, these being visible at the bell end of the instrument, do not match up to the segment junctions. This suggests that the segments themselves are legacies from earlier manufacturing styles. In addition, the segments are grouped into larger sections, presumably representing the fact that, using the manufacturing techniques available at the time this lur was

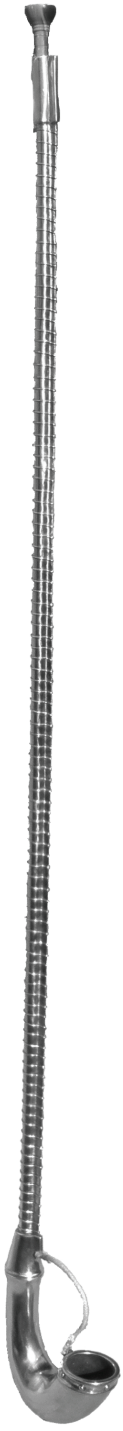
made, larger sections could be cast than heretofore. When setting out to make this piece, my colleague Martin Sims and I decided to create it from 27 segments made from bronze sheet and to assemble these to get the final shape. Figure 9.22 shows all the segments which have been created and partially formed. On the right of the picture is the carbon-fibre instrument which Martin created from the data collected in Lund, Sweden which we used to match the shape of the overall lur to the original.

Making a large curved horn of this size in metal without a good solid mandrel over which to form it is a really tricky and challenging task. Creating one in segments overcomes some of the problems and it appears that this was the way that the cornu from the Etruscan Tomb of the Shields was made. (Figure 9.23)

Figure 9.23: A Segmented Cornu from the Etruscan Tomb of the Shields, IC313

One of the enigmatic instruments from Etruscan times is the Pian di Civita Lituus. Dated to 680 BCE, it is the oldest of the extent Etruscan litui. What marks it out as different from the other extent litui is its composite manufacturing technology as, while its bell is cast, its tube yard is made of wrought metal. When found it was bent into three pieces and Figure 9.24 shows my modern analogue of this instrument based upon careful study of the original. All the other extent litui are made entirely of wrought material.

Just how the bell of the Pian di Civita lituus was cast cannot be determined because of the high level of corrosion on its surface but to someone used to working with Irish horns, it could have been cast in the same way as these instruments. Nevertheless, whether cast in a two-piece mould or by lost wax, the combination of a cast bell with a wrought tube yard does present as a combination of manufacturing technologies drawn from both northern and southern manufacturing technology cultures.



The manufacturing technology of the tube yard is distinctive in that the seam is created by the joining of two flanges. In the case of the Pian di Civita instruments, when creating an analogue of this seam, I found it impossible to create a seal without the use of some sealing material. Subsequently, when examining the slightly later Cortona lituus, which had both wrought bell and tube yards, it became clear that the maker had encountered the same problems and had used either pitch or bitumen to create a seal.

This was likely what had been used on the Pian di Civita instrument but there were no traces of any sealant present on this when it was found. By the time the Cortona Lituus was made, the more-standard technique of sealing the two flanges of both tube and bell yards using a crimping strip, a U-shaped strip which was fitted over the two lips of the tube and bell. Figure 9.25 shows the various forms of seal on the extant Etruscan litui. Because of the wide range of sealing techniques employed, it seems reasonable to conclude that sealing techniques were being developed indigenously, hence the experimentation.

Figure 9.24 left: A Modern Analogue of the Pian di Civita Lituus

The best known sealed tubes up to that date are those from Tutankhamun's tomb, the two trumpets, and these are provided with much more conventional seams, one being a straightforward butt joint and the other created from flaps cut into one side of the seam and then alternated over and under the other side of the tubing.

The only other place where anything like the lituus seams can be seen is on the Dürnau Karnyx bell and possibly on the Tattershall Ferry Karnyx although only a drawing of that latter instrument survives. The evidence suggests that the karnyx bell was generated in the same way but that the lipped seam was on the outer curve of the bell, forming part of, or a foundation for, the crest of the karnyx head.

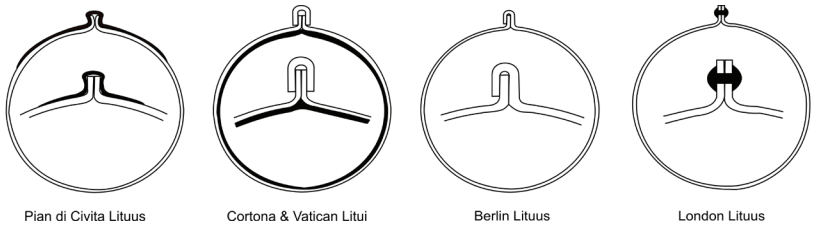


Figure 9.25: Sealing Techniques used on the Etruscan litui

The bell body was split into two parts with the inner seam being riveted. (Figure 9.26)

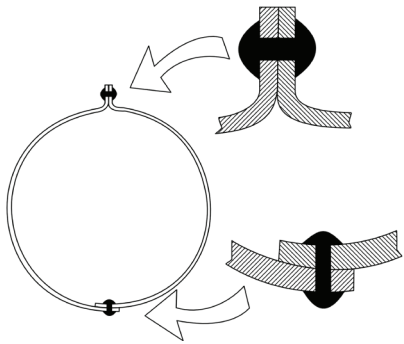


Figure 9.26: The Seaming Technique on the Dürnau Karnyx Bell

Only one other instrument provides any evidence of this lip-sealing technique in use, this being the cornu from the Etruscan Golini Tomb where the lips seam can be seen along the inner curve of the instrument (Figure 9.27) This evidence points to another source of similarity between northern and Mediterranean manufacturing technology, albeit at a somewhat later date.

Figure 9.27 right: Tube Sealing on the Tomba Golini Cornu

The strongest link between the lurs and the Etruscan lituus lies in the helical decoration applied to the tube yards. Such decoration is seen on the upstream section of the tube yard on some later lurs between the mouthpiece and the central lock. It takes the form of a helical decoration presumably created by wrapping

a string of wax round the tube during manufacture and before the wax pattern was invested. Figure 9.28 shows such a decoration on the British Museum lur fragment. This is discussed in more detail in Chapter 10.

Figure 9.28: The Helical Decoration on the British Museum Lur Fragment, SD154

In the case of the litui, such a decoration is present on the two instruments which were recovered in controlled excavations. It is clearest on the Cortona lituus where it is seen in the form of an organic strip, possibly leather, wrapped around the entire tube yard of the instrument. (Figure 9.29)

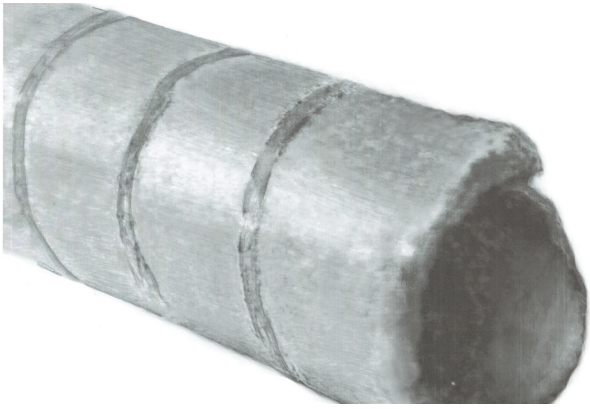


Figure 9.29: The Helical Decoration on the Cortona Lituus

On the Pian di Civita instrument, because of the heavy layer of corrosion covering the surface of the entire instrument, such a decoration is only detectable by eye

as a faintly-traced pattern. However, X-ray photography shows this up much more clearly and the pattern mode visible shows two helices wrapped around the tube yard, one running clockwise and one anti clockwise. These are visible as the black traces seen on the edge of the lip as shown in Figure 9.30.

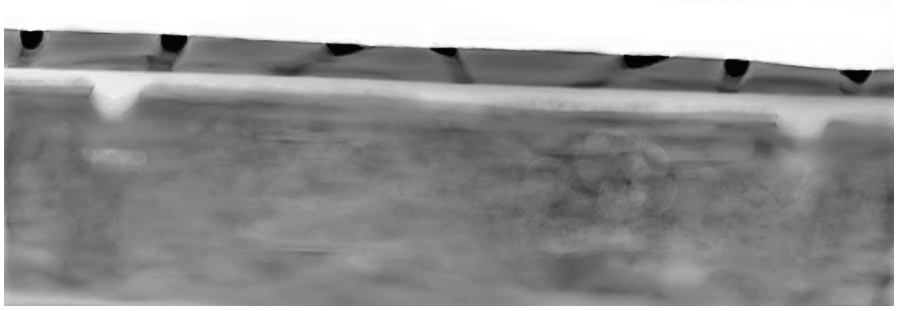


Figure 9.30: X-Ray of the Decoration on the Pian di Civita Lituus

Where this applied decoration wraps over the top of the two lips of the seam, blobs of material remain. Chemical testing of these remnants which we carried out during the European Music Archaeology Project (EMAP) revealed these to be of iron[30]. It appears, therefore that fine iron wire was wrapped helically around the tube yard of this instrument. This was a somewhat surprising finding as one could not imagine that the several metres of fine iron wire needed to create this winding would be a common commodity at this time.

Neither the lituus or cornu are represented in the earlier Mediterranean world other than in Etruscan or Roman contexts or from Iberia. In Spain during what is regarded as the Celto-Iberian Period, images of the lituus are seen on pottery[31]. (Figure 3.31)

What is interesting about this area is that Spain was another location where tin was mined and it was possibly somewhat involved in the north-south tin trade and shared cultural connections with other parts of the Mediterranean. In particular in Spain, women enjoyed considerably more freedom than in most of the Mediterranean, a cultural practise they shared with the Etruscans.

30 Pelosi et al 201
31 Holmes 2022: Chapter 10

Figure 3.31: The Celto-Iberian Lituus, IC599

Use of the lituus and cornu together is also seen in Europe north of the Alps. Although from our reliance on Roman iconography, particularly their coins, one might assume that the karnyx swept away all brass competition, that's only because the karnyx was the instrument which the Romans chose to represent as the quintessentially Native European brass instrument. One piece of iconography in particular suggests that Native European communities employed a rich range of brass instruments. This piece, the Cumae Frieze show some seven different types of brass instrument with a lituus in the top lefthand corner. These include the lituus and the cornu[32]. (Figure 9.32)

As discussed below in this chapter, there's considerable evidence of interaction between Scandinavia/Baltic and the Mediterranean world but evidence also exists for contacts and trade between Britain/Ireland and the Baltic. This is despite the fact that the Bronze Age started in Ireland/Britain around 2000 BCE, some 350 or so years before it spread to the eastern Baltics.

Being found in such large numbers over the past few centuries, the Irish Horns were likely present in the Irish Bronze Age in considerable num-

32 Holmes 2022: Chapter 6

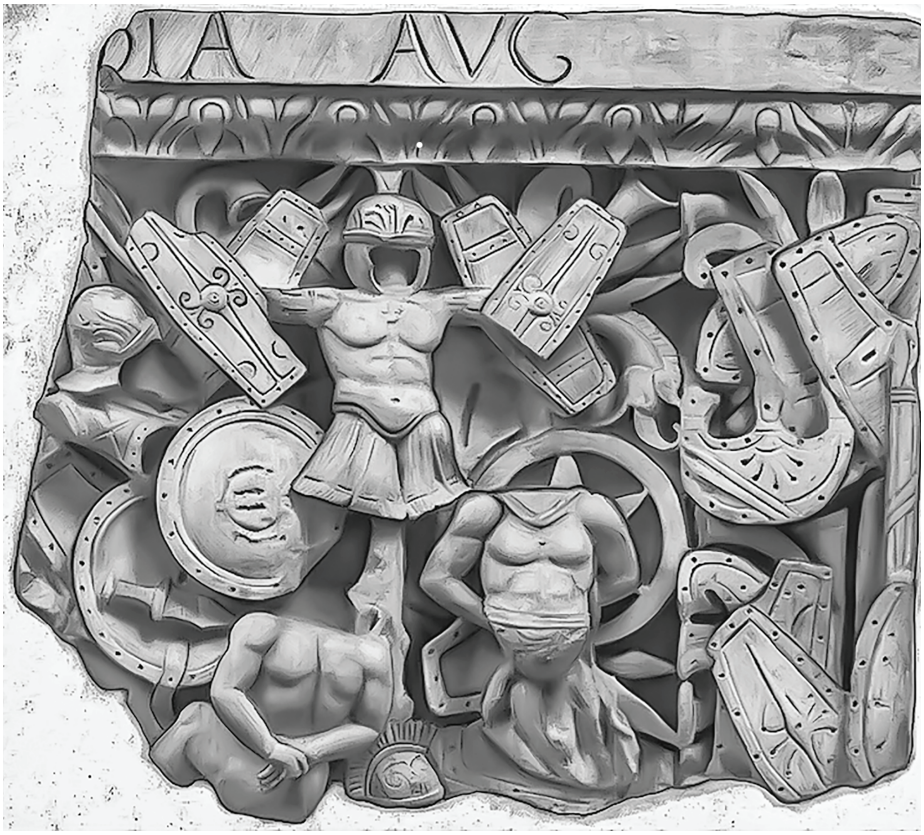


Figure 9.32: The Cumae Frieze, IC498

bers. Such a large number of bronze instruments would have called for a correspondingly large quantity of tin and only the Irish Sea separated Ireland from one of the ancient world's most prolific sources of tin, Cornwall.

Archaeological explorations have provided ample evidence for trade between Ireland and Cornwall during the early Bronze Age. Metals, finished goods and cultural practices either side of the Irish Sea demonstrate the close ties which existed between the two communities. Hence if we seek ties between Ireland, the home of the Irish horns, and the Mediterranean world, we can look to Cornwall as a staging post in that interaction.

In the South of Europe, around the Mediterranean and in the Middle East, the predominant technology employed to create brass instruments utilised wrought materials as seen on the Tutankhamun trumpets. (Figure 9.33)

Figure 9.33: The Author's Modern Analogues of the Tutankhamun Trumpets

The metals from which the Tutankhamun instruments were made, copper, silver, gold and possibly electrum were all possibly metal that could be obtained as natural minerals whereas analysis from Etruscan usage suggests that this was clearly deliberately alloyed using a very low-tin bronze.

This important metal was imported from Cornwall in southwest England, SW France and northwest Spain but the method of transmission has generally been seen to be via river systems and overland routes. However, the possibility of seaborne transmission is strongly suggested by Mörner and Lind and outlined above.

Initially, it may well not have been amber which was the driving force behind such movements as southern influence on the northern provinc-

es was detected first in Britain where the abundant resources of tin were being exploited. It is not known how early such resources were being tapped but the Bronze Age in Britain and Ireland is generally considered to have begun around 2000 BCE, and this is some 350 or so years before the time that tin from Cornwall started to appear in Mycenaean/Minoan contexts.

There's no way of knowing how big the time gap was between the onset of bronze working in Britain and Ireland and the earliest efforts to create horns in bronze. The only evidence left from the musical culture of that time is the enigmatic Wicklow Pipes, a set of wooden pipes found just South of Dublin which have been dated by carbon 14 to around 2000 BCE[33].

From the great diversity in manufacturing technology seen on the Irish horns and the innovative techniques employed, it seems very likely that the Irish horns were developed indigenously during the process of replacing natural horns with metal ones.

As both the Irish Horns and the Scandinavian Baltic bronze lur embraced complementary duality, the possibility of cultural links existing between these two schools of instrumental use and manufacturing technology seems very strong.

A major problem when attempting to divine the origin of Roman brass lies in the wide variety of uses to which the brass was put during Roman times. It may be therefore, that some cultural usages were derived from one source and others from different sources. Of particular note is the difference between the gladiatorial games and the agonistic games the two different events being based upon different earlier cultural practises. While the tuba was used in both these activities, the actual form of the instrument used in the agonistic context may have been derived from either the Etruscans or more southern cultures while another form of the tuba is quite likely to have been sourced from a Greek origin.

A further possibility is that the Roman tuba/cornu combination evolved before instrument usages were differentiated between gladiatorial and agonistic games.

33 Holmes 2022: Chapter 12, Section 12.1, p.199

It is known that the Etruscans did have games which were similar to the Roman gladiatorial games although the iconography of these is very scarce. The Etruscans held games at funerals to honour their dead in religious events. It is not known whether such games had any sort of agonistic intent but it is likely that they didn't as the contests featured fighters who fought to the death and these may have been prisoners or slaves, such as those who provided the expendable gladiators in the later Roman games. In the funerary context within which such games took place, the death of a person seen to have no value to society might well have been seen to be a fitting sacrifice to the Gods. Figure 9.34 shows some of the links between Greek, Etruscan and Roman Instruments

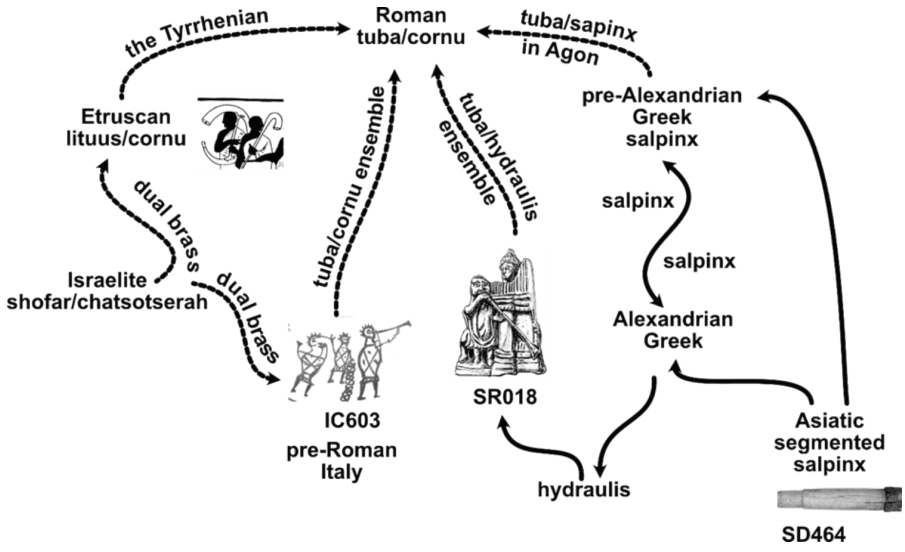


Figure 9.34: Possible Sources of the Roman Brass Instrumentarium

One of the few pieces of iconography depicting the Etruscan games is shown in Figure 9.35. This image shows two players blowing salpinges during a boxing match. The use of this instrument mirrors that used in the Greek context in similar contests however only one instrument and player is shown in the comparative Greek iconography as opposed to two in this depiction. In this image, standing behind the two players an individual stands holding a tuba and a lituus possibly indicating that these instruments were used in other events during the Etruscan games. This image therefore, while exhibiting some of the elements that were

incorporated into the Roman gladiatorial games, remains quintessentially Etruscan.

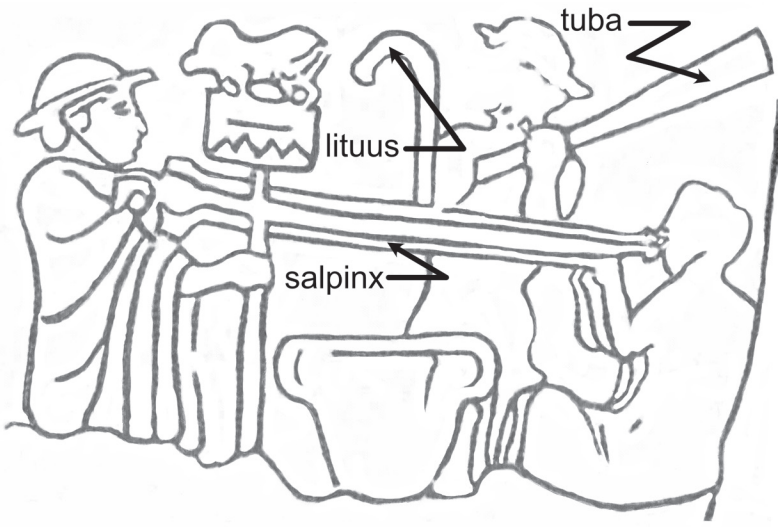


Figure 9.35: Instruments in the Etruscan games, IC578

The Romans were clearly influenced in many ways by the Etruscans. They used animal sacrifice to divine the future and their augurs carried the ceremonial staff, the lituus. In ceremonial events, officials carried the symbolic fasces and they organised gladiatorial games. For the Etruscans, these contests were associated with the rites of death and thus carried some religious significance.

The first record of a privately-organised Roman gladiatorial contests was in 264 BCE and this was held to commemorate the death of a father. While later Roman official contests removed the religious element, traces of the religious origins survived in the act of finishing off fallen gladiators. This gory act was carried out by an official who would strike a blow to the forehead of the injured or fallen gladiator while wearing a costume representing the messenger God, Hermes: a God who task was to escort souls to the underworld, a direct Roman successor to the Etruscan God, Charun who had carried out the same role in Etruscan times.

The typical brass combination seen in the Roman gladiatorial games consists of the tuba and cornu, such a combination being seen on the askos from Catarinella. (Figure 9.36)

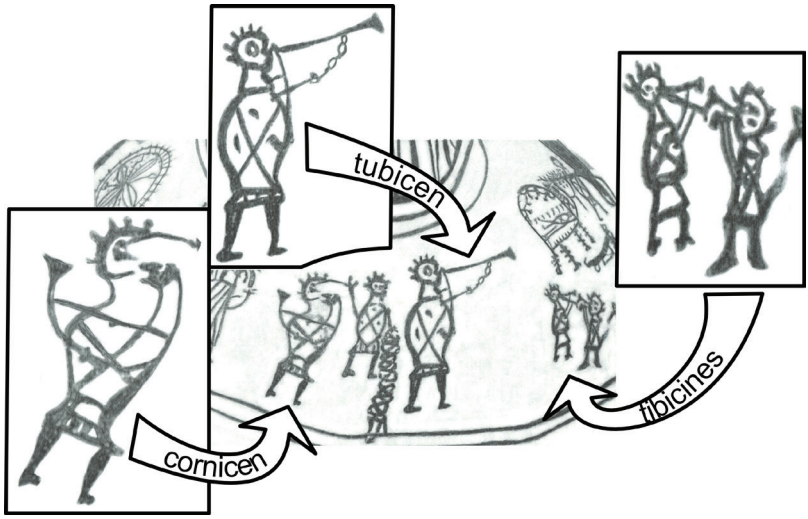


Figure 9.36: The Catarinella Askos, IC603

This askos, a small vessel such as might contain oil, is decorated to show a funeral scene and generally given a date to somewhere between the third and first half of the first century BCE[34]. It appears to show the funeral of a young child and features both brass and woodwind playing at the same time although not necessarily together. The brass are represented in the form of a tuba and a cornu and appears to be being blown by adults whereas the tibia appear to be being blown by young children. While the scene on this askos relates to a funerary event, it shows the tuba and cornu together in a way which is mirrored on later Roman usage both in the amphitheatre and in military contexts. Although the general opinion of the dating of this askos allows for a date up to the first half of the 1st century BCE, the cornu shown is in the form of a C-shaped instrument which I would generally consider to be somewhat earlier than this date. Nevertheless, the imagery shows a straight tuba-like instrument being played alongside a large curved cornu-like instrument.

While we might wish to see the imagery being intended to demonstrate the agency of instruments/performers or the brass/tibia duo in this context, according to Heitz and Hoernes it is really reporting on the agency of 'subadults' or children in the artist's culture. They suggest that the imagery may be contextualised:

34 Heitz and Hoernes 2024

within the figurative repertoire of southern Italy, drawing on 4th-century [BCE] funerary paintings from Campania and terracotta figurines from tombs in 4th- and 3rd-century [BCE] northern Apulia, but also on earlier Italic depictions and later Roman parallels.

The most-obvious source for the instruments seen in agonistic contexts in the Graeco-Roman world after the introduction of the Ludi Capitolini by Domitian, is of course the ancient Greek agon. However, the instruments seen in the Roman agonistic iconography are either the standard Roman tuba, the extended tuba or the augmented tuba and neither of these are seeing in earlier Greek contexts.

However the Greek salpinx is seen being played alongside the hydraulis, this representing the first time that the brass is seen in use alongside this keyboard instrument and this is the combination of brass and keyboard which became the staple grouping in the Roman amphitheatre.

While it is indeed true that the straight brass and woodwind and keyboard were grouped together in this way in Roman times, the only piece of iconography from the Greek world which shows this combination depicts what I would call a segmented salpinx. This I would consider to have been created from sections of bone or ivory which were joined together in some way. Figure 9.37 shows the Hellenistic Greek iconography of the segmented salpinx alongside an hydraulis.

Although lacking in detail, the salpinx illustrated in Figure 9.37 appears to be very similar to the Boston Salpinx and the bell to the Lamia Salpinx.

While the date of the iconography shown in Figure 9.37 cannot be ascertained precisely, the inventor Ktesibios

Figure 9.37: Hellenistic Segmented Salpinx in use alongside the Hydraulis, SR018

Figure 9.38: An Alexandrian Segmented Salpinx and Salpinktes, SR020

was active between 285 and 222 BCE so the invention of the hydraulis was made sometime after 329-327 BCE when Alexander entered the area of Central Asia modern-day Tajikistan. Thus, the segmented salpinx could have found its way into Alexandrian or Ptolemaic Egypt in the 50 or so years between the colonisation of that part of Asia and the invention of the hydraulis. Had it been seen as a new form of brass instrument, one might understand why it might have been adopted as the instrument to accompany the hydraulis.

Such a suggestion is, of course, very speculative but the segmented salpinx does appear in the iconography twice and that is in Alexandrian contexts both times. Figure 9.38 shows the second representation of the segmented salpinx, again as a statuette.

In an earlier section, the segmented salpinx was discussed. Some of the earlier Greek iconography appears to point to the use of such an instrument but iconography is not a reliable source of information on the raw material from which an object was created[35]. It has been suggested above that some of the long salpinges have been created from a reed such as Arundo Donax while the two instruments of this form discussed above have been created from bone or ivory.

The solid tip of an elephant Tusk can yield a considerable amount of workable ivory but bone is a different material. Two instruments have been noted above as having a bone element, the Pompeii Tuba and the

35 It is rarely possible distinct to distinguish between bone on ivory without the use of destructive techniques

Boston Salpinx. Both of these demonstrate how the maker utilised bone as an irregular material and created instruments from different lengths of bone. In the case of the Boston salpinx, for instance, the instrument is created from thirteen pieces of the form shown in Figure 9.39.

Figure 9.39: The Segments for a Boston Segmented Salpinx Analogue

The instrument was provided with an open-aperture mouthpiece, as shown in Figure 9.40

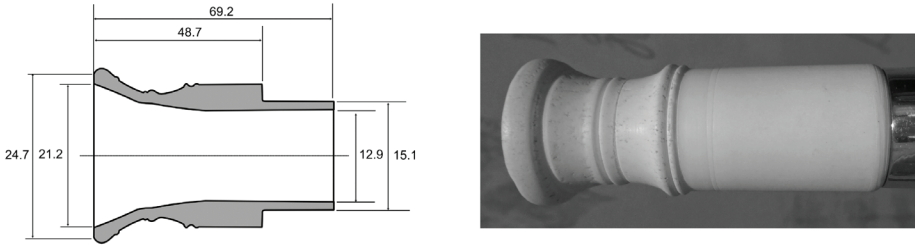


Figure 9.40: The Blowing Device of the Boston Salpinx

Figure 9.41 left: The Assembled Boston Salpinx Modern Analogue

Earlier in this book, reference has been made to the appearance of two different forms of tuba in the Graeco-Roman agon: the extended and augmented tubae and these may have come from different sources. The common element which led to their development and introduction was the acceptance of such a change in the musical culture of the time. Were brass instruments to have been seen as musical instruments deserving of the same status as other instruments, this would have left the way open for their design, development and use in musical contexts

One of the two new instruments seen in the Roman agonistic context was the extended tuba; seen in the form of the 8 foot C instrument. The nearest instrument to this organologically speaking was one form of the Etruscan litui which was depicted in Etruscan iconography. While the extent litui are essentially cylindrical with a conical bell, the iconography shows several examples of conical instruments, some of these being quite long. The example from the Tomba Bruschi IC073, for example scales at 1845 mm (6 feet long) overall and were that to be made as a straight tuba-like instrument, it would yield one in 6 foot F. Such a straightened-out instrument could form a starting point for an instrument such as the Graeco-Roman extended tubae. (Figure 9.43)

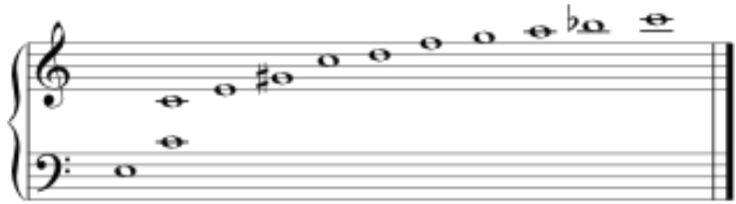


Figure 9.42: The Notes Playable on the Tomba Bruschi Litui Modern Analogues

Figure 9.44 shows my two modern analogues of the Tomba Bruschi instruments along with other Etruscan, Campanian and Greek instruments.

All but one of the extant litui have both tube yards and bells which utilised the same manufacturing technology but the exception, the instrument from Pian di Civita (SD206) has a cast bell while all the other bells are of wrought construction. This change from cast to wrought technology is one seen elsewhere. For instance, the principal manufacturing technology used in Ireland on the late Bronze Age horns was casting while some of the later instruments from here incorporate wrought elements. However the later Iron Age horns from the northern province of Ireland were wrought.

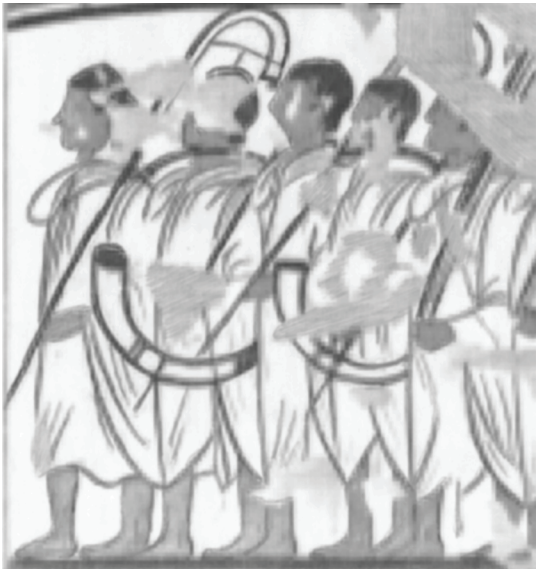


Figure 9.43: The Tomba Bruschi Litui and Cornua

Figure 9.44: Modern Analogues of the Tomba Bruschi Litui and Cornua

The seven Tintignac Karnyces were created by a mixture of technologies, four of these being cast and three wrought, this seeming to represent the mixture of manufacturing technologies which were present north of the Alps. (Figure 9.45)

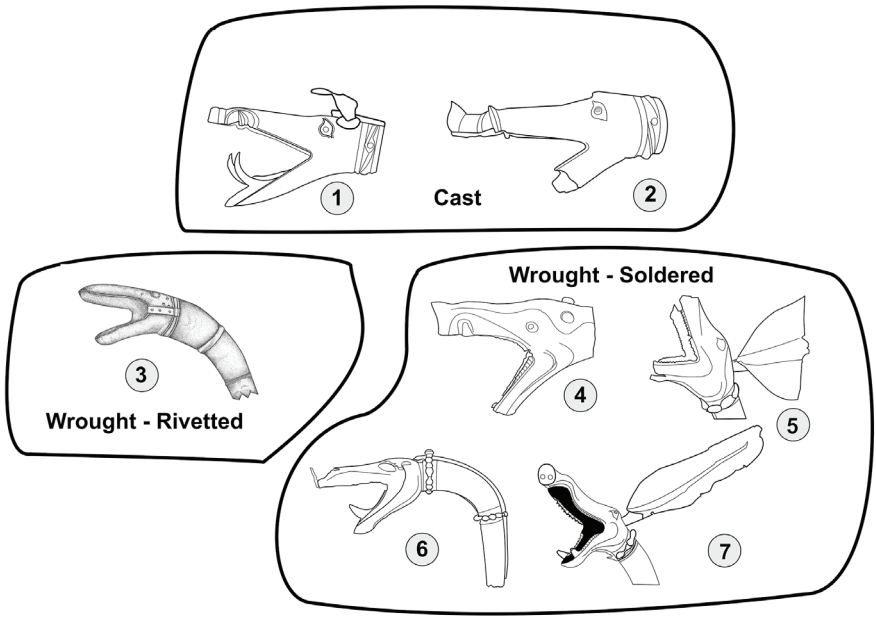


Figure 9.45: The Manufacturing Technologies of the Tintignac Karnyces

In the case of the Tattershall Ferry Karnyx, although the evidence comes from a drawing, it appears that the main fabric of the instrument was created using wrought manufacturing technology but that the joining elements, the ferrules, were likely cast this is mirrored somewhat in the cast ferules from Verulamium although these were not found in connection with an instrument[36].

Probably the greatest point of convergence between the karnyx and the lituus lies in the manufacturing technology employed in the creation of the bell. Although the bell of the lituus was made in one piece and the karnyx head was made in two, both employed a flanged seam at one point. In the case of the lituus, this seam was on the inside curve of the instrument while on the Dürnau Karnyx bell it was on the outside and formed the structural member to which the crest of the animal head was probably attached. Such a seam is not utilised on other instruments of this period. (Figure 9.46)

36 Holmes 2022: p.109

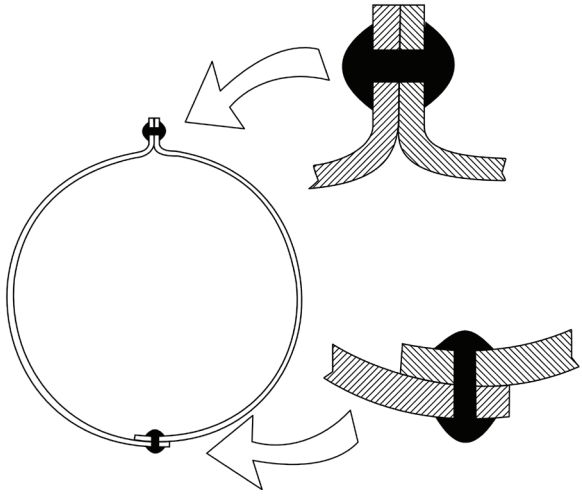


Figure 9.46: The Manufacturing Technology of the Dürnau Karnyx Seams

All the extent litui, with the exception of Pian di Civita, have a crimping strip over the two lips of the flange while this function is served by the Crest or mane on the karnyx. Such features are necessary because it is not possible to create an hydraulically sealed seam using a flange joint like this without some form of joining technology. On the London Lituus the lips of the flange around the inner curve of the bell were extensively rivetted and similar rivets are present on the Dürnau Karnyx bell while extensive riveting was utilised on the slightly-later Irish and British long-curved horns. Figure 9.47 shows the distribution of the instruments discussed here and this is clearly a western distribution with no outliers in the eastern Mediterranean area.

Figure 9.47: The Distribution of the Late Bronze-Age and early Iron-Age J-shaped Instruments

Mention has been made above of the riveting employed on the London Lituus and, in order to create a seal by this method, it was necessary to rivet the seams with many rivets spaced closely together. Such a situation is seen on both the Etruscan London Lituus and the Iron-Age long curved horns from Ireland, both made around the same time. As the London lituus disappeared after its sale at Sothebys and my enquiries have failed to locate it, the only evidence available to me for the form and structure of the instrument is a few very poor photographs. However, these are good enough to show that the seam was sealed by riveting. (Figure 9.48)

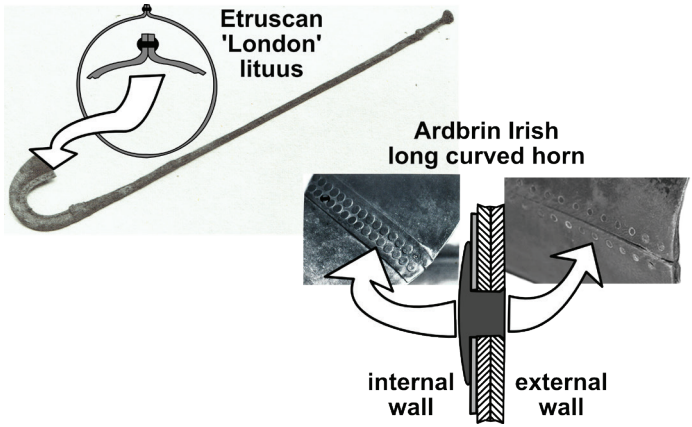


Figure 9.48: Riveting Techniques on the London Lituus and the Ardbrin Long Curved Horn

The fluidity of form and manufacturing technology suggests that, despite competition and wars between the Etruscans, Romans and Native Europeans, there was considerable interaction between them in terms of their brass instruments, both in design and manufacturing technology. This is nowhere better illustrated than on the Cumae Frieze in which some instruments would be equally at home on a Native European, Etruscan or Roman frieze[37].

Figure 9.49 shows some of the manufacturing technologies used to create seams on brass instruments. It might be argued that the major difference between the lituus and the karnyx lies in the decoration of the instrument heads as the karnyx is always supplied with a more-or-less zoomorphic head. However such a form was not unknown to the Etruscans and appears on a protome (just a word for a decorative element which takes the form of a stylised representation of the head/upper

37 Holmes 2022: Chapter 6

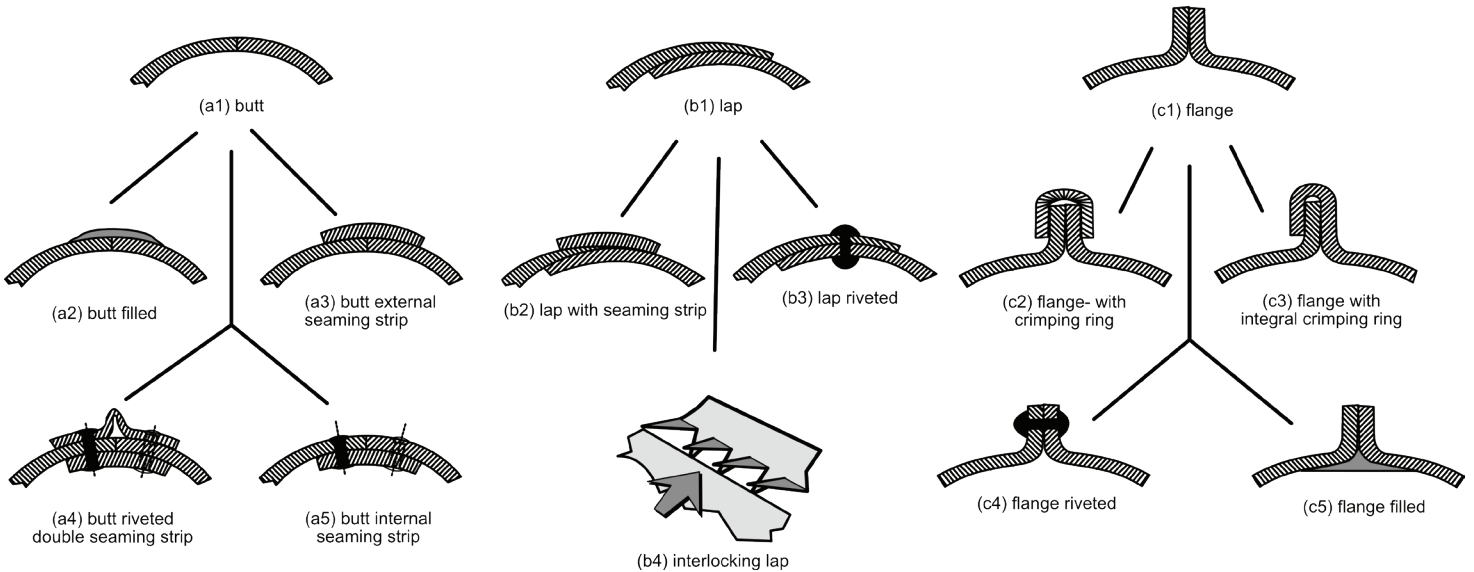


Figure 9.49: The Manufacturing Technology of Iron-Age Tube Seams.

Method a1, a simple butt seam relied on the availability of a suitable joining medium such as solder but it was, nevertheless used on the Tutankhamun bronze/copper trumpet. Method a2, a filled butt joint is seen on some of the karnyces and on the bell of one of the Pompeii cornua. In this latter case, the jointing medium or solder is brass, indicating a very hight level of technology in terms of temperature control. Method a3 is seen on the Etruscan Tomba Vipinana C-shaped cornua as well as on the Nice Horn and the Villa Giulia cornu. These instruments also show the use of b1 and b2. Method b3 is seen on the Dürnau Karnyx.

Methods a4 and a5 are seen only on the Iron-Age Long Curved Horns from Ireland.

Method b4 is seen on the Tutankhamun silver trumpet and the Roman Zsambek Tuba.

Method c1 is present on the Pian di Civita Lituus but this may also have had a filled joint such as c5 which is seen on the Cortona Lituus. Method c4 is seen on the Dürnau Karnyx bell and also on the London Lituus bell.

Figure 9.50: An Early Etruscan Pronome, SR042

portion of either a human or an animal). As may be seen from Figure 9.50, had this been found in a different context, it might have been described as a model of a karnyx, although one lacking a mane. However, it was found in the Etruscan Tumulus I of Cantinaccia di Urbania which is dated to the late 8th to early 6th century BCE indicating that imagery such as was later incorporated into karnyx heads was in use to the south of the area where the karnyx was later found and several centuries earlier.

While metal mouthpieces had been in use during the Nordic Late Bronze Age, and a clear sequence of development is seen on these[38], no metal mouthpieces appear around the Mediterranean or in the Middle East before those seen on Etruscan instruments. These appear on the Vipinana Tomb C-shaped cornua in the British Museum and the Cornu in the Etruscan Villa Giulia Museum. Figure 9.51 shows these mouthpieces along with those of the Brudevaelte Lurs'.

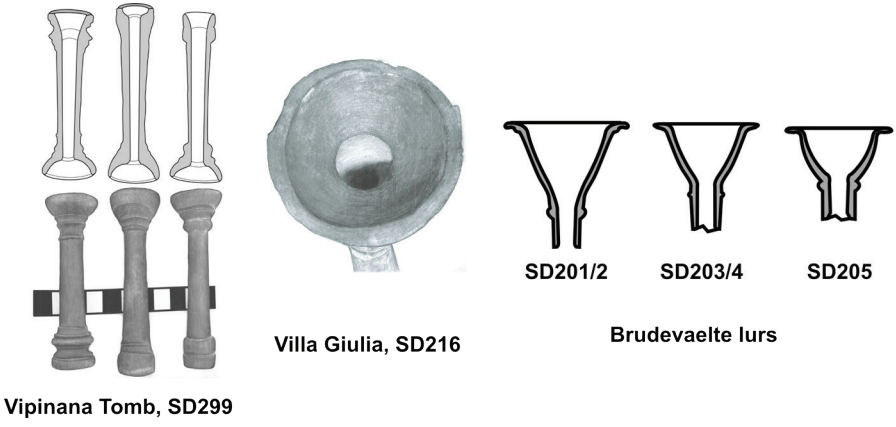


Figure 9.51: Etruscan Cornua and Scandinavian Lur Mouthpieces compared

38 Holmes 1978: Chapter 4; Holmes 1986: pp.51-126; Holmes 2006: pp.59-70

In Figure 9.51, the three forms of the Brudevaelte Lur mouthpieces are shown with SD101/2 being the earliest of these and SD205 being the latest[39]. The various features which lead to this conclusion are discussed elsewhere but are quite clear[40]. Between the time when SD101/2 and SD105 were made, the cups of these mouthpieces were developed from a more-conical form to a hemispherical-cup form, SD203/4 being somewhat midway between the two other pairs. The Vipinana mouthpieces are much shallower than any of the lur mouthpieces and this was the case with all the following Roman mouthpieces. The Villa Giulia mouthpiece is quite a bit deeper than the Vipinana mouthpieces being the closest in depth to the Brudevaelte No. 5 mouthpiece.

The Vipinana mouthpieces are externally stemmed and fit into internal receivers whereas the Villa Giulia mouthpiece is internally-stemmed, fitting into an external receiver. However, it has to be said that the Villa Giula Cornu is a veritable jigsaw puzzle, very expertly put together at some time by a very patient conservator so the fitting of mouthpiece to receiver might be subject to some error. All the lur mouthpieces are cast integrally onto the end of the mouthpipe. Roman brass mouthpieces are made with both types of stem fitting, i.e. both internal and external.

The oldest of the Etruscan Litui, the Pian di Civita, although lacking a mouthpiece, has a distinct receiver which appears to be cast. It is bulky enough to withstand a hefty metal mouthpiece being jammed into it without splitting. However, the Cortona lituus which is a hundred or so years later and has remnants of a receiver, appears to possess a tiny fragment of wood which, from its shape, appears to be what remains of a wooden mouthpiece. It may, of course be that both wooden and metal mouthpieces were in use, alongside each other, perhaps with similar ones made of bone or ivory.

While the timing of the appearance of metal mouthpieces overlaps with the time of the very end of the lurs, it cannot be said with certainty that influence from Scandinavia was a factor in the adoption of metal mouthpieces in the Etruscan world but it remains a possibility.

39 SD205 was paired with SD206 but the latter is no longer available for study, being in St Petersburg, Russia.

40 As above, Holmes 1978: Chapter 4; Holmes 1986: pp.51-126; Holmes 2006: pp.59-70

While the possible physical links between Scandinavian and Mediterranean instruments has been discussed above, the meaning of the instruments to their makers and users has been somewhat disregarded. We do know that much later sonic devices were created which were seen by their users and makers to possess special powers, particularly in sacred and mystical domains and a number of writers have discussed such a phenomenon in the past. However, it is not just sonic devices which have been discussed in this context. In 1871, Sir Edward Burnett Tylor wrote a book entitled *Primitive Culture* and, in this he coined the term *animism*, defining it as the: *theory of the universal animation of nature*. The definition referred to his belief that such ancient civilisations considered that all things, including both inanimate objects and natural phenomena, possessed their own spiritual essence or soul.

A later scientist, Wilhelm Wundt, who was best known at the time for his work in the then nascent study of psychology set out, between 1900 and 1909 to write his ten-volume account of the natural history of humankind. In this, he discussed systematically, myths, religion, languages, culture, art, society, history and legal systems. In this epic work, by the study of the history of human culture, Wundt maintained, that one can achieve an understanding of the true nature of thinking, a mental activity whose basis cannot be discerned any other way. He was thus attempting to understand the thinking processes which ancient people might have employed.

He investigated animism further and discussed extensively how it was the practice of peoples in simpler pre-industrial cultures and children to attribute a soul to things. By doing this, they were ascribing an intentionality to objects which we would today interpret in purely mechanistic causal terms.

Freud developed his concept of animism further in his 1912/1913 *Totem and Taboo*. in which it is related to magic and the omnipotence of thoughts. Here Freud presents a picture of an ancient world view in which objects which we would today see as inanimate may possess independent souls creating a world view made up of large numbers of such entities which populate the universe. As the souls of these entities may be separated from their original material origins, they can be transported into other people and objects. Freud's actual text read:

What led to the formation of these names [animatism and animation[41]] is the insight into the very remarkable conceptions of nature and the world of these primitive races known to us from history and from our own times. These races populate the world with a multitude of spiritual beings which are benevolent or malevolent to them, and attribute the causation of natural process is to the spirits and demons; They also consider that not only animals and plants, but inanimate things as well are animated by them. The third and perhaps the most important part of this primitive 'nature philosophy' seems far less striking to us because we ourselves are not yet far enough removed from it, though we have greatly limited the existence of spirits and today explain the processes of nature by the assumption of impersonal physical forces. For primitive people believe in a similar animation of human individuals as well. Human beings have souls which can leave their habitation and enter into other beings; These souls are the bearers of spiritual activities and all, to a certain extent, independent of the 'bodies'. Originally souls were thought of as being very similar to individuals; only in the course of a long evolution did they lose their material character and attain a high degree of 'spiritualization'.

An example of such animate and sonic devices is seen in the use of the didgeridoo by Australia's First Nations. For instance, for the Yolngu people, during their ceremonies, the instrument actually becomes the *Rainbow Snake*, the *Great Serpent of the Dreamtime* at the time of their ancestors. The Murinbata from the north of Australia believe that people appeared on earth only after the *Rainbow Snake, Kummanggur* blew them out of the end of his didgeridoo[42].

From ancient times comes another example of the animisation of a physical object. A Babylonian text describes the sacrifice of a bull in the temple. Following the killing of the animal, it was skinned and sinews were removed from the left shoulder. Some texts which describe the event report that the body of the bull was then buried. Fifteen days later, another ceremony was carried out in which a newly-strung tympanum was brought into the ceremonial place, the skin of the drum having been made from the bulls hide: a celebration of the resurrection of the animal in its new form. The bull thus spoke through the sound of the tympanum.

Wundt and later, Freud, adopted another concept in their explanation of human behaviour, that of totemism. This term was first introduced by the British merchant and translator James Long in 1791. He was

41 As the term animation is in general use in cinematography, it is generally replaced in this context by the term animisation at present.

42 Holmes 2019, entry Didgeridoo in The Cambridge Encyclopedia of Brass Instruments.

adopted into the American First-Nation Ojibwa tribe but when writing of his experiences, mistranslated their word “ototeman”, which means “one’s brother-sister kin,” and thought it referred to a guardian spirit in the form of an animal. This is so intertwined with the concept of animism when looking at ancient instruments that the two concepts seem to merge together.

When taken up by others, such as Wundt and Freud, a more general definition was adopted something along the lines of: *A totem is a belief regarding certain things such as animals, plants or objects which are commonly and sacredly shared and worshipped by a group of people, be that a family, a tribe or members of a profession or association.*

The approach taken by Wundt saw his explorations as being directed along the lines of what he referred to as a *synthetic survey of folk psychology*. He argued that studying individual responses to phenomena and events was not sufficient but that collective mental phenomena, what he referred to as the collective mind must be understood. As the events and phenomena in the lives of ‘ordinary’ ancient people were very diverse in character,

In terms of its expression, physical objects are adopted as manifestations of the totemism, such as badges, insignia, National Emblems etc. For instance, the image of a kiwi on an object reflects a reference to New Zealand, the kangaroo to Australia, the Bald eagle to the USA and the lion and the unicorn symbolising the joint sovereignty of England and Scotland in the case of the UK.

Using a slightly more general definition here to cover the archaeological case of the brass, as an example, one might consider the silent lituus, seen in the hands of the Etruscan and Roman augur as a totemic device. (Figure 5.92)

The possession of such a device marks out the person bearing it as holding a position of authority as the augur who, by means of various techniques, predicts the course of future events. Acting as much more than a mere symbolic device, the lituus possesses its own special powers in the hands of its owners. This creates an object which I would identify as a totemic device. One technique, the observation of the patterns of flight of birds is alluded to by the presence of the flying bird in the left image in Figure 9.52. In the world of musical instruments, the lituus is somewhat special as it is present in two forms, one being the silent instrument shown in Figure 9.52 and the other being the J-shaped sound tool.

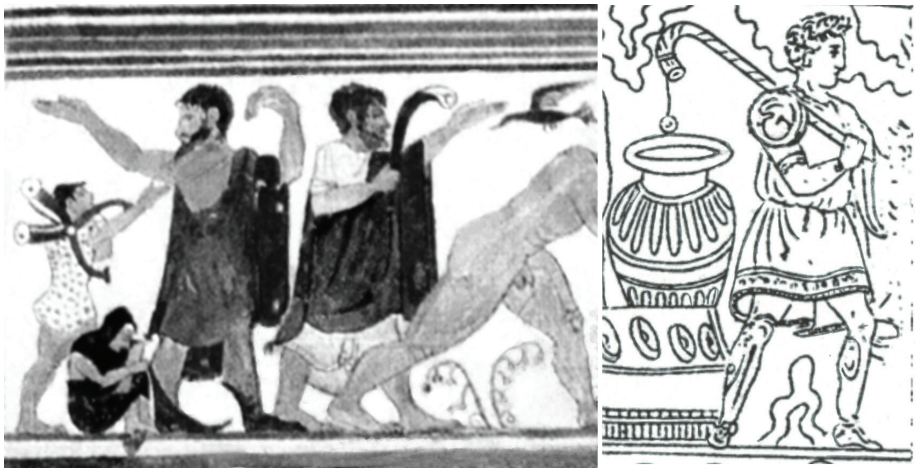


Figure 9.52: Two Silent Etruscan Litui in the hands of their Augurs

Instruments with a J-shaped form are seen on a Scandinavian rock carving, in Etruscan iconography, in one of the forms of the Irish Horns, as well as in Celto-Iberian contexts. (Figure 9.53 shows the first three of these).

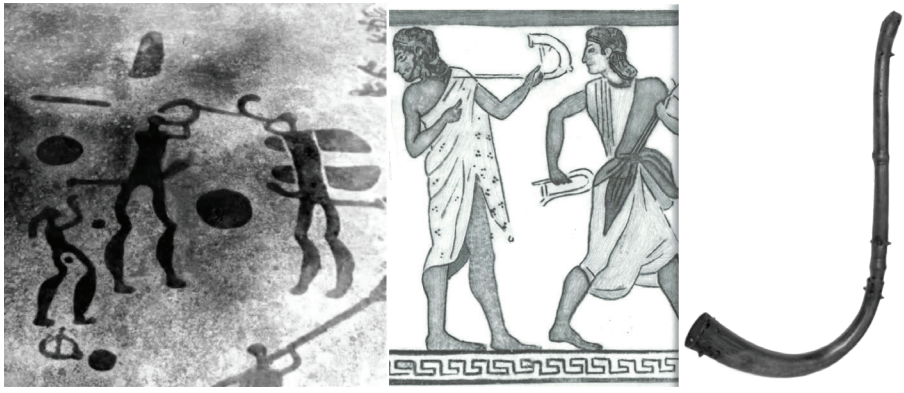


Figure 9.53: J-Shaped instruments from Scandinavia, Etruria and Ireland

J-shaped instruments are also seen in the Native European context in the form of the karnyx which, although it may be provided with a more-or-less ornate head/bell, its overall windway is pretty-much identical to that of the lituus.

Much of the early work of Wundt focussed on the role of animals as totemic beings and, in his *Elemente der Völkerpsychologie* he wrote that [the totem animal] *is usually regarded as the ancestral animal of the group*. In the case of the Amazonian Tukano, their trumpet was seen to have arisen from the ashes of their ancestor, The Great Anaconda. Wundt's comment does suggest for our interest that, if there is any commonality in the instruments, then one should be able locate an ancestral creature to which the J-shaped instruments might have been associated with in ancient times[43].

Throughout the ancient world, the serpent was such a creature which appeared in many different aspects of ancient mythology. Because of its very widespread nature in ancient representations, one might feel wary about identifying this specifically with the J-shaped instruments but it does make an appearance in many different ways among this genre of the brass.

For instance, on the bell of the Roman Memphis votive lituus a serpent is clearly portrayed immediately above what may be intended to be lotus blossom leaves. (Figure 9.54)

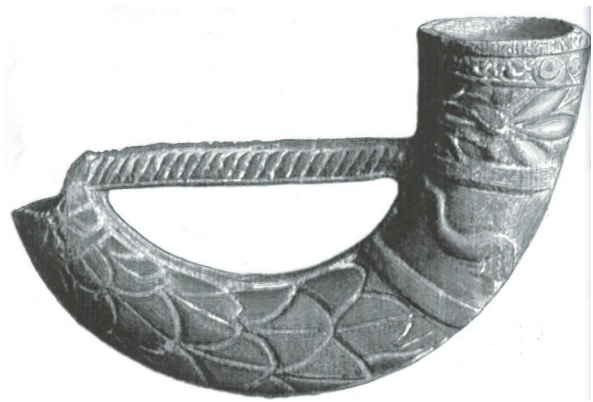


Figure 9.54: The Memphis Votive Lituus Bell, SR019

Another clear example exists on one of the Tintignac Karnyces. While six of the instruments have bell decorations which have been described as Boar heads, one has a serpent head. This instrument, unlike the other karnyces in the group, is made from sheet and is rivetted, a technology shared with at least one of the Etruscan litui[44]. (Figure 9.55)

43 Holmes 2022: Chapter 3

44 For discussion of the Tintignac instruments, see: Holmes 2022: p.112, Section 7.7

Figure 9.55: The Tintignac Serpent-Headed Karnyx, SD319

The Etruscan Cortona lituus has a decoration on its bell which mimics the markings of a snake. These are deeply incised into the metal of the bell.

On what is probably the most-famous depiction of the karnyx, that on The Gundestrup Cauldron, the serpent is depicted above the three karnyces in the upper section of the image[45]. (Figure 9.56)

Figure 9.56: The Depiction of the Serpent on the Gundestrup Cauldron, IC049

45 For an interpretation of the imagery on this cauldron, see: Holmes 2022: p.130, Section 7.13

The serpent was viewed with awe in the ancient world and was seen as being immortal as, when it when through the process of removing its old skin to enable it to grow (sloughing off), it appears to have died initially and then a totally new snake crawled out the old one. Thus, while it is never explicitly named as a totemistic animal, the analysis of two myths grant it this status. Wundt, interpreted somewhat by Malinovski, described totemistic creatures as follows[46]:

> *The totem represents a safe place of refuge in which the soul could be deposited and so escapes the dangers that threaten it. When primitive people believed that they had deposited their souls in their totems, they thought that they were invulnerable and well protected. They usually avoided eating or killing their totems.*

In one of the Greek myths, Tiresias who lived in Thebes was walking in the mountains one day when he came across a pair of snakes copulating in the middle of his path. They were blocking his way so he had to decide what to do: he could turn round, walk on and risk being bitten by the snakes or try to separate them and send them on their way. He decided on the latter strategy, hitting the snakes with his stick. Sadly, he killed them and the Goddess Hera, who heard what had happened, was very angry and displeased. She had to punish Tiresias for his misdeeds, so she turned him into a woman so, now being a female, she had to work as one of Hera's priestesses. Tiresias had killed a totemic animal and had to be punished.

In one of the many versions of the myth, Tiresias had been blinded by the Goddess Athena after he had accidentally seen her bathing. However, as compensation for the sight she took away, Athena bestowed on him the gift of prophecy along with the ability to understand the language of birds. This made Tiresias a renowned prophet in Greek mythology, despite his blindness. Other versions tell that it was Zeus, who, on being unable to remove Athena's curse, gave Tiresias his gift of prophecy and insight.

Pindar, the ancient Greek poet, referred to Tiresias as the 'father of augury', praising him for ability to foresee future events and having the gift to interpret the songs and flights of birds.

This myth, using Tiresias as the medium links the snake with wisdom and with augury.

The tale does have what some would call a happy ending as, seven years later, Tiresias, who was still female was walking along the same path and

46 Wundt 1916: p.193; Malinovski, 1926

came across another pair of copulating snakes. In many versions of the tale, he let the snakes be and her 'reward' was to be turned back into a man.) Happy ending?

In another myth, Aesklepios, a Greek God, was approached by a snake which coiled itself around his staff. Aesklepios responded by striking the snake and killing it but, almost immediately, another snake arrived on the scene bringing with it a medicinal herb with which revived its fellow serpent. Aesklepios, by observing this, gained the secrets of healing and resurrection. In this myth, the snake, a symbol of regeneration and knowledge to the ancient Greeks, transferred vital medical wisdom to Aesklepios. In some versions of the myth, the snake whispered the secrets of healing in Aesklepios' ear. Future portrayals of Aesklepios show him carrying his staff around which is entwined a snake and, to this day, this remains a powerful symbol of medicine and healing. (Figure 9.57)

Figure 9.57 right: Aesclepius with his Snake-Entwined Rod

Both these tales link the serpent or snake with healing, knowledge and prophesy reflecting the ancient view of the snake as being an eternal creature capable of resurrection and capable of imparting knowledge.

The imagery of the coiled snake is seen on the silent lituus which Etruscan augurs carried, as seen in Figure 9.53, above but it is also seen on the two Etruscan litui which were recovered in organised digs, the Cortona and Pian di Civita litui. On the former of these, it was created by wrapping a thin strip of organic material in a helical pattern around the tube yard of the instrument. In the case of the Pian di Civita instrument, the pattern is not so clear because of depositional degradation but it was clearly a helical one, possibly consisting to two opposing helixes, one rotating clockwise and one anticlockwise. Figure 9.58 shows a section of the

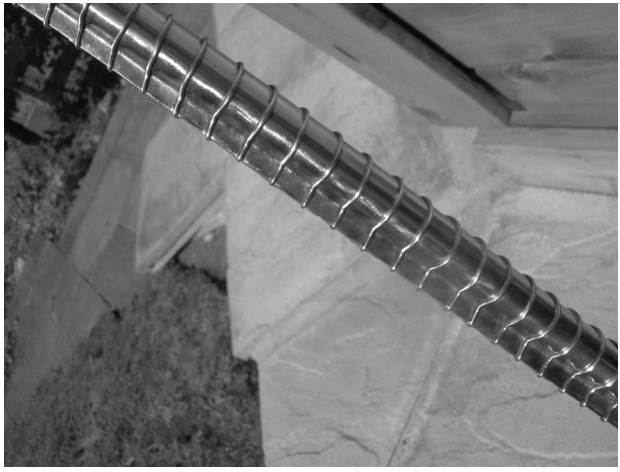


Figure 9.58: Section of the Tube Yard of a Modern Analogue of the Pian di Civita Lituus

tube yard of my modern analogue of the Pian di Civita Lituus on which I only wound a single helix as I had not had access to the X-Ray which showed the double helix coils at the time I made it.

A similar helix is represented on the cross bars of the votive lituus bell shown in Figure 9.54

The significance of this helical winding from the perspective of the argument presented here is that such a winding is also present on some of the karnyces but is also seen on some of the later lurs but not elsewhere on other instruments. On the lurs which have this decoration, it is applied from the mouthpiece up to the lock, the demountable joint between the upstream and downstream tube yards. (Figure 9.59)

Figure 9.59: The Helical Winding Decorating a Lur Mouthpipe, SD154

Another similarity between the southern area where the lituus is found and the Scandinavian area is the presence of the folding stool, an object found represented in association with the lituus. This is a common item in the Mediterranean world but only seen north of the Alps in Scandinavia and around the Baltic. It is illustrated in Figure 9.52, above, where it is shown folded up and in the hands of the diminutive character on the left of the left-hand image. It is also seen in the Tomb of the Reliefs, again folded up, and located immediately to the right of the lituus shown on the right-hand pillar when facing into the tomb. (Figure 9.60)

Such stools had a long history in the Mediterranean world and were seen in Ancient Egypt from the Middle Kingdom onwards (around 2030-1640 BCE). At this time, they were symbols of status and used to show respect to those of authority. In Greek culture, they were referred to as the diphros These stools were often used by magistrates, officials, and people of high social standing having a clear association with authority and prestige.

Within Roman society, a similar stool was used and this was known in Latin as the sella curulis, and this too was often used by magistrates and also symbolized authority and status.

The only finds of such a stool north of the Alps are around the Baltic region, one complete one and a number of fragments having been found there.

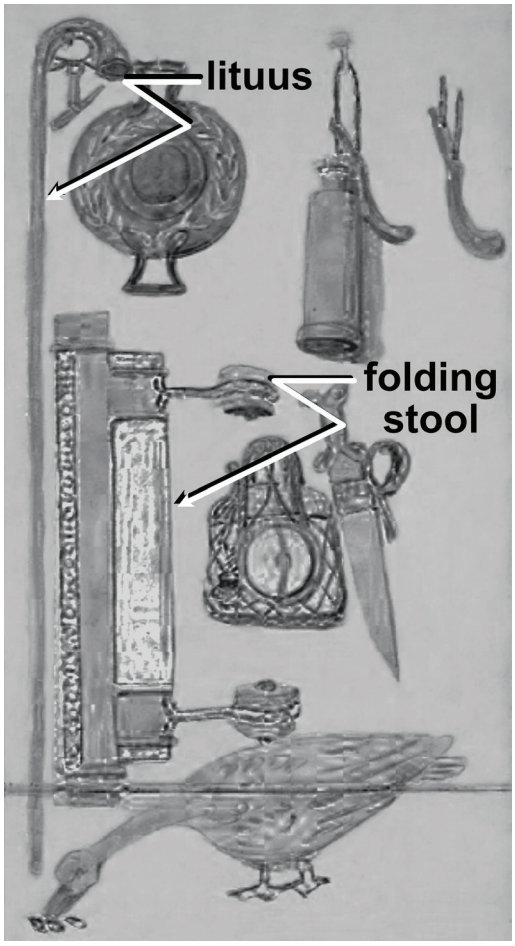


Figure 9.60: The Folding Stool shown adjacent to the Lituus in the Tomb of the Reliefs

Figure 9.61: The Folding Stool from Guldhøj in Bronze-Age Denmark

Figure 9.61 shows the Folding Stool of Guldhøj, which has been dated to the second half of 14th century BCE[47]. The stool was found in a barrow with an oak coffin which contained the body of a man. The folding stool lay at his feet and this was very well preserved, being made of ash with carved patterns which were detailed by a black pitch inlay. Only fragments of the seat were preserved, this being of otter skin.

This folding stool is the only one which is completely preserved from Bronze-Age Europe although there have been several finds of fragments of stools like this found from western Jutland, Sweden and northern Germany.

Altogether, the evidence of direct trade and the exchange of ideas in both directions between the Mediterranean world and northern Europe during the period between roughly 2000 BCE and around 500 BCE is pretty comprehensive. Furthermore, the direct involvement of sound tools is also indicated by the inter-relationships between the iconography, physical instruments from north and south and items closely associated with the sound tools.

While the Scandinavian Baltic lurs are relatively-conventional brass instruments in that they use a mouthpiece which is not unlike those seen on a modern trombone, the horns from Ireland are somewhat different in that their blowing device is open-aperture with a relatively wide diameter in the case of the end-blown instruments and little more than an oval hole in the case of the side blown ones. (Figure 9.62)

47 This was found in 1891 in Guldhøj near Vamdrup, Kommune Ribe, Denmark and is currently in the Nationalmuseum of Denmark, Copenhagen, Denmark. In Danish publications, this is referred to as a folding chair.

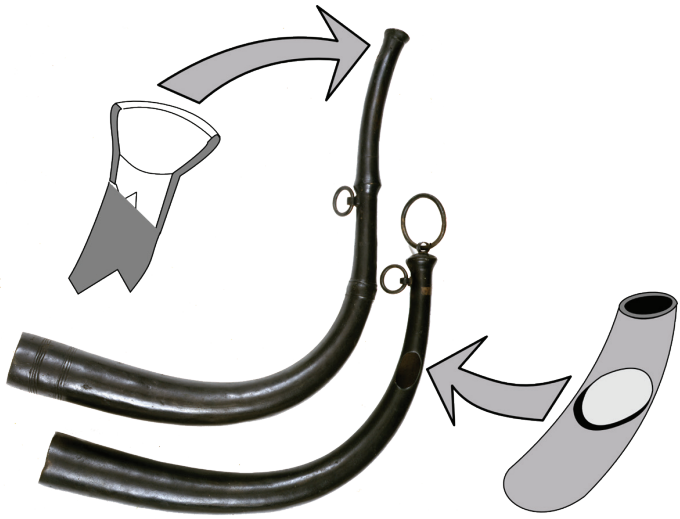


Figure 9.62: The Drumbest Irish Horns Blowing Devices, SD016

In the early 1970s, these instruments were treated as simple, single-note horns. Even then, the side-blown instruments were difficult to voice even in this way. In seeking to find an analogue from either modern or ethnographic instruments, I was drawn to the didgeridoo. After obtaining an instrument and learning to play it, I made a fibre-glass model of the Drumbest end-blown instrument and found this to play excellently á la didgeridoo. I then journeyed once more to the Ulster Museum in Belfast where the end-blown instrument spoke superbly easily as variable tone-colour instruments. Even the side-blown could be played this way albeit not so easily.

I do accept that such an experiment does in no way prove that these instruments were played in this way but it does show that this is a feasible way of playing them. As might be expected, no-one from the time tells us how instruments were blown and there is no evidence of a variable tone colour type of performance recorded from Bronze-Age Ireland. At the present time, the modern-day launeddas from Sardinia is played that way and has been traced back to 2700 BCE.

Breath has long held a mystical significance and breathing through the nose is spoken of in several ancient texts as being ritually important so it could be that this type of playing using circular breathing drew on this stream of cultural understanding for its importance. The most well-known example of this technique being used today is among Australia's First-Nation peoples but one reference, dating from 1888, the contro-

versial figure of Curt von Francois published an account of his travels in the Congo Region in what is now the Tshuapa Province in the Democratic Republic of the Congo. His illustration is shown in Figure 9.63 and he reports:

A beautiful 1.5 metre long ivory horn (see illustration page 173) which has been extended by a 2 foot long wooden pipe, touched my buying interest, but the owner did not want to be parted from his horn; With great stamina he blew something for us and received a spoon as a present straight away another appeared, also wanting to earn a spoon and he played the horn in a similarly beautiful, very deep tone without a break. The blowers managed that by the fact that they kept the tone static when breathing out and breathing in. Before use the horn was moistened with water.

Figure 9.63: The Horn Illustrated in Curt von Francois' Book

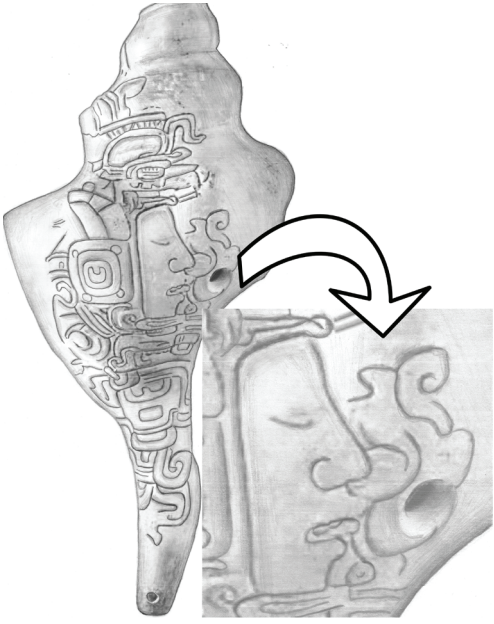


Figure 9.64: A Campanian Salpinktes, SR002

No physical instruments survive from the Mediterranean world which are provided with such large bore open-aperture blowing devices. However, one small statuette, said to be from a Campanian context exits in the British museum and this shows an instrument which close examination suggests is one provided with a blowing device not unlike those seen on the side-blown Irish side-blown horns. As with much extant material from this period, this statuette cannot be accurately dated but is said to be from between 500 to 250 BCE. (Figure 9.64)

A modern analogue of this instrument which I made performs excellently as a variable tone colour instrument.

It's always difficult to get scaling of diameters from iconography or small 3D statuettes, etc. and another piece of Campanian art illustrates this. It is present in the scene on the lid of the Campanian cinerary urn from Capua, some 30 km north of Naples and dated to around 500 BCE. It is shown in Figure 9.65[48].

The urn is a bronze vessel of a form known to the Greeks as dinoi. These began to be used as funerary urns around the mid-sixth century BCE in Capua. The decoration on the lid marks them out specifically as being Capuan. They are said by various researchers to be expressing a new heroic-athletic ideology[49] and were awarded as prizes at agonistic contests, as reported by inscriptions on their outer walls. The 3D decoration on the lid and the frieze around this symbolise the athletic training which the youth of the time received in preparation to their military career.

These vessels remained very localised in their distribution, they vary very little in either their shape or decoration and it seems most likely that they were made in specialised workshops in at Capua. (Figure 9.65)

Figure 9.65: Cornu Player on Campanian Cinerary Urn, SR017

48 Author: Silko This file is licensed under the Creative Commons Attribution 3.0 Unported, from Wikipedia

49 d'Agostino – Cerchiai 1999, 164–65; Benassai 1995, 55–68

One might be tempted to see this cinerary urn as containing the ashes of a cornicen playing at a parade of horses. However, the horses or similar quadrupeds, some winged, are a familiar motif on such cinerary urns. The centrepieces, between the horses are very varied and the one shown here is the only one which depicts a musician. He is naked, as is the Campanian salpinktes shown in Figure 9.64. In general form, the instrument is the same overall shape as the Vipinana C-shaped cornua, those from Catarinella (Figure 9.36), Scandinavia and the Cyclades (Figure 9.10). What differentiates the cornu shown in this depiction, however, is its wide bore. The way it appears to be being blown and the wide bore suggest that, like the Campanian Salpinktes, this instrument too could be being used in a variable tone colour mode.

Were such a practice as the use of instruments in a variable tone colour mode to have been more-generally in use, it would raise the question of how instruments were being played such at funerals such as that shown in Figure 9.66. In this scene, the brass could be providing a drone accompaniment to the ensemble of brass and auloi, this serving to create the necessary sound level to keep the threatening mystical creatures of the Netherworld at bay during an internment.

A further question is raised by this depiction as the liticen in the top right of the scene appears to be blowing a side-blown instrument, one

Figure 9.66: A Roman Funeral Procession from Amiternum, IC016

much like that seen in the depiction of the Campanian Salpinktes shown in Figure 9.65

Summary

This article embarked upon an exploration of the intricate connections between Northern European and Mediterranean cultures, focusing on the evolution and significance of brass instruments such as the Irish Horns, Bronze Lurs, salpinx, and tuba. The investigation addressed several core themes:

1. Cultural Interactions and Instrumental Evolution:

It examined the potential exchanges of musical traditions between Northern and Mediterranean societies, considering mechanisms like cultural diffusion, trade, and migration. Evidence from materials such as amber and tin, along with shared decorative motifs and ritual practices, suggests a rich tapestry of cross-cultural interactions.

2. Methodological Considerations:

The study highlights the challenges posed by the traditional separation between classical and Northern European studies. This division often leads to distinct methodological approaches, influencing our understanding of historical narratives and the representation of non-Mediterranean cultures.

3. Manufacturing Techniques and Technological Transmission:

Through a detailed analysis of manufacturing technologies, particularly in brass instrument production, one may gain insights into the technical challenges faced by ancient craftsmen. The evolution from visually estimated designs to the use of precise measuring tools reflects a significant advancement in mensuration practices, possibly influenced by Eastern Mediterranean and Middle Eastern techniques.

4. Broader Implications:

By tracing the derivatives of instruments like the salpinx and tuba in Greek, Etruscan, and Roman traditions, one may venture beyond their sonic functions to understand their deeper symbolic and societal roles. This approach underscores the importance of viewing musical instruments as integral cultural artifacts, embedded within the social and ritualistic fabrics of their respective societies.

This comprehensive examination not only sheds light on the interconnectedness of ancient cultures but also challenges one to reconsider the linear narratives of technological and cultural development. It emphasizes the value of interdisciplinary research and the continuous reassessment of scholarly conclusions in light of new evidence and evolving methodologies.

By reflecting on these themes, we may gain a more nuanced understanding of how musical instruments served as both products and propagators of cultural identity, technological innovation, and artistic expression across diverse ancient societies.

Bibliography

Full bibliographic references are provided on the web site:

https://www.holmesbrass.com

under the References bibliography tab at:

https://hornandtrumpet.com/refs/bibliography/

Should you wish to utilise this and find any references to be missing, please use the *Contact Us* facility and I will attempt to rectify the situation immediately.