

An Trumpa Créda – Construction and Exploration

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ZUSAMMENFASSUNG

Im Folgenden wird das erste spielbare Replikat einer irischen Trompete vorgestellt. Das Original wurde 1798 in Lougnashade, County Armagh, entdeckt, es stammt aus der Zeit von Cú Chullains (ca. 100 v. Chr.) und der großen keltischen Mythologie Irlands. Das Instrument wird „An Trumpa Créda“ genannt. Es ist das wohl subtilste und leistungsfähigste Instrument, das jemals in Irland entwickelt wurde. Wir halten es für wichtig, dass dieses schöne Beispiel keltischer Kunst und Musik aus der Zeit um Christi Geburt für das neue Jahrtausend als in das kulturelle Erbe Irlands zu integrierender Bestandteil wiederbelebt wird. Es ist unser Ziel, die musikalischen Eigenarten des Instruments zu erforschen und um Verständnis für die keltische Musikkultur durch Auftritte in Schulen, Universitäten, bei öffentlichen Ereignissen und Festivals zu werben und es durch Aufnahmen auf Tonträgern und durch gezielte Information in Zentren für die Darstellung des kulturellen Erbes und durch andere diesbezügliche Organisationen bekannt zu machen. In einem Konzert im Irischen Nationalmuseum in Dublin stellten wir „An Trumpa Créda“ erstmalig vor (Gruppe „Reconciliation“ mit Simon O'Dwyer an der Trumpa und Maria Cullan, Bodhran = irische Trommel). John Kenny ließ den Carnyx erklingen, John Purser, Komponist und Autor von Studien über keltische Musik, spielte irische Bronzehörner. Die aufgeführten Stücke wurden von Michael Holohan komponiert.

I. PRELIMINARY REMARKS. THE IMPORTANCE OF REPRODUCTION AND HANDS-ON EXPERIMENTA- TION OF PREHISTORIC MUSICAL INSTRUMENTS

Archaeology is the guardian of truth and accuracy in the pursuit of knowledge of prehistoric peoples

and cultures. Many archaeological artifacts are self-explanatory and their function is both obvious and easily related to similar modern examples. We might look at a Bronze Age knife or an ancient house and know that a knife cuts and we live in a house. A clear exception to this general rule is the world collection of prehistoric musical instruments.

All musical instruments are by their nature made to have music played upon them. They are a medium through which people share communication and emotion in the form of rhythm, melody and harmony. Therefore, a musical instrument which is not played and heard has little meaning or relevance. Invaluable research has been carried out on the notational, anthropological and manufacturing methodology of prehistoric instruments and as a result a huge store of knowledge now exists about them. For this we can thank the music archaeologists of the scientific community for their years of dedication to excellence in this research.

However, because of the special nature of musical instruments, of equal importance is the necessity to reproduce and make available perfect copies of the originals so that detailed and extensive study can be undertaken into the musical properties inherent in instruments and the applications to which these properties can be applied. To play music on a prehistoric instrument is to build a bridge in a very real sense between its time and place and the here and now. To become good, i.e. performance standard, long hours of practice and exploration will be required to develop the muscles in the musician's body needed to play properly and to increase his or her ability to discover previously unknown aspects of an instrument. An experienced musician who is already proficient on a similar modern equivalent will be able to achieve results much more quickly. The renowned classical trombonist John Kenny wonderfully demonstrated this when he was invited by Dr. John Purser to turn his remarkable

talent to the first reproduction of the Scottish carnyx.¹ The result immediately shows the breath and versatility of the carnyx, placing it among the great musical instruments of all time.

There can be no doubt that many surviving instruments were played for decades or hundreds of years in their own time. Heavy wear can clearly be seen on the Middle Iron Age trumpa from Co. Down in Northern Ireland at the points where the instrument was held by the hands in the playing position. It has been suggested that so much wear could only have been caused by many years of playing. Thus, it is not unreasonable to surmise that there would have been great musicians, composing for and playing their trumpa to the delight of an audience.

Many fine instruments did not die out by becoming obsolete through deficiency in their design or musical properties. Rather, the cultures which developed them were destroyed through climate change, famine or conquest. In looking for clues into an ancient music tradition we can turn to living folk songs and tunes of today. Many of these have roots in antiquity and some remain relatively unchanged for thousands of years. In Ireland we have been able to introduce reproduction Bronze Age horns into our traditional music. They function very well as rhythm and bass and are now a valued part of the music being played by musicians at sessions around Ireland. Through ongoing research it has been established that this family of horns are perfectly capable of reproducing the rhythm, melody and harmony of music. Yet these same instruments were a silent mystery until the mid 1980s. Results like these would not have been possible without extensive reproduction and exploration.²

Sometimes it happens that a seemingly obvious way of playing a prehistoric instrument will be overlooked until one day a player has a flash of inspiration. In May of this year (2000), on meeting with the eminent Scottish piper Ian McDonald, I offered him my set of the silver pipes of Ur which were sent to me by Prof. Bo Lawergren.³ Ian explored them in a very experienced way and then without warning he turned one of the pipes around and put the reed in the other end. He then played three new notes and opened up a whole set of possibilities as to what could or had been played on the originals.

A most dramatic discovery was made following the reproduction of the Middle Iron Age trumpa known as 'An Trumpa Créda'. It can be said that a musical instrument is timeless as long as there is a player to play and an audience to enjoy. To quote John Kenny, "an instrument may have been asleep for a very long time", but it does not die and remains a link with us and those who originally made and played it (Fig. 1).

Therefore, through increased collaboration between archaeologists, musicologists and musicians, a greater understanding of prehistoric instruments will give us a fuller picture of all they have to offer and make it possible to bring many more of them to life again.

II. INTRODUCTION: 'THE LOUGHNASHADE TRUMPET'

A large part of our studies into the prehistoric musical instruments of Ireland in the middle 1980s was the desire to effect a reconstruction of the great Iron Age trumpa known as 'The Loughnashade trumpet'. Following many enquiries it became clear that the skill and craftsmanship required to reconstruct accurately such a fine sheet metal trumpa was not available in Ireland at that time. Thus the project was only made possible when Dr. John Purser commissioned master silver smith John Creed of Glasgow to reconstruct the Scottish carnyx.⁴

The subsequent rediscovery of the construction techniques of this other sheet metal Iron Age instrument at last made it possible to approach the making of an Irish example. The original was closely examined and measured in detail during the summer of 1998 at the National Museum of Ireland. Work on the reconstruction commenced in the autumn of that year and was completed at the end of January 1999. As a result of this work and ongoing exploration, many discoveries have been made which clearly show the instrument to be a remarkable example of musical and visual artistic design and a triumph of advanced sheet metal engineering technology.

III. DESCRIPTION OF SURVIVING ORIGINAL INSTRUMENT

The original trumpa known as 'The Loughnashade trumpet' is displayed in the treasury room of The National Museum of Ireland. Its name derives from the small lake, 'loughnashade' or lake of the treasures in Co. Armagh where it was found in 1798. There were four examples of this instrument recovered at that time but three have subsequently disappeared. The entire instrument survives except for the mouthpiece. The bell half is in

¹ Purser 2000, 329–330; Hunter 2000, 341–343; Creed 2000, 347–350; Kenny 2000, 351–355; Campbell/MacGillivray 2000, 357–363.

² O'Dwyer 2000, 337–340.

³ Lawergren 2000, 121–132.

⁴ Creed 2000, 347–350.

very good condition though the decorated plate at the end is detached. The center knop at the join is also loose and can be removed. The other half of the overall tube is not in good condition and the craftsmanship employed in making it is of a much cruder fashion than the bell. This may indicate that the two halves were in fact originally from different instruments. The connecting seam on the tubes is joined by fine rivets along the inside curve. On the bell a raised rib of bronze serves as a reinforcement and covers the rivets. A repair patch is attached onto the underneath end of the bell. This would appear to suggest that the trumpa was played over a long period of time. It is believed to have been deposited in Loughnashade around 50 B.C. The origins of this instrument as indicated by the sheet metal technology and the lotus flower design on the end bell plate are most likely to have been from the La Tène area of Switzerland. This design and craft may have come into Ireland in the middle of the first millennium B.C. replacing the earlier cast bronze technology of the late Bronze Age.

Note: We are very fortunate that so much of the original trumpa survives so that we can be assured that a perfect reproduction will play and sound exactly as it did and that accurate conclusions can be drawn from studies into the reproduction.

IV. QUALITIES AND CHARACTERISTICS OF THE TRUMPA CRÉDA AS DISCOVERED THROUGH THE EXPLORATION OF THE FIRST REPRODUCTION

A. MUSIC

1. INHERENT NOTES

(see musical notation chart Fig. 1)

Following the first experiments with the reproduction it became clear that many notes could be played on it. The range begins with the fundamental E flat and progresses up through an almost perfect harmonic series. All the true notes are strong and easy to play, especially for an expert mid-range brass player. John Kenny, the afore-mentioned trombonist, is able to play easily through all the true notes and also produce a series of higher particles and pedals. It appears that the shape and internal bore of the instrument is specifically designed to have a definite tuning and note range. As we have no predecessor to the trumpa it can be surmised

that its design was purposely made to produce its inherent musical notes. The question therefore arises as to how such an accurate shape, with the mathematical perfection required to play perfect notes, was achieved by Middle Iron Age people.

2. VOLUME CONTROL

(see accompanying article by John Kenny)

An unusual feature of the trumpa is the range of volume control that can be employed. This control varies from low gentle sweet notes through normal volume as compared with a modern trombone, to almost violently loud blasts which, when played indoors, will deafen a listener and carry for kilometers when played in the open air. Following a loud blasting test outside our house in the West of Ireland, a local shepard who lives 2 kilometers away told us that his sheep dogs ran and hid in the barn in the same way as they would upon hearing thunder. This powerful volume can be explained in part by the 2 meter long bronze tube, but may also be made possible by the circular disc at the end of the bell and the distinctive vertical playing position.

Philip Conyngham, Australian didgeridoo player, has put forward the theory that the disc is very similar in appearance to the earliest loud speakers. It is also notable that the sound of the trumpa can be heard with almost equal volume from behind the instrument. This phenomenon would occur if the disc were vibrating independently as a speaker/diaphragm. Definite tone and volume differences were noted during the construction of the trumpa créda when John Kenny played it first without the bell plate attached and then on the finished instrument.

3. HARMONIC COLOURING

The most common method employed to play lip reed instruments is to blow clear even notes. If, however, certain alterations in the tongue position and shape of the inside of the mouth are made while playing, the note quality can be altered to sound more bass or treble. Sound coloration of this kind can also be used with Irish Bronze Age horns and other single cavity instruments.⁵ In this way a richness and texture can be added to the otherwise straightforward tones of the trumpa.

⁵ O'Dwyer 2000, 337–340.

4. SIMULTANEOUS OVERTONE

As is the case with the Bronze Age horns, distinct overtones can be generated above the lower notes of the trumpra. These are achieved by interfering with the wavelength of a single note which is being played, so that a series of higher tones become audible above it. In effect the frequencies of the drone are split and divided when the tongue is held in a precise position relative to the roof of the mouth. Though these techniques are only used in the present day as a part of singing traditions, there is every reason to suggest that they may have been employed with early Bronze and Iron Age horns and trumpas. There can be no doubt that they contribute in a very real way to the sound colour of certain notes and thus broaden the range and versatility of the instrument.

5. CIRCULAR BREATHING

Experiments using a circular or cyclical breathing method on the trumpra cr da have made it possible to play extended notes in the lower range and have allowed for more successful use of harmonics and overtones. An interesting application of circular breathing is that a player can slowly pace and hold the instrument vertically in the air while playing a continuous undulating droning. If several of these trumpas were played together in this fashion whilst being paraded in a line abreast, the affect on spectators would be eerie and intimidating whilst at the same time uplifting and invigorating.

The droning made possible by circular breathing could have been employed at religious gatherings. Exposure to such a sound may have had a hypnotic affect on the participants. Parallels can be found today in Australia and the Far East, and illustration may be found on the Gundestrup Bowl where carnyx are shown being used in a ceremonial situation.⁶ It is also likely that trumpra were used to lead troops into battle and to terrorize the opposing forces. This breathing technique also facilitates a perfect accompaniment with one or more singers.

6. PLAYING POSITION (Figs. 2 and 3)

An integral part of making music with an instrument is that the shape or accessibility of the instrument allows the player to maximize the potential range and volume and to play for extended periods of time. Thus the playing position or presentation of the instrument is very important. Because the trumpra was designed having two quarter circles, these could be attached either as a half circle or 'C'

shape or as two opposing quarter circles or 'S' shape. Traditionally the original has been displayed at The National Museum of Ireland in the C shape. However, when the reproduction became available it was immediately clear that the 'S' shape position was far more practical and preferable in that:

- The instrument could be easily lifted up vertically and held in position. It then bore a remarkable resemblance to the carnyx.
- In this upright position the strain on the central join at the knop was reduced to a minimum and the whole became evenly balanced.
- With the bell held up vertically the disc at the end naturally pointed forward so that it could be observed from the front and the negative repouss  design was also visible from behind. This presentation of the disc also allowed the sound to radiate forward and backwards from it so that volume and tone potential was maximized.
- When the player held up the trumpra vertically, the mouthpiece was then perfectly presented to the lips. The head was inclined back and this had the effect of straightening the trachea so that the diaphragm could be best employed to emphasize and amplify the notes. The player could generate sounds through a spectrum range from soft rich sounds to immensely loud powerful blasts.
- Vertically, the combined height of the player and instrument was almost 4 meters above the ground. Thus spectators would be able to observe the disc from a great distance, and the sounds would carry uninterrupted over the heads of a crowd.
- The 'S' position proved to be the most effective for a player who wished to pace or march while playing. The weight was distributed down through the hands and arms supporting it and the player could look forward while playing. This was very important to insure that he/she could see the nature of the ground across which they were traveling and thus avoid obstacles in their path.

7. PLAYING METHOD

Lip-reed instruments, i.e. those that are played by vibration of the lips, usually fall into two classes. Class 1 is defined as horns with an open mouthpiece. This means that when a fundamental note is played the entire instrument vibrates to the frequency of that note. Existing instruments in this family are large sea snail shells, wooden, bronze

⁶ Purser 2000, 336, Fig. 6.

and animal horns and didgeridoos. This family is not designed to play melodies, but rather rich tone and harmonic alteration on a fundamental note. Class 2 wind instruments have a choked mouthpiece. This allows a player to produce many notes which are then amplified by the instrument. This family includes alp horns, French horns, trombones, trumpets and tubas. These instruments prevail in the newer more dominant melody-oriented traditions of modern music.

The trumpa créda, however, appears to fall somewhere in the middle between these two classifications. While it has many of the characteristics of modern brass trumpets/horns, the large diameter tube '2 cm' and the open mouthpiece allows a player to produce both melody notes and the single fundamental with harmonic and overtone colouration. Also a debate continues about the definition of a 'trumpet' or a 'horn'. The modern classification appears to be governed by the shape of an instrument: the trumpet is more a cylindrical tube, and the horn more conical. In the case of the trumpa créda, the equation is exactly half and half. So we can surmise that it is neither trumpet nor horn but rather in its own category. It is interesting to note that the other Irish sheet bronze instrument that survives from the middle Iron Age known as the 'Ard Brinn Trumpet' also falls into this category. Therefore we can differentiate between these two and all the other lip reed instruments by calling them 'trumpa', which is also the Gaelic word for trumpets. The word 'créda' is an old Gaelic word meaning 'of metal' or 'of the earth'.

B. CONSTRUCTION

1. WEIGHT (Fig. 11)

One of the most important aspects of designing a parade instrument is that it must be light enough for the player to carry easily while playing. Holding up a metal trumpa two meters long in an exact playing position while standing or walking requires that it must be very light. A prevalent feature of Irish early Iron Age metal work was the use of finely beaten bronze sheet. Bronze beaten to thinness of 0.5 mm or less was employed to make jewelry, headdresses and sword scabbards. This sheet made it possible to design large bronze trumpets which were very light at the same time. The trumpa créda with its 0.5 mm wall thickness weighs only 1 kg. Even an instrument this light requires energy and fitness to play for more than a few minutes in a vertical position. Thus even only 0.1 mm extra in the width of the metal would have a large effect on the ability of the player to conti-

nue holding and playing the instrument for any length of time.

2. REINFORCING RIB AND RIVETING (Fig. 9)

If a trumpa is to be 2 meters long but made of very thin metal, the necessary connections and the overall shape has to be strong. A musical instrument is a 'hands-on' tool. They are played in a robust manner sometimes in open air, wind and rain. They are used frequently for many years. Great strength was achieved in making the original by the use of hundreds of tiny rivets to join the seam of the tube. These were in turn covered with a raised rib which served to stabilize and reinforce the tube and also hid the riveting from view. In the reproduction it was decided to use silver solder as an alternative to rivets. This decision was made because a solder joint would not, in any way, alter the musical and physical integrity of the trumpa and a huge amount of craftsman hours and expense would be required to replicate detailed riveting which would have been hidden under the rib in any case. Thus, in this first reproduction more emphasis was placed on producing an affordable strong working instrument.

John Creed will, however, be employing the original riveting technology on the next reproduction project, that of the trumpa fada, 'Ard Brinn Trumpa'. This second surviving example of an Irish Iron Age trumpa was also riveted but in its case the rivets can clearly be seen. It is therefore important that this inherent visual aspect be included in the new instrument.

3. KNOP (CENTRAL JOINING POINT FOR THE TWO PARTS OF THE TRUMPA (Figs. 6 and 10)

The knop represents an ingenious combination of practical strength and visual artistry. If two tubes are to be successfully joined without riveting or welding, the point where they connect must be reinforced. Otherwise there would be a tendency for the joining point to buckle. The knop could be described as a collar which surrounds the area where one tube overlaps the other. Its shape gives great lateral strength at the connection point while at the same time it has a delicate refined artistic appearance. It might seem improbable that only one connecting point for an overall instrument length of 2 meters would be of sufficient strength to make a robust durable join, but the reproduction trumpa has shown that the knop design is very successful and functions perfectly.

The trumpa has now been played extensively for more than two years, and the connection has shown no sign of wear or weakness to date.

4. MOUTHPIECE (Figs. 6, 7 and 8)

As no original mouthpiece survives, a new one had to be designed that would work as effectively as possible and compliment the shape of the trumpa. A precedent had been set when four different mouthpieces were made for the carnyx reproductions.⁷ It would be likely when taking into account the similarity between the average internal bores of the two instruments that the mouthpiece most suited to the carnyx would also work with the trumpa. Thus the mouthpiece design, which had been chosen by John Kenny for the carnyx reproduction, was the preferred option for the new trumpa créda.

This is an open mouthpiece with a cushion for the lips and a 10 cm length of curved tubing attached. The tube is fashioned to slide into the end of the instrument. Thus, the mouthpiece can be moved in or out a few centimeters allowing for fine-tuning. To be able to alter the tuning in this way is essential as the fundamental note of the trumpa can be affected by air temperature and pressure.

5. PLATE (DISC) (Figs. 4 and 5)

This feature is probably the most extraordinary achievement of the Iron Age trumpa designers. The complex lotus decoration was created by the use of the repoussé method of metal work. A plain disc was laid flat on a bed of molten pitch. When the pitch had hardened, the negative of the design was beaten into the bronze from above down into the pitch, which acted as a cushion for the metal. This work entailed many long hours of skill, patience, concentration and attention to detail. If even one mistake were made the whole process would have to be carried out again. As the disc has a metal thickness of only 0.5 mm, it would have been very easy accidentally to punch a hole through it or make a wrong indentation. Thus, the perfection of the decorative work on the original trumpa and the reproduction can only be admired and respected as great craftsmanship.

Studies into the design and construction of the trumpa créda show that a high level of expertise, craftsmanship and artistry were employed to make the original instrument. Many problems were overcome and different disciplines brought together so that the end result would function as a large strong wind instrument with a great volume

range and, most importantly, fine musical properties. For the player it had to be light and user-friendly, and for the audience it had to look and sound dramatic. There can be no doubt that even today with our advanced computer and metallurgical technologies, such a task would be formidable. It is clearly remarkable that artisans in the middle Iron Age achieved this.

V. CONCLUSION

Many possibilities were anticipated while waiting for the first accurate reproduction trumpa créda to be completed. It had become clear, through detailed study of the original (loughnashade) and through the remarkable revelations which occurred following the making of Bronze Age horns and the Deskford carnyx, that exciting new discoveries would become apparent.

In the event, the inherent metallurgical, practical, visual and musical properties of the trumpa créda exceeded our expectations by far. That an instrument of such musical and visual power was designed and made in the last centuries B.C. is a remarkable testament to the ingenuity and artistic excellence of Iron Age people. Today we can only look at, listen to and admire their achievements. As a result of this successful reproduction it is now possible to incorporate the aspects of this wonderful trumpa into our modern music, thus bringing back to life the power of sound and vision that it generates.

VI. RESULTS AND CONCLUSION FROM EXPERIMENTS CONDUCTED ON THE TRUMPA CRÉDA DURING CONSTRUCTION

John Kenny

In the final stages of reconstruction of the Loughnashade trumpet (now known as the trumpa créda), I was invited by John Creed to play the instrument in sections in order to find out how it functioned. This procedure was, unfortunately, not recorded; however, here are my impressions: The upper trumpa produced a clear tone, obviously displaying the expected character of a non-flared length of tubing, i.e. a limited harmonic range. However, the tube resonated

⁷ Creed 2000, 347–350.

very well, showing that this part of the instrument was very 'live'. When the tube was completed, but without its surmounting ornamental disc, the full Bb harmonic series appeared. This was smooth, with the expected flat 7th and other normal characteristics of the harmonic series. It was mainly even in response, but lacked clarity and depth of colour. With the disc attached the tone character changed very markedly: not only was the instrument capable of greater volume, but also the tone became far more focused in sound, and even in response. The individual overtones of the harmonic series audibly came into sharper focus, and the instrument played with greater ease, centering better, as a contemporary brass player would say (see Fig. 1).

VII. MAKING THE TRUMPA CRÉDA. 1ST WORKING REPLICA OF THE LOUGHNASHADE TRUMPET COMPLETED IN FEBRUARY, 1999 (Fig. 12)

Procedure: John Creed

1. Research and accurate dimensions taken from the original at the NMI, Dublin.
2. Drawn full size and templates made.
3. Steel mandrels made of the two tubes.
4. Bronze 90 % copper + 10 % tin used, 0.5 mm thick.
5. Both tubes are formed in the same way, i.e.: The sheet is accurately calculated and sheared to size. The centre of the rectangle, about a third of its width, is stretched along its length. It is regularly annealed and gradually worked to achieve the curve of the outside of the mandrel. This is done with a steel hammer on a hard-wood block. The bronze is then worked over the mandrel, little by little, to compress the metal, with a wood or plastic-tipped raising mallet. When achieved, any irregularity of the edges is filed to make the seam. The metal is clamped around the mandrel whilst working to achieve a uniformity of shape and metal thickness.

Unevenness of the surface can be burnished, and the final finish done by planishing.

The seam of this replica was silver soldered, for economic reasons. The original is riveted by using a tongue of metal on the inside of the tube. Replica number two will be made in this way.

6. The seam, on the inside of the curve, is covered along its length with a simple moulding of bronze. A swage of the section was made in steel and a 0.7 mm bronze strip drawn through it. The original is riveted to the tube; this was lead soldered for economic reasons.
7. The knop at the junction of the tubes is spun in bronze. [These were used in the making of the replica carnyx.] The tubes are mated along the length of the knop by matching tapers.
8. The mouthpiece is separate, to accommodate players' preferences, and turned in bronze with a taper fitting.
9. The bell was formed with an integral collar for attachment, with rivets, to the tapered tube.
10. The edge is wrapped for strength and visual appeal.
11. The celtic design is created by repoussé. This is oxydised with liver of sulphur to give visual depth.

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Photograph numbers 2 to 11 by Astrid Neumann.
Music notation by Michael Holohan.

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Trumpa Créda

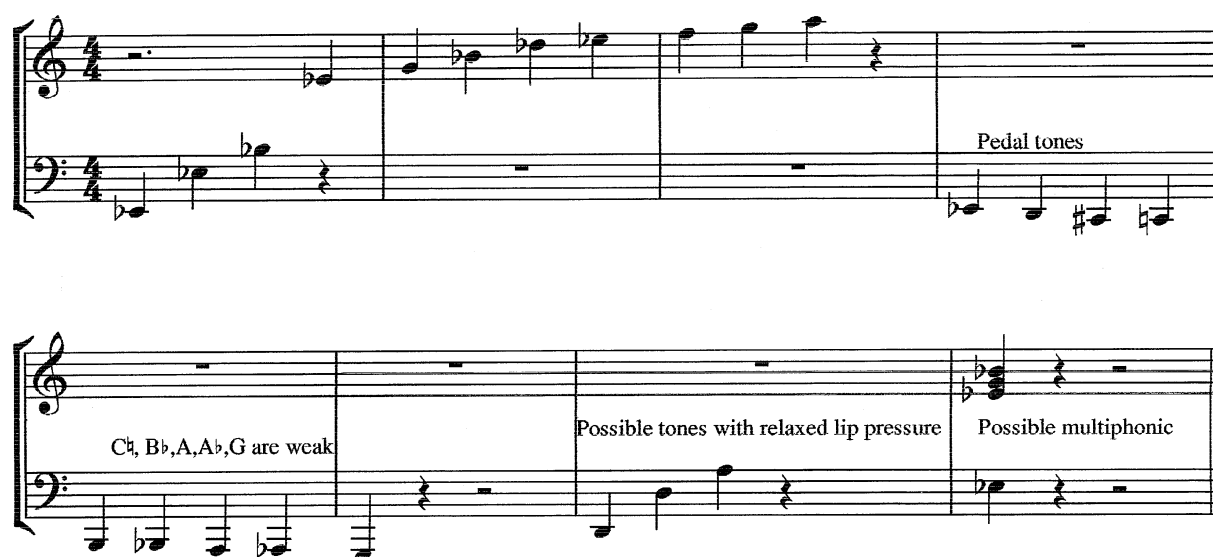


Fig. 1 Tonal possibilities of the trumpa.

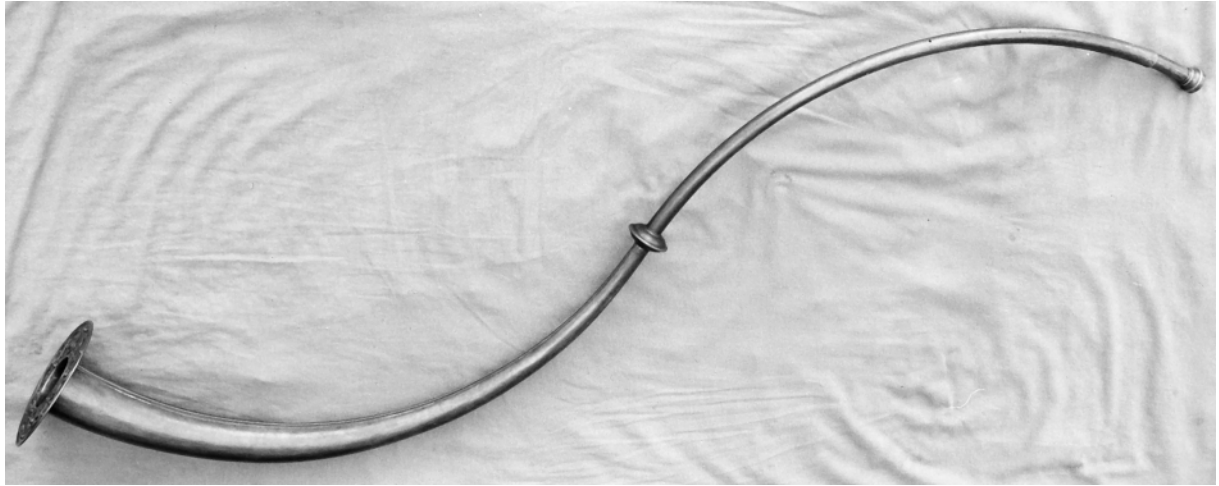


Fig. 2 and 3 Trumpa créda, S- and C-shaped.



Fig. 4 Front of the plate.



Fig. 5 Back of the plate.



Fig. 6 The three parts of the trumpa créda.



Fig. 7 Mouth piece of the trumpa créda (reconstruction).



Fig. 8 Front of the mouthpiece.



Fig. 9 Rib and riveting reinforced.

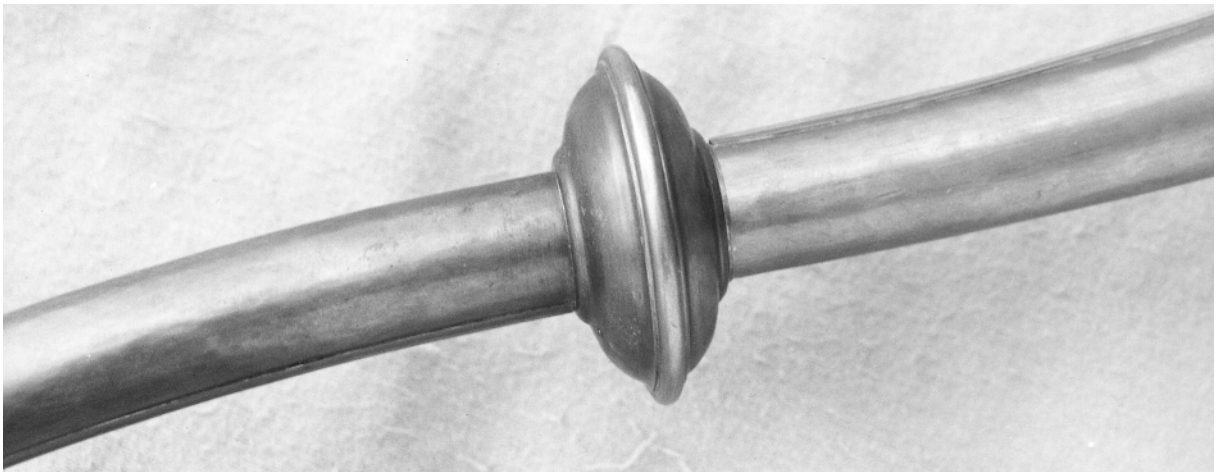


Fig. 10 Knop: central joining point for the two parts of the trumpa.

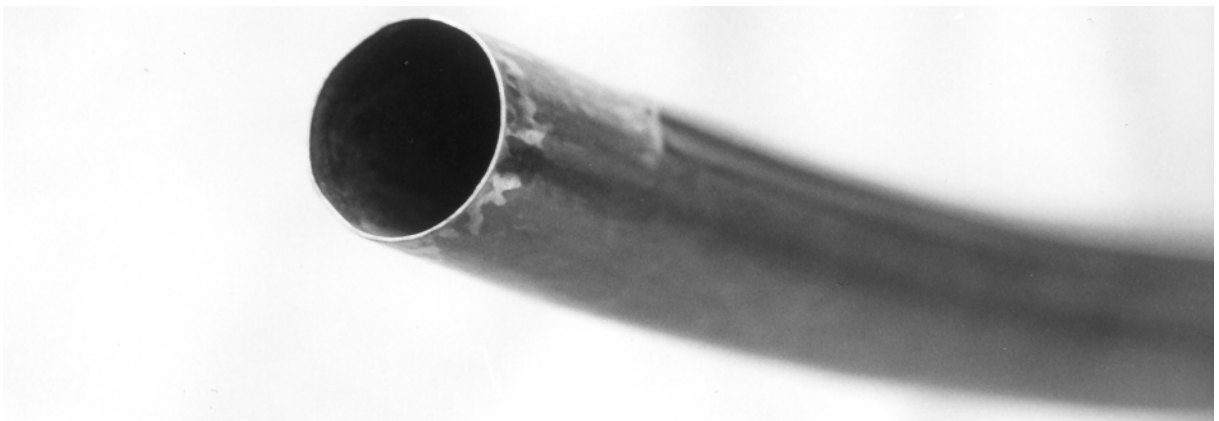


Fig. 11 Original end piece of thinly beaten bronze sheet.

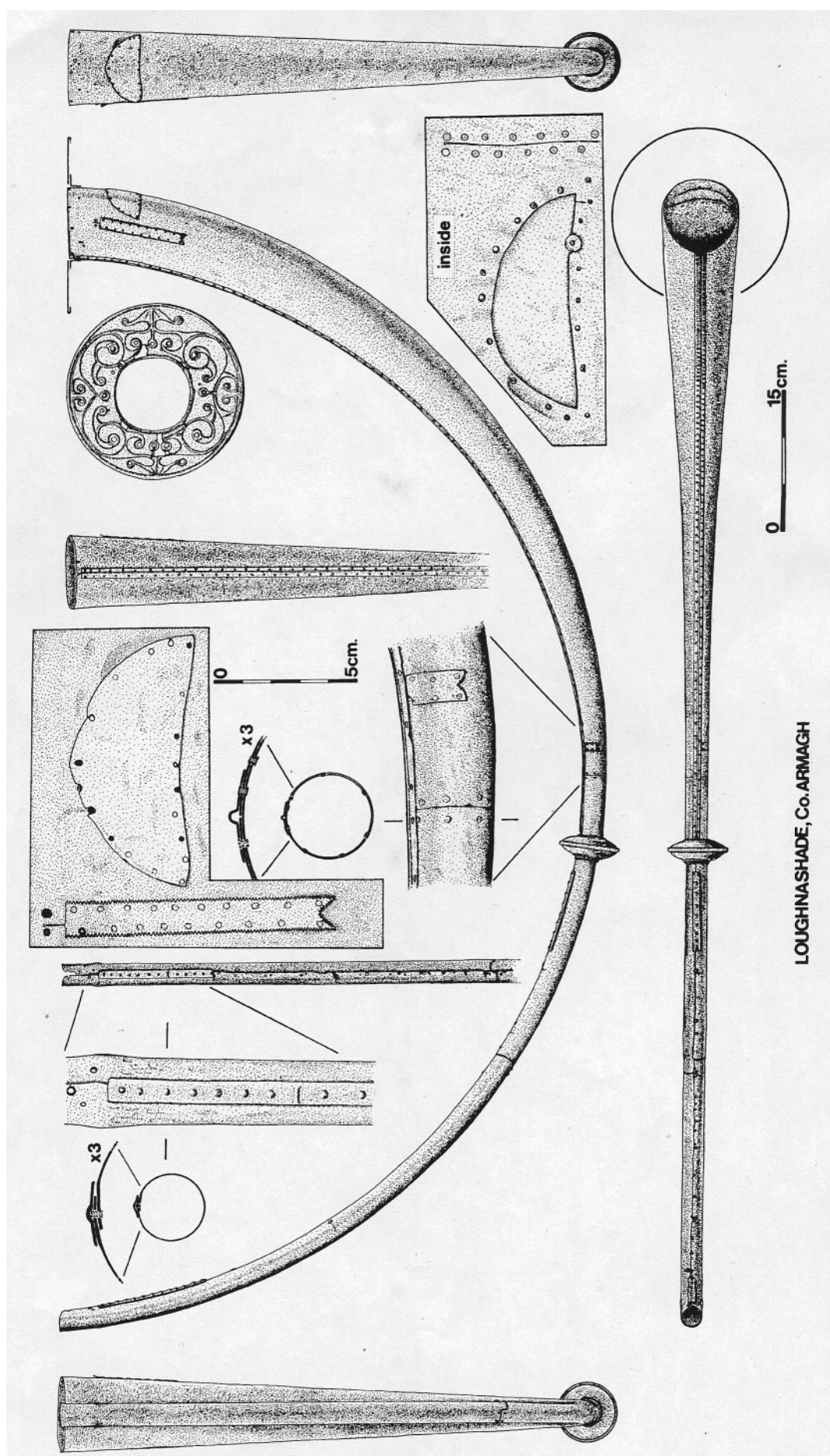


Fig. 12 Construction parts of the trumpa. Drawing by Barry Raftery.