An Guth Cuilce/The Mayophone Study and Reproduction

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ZUSAMMANFASSUNG

Ein 1791 aus einem Moor geborgenes Artefakt, von dem man annimmt, es sei ein Blasinstrument, wird heute im Irischen Nationalmuseum Dublin bewahrt. Der Gegenstand besteht in einer konischen Röhre, die mit einem Bronzeband spiralartig umwunden ist. Entsprechende Spuren auf dem Holz ließen erkennen, daß weitere Bronzebänder für das Instrument verwendet worden sind. Der Gesamtzustand des Objekts ist gut, allerdings ist es auf der einen Seite der Länge nach gerissen, und auch auf der anderen Seite geht ein Spalt fast über die ganze Länge (des Stückes). Datiert wurde der Gegenstand bislang, nur grob geschätzt, zwischen 2000 v. Chr. und 1000 n. Chr.

Bei den Erörterungen wird es um die Datierung, die Frage, welche Technik auf den Nachbau des Instruments nach den erhaltenen Teilen angewandt, das Material, das zur Herstellung verwendet wurde, und die musikalischen Möglichkeiten nach den existierenden Maßen gehen.

In the summer of 1791 A.D., a wooden artifact was recovered from a peat bog in the town land of Becan, Co. Mayo, Ireland. It was presented to the Royal Irish Academy and is now preserved in the National Museum of Ireland, Dublin. A description of the artifact was communicated to the Academy, in the year it was found and quoted by W. R. Wilde[1].

It seems to have been originally a solid piece, which in that state was split from end to end; each of the pieces into which it was thus divided was then hollowed or grooved on the inside and tapering in such a manner that when joined again, these grooves applying to each other, formed a circular and conical perforation through the whole length resembling that of a trumpet or horn. To secure the pieces in this position, they were bound together on the outside by a long fillet of thin brass, about an inch and a quarter broad, wrapped around them in a spiral from one end to the other, with upwards of an inch of interval between the rolls and fastened to the wood with small brass nails. The ends were secured by circular plates, probably of the same metal as appears from marks still remaining on the surface of the wood, these pieces having been lost (see Fig. 1).

D. M. Waterman[2] published the artifact in more detailed description as part of his study of the Loch Erne horn and included external measurements:

"The Becan horn, very slightly curved in the length, is 192 cm long, the sounding end, now very imperfect, originally about 8 cm in diameter, the opposite end of oval from 1.1 by 0.8 cm with a curiously small blow-hole, (possibly to accommodate a simple reed) only 4 by 3 mm in size. A mouthpiece was formerly present, presumably of metal and 6 cm long, the length of which is indicated by a slight collar cut in the wood to form a stop. A bronze binding, 2–2.5 cm wide, is still attached, spiral-fashion, to the horn, composed of five separate lengths which over-lapped at their ends and were secured to the wood by pairs of bronze rivets." Waterman also suggested that the 'Becan Horn' could have required a simple reed to play it.

In the spring of 2000 John Purser, John Kenny, Maria Cullen O'Dwyer, and Simon O'Dwyer undertook a detailed study of the 'Becan Horn'. We established that the measurements taken by D. M. Waterman were accurate though he had not internally measured the horn and that his theory regarding the use of a reed was almost certainly correct. John Kenny immediately identified the 'horn' as a member of the 'beating reed' shawm family. Following this first examination it was decided to undertake a precise internal/external measuring, to positively identify the wood used and to establish the age of the artifact through car-

1 Wilde 1857.
2 Waterman 1969.

bon dating. The accumulated knowledge could be used to create as exact a reproduction as possible.

A further examination of the 'horn' was conducted in Autumn 2000 by Rod Cameron[3], Maria Cullen O'Dwyer and Simon O'Dwyer, which consisted of precise internal and external measurement, investigation of means of construction, of tools used and of possible comparison with other surviving examples of musical instruments. Maria Cullen O'Dwyer carried out a photographic study (see below). Dr. Ingelise Stuijts[4] accomplished a formal identification of the wood species in the spring of 2002 and results of carbon dating were received in May 2002.

REPORT ON THE MAKING OF A REPRODUCTION *GUTH CUILCE (MAYOPHONE)* DECEMBER 2001 – JANUARY 2002

Following detailed examination and measuring of the surviving original instrument in The National Museum of Ireland by Dr. John Purser, John Kenny, Rod Cameron, Maria O'Dwyer and Simon O'Dwyer, the undertaking of making a perfect reproduction was commenced in early Autumn 2001. An examination of the original following its discovery in 1791 had suggested that it was made of willow wood. Because it had been made by splitting a two-meter length and then carving the two parts outside and inside into a long cone and binding them together with bronze ribbon (see Figs. 6. 21. 22), it did appear likely that the wood was actually willow. In September 2001 the search commenced for a straight length of willow branch or trunk approximately 2.5 meters long and 15 centimeters in diameter. This proved to be a difficult task; as such a piece of wood appeared to be very rare.

Fraser Hunter[5] suggested at a meeting in Kilmartin House that such a straight piece would most likely only result from willow that had been coppiced. We found a group of willow tree trunks together in a neighbour's garden, which had grown from one root system (see Fig. 9). After speaking to the owners we discovered it had been cut to ground level fifteen years ago. With their permission the most suitable piece of wood was cut and kept green in a small stream. It was noticed that the cut ends of the piece appeared to have a natural split.

John Purser identified this phenomenon as being the release of tension in the wood following cutting. This was to have a major bearing on the subsequent fashioning of the instrument. In November 2001 I commenced carving the wood. It was decided to use a drawknife for the removal of the bark and preliminary outside carving. The knife was made from an old sickle (see Fig. 10). By pinning one end of the length against the wall and the other in my lower stomach I was able to remove long even strips of bark and wood. It was important to work towards the narrow end of the wood to ensure that long lengths of the grain did not lift away. Having carved off enough to reduce the width at the wide end to 10 cm and the narrow end to 3 cm, it was time to attempt to split the length. This was achieved by gently tapping a wide chisel into the already existing split at the wider end (see Figs. 12. 13). The wood then began to open relatively evenly along its length. A long flat bar was employed to continue the split. Towards the narrow point it went sideways and came away 6 cm from the end. However, by splitting from that end at an angle for 50 cm the inside was made accessible for carving the bore.

Immediately following the split both halves twisted substantially out of shape. This release of tension made it necessary to compensate for the twists while chiseling the two halves of the inside cone. It was possible to achieve accuracy by closely watching the curve line with the eye and by following the thickness of wood at different points with thumb and forefinger. The chiseling was straightforward and did not require a lot of pressure or heavy hammering, as the willow was soft and wet. There was a tendency for the timber to peel away in long hairs. When the internal bore was carved these hairs were left until after the drying period. Both halves were bound back into the original shape between two lengths of 3 x 2 planks with rope and left in a cool dry place over a couple of weeks (see Figs. 15. 16. 18).

In early January 2002, a month later, the piece was found to have dried out almost completely and most importantly, no cracks had appeared in the wood. It was decided to complete the drying by propping it close to a large open fire in the house for a few days (see Fig. 19) while I watched closely for shrinkage splits. None appeared. This was probably because with the interior wood removed, the piece was allowed to shrink evenly in on itself. The rope and planks were removed. Surprisingly, even after the drying process the two halves returned to the original twists they had assumed after splitting.

It should be noted that no evidence of glue was found on the original instrument. This had led us

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3 Master maker of Baroque wind instruments and prehistoric bone whistles and flutes.

4 Expert in identification of samples of prehistoric wooden artifacts.

5 Hunter 2000.

to the opinion that in the case of the original instrument the two halves were bound together with bronze ribbon while dry without the use of glue and then soaked to make the wood swell inside the wrapping and create an air seal along the seams.

However, having listened to Fraser Hunter's opinion that visual remains of glue would probably not have survived on the original wood and because of the near impossibility to achieve a tight join along the seams given the twisted nature of the halves, it was decided to use a glue. The inside bore of the two halves were cleaned and smoothed down and then glued together and bound with rope and jubilee clips. Having been left to allow the glue to dry for a couple of days it was then time to finish the outside carving and polishing before putting on the metal ribbon. This would have been very difficult had the halves not been glued before hand. Lengths of sheet bronze ribbon 2.3 cm wide with a thickness of 3 mm were cut in accordance with the surviving ribbon and marks of ribbon on the original instrument. The longest of these was 1 meter 60 cm and spiraled around the wood for ten loops.

Commencing at the wide end or the bell, the beginning of the first length of spiral had to be overlapped with a horizontal band of bronze and the two secured with rope while two tiny holes were drilled through them and into the wood. A copper staple was tapped into the holes and the wood. The bronze ribbon was spiraled tightly along the length of wood and then tied into position using rope (see Fig. 22). The end was then overlapped with the beginning of the next ribbon and both of these were overlapped again with a horizontal band. This arrangement was held in position with rope. Two holes were drilled at the joint of the horizontal band through the three layers of bronze and a copper staple tapped through into the wood underneath. This process was exactly in accordance with the evidence surviving on the original and worked very well. It was continued along the length until the entire tube was bound in bronze ribbon.

Finally a decision had to be made about what to use as a reed receptacle at the narrow end. Having listened to the various opinions which were presented at the meeting in Kilmartin and following consultation with a professional bassoon player and reed maker, it was decided to attach a 5 cm length of tube taken from the end of a bassoon crook to the end of the wood and to secure it in place with a brass cup which was made to fit tightly over the end. Thus, various modern and early bassoon type reeds could be tested on the instrument (see Fig. 23).

CONCLUSION

Since this instrument was completed, Dr. Ingelise Stuijts has established through a microscopic examination of the original wood that it is made of yew. It is however, very likely that the techniques employed and problems encountered in the making of the willow reproduction would have been the same in the case of yew being used. It should be noted however that yew is a much harder wood than willow so we anticipate that there will be more discoveries made when the instrument is reproduced. There can be no doubt that great expertise in both wood carving and metal work were required to make the original instrument and that a high level of craftsmanship and artistic knowledge existed in Mayo at the time that it was made.

John Purser organinsed to have the original artifact carbon dated with a grant from the Hope Scott Trust and its age has been established at 1270 B.P. plus or minus 40.

BASSOON ILLUSTRATION

The entire question of mouthpiece is of great importance to the nature of the instrument and remains yet to be answered. Any ideas on this would be hugely appreciated.

ACKNOWLEDGEMENT

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Photography by Maria Cullen O'Dwyer.

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PRESENTATION OF THE MAYOPHONE (GUTH CUILCE) FROM BEKAN, CO.MAYO

Fig. 1 The *mayophone* can best be described as a conical wooden tube, partially bound with bronze alloy ribbon. In 1791 it was noted in a description, which was later quoted by W. R. Wilde, that the tube was straight along its length when found.

PRESENTATION OF THE MAYOPHONE (GUTH CUILCE) FROM BEKAN, CO.MAYO

Fig. 2 Here the fine carving can clearly be seen and also the tiny hole at the end, the reason for John Kenny to pronounce it to be a member of the shawm family. This measures at 3.5 mm across and forms a channel approximately 15 mm long which then expands inside to approximately 10 mm.

Fig. 3 Continuing along the instrument from the mouthpiece end this area was covered in a metal ribbon spiral, now missing but the corrosion marks can still clearly be seen on the wood. This area is also of particular interest in that here is the so-called hinge point. This shows how a length of wood was split into two halves, each of which was carved out on the inside to the required internal bore and the parts were then joined again. At this point a small strip of wood between two split lines was deliberately left connected to each half. This was probably to facilitate the accurate reassembly of the parts. It could also indicate that the wood was originally worked in a green or wet state to remain supple enough for this technique to be successful.

PRESENTATION OF THE MAYOPHONE (GUTH CUILCE) FROM BEKAN, CO.MAYO

Fig. 4 This shows a closer view of the ribbon and a variation in width can be seen between the different spirals. One can speculate that the length of band was fashioned by beating a long rod or wire of bronze into thin sheet. If the rod varied in diameter and the maker desired a relatively even thickness of metal then the width would vary also.

Fig. 5 Here we see one of the joining points for the metal strip and also a securing point onto the wood. A clever system was used whereby two lengths of metal strip were joined by over-lapping one with the other and this was covered by another horizontal band which served to hide the join and the whole was attached to the wood with a copper staple. The second spiral strip continued until the next join point where the same procedure was repeated. This meant that the metal covering along the entire length of the instrument was held in place solely by the single staples at each point. This required a total of no more than eight staples.

PRESENTATION OF THE MAYOPHONE (GUTH CUILCE) FROM BEKAN, CO.MAYO

Fig. 6 A view of a staple with a small fragment of the horizontal band still attached. The original split can also be seen very clearly. It must have been a difficult operation to split a two-length meter of wood with such evenness and accuracy. We know from Dr. Ingelise Stuitz that the instrument is fashioned from a fast growing yew tree of approximately 15–20 years old. A tree with the necessary even growth, grain and lack of knots would in all probability be rare and requiring much effort and patience to find.

Fig. 7 We are now looking at the open or 'bell' end of the instrument. It is quite damaged and loose pieces are tied on with string. A small sliver, however, continues to a horizontal cut end so that we do know the original length of the instrument. This is very important and fortunate. The figure shows fine lateral carving that was employed to round off the inside bore of the bell. To achieve this it would be necessary to use a specialized chisel, which had a rounded blade but also was curved along its length, thus allowing the removal of slivers of wood from the tight inside semi-circle of the bell. During a measuring session of the instrument, Rod Cameron compared the fineness to this carving to that employed on the sound boxes of the early Stradivarius violins.

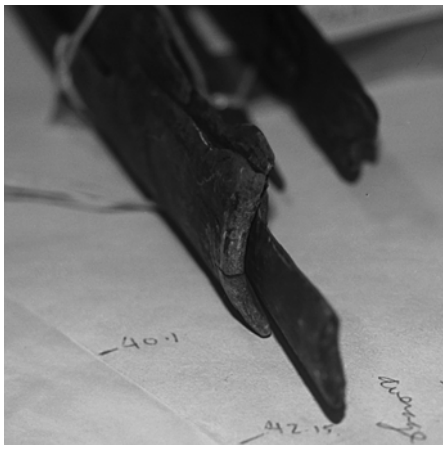

Fig. 8 This is an end view of the remaining intact strip at the bell with the lateral cut and another detached piece, which shows off the thinness of the sidewall and the accuracy of the carving. It can be said that this compares favorably with modern wooden instruments.

THE MAKING OF THE NEW MAYOPHONE

Fig. 9 At the time this project was undertaken we had not established the species of wood used in the original instrument, so we followed the 19th century opinion that it was willow. However, we used the same technique in the fabrication and interestingly Murray Campbell of the Acoustics Department at Edinburgh University noted that the sound of the new instrument would only be altered by a factor of 1 % through the use of a different wood. It required 3 months of searching to find a suitable trunk of willow, which was straight enough, and 'knot free' to fulfill our requirements. It should be mentioned that even after half a year we have not yet seen a suitable yew tree though work is progressing using a four thousand year old yew trunk from a bog. When completed and if subsequently lost this could cause serious problems in the future if carbon dating was to establish the age of a mayophone at 4000 B.P. years. We will have to make sure to stamp 2002 A.D. on it!

Fig. 10 Here I am in my tricky leather apron stripping back the bark from a length of trunk with a drawknife fashioned from an old sickle. This worked very well and I was able to get good accuracy with delicate shaping of the outside curve of the wood.

THE MAKING OF THE NEW MAYOPHONE

Fig. 11 Keeping the stripped wood soaked in water to prevent cracking and maintain a wet softness. I wanted to carve out each half before drying so that the sidewalls would be able to shrink in on the empty center space and thus not crack or split. Willow moves quite substantially as it dries so I was hoping this idea would work.

Figs. 12 and 13 Going for the lengthwise split and being careful not to damage the edges at either side as these would have to meet up again in re-assembly.

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Fig. 14 Carving out the inner bore with a curved knife. Last week we received the long awaited results of the carbon dating of the original which told us it was made at 1270 B.P. + or – 40 years, putting it firmly in Early Medieval 7th–8th century A.D. Thus the iron knives and the way, is the first public announcement of these results. I am delighted to present them here at this conference.

Fig. 15 The two halves with inner carving nearing completion. It was interesting to note the way the wood moved after the split. John Purser had warned me of the likely existence of inherent tension in the trunk and the probability of twisting or warping during work. In fact the two parts shifted quite substantially out of true. I hoped that following the carving out and by binding the parts together while drying them out that the twisting would be reversed.

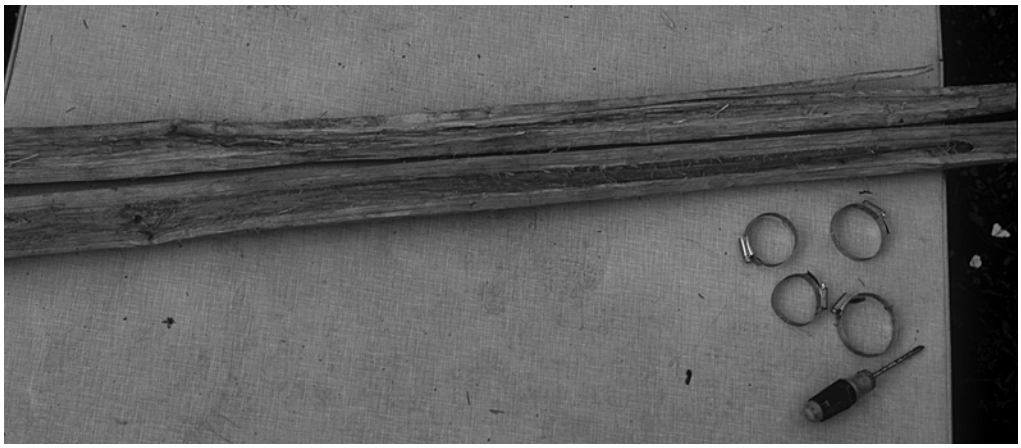

Fig. 16 Almost completed hollowed out parts. The process of carving out the inside of each half turned out to be quite straight forward. I was able to use a paper template made to the measurements of the original, which Rod Cameron and I had taken in the National Museum in Dublin. He made an interesting observation about the similarity of the bore dimension of the *mayophone* with that of a *dulzian* that he had fashioned. – Longer view of the two halves nearly ready. Just some final fine peeling with a curved chisel and last minute finishing off.

THE MAKING OF THE NEW MAYOPHONE

Fig. 17 Assembly of the two halves to facilitate the drying process. Because the wood had moved so much after splitting it was necessary to secure the parts at several points along the length. John Purser came up with the idea of using jubilee clips as binding and this worked very efficiently.

Fig. 18 I felt it would be advisable to brace the length with two heavy splints to prevent sideways bending or curving during the drying. – Here I used some sea knots to hold the assembly secure. This arrangement was stored at the rear of our living room for a month whilst a close watch was kept for any signs of cracks or splits. Everyday it would be propped up closer to our open fireplace until finally it was dry. The splints and clips were removed in preparation for the final assembly. During our initial examination of the original, the question had arisen as to whether a glue had been used to seal it together. We found no evidence of the presence or past existence of any glue though Fraser Hunter told us that there would not necessarily be any remaining evidence of the use of glue. For me a deciding factor would be whether the two parts had twisted out of shape having been dried together. In fact they immediately reverted to the shape they had assumed before drying. Under these circumstances the only possibility of achieving an airtight seal along both splits was to re-tie them tightly together and use a glue.

THE MAKING OF THE NEW MAYOPHONE

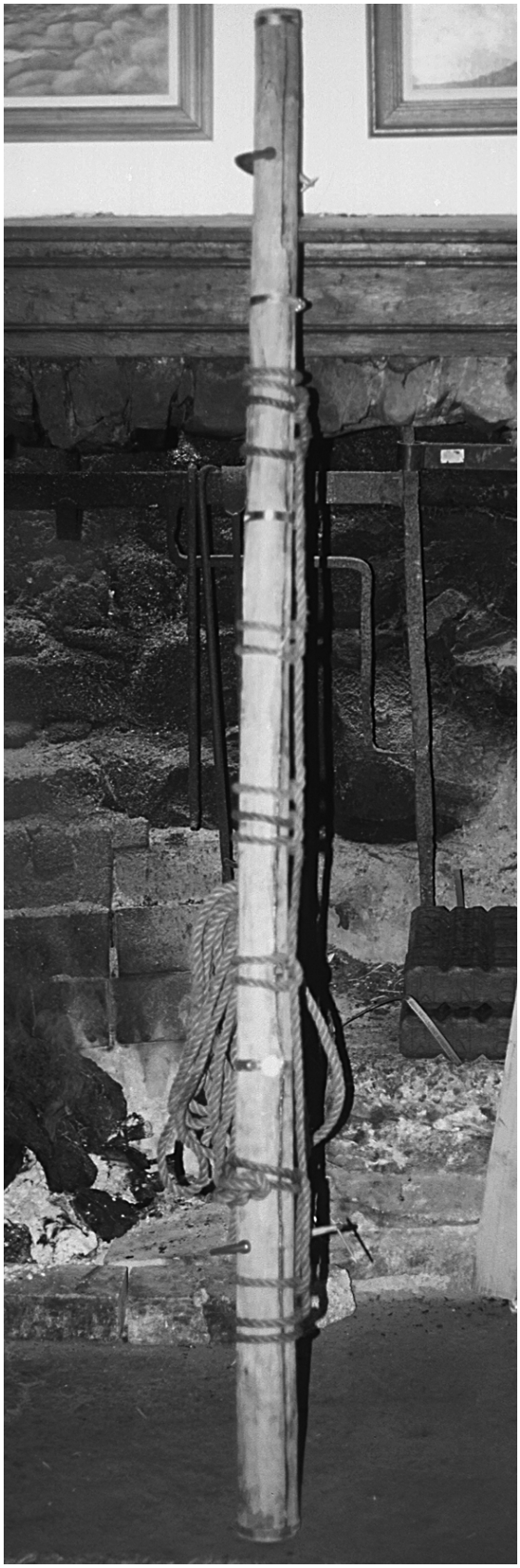

Fig. 19 To this end I employed a water-soluble wood glue, tied the halves together with rope and let it harden for two days.

Fig. 20 Upon release of the rope the wooden tube was completed and after outside finishing and shaping was ready for binding with bronze ribbon.

THE MAKING OF THE NEW MAYOPHONE

Fig. 21 Luckily it was not necessary to hand beat the ribbon as bronze sheet is easily available so all that needed to be done was to cut the required lengths of band in preparation for fitting. I used a 0.3 mm gage and ebrased it down to 0.2 mm. This seemed closest to the original pre-corrosion.

Fig. 22 Starting at the bell, the end of a spiral strip was held under the first horizontal band and tightened onto the wood with light rope. Two holes were then drilled through both and a copper staple tapped in. The length of strip was then wrapped spirally along the instrument. At the end it was over-lapped with the next length and this was covered by another horizontal band. All three were tied tightly to the wood and again two holes were drilled and a copper staple hammered in. I was interested as to how the original drilling was done, considering the tiny holes and the lack of modern electric drills. – This process was continued up along the tube until all but the carved cap at the mouthpiece end had been covered.

THE MAKING OF THE NEW MAYOPHONE

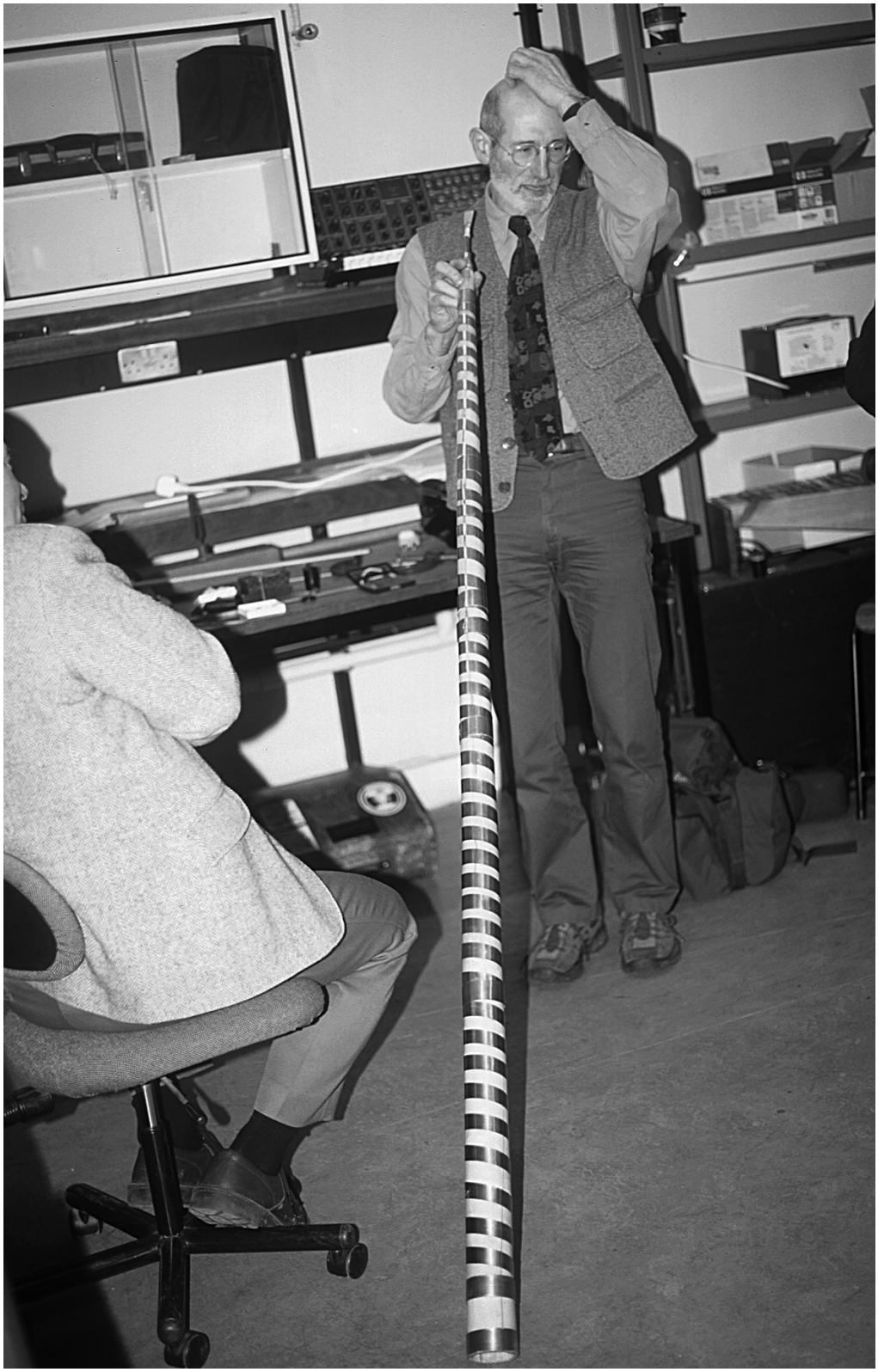

Fig. 23 The finished tube can be compared with the original. – As no mouthpiece arrangement survives we are engaged in investigation to find the most likely one with may have been used. We have two problems in that as far as we know this find appears to be unique in Western Europe and is also somewhat older than surviving relatives from elsewhere. I have made it so that a modern bassoon double reed can be used. My reason for this is the similarity, which is evident between the internal bore of the *mayophone* and that of a modern bassoon (see Fig. 1).