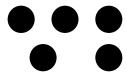
Tutti Brassi

A brief description of
different ways of sounding brass instruments

Jeremy Montagu



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WHY MOUTHPIECES

This began as a dinner conversation with Mark Smith of the Oriental Institute here, in connexion with the Tutankhamun trumpets, and progressed from why these did not have mouthpieces to 'When were mouthpieces introduced?', to which, on reflection, the only answer seemed to be 'Often', for from the Danish lurs onwards, some trumpets or horns had them and some did not, in so many cultures.

But indeed, 'Why mouthpieces?' There seem to be two main answers: one to enable the lips to access a tube too narrow for the lips to access unaided, and the other depends on what the trumpeter's expectations are for the instrument to achieve.

In our own culture, from the late Renaissance and Early Baroque onwards, trumpeters expected a great deal, as we can see in Bendinelli's and Fantini's tutors, both of which are available in facsimile, and in the concert repertoire from Monteverdi's *L'Orfeo* onwards. As a result, mouthpieces were already large, both wide enough and deep enough to allow the player to bend the 11th and 13th partials and other notes easily. The transition from the base of the cup into the backbore was a sharp edge. The slightest curve or chamfer at that point degrades the true natural trumpet tone quality, as I found when I first got Paxman to make me a copy of one of Joe Wheeler's mouthpieces, and I had to ask him to make another one. The shape of the backbore is also

critical. For examples of such mouthpieces, see Eric Halfpenny's articles in early issues of the *Galpin Society Journal*.

But in other cultures it's another matter. To return to where we began, with Tutankhamun's trumpets, which are the earliest we have, the mouthpiece is simply the top of the tube, the upper edge slightly everted over a ring round the top of the tube. For details of this, see my article in *GSJ* 29,1976,115-7, and a much expanded version among the Downloads on my website, jeremymontagu.co.uk: 'Tutankhamon's Trumpets and the Ḥatsots'rot'. These trumpets could produce two, maybe three, notes, and this is all that is needed for simple military signals; indeed with a code of different rhythms, the one really good note these trumpets produce is sufficient and no mouthpiece is needed.

In the Download cited above, I suggested that the biblical silver trumpets of the temple, the *ḥatsots'rot*, were identical with the Tutkankhamun trumpets, basing this on contemporality and on the memory of what the Israelites would have been familiar with during their four centuries in Egypt. We have no example of these, nor do we have any reliable iconography, for those portrayed on Titus's Arch are typically Roman and are much longer than the written descriptions that we have from Josephus; there is no mention of size in the Bible.

Equally, we have no examples of the *shofar*, the biblical ram's horn from that period – we have nothing earlier than seventeenth century European examples. Judging from first-century and later iconography, we simply have the cut-off tip of the horn with no

internal shaping. Some of the earliest European example do have some slight internal shaping, some even with a small cup, but this we must assume derives from surrounding brass-playing practice of the Baroque period.

In complete contrast, we have the Danish bronze lurs. These date from around 1000 BCE onwards and are made of cast bronze. None has been found in any archæological context and all known were found in bogs, long before the days of pollen analysis and other modern dating techniques. They were roughly grouped into periods by comparison with other objects from their decorative elements. The great descriptive catalogue by Broholm, Larsen and Skjerne (*The Lures of the Bronze Age*, Copenhagen: Gyldendal, 1949) includes full size drawings of the mouthpieces in half-section. One of the Gullakra pair of lurs (all lurs are named from their find sites), which are thought to be the earliest complete examples, has simply an everted rim at the top of the full width of the tube, and is thus comparable with the Tutankhamun trumpets save that the rim is wider on the lur and that it is more than twice the length. The next group have V-shaped mouthpieces, similar to those of the Moroccan and Nigerian long trumpets, and to the mediæval Billingsgate trumpet, to all of which we shall return below. But when we come to the group of Brudevaelte lurs of a rather later period, we find one, no. 8117, with a baroque-style trumpet cup with a sharp edge to the throat, and four others, in pairs, with the double cup, and smooth curve into the throat, typical of late nineteenth-century trombone mouthpieces. In the last

period there are only two lurs, a pair from Folvisdam, and these revert to the V-shape. None seems to have a shaped backbore since all are cast integrally with the main tubing, which is fairly evenly and gradually expanding.

Now what are we to make of this? That the Gullakra lur players just played a few notes, while the Brudavaelte players (again in pairs), a few centuries later, could play Bruckner brass parts? That of course is nonsense, but 'the few centuries later' is part of the problem. We do not have a reliable sequence of lur finds; all are random, none is precisely datable, and we have no idea of whether there was any continuity or community of makers. But to me it seems all-but ludicrous to suggest that such elaboration of mouthpiece shape was not purposeful, and that it was not done to increase either the tone quality and/or the musical range of the instrument.

We only have one example of a Greek salpinx, the one in the Boston Fine Arts Museum, and that is made up of thirteen segments of bone tubing, each linked with a bronze ferrule, an arrangement that, judging by the iconography, is unlikely to be typical, especially also because it has a funnel bell whereas all the iconography shows a bottle bell. The top of the tube is just a rim with no internal shaping. Whether a separate mouthpiece might have been inserted, we have no idea.

A little later, we do have a number of surviving Roman mouthpieces. Such as I have seen, for example in museums along Hadrian's Wall, have been small, not much larger than a Renaissance

cornett mouthpiece, and sharply cup shaped, though others are larger. This shape does suggest a purpose, to produce a sharp trumpet blare, designed to be audible across the noise of a battlefield with swords clashing on armour and probably a good deal of shouting. Peter Holmes has told me that the Etruscan trumpet mouthpieces are similar to the Roman, though shallower.

The Celtic carnyx mouthpieces, however, are again just a rim with no interior shaping, and it was the armies of these Celts with whom the Romans were battling, and they must have been content with a less strident sound.

In our own early Middle Ages, we have a few of the ivory oliphants, dating from around the tenth century CE. These were heavy ivory tusks, no longer than a foot to eighteen inches, and all that I have seen, some four or five of them, simply had the tip sawn off with no further shaping, leaving a fairly wide rim due to the thickness of the tusk. These are thought, from their decoration, to have come from East Africa, through Egypt, to Byzantium where most were decorated. Beware in this context of the Renaissance Afro-Portuguese oliphants. These were much lighter, carved in West Africa at the behest of the early Portuguese colonists. The decoration is mostly typically West African, but the mouthpieces are small copies of those of standard sixteenth-century European trumpet mouthpieces.

So, from antiquity, only the lur blowers and the Etruscans and Romans used what we would regard as a proper mouthpiece and even with their instruments, the mouthpiece was always integral

with the instrument – so far as we know, it was never a personal insert as it was with our instruments from the later European Renaissance onwards.

The one exception, from the earlier Renaissance onwards, that we we can be certain had a removable inserted mouthpiece, is the cornett. There were three main types of this instrument: the black cornett, the most common type, slightly curved and covered with leather or parchment stained black. The second was straight and because it could thus be turned on a lathe instead of being split, carved, re-united, and leather covered to avoid leakage, it was left uncovered and was therefore the natural colour of the wood. It was called the white cornett in German in the same sense that we call light brown coffee 'white coffee'. Both these had a separate, very small, sharply cupped mouthpiece which has been described as similar to the cup in which an acorn sits. The third type, the mute cornett, had an integral conical mouthpiece carved into the top of the tube, and it was called the mute cornett because of that mouthpiece which gave it a softer tone than the cup mouthpieces of the others, whose players often had to contend with all the noise of a street market when playing with trombones from the balconies of a town hall.

We should now turn to ethnography. Here, for lack of any evidence, we can have no knowledge of antiquity or otherwise for any of the instruments we see, with the exception of some conch trumpets, one at least dating from the Upper Palæolithic period, which we shall discuss below in order to keep all conchs

together. Even with long-standing traditions, as for example in Buddhist ritual practice, we have no evidence of what may have been done millennia ago. We can go back to iconography contemporary with our Middle Ages but no further, and far too often our evidence goes back only so far as the collecting habits of our own nineteenth-century ethnologists.

The plain, undecorated Tibetan human thigh-bone trumpets had no mouthpiece, just the plain end of the bone. Back in the late 1960s, Bernard Fagg, then the Director, invited the Incarnate Lama, Chime Yongdong, to come to the Pitt Rivers Museum and show us how the various Tibetan trumpets were used. He blew one of these bone trumpets with upward glissandos to what appeared to be the fundamental pitch, using continuous breathing. 'Appeared to be' because, of all that I've blown over the years only one had a really clear sound, and that was a child's femur in the old India Museum in London (run by the Victoria and Albert Museum, then as a separate entity). But Chime Yongdong told us that a lama of his status was not supposed to blow such a bone in ritual, and so a simulacrum was made in copper, retaining the shape of the condyles as a bell, but with the very narrow proximal end typical of other Tibetan metal trumpets. Because the tubing is so narrow, 2 or 3mm in internal diameter, a mouthpiece is necessary. This was the usual wide, flat, very shallow shape that is blown with everted lips, not curved in over the teeth like our horn and trumpet embouchure. Because the metal bore is regular, narrowly expanding to the condyles, the tone was clearer, but it was

blown with the same upward glissando. So here we have good examples of the two answers with which we began: both the plain bone fulfilling all the expectations of the player, and the copper simulacrum that displayed the need for a mouthpiece to allow the lips to access the tube.

Pairs of long trumpets are used in Tibet also, and these, too, have either the flat shape described above with the thighbone simulacra, or a shallow cup, still with a wide flat rim, for again the top of the bore is very narrow. These trumpets are used either in unison or sequentially to sound long notes at the bottom of their range, as one might expect with mouthpieces of this type.

A more unusual mouthpiece is that of the Dutch *midwinterhoorn*. This is a lowland alphorn, made like other alphorns by splitting a young tree in half (done today by sawing rather than by an axe and wedges along the grain), but because it is used in the marshes near the Dutch/German border the body is not covered by bark or other material; it can be soaked down a well (or in the bathtub) to seal the seam. The mouthpiece is traditionally a piece of elder with the proximal end cut off in a slant so that it can be thrust into the side of the player's mouth while the *hoorn* is held sideways, thus allowing the player to blow straight down the tube. A flat end to the mouthpiece would be impossible with the instrument held sideways, and a side embouchure would mean that one was blowing into the side of tube, whereas an oblique end tucked into the corner of the lips allows complete freedom. It is much easier to hold the *hoorn* sideways than if it were held

out straight in front of the player. It is normally only four or five feet long (around a metre and half), so that it is too short for the bell end to rest on the ground like a Swiss alphorn, and it is much heavier to hold than a Scandinavian or Romanian alphorn because it is made from thicker pieces of wood. The range of notes blown on it are smooth arpeggios from the 3rd to the 6th or maximum 8th partials, very different from the extended range and elaborate flourishes and tonguings of the Swiss instruments. With the exception of one maker, who was an army bugler and who made wooden mouthpieces with some attempt at a backbore, the normal mouthpiece is simply the cylindrically natural hollow of a piece of elder, thus again linking the instrument with the Tutankhamun and Tibetan thigh-bone trumpets.

With little or no evidence to support the theory, there have been attempts to link the *midwinterhoorn* with the Celtic *carnyx* in some sort of derivation. Certainly both were used in the same geographical area, though far apart in time, and the representation of the *carnyces* on the famous Gundestrop cauldron does suggest some possible similarity in the use of an oblique mouthpiece. However, what we know of the *carnyx* is that it was always held upwards rather than sideways.

In Nigeria among the Hausa people and in neighbouring areas, the long trumpets *kakaki* have a simple conical mouthpiece like that of the Folvisdam lurs, with a wide flat rim, made of the same thin metal as the trumpets themselves, and all soldered up together. They are similar to the mouthpiece of the Moroccan

trumpet *al nfir*, which was left in Morocco as the Hausa people passed through that area back in the times of our Middle Ages. It is thought that what are now the Hausa and their allied peoples had arrived in North Africa from somewhere in the Persian area, an area where much iconography has shown the use of similar instruments. Like the Tibetan long trumpets, the *kakaki* blow notes in the bottom of the range and these are often used for talking, for example to 'shout' the praises of the Emir, for theirs is a tonal language in which instruments can imitate the pitch patterns and rhythms of spoken text. The Moroccan instruments were, and still are, used both by the military and also often to signal the end of the fast each evening during the month of Ramadan.

It was from Morocco that *al nafir* passed into Spain as the *añafil* in the thirteenth century or before, and it was this that became the European long trumpet, appearing in manuscript illuminations all over Europe from the fourteenth century onwards. As time went on, it changed its typology, its shape, and its mechanism, and it eventually became our modern trumpet and trombone.

The earliest known example of what we have of the European long trumpet was found in the mud of the Thames when the site of the old Billingsgate fish market was redeveloped. This was found in four separate sections, and clearly not all those sections came from the same instrument, for the metals and the appearance differ. One section had an integral mouthpiece, again a smooth cone. We have a plethora of illustrations in mediæval

manuscripts from the *Cántigas de Santa Maria* from the late thirteenth century onwards, but in none, not surprisingly, do we have a clear view of the shape of the mouthpiece. Some appear to be conical, whereas others look as though they may be cupped; it is of course the latter shape that is with us today. We are unfortunately no wiser as to what was blown on the mediæval trumpet in the thirteenth and fourteenth centuries than we are of what was blown on the bronze lurs two thousand years earlier. It may have been one- or two-note signals, and equally it might have been calls up to, and perhaps beyond, the eighth partial. The word 'fanfare' is musically imprecise. Not until we reach the tuckets and sennets of the playwrights do we have positive ideas of what they blew. This seems to have been improvised sequences of partials on a simple bass, with perhaps sometimes or perhaps usually, an elaborate passage in the upper part; Monteverdi in the *L'Orfeo* 'Toccata' provides a brilliant example, and the contemporary trumpet tutors of Bendinelli and Fantini show us simpler ones.

In China we have a good example of a mouthpiece designed for a purpose. It is also a warning to be careful when interpreting iconography because the outside looks typically conical whereas the inside is very different. The top is a gently curved plate 45mm wide; in the centre is a shallow cup 11mm wide and 4mm deep with a pinhole in the centre just over one millimetre in diameter. All that can be produced with such a mouthpiece is a wild braying sound, and this is what seems to be desired.

In Africa no trumpet or horn has anything that we would recognise as a mouthpiece. Many are simply a hole in the side or less often in the end. Some side-blown horns, especially those of ivory, have the mouthhole in what we see as a raised block, though in fact it is raised simply because the rest of the thickness of the tusk has been carved away to leave it standing. Cutting the mouthhole through that block does usually result in some conicity, but this is not the result of deliberate shaping.

In India, many trumpets have mouthpieces not unlike our own, but this can be taken to be the result of deliberately copying those belonging to the Imperial power, whether those earlier of the Persian Moghuls or later of the British. Others are simple cones, particularly those of light sheet brass and of narrow tubing, and some, when made of more substantial cast metal, are simply the end of the tubing.

The conch trumpet is ubiquitous around the world. As noted above we have one that was found in one of the Magdalenian caves of southern France from the late Palæolithic period, and we have many from the Neolithic period and into Classical times (fuller details will be found in my *The Conch Horn*, as a book freely available on my website). All these simply have the end of the spire removed to leave a hole. With one exception, those with added mouthpieces are from Asia and beyond. Some Tibetan area conchs have an added mouthpiece, but this consists of a hole through added materials, usually of silver. In Japan we see tubular mouthpieces of wood or metal, normally simply a cylin-

drical tube. The same is true of New Zealand. In both cases this does add a little, some four to six inches, to the length of the sound column. Much less usual are those of some islands in French Polynesia where a tube, up to two feet long, is attached with wax or similar compounds to a side embouchure, adding quite substantially to the length of the air column, and sometimes with what appears to be a nut shell or small gourd as a cup-shaped mouthpiece. Whether this was an indigenous practice or whether it is some form of copy of the trumpets of earlier voyagers is unknown.

The one exception noted above is in Slovakia in Central Europe, where conchs were blown to avert thunderstorms, as can be heard, imitated on the string instruments, in Vivaldi's concerto *Concha*. Those that I have seen in museums had a mouthpiece like that of a brass-band cornet or trumpet, made in what appeared to be brass or more probably pewter. These, with one example in Italy, are the only European conchs with a mouthpiece. What sort of calls they produced seems not have been recorded; Vivaldi uses octaves and fifths, so that this may, in his time, have been plain end-blown shells.

So the only clear answer to the second question, 'When were mouthpieces introduced?', seems to be 'Spasmodically'. We have seen examples from the Danish Bronze Age, then from the Etruscans and Romans, with intervening centuries between them, and then again centuries later with the thirteenth century European long trumpets, and during those last intervening centuries

the Hausa and Maghribi trumpets. All the other examples above are essentially undatable because we have no knowledge of their prehistory.

But all these mouthpieces were integral with the body of the instruments, so the next question is 'When did the insertable mouthpiece arrive?' One possible answer is with the draw trumpet. If, as many of us believe, the grip seen in, for example, the great Memlinc tryptic in Antwerp, with one hand on the body of the instrument and the other holding the mouthpiece to the lips, indicates an early form of the draw trumpet, then that mouthpiece with its long stem was separate from the body. But the only definite example of such a system that is preserved to us is the Huns Veit trumpet in Berlin from the Bach period of the *tromba da tirarsi*. Other than that, the only definite evidence for an insertable mouthpiece comes from Bendinelli in the early seventeenth century. His trumpet, made in Vienna by Anton Schnitzer in 1585, is still in Verona, in the Accademia Filharmonica, and this has a mouthpiece socket. I would be willing to bet that the trumpets and trombones in Maximilian's *Triumph*, earlier in that century, did so as well. And, of course, the black and white cornetts always did so as well. So it looks as though the answer to that question may be 'Certainly by 1500 or so.' How much earlier than that? We do not know.

And the answer to our title, 'Why mouthpieces?' seems to be as it was in the beginning of this paper: Either when it was necessary to meet the expectations of the player, or when it was

needed to enhance or to allow access to an otherwise inaccessible or inconvenient aperture.

The English post horns and coach horns were usually straight, with mildly expanding bores, the post horn a bit over two feet long and the coach horn in four-foot-six B flat. On the continent of Europe they were more commonly coiled, again in four-foot-six B flat, and their image can still be seen on post boxes and mail vans. Everywhere the mails have priority over other traffic, and the horns were blown to assure this and, in the days of horse-transport, to warn tollgates to open and to prepare the next team of horses to ensure that all changes were made as quickly as possible.

By the late eighteenth century, these small coiled horns were sometimes provided with one or more crooks, smaller coils of additional tubing, fitting between the mouthpiece and the body, to change the pitch; Mozart, for example, wrote a Serenade with a post horn solo in A. So it was not surprising, once valves had been invented for brass instruments, to see a short valve section available, again to fit between the mouthpiece and the body. On the journeys between one mail station and the next, it would pass the time more pleasantly if the guard could play a few proper tunes instead of just fanfares.

Thus, in France for instance, the *cornet de poste* became the *cornet à pistons*, and so the cornet was born. The valve section was properly built in to the tubing and there was usually a full set of crooks from the shank (a straight tube) for B flat down to

a coiled crook for F. After cornets were adopted into bands, a soprano model, in E flat a fourth higher, also became common. Larger sizes were also produced, altos in low E flat and tenors in nine-foot B flat. Parlance differs in different countries, and E-flat altos in France, Germany, and America are tenors in Britain, and B-flat tenors are baritones.

Bugles began as oxhorns and as metal copies of these were called *Halbmond* in Germany. The still appear as regimental badges, especially for Light Infantry and Rifle Brigades. By the early nineteenth century longer bugles were in use, usually once-round in an openly folded shape, again in four-foot-six B flat. By the second half of that century they were usually twice-round and more compactly folded, as the duty bugle still is today, but they always retained the wider bore of the oxhorn, keeping them distinct from the cornets.

Early in the nineteenth century, before valves had been invented, an Irish inventor, Joseph Haliday, devised the key bugle with five keys covering holes in the tube, the lowest key standing open to produce the leading note of the key when it was closed. There was always a small crook between the mouthpiece and the body to keep a key in the back-bow of the tube clear of the player's chin and/or beard. The resulting instrument was again in B flat, often with a soprano in E flat, and, as the century progressed, with additional keys up to a maximum of thirteen.

In Paris, the French maker Hilaire Asté, who used the name of Halari, took the key bugle and produced tenor and bass mod-

els which he named *ophicléide*, a combination of Greek *ophis* or serpent, and French *cléide* for keyed. The ophicleide became a common brass bass in bands and orchestras, replacing the many forms of serpents and bass horns that had previously been used, and survived in use almost up to the end of the nineteenth century. It has now been revived for modern performances of works in which it was specified, for its tone is quite different from any of our tubas.

Valves were, of course, applied to the bugle, which became the flugelhorn, and to sopranos and altos, though it was well into the middle of the nineteenth century before successful basses appeared. In Britain, we contrast the bass cornet, calling it the baritone, with the nine-foot bugle, calling that the euphonium, but while the narrow bore cornet family and the wide bore bugle family do still exist, there have been so many instruments of intermediate bores that the situation is inextricably confused. Certainly, the lower the pitch, the wider the bore is a standard rule of thumb, but that has never deterred an inventor. Tubas today go down to eighteen-foot B flat and sixteen-foot C.

LONG TRUMPETS

There is some evidence that the long trumpets, like other instruments, may have originated in Central Asia, perhaps in the Persian area, and then spread East and West. So far as our European instruments are concerned we do know that the people who became the Hausa in Nigeria and others of their tribes who settled in Ghana, migrated across North Africa from somewhere further East, leaving in Morocco the long trumpet *al nfir*, and settling in West Africa, where they call their trumpets *kakaki*.

The *kakaki* is usually a couple of metres long, sometimes a little more. It is rolled up from quite thin brass or copper sheet and made in two joints, each about the half the total length, for convenience in storage. The lower joint has a socket protected with a couple of small bosses and at the far end a fairly long, evenly expanding bell with a thin projecting rim. The soldered joint between the straight, cylindrical body and the bell is again protected by one or two small bosses – these are made up of two bowls soldered together rim to rim. The upper joint has an integral conical mouthpiece with a wide flat rim, all soldered up together, and it ends with a tenon to fit into the socket of the lower joint.

As in other areas, the *kakaki* is a military instrument, used by camel-back cavalry, but it is also a talking instrument, used to 'shout' praises to the Emir, and for other purposes.

The Moroccan *nfir* is similar in pattern, though usually slightly shorter, a bit less than two metres, and, for military use, made of rather heavier brass. I also have a smaller one, about half the usual length, rolled up from flattened fuel-can metal.

As is well-known, the Amazigh peoples (pejoratively called Berbers, which equates with Barbarian), conquered southern Spain in our early Middle Ages. There *al nfir* became in Spanish *añafil* and we see it rather vaguely portrayed in early Mozarabic manuscripts, and much more precisely in the *Cántigas de Santa Maria* of around 1270. It appears to have been almost exactly the same instrument as the *kakaki* described above. Its use spread rapidly across Europe and we can see examples in numerous mediæval manuscripts from the early fourteenth century onwards. The oldest surviving example is the Billingsgate trumpet in the London Museum, again dating from the fourteenth century; this is described in detail in another paper on my website. One of its joints also has an integral conical mouthpiece.

It is when we see the great triptych of Christ surrounded by angel musicians in Antwerp Royal Art Museum, painted by Hans Memling around 1480, that controversy arises. By now the long trumpet had been folded into three joints by inserting two U-bends, one between the mouth yard and the middle yard, and the other between the middle yard and the bell yard, to form an instrument similar to but more closely folded than our Baroque natural trumpet. Here in the triptych we see the instrument held with one hand just below the mouthpiece and the other hand further down

the instrument. The question is, is the upper hand holding the mouthpiece to the lips while the lower hand is pulling the body of the instrument away along a long mouthpiece-stem or not? Most of us think that it is, for there are many other illustrations of what is called the draw trumpet, which Bach asks for three centuries later as the *tromba da tirarsi*.

Moving the body of the trumpet along a mouthpiece stem is something that is not easily done rapidly, but there is much mediæval music for a slow-moving tenor part with one or more, quicker upper parts, especially in *basse danse* music. There are many illustrations of a pair of shawms playing with just such a trumpet. Obviously, it would be easier, and from the player's point of view much safer, if the slide movement could be half the distance for any different pitch, and this was eventually achieved by moving the slide into the first U-bend instead of at the mouthpiece. This was the origin of the trombone.

Trumpeters still hankered after being able to play notes between the partials of the natural overtone series which, in the lower part of the range has only three pitches, an octave of the fundamental, the fifth above, and the octave above, and in the middle range just an arpeggio of third, fifth, flat seventh, and octave. In Purcell's time, the second half of the seventeenth century, we have the description of the Flatt Trumpet, which had a slide in the second U-bend, moving back over the player's shoulder; Purcell wrote for a group of them in music for Queen Mary's funeral. In Bach's time, a century later, we have one example of

a revived mouthpiece slide from Naumberg in Germany, made by Huns Veit. At the end of the eighteenth century we have the English slide trumpet, a revival of the backward moving slide, passing the player's cheek, and this, in the hands of the Thomas Harpers, father and son, continued in use into the end of the nineteenth century.

In the meanwhile, there had been two different developments, one short-lived and the other still with us today.

The first was the invention, allegedly by Anton Weidinger but more probably an adaptation of some earlier device, of the key trumpet. This had a series of holes, each covered by a key, and allowed the player a full diatonic range with at least some chromatic notes. Haydn wrote his Trumpet Concerto for Weidinger and his key trumpet, and so did Hummel. Haydn had two natural trumpets in the orchestra (unusually for a wind instrument concerto), playing normal fanfare pitches, so that the soloist could, with typical Haydn sense of humour, show 'look what I can do, boys', in his first entry. The key trumpet survived in Austria and Italy into the mid-nineteenth century.

The second invention came in the early years of the nineteenth century, and this was the valve which, when opened, allowed the air access to a length of additional tubing, long enough to lower the pitch by a semitone or a wholetone – the third valve, lowering the pitch by a tone and a half, was added a little later. The history of the valve is detailed in enough books, including two of my own, not to need elaborating here.

But we should go back to the natural trumpet, the one with the two U-bends. We have no idea at all of what the long, straight, mediæval trumpet may have played, but we can assume that it produced at least arpeggio-style fanfares, and perhaps limited melodic phrases above. We have ample written evidence in the sixteenth century of tuckets and sennets, English for toccata and sonata, and by 1600 two good trumpet tutors, by Bendinelli and Fantini, each available in facsimile and transcription. These showed a full range of melodic possibilities up to the C two octaves above middle-C, though we do not know how much earlier such music was commonly heard. The actual pitches produced would have depended on the length of the instrument, and it seems likely, if only on the basis of Monteverdi's use, that this was in the key of C, from a tube around eight feet long, though he asked them to sound it a tone higher by using mutes. Players were then acquiring the skill to sound non-partial notes by lip control, flattening the top-line written F into F natural or sharpening it into F sharp (the natural partial is halfway between the natural and the sharp), pulling the top A and the middle-line B natural into tune, and so on. We have ample evidence that players could do this, for no composer in his senses writes music that he knows cannot be played in tune. Nevertheless, we also have plenty of evidence from contemporary sources that some players were a great deal less skilled than others. Composers at this time, and for at least a century to come, were writing for known individuals whose skills they also knew. If they passed on copies of

their music to other colleagues whose players they did not know, then of course accidents might happen.

By the time of the High Baroque, a century and a half later, the trumpet seems to have shortened by a foot or so into the key of D, but retaining its ability to play in C by inserting an extra loop of tubing called a crook between the mouthpiece and the trumpet. By the Classical period the trumpet had shortened further to six-foot F, and there it usually stayed – there are some rare parts for G trumpet but they are not common. More crooks were provided for E, E flat, D, C, and, for example for the calls in Beethoven's *Leonore Three*, for nine-foot B flat, the same pitch as the tenor trombone.

When valves were added to the trumpet, the basic instrument was still in F, and it was not until the cornet became so popular that players were using it to play trumpet parts, that trumpets began to be shortened further to four-foot-six B flat where it remains today, with occasional use of high C and D and even shorter bodies.

Even today there is a division between what the Germans call *orchester-Trompete* and *jazz-Trompeter*. The orchestral trumpets have cylindrical lead-pipes like those of the earlier natural trumpets, expanding only at the bend into the bell and usually with rotary valves, whereas the Jazz trumpets have an expanding lead-pipe, like that of the cornet, and are cylindrical in bore only in the valve section, usually with piston valves. French, English, and American trumpets have expanding lead-pipes. As a result,

the German orchestral trumpets have a rather broader and firmer tone quality, more suited to the orchestra.

Returning once again to the natural trumpets, these have now been revived in skilled hands for many of our Baroque and Classical early music ensembles. Those who have less expertise in what is commonly referred to as 'bending' the notes, bringing the partials that evade our scales into tune and sounding the non-partial pitches by lip control, resort to the use of fingerholes, which introduce a foreign series of partials in a different overtone sequence. The tone quality is degraded but the out-of-tune partials are brought into tune with less difficulty and with less risk of an accident. We have become so accustomed to perfection by the use of retakes in recording studios that some conductors demand their use in concerts even by skilled players, to avoid any risk of accident. But any claim that they are Baroque or Classical trumpets or trumpeters is a falsehood.

One final point in 'revival': there are some players who have revived the use of the key trumpet so that once again we can hear the Haydn and Hummel concertos as they were originally heard.

PLAYING THE HANDHORN IN THE FRENCH TRADITION

Way back in my student days, I became aware that the french horn that I was playing (at that time a Kruspe four-valve F) was not the instrument for which Mozart and Beethoven were writing their concertos, quintet, and sonata. So I kept an eye open for a handhorn. I found my first one in an old music shop in Wisbech in 1951 while on tour during the Festival of Britain of that year. Somebody had ordered it, they said, in 1870 and never collected it. It was a Besson with a full set of crooks, from B-flat alto down to C with two couplers for low B and B flat, plus a two-valve alternative tuning slide, all in its original box. I was carrying too much to cope with the box, so the shop found me an old tea bag and I ditched the box – I was so stupid that I did not think to put it on a train to my home to be picked up on my return.

Once I'd got it, I asked Eric Halfpenny to introduce me to Reginald Morley-Pegge. Morley, as we all called him, invited me to visit him in his flat in London. There he played me a diatonic scale from written middle C to the C two octaves above, with no variation of tone quality from top to bottom, from the 4th partial to the 16th. I tried to do the same with little success. So he showed me the proper hand position that he had learned in Paris back in the 1920s.

What he said was: put your hand in the normal valve horn position and tune to the 7th partial (written B-flat, a very flat partial).

Then check the pitch against the 4th and 8th partial (both written C) and move the hand to get those in tune. You'll then be around a third closed, which is the right position to play a scale on the hand from 4 to 8 with no difference in tone – I still wasn't clever enough to do that from 4 to 6, but 6 to 8 was easy, as was the next octave. The 5th partial (written E) had to be opened slightly, the G (6th partial) is a natural note, the written A stopped down a little, as was the B natural. He could do the whole scale, though, using both hand and lip. From memory this must have been around 1951/52. In the upper octave, C and D are open partials (8th and 9th), the 10th is the octave of the 5th, the 11th needs stopping down a bit, the 12th is natural, the 13th (A) needs opening a bit, and the 15th (B natural) is a good natural partial and there you are.

Morley also pointed out Beethoven often wrote a sforzando (*sf*) on a top-line F, which he obviously intended to be well stopped with the very brassy sound that that implies (the same as hand-muting), an effect that it is totally missed when the note is played on a valve. In contrast, he said that in the 7th Symphony, the repeated low G/F-sharp should be played on the lip, not by the hand.

I could then play the Mendelssohn 'Nocturne' on the hand-horn, have a crack at the Mozart and Beethoven repertoire, and even once the Brahms Trio with two fellow students, who had to jam on the brakes at my first entry when they realised that with

Morley's technique they were drowning me instead of, as they'd expected, that I would drown them.

Later, after I'd found C alto shanks all over Eastern Europe, and seen Robbins Landon's editions of the Haydn symphonies, Morley also advised me to get hold of a cornet A shank and get the top shimmed to accept a horn mouthpiece, and that makes a good C alto shank.

After a while I found two other handhorns, one a Brown of Kennington, unfortunately a wholly Brown, not one of his earlier models, a Raoux with added valves, but still a good horn on the Raoux model – I took the valve tuning slide off and had a blind tuning slide made. The other is an anonymous Austro-Bohemian which slurs like cream and has a mixed set of crooks and couplers.

Mysteries because these are spasmodic in both time and space. They appear with conches in Fiji and South America for unknown purposes. They appear in Central and West Africa and in Burma and other near-China areas, in both areas for tonal language use. They appear in Europe in well-separated periods and places. And, so far as we know, in no other areas (save, as always, for modern experimental musics, which are beyond our remit here).

One of the two species of conch on the main island of Fiji, the *Bursa bubo* shell, have been found, mostly at temple sites, with a single fingerhole in the interior of the parietal wall (for more detail, see my book *The Conch Horn*, on my website). Others have been found in Mayan contexts in Central America with a series of fingerholes on the outside of the shell. The Fijian religion was firmly put down by the missionaries and there are no surviving records of the use or purpose of such shells. The use of conchs survives in Central America, but not with fingerholes, but since the fingerholes are multiple, though varying in number on such shells that have been found, we can surely assume that the use was musical.

The use of differential pitch and rhythm to imitate speech patterns with instruments of all sorts, and with vocal and whistling, is widespread around the world (and by animals), but the use of horns for this purpose seems to be restricted to Africa and

the western border areas of China. In both areas the horns are side-blown with a thumbhole in the truncated tip, but whereas in Africa they are trumpeted, in the Orient they are sounded by a free-reed (as with a mouthorgan) (see my book *Horns & Trumpets of the World*). At least here we do know the purpose, which is to convey meaning over a wider area than the voice alone can reach, or to convey a meaning only to those conversant with the 'language'.

In Europe, there appear to be temporal gaps in the use of fingerhole horns – whether the practice continued unrecorded we simply do not know. We do have firm evidence for their use in western Europe in the eleventh century. We have church carvings showing a horn with a series of fingerholes; we have manuscripts showing players waving their fingers over a series of holes in a horns; we have at least one surviving example, a horn with fingerholes of that date in the London Museum. I do not know whether there are further examples in other museums which have also been dated to that period.

We have, still in use today, the use of fingerhole horns around the Baltic Sea in northern Europe. These are normally goat horns and the use seems to be mainly in the three Baltic Republics (Estonia, Latvia, and Lithuania) and in southern Sweden, and also in Scandinavia the use of short wooden bark-covered horns (mini-alphorns, as it were) with fingerholes, and the *rozhok* of Western Russia (the use of a similar reed-blown instrument with a horn bell and mouth-cap is also common). There seems to be

as yet no evidence for the age of such fingerhole horns; all that we know of them comes from nineteenth- and twentieth-century folklorists. None, so far as I know, has been found archaeologically nor iconographically from any earlier times.

The serpent was said to have been invented by a French priest, Canon Guillaume d'Auxerre in 1590, but the only record of this comes in a report in 1743, which makes it somewhat dubious. This was a wide-bore instrument of wood, covered in leather to avoid leakage in the days of glues that are soluble in water. Its purpose was said to be to accompany plainchant, though the grossly non-acoustic position of its fingerholes, which must be spaced within reach of the hands, must have made it difficult to have helped singers to maintain the accuracy of their pitch. It survived, in many different forms up to the end of the nineteenth century, culminating in the ophicleide (itself originating as a bass version of the key bugle), both in orchestras and in church use, and has been successfully revived in period orchestras today. Because of its bore and dry richness of tone quality, it is always thought of as a sixteen-foot instrument, substituting in many scores for the contrabassoon, but it is in fact an eight-foot bass with a lowest note of the C two octaves below middle.

Whether it has any relation to the cornett has been alleged and denied by many scholars – unlike the cornett, the serpent has no thumbhole and its bore/length ratio is very different. Only Canon Guillaume could give us the answer, and he failed to do so.

The cornett, spelt nowadays with a double t to distinguish from the brass-band cornet, seems to have originated around 1500, and has a triple life and use. It was used to support the voices in choirs, playing the treble line along with trombones supporting the middle and lower voices. It was used as a loud instrument, again with trombones, to play from church towers and city halls in much of western Europe, competing with all the noises and iron-rimmed cartwheels of the markets below. It was used as a soft instrument for playing divisions, as variations were then known, and we have much very elaborate surviving music composed for it.

Like other renaissance instruments, it was made as a family, with a descant, the cornettino, an S-shaped tenor, the cornone, and rarely a bass. The treble, as with the recorder the most common size, came in three types: normal, straight, and mute. The normal type was gently curved to bring the fingerholes within the span of the hand, made of wood, split, hollowed, glued, and leather- or parchment-covered to avoid leakage; in German it was called the black cornett because of its cover. The straight cornett was lathe-turned and therefore left uncovered and called in German white, as in white-coffee. Both these were played with a very small mouthpiece, much the size and shape of the cup in which an acorn sits, though there are suggestions that the straight cornett was also sometimes played with a double reed. The mute cornett was also straight and uncovered, but it mouthpiece was carved

into the top of the bore and was more the shape of a miniature horn mouthpiece than that of a trumpet.

Where is the mystery? The cornett has no known history. Suddenly it was there, the main virtuoso instrument of the Renaissance. Was it a revival of the eleventh-century fingerhole horn? We do not know – there is no evidence of continuity. Was it a derivation of the Baltic *bukkehorn*? There is no evidence surviving of the use of the *bukkehorn* at that date, nor is there of the *rozhok*. And since much of the early use of the cornett seems to have been in Italy there is geographical separation to be considered in those contexts.

We have all these instruments, separated in time and space, with no connexions known between them. We can of course conjecture. Did Canon Guillaume (assuming for the moment that he was responsible), look at a cornett and say that a wider-bored bass version could be useful to keep his singers in tune? Were the Baltic and Russian fingerhole horns folk back-projections of the cornett, just as similar folk clarinets are known to have been in the same areas? Why were the Burmese and western Chinese border areas thumbhole horns played with a free reed instead of with the lips?

We do not know.

HORN CHORDS AND OTHER TRICKS

Today, playing a chord on a french horn is mainly a bandroom ploy, done to show off or to entertain the squad, but it has a serious past. Weber scored it, inaccurately, in his Concertino for Horn, and Ethel Smyth scored it in her Concerto for Violin and Horn.

It is done by playing one note, humming a second, and hoping for the third and fourth. It is an acoustical trick using resultants. If two partials of the harmonic series can be played exactly in tune, other partials will be heard as resultants, above and/or below. So, if one plays the 5th partial, written as an E (horn parts were traditionally written in C, with a specific crook named to establish what actual pitch the written C would sound at), and sings the 3rd partial, G, exactly in tune, an 8th partial C should be heard above, since 5 plus 3 equals 8. And since 5 minus 3 equals 2, a very low C should also be audible. Equally, playing the 5th partial and singing the 8th should produce a rather flat high A, the 13th partial, and perhaps also a low G. Indeed, playing and singing the 4th and 5th partials should produce the D above as a 9th partial and also that higher A if the 4th partial were strong enough to include its octave, the 8th partial. These are summation and subtractive tones. The whole process is referred to as multiphonics.

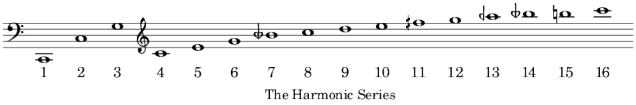
One suspects that Aubrey Brain, for whom Ethel Smyth wrote the concerto, may once have demonstrated the trick to Smyth, and that she included it in the Concerto for fun, for in the first

performance, which she conducted, she turned to the audience and gestured to draw their attention at the strategic moment.

Multiphonics are widely used in modern music, usually for single players in small ensembles, but on most woodwind instruments they are achieved by opening several keys simultaneously, sometimes only partially, and string instruments by multifingering. On brass an alternative method is by partly depressing valves, but the above method, playing and singing, is much the most effective.

Factitious Notes

These are notes that, in the days before valves were invented, were outside the normal range of the horn and that were produced by lip control rather than by the normal handhorn technique of handstopping. Even earlier they were used by trumpeters and horn players in the Baroque period. In theory, players were restricted to the partials of the harmonic series:



The Harmonic Series

Some of these partials are incompatible with our tempered scale: the 5th (a strategic note in the so-called common chord) is rather flat, the 7th is flatter, the 10th, the octave of the 5th shares its problem, the 11th is halfway between F and F sharp, the 13th is very flat, and the 14th, the octave of the 7th, suffers the same

fate as that. Players were expected to adjust these notes by the strength of their lips and by slight changes of mouth-shape.

That some were less successful in doing so than others is well-recorded in the literature, but that some were fully successful is shown by the music itself. No composer in his or her senses would ever write notes that were certain to be out of tune, but would avoid them in their music. The fact that they wrote them, in those days most usually for players whose skills were known to them, shows that they were confident that they would hear them played correctly. We know that some players can do it today without the use of fingerholes or other tone-destructive devices, and if they can do it today, certainly they could do it then.

In the later Classical period we know that all these notes were tuned by moving the hand in the bell (trumpeters in that period seldom ventured above the 12th partial – the horn took over the upper range). But some composers wrote notes in the gaps between the partials at the bottom of the range. Beethoven did this in the *7th Symphony*, in the Scherzo, a series of low Gs (the 3rd partial) and F sharps. The player just has to drop the chin slightly and relax the lips a little, and there is no problem in doing this. In his *Horn Sonata* he takes the player down to the bottom G, between the first and second partials; this is, as it were, a false partial and it is quite easy to produce. But Haydn has much more fun. In his Symphony no. 51, he takes the first horn up to the F in alt (and in a high crook at that), and then asks the second horn to trek down from the 2nd partial C to B, A, F sharp and back

to G. Again it's a matter of dropping the chin more and more, thinking hard of the notes required, and hoping for the best. He really did like to tease his players, as well as his audiences, and he plays many similar tricks elsewhere.

Flutter Tonguing

This is a matter of either rolling an R or gargling as one plays. Richard Strauss uses it in Don Quixote to imitate the baaing of a flock of sheep which the Don mistakes as an army, and he used it again elsewhere. The use has now become quite common for all wind instruments.

Some players are unable to roll an R with the tip of the tongue, but they can usually do so with the back of the tongue, and if that also is impossible, then gargling at the top of the throat is the only other expedient.

THROAT OR OVERTONE SINGING

This doesn't really belong here since otherwise I am writing about instrumental practices, and this is a vocal technique. It is an example of multiphonics and I have a suspicion that the technique may have derived from an instrument that also produces multiphonics. This is the jews harp, more suitably known today, to avoid any imaginary offence, as the trump, its earliest English name, since it produces the same pitches as a natural trumpet. How the 'jews' attribution arose, nobody knows, but it appears in the earliest English records of the instrument (fifteenth-century Customs dues as Jewes trumps) and in no other language. The French term is *guimbarde*, apparently a piece of horse harness of similar shape, the German somewhat pejoratively as *maultrommel*, '*maul*' being a rather rude name for the mouth, and the Italian *scaccia pensiera*, away dull thoughts.

There has long been controversy whether the trump is an aerophone or an idiophone. The aerophone adherents say that this is because the overtones are produced by the air in the mouth, whereas because the sound is initially generated by plucking the feather, whether from distal end or, as in parts of Asia, Oceania, and Indonesia, by plucking the hinge end, the instrument is clearly an idiophone.

The trump needs both hands to play it, one to hold the body to the mouth, and the other to pluck the feather. By changing the

shape of the mouth into the forms of the different vowels, A, E, I, O, and U, overtones are sounded, those of the harmonic series and, with skill, more non-harmonic pitches as well. The instrument is also regarded in some cultures as a talking instrument, lovers using it to transmit their thoughts and intents.

Not many things can be done without the use of the hands, and my suspicion is that overtone singing may have developed to replace the use of the trump while one or both hands were otherwise employed. Since the great centres of overtone singing are found in Mongolia and the steppes of Siberia, areas where much of the best trump playing is also found, and where the use of the horse is endemic for transport, I suspect that overtone singing may have arisen in those areas simply because the hands are best kept on the reins and for holding spears or bows and arrows, while overtone singing can be used to while away the tedium of a journey or of herding.

The basic technique is quite easily learned. It consists of a hum produced by keeping the tongue close to the palate, so eliciting a nasal sound. Then, by changing the mouth-shape and pursing the lips towards a whistling shape, overtones will be heard. Beyond that stage, however, there is need for skill and much practice because the ideal is to diminish the sound of the hum and to augment the sounds of the overtones until the hum is barely audible and the melodic overtones ring out loud and clear.

Many examples of the technique can be heard nowadays on the worldwide web, but it was very new to us back in the 1960s

when recordings from Mongolia were first produced at an IFMC conference. Today the technique is widely employed in many different types of music in our Western world.

An allied technique can be heard from some Tibetan monasteries. There the hum, rather more a growl, is produced at the very bottom of the vocal range, in the same tessitura as that of the long temple trumpets. One can hear clearly the low drone imitating the sound of the trumpets, for there is no attempt to diminish the low fundamental sounds, and indeed these are as important as the sound of the trumpets in the instrumental interludes with trumpets and shawms. But high, high above the drone come the ethereal overtone pitches. It is done by groups of monks so that overlapping voices keep the sound continuous, just like that of the trumpets which can use circular breathing. This type of overtone singing is clearly of spiritual intent, a sacred ritual practice, and a wholly different, and yet similar skill to that of the Mongolian and Siberian overtone singing.