

The Harmonic Cornu

The Roman Cornu, a descendent of its Etruscan cousin, was developed further in Imperial times, principally by increasing its length and wrapping it around the player in a more accommodating way. It also took wider roles in entertainment, being used alongside another brass instrument, the tuba, and with the hydraulis, the earliest keyboard instrument.

By the time four cornua were put away in the amphitheatre in Pompeii, soon to be preserved by Vesuvius, they had attained the classical 'G' form depicted in the iconography. These four instruments are similar in form, some 3.8 metres in length, with a conical-cylindrical-conical windway and a flared bell.

No one felt the urge or need in Roman times to report on the performances in the arena; so we know nothing of the quality of the musicianship displayed by the aeneatores (brass players or, more precisely bronze players), the variety of the musical offerings or the attempts to match the natural-harmonic brass to the scale of the hydraulis, doubtless reflecting standard auletic and citharistic tunings ultimately based on fifths and fourths, even though usage of the seventh harmonic was reportedly part of fine tuning.

The imperfections in the match between the brass traditions and those of instruments with the ability to control the intervals within the octave persisted into the 18th century. When Charles Burney wrote of a performance of the Messiah, describing the rendition of 'The Trumpet Shall Sound', he reported that "Mr Sarjant [...] accompanied [the singer] on the trumpet admirably. There are, however, some passages in the trumpet part to this Air, which always have a bad effect, from the natural imperfections of the instrument."

Unfortunately, we do not know what a Roman audience would have made of these 'imperfections' but we do know from writings from this period and earlier Greek texts that musicians were as aware of tuning discrepancies as we are today. We also know, from replicas we have made recently of the Pompeii tibia, that the Roman maker had the ability to make instruments capable of use by a modern professional player and in concert with modern instruments.

The four cornua from Pompeii provide evidence of the entire instrument structure, apart from the mouthpiece and the non-musical support bar. However, only one is relatively complete. It is this instrument which provides an intriguing insight into possible features which were provided to change either the tonality of the instrument as a whole or that of individual harmonics. Located just before the transition from the central cylindrical section of the windway to the final conical section, there are two holes, which are clearly deliberate, being round and having every appearance of having been drilled. Their diameter is around half of that of the tubing at that point and they lie on the same side face of the tubing, i.e., not on its outer or inner

diameter. Just downstream of these two holes is an irregular perforation in the tubing but it is not clear whether this is the highly-corroded remains of a drilled hole or simple corrosion.

The holes lie just upstream of the cast boss into which the support bar is fitted and through which the instrument's tubing passes. At the point where the tubing runs into the boss there is a sleeve which appears to wrap around the tubing and pass inside the cavity of the support boss, being partly hidden within this. However, the section which is visible, lying outside the boss, has a hole of roughly the same diameter as those in the tubing wall. However, it has to be said that this hole is not nearly so clearly defined as those in the tubing wall itself.

One characteristic of this sleeve is seen at its upstream edge where the tubing is turned outwards to form a lip. A similar lipped tube is also seen on the other Pompeii cornua, whose walls have no visible holes.

The phenomenon of vents on natural brass instruments was reported by Eric Halfpenny in his article entitled 'The Harmonic Trumpet', which described William Shaw's trumpet of 1787. Eric Halfpenny concluded that the keyed holes on this instrument might have been provided in order to adjust the overall tonality of the instrument or to adjust individual harmonics in order to pull them into line with notes provided on tempered instruments.¹ In order to carry out a preliminary appraisal of applying this idea to the Roman cornu, a simple model of the Pompeii instruments was made using plastic tubing and the similarly-sized metal bell of a comparable instrument which I was constructing at the time. The instrument was then blown by me over its playable range using a trumpet mouthpiece (Vincent Bach 3C). As this mouthpiece is in no way typical of those which are believed to have been used on the cornu, the experiment was only intended to test out the principle.

The blowing tests were carried out with both holes closed, both holes open and each individual hole open.

Each different configuration of open vent holes yielded a different harmonic series for the instrument as a whole. However, these different configurations did not simply move a stable series of notes up or down in pitch but affected the various oscillatory modes in different ways. One or two remained unchanged while others were raised or lowered by anything between 10 and 90 cents. The details of the changes are not reported here as the experimental cornu tubing was not an exact match to that of the Pompeii instruments. All that can be claimed for certain is that by opening and closing the vent holes on the tubing one could adjust the tonalities of different harmonics.

At the time when the cornua were last examined by myself, the visit had been primarily devoted to another instrument, leaving little time for studying the cornua. The next visit will be designed to remedy this deficit, focussing on the provision of

vent holes and sleeves on this instrument and, hopefully, providing data which may help to answer the question, 'how musical were the Roman aeneatores?'

¹ Eric Halfpenny, *The Galpin Society Journal*, Vol. 13, (Jul 1960), pp. 7-13