

Tuba: Long Time A-coming



Bucinator on Trajan's Column, Rome

If this is truly a Historical Instruments column, it should incorporate your newest, shiny euphonium or tuba as well as serpents, bass horns, and ophicleides. That's quite simply because of the chronology. The tuba came into existence in 1835 in Berlin, and a few years later the euphonium appeared. To give these events some historical perspective, in 1835 elsewhere in Germany the country's first railroad opened; in the United

States, public debt fell to zero, the only time in its history, and the first assassination attempt on a president (Andrew Jackson) took place; in Australia, Melbourne was founded; and in London the final executions for a homosexual offense took place. (So, to many people the first appearance of the tuba was not the most important event of the year.)

But one important difference from many of the events listed above is the fact that the tuba

and euphonium are still with us, and with due respect to the dent in your personal fortune caused by your most recent purchase of such an instrument, essentially it hasn't changed much, unlike the American public debt, the size of Melbourne, and British attitudes toward homosexuality. However, what all these events did have in common was the fact that they didn't suddenly burst out on an unprepared world: there had been a long process leading up to

each of them. And what follows is an attempt to trace the events leading up to the advent of the tuba and euphonium.

As you do your next warm-up consider two crucial elements: the musical and the technological—if you like, the chicken and the egg. You need both—no music, and you wouldn't know what to play; no technology, and you wouldn't have anything to play it on. Which came first? Or did they develop hand-in-hand? Or has it all been

a fortuitous accident? Let's try to identify the crucial events, see how they impacted one on the other and, like a latter-day Sherlock Holmes, come to a conclusion based firmly on the facts.

Those of us who grew up in Britain during the Second World War relied on the wireless in the corner of the living-room for information, entertainment, and morale-boosting messages from Winston Churchill. The BBC's *Brains Trust* was a weekly discussion on the Home Service by a panel of experts, including the philosopher Professor Joad. He often began his contribution by saying "It all depends what you mean by," and then he named the topic. Along with the wail of the air-raid siren, a distaste for Spam, and lack of enthusiasm for fascism, this is something that has remained in my memory over the years. So it all depends on what you mean by "music." And to answer that point we need to try to distinguish which factors are common to Hip-Hop, Palestrina, Sousa, J. S. Bach, and Philip Glass. For our purposes, we don't need to think about the emotional effect (sometimes it's pure annoyance), and that leaves, technically (speaking as musician to musician), generally some kind (note, some kind) of rhythm, melody, and harmony, however crude or basic.

It has been suggested that music may have begun with people imitating natural sounds, possibly for the practical purpose of luring animals during hunting; or through "motherese," the vocal-gestural communication between mother and infant with its elements of melody and rhythm. There is often a combination of speech and song in primitive peoples. This may give some clue as to just when some sort of melody first appeared, following the discovery of the earliest known Neanderthal hyoid bone with modern human form, dated to around 60,000 years ago. This is the part of the anatomy that permits tongue, pharyngeal, and laryngeal movements, all in the region where sound is generated,

that is, the voice (and, incidentally, all important in playing brass).

At some time during the Palaeolithic Age (beginning about 3,000,000 years ago), stone tools began to be used, and flutes made from mute swan bone and from woolly mammoth ivory dating from 42,000 to 43,000 years ago have been discovered in the German Swabian Alps. Although *Homo Sapiens* appeared in Africa some 200,000 years ago, the Neanderthals did not finally disappear until 40,000 years ago, so the flutes could possibly have been Neanderthal. The earliest lip-activated instruments known are conch-shells, one found in France dating from before 10,000 BCE. But although we know how they must have been activated, we can only guess how (or if) they were used musically.

10,000 to 9,000 years ago, in Mesopotamia, wheat and barley were first cultivated, and it is considered that the action of pounding seeds and roots into meal may have created an awareness of rhythm. Thus, although in different parts of the world, at this point there may at last have been awareness of the two important musical constituents, melody and rhythm, significantly both involving "instruments." (A flute may only produce "melody," pounding a stone can only produce "rhythm.") But if you can't work out how to produce a note on your bone flute, it may as well just remain an ornament to put on your Neanderthal mantelpiece.

As you read these words, the Sentinelese, living on North Sentinel Island in the Bay of Bengal, remain virtually untouched by modern civilization. The Indian government forbids any vessel to enter closer to the island than five nautical miles. Those ignoring this ruling have usually ended up killed by bow and arrow. In the unlikely event of your landing there with your Conn BBb tuba, what do you think the islanders would make of it? Just give it a few moments' thought . . .

Matters Metallic

The first metal to be discovered was copper, known to have been

smelted in Pločnik, Serbia some 7,500 years ago (around 5500 BCE). The Copper Age was to last from 9000-3500 BCE and led to the discovery of bronze (Bronze Age, 3500-1500 BCE). Bronze, basically an alloy of copper and tin, was stronger than copper and had more ductility so could be cast and hammered into many more forms. Until the Bronze Age the only musical instruments known were the result of the accidental discovery, or slight modification, of suitably-shaped defunct animal bones or some other natural material. But this new metal offered opportunities for the total design and construction of musical instruments. Bronze bells were made in Thailand and Cambodia 3,600 years ago, and bronze is still used for high-quality bells and cymbals.

"The seven metals of antiquity" have been known since prehistoric times. They are gold, silver, tin, copper, lead, iron, and mercury. The first four of these have been used in musical instrument-making since the earliest times. Gold was found in Egypt and Nubia (northern Sudan/southern Egypt), silver in Asia Minor (Turkey) and the Aegean islands, copper in Ireland and south-west England. The tin export market to the Levant from Cornwall was of particular economic importance, and all the other minerals were exported along the many trade routes that existed at the time, including those from West Africa across the Sahara to Egypt.

The two trumpets found in Pharaoh Tutankhamun's tomb (died 1323 BCE) were made respectively of copper alloy and silver with brass fittings. The first is 50 cm. (20 inches) long, the second, 58 cm (23 inches). Neither utilized a mouthpiece: they were blown directly at the narrow end (diameter 1.7 cm.; .7 inches) and expanded to a bell size of 8.2 cm (over 3 inches). Existing illustrations show that the Egyptians of the time used trumpets for military purposes and possibly also in dance, but we do not know the playing techniques involved. However, the absence of a whistle-mouthpiece or a reed, coupled with a trumpet-like profile, implies that a technique with some

similarity to the lip-vibration used today will have been adopted, although it has been shown that since only one pitch was viable without using a modern mouthpiece, it is likely that the "music" produced had only a rhythmic function. Trumpets were common during the Egyptian New Kingdom (1550-1017 BCE).

Of particular importance is the fact that Tutankhamun's trumpets demonstrate an ability to fabricate metal tubes. The copper alloy instrument is formed from two rolled sheets soldered lengthwise. The two parts of the sheet are brought together in a brazed tooth seam with a high finish, similar to that which is obvious in an unplated, or much worn, modern brass instrument. Technologically, this is early evidence of the "brass" instrument as it eventually came to be known.

Music played a significant role in Ancient Greece, but only two types of lip-reed instruments are known: the salpinx (straight trumpet) and keras (curved trumpet). Salpinxes were bronze, 1-1.5 metres (39-59 inches) long, with a bone mouthpiece, while the keras was a small conical animal's horn, favoured by shepherds. The salpinx, with its long tube, was used in military activities and sport, and salpinx contests were included in Olympic Games. (It is interesting that while the scholar Eustathius ascribed the invention of the trumpet to the god Osiris, it was banned in Busiris and Lycopolis because it was thought to sound like the braying of an ass.) But it was perhaps the Romans, addicted to empire-building as they were, whose interest in military matters did most to encourage the development of lip-reed instruments. (The Roman Empire lasted from 27 BCE to AD 476 in the west.)

There were three distinctive types of Roman brass instruments, plus one of a mysterious nature: the cornu, the tuba, the lituus, and the bucina. The cornu's gently-tapering tube was some 3.35 metres (11 feet) long, so the instrument was built in a G-shape with a circumference of about 1 metres (3 plus feet). The curved shape was achieved by casting each half of the bronze tube longitudinally and

then soldering the halves together, rather as the wooden serpent was to be made in later centuries. It was held vertically, the bell facing forward above the player's head, steadied by a wooden bar extending from top to bottom. Primarily a military instrument, it was also found in state processions.

The tuba was the most important of the Roman brass. This was a straight trumpet, anything from one to three metres long (3 plus to 10 feet), with a terminal flare. It accompanied marching, sounded the attack and the retreat, and was used in battle to boost Roman morale and terrify the enemy. It was also played at funerals and in the arena.

The earliest extant picture of a lituus dates from the early 5th century BCE. It was shaped like a J, possibly derived from a reed instrument plus a cow's horn. At 1.5 metres (5 feet) long, it gives a modern G and will produce six notes. Although it appeared in military processions, it did not have the prestigious associations of the cornu.

A description of the bucina is difficult since none has ever been found, but it seems that the player of any brass instrument in Roman times was called a *bucinator*. The technique involved in these Roman instruments was not sophisticated. To avoid splitting their distended cheeks, players often wore a leather head-band called *capistrum*.

As the Roman tuba, their most important "brass" instrument, was a straight trumpet, when, in 1835 Wilhelm Friedrich Wieprecht invented the instrument we know and love as the tuba, was he mistaken, playing a trick, or simply plain ignorant? We need to bear in mind that strictly Wieprecht did not invent the "tuba": he invented the *Baß-Tuba*, or "Bass Trumpet," following a valid organological definition in which "trumpet" is, according to the *New Grove Dictionary of Musical Instruments*, the "word used to denote some or all of the lip-vibrated wind instruments, depending on the system of classification."

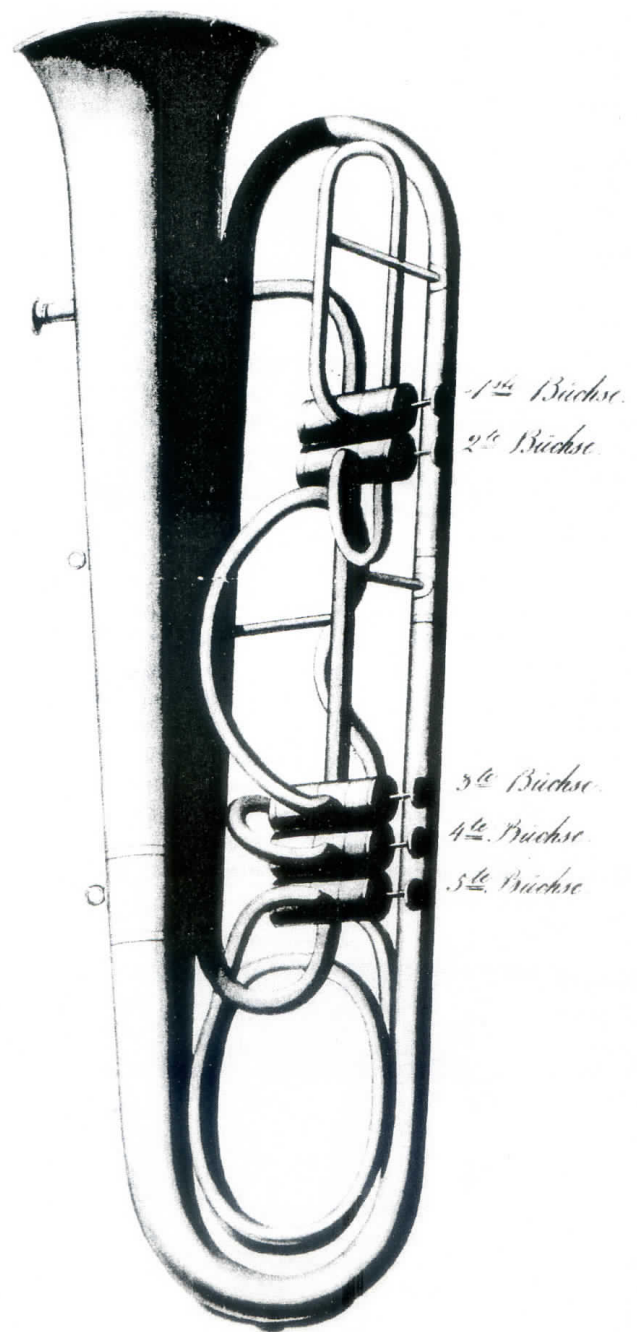
Entry of the Brass

This survey began with considerations of vocal music and, following

the decline of the Roman Empire, music for voices remained, technically and artistically, far superior to music played on any kind of instrument. While in Europe vocal music grew increasingly complex and expressive, the process of developing techniques for string and woodwind instruments was slow. The greatest problem for brass was that of devising a means of playing more notes than were available from the basic harmonic series. Techniques for bending brass tubing (by filling the tube with molten lead or pitch before bending and melting this out afterwards) were formulated around 1350, and shortly after this the slide-trumpet appeared, in which the player held the section of tubing holding the mouthpiece with one hand while moving the other section out to one of three or four positions. Probably around 1420 the trombone came into existence: *tromba* is Italian for "trumpet," so *tromba* ("trumpet") plus *one* ("a bigger version") became the logical name for this instrument. (The alternative name "sackbut" derives from a less certain source.)

For the first time, it became possible for a lip-vibrated instrument to contribute lower notes to an ensemble, adding a welcome new power and sonority. The earliest known extant tenor trombone was made in Nuremberg in 1551; a contrabass trombone, an octave lower, made in Stockholm dates from 1639. While the instruments are cumbersome by modern standards, they could cope well with the demands of contemporary music (and there is a piece of Venetian music with trombone sixteenth-notes dating from 1620). But there may have been an even more important aspect of the trombone. Marin Mersenne, writing in 1636, stated that "it should approach the softness of voices." This was perhaps the first time that a brass instrument had been considered anything other than a device for providing a greater volume of sound than other available instruments.

The alternative method to a slide for increasing the number of available notes on a lip-reed instrument is through the woodwind principle of progressively shortening the tube using finger-holes. As tends to be the case in the development of our family of instruments, the next stage began with one of treble pitch when



Baß-Tuba as illustrated in Wieprecht's Patent document of 1835.

around 1500 the prototype cornett appeared. Usually made of wood and about 60 cm (2 feet) long, with either a separate or an integral mouthpiece, it soon became the favourite wind instrument for virtuoso display. Appearing more or less at the same time as the trombone, it also became the normal treble partner to trombones in instrumental ensembles. These new instruments were able to play the same musical lines as the singers they accompanied. In addition, there were a cornettino pitched a 5th higher and a tenor cornett pitched a 5th lower, often with an additional finger-hole covered by a key.

It was the acoustic principles of the cornett that led to the invention of the serpent around the year 1590—finally, a real bass instrument (and one that for peculiar acoustic reasons often sounded more like a contrabass). We conveniently tend to call lip-reed instruments by the familiar name of “brass.” This being so, it seems extraordinary

that the inventor of the serpent decided that it should be made from wood. Was this simply because it seemed like a sort of woodwind instrument and should therefore adopt that material for its construction? (Musicologist Cecil Forsyth considered it an “obsolete wood-wind” instrument in his *Orchestration* of 1914/35.) Was it the (mistaken) belief that wood would confer a more “vocal” tone to this instrument that was associated from the beginning with church choirs?

It certainly was not the case that wooden construction was easier, quicker or more convenient. When the pioneer early instrument maker and player Christopher Monk decided to try to make serpents more widely available in the 1980s, he began operations by carving an instrument from the plank, following traditional methods. Working at it day-by-day, it took him nine months from start to finish. He eventually solved the problem by adopting sophisticated metal-working machinery, but the

point is that previously serpent construction was a very laborious process.

We may return in more detail to the question of the wooden serpent in a future *ITEA Journal* column, but for now we need to consider a later development: the ophicleide, at last literally a brass instrument, for all that it maintained the serpent’s pitch-changing principle of finger-holes. Jettisoning the serpent’s curves (probably because there had subsequently been numerous versions of bassoon-shaped upright serpents), the form of the ophicleide was indeed that of a metal bassoon: two vertical tubes joined at the base, a crook for adjusting overall pitch, and a bell.

Musician and Craftsman Create the Perfect Instrument

Before the ophicleide appeared in France in 1821, there had already been instruments with valves elsewhere, although of higher pitches. Arriving at the valve as the solution to the missing notes of the harmonic series had been an arduous process. There were many failed experiments, and even the very concept of the valve as a means of providing extra notes took time to be reached. The first really viable valve, for example, was invented by a horn-player simply to speed-up the task of changing crooks, a vital, but frustrating, part of hand-horn technique.

The invention and more-or-less perfection of the valve as we know it was complicated enough to result in a decade of litigation, but by 1830 a Prussian guards band had adopted valved instruments. Five years later bandmaster Wilhelm Wieprecht and instrument-maker Johann Gottfried Moritz patented their *Baß-Tuba*, arising out of Wieprecht’s “need of a true contrabass wind instrument.” The real breakthrough had been Moritz’s ability to make a large-diameter piston-valve (the *Berlinerpumpventil*) which overcame the problem of leakages found in previous makers’ attempts to make anything of wider bore than valves for french horn or trumpet. This solution was,

incidentally, a textbook case of musician and craftsman working together to advance the cause.

By 1835, the great classical composers were joining in that great coda in the sky. The last of these greats, Beethoven, had died eight years earlier, and Bach, Handel, Haydn, Mozart and hundreds of lesser musicians whose music we still hear today had preceded him long before. So it’s salutary to consider the big question: how did they manage without ever having heard a tuba, or seemingly even needed a tuba?

The answer lies in the increasingly fast development of instrumental music during this period. Here is the instrumentation of Mozart’s last symphony, in 1788: strings, flute, 2 oboes, 2 bassoons, 2 horns, 2 trumpets, and timpani.

Beethoven’s last symphony, 15 years later in 1823 included strings, piccolo, 2 flutes, 2 oboes, 2 clarinets, 2 bassoons, double bassoon, 4 horns, 2 trumpets, 3 trombones, timpani, organ, and four-part choir.

Note that when Beethoven felt the need to strengthen his string double-basses, the only wind instrument available was the double bassoon. (Handel had tried the same solution in *Music for the Royal Fireworks* of 1749, an open-air performance so spectacular and chaotic that as a surprise climax the pavilion burnt down.)

When Berlioz composed his *Symphonie fantastique* (1830/31), he scored for strings, 2 flutes (1 doubling piccolo), 2 oboes (1 doubling English horn), 2 clarinets (1 doubling Eb clarinet), 4 bassoons; 4 horns, 2 cornets, 2 trumpets, 3 trombones, 2 ophicleides; 4 timpani, cymbals, side drum, bass drum, bells; 2 harps.

Although considered avant-garde (and admittedly somewhat given to excess), Berlioz was really at a pivotal point so far as instrumentation was concerned. Initially in this work he had specified serpent and ophicleide rather than two ophicleides; these were dictated to some extent by the music’s programmatic nature. Yet just a few years later he was sufficiently aware of the tuba’s unique qualities that in the *Grande*

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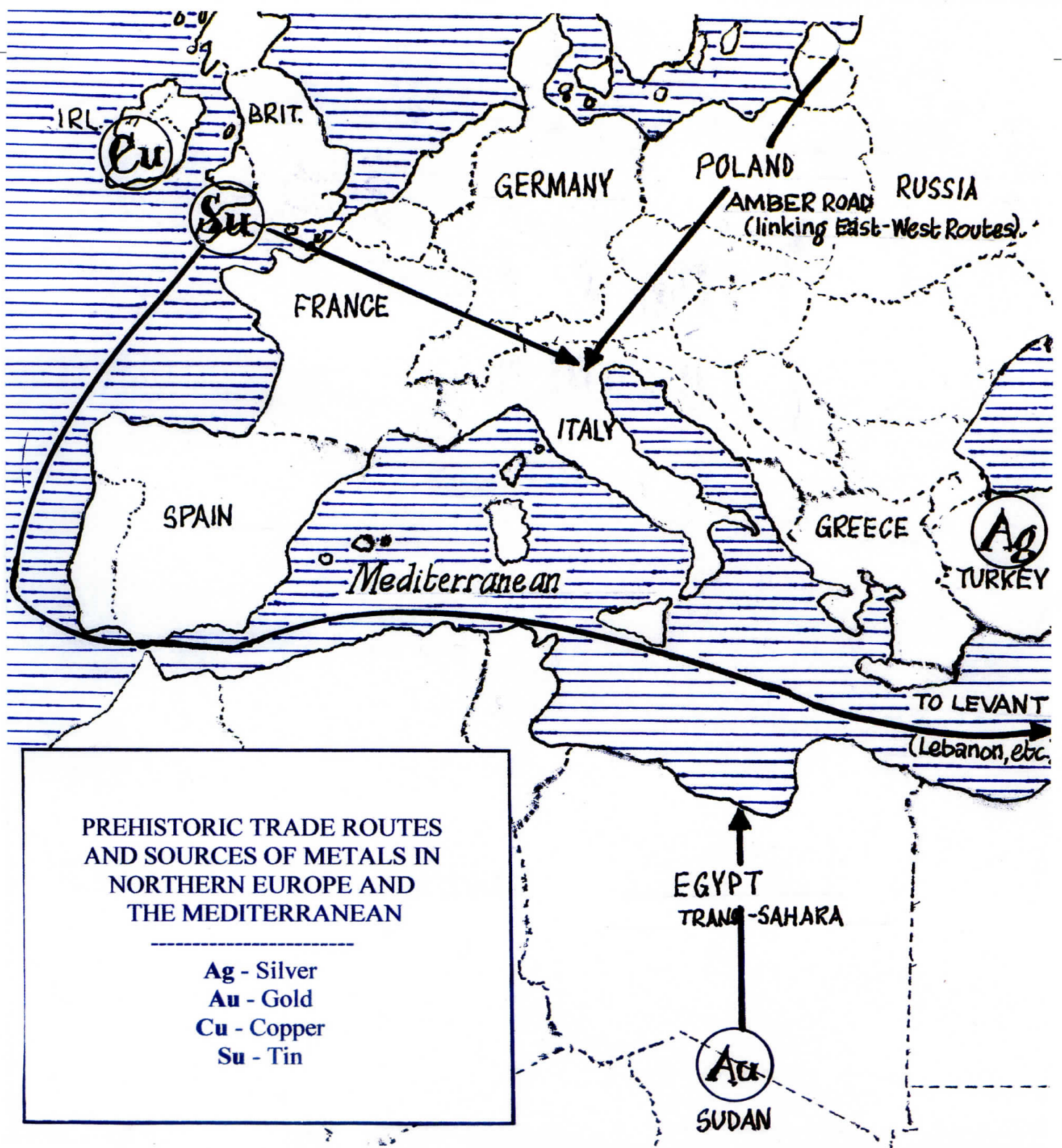
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Prehistoric trade routes and main sources of metals used for musical instruments

Messes des Mortes he included a tuba under the common French name of *Bombardon* (*ophicléide monstre, à pistons*).

Who could now doubt that the tuba was here to stay? With-

in ten years of its invention, Wieprecht and Moritz claimed to have sold no fewer than 84 to military bands and opera house orchestras throughout Europe. It is interesting to speculate on how many have been bought since

then. Ask any composer—if the tuba didn't exist, someone would have to invent it. Fortunately, a military bandmaster and an instrument-maker already have.

We've come a long way in the 60,000 years or so since some

Neanderthal's first guggings and gurglings, but now we can at last be sure that the tuba is here to stay.

Can't we...?

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