

# Extant Silver Pipes from Ur, 2450 BC

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## PREVIOUS WORK

When Woolley excavated at Ur (southern Iraq) in 1926–28, he found a pair of silver pipes in private grave PG / 333 (PG. 333).<sup>1</sup> These were given to the University of Pennsylvania Museum of Archaeology and Anthropology, Philadelphia (formerly ‘The University Museum, Philadelphia’), where they have received little attention. The excavation report had a sketchy drawing (Woolley 1934, 259; reproduced in Fig. 1a), and brief description: “The apparently meaningless mass consists of silver tubing, with a total length of 0.408 m.; it is broken into five pieces, but may originally have consisted of two parts each of an approximate length of 0.260 m. Along one side of each there are five (?) holes 0.006 m. in diameter placed at intervals of 0.025 m.; the last hole comes at 0.025 m. from the end of the tube, and the first at 0.14 m. from the unbroken end which may be the mouthpiece. At 0.07 m. from the (complete) end of one tube there is a double incised band, and a similar band on the second tube close to its broken end. ...the slenderness of the pipe suggests that it is directly inspired by its original, the reed of the marshes; the intervals may help to throw light on Sumerian music as a whole”. Based on that description, the pipes would have looked like Fig. 1b.

In the 64 years since Woolley’s publication, several scholars have attempted to evaluate the pipes more fully. But none examined the material in the museum first hand. As a result, dimensions are inaccurate and fingerholes are wrongly counted.

The first attempt was published by Francis Galpin (1937, 94). The reason for his failure emerges from the correspondence between him and the museum staff 1934–36.<sup>2</sup> Being 74–76 years, he could not undertake the long journey from England, and had to rely on information provided by the museum staff. According to his first letter to Dr. Leon Legrain, the museum curator in charge, he had made a facsimile based on the staff measurements. It had five fingerholes in each pipe. When fitted with reed mouthpieces it gave the scale C–D–E–F–G–A. On August 1, 1934 he

acknowledged a letter which had announced that a third pipe had been found in the collection, and asked if it also had five finger holes. No answer seems to have ensued, and he repeated the question in several subsequent letters. On June 11, 1935, when his book *The Music of the Sumerians and their Immediate Successors the Babylonians and Assyrians* was being prepared, he had been told of still more pipes in the museum. Each pipe was now thought to have only four finger holes. Because of the confusion, the book ended up with no picture apart from a curious photo montage where bent fragments had been pasted on top of imaginary straight pipes (Fig. 2). The measurements given in a note (Galpin 1935, 94), imply two identical pipes, each with four finger holes (Fig. 1c).

The next mention came eight years later when Curt Sachs invoked the pipes to derive an ancient scale system. “One [pipe], with four fingerholes”, he declares, “is broken and must be disregarded; the other, with only three holes, is arranged in the ratios: 10:9:8:7, that is approximately in whole tones (182–204–231 Cents)” (Sachs 1943, 73). Judging by the ratios, he assumed a pipe length of 25 cm and a hole spacing of 2.5 cm (Fig. 1d). However, we recognize that pipe lengths alone do not determine pitches, since mouthpieces add lengths. The effective length of the air column is difficult to estimate, but it certainly differs substantially from the geometrical length. The reeds have perished, and scales cannot be determined.

Twenty-six years elapsed before the next reconstruction (by Joan Rimmer), reproduced in Fig. 1e. Like earlier suggestions, one pipe has four holes, but the other has only one. Although the

<sup>1</sup> Woolley’s PG / designation has been relabeled by Moorey (1977) to reveal their royal (RT.) and private (PG.) nature.

<sup>2</sup> Nine letters from Galpin are preserved in the museum (Near Eastern Section; Legrain; Box 7; Correspondence; E–G), but none sent from the museum to him. His first letters (Feb 15, 1934) to the director of the Babylonian Collection, Dr. Leon Legrain is followed by four to Miss Cross (May 16, 1934; Aug 1, 1934; Dec 26, 1934; May 12, 1935), and two to Legrain (Nov 6, 1935; June 3, 1936).

reconstruction is wrong. Rimmer's comments on reeds are apt: "The difference between sounding with single reeds and with double reeds, often mistakenly taken to be a distinction of instrumental type and sound, with the former making 'clarinet' and the latter 'oboe', is in fact only a difference of degree within the clarinet type, for the basic acoustic behavior of a reed instrument depends on the shape of its bore, not the single or double nature of its reed. ... Single reeds, like those used in present-day Mediterranean pipes (which are generally parallel, apart from the divergent triple-pipe *launedda* of Sardinia) ... are not controllable [in dynamics]" (Rimmer 1969, 36).

Finally, there was a lengthy discussion by Collinson (1975, 9–16), but no new details emerged. Instead, he asserted that objects buried in the tomb were tools for making pipes and cleaning wax from fingerholes. This is pure speculation, as is his statement that the deceased "was a man publicly admired and perhaps loved in life for his music" (1975, 14).

## THE EXTANT SILVER PIPES

According to Woolley's report (1934) the pipes were broken into five pieces. Meanwhile, extra pipes were reported to Galpin. Many of the original pieces have now (1997) split into further fragments, with 17 shown in Fig. 3. Fortunately, there are several early photographs of the pipes in the museum archive, and these offer valuable guidance. Some photos have not been published previously, and none is dated. The one shown in Fig. 4 must be the earliest since the pipes are not yet cleaned and conserved (before 1933?). Figure 5 is probably next. Figures 6 and 7 have both been published (Rashid 1984, 47). I have identified the different pipe segments and added consistent labels to Figs. 3–7. These identifications constitute the main research of this paper. Once this had been done, the measurement itself was a straightforward matter (the scale is given in Fig. 7).

Figure 4 shows two tightly folded bundles, with three segments in each (A1–A2–A3; B1–B2–B3). When cleaned, these became the two silver pipes reported by Woolley. Most likely, the other fragments (C–G) were the extra pipes reported to Galpin. The latter fragments were not mentioned in Woolley's excavation report or dig notes. Compared to pipes A and B, fragments C and G are in a worse state of preservation, and this fact suggests that they came from different tombs. Because of their poor condition, one cannot identify fingerholes or tell which fragments belong together.

The bundles in Fig. 4 show exactly how the parts were joined to form two pipes, as clarified in

Fig. 8. In Woolley's reconstruction parts B1 and B2 are erroneously reversed 180°. As a result, the ends labeled x do not meet, neither do those labeled y. A similar error occurs in Fig. 7 where B2 is reversed.

Each pipe has one end that looks 'definite', i.e. has a square cut and good finish. In other words, some parts are missing. On pipe A, the missing part occurs on segment A3. But two of the early photographs (Figs. 5 and 7) seems to show the missing part, because piece A3 is longer there than on Figs. 4 and 6. Figure 4 shows a fragment – not attached to A3 – which may be the missing end, and I have drawn a curved line to indicate the connection. I assume that the people who arranged photographs 5 and 7 knew that the piece belonged to the end of A3. This 'missing end' is no longer in the museum.

The finger holes are distinctively cut (Fig. 9), and the spacings between them is easily measured. Two parallel lines encircle each pipe near the middle. When the two pipes are placed with the double lines at the same level, three fingerholes line up on both pipes (Fig. 1f). This correspondence, presumably, indicates that the measurements are correct. On the A-pipe we know the length above the double line, and it is probably duplicated on the B-pipe. Both pipes are, then, 24.0 cm. One has four fingerholes, the other three.

A glance at Fig. 1 shows that none of the earlier reconstructions have correct dimensions or fingerholes. The pipes do not have exactly circular cross sections, since they were made from a rolled up flat sheets. The procedure formed an open seam (Fig. 10) extending along the underside of each pipe. The seam was surprisingly narrow and well aligned but not soldered. Since instrument pipes must be air tight, the seam would have been covered with some sealant like bee's wax or bitumen. The outer diameter of the pipes was 4–5 mm and the wall thickness 0.5–0.8 mm.

Made of silver, they were luxury objects. The tradition continued three centuries later when inventories at Ur list pipes made of gold and silver as well as bronze (Legrain 1947, nos. 730 and 745).

## THE REEDS

Tubes with fingerholes can either be flutes or reed instruments. The former can be ruled out since there are no notches, embouchure holes, or other details typical of flutes (Baines 1977, Fig. 31). Being reed instruments, each pipe would have had a mouthpiece possessing a single or double vibrating tongue. But the mouthpieces have perished, and their reconstruction is hypothetical. Unfortunately, they greatly influence the sound, and any

statement about tuning and scales rests on uncertain grounds.

Woolley remarked that the pipes were directly inspired by the reeds of the marshes:

“Indeed, the marshes of southern Iraq provide an ideal environment for reeds (*gramineae*), rushes (*juncaceae*), sedges (*cyperaceae*) and other grasses. It is difficult, I am told, for a botanist to describe or identify the many species of the plant that exist here because of their extraordinary variety and the similarities of their basic structures. During the excavations I became quite interested in the ways reeds and rushes were used by people in the surrounding villages. Reeds are called *gasab*, rushes are known as *bardy* and sedge is *kaulan*. Although the inhabitants clearly know what kind of growth each plant will produce, the difference between the words ‘*gasab*’ and ‘*bard*’ in common usage seems to be largely on function rather than scientific botany. Young reeds can be referred to as *bardy* when harvested, as can certain sedges. The term *gasab* is usually confined to the growth of the larger, thicker plant even if in reality they are a variety of rush and sedge” (Ochenschlager 1992, 54).

Double-pipes made from reeds are now played in many parts of the Islamic world (Jenkins and Rovsing Olsen 1976; Picken 1975; Simon 1995). Each pipe of an Iraqi instrument, f.i., consists of two reed-tubes of different diameters. Typically, the wide tube has an outer diameter (OD) of 13 mm, a length of 20 cm, and contains six fingerholes. The narrow tube (the ‘mouthpiece’) has an OD of 7 mm and contains the vibrating tongue. The latter is cut out of the mouthpiece itself, a construction known as an ‘idioglot’ tongue. There is an air-tight seal between the mouthpiece and the wide tube.<sup>3</sup>

Our Sumerian silver pipes have an OD of 4–5 mm, i.e. they are much narrower than the pipes just mentioned. If reed mouthpieces were fitted inside the silver pipes, their ODs need to be 3–4 mm; if they were outside, the ODs would be 5–6 mm.

Beside the Islamic double-pipe mentioned above, idioglot reeds are used in the drones of bagpipes. Here, too, the dimensions are usually much larger than on the silver pipes, ca. 15–23 mm (Baines 1977: 90). But narrower gauges are used in rare cases. The drones of Northumbrian and Union bagpipes have ODs of only 4–6 mm (Baines 1977, 89–90). Likewise, musettes and Highland small-pipes have narrow drone-reeds (Baines 1960, 125–131).

Because of the tiny diameters of the silver pipes, marsh reeds may not have been the ‘direct’ inspiration. Perhaps wheat plants (*triticum aestivum*, Fig. 11) were.<sup>4</sup> In fact, the stems of mature wheat plants fit snugly inside the silver pipes.

In Mesopotamia wheat harvest took place near the month of May after nearly five month’s growth (Meissner 1932). As harvest approached, the root and lowest few segments of the stalk have dried, and moisture no longer rises from the root. In Europe children’s toy pipes are still made: the stem is cut near the knots (Fig. 12), and a tongue is cut with a sharp and thick knife. This procedure forces the tongue to bear away slightly from the stem. The tongue is adjusted until the pipe plays well for any combination of fingerholes. If the frequency of the tongue is too low, it can be increased by shortening the effective length of the tongue, e.g. a thread may be wound around the base of the tongue, as illustrated in Fig. 13. If the pitch is too high, one may (i) scrape the base of the tongue to make it less stiff, or (ii) put a small lump of wax at the tip of the tongue to increase its vibrating mass.<sup>5</sup> Such techniques are well-known today and probably were likewise in ancient Ur. Although idioglot wheat plants are most easily found, they only last for a limited period (weeks). Reeds are more tenacious, but pipes may not necessarily have been played the year round. Perhaps Sumerian pipe music was seasonal. The most famous piper, Dumuzi, certainly embraced cyclic behaviour with a one-year period, see below.

#### PIPES, ‘KILLED’ AND BURIED

The two pipes described here are the oldest extant wind instruments, more than 500 years older than the oldest surviving Egyptian instrument, a set of Middle Kingdom flutes made of reed. As Fig. 4 shows, each pipe had deliberately been bent into three segments of nearly equal lengths and crunched into a compact bundle. The procedure rendered the pipes unplayable. This destruction of the pipes contrasts with the careful burial of the string instruments at Ur. Many had been clad with silver and/or gold foils to adorn/preserve them in afterlife.<sup>6</sup> Of course, with only two surviving wind instruments, general conclusions must be drawn cautiously, but it is tempting to look for a deeper

<sup>3</sup> The dimension are taken from a double pipe kindly supplied by Dr. E. Ochenschlager, September 1998. It was made ca. 1970 by a villager living in the marshes of southern Iraq. These marshes have now largely been destroyed.

<sup>4</sup> In folk tradition, wheat stalks are still fashioned into musical pipes, although usually considered children’s toys.

<sup>5</sup> Reed manufacture for concert instruments is exhaustively discussed by Baines (1977, 76–90), and for Greek bagpipes by Anoyanakis (1979, 180–182). To dry and prolong their useful life, Greek reeds are heated in milk, vinegar, or oil.

<sup>6</sup> Six chordophones are cited by Lawergren and Gurney 1987: table 3. Note: the ‘Boat-shaped lyre’ in Philadelphia has recently been examined by de Schauensee (1998).

significance of the pipe destruction. Two explanations come to mind:

I. The first is based on Mesopotamian mythology. Several Mesopotamian texts associate pipes (Sumerian *gi-irra*, *gi-gíd*, *di-di* [from *gi*=tube], Hartmann 1960, 108–112; Ebeling 1957–1971) with the shepherd-god Dumuzi who was the lover of the goddess Inana (Black and Green 1992, 72, 108). One story, *The Descent of Ishtar to the Underworld*, tells of her death and subsequent wish to return to the realm of the living. Her wish was granted when Dumuzi took her place in the underworld, an act he periodically repeated. The pipes fell silent when he descended to the underworld; when he returned the pipes were again played, and the living rejoiced (Dalley 1988, 160). Perhaps the destruction of the pipes in PG/333 was a reference to the silence of Dumuzi's pipes in the underworld.

II. An alternative explanation is based on a hypothetically status difference between strings and winds. Our pipes are much smaller than strings and would have been more easily manufactured. The pipes were found in a private grave whereas most string instruments were in the royal tombs (i.e. in the Great Death-pit [PG / 1237; RT. 1237] and in Queen Pu-abi's tomb [PG / 800; RT. 800]).

This may have imbued low status to the pipes, making them unfit for the hereafter.

Such a status difference existed two millennia later in Classical Greece. One manifestation is seen in the contest between Apollo and Marsyas. Apollo's lyre triumphed over Marsyas' pipes, and the piper was severely punished (Michaelides 1978, 198). But Greeks had ambiguous feelings about pipes. At the same time as their musical potential was acknowledged, they were regarded as lacking in dignity (West 1992, 82) and philosophers considered them unsuitable for the education of youth (Michaelides 1978, 45). Lyres, on the other hand, were esteemed across a wide spectrum of Greek society: gods – such as Apollo – play it on vase paintings, heroes – such as Achilles – master the lyre and the sword alike (*Iliad* 9.186ff), mythological figures – such as Orpheus – live by it, and philosophers used it metaphorically (on his last day Socrates drew a parallel between lyres and his soul, Plato *Phaedo* 85E–86B). Lyres were greatly recommended as an educational tool (*Plato Clitopho* 407C, *Theages* 122E).

I am most grateful for the help of two eminent scholars. Richard Zettler brought the silver pipes out of the depths of the museum storage and found Galpin's correspondence. Edward Ochenschlager sent highly relevant articles and reed pipes.

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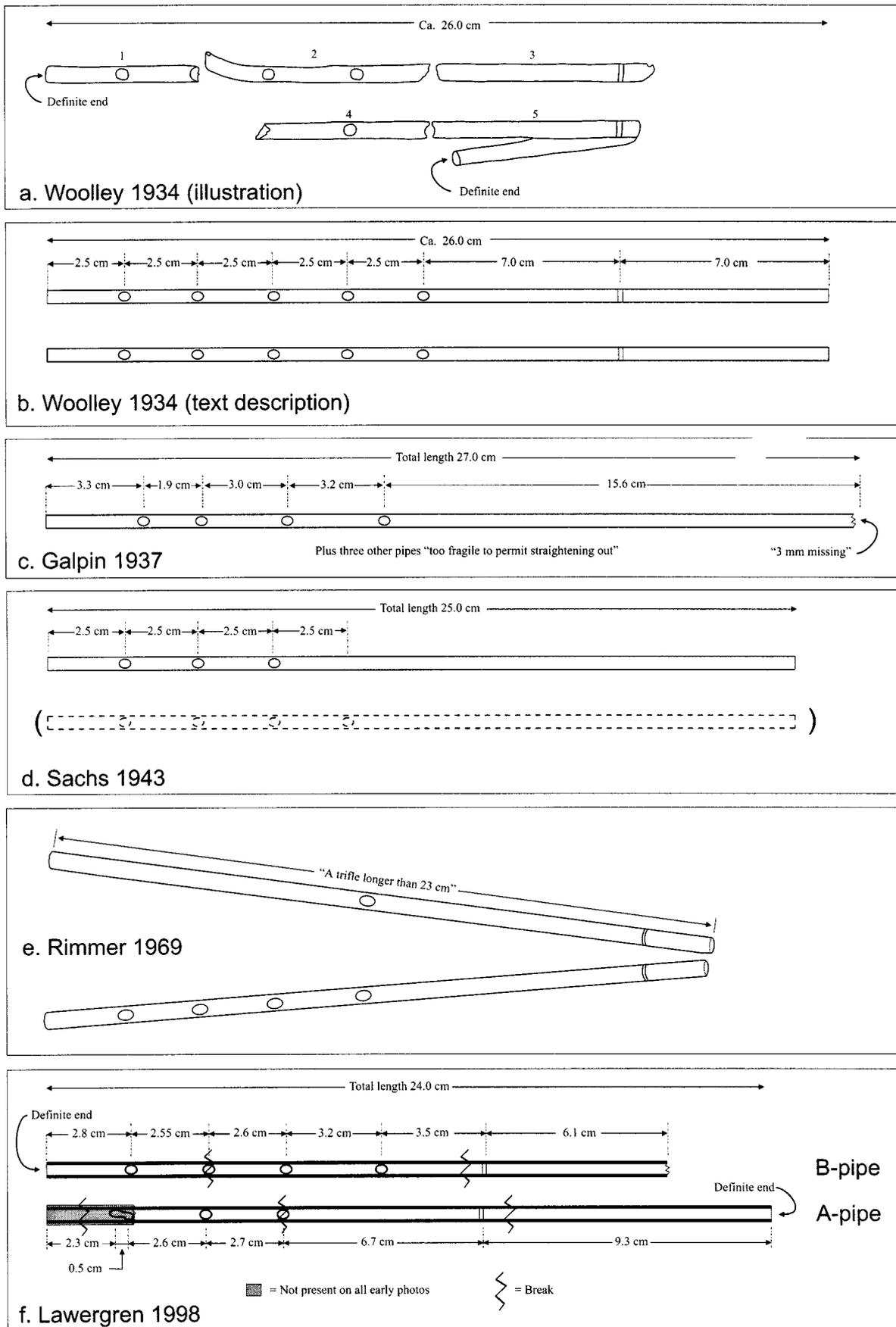


Fig. 1 Various reconstructions of the two main silver pipes.

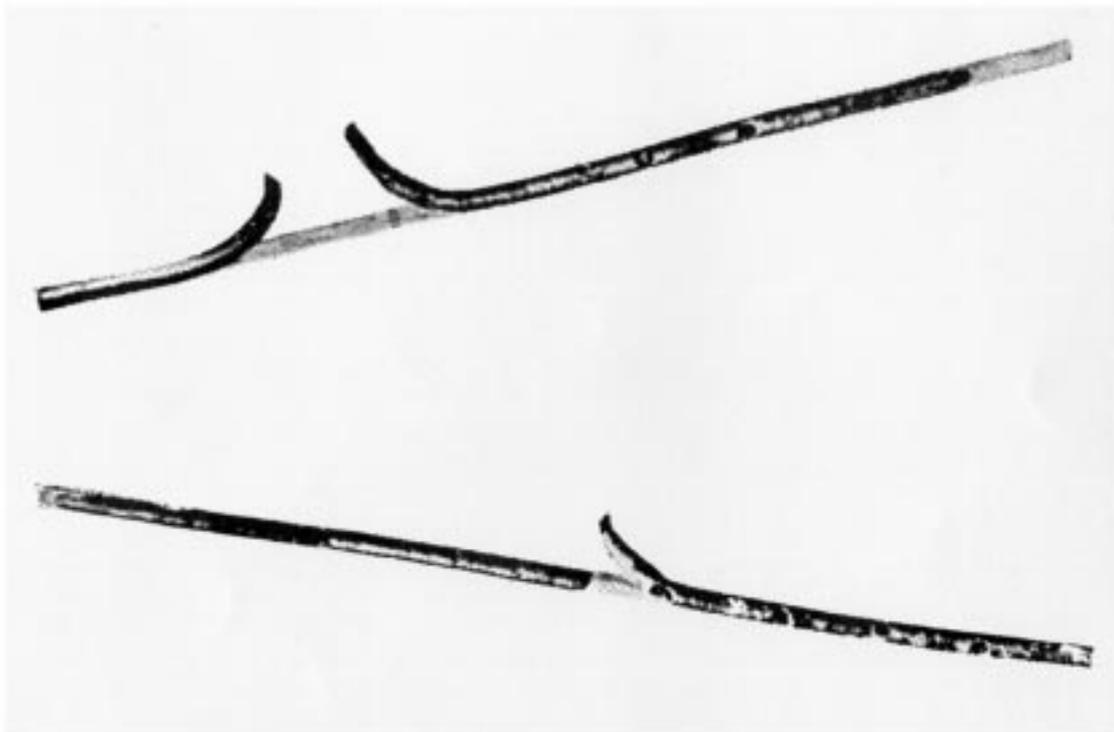


Fig. 2 Galpin's enigmatic reconstruction (1937: pl. iv,3).

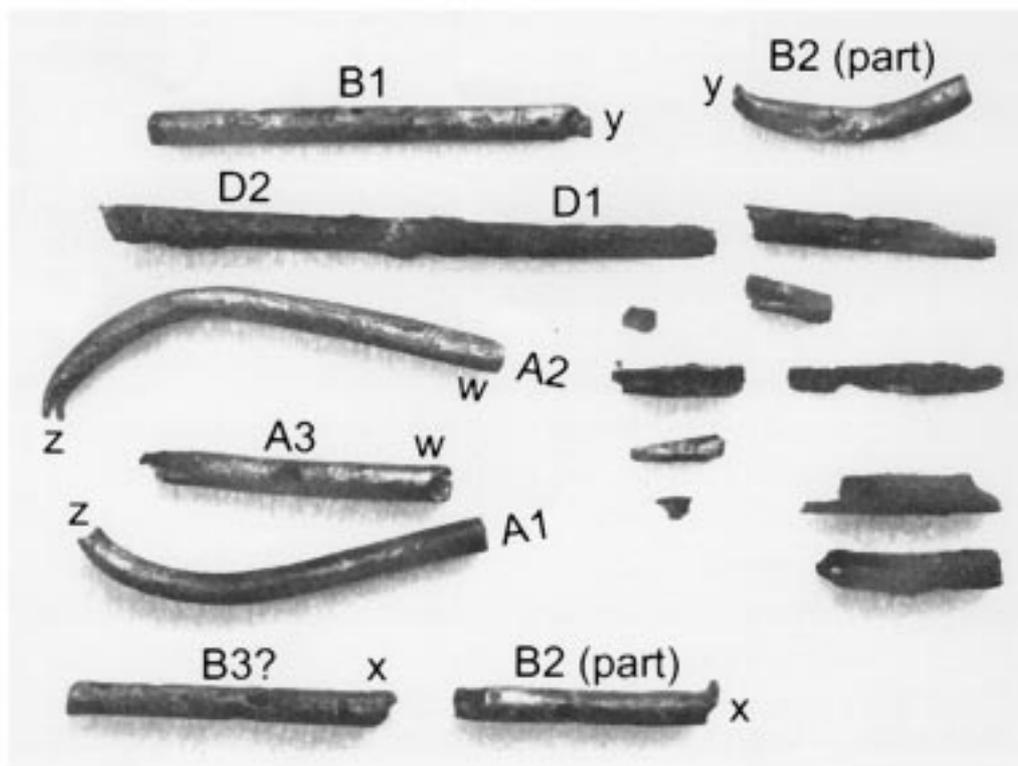


Fig. 3 All pipe fragments in their present (September 1997) condition.

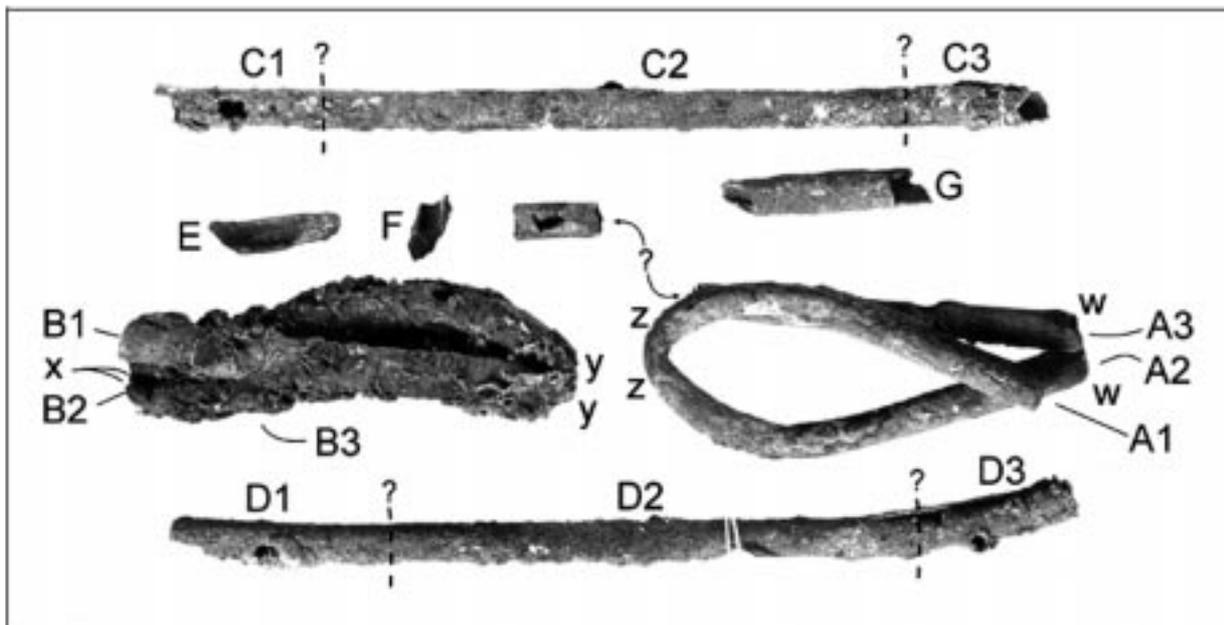


Fig. 4 Old photograph of all silver pipes before cleaning. University of Pennsylvania Museum, Philadelphia (Neg. # S8-8249).

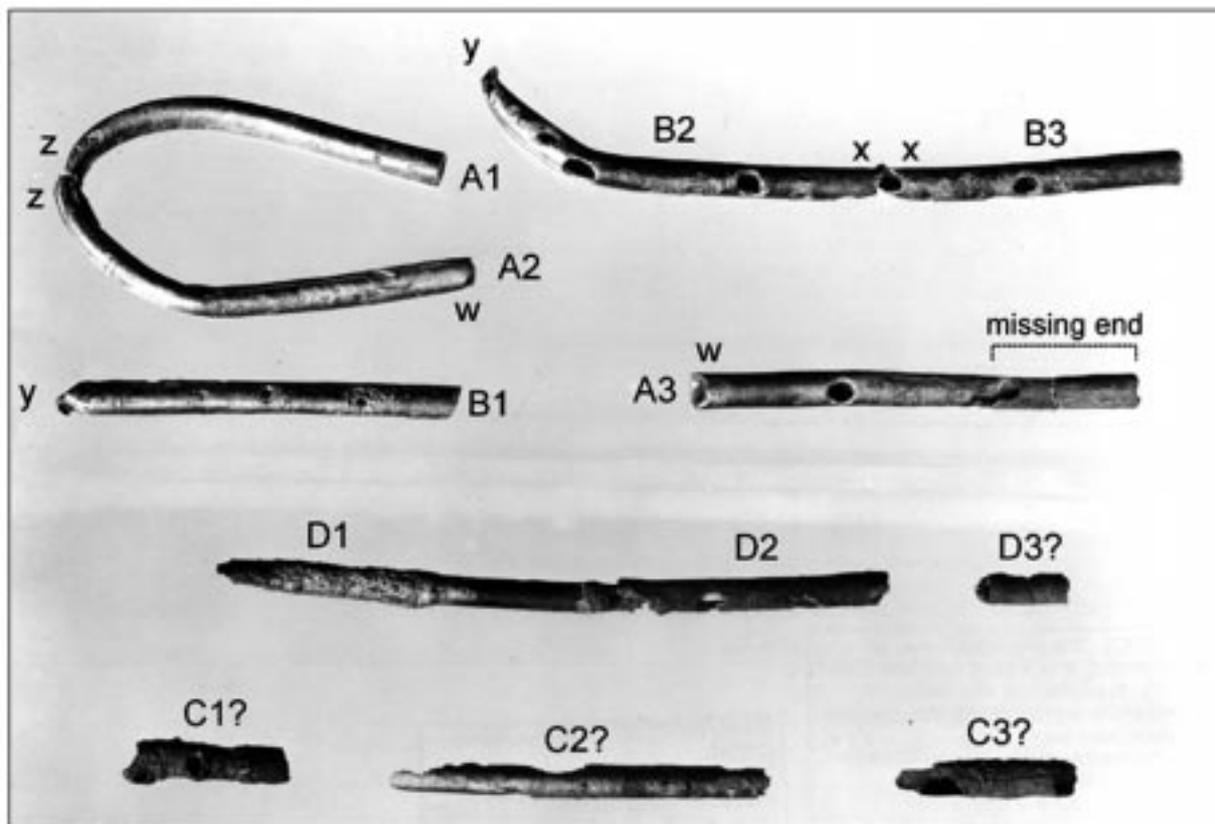


Fig. 5 Old photograph of all silver pipes after cleaning. University of Pennsylvania Museum, Philadelphia (Neg. # S8-8253).

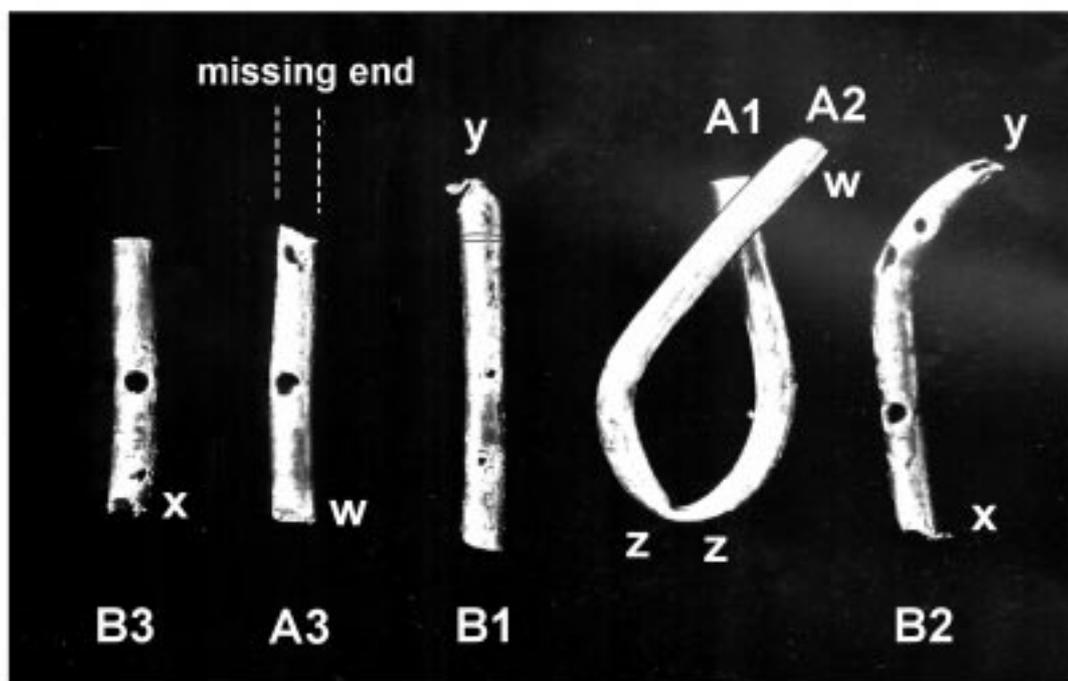


Fig. 6 Old photograph of the parts constituting the two main silver pipes (with a section of A3 missing).  
University of Pennsylvania Museum, Philadelphia (Neg. # S8-8250).

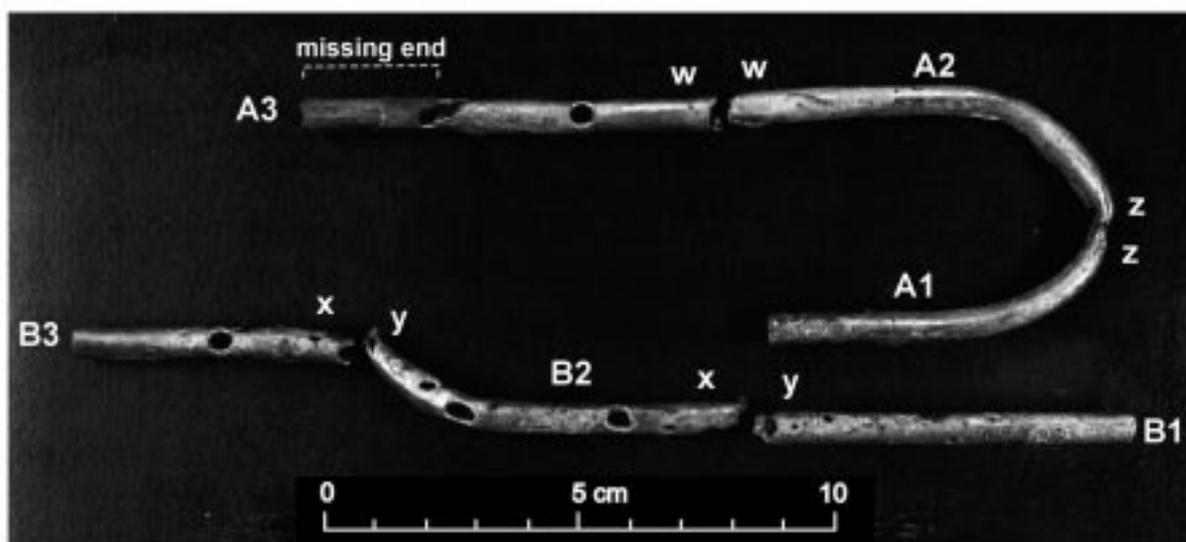


Fig. 7 Old photograph of the parts constituting the two main silver pipes (with B2 reversed).  
University of Pennsylvania Museum, Philadelphia (Neg. # S8-8251).

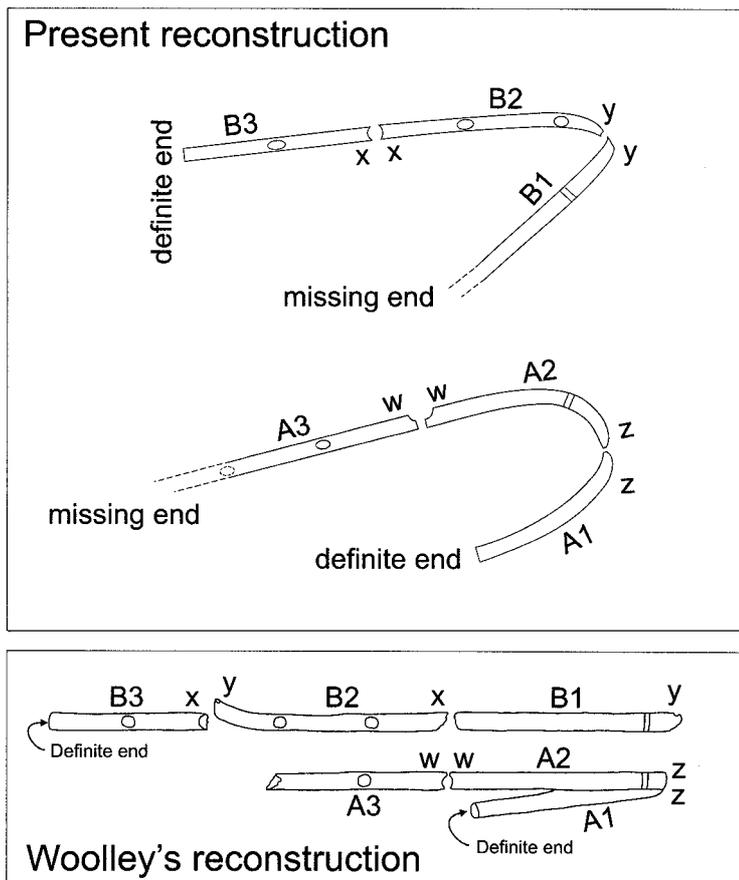


Fig. 8 Joining the parts in Figs. 3-6 to make two complete pipes. Top: The present reconstruction (not drawn to scale). Bottom: Woolley's reconstruction (from Fig. 1 with added labels).

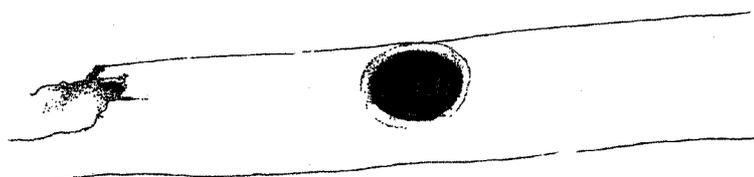


Fig. 9 A fingerhole.

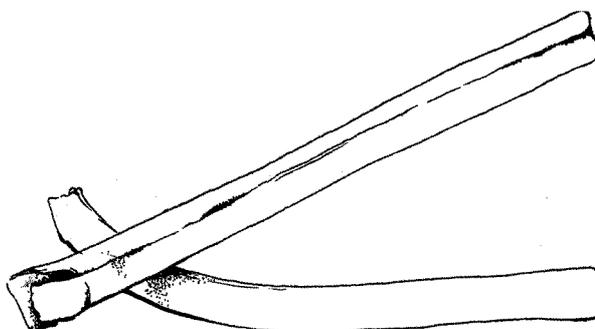


Fig. 10 The seam along the pipe.

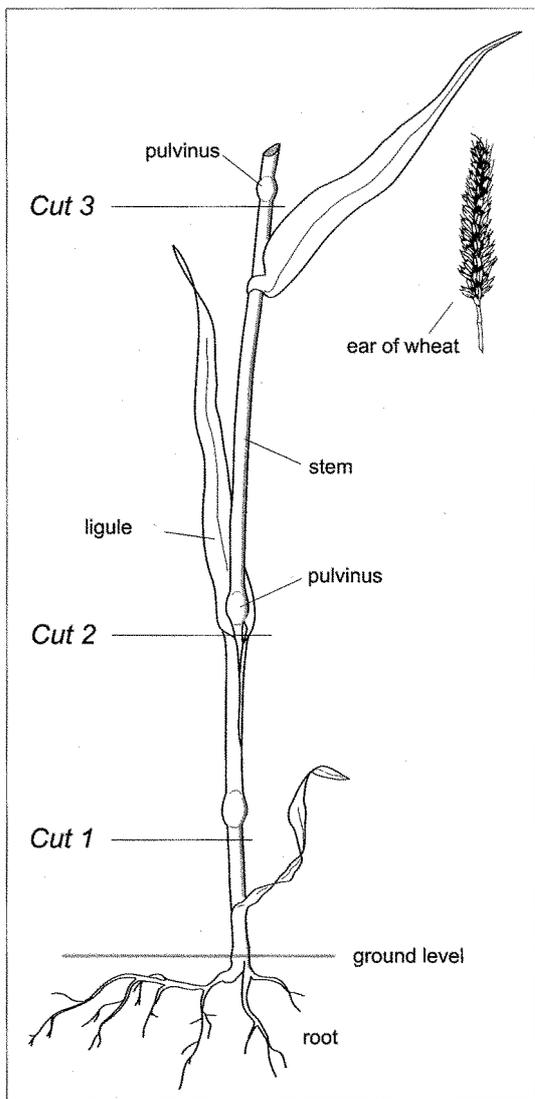


Fig. 11 A wheat plant at the time of harvest.

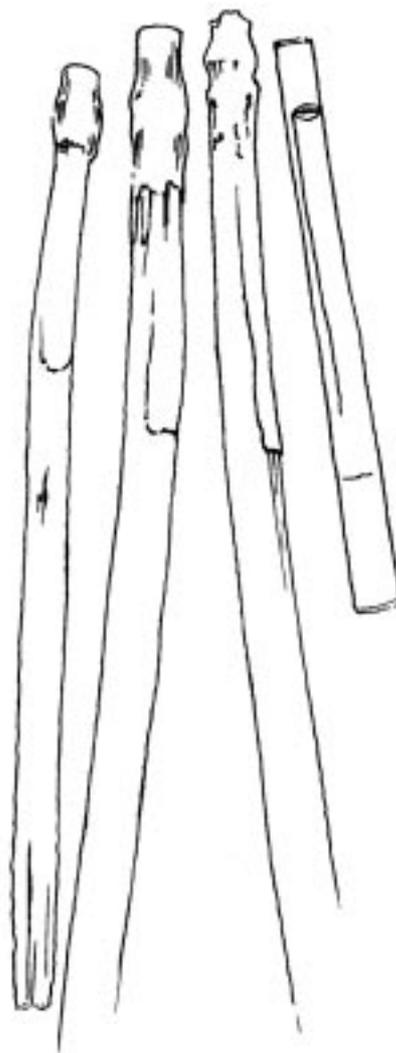


Fig. 12 a-c Stems cut at the knots with cut-out tongues.

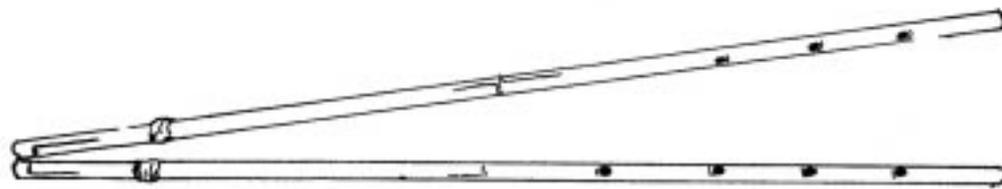


Fig. 13 A reconstruction of the pair of silver pipes. The wheat reeds were cut in late August 1997 on a Danish field.

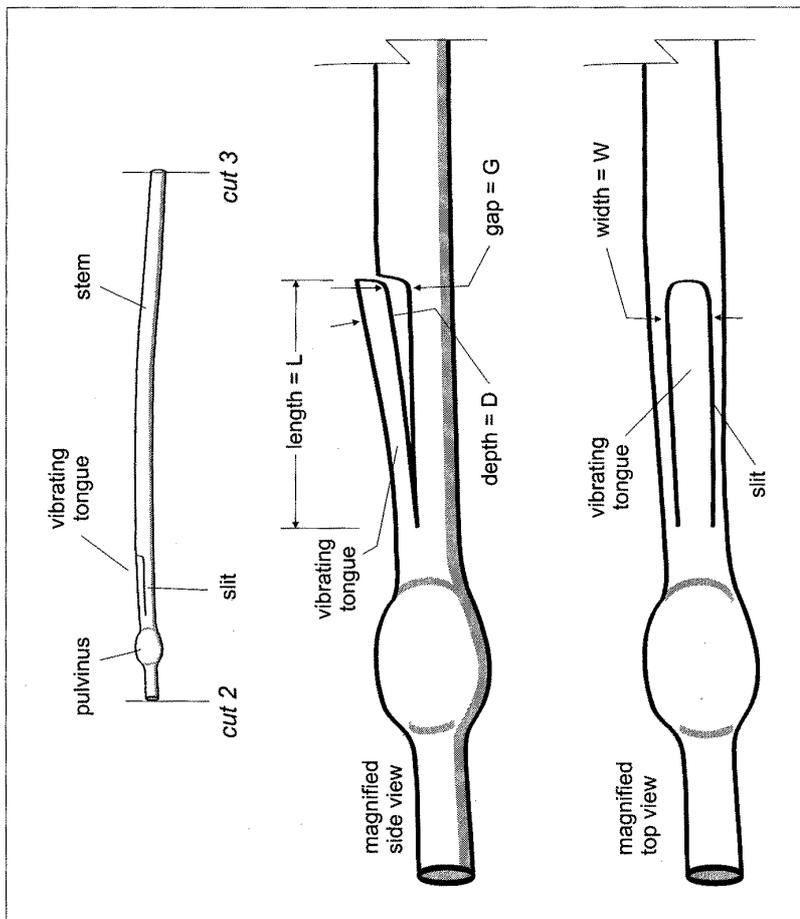


Fig. 12 d A single reed made from the stem of a wheat plant.