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A very distinctive smile: Etruscan dental appliances

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Marshall Joseph Becker

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Jean MacIntosh Turfa and Marshall Joseph Becker

Introduction

During the second half of the first millennium BCE, a few Etruscan and Italic noblewomen wore false teeth made with golden bands; they were buried with these prostheses in place, tempting items for modern *tombaroli* to extract. Few such dental appliances have come to us with proper contextual information, but even those separated from their owners’ bodies, including several that became Victorian collectors’ items, can still furnish a wealth of information about those who wore them and the technology used to construct them. They also pose some tantalising paradoxes and challenges to what we know about ancient technology and Etruscan and Italic society. In the past these appliances were studied somewhat haphazardly, as curiosities or as illustrations of the supposed advances in dentistry of an ancient civilisation. In some cases, nineteenth-century museums and private collectors commissioned copies of these ancient specimens for study or display. Many of these copies came to be treated as genuine, leading to great confusion in scholars’ attempts to tabulate and measure all the known examples. Further confusion has accrued because many authors over the last 200 years have simply repeated past scholarship and few had actually handled the original pieces. We attempt to correct this in our book, *The Etruscans and the History of Dentistry: The Golden Smile*, with Becker’s autopsy of all extant prostheses and study of the information from a few specimens that now are lost or unavailable for examination. The sophistication of Etruscan goldsmiths and the startling social traditions behind these appliances mark the only time in the history of dentistry prior to the modern era that such prostheses were developed and used. Our study of 20 band-appliances has found that the phenomenon has virtually nothing to do with medical practice or professional dentistry. The known wire appliances (W1–W7) are an entirely different category of prosthesis.

Dental appliances formed from thin gold bands, with inserted replacement front teeth, began to be used in Italy during the seventh century BCE. They are documented by relatively few examples, all apparently buried with their owners. These represent a range of several hundred years, perhaps down to the second century BCE, followed by a brief period in the first centuries
<table>
<thead>
<tr>
<th>Name, Location Measurements</th>
<th>Provenance, Date (BCE)</th>
<th>Sex</th>
<th>Jaw region</th>
<th>Type, Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Barrett I Formerly collection of Dr. Wm. C. Barrett, Buffalo, NY location unknown L. 20 mm</td>
<td>Etruria 5th c.?</td>
<td>F?</td>
<td>Maxilla left central incisor plus two more teeth</td>
</tr>
<tr>
<td>2</td>
<td>Barrett II as No. 1 L. 25 mm</td>
<td>Bisenzio, tomb on Capodimonte 500–480</td>
<td>F</td>
<td>Maxilla left second premolar to central incisor?</td>
</tr>
<tr>
<td>3</td>
<td>Van Marter Obtained by Dr James Gilbert Van Marter in Italy location unknown L. 25 mm</td>
<td>'Lake of Valseno' (Bolsena?) 600??</td>
<td>F??</td>
<td>Maxilla?</td>
</tr>
<tr>
<td>4</td>
<td>Copenhagen, National Museum inv. 8319 L. 21.6 mm</td>
<td>Orvieto(?) 500–490</td>
<td>F</td>
<td>Maxilla left central incisor to right lateral incisor</td>
</tr>
<tr>
<td>5</td>
<td>Poggio Gaiella Florence Museo Archeologico inv. 11782 L. 42 mm</td>
<td>Chiusine necropolis Poggio Gaiella tomb of 4th–3rd c.?</td>
<td>F</td>
<td>Maxilla left first premolar to right first premolar. Now in wrong skull and mandible</td>
</tr>
<tr>
<td>6</td>
<td>Populonia Florence, Museo Archeologico, inv. 84467 – lost in 1966 Florence Flood</td>
<td>Populonia, San Cerbone necropolis tomb of 4th c.</td>
<td>?</td>
<td>Maxilla? (all four incisors?)</td>
</tr>
<tr>
<td>7</td>
<td>Ghent, University Museum, looted by German forces, WW II L. 27 mm</td>
<td>'near Orvieto' ? tomb? of 6th c. or later</td>
<td>Maxilla (all four incisors?)</td>
<td>Complex band, three loops, four spaces</td>
</tr>
<tr>
<td>8</td>
<td>Bruschi I Tarquinia, Museo Nazionale Archeologico, Ex Bruschi-Falgarri L. 32 mm</td>
<td>(probably Tarquinia) 5th c.?</td>
<td>F</td>
<td>Maxilla all four incisors</td>
</tr>
<tr>
<td>Name, Location Measurements</td>
<td>Provenience, Date (BCE)</td>
<td>Sex</td>
<td>Jaw region</td>
<td>Type, Function</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------------------</td>
<td>-----</td>
<td>------------</td>
<td>----------------</td>
</tr>
<tr>
<td>9   Bruschi II</td>
<td>Territory of Tarquini?</td>
<td>F??</td>
<td>Maxilla</td>
<td>Four rings, one rivet (one false tooth, right central incisor?)</td>
</tr>
<tr>
<td>Tarquini, Museo Nazionale Archeologico, Ex Bruschi-Falgari</td>
<td>date unknown</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missing since 1916–1925 transfer. L. 29 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10  Bruschi III</td>
<td>Territory of Tarquini?</td>
<td>F</td>
<td>Maxilla?</td>
<td>Four braces, five spaces, no rivets, stabilising</td>
</tr>
<tr>
<td>Tarquini, Museo Nazionale Archeologico, Ex Bruschi-Falgari</td>
<td>2nd c.?</td>
<td></td>
<td>Teeth</td>
<td></td>
</tr>
<tr>
<td>L. 36.8 mm</td>
<td></td>
<td></td>
<td>displayed are not original</td>
<td></td>
</tr>
<tr>
<td>11  Corneto I</td>
<td>Tarquini?</td>
<td>??</td>
<td>Maxilla?</td>
<td>Braced? band, five spaces, two rivets, one false tooth (right central incisor)</td>
</tr>
<tr>
<td>Tarquini Museo Nazionale Archeologico</td>
<td>probably excavated 1876–1877</td>
<td></td>
<td>Teeth</td>
<td></td>
</tr>
<tr>
<td>Missing since 1916–1925 transfer. L. 28 mm</td>
<td>530–510?</td>
<td></td>
<td>displayed are not original</td>
<td></td>
</tr>
<tr>
<td>12  Corneto II</td>
<td>Tarquini?</td>
<td>F??</td>
<td>Maxilla?</td>
<td>Compound: seven rings, eight spaces, three rivets (animal tooth replaces central incisors; false left first premolar missing)</td>
</tr>
<tr>
<td>Tarquini Museo Nazionale Archeologico</td>
<td>Possibly excavated c. 1875</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missing since 1916–1925. L. 62.5 mm</td>
<td>500?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13  Liverpool I</td>
<td>unknown date</td>
<td>F?</td>
<td>Maxilla?</td>
<td>Band with four spaces, two rivets, two false teeth (central incisors)</td>
</tr>
<tr>
<td>Liverpool World Museum inv. 10334, ex Joseph Mayer L. 30.9 mm</td>
<td>unknown collected before 1857</td>
<td></td>
<td>all four incisors</td>
<td></td>
</tr>
<tr>
<td>14  Liverpool II</td>
<td>unknown date</td>
<td>F?</td>
<td>Maxilla?</td>
<td>Band with four spaces, two rivets, two false teeth (central incisors, missing)</td>
</tr>
<tr>
<td>Liverpool World Museum inv. 10335, ex Joseph Mayer L. 28.2 mm</td>
<td>unknown collected before 1857</td>
<td></td>
<td>all four incisors</td>
<td></td>
</tr>
<tr>
<td>15  Valsiarosa</td>
<td>Valsiarosa necropolis of Falerii Veteres Tomb 20</td>
<td>F?</td>
<td>Maxilla</td>
<td>Four welded loops, four spaces, one rivet (false right central incisor missing)</td>
</tr>
<tr>
<td>Civita Castellana, Museo Archeologico dell’Agro Falisco Ex Villa Giulia 1515</td>
<td>4th c.?</td>
<td></td>
<td>all four incisors</td>
<td></td>
</tr>
<tr>
<td>L. 38 mm</td>
<td></td>
<td></td>
<td>Displayed on ancient skull that is not original owner’s.</td>
<td></td>
</tr>
<tr>
<td>Name, Location Measurements</td>
<td>Provenance, Date (BCE)</td>
<td>Sex</td>
<td>Jaw region</td>
<td>Type, Function</td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------------------</td>
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<td>------------</td>
<td>----------------</td>
</tr>
<tr>
<td>16 Teano Berlin, Institut für Geschichter der Medizin, Humboldt University L. 47 mm Not Available</td>
<td>Teano (Campania), Fondo Gradavola necropolis, Tomb 18 4th–3rd c.</td>
<td>F</td>
<td>Maxilla left to right canines</td>
<td>Six rings, no rivets, stabilising</td>
</tr>
<tr>
<td>17 Praeneste (Palestrina) Villa Giulia inv. 13213 L. 31 mm</td>
<td>Praeneste, Sporadic find in necropolis date unknown</td>
<td>F</td>
<td>Maxilla all four incisors 35–45 years*</td>
<td>Band, four spaces, two rivets (false central incisors missing)</td>
</tr>
<tr>
<td>18 Satricum Villa Giulia inv. 12206 L. 29 mm</td>
<td>Satricum, Borgo Le Ferriere, Tumulus C 7th c./c. 630</td>
<td>F</td>
<td>Maxilla left lateral incisor to right canine 50 years</td>
<td>Band, five spaces; gold tooth (right central incisor)</td>
</tr>
<tr>
<td>19 Bracciano Vienna, Museum of Natural History inv. 24.296 (catalogued c. 1990) L. 24 mm, estimated Not available</td>
<td>Near Lake Bracciano, tomb 7th c.?</td>
<td>F?</td>
<td>Maxilla left central incisor to right lateral incisor</td>
<td>Band, three spaces, one rivet holds false tooth (cut-down right central incisor)</td>
</tr>
<tr>
<td>20 Tanagra Athens National Museum: Lambros Collection inv. 358 L. 43.3 mm</td>
<td>Tanagra, Boeotia 4th–3rd c.?</td>
<td>F?</td>
<td>Maxilla left to right canines ± 10 years*</td>
<td>Compound band, two loops, no rivets, stabilising</td>
</tr>
<tr>
<td>21 Sardis Ankara, Turkey: Collection of Dr Ilter Uzel (L. 48 mm) Not available</td>
<td>Salihli ‘ancient Sardis’ found in a tomb 3rd c.?</td>
<td>F</td>
<td>Mandible skull, some teeth found 25–40 years</td>
<td>Band, four loops, two rivets (in two false teeth, human or bovine central incisors)</td>
</tr>
</tbody>
</table>

For more complete data, see Becker and Turfa, 2017, or the bibliography cited in endnote 2. Almost all of the known gold bands are now slightly distorted (or worse) from burial and modern handling.

Where noted, sex has been assigned based on (small) tooth size, determined by the spaces in appliances.

*Age estimate based on dental wear of extant teeth.

L. = length of appliance as preserved.

M = male; F = female.

? = some uncertainty in identification of sex, age or date.

?? = serious uncertainty.
BCE and CE when Roman authors (especially satirists) speak of society women trying to hide the effects of age with white false teeth. From that era, only a single prosthesis has ever been found in Rome (No. W7 below) and that belonged to a cremated woman in her fifties. Her prosthesis, however, was made in a different technique from the Etruscan appliances—using gold wire rather than flat bands. Although often cited in Roman literature, this technique previously had been known from only six other cases, all found in the eastern Mediterranean, Levant and Egypt (Nos. W1–W6). While the Etruscan appliances were the work of goldsmiths, not dentists, the Hellenistic and Roman wiring technique reveals true dentistry.

Many issues can be raised with regard to these appliances, but we have few ready explanations. A disconnect between actual finds of prostheses and the facile comments of Roman authors is surprising. The earlier gold band-appliances are linked to Etruscan technology; in fact, they betray quite sophisticated metallurgy (below), although they were never as efficient as modern bridges or braces. As a social phenomenon Etruscan appliances are even more puzzling: all examples with true contexts came from the burials of affluent women, and even the orphaned appliances, according to the measurements of their gold loops, are so small that they probably were fashioned for female teeth. The reasons why Etruscan women of the ruling classes should have needed to replace one or more of their upper front teeth are difficult to discover and have led us to consider parallel ethnographic evidence for dental evulsion: rites of passage and mourning rituals heretofore undocumented for ancient Etruria. Other questions arise concerning the availability of dental treatment in ancient Etruria, or in general in the Mediterranean world and Near East during (or before) the first millennium BCE. A survey of documented dental appliances will begin our discussion of these issues; basic data has been condensed into Table 2.1.

The phenomenon of wire appliances

The most recent find of a gold dental appliance, No. W7, comes from excavations at a necropolis in Rome. This wire appliance is fashioned from gold, as are all but one of the Near Eastern appliances. One wire appliance, from Lower Egypt, is made from drawn silver, from a necropolis of Ptolemaic or Roman date. The Near Eastern examples all post-date the invention of Etruscan gold band-appliances, and range in date from the fourth century BCE to the early Imperial period. Five appear to have been installed in the mandible, in contrast to the Etruscan band-appliances. Five of these apparently used the owner’s teeth as replacements.
Table 2.2 Wire appliances (Hellenistic and Roman)

<table>
<thead>
<tr>
<th>Item, Dimensions</th>
<th>Provenance, Location</th>
<th>Date</th>
<th>Sex/Age</th>
<th>Replacement Material</th>
<th>Type/Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1. Sidon I</td>
<td>Sidon, Tomb XI, Room 1, fosse b (1861 excavations) Louvre</td>
<td>1st 1/4 4th c. BCE</td>
<td>F</td>
<td>two human incisors, two holes drilled in each</td>
<td>mandibular?? wire binding six teeth</td>
</tr>
<tr>
<td>L. 34 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L. 35 mm (estimated)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L. 25 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W4. El-Qatta</td>
<td>El-Qatta Tomb No. 90 reused mastaba, shaft 5 (Cairo Museum?)</td>
<td>Roman</td>
<td>?</td>
<td>R central incisor, drilled</td>
<td>maxilla, wire deformed</td>
</tr>
<tr>
<td>L. 43 mm (broken)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W5. Tura el-Asment silver wire</td>
<td>Tomb T-121 in Ptolemaic necropolis Cairo/Museum?</td>
<td>Ptolemaic</td>
<td>M?? young adult?</td>
<td>R central incisor returned to mouth with root modified</td>
<td>maxilla severe malocclusion, necrotic abscess of R central incisor</td>
</tr>
<tr>
<td>L. 27 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W6. Eretria</td>
<td>tomb at Eretria Athens National Archaeological Museum</td>
<td>4th c. BCE</td>
<td>F???</td>
<td>-no-</td>
<td>mandibular complex pattern binding 6 teeth incomplete?</td>
</tr>
<tr>
<td>L. 49 mm (estimated)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L. 39 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All gold wire except W5, which is silver wire.
Discussion of known ancient dental appliances

Provenance

Although provenance information on several pieces is unconfirmed, the majority of band-type appliances came from southern Etruria and environs. Three early finds of Etruscan appliances collected in the 1880s (Nos. 1–3) came from the region of Lake Bolsena in the south Etruscan heartland, including the site of Bisenzio (Visentium, an early settlement in this rich region of trade and metal working). Another example, now in Copenhagen (No. 4) came from nearby Orvieto, the major Etruscan city of Volsinii. A lost specimen once in Ghent was also attributed to Orvieto (No. 7). Five examples, the largest group, came from unidentified tombs in the necropoleis of Tarquinia (Nos. 8–12). Two pieces in Liverpool (Nos. 14–15), found early in the nineteenth century, may have come from Vulci. Northern Etruria is represented by a bridge from the region of Chiusi (No. 5), and a lost specimen from the early city of Populonia (No. 6). The Italic zone of central Italy produced the earliest archaeologically datable appliance, which is also the only bridge with a gold false tooth, from a necropolis at Latin-speaking Satricum (No. 18). Other Italic necropoleis represented include Latin Praeneste/Palestrina (No. 17), the Faliscan city Falerii Veteres (Civita Castellana, No. 15), and Campanian Teano (No. 16). Provenance cannot be verified for a bridge said to have been excavated at Bracciano in southern Etruria (No. 19) and made known around 1990.

Two examples of these appliances are outliers: a stabilising appliance using gold bands to brace loose teeth was found in Tanagra (Boiotia), and is now in the Athens National Museum (No. 20): its technique of construction is Etruscan in origin. Some Greek medical writers had spoken of the use of metal to stabilise loosened teeth (see below) but the band-construction matches all the Etruscan/Italic examples. One possible specimen, said to be from a tomb at Sardis, was published in two brief articles in dental journals and said to be in a private collection. As it has not been made available for study, we cannot verify its authenticity or provenance. Obviously the dates of Etruscan appliances preclude any connection to the Herodotean fiction of a Lydian migration.

Etruscan dental appliances: dating

Some complex band-appliances were used as braces for living teeth. These range in estimated date (mostly based on descriptions of artefacts found with them) from the early fifth century (Nos. 1, 2, ‘Etruria’ and Bisenzio) through the fourth and third century (Nos. 5, 8, 16, 20) to possibly the second century (No. 10, Tarquinia?). This implies that this use began distinctly later than the single bridges with one or two false teeth. The earliest known appliance (No. 18, from Satricum) is a band with one replacement front tooth in gold;
it comes from a Latin town with a strong flavor of Etruscan culture. Although the tomb was disturbed and could not be reconstructed, all ambient evidence points to burial during the seventh century. The appliance was constructed earlier still, perhaps in the first half of the seventh century. It is the only example of a false tooth constructed in gold, and all other bridges seem to have employed human or animal teeth or ivory. If the scanty evidence is correct, the bridges, with replacement teeth, range in date (of the tomb in which their wearer was found) from this example (No. 18) of the seventh century to the fourth–third century (Nos. 6, 15). Three other band–appliances may perhaps be dated to the sixth and early fifth century BCE (Nos. 11, 12, 3). All are one–of–a–kind constructions for individual situations. These vary from three loops of which the middle example holds the one central incisor replacement tooth (Nos. 3, 19), to the band with five spaces in which is found the unique gold tooth (No. 18), to an example spanning eight spaces into which have been inserted three false teeth (No. 12). The wire appliances also were used for both replacement and stabilising, and range from the fourth century BCE (Sidon, Nos. W1–2) to the second century CE (Rome, No. W7).

**Dental appliances: technique of construction**

All twenty (or twenty–one) band–appliances associated with Etruscan technology were constructed using thin sheet gold cut and hammered into a narrow band that encircled the teeth, either in a continuous loop (thirteen examples) or a set of rings (eight examples). In those few cases where the false teeth are preserved, the ‘replacement teeth’ were trimmed and smoothed from human teeth, probably the wearer’s own, or were carved from animal teeth (see No. 12). It is possible that some specimens from which the replacement tooth is missing (as No. 14) had false teeth carved from ivory or other organic materials. The sole exception is the oldest dated example, the bridge from Satricum (No. 18) which has a gold replacement tooth welded to its gold band. Most replacement teeth were attached by one small cylindrical rivet each, also of gold, set horizontally through the drilled tooth. Where we believe the person’s own teeth were used, the roots had been trimmed. The whole structure was then fitted into the mouth (in what must have been a ticklish process) by anchoring a loop around a sound, rooted tooth on each side and tightening the band to keep everything in place. In cases where the band–appliance functioned as a brace for loosened teeth, and there was no replacement tooth, the technique was the same, to encircle or wrap the relevant teeth with a thin gold band.

Using flat bands for the construction must have been a well–reasoned choice: Etruscan jewellery, from the earliest days (c.t700 BCE) employed wire, even though making it was a laborious and time-consuming process. Wire had to be made by cutting sheet metal, then twisting, hammering and annealing in multiple iterations – draw plates for wire making were not yet known to be
in use, nor was steel for tools (see Figure 3.1). Presumably the display of wire in filigree ornaments and chains contributed to the symbolic value of jewellery, since observers would appreciate the labour-intensive process. But wire does not stand out in a smiling mouth the way a band of gold could.

**Advanced metallurgical techniques**

The metallurgical skill of the Etruscan goldsmith is shown in these appliances to be considerable; in fact, both Liverpool appliances, analysed in May 2015, show an exceptionally high degree of purity in the gold. The Liverpool World Museum generously made them available for Matthew Ponting and Pablo Fernandez-Reyes (University of Liverpool) to test by scanning electron microscope with energy dispersive spectrometry (SEM-EDS): a full report of these test results is in Becker and Turfa (2017: Appendix VII). Both the gold bands and the rivets of these two examples were found to be at least ninety-eight per cent gold, which could only have been attained by assiduous refining processes to remove the naturally occurring silver and other metals from the original: a process called ‘parting’. The process of achieving a higher purity than that found in most (seventh–sixth century BCE) Etruscan jewellery or artefacts of other Mediterranean cultures at such an early date may be remarkable. Of course, these two examples may be of later date, after the processes for parting gold had become more common. Even after that process had been perfected, jewellery of great purity is not common. These findings regarding the two Liverpool appliances call for the immediate analysis of all the other appliances, particularly those believed to be of the earliest dates. There is no indication that the non-toxic aspect of gold or silver was recognised at this
date. The earliest datable appliance, the five-space/socket example from Satricum, is a real masterpiece simply for the construction of its hollow gold replacement tooth, made of two pieces beaten into shape within a mould and affixed to the band.

**Dental appliances: anatomical details**

All band-appliances may be shown by their tooth size to have been worn by women.\(^6\) The condition of wear on the living ‘anchor’ teeth can sometimes yield information for the age-at-death of the wearer and these seem to have been mature women, aged between 25–40 years (No. 5), 35–45 years (No. 17), 45 ± 10 years (No. 20, from Greece), or 50 years (No. 18, the early example from Satricum). Only two wire appliances, Nos. W2, W5 (silver) from Sidon and Ptolemaic Egypt, have been tentatively associated with men, but all the wire appliances relate to dental issues rather than Etruscan ornamentation.

The ‘false teeth’, replacements for missing teeth, vary in number from one (as in No. 3, composed of three rings with the replacement in the central ring) to a nominal three (see No. 12). Invariably only the incisors (central and/or lateral) are replaced. In virtually all well-documented examples, they were worn in the upper jaw (maxilla). Unfortunately, in many cases, especially those found in the nineteenth century, museums or dealers chose to display them in lower jaws (mandibles) or even in different skulls entirely (for instance, Nos. 5, 10 and 15). In some examples, this resulted in damage to appliance or skull/remaining teeth, and caused great confusion among scholars who studied the phenomenon only through publications and photographs.

Seven bridges replaced a single tooth each, while five replaced two adjacent teeth; only one (No. 12) replaced three teeth, and used an ingenious method to do so (below). Some show more sophisticated or difficult techniques of creating or joining the loops needed to encircle the teeth. At least one tooth on each side of the replacement was rooted and living, and anchored the appliance in place; thus No. 3 (Bolsena?) had three spaces for a central replacement tooth framed by a single anchor tooth on each side. Some examples replaced two front teeth (central incisors or a central and a lateral incisor), centred between a single anchor tooth on each side (Nos. 13, 14, 17). The original Etruscan examples were intended to replace one or both upper central incisors – deliberately removed – with an ornamental false tooth. Later adaptations used this ‘bridge’ technology to provide loose-tooth stabilisation or replacements for lost teeth. Since upper central incisors would be among the last teeth to be lost in the natural decay process, it is not surprising that the adaptations of Etruscan techniques would be applied to teeth other than the upper central incisors.

The basic design of the early Etruscan examples is well illustrated by two appliances now in the Liverpool World Museum. Both were obtained in the early nineteenth century for Joseph Mayer, a Liverpool goldsmith whose
varied collection formed the core of the first Liverpool Museum. The bulk of his Etruscan antiquities came by various routes from the Bonaparte excavations at Vulci, but the appliances cannot be surely assigned to this group. Liverpool I (No. 13, see Figures 2.2 and 2.3) is a gold band with two replacement central incisors, each held by a single rivet. The incisors appear to have been carved from two human incisors, perhaps those of the owner, with the roots filed away and carved to fit snugly against the gums. The original, rooted lateral

*Figure 2.2* Liverpool I appliance, frontal view, inv. 10334. Image courtesy of the National Museums Liverpool.

*Figure 2.3* Liverpool I appliance, lingual (interior) view, inv. 10334. Image courtesy of M. Gleba with permission from the National Museums Liverpool.
incisors are missing, so we cannot confirm that the replacements represent the wearer’s own teeth. Liverpool II (No. 14, see Figures 2.4 and 2.5) is constructed in the same fashion, with riveted replacements for the central incisors set into a gold band, and presently retaining, on either side, teeth with long roots.

Figure 2.4 Liverpool II appliance, frontal view, inv. 10335. Image courtesy of the National Museums Liverpool.

Figure 2.5 Liverpool II appliance, lingual (interior) view, inv. 10335. Image courtesy of M. Gleba with permission from the National Museums Liverpool.
These may have been inserted by the nineteenth-century dealer, but we believe that they are probably the owner's teeth; of the replacement teeth only the fine gold rivets remain (see Figure 2.6). Possibly the false teeth were made of some material softer than tooth enamel.

Some cases of surviving appliances had more than one living human tooth encircled on each side. For instance, in the Satricum example (No. 18), the living teeth adjacent to the gold replacement must have been loose or fragile, so the band was designed to encircle the next teeth as well, and thus covered all four incisors and one canine, with the artificial gold tooth replacing an incisor. Some goldsmiths employed more ingenious solutions, as in the most complex of the Etruscan prostheses. One appliance from Tarquinia, possibly dating to the sixth century (No. 12), was a compound construction of seven rings encircling eight tooth spaces, three of which held replacements. One loop encompassed two spaces to surround the ‘central incisors’ but these replacement ‘teeth’ were actually a single piece, carved from an animal tooth to resemble two separate teeth and affixed with two rivets, looking just like appliances with two individual human teeth, each held by a rivet. Unfortunately, the appliance, probably excavated in the Corneto necropolis around 1875, is missing.

A similar situation applies to the band-appliances worn either to stabilise loose teeth or to serve as pure ornamentation (Nos. 1, 2, 5, 8, 10, 16[?], 20). These examples have no rivets, being a simple loop of gold or set of golden rings tightly surrounding part of a row of teeth. These teeth surrounded by these simple bands range in number from two (No. 20, Tanagra) or three (No. 1), to four, five or six teeth (No. 16, Teano). In some cases, where the
appliance is no longer associated with the jaw and the teeth are missing, it is
difficult to identify the exact locations of the braced front teeth.

**Dental health and Etruscans’ teeth**

The diet of Etruria was quite healthy, and until the later centuries of the first
millennium low in the refined foods such as bread that contribute to dental
caries: most skeletons of the eighth–seventh centuries (and earlier) have teeth
worn from chewing coarse foods and not infected with cavities. In central
Italian (and other) populations, the molars are the teeth most likely to be lost
during midlife, followed by the other more medial teeth. Features such as
dental calculus imply poor hygiene as a factor. The dental profile of a middle-
aged Chiusine noblewoman, Seianti Hanunia Tlesnasa, whose skeleton and
sarcophagus have been studied in the British Museum, shows the results of an
old injury causing a TMJ (temporomandibular joint) dysfunction that made
hygiene difficult, resulting in loss of molars and a chronic abscess of a second
premolar. But neither Seianti nor other Etruscan orItalic skeletons that have
been studied show the loss of front teeth, nor did an elderly woman buried
in a rich tomb at Narce in the sixth century BCE, and the list could go on. While increasing luxury in food choices affected the dental health of Etruscans
and their Italian neighbors, front teeth were rarely lost during life. The need
for replacements of front teeth is puzzling. The rare evidence of Roman
extractions, namely eighty-five extracted molars (and one premolar) recovered
from a dentist’s shop in the Roman Forum shows a similar profile of tooth loss. It would appear that the lost front teeth of Etruscan women of the upper
classes wearing ornamental appliances may reflect a deliberate phenomenon.

**A note on alleged ancient dentistry**

Numerous ‘histories of dentistry’ refer to alleged ancient Egyptian burials
found ‘with gold teeth’, appliances or fillings in place. Unfortunately, all of
these are archaeological fantasies. There is absolutely no physical evidence for
these finds representing any form of dentistry, and no examples of dental work
performed, or even of deliberately extracted teeth, are known from among
the ancient Egyptians. It is surprising that, of the thousands of known
Egyptian mummies, many of whom obviously suffered or even died as a result
of dental abscesses, there is no evidence of intervention, even when a diseased
tooth could have been extracted by hand. A few jaws show holes, similar (in
some scholars’ eyes) to the surgical procedure of drilling at the apex of a root
to create drainage for an abscess, but these are in fact the natural process of
an infection eroding out to the surface, and not surgical scars at all. Masali
suggested Sumerian use of gold wires *post mortem* as cosmetic attempts to keep
loose teeth in place, but again, no examples of wire appliances have ever been
found in Mesopotamian burials.
Ancient sources on dental prostheses and related matters

No direct reference to the Etruscan gold-band prostheses is preserved in Greek or Roman literary or epigraphic sources; Etruscan literature has not survived. Perhaps the best reference is from the Roman Law of the Twelve Tables. Its text is known from fragments of a posting made in the early fifth century BCE, but believed, on account of its archaic language, to derive from a much older source. The new Roman Republic had enacted sumptuary laws to limit the outflow of wealth from its economy, forbidding burial of riches in tombs (in contrast to Etruscan ‘princely tombs’ that held fortunes in gold ornaments, furniture and vehicles). Table X of this set of laws, as preserved in a quote by Cicero, in On the Laws 2.24.60, stated: ‘neve aurum addito’ (‘nor shall anyone add gold’) from one law, and ‘At cui auro dentes vincit escunt, ast im cum illo sepeliet uretve, se fraude esto’ (‘But whoever has had teeth fastened together with gold, if someone shall bury or cremate him, this shall be with impunity’). For Cicero, this signalled the humane intentions of the law.

The earliest medical reference to dental appliances seems to come to us from the Hippocratic text On Joints:

If the teeth at the point of injury are displaced or loosened, when the bone is adjusted fasten them to one another, not merely the two, but several, preferably with the gold wire, but failing that, with thread, until consolidation takes place.

The term translated ‘gold wire’ (chrysio) in the original Greek means ‘with gold’, and it is logical to assume the form would be wire. The term for ‘with thread’ (lino) can mean ‘with linen thread’.

Several works of poetry and satire offer confirmation of the use of dental appliances, with a comment by Horace (65–8 BCE, Satire 1.8.48–50) that seems to imply false teeth worn by one Canidia as she indulges in some witchcraft on the Esquiline late at night: ‘Canidia’s teeth, the tall hairpiece of Sagana you will see them with much laughter and fun fall out, along with the herbs and charmed love-knots [they carry].’

Other references to false teeth come from satirists of the first century CE. The Greek Lucilius, patronised by Nero, wrote an epigram criticising use of cosmetics and false parts: ‘You bought hair-braids, seaweed-rouge, honey, wax, and teeth. For the same expense you could have bought a face’.

The Roman poet Martial (40–104 CE) mocked men and women who had bad or missing teeth, and had worse in store for courtesans who used dentures:

You yourself are at home, Galla, but you are being made up in the middle of Subura [Rome’s slum]. Your hair is manufactured in your absence. Nor do you lay aside your teeth at night any differently than you do your silk dresses, and you lie packed away in a hundred boxes. Nor does your
face sleep with you. You flirt with an eyebrow that is brought to you in
the morning...¹⁹

Because of my verses, Fidentinus,
do you think you are a poet, and want to be believed?
In the same way Aegle imagines she has teeth,
having bought them in bone and Indian horn...²⁰

This has black teeth, Laecania snow-white ones.
What is the reason? This one has bought teeth, the other her own.²¹

You use teeth and hair that are bought and you are not embarrassed.
What will you do about your eye, though, Laelia? They don’t sell
them.²²

Martial’s Epigram 10.56 derides a dentist, Cascellius, perhaps practising on the
Aventine in Rome around 80 CE, who extracts or repairs aching teeth, but
no author describes the fashioning of a bridge or appliance.

Roman-era medical texts suggest treatments for sore gums, toothache
or trauma, and offer various pharmaceutical prescriptions to alleviate pain or
swelling and prevent infection, but do not describe the use of dental bridges.
Celsius notes, following the Hippocratic texts, the use of gold to temporarily
hold teeth loosened by trauma, and discusses the problems of incomplete tooth
extraction.²³ Galen and others, in surviving works, concentrate on medication
or other treatment for wounds or infections of the mouth, not replacement
of teeth.

Perhaps the last Roman reference to dental appliances, according to
Waarsenburg, is from the second century CE author Lucian of Samosata.
In the Professor of Public Speaking (Rhētarōn Didaskalos/ Rhetorium praeceptor 24),
a low-life says he pretended to love ‘a seventy-year-old woman who had only
four teeth remaining and all of them fastened with gold’.²⁴

One last reference to false teeth comes to us from a different culture entirely.
The Talmudic writings imply that the Hebrews of the Late Hellenistic period
were making some type of dental appliances, using gold, silver and wood.²⁵
References to these schen zahar (‘gold, false’) teeth distinguish them from a
removable type, schen-tothebeth, which according to Rabbi Zera (279–320 CE)
were not to be ‘carried’ (worn) on the Sabbath.²⁶ The Palestine Talmud notes
a young girl who was ashamed to ask a nagor (‘turner’ of wood) to make her
another appliance of ivory.²⁷ The term Rarash, or worker in wood, stone or
metal, also is found associated with the craft of producing dentures. An
exhaustive study of Talmudic dental references would certainly clarify the
situation for the Late Roman period, although to date no such appliances have
been discovered.
Conclusion

It seems that ancient authors took it for granted that artificial bridges and braces were options for affluent persons, especially women. Although they did not describe wearing such objects, the satires worked because readers were already familiar with the practice. Although gold appliances could be buried legally on the owner, very few have ever been found, and most were made long before the Roman satirists' society evolved. But what early Etruscan or Italic rituals caused the earliest appliances with false teeth to be needed? It seems very unlikely that several affluent women, who would not be training at arms, riding horseback, or performing heavy household chores, should happen to lose their front teeth when the rest of the population never did . . . they must have lost them deliberately. We can only allude to ethnographic studies for possible parallels.

Ceremonial tooth removal (dental ablation or dental evulsion) is documented in the archaeological record as well as from modern ethnographic studies, although not specifically for Etruscan society. Geographically the custom can be found from North Africa (prehistoric to modern) and India, the Arctic and beyond. In Hawaiian society for instance, tooth ablation was part of formal mourning rituals. In parts of ancient China, one or more incisor was removed from boys at puberty and from girls at marriage. In fact, there are examples of tooth removal in Italian Neolithic women, but there is a gap of millennia between that period and the age of Etruscan culture.

There is one difference between the Etruscan phenomenon and all the ethnographic parallels: only the women of first-millennium central Italy availed themselves of gold-banded replacements for their lost teeth. Lacking Etruscan literature, and noting that this custom was limited to a small number of high-ranking women, we do not yet have enough data to develop a reasonable explanation. It seems likely that certain women had one or two front teeth removed, fashioned into dental bridges and installed in their mouths: they would have been better able to eat and speak, but what rite of passage had they undergone that others never did? Whatever it was, their families must have proudly commissioned the goldsmith to create for them a prestigious new smile.

Authors' note

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Notes

1 Catalano et al., 2007; Minozzi et al., 2007; Becker, 1997. On Jewish dental prostheses, see Lehmann, this volume.
3 Terzioglu and Uzel, 1986, 1987. Collectors in the dental profession have often been targets for the sale of copies or forgeries; items from unauthorised excavations carry other uncertainties. If an Etruscan-style gold-band prosthesis were to be found in a controlled excavation at Sardis, it could be evidence of an Etruscan woman abroad, or of the movement of an Etruscan goldsmith at a time (third century BCE) when fortunes were falling in his or her central Italian homeland. Only the skull of this skeleton, if the find is genuine, may survive, but identification of ethnicity through DNA or other biochemical analyses has been prevented.
4 For sensible recent research in that field, see Ghirrotte et al., 2013.
7 See Becker et al., 2009, Table 6; Turfa, 2012, pp. 136–163 on diet; Turfa and Becker, 2013 on general health.
8 See a man from Archaic Chiusi, Becker et al., 2009, pp. 78–79 no. 18.
9 Lilley, 2002; Stoddart, 2002; Swaddling and Prag, 2002.
10 Becker et al., 2009, pp. 59–61 no. 8.
11 Becker, 2014.
12 See Leek, 1972; Foreshaw, 2010.
13 Miller, 2008; Foreshaw 2010, p. 73.
16 Hippocrates, On Joints 33.7–11 (trans. E. T. Withington): καὶ ἢν μὲν διεστραμμένοι ὑμῖν οἱ ὀδόντες οἱ κατὰ τὸ τρόπον καὶ κεκινημένοι, δύος τὸ οὖστεν κατορθίζη, ζεύξαι τοὺς ὀδόντας χρῆ πρὸς ἀλλὰς, μὴ μοῦνον τοὺς δύο, ἀλλὰ καὶ πλέονας, μάλιστα μὲν δὴ χρυσίῳ, ἐστὶν· ὡς κρατηθήκας τὸ οὖστεν, εἰ δὲ μὴ, λίνῳ.
17 Horace, Satires 1.8.48–50: Canidiae dentes, alium Saganae calidrum/Excidere atque herbas atque incantata lacertis/Vincula cum magno risuque iocoque visere. Latin translations by Turfa unless otherwise noted. On prosthetic hair, see Draycott, this volume.
19 Martial, Epigrams 9.37.1–6: Cumi sis ipsa domi medique omere Subura, siasm absentes et tibi, Gallla, coma, nec dentes aliter quam Serica noce responas, et iaceas centum condita pyxidibus, nec tecum facies tua dormiat, innuis illo quod tibi prolatum est mane supercilio, et te nulla movet cani reverentia cummi quem potes inter avos iam numerare tuos. promittis sescenta tamen; sed mentula surda est, et sit lusca licet, te tamen illa videt. On prosthetic hair, see Draycott, this volume.
20 Martial, Epigrams 1.72.1–4: Nosiris versibus esse te poetam, Fidentine, putas cupisque credisse dentata sibi videtur Aegle. emptis ossibus Indicoque cornu . . .
21 Martial, Epigrams 5.43: Thaei habet nigros, niveos Laesania dentes. Quae ratio est dum emptus haec habet, illa suos.
Bibliography


Etruscan dental appliances


