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Dentistry in Ancient Rome: Direct Evidence for Extractions Based on the Teeth from Excavations at the Temple of Castor and Pollux in the Roman Forum

Excavations by a Scandinavian team at the Temple of Castor and Pollux within the Roman Forum identified a *taberna* within the platform that yielded evidence for the practice of dentistry. The evidence from the 86 teeth recovered attests to the remarkable abilities of Roman dentists to perform extractions. This skill has long been documented in the ancient medical texts. This discovery is the first to provide persuasive archaeological verification for these written records.

KEY WORDS: *Roman Dentistry, Dental History, Archaeology of Medicine, Temple of Castor and Pollux in Rome.*

In Memoriam

Pia Guldager Bilde (1961-2013)

Introduction

The original construction of the Temple of Castor and Pollux within the Roman Forum was completed about 95 BCE. It was restored a few decades later, but burned in 14 BCE. Within a few years it had been rebuilt, with the later iteration standing throughout the first centuries of the Christian era. The main temple served as a treasury and as a meeting place, but small shops (*tabernae*) were built into the basal platform. These stall-like openings served for various types of businesses, including one that appears to have been used by an apothecary-dentist.

In an area located beneath the northernmost aspect of the Temple stairway Pia Guldager's excavations (Trench T) entered into one of the many *tabernae* within the platform. Her efforts recovered items that I believe to be associated with a pharmacy (cf. Becker, 2009) that seems also to have housed a dentist – perhaps the same person. Based on the entire complex of items that Guldager (later Guldager Bilde) recovered, the excavation team refers to this *location* as a “barber's shop” and dates the context to ca. 50 to ca. 110 CE. Within the sophisticated floor drain inside that shop, similar to drains in most of these *tabernae*, were found a number of teeth (N = 86), most of which have extensive carious lesions. Caries, from the Latin term for decay or rot, is a bacterial infection that causes the demineralization and destruction of teeth, and sometimes bone. Dental caries, commonly called tooth decay, is a chronic and progressive disease that can cause extreme pain and can lead to more serious infections. The carious lesions seen in almost all of these teeth make them ideal candidates for dental extraction. The observation that these afflicted examples are unbroken reveals that their removal was through the actions of an extremely skilled dentist.

The discovery during the excavation of this trench of a significant number of human teeth unrelated to any other human skeletal remains prompted a detailed examination of these “artifacts” to confirm that they were the result of dental extractions. Following the completion of the extensive excavations at the Temple of Castor and Pollux the excavators issued a great number of publications describing the temple and its associated artifacts in detail (see Guldager Bilde & Poulsen, 2008; Nielsen & Poulsen, 1992; Slej & Cullhed, 2008; Nilson et al., 2008). Guldager Bilde’s limited excavations in the area that produced these teeth (Trench T) have yet to be published. The important findings regarding a context for ancient dentistry, therefore, were not included in these works. Until now the data on the teeth themselves were limited to the popular literature, where some very good illustrations are to be found (Ginge et al., 1989; Becker, 2003b; see also Guldager & Slej, 1986, p.33), and to a report on the clinical features of the lesions (Fejerskov et al., 2012).

The present goal is intended to make the original study of these teeth, and the important data set contained therein, available to scholars interested in this aspect of the history of dental medicine. Guldager Bilde’s notes and manuscripts regarding the context of these finds, and perhaps further excavations surrounding Trench T, are only now being considered. Future excavations within the *taberna* that yielded these teeth may enlarge the sample as well as expand the evidence indicating the activities that took place at this specific location.

Examination of these 86 teeth in 1987 revealed that almost all of those from adults are carious, with few exceptions. Most impressive is that they are generally intact, preserving the roots as a reflection of the skill of the extractor. The vast majority of these teeth have carious lesions of large size, generally penetrating well into the pulp chamber. The pain from these lesions would have made them suitable for extraction, leading the sufferers to seek aid in the form of extraction of the problem teeth. The use of pain killers in treating this long term condition, until the tooth died, provided only limited and temporary relief; an observation made by both Archgenes and Galen (see Hoffman, 1973). The pharmaceuticals sold at the same *taberna* where these teeth were found would certainly have included the requisite analgesics. The findings of Fejerskov et al. (2012) that most of these “lesions had a hypermineralized zone in the dentin at the advancing front of the carious cavities” suggests the possible use of analgesics, as originally suggested by Becker. The evidence leaves no doubt that the location in which these teeth were found must have been a site where dental extractions were performed.

The Roman medical literature, following the Greek tradition, describes the complex process needed to extract a decaying tooth without breaking it or leaving a piece of root in the jaw (see Becker & Turfa, forthcoming). Dental extraction was virtually the only aspect of dentistry that existed in the Classical world, although the production of gold bands and wires to stabilize loose teeth was perfected in the few centuries before the Christian era. Claims attesting to the use of ancient dental implants, prior to the past few decades, or of the use of appliances to practice ancient orthodontics are entirely specious (Becker, 1999c).

Methods, Materials, and Findings

Emery (1963) discusses many of the problems relating to archaeological studies of dental pathology, and suggests some methods by which these questions might be answered. The extensive literary evidence has been reviewed as a preliminary means of orientation to the specific question of the Roman Forum dental remains. Archaeological evidence for a related matter, involving Etruscan and other gold dental appliances, also has been studied (Becker, 1994, 1999a, 1999b, 2002, 2003; Becker & Turfa, forthcoming). These teeth were delivered to me for study having been thoroughly cleaned and I presumed washed. During my visual examination of the teeth no instrument or probe was inserted into any of the carious lesions. No samples were taken.

X-rays were considered unnecessary in this phase of the study of these teeth since the carious lesions invariably were very large. Of interest is the fact that all of the carious lesions had large holes penetrating the enamel, with a vastly larger region of decay ballooning into the dentine and pulp chamber. No small lesions were evident in any of these teeth. While decay invariably was more advanced in the softer zones of these teeth, the considerable damage also involved much of the enamel layer in all these cases.

The enamel surfaces of the teeth were examined for evidence of tool marks or any indications of treatment that might have left breaks or scratches. No indication of surface damage or of tool application was encountered. In fact, the unusually intact state of these severely decayed teeth (only thin enamel "shells" in many cases) reflects an unusually high degree of ability in performing dental extractions. This is consistent with the literary evidence, indicating that decayed teeth were firmly grasped and wiggled loose in their sockets before extraction. These processes also may have involved cutting the gum and the alveolar areas of the jaw, a process described in antiquity by ~~Aulus~~ Cornelius Celsus (1938) and several others (see in Becker & Turfa, forthcoming). The person, or persons, who removed these teeth must have been quite skilled in the procedure, as particularly indicated by some extreme examples noted below.

These procedures obviously were employed with great success. The very few examples of broken teeth among the 86 in this archaeological collection, mostly with snapped roots and some with fractured crowns, all probably resulted from being trod underfoot while they lay about within this *taberna* prior to finding their way into the drain from which they were recovered. These examples, where the roots of the teeth were broken, were examined specifically; searching for any indication as to when the breaks occurred; whether during extraction or subsequently as the result of being stepped on while lying about on the shop floor (see illustrations in Guldager's excavation report).

Individual teeth were identified as to the original position in the jaws, and then measurements were taken of each tooth (see Tables, below). Evaluation of sex was made on the basis of tooth size, a technique that has been successfully employed at the nearby archaeological site of Osteria dell'Osa, the Iron Age cemetery of ancient Gabii, which was the settlement to the east nearest to ancient Rome (Bietti Sestieri, 1992; Becker &

Aulus

Figure 1. A sampling of teeth from among the 86 recovered by Pia Guldager from a taberna in the Temple of Castor and Pollux in the Roman Forum.



Figure 2. The only two deciduous teeth recovered from among the 86 teeth recovered by Pia Guldager from a taberna in the Temple of Castor and Pollux in the Roman Forum.

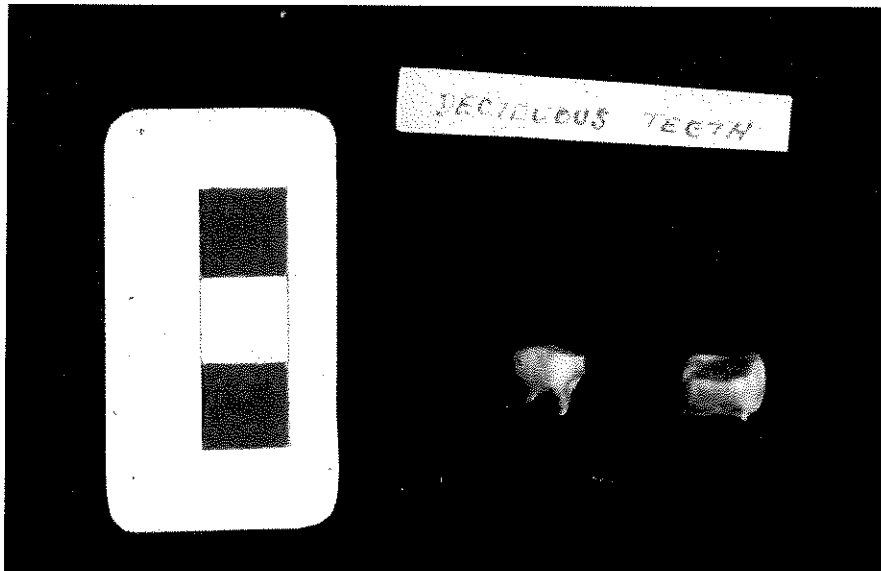


TABLE 1. The contexts and evaluation of these teeth (N=86).

Castor and Pollux Trench "T": All of the teeth recovered in this excavation (N=86) derive from a single small test area, designated as "Trench T", located beneath the northernmost aspect of the Temple stairway. Each excavation unit (location) within Trench "T" is listed here as a "unit" number. This location also is noted after the identification of the position in the mouth which has been evaluated for each tooth.

Excavation Unit Number:														
1	2	5	6	8	9	10	11	12	19	31	32	34	36	37
Number of Teeth:														
11	13	4	1	8	2	1	5	1	1	2	2	2	30	3

TABLE 2. Deciduous Teeth (N=2).

	Carries Size/Loc.	No. of Roots damaged	Tooth Size (in mm.) M-D / B-L	Wear	Age	Sex
Mand. dM2:19/	0	-	Absorbed? 8.3 9.9	6	10+	M
Max. d1M: 9/ 2?	LG	2+	d 8.9	5+	8.5	F

Notes for Tables:

X: Irregular wear pattern on the surface, probably due to the loss of 1 or more opposing teeth.

Y: Distal root entirely missing, but crown largely intact.

Z: The carious lesions may not have been noticeable in this otherwise sound (healthy) tooth.

Salvadei, 1992). Although the time period covered by the interments at Gabii is centuries earlier than that involving the final construction and use of the Temple of Castor and Pollux in the Roman Forum, the geographical areas are quite close. This technique for determining sex also has been used at several other ancient sites (Becker, 2000) and is well established in the literature, as reviewed by Becker and Salvadei (in preparation).

Dental pathology, as it is generally studied within archaeological contexts, focuses in most cases on disease as it is found in cemetery populations. This kind of information, a historical summary of which is provided by Emery (1963), offers a "normal" cross section of dental disorders. The unusual case which we have here provides us with a pre-selected sample of a limited range of pathological types.

The examination of these 86 teeth (see Tables, below) enables us to make seven significant general observations regarding the technical and cultural situation, as follow:

1. These 86 teeth clearly represent a large sample of diseased (cariou) teeth which appear to have been extracted in a *taberna* located within the building platform of the Temple of Castor and Pollux in the center of the Roman Forum. The tooth types represented (almost all molars) and the patterns of decay (almost all extreme examples) clearly rule out any possibility that these teeth came from a relatively small number of people (as might be the case where skeletal material dissolved away leaving only the dentition, see 3 below). They appear to be extractions which derived from a great number of individuals, possibly as many as represented by the entire number of teeth (N=86). At least 11 adults and one child are represented (Minimum Number of Individuals, or MNI), but almost certainly the actual number of individuals was close or equal to 86. However, allowing for normal patterns of dental decay and dental loss, plus cultural factors concerning dental extraction, I would estimate that no fewer than 50 individuals are represented by these teeth recovered from within the drain. How many other extracted teeth made it through the excellent Roman sewer system to the *cloaca maxima* and into the Tiber River, or were thrown into the gutter outside this shop, or swept away in routine cleaning, cannot be known.

2. The success of the method of extraction used is attested by the absence of tooth fragments broken across or through the decayed area. In no case did we find that the tooth crown broke as a result of employing poor dental procedures. No lead fillings, used by Roman dentists to prevent breakage during extraction, were found (cf. Becker & Turfa, forthcoming). The suggestion that lint or wool stuffing was used to stabilize the teeth to prevent breaking during removal is unlikely. Such materials might have been used to hold medicinal oils in place; such as oil of cloves. Even more probable is that no effort was made to prevent crown damage since cutting through the alveolus, followed by manual loosening of the tooth, was almost certainly the procedure of choice.

Of particular note in regard to sophistication in extraction methods is an upper right third molar from Unit 1. This tooth was recovered with a small piece of the maxilla still adhering to it. This suggests that the tooth was removed using dental forceps, after cutting away the soft tissue over the root, because the decay into the tooth was so deep that

TABLE 3: Mandibular Teeth, Listed by Position and by Excavation Unit Number (No crown heights were measured).

Tooth	Lesion Size/Loc.	No. of Roots damaged	Tooth Size (in mm.)		Wear*	Age	Sex
			M-D	B-L			
3M: 2	4 A	0	11.0	9.7	1	40+	M?
2	2 DG	0	10.9?	9.4	5	45+	M?
5	3 MG	0	9.6?	10.2	1	?	M?
36	4 MA	0	10.7?	9.5?	1	?	M?
2M: 36	{4 DG	0	d	9.2d	5	45+	F?
	{1 LG						
36	3 DG	0	11.2	10.0	4	40	M
36	2 A	0	10.1d	9.5	X	?	F?
2	3 A	0	10.6	9.4d	5	45+	F
11	3 MG	0	d	d	4	40+	M
11	2 MG	2	d	9.6	5	45+	F?
1	5 A	1	d	d	1	25	F?
1M: 1	3 MI	1	d	9.9	4	40+	M?
2	3 MI	1	12.4d	11.6	4	40+	M
2	3 MI	0	10.9?	9.8	4	35+	F?
8	3 DI	0	10.0d	10.1	4	35+	M?
8	4 MI	0	d	11.2	5	50+	M
12	3 MI	0	12.0d	10.9	4	35+	M
31	2 MI	0	11.2	10.6	3	35	M
1PM: 36	3 DG	0	6.8	9.3	4	40+	M
PM1: 5	4 MI	0	d	10.3	1	35?	M
MI: 8	2 I	1	11.2	10.1?	4	40	M?
36	{3 DA	0	10.5?	9.4	1	30?	F?
	{1 MI						
36	3 MI	0	d	11.0	3	35	M
36	3 DI	0	d	10.5	4	40	M
36	3 DI	1	d	11.2	4	45	M
36	2 MI	0	11.2?	11.4	3	35	M
M2: 1	2 DI	0	11.8?	11.2	4	45	M
5	5 DA	0	d	11.3?	1?	30?	M
8	3 DA	0	d	d	2?	35	M?
8	4 DI	0	d	10.2?	3+	35+	F?
10	2? A+?	1	(half a tooth)		3+	35+?	M?
32*	0 -	1	8.8	10.8	4+	45+	F?
34	4 DI	Y	d	10.1	3	30	F
M3: 1	3 BG	0	12.0	10.9	4	45	M
2	0 -	0	/	/	6X	60+	?
8	4 DA	0	10.5?	9.9?	1	50	F?
9	4 A	0	(enamel shell broken)?			?	?
11	1 MA	0	9.5?	9.6	2	?	?

WEAR:

0 = Zero

1 = Traces on 1 or 2 cusps

2 = Moderate wear on all cusps

3 = Wear leveled surfaces. Occlusal surface worn flat.

4 = Into dentine on cusps

5 = Dentine exposure considerable; crown worn to below nec

6 = No surface enamel remains (Worn into root)

very little of the crown remained to be gripped. In order to remove the root intact, the dentist cut down to expose the maxillary bone and gripped both bone and root to make the extraction. This procedure is recommended, quite correctly, as a preferable alternative to the possibility of snapping off the crown and leaving the root in place. A damaged maxilla could be treated and repaired far more easily than an abscess that was to be expected when a root fragment failed to be extracted.

Note also should be made of Molar 36 (an upper left first molar), which also bears a bit of the maxillary bone from the labial side. The roots of this tooth curve sharply towards each other, and in nearly touching have pinched off a piece of the bone during removal.

3. The variety of tooth categories (molars, premolars, etc.) and positions in the mouth that are represented by this series reflects the fact that these are the decayed teeth of a large number of people. These are not the dental remains from a few human skulls from which the teeth had been lost.

4. These teeth primarily derive from adults, although two deciduous teeth indicate that extractions from children were also practiced at this location. Dental wear patterns suggest that most of these adults were from 30 to 60 years of age at the time of extraction. Very few of these teeth have wear patterns that might suggest that they came from the jaws of extremely old people. The teeth of the very elderly probably were more easily removed due to periodontal problems that were common in this population during this period of time. As noted above, even the worn teeth of elderly people were removed successfully; teeth that were difficult to grip firmly.

The degrees of wear on the surfaces of the teeth suggest that the age of the persons from whom they came was primarily between 30 to 40 years, but this estimate of age from dental wear may be low since it is made without a complete comparative population. The age distribution, however, is consistent with data which we have from the Iron Age population in the area of Rome (Becker & Salvadei, 1992). The Osteria dell'Osa data suggest that the frequencies of carious lesions increased with age, and tend to be strongly concentrated in the molar teeth. This pattern, which might seem logical to contemporary people, is actually very different from that found in contemporary America where caries frequencies are very high in children, but tend to decrease with age. In modern America, for example, even where water is not fluoridated, by age 25 dental caries are being superseded as a problem by periodontal disorders. Decay in modern populations probably is kept at low levels by fluoridated water and preventative dental treatments. Causes for the variations in dental problems in any culture may relate to pathogens, diet, or food consumption patterns and are specific to each population.

5. In the Castor and Pollux dental sample, decay appears to have been concentrated in the interproximal areas rather than on occlusal surfaces. Eating whole grains and coarse foods may have "polished" the occlusal (working) surfaces of teeth and reduced decay in those areas.

TABLE 4. Maxillary Teeth, Listed by Position and by Excavation Unit Number

Tooth/ Unit	Lesion Size/Loc.	Roots damaged	Size (in mm.) M-D / B-L	Wear	Age	Sex
3M: 1	{3 MG	0	7.2 12.1	1	?	?
	{2 LG					
6	3 LG	0	d d	2?	?	M?
11	{3 MG	0	d d	3	?	M?
	{2 BG					
36	3 MG	0	7.9 11.0	0	?	?
36	3 BG	0	9.8 12.8	1	?	M
2M: 1	2 DG	1	d d	2	35	F?
2	3 DG	0	d 10.9?	1	30?	M?
2	0 -	2	8.5 11.9	5	50+	M??
2	3 DI	1	11.5? d	2	35	M
8	3 MG	0	d 11.1	4	45	M?
34	0 -	0	10.2 11.1	4	40+	M?
36	3 DG	0	d 11.8?	4	45	M
36*	1Z BG	1	d 11.2	4	45+	M
36	2 MG	3	d d	4	45	M
36	4/5 MG	0	d 11.6	5	55+	M
36	3 DI	1 (half tooth missing)		2	35	F?
1M: 1	3 DG	1	9.9? d	5	55	M
2	4 DG	1	10.6? 11.6?	3	40	M
8	{4 DG	0	11.1 12.0	4	45	M
	{3 MG					
31	3 DG	1	10.5? 11.9	4	45+	M
36	3 DG	0	d 11.4	4	40+	M
36	1 MG	(only 1/3 of tooth remains)		2	?	?
37	4 DG	0	d 11.8	1	30?	M
EM2:11	2 MI	1	6.9 9.1	4	45+	M?
M1: 1	3 DG	1	d 12.1	4	45	M
2	{3 DG	0	d 12.5?	4	40+	M
	{2 MG					
2	3 MG	2	d 12.3	3	40	M
5	2 DG	0	10.3? 11.9	2	35?	M
32	2 DG	0	11.0? d	5	55+	M
36	4 DG	1	d 11.8?	1	30?	M
36	3 DG	0	d 11.4?	2	35	M
37	4 DG	0	10.3? 11.8	1	30	M
M2: 1	3 DI	1	10.2? 11.8	2	35	M
1	3 DG	0	d 11.7	1	30	M
36	3 DG	0	8.5 11.7	3	40	F?
36	3 MI	1	9.3 11.2	5	50+	M?
36	3 MI	1	d d	5	55	M?
36	3 MG	1	d 11.0	2	35	M?
36	3 MI	0	d 11.2	2	35+	M?
36	3 DG	0	8.7? 11.0	2	35	M?
36	3 AL	1+	9.8 10.5	1	30	F?
37*	4/5 M/LI	0	d d	1	30+	F

TABLE 4. (Maxillary M2): Continued

M3:	1	{5	MG	0	d	d	3?	40?	M??
		{2	DI						
	2	1	MI	2	9.7?	d	3	40	F?
	36	0	-	1	7.8	11.1	1	?	F?
	36	3	MG	0	8.9	11.8	4	?	M

* Calculus adhering to tooth.

Codes:

Wear: Carious Lesion Site:

0 = Zero	M = Mesial
1 = Traces on 1 or 2 cusps	D = Distal
2 = Moderate wear on all cusps	B = Buccal
3 = Wear leveled surfaces, all cusps	L = Lingual
Entire occlusal surface worn flat	
4 = Into dentine on cusps	A = Occlusal surface
5 = Dentine exposure considerable	I = Interproximal
crown worn away to below neck (on crown only)	
6 = No surface enamel remains	G = Gingival margin
(worn into root)	

Carious Lesions: Maximum extent of enamel decay (interior larger)
(in oval shaped caries this is calculated as the
average of the maximum and minimum diameters).

- 0 = No carious lesions
- 1 = Up to 2.99 mm.
- 2 = 3.0 to 4.49 mm.
- 3 = 4.5 to 6.0 mm.
- 4 = 6.1 to 7.5 mm.
- 5 = More than half the crown destroyed.
- 6 = Massive decay.

Notes for Tables:

- X: Irregular wear pattern on the surface, probably due to the loss of 1 or more opposing teeth.
- Y: Distal root entirely missing, but crown largely intact.
- Z: The carious lesions may not have been noticeable in this otherwise sound (healthy) tooth.

6. Periodontal problems afflicted these ancient Romans to a considerable degree, but no comprehensive comparative research has been conducted. The loss of bone surrounding the roots of teeth, due to ineffective or absent periodontal care, however, was rarely a very severe problem for these Romans. For the practicing dentist of this period such periodontal difficulties were an aid to extraction of the teeth since the loss of supporting hard tissue surrounding the roots facilitated the removal of a diseased tooth.

One of the 86 teeth recovered, a right mandibular third molar (Trench T, Unit 2), had no evidence for decay or pathology. However, more than 2/3 of the dental crown had been worn to below the original gum level, or neck of the tooth. The very small portion of remaining enamel had been fractured away, but when and where this took place is unknown. Perhaps the delicate remains of this enamel broke off while the tooth was in place, and the discomfort caused by the jagged edge led to the sufferer having the tooth removed. More probably, the tooth may have simply been loose in its socket and the owner decided to have it removed – with the enamel remnant subsequently having been broken away.

7. The study of these teeth reveals the presence of only one possible abscessed example. This does not preclude a greater incidence of this problem, but only reveals how difficult it is to identify problems related to caries when we do not have the affected bony tissue to study.

Associated Archaeological Evidence

With these teeth from the Roman Forum were a number of associated artifacts and tools, both fragmentary and intact, which support the conclusion that this shop plied a trade in pharmaceuticals as well as providing dental extractions (Guldager & Slej, 1986:33; Ginge et al., 1989). Künzl (1982, pp. 5-6), on the basis of extensive studies of medical instruments,¹ concludes that medicine and pharmacy, together with cosmetics and painting, were closely linked in the Roman world (see also Miller, 1981, p. 48 for cosmetics in a Late Antique grave; also Baker, 2004). Künzl's publication of numerous items related to the trade in pharmaceuticals provides outstanding comparative data for the assemblage found in the Temple of Castor and Pollux. Of particular note is the appearance, in a 3rd century CE context, of a barber's shears in association with a round bellied ointment jar (Künzl, 1982, pp. 94-5) that is identical to those found with the teeth from the Temple of Castor and Pollux. These jars typically have a small base and wide mouth, with a bulbous center (cf. Becker, 2009). Other medical equipment (illustrated by Künzl), derived from Syria, parallels the material from the Temple of Castor and Pollux. These include numbers of pins and rods, a bone spatula and small scoops (Künzl, 1982, pp. 96-97, 114-116, 123, Fig. 97).

The information from the teeth and the associated artifacts recovered from this *taberna* in the Temple of Castor and Pollux provide conclusive evidence for the practice of dentistry at this location. Analysis of the contents of the jars recovered from this context

may offer further clues regarding the specific ointments, potions, or drugs offered for sale here. Some of these products almost certainly were used in the course of extracting teeth from the many customers who were living active lives in the center of ancient Rome.

Comparanda

To date, this assemblage of extracted teeth recovered from the Temple of Castor and Pollux in the Roman Forum remains a unique archaeological demonstration of the impressive skills of ancient dentists. The surviving medical literature effectively describes the processes by which decayed teeth could be removed, but this collection remains the only direct evidence for the efficacy of the process and attests to an impressive degree of skill that cannot be conveyed through the literature alone.

The sample of decayed teeth from the Roman Forum offers us no helpful information regarding dental decay rates during the Roman Imperial Age (ca. 27 BCE-284 CE). Skeletal studies from this period derived from excavations in and around ancient Rome offer very little information on this subject. The skeletons from the vast Collatina necropolis recently excavated within Rome (Minozzi et al., 2007, 2012) have yet to be studied and dental data from central Italy of this period and beyond are sparse (e.g. Manzi et al., 1999). The best compilation of relevant information has been gathered by Kristina Killgrove (2010). Killgrove points out that the best comparative populations for these studies are from Vallerano (Cucina et al., 2006) and from Portus Romae (Prowse 2001). Catalano et al. (2010) offer some data from the lower classes of this period at Castel Malnome near Rome, but the dental data is limited. The work of Bonfiglioli, Brasioli and Belcastro (2003) derives from Molise but does offer somewhat problematic comparative information from that period. A study of infant and child feeding behaviors in the area of Rome during this period (Prowse et al., 2008) does little to address questions of adult carious lesion rates. In short, focused studies of topics as specific as rates of carious lesions in and around Rome, or anywhere else in Italy, remain for future scholars to address.

The archaeological literature abounds with data on medical instruments, many of which are identified as dental forceps (Milne, 1907; Bliquez, 2015). Quite possibly the many forceps recovered from excavations could have been used for dentistry as well as surgery. The highly specialized forms of tooth extractors known as pelicans and tooth keys, however, are relatively modern inventions. Their forms remain unknown from any ancient archaeological context or from the literature until the Late Middle Ages. Medical historians generally agree that the kinds of forceps known from antiquity could have been used for general surgery and bone work as well as for dental extractions. Despite the previous absence of archaeological evidence for dental extractions, such as the collection of extracted teeth reviewed here, after I began this study in 1987 I received several verbal reports concerning finds of “teeth” at one or another excavation of a Roman

fort. Thanks to the kind efforts of Patricia Baker (pers. comm. 15 Aug., 2001; see Baker, 2000) the genesis of these comments can be traced. Apparently, the “teeth” said to have been found at these forts are an illusion, perhaps referring to those few examples recovered from the baths at Caerleon (see below). The actual data on “dental” instruments have been gathered by Dr. Patricia Baker (pers. comm.) and are summarized here.

Two artifacts identified as “dental” forceps have been recovered from near the legionary fortress of Vindonissa in Switzerland. Both were recovered from a waterlogged area immediately outside the fortified area; an area known as the *schutthugel*. One of these has been published by Doderlein (1973, p. 410, Pl. 4) and the other by Frolich (1910, p. 127, Fig. 17). A tool identified as dental forceps, with silver inlay, has been recovered from the legionary fort at Carnuntum in Austria (Hauff, 1993-4, p. 126, Nr. 31, Table 7), with no further data regarding the find site. Baker also notes that Lee (1862, p. 67, Nr. 9, Pl. 34) reports the find of a dental “instrument” from the legionary post at Caerleon, Wales. Baker thinks that it may be some form of rasp. Recent reporting of “milk teeth” and (supposedly) the teeth of young soldiers said to have been recovered from the baths at Caerleon, are the closest one gets to evidence for dentistry at Rome’s frontier fortifications. These teeth are mentioned by Zienkiewicz (1986) and may be the source of the “information” regarding Roman “dentistry” given to me verbally after 1987.

Observations Relating to the Teeth from the Roman Forum

1. Almost every tooth in this sample has extensive carious lesions.
2. Only 2 of the ⁶~~8~~ teeth recovered are deciduous. 86
3. 5 of the “teeth” in this collection are actually only large tooth fragments. These show vertical fractures that are almost certainly the result of post-extraction damage.
4. A large number of these teeth have lost at least a small portion of the enamel that was still intact at the time of extraction. This loss was probably the result of post-extraction exfoliation due to being dropped, trampled, buried, etc.
5. Sex has been evaluated on the basis of crown dimensions (Becker & Salvadei, 1992; Becker, 2000; Becker & Salvadei, in preparation), as well as from an evaluation of root sizes and configurations. Errors in this phase of the study may be high, since there is a degree of uncertainty concerning the locations of individual teeth.
6. Wear cannot be used as an effective indicator of age when evaluating individual teeth (cf. Molnar, 1971). We have no evidence for the presence or absence of any oppos-

ing tooth.

7. Very few of these teeth are free from decay. No X-rays have been taken to determine possible disease in the few seemingly decay free examples. Possibly they were extracted in error, but more probably they were pulled in conjunction with therapies for disorders other than dental disease (e.g. chronic headaches, Bell's palsy, etc.). Becker and Turfa (forthcoming) conclude that Roman dental practitioners, like modern dentists, did all they could to preserve teeth.

8. Fewer females than males appear to be represented. Did the women suffer in silence, have better teeth, or were they less likely to seek external treatment? Women also may have been less willing to spend money on their medical woes. Women simply may have suffered the pain, or perhaps were treated informally by other women.

9. Of the sample of healthy (decay free) teeth from this context, females appear to be over-represented. Possibly the teeth of these women were removed when symptoms other than decay-generated toothache were present. Perhaps teeth were removed in antiquity the way other portions of the female anatomy have been removed in more recent times; as a "treatment" for symptoms of ills perceived as "female complaints." I suggest that these removals may have been "as punishment for" complaints unrelated to the symptoms, a "treatment" similar to others noted by several modern medical anthropologists, as well as researchers examining data sets from a feminist perspective.

10. Evidence for deliberate tooth evulsion, for culturally "decorative" purposes, is known from among the Etruscans (Becker, 1995), but not from any Roman context or other Italic cultures of that time (see Robb, 1997a, 1997b).

11. The evidence from the Temple of Castor and Pollux provides direct physical information on the practice of skilled dental extractions in antiquity. This is distinct from the ornamental use of gold dental appliances in South Etruria (Becker, 1992, 2000), a cultural behavior that reflects metallurgical rather than medical skills. A list of archaeological locations where medicine was practiced remain to be assembled (cf. Baker, 2011, also Baker & Carr, 2002).

12. The belief that dental "implants" were used by the ancient Romans or any other population prior to the late 20th century is technologically improbable. All suggested archaeological "examples" can be discounted (Becker, 1988, 1999c).

Space

Footnotes

¹ Many of the artifacts studied by Künzl (1982) were intact sets of instruments which had been contained in "physicians'" tool kits. On rare occasions, such as shipwrecks, the actual box and normally perishable contents survived. However, one of the few examples suggested as a tool or pharmaceutical kit appears to be a jewelry case (Mas, 1985). Another yielded cumin and coriander among the organic remains which could be visually identified (D'Atri & Gianfrotta, 1986, p. 206). Whether this was a spice box or medicine case remains unclear.

Mas (1985, p. 219) specifically examined the cases holding instruments that were recovered from the House of the Physician at Pompeii. These are now in the National Museum at Naples. Mas concluded that he did not have a similar container. The small cylindrical box containing a bone needle which Mas (1985, p. 212, fns. 15, 16) also recovered appears to be a sewing case.

The small or miniature wooden box from the Crimea now in Berlin (Cat. no. 11863; Richter, 1966, Fig. 402) has been termed a "pharmaceutical box", but no evidence exists to make such an association.

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