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ABSTRACT

The case of the Boy with the Golden Tooth, a “miracle” in a remote village in Silesia, in what is today southwestern Poland, was reported extensively in 1593. Here we report that the hoax, perpetrated by someone close to the family and with knowledge of goldsmith techniques, is the first documented case of the use of a molded gold crown. Using period instruments available to goldsmiths and a 0.001” copper sheet, we reproduced, on a plastic pediatric model, what the gold crown could have looked like.

KEY WORDS: gold, tooth, crown, Jacob Horst.

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INTRODUCTION

The year is 1593. The location is the village of Weigelsdorf (today Ostrowiec), a community in Silesia, at the southwestern border of today’s Poland, which was, at the time, part of the German Holy Roman Empire of Rudolph II. A 7-year-old farm boy by the name of Christoph Müller is reported to have grown a golden tooth in his lower jaw. News of the event brings a crowd of admirers and onlookers, including Dr. Jacob Horst (Iacobus Horstius), a professor of medicine at Julius University in Helmstædt, originally from Schweidenitz (Swidnica, today), just 15 miles northwest of Weigelsdorf. Dr. Horst is in the region to sell one of his properties. He examines the boy, even summons experts to evaluate the authenticity of the gold, and after confirming that it is almost as pure as “Hungarian” gold, he declares the phenomenon to be real.

The case would likely have been forgotten if Dr. Horst had not written about it. In a 145-page treatise (Horstius, 1595) (Fig. 1), “*De aureo dente maxillari pueri Silesii*” (“Of the Golden Tooth of the Boy from Silesia”), he provides a lengthy description of his mystical interpretation of the events, including the boy’s birthday: December 22, 1586. According to Horst, during the winter solstice of that year, the sun was in conjunction with Mars, Saturn, and Venus in the sign of Aries. As such, the heat of the sun likely turned bone into gold in the jaw of young Christoph, leading to the appearance of the golden tooth. Such a rare event had to have major significance, Horst went on. Given the growing threat to Europe by the Ottoman Empire, Horst explained, this phenomenon signaled the end of Turkish expansion. Furthermore, because the golden tooth was the last in the lower jaw, it would lay the foundation of a Christian empire that would last for thousands of years, establishing a golden epoch for the Holy Roman Empire. However, given that the tooth was on the lower left side (in Latin, left is *sinister*), Horst explained, the Christian armies of Rudolph II would first face sinister events before achieving a final victory.

The same year, another physician, Martin Ruland, from Lauingen, and John Ingolstetter from Nüremberg, the pro-rector of the Paedagogium at Amberg, wrote about the miracle of the boy with the golden tooth, but had a different interpretation of the cause and significance of the event (Ruland, 1595; Knight, 1998). Ruland tried to explain it by natural causes, while the latter, like Horst, considered it a miracle (von Liebig, 1851). Contrary to Ruland and Ingolstetter, Duncan Liddell, a Scotsman who was in Helmstædt at the time, wrote a scathing refutation of Horst’s account, declaring the golden tooth a man-made gold crown or shell crown (Liddellius, 1626). In the introduction to his book, Liddell published a letter written on December 31, 1595, by Balthazer Caminæus, a doctor from Frankfurt, to a Doctor Caselius, describing how the child (Christoph Müller) would show the golden tooth

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only to those who would pay a fee. However, if educated men would ask for it, he would become reluctant to open his mouth. The tooth, based on the account of eyewitnesses, was slightly larger than the neighboring tooth and was most likely covered by a “plate, lamina (or layer) skillfully wrought of the best gold, and the gold was let down so deep into the gum that the cheat was not observed. However, as the plate was sometimes rubbed with a touch-stone as a test and was daily worn down by chewing, the real tooth at last began to appear”. The letter further described the story of a drunk nobleman who, upon being refused when asking to see the miracle, became angry, pulled a dagger, and stabbed the young Christoph in the cheek. When a surgeon was called upon to suture the wound, the fraud was revealed in the process. Further, the author of the fraud was described as taking refuge in flight, and Christoph Müller was taken to prison (Liddellius, 1626).

That people like Horst could have been fooled by such a hoax and even enticed to write an extensive treatise on the subject in an attempt to explain the phenomenon with superstition is not unusual for the period (Jutte, 2007).

The tooth, by all accounts, was covered in real gold and must have been the work of a goldsmith or blacksmith, someone probably close to the family. In the process of committing a fraud, the perpetrator made the first gold crown. Because the event created such a sensation and was recorded by Jacob Horst and a number of subsequent reports, this incident is the first documented case report of a gold crown.

The purpose of this report is to explore the nature of this crown and speculate how this crown might have looked.

DISCUSSION

There are several issues that one needs to consider when discussing this case.

The hoax that was perpetrated and the extent to which Horst and some contemporaries went to explain the ‘miracle’ have been the focus of numerous studies (Guerini, 1909; Ring, 1993; Jutte, 2007). What has received very little attention is the nature of the crown: Who could have made it? How was it made?

Was It a ‘Traditional’ Crown? Was It ‘Traditional’ Gold Foil?

There is only circumstantial evidence as to the type of crown young Christoph had. The golden tooth was described as slightly larger than neighboring teeth, and it must have been of sufficient thickness to last about 18 months before the hoax was discovered. The gold was well-adapted under the gum line to fool people for a while. Furthermore, it had sufficient thickness to withstand removal of a small amount with a touchstone to demonstrate that it was pure gold.

If there were neighboring teeth, they had to be in front of the gold tooth. Liddell’s work indicated that there was no tooth behind the golden tooth. That would not be expected until age 12, when the second permanent molar is due. If indeed the anterior adjacent tooth was missing, that could have been lost to decay or removed on purpose to provide better access to the person performing the hoax.



Figure 1. Jacob Horst’s 1595 study, published in Leipzig, describing the “Boy with the Golden Tooth from Silesia” (*De aureo dente maxillari pueri silesii*). This copy of the book is at the library of the NYU College of Dentistry.

A further important point is that the golden tooth, initially, was most likely out of occlusion with the opposing first permanent molar, which erupts several months later. This would have created some space for the extra layer of gold placed on top of a fully erupted lower molar. Alternatively, if both upper and lower permanent first molars were already in occlusion, the added gold layer on top would have created premature contact and considerable discomfort, leading to pain and periodontal inflammation. Furthermore, such premature contact would have destroyed the occlusal surface of the gold-covered tooth sooner than the approximately 18 months the hoax apparently lasted.

Perhaps one of the mysteries of this case is the true nature of the crown. Was it a crown, a layered gold foil, a swaged crown, a molded shell crown? Perhaps we will never know. There are no



Figure 2. Image of a reproduced molded “gold” (copper) crown of the type very likely Christoph Müller had. Using period instruments available to goldsmiths of the time and a 0.001” copper plate, we reproduced this crown on a pediatric dental model with mixed dentition, which includes only the first permanent molar.

first-hand descriptions, only second-hand eyewitness accounts. The best we can do is to use circumstantial evidence and conjecture.

What is the Argument against a Cast Crown as We Know It Today?

Casting was known and used by artists. For instance, the Etruscans used casting for bronze statues as far back as the 4th -5th century B.C. Casting by means of wax models, embedding, burning away the wax, and replacing it with molten metal was rediscovered in 1460 by the Renaissance sculptor Benvenuto Cellini, who used it for gold statues. It is highly unlikely that a small village in Silesia would have been the site where gold crowns were first cast. Furthermore, the tooth had undercut that would have made it impossible to place a rigid cast gold crown over the natural tooth and to adjust the cast margins smoothly under the gingival gum line to make it indistinguishable from a natural tooth.

What is the Argument against Traditional Gold Foil?

Gold foil was used by goldsmiths and artists like Giovanni D’Arcoli, who introduced it for the first time in 1483 (Hoffman-Axthelm, 1981). Traditional thin gold foil would have required multiple layers to create enough thickness to last the assumed 18 months. Handling gold foil is tricky. It does not usually stick to wet surfaces unless annealed (heated), making handling it in the oral cavity quite problematic.

What is the Argument for a Molded Thin-layer (shell) Gold Crown?

The most likely argument is that it was a shell crown, molded onto the surface of the tooth by means of a thicker gold foil used by goldsmiths. Gold foil of 0.001” thickness is soft enough to be cut with scissors, applied and adapted under the gum line, be burnished, even layered on top of other foil, yet creating enough thickness and strength to last and withstand chewing forces.

Furthermore, handling of such a thickness is easier than handling the very thin traditional gold foil. Such a crown could have been initially molded by means of a swaged crown-type molding system (“Swaged metal dental crowns”), followed by manual adjustment and burnishing. (From the 1975 patent: “A swaged crown or band useful in the fields of general preventive dentistry and orthodontic work produced by placing a crown blank upon a rigid die of the tooth to be banded or crowned and then forcing the die with the blank thereon between confined laminae of a non-rigid material, such as a roll of cloth tape. When the die is forced completely into the laminae, the blank assumes the shape of the die only in the direction in which it is forced, and not in any transverse direction. Thus, the product is a crown which is swaged on the occlusal surface and on the occlusal one-third or one-half of the sides of the tooth down to, but not including, the undercut portion which is normally designated as the gingival one-third or gingival one-half of the tooth.”)

To prove that such a crown is achievable, using period instruments, such as a burnishing instrument, and a blunt-ended, pointed paper-cutter and scissors, we managed to reproduce a copper crown (Fig. 2). A piece of copper foil of 0.001” thickness (Storm Copper Components Co., Decatur, TN, USA) was first bent by means of a swage crown-molder, shortened to fit the length of the crown, then gently molded onto the tooth surface, adjusted at the gingival margins, and burnished. Gold of similar thickness could have been easily used to make the same point. We used a pediatric plastic model that had all deciduous teeth and the first permanent molar, a model that mimics what the young Christoph must have had at the time.

Who Could Have Perpetrated This Hoax?

The most likely person was someone who had experience handling gold. It is highly unlikely to have been a dentist. Dentistry was in a rather primitive form at the time, practiced by barbers, blacksmiths, itinerant self-appointed healers, even charlatans, and a very few surgeons. It is argued here that the most likely person to complete this crown was a goldsmith or a goldsmith’s apprentice. It is not too difficult to imagine that the city of Breslau, just 20 miles to the northeast, could have provided the training ground. Over a period of 300 years, stretching from the mid-16th to the mid-19th century, Breslau had a rich tradition of goldsmiths. There were 94 registered goldsmiths in Breslau (Rosenberg, 1922). Of these, 14 were active during the end of the 16th century and could have been directly or indirectly involved in training someone associated with this hoax. We fully realize that this is all speculative. However, if we assume that the work was that of a goldsmith, or an apprentice who was trained in the handling of gold, the proximity of this major hub could have provided ample opportunities.

The hoax had to be done in either late 1592 or early 1593, when the boy’s permanent molar was fully erupted. Furthermore, we hypothesize that it had to be someone whom the older Müller, a poor carpenter, and young Christoph trusted to keep secret. Perhaps it was an older brother, or a relative who was trained or working in nearby Breslau. The issue is not simply of knowledge of gold-handling, or of having the right instruments, but also of having access to the appropriate amount and quality

of gold. Access, instruments, material, know-how—all point to somebody who was well-versed in the handling of gold and was close to the family. Furthermore, the person performing the work had to have access to Christoph for several days, perhaps weeks. It is clear that placing the crown must have been done over a longer period of time, perhaps even after several unsuccessful attempts. Not having electricity at the time meant that it had to be done during the daylight, perhaps in an open space under sunlight. Finally, the person who was doing this must have been right-handed. For best access and maximum long-term visibility, the lower left molar would have been the most obvious choice. Several sources discuss the fact that the tooth anterior to the golden molar was missing, which would have given even more access. The crown most likely lasted about 18 months, from spring of 1593 to sometime in 1595. Around that time, the tooth started to change in color, and its occlusal surface must have begun showing through. This was the stage when the young Christoph stopped showing his golden tooth, a phenomenon that enraged a drunken nobleman and led to his stabbing of Christoph's cheek and the discovery of the hoax.

One of the questions one should also ask is: If the crown started to show through, and assuming that those who perpetrated the hoax were still around, why wouldn't they replace the old crown with a new one and continue to perpetrate the lie? The answer, again, can only be speculative. Either the person, the instruments, the gold, or the opportunity no longer existed. The most likely answer may be that the opposing upper permanent first molar was completely erupted by this time, making replacement of the crown impossible without considerable pain and discomfort, which would have been caused by premature contact. This possibility further supports the idea that the crown was placed at a time when the opposing tooth, the first permanent upper molar, was not yet in occlusion.

CONCLUSION

The 'boy with the golden tooth' was a hoax most likely perpetrated by someone close to the family and with knowledge of handling gold, possibly trained by goldsmiths in nearby Breslau,

a city with several hundred years of tradition for goldsmiths. The hoax was discovered because the crown became worn due to excessive chewing. But whoever perpetrated the hoax created the first gold-molded crown, so perfect that even the learned men of the time were fooled in trying to explain and chronicle it for posterity. Without this perfect workmanship, we would likely not know about the first documented case of a gold crown in 1593.

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