Annalise Valdivia

Professor Dr. Jordan Hanson

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# Dental Work in Ancient Mayan Culture

In today's society teeth are the most important thing regarding appearance and health, like the rest of humanity, the Mayan civilization also acknowledges that their teeth meant more than just bones growing out from their gums. Ancient Mayans believed their breaths were intertwined with the divine, allowing them a sense of closeness to their God. Holding such religious values, Mayans believed that by modifying the appearance of their teeth through decorative dental procedures, they were representing their religious culture. Thanks to archaeological findings we have evidence of the beginning stages of dental practice among the Mayan civilization. Mayan dental modification practices provide evidence of some of the earliest forms of modern dentistry, highlighting their significance in the evolution of dental care.

In different Regions of Mexico, scientists have uncovered an array of skeletal artifacts including an assortment of teeth providing dental records dating back from the Middle Pre-classic period, from 1000 to 400 BC (Figure 1). While examining these dental artifacts, scholars follow a modification/mutilation classification called Romero's tooth mutilation types (Figure 2),

> “Romero (1970: 50; 52) identified three modes of modification which include: (a) alteration of the contour of the dental crown, (b) alteration of the labial surface, and (c)

> alteration of both the contour of the crown and the labial surface" ( Journal of Archaeological Science, Volume 115).

It is from these records and Romero's classifications that archaeologists, dentists, and scientists have been able to confirm and document such historic dental practices. It is also from these dental records that many believe that these practices occurred for religious beliefs, appearance, and rite of passage. Furthermore, it is also believed that dental procedures among the Mayans served as a way to determine one's social standing, "The most persistent hypotheses focus on its use as a social status indicator, for defining local family affiliation, or indicating lineage ties" (Journal of Archaeological Science, Volume 115). While using their teeth to represent social status, they also utilized it to join a kinship with their God through fashions and styles.

In having a deep respect and admiration for lineage and religion, Mayans had the most respect for their god and culture. As a way to show respect to their God, women and men would perform various procedures to modify and decorate their teeth, As Samuel Fastlicht states,

> "Three kinds of mutilation are known: filing, inlay, and a third, which is a combination of both. By these methods, the natural denture acquired complicated and beautiful designs of religious significance, which were undoubtedly the pride of their owners. We note that the work was purely ornamental and was never done for restorative dental purposes" (Fastlicht, 394 - 305).

It is from the skeletal remains that dentists and archaeologists were able to see these dental mutilations in person. Mayans whose mutilations were determined as a religious practice were those who had stone carved inlays in the tooth's enamel that was filled with various materials (Figure 3). As the Fresh Dental & Implant Clinic describes,

> “These inlays were made of minerals such as; turquoise, quartz, cinnabar, serpentine and jadeite. Two different types of adhesives were used to secure the inlays including liquid amber and the other from the maguey plant. Archaeologists have found that due to the gems used, the inlays were mainly confined for the upper classes” (Fresh Dental & Implant Clinic).

As previously mentioned, other than utilizing their teeth to reach the connection with their god, Mayans utilized their teeth as a social ranking. Serving as a fashion statement, women would dye their teeth a red or black color to enhance the appearance of their smile which has been revealed through findings of teeth that exhibit distinct coloration, often red or black. Ingredients used to create these dyes were “derived from insects and were named cochineal” (Fresh Dental & Implant Clinic). Archaeologists have discovered a wide array of patterns, reaching more than fifty designs (Figure 5). With such a variety of patterns, many procedures were desired among Mayan society.

As discussed earlier, Mayans would gravitate to many forms of teeth modification, but one of the first techniques used for teeth procedures was dental fillings. Teeth would be filled with cement and water which lasted longer (Figure 6), making it possible for later discoveries and research. It is important to note, “for technical as well as aesthetic reasons, mutilation was done preferably on the six anterior teeth of the maxilla” (Fastlicht, 395). This was done so that intricate designs could be better seen by others. As a way to determine whether these procedures were done during the subjects' life, researchers would conduct extensive X-ray studies (Figure 7). As Fastlicht writes,

> “In one of these lowers there is an abscess, resulting from a lesion probably produced during the preparation of the cavity which was to receive the inlay. Another fine complete

> specimen has six anterior teeth with five inlays, one lost, four of hematite, and one which appears to have been replaced with a jade inlay during the individual's life. There is an abscess in the upper lateral incisor, with the green inlay (Figs. 3 and 4). These lesions prove the inlays were made during life, a point we have checked by X-ray studies in earlier reports in 1947" (Fastlicht, 395).

From this, we can infer that they acknowledge that most and all of these mutilations were done during their lifespan, as Flashlight describes that an abscess was found in correlation with the jade inlay, meaning that a jade inlay could have only created an abscess with living tissue.

In having such carefully thought out and intricate dental procedures, the Mayans would make sure that those who could operate were knowledgeable of the dental anatomy and skilled at their craft. As Scott E. Burnett and Joel D. Irish mention,

> "Practitioners used different techniques to obtain the desired morphological changes and visual effects. Microscopic analysis of the striations in freshly filed teeth suggests that hard stones, such as chert or obsidian blades, must have been the tool of choice. This finding confirms local ethnohistorical sources that report that elderly women would use "stones" to cut or grind down teeth" (Scott E. Burnett, Joel D. Irish 274).

Such tools were handy when dealing with intricate designs that dealt with precision. Since these procedures were done before modern medicine, Mayans had to invent and craft tools that allowed for easier and exceptional procedures that resulted in less tooth damage, as a result, the bow drill was utilized (Figure 8). As Fresh Dental & Implant Clinic explains,

> "Ancient Mayan dentists used a bow drill to perform procedures. The drill was made from metal, mounted on a shaft and was then rotated by the bow. It was the main tool that the Mayans used to carry out various dental procedures. They were so skilled with this

> tool, that they could carefully carve into a tooth without generating an infection, break a tooth or provoke the loss of a tooth" (Fresh Dental & Implant Clinic).

The Ancient Mayan bow drill exemplifies the ingenuity of the Mayan Civilization, from its ability to perform intricate procedures with precision while minimizing infection. This not only reflects their advanced understanding of dental care but also highlights the sophisticated medical practices that laid the groundwork for modern dentistry.

Through continuous research by archaeologists a pattern was discovered, it was noted that a significant number of dental specimens had no sign of tooth decay, or infections, and had mostly all their teeth intact. Archeologists and dentists believe that Mayans consistent dental hygiene was a result of chewing sticks or copper instruments used to remove tartar, but dentists believe the main contributor to Mayans dental hygiene was the adhesives used to glue the stones on their teeth. As Scientific journalist Richard Kemeny explained,

> "Most samples included ingredients found in pine trees, which other research suggests can fight bacteria that cause tooth decay. Two teeth showed evidence of sclareolide, a compound found in Salvia plants that has antibacterial and antifungal properties, and is currently used as an aroma fixative in the perfume industry. Sealants from the remote outer Copán region, near the border of modern Honduras and Guatemala, included essential oils from mint plants whose components potentially have anti-inflammatory effects. This ingredient wasn't found elsewhere, possibly reflecting connections with other Mayan groups or traditions" (Kemeny).

The practice of utilizing local materials such as plants and herbs as tooth adhesive showed the ingenuity of the Mayan people and their ability to practice modern medicine without the use of

modern supplies. Kemeny also brings into conversation the importance of dental hygiene not only as a practice but as an opportunity to learn about Mayan Culture when he cites,

> "Oral hygiene was important to the Maya, says co-author Vera Tiesler, a bioarchaeologist at the Autonomous University of Yucatán. She points to Janaab' Pakal, the Maya king of Palenque, who died in 683 C.E. at the age of 80 with nearly all his teeth and no signs of decay in those that remained—a tribute to the remarkable dental skills of his people" (Kemeny).

In mentioning the physical state of the Mayan king, Janaab' Pakal (Figure 9), journalists shed light on the validity of the Mayan dental practice and their ability to be a direct reflection of modern dentistry.

Many may question how the Mayans were able to withstand such invasive and painful procedures, but from studies, scholars have provided context to our curiosities. Since Mayans were pioneers in utilizing their natural resources, they used herbs and plants to help numb the pain from such invasive dental procedures. As the National Library of Medicine states, "For the treatment of the dental pain, they used the root of Chicalote (Argemone Mexicana L. [Papaveraceae]) as a reliable anesthetic" (Martínez, Gómez and Sook Oh). Not only did the Mayans practice a form of advanced dentistry, they combined their research and procedures with the study of botany. In utilizing various herbs to cope with pain, Mayans practice dentistry with a modern mindset that helps further the understanding and anatomy of teeth and the human body. As the National Library of Medicine mentions,

> "Herbal medicine is not a fad; rather, it reflects a wide and varied range of therapeutic resources, including homeopathy, acupuncture, and various forms of psychotherapy, as well as therapeutic agents derived from plants. Plants have been proposed as an

> alternative treatment for buco-dental diseases, a domain in which long-term reliability is an important aspect of treatment" (Martínez, Gómez and Sook Oh).

The use of herbal remedies for dental pain underscores the enduring value of herbal medicine, emphasizing its integration with diverse therapeutic practices and its potential to offer sustainable, plant-based solutions for long-term health challenges, particularly in the realm of oral care. Thus illuminating how essential the Mayan dental practice was and is to the continual development of the dental industry.

The rich history of Mayan dental practices reveals a remarkable continuity in techniques that have shaped modern dentistry. Without the curiosity and determination of the Mayan people, much of the medical knowledge we possess today would have been lost, especially from the lack of a scientific mindset. In recent years, the procedure for dental inlays and onlays remained similar to the Mayan technique. As Jean-Francois Roulet and Michael Noack explain,

> "The use of posterior composites as an amalgam substitute does not seem very promising. There are still many unsolved problems related primarily to polymerization shrinkage. Furthermore, their use requires a perfect technique, which is difficult and time-colored inlays that are cemented with composites and adhesive techniques are a good alternative because the mass of the composite polymerized in the oral cavity is very small" ( Roulet and Noack, 42).

In the years that dentistry has significantly advanced, the industry still utilizes inlays that are cemented, a technique known to have its roots in Mayan dentistry. It is more than likely that if you are someone with a cavity filling you have a cemented inlay. Mayans were able to create and produce dental techniques that not only prevented patients from dental pain and tooth decay but provided validity to the structure of the dental industry as a whole. Their innovative approaches

laid the groundwork for many contemporary practices, emphasizing the importance of both functionality and aesthetics in dental care.

The dental practices of the Mayan civilization reveal a sophisticated understanding of oral health and the cultural significance of dental aesthetics. Mayans not only practiced advanced dental hygiene but also utilized their teeth as a way to display intricate modifications for religious and social purposes, this was accomplished by their ability to utilize natural materials from their environment such as plants and minerals. The research gathered from archaeological findings of skeletal remains illustrates the advanced techniques and tools utilized by Mayans, paralleling modern dental practices. Their integration of herbal medicine for pain management further illustrates their knowledge of botany and innovative approaches to healthcare. Mayan dental modifications provide evidence of some of the earliest forms of modern dentistry, highlighting their significance in the evolution of dental care. Ultimately, the legacy of Mayan dentistry is profound, highlighting a rich tradition that contributed to the evolution of dental care that has influenced contemporary dentistry today.

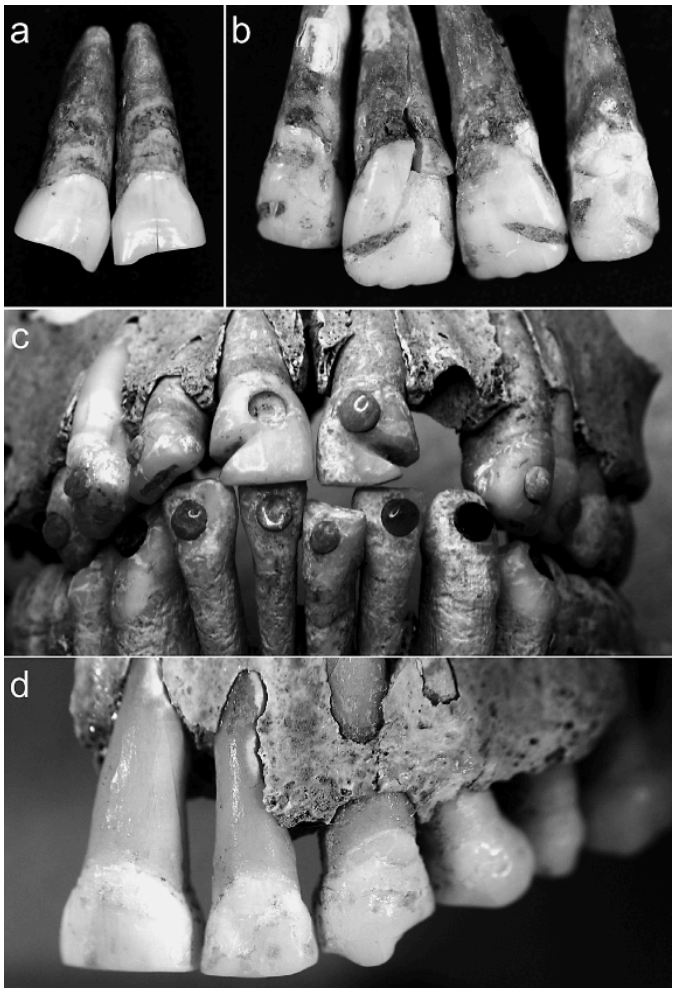


**Figure 1**. Different forms of permanent dental modifications: (a) Tooth polish in a pair of upper central incisors with Ik filing; Burial 123-8, Barton Ramie (56-30-20/N8857.32), Peabody Museum of Archaeology and Ethnology, Harvard Museum. Copyright 2017, President and Fellows of Harvard College. (b) Grooving of labial surface of upper inci-sors with filling; Burial 130-5, Barton Ramie (56-30-20/N8857.17), Peabody Museum of Archaeology and Ethnology, Harvard Museum. Copyright 2017, President and Fellows of Harvard College. (c) Inlays and fillings in a male from Dzibanché, Mexico. Credit: SE Petén/ Instituto Nacional de Antropología e Historia. (d) Straightening of the maxillary incisal line with lateral C filing; Burial 70, Altar de Sacrificios (58-38-20/N10126.0), Pea-body Museum of Archaeology and Ethnology, Harvard Museum. Copyright 2017 Presi-dent and Fellows of Harvard College. All photographs by Vera Tiesler MLA 9th Edition (Modern Language Assoc.) Scott E. Burnett, and Joel D. Irish. A World View of Bio Culturally Modified Teeth. University Press of Florida, 2017. APA 7th Edition (American Psychological Assoc.) Scott E. Burnett, & Joel D. Irish. (2017). A World View of Bio Culturally Modified Teeth. University Press of Florida.

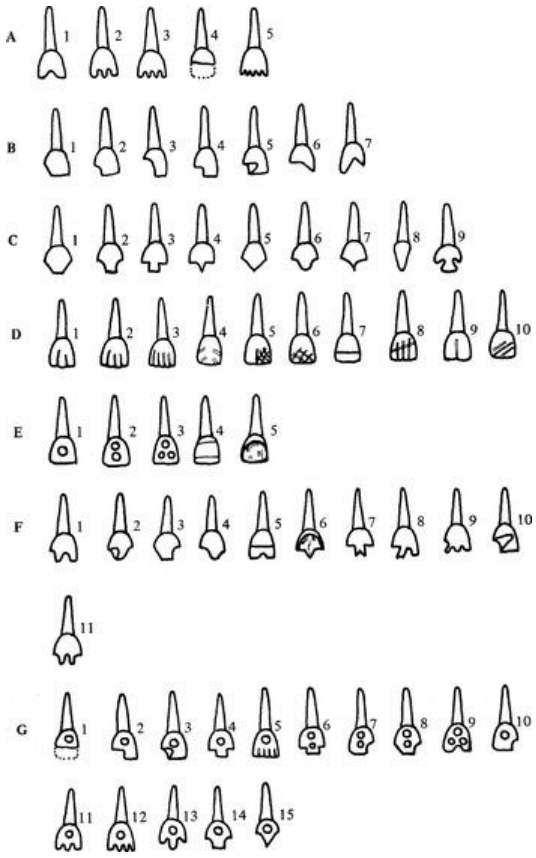


**Figure 2**. Romero's system of classification for teeth with dental modification.

**Figure 3**. Mayan jeweled dental inlay. Picture courtesy José C. Jiménez López of National Geographic.

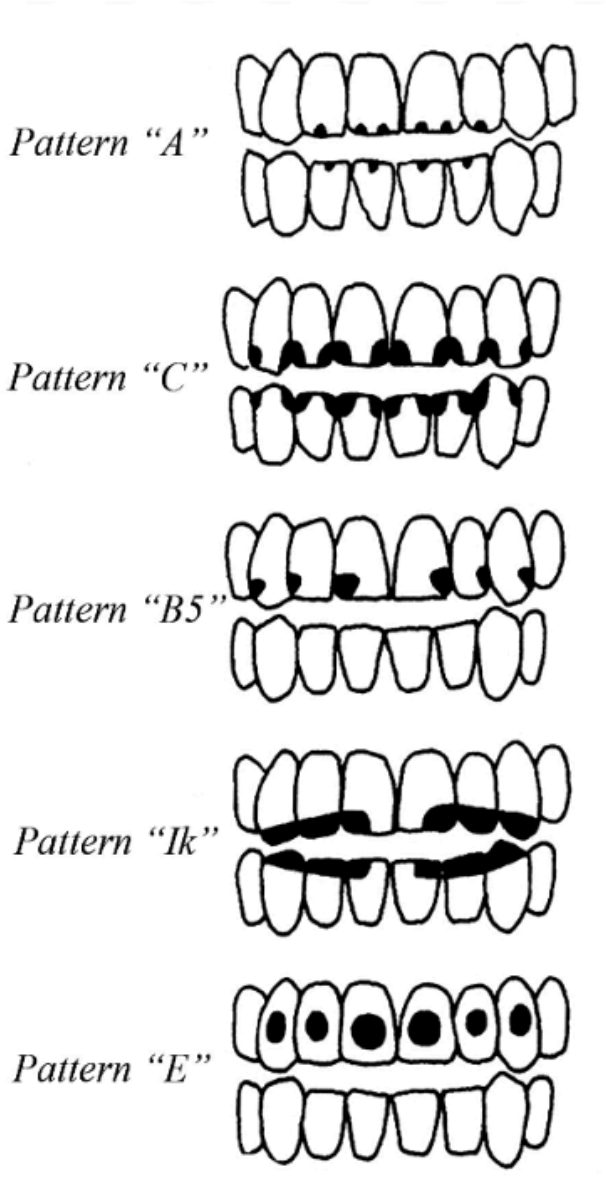


Figure 17.1. (a) Taxonomy of artificially modified teeth (Romero 1984; gray color denotes practice in the Maya area and additional types displayed among the ancient Maya). (b) Visual patterns in each dentition (adapted by Tiesler and Ramirez 2015; numbers refer to original count by Romero).

**Figure 5**. Taxonomy of artificially modified teeth.

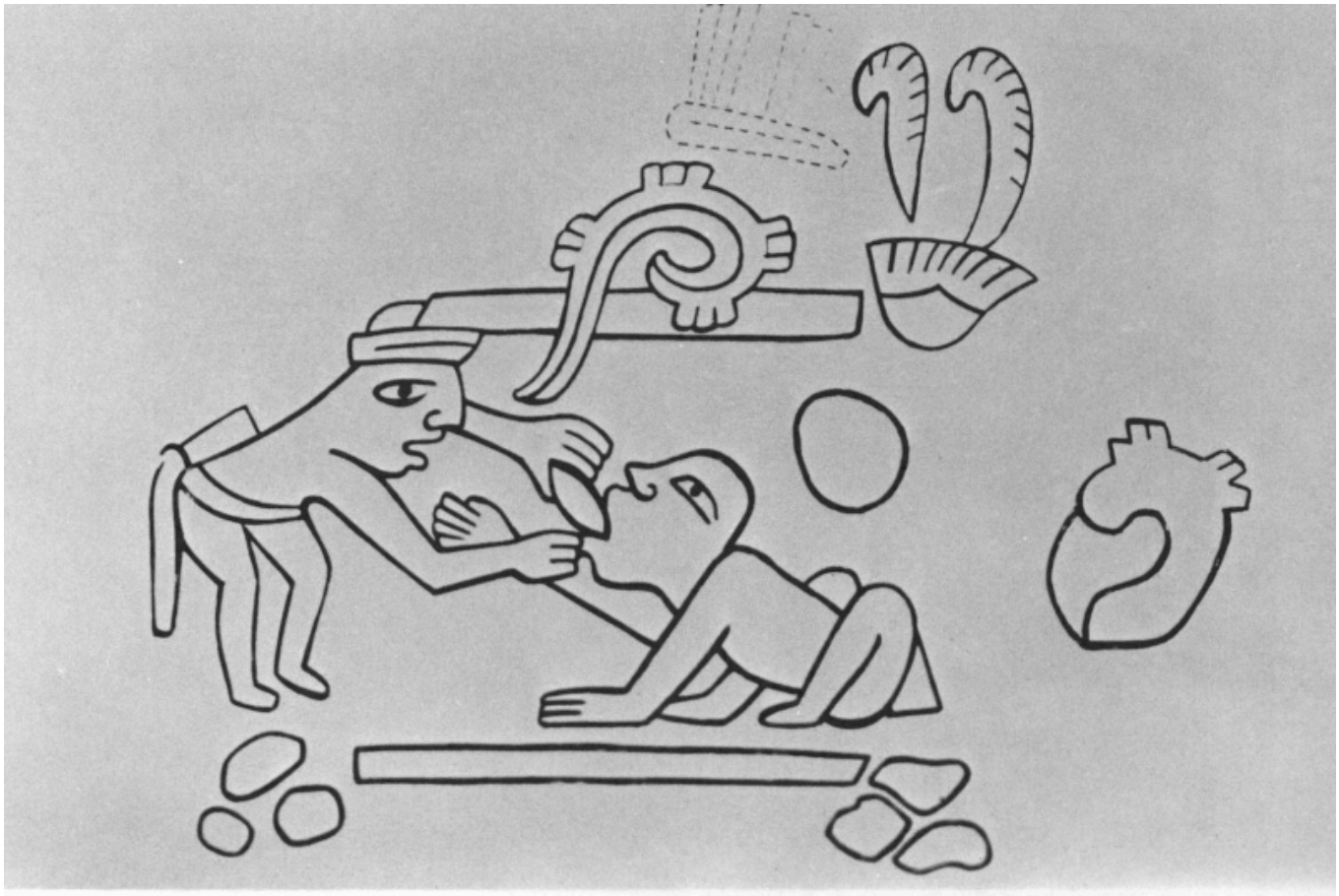

**Figure 6**. Fragment of polychrome mural known as "Earthly Paradise" discovered Tepantitla, Teotihuacân. It probably represents the act of filing the teeth with a stone.

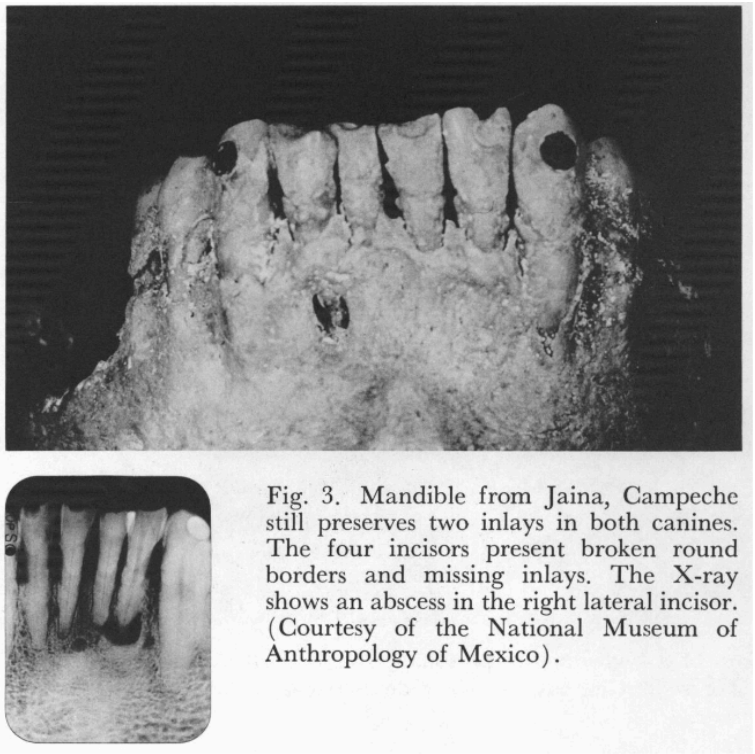

Fig. 3. Mandible from Jaina, Campeche still preserves two inlays in both canines. The four incisors present broken round borders and missing inlays. The X-ray shows an abscess in the right lateral incisor. (Courtesy of the National Museum of Anthropology of Mexico).

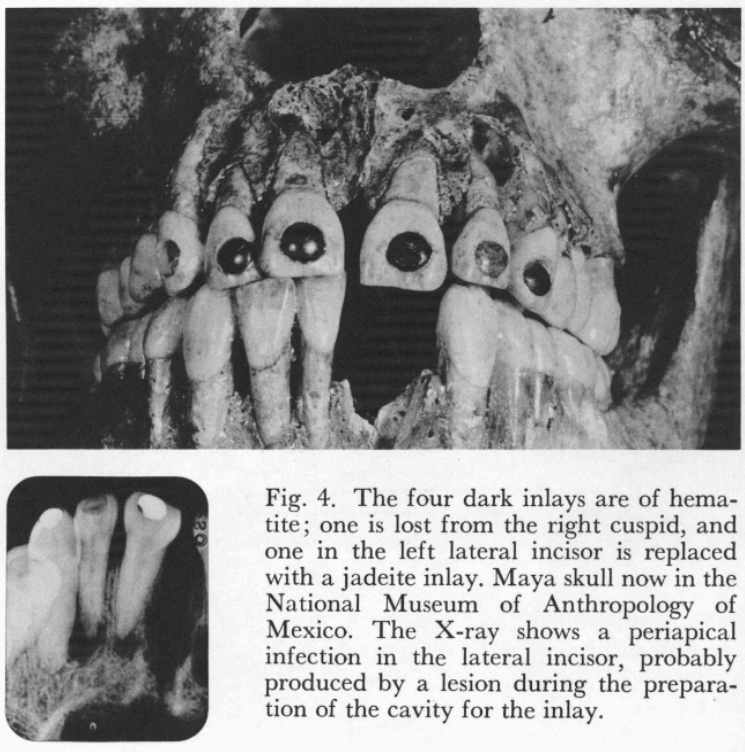

Fig. 4. The four dark inlays are of hematite; one is lost from the right cuspid, and one in the left lateral incisor is replaced with a jadeite inlay. Maya skull now in the National Museum of Anthropology of Mexico. The X-ray shows a periapical infection in the lateral incisor, probably produced by a lesion during the preparation of the cavity for the inlay.

**Figure 7**. X-ray studies of Mayan dental abscess reports in 1947 photographed by National Museum of anthropology of mexico.

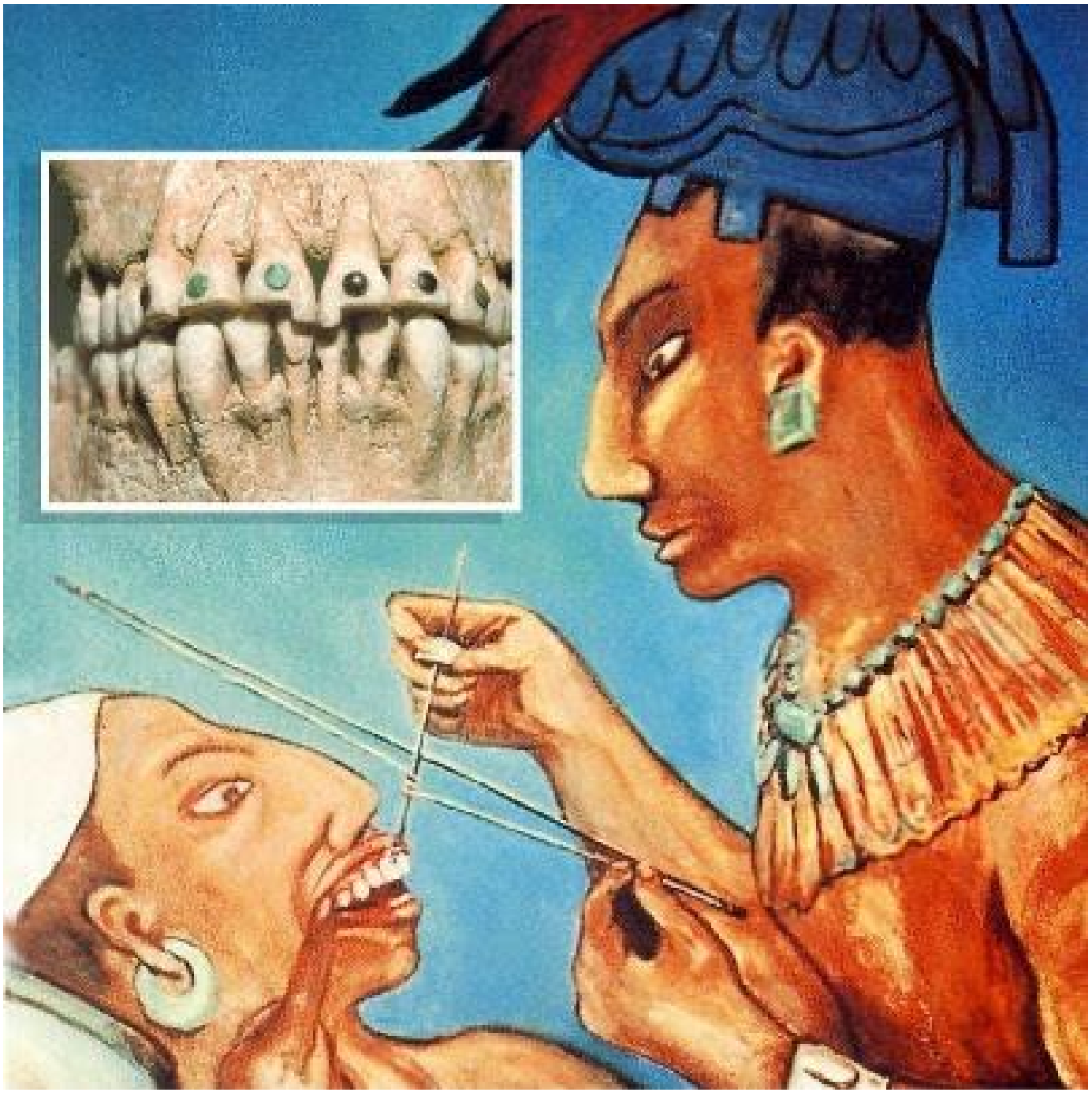

**Figure 8**. Depiction of a mayan dentist using bow drill on teeth.

**Figure 9**. Mayan king, Janaab' Pakal's bones were found in 1952 by Alberto Ruz in an elaborate tomb inside the Temple.

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