



F37 Forensic Analysis and Historical Review of an Excavated Partial Denture From a United States Civil War Camp Site

Thomas A. Gromling, DDS, 100 Highlander Road, Stephens City, VA 22655; Thomas Beatley, 119 Elmwood Road, Winchester, VA 22602; Peter J. Bush, BS, Laboratory for Forensic Odontology Research, School of Dental Medicine, SUNY at Buffalo, B1 Squire Hall, South Campus, Buffalo, NY 14214; Paula C. Brumit, DDS, PO Box 608, Nocona, TX 76255; Bruce A. Schrader, DDS, 9004 Francia Trail, Austin, TX 78748; and David R. Senn, DDS, University of Texas Health Sciences Center at San Antonio, Center for Education and Research in Forensics, 7703 Floyd Curl Drive, San Antonio, TX 78229-3900*

After attending this presentation, attendees will have a better understanding of the history of the fabrication of removable prosthetics in the United States.

This presentation will impact the forensic science community by increasing awareness of alternative techniques for the identification of dental prosthesis that may be associated with an individual to aid in their identification.

Historical and archaeological evidence have shown us that ancient civilizations had some knowledge of dental maladies and their treatments. While there have been written records with detailed instructions for wounds of the mouth, there is nothing mentioned for the restoration of lost teeth resulting from these injuries or maladies. Around 700 B.C. we begin to see the art in dentistry and the replacement of lost teeth with the use of ivory and bone, secured by gold bridgework. This level of dental art for the replacement of teeth was lost on further civilizations until the 1700s.

In 1774, the French pharmacist Duchateau designed hard baked, rot proof porcelain dentures, and patented them in 1789 as "Mineral Paste Teeth". These teeth were held in place by platinum pins, invented in 1808 by Italian dentist Giuseppangelo Fonzi. Porcelain teeth came into use in the United States in 1817. Artist Charles Peale began baking porcelain teeth in Philadelphia and the commercial manufacturing of porcelain teeth began in 1825 by Samuel Stockton in Philadelphia. Stockton's nephew improved the design and founded the S.S. White Company in 1844.

Throughout history, denture bases were fabricated from many different materials, each with their own advantages and disadvantages. Carved ivory was used early on as well as metals such as gold, both hammered and cast. Cast aluminum was not available until approximately 1870 but there were problems with it involving warping and imperfect density during casting.

While metal detecting in a field known to have been the site of several camps for armies from the North and possibly the South during the Civil War in the Shenandoah Valley of Virginia, an item was found at a depth of approximately 8 inches. When cleaned, it was found to be a metallic partial denture, yellow in color and having what appeared to be two denture teeth attached to it. After an initial examination, permission was granted to have the denture taken to SUNY at Buffalo for a thorough microscopic examination.

The denture was photographed, weighed, and examined with a stereomicroscope and images were captured of different areas of the denture. It was noted that each of the teeth were held in place to the base by two pins. It was also noted that the metal framework was actually three different pieces that appeared to have been soldered together.

The denture was analyzed by Scanning Electron Microscopy and Energy Dispersive X-ray Analysis (SEM/EDS). Areas analyzed were the base metal, soldered areas, denture teeth material, and the pins. The results were noted by a weight percent analysis of each of the regions giving the elemental breakdown. The results showed the base area to be 81.3% gold, 17.3% silver, and 1.4% copper. The soldered areas were 55% gold, 40% silver, and 5% copper. The solder had higher silver content, with a lower melting point than that of the predominately gold portions of the denture, allowing for soldered connections between the base area, clasp and the area connecting the denture teeth. The pins securing the teeth to the gold framework were 95% platinum, and 5% copper.

The tooth material had a composition corresponding to a ceramic feldspathic silicate, with oxides of silicon, aluminum, and potassium. From the composition of the teeth in this object and presumed provenience, it is possible that teeth from the S.S. White Company were used in this partial.

After the completion of various analyses and reviewing the historical data available regarding the fabrication of removable partial dentures in the United States, the investigator determined that the data tends to confirm that the prosthesis that was excavated from a known Civil War campsite is consistent with the materials in use during that time period in U.S. history.

Forensic Odontology, Forensic Archaeology, Identification