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MILITARY DENTISTRY IN ANCIENT ROME: 27 B.C.-A.D. 476

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ABSTRACT
Vegetius writes that military leaders selected only the healthiest, strongest citizens for service.1 To maintain physical fitness legionnaires exercised, trained and consumed adequate quantities of healthy foods. Dental injuries and diseases interfered with the intake of proper nourishment. Roman commanders understood the importance of dental care to the overall well-being of a fighting soldier. Medical inspections and treatment including dental care allowed soldiers with medical problems to return to the battlefield as soon as possible. Medical and dental treatment acted as a force multiplier to give the Roman army an advantage in war.

KEYWORDS: Caries, periodontitis, prostheses, dental injuries.

INTRODUCTION
Modern dentistry has its roots in the Roman Empire. James Wynbrandt points out: "Rome . . . marked the zenith of the ancient world's oral-care arts. ... They invented gold shell crowns, new methods of securing loose teeth, and created artificial replacements in the selection of materials including bone, boxwood, and ivory."[1] Medicine and dentistry was not considered different specialties in ancient Rome. Physicians (Medidi ordinarii) (primary care physicians), surgeons (medici chirurgi) and their assistants treated medical maladies of all kinds including emergencies. Romans referred to physicians who regularly performed dental procedures with expertise used the term dentatores as well as medicus, but the former was an honorary title rather than a formal one.[2] Dental disease and pain was common in Roman times and remains so today. Severe dental pain can affect a soldier's concentration and focus in battle. Therefore, it was important for the Roman medical corps to address this problem as quickly as possible.

The main purpose of this article is to demonstrate that early treatment of injuries to the teeth and associated structures of the oral cavity facilitated the return of affected soldiers on the battlefield as quickly as possible. The key question addressed is the efficiency of Roman dental care to legionnaires with dental injuries or infections for reentry into battle. Major sources of information for this article are: writings of Greek and Roman physicians, artifacts, archaeological discoveries, and writings of modern scholars. The main inference is that Roman dental care was superior to the dental care of most Roman enemies. The key concepts to understand in this article are "immediate medical care," "military medicine" and "dentistry." "Immediate medical care" means care rendered soon after a wartime injury or acute dental pain by caregivers and hospitals located near the battlefield."[3] "Military medicine" means medical assistance rendered a wounded soldier with a "primary goal of reducing manpower losses caused by the enemy."[4] "Dentistry" means the branch of medicine dealing with the care of the teeth and associated structures of the oral cavity.[5] It is improbable that the Roman state could have forged and maintained an empire encompassing two million square miles, 44 province and 40 million people without a large, effective, disciplined army supported by a highly effective medical corps, which included state of the art dental care. Following this line of reasoning, the implications is a better understanding of Roman imperialism and success on the battlefield. Failure to take this line of reasoning leads to a lesser understanding leads to a lesser understanding of Roman imperialism and success on the battlefield. The main point of view presented in this article is that dental care and care of associated structures of the oral cavity in the field and in field hospitals was an important aspect of providing immediate medical care to legionnaires soon after a wartime injury to the buccal area.

PRIMARY SOURCES
Aulus Cornelius Celsus (first century A.D.) wrote a study of medical techniques and medicines, Pedanius Dioscorides (A.D. 40-80) compiled an extensive list of drugs and other materials used in medicine. Claudius Galen (A.D, 129-205) developed a systematic approach to medical procedures, and Paulus AEgineta (625-690) wrote a medical encyclopedia, Medical Compendium in

Seven Books. Flavius Renatus Vegetius (4th century A.D.) wrote a chapter on desirable physical conditioning and mental acuity.[6]

METHODOLOY

The available historical and archaeological materials do not permit a statistical empirical Approach to the topic of Roman dermatology. Therefore, the research design of this Study employs a combination of an exhaustive historiography and conceptual analysis of The primary source s in their translated editions and in the original Latin. Historiography is An approach based on the concept that historical knowledge provides a basis and rationale For valid knowledge about human activities and achievements. Conceptual analysis is Based on careful analytical evaluation of ancient literary sources, inscriptions, pictorial Sources, coins, and archaeological discoveries.

THE ROMAN MEDICAL CORPS

After Gaius Octavian Augustus (63 BC–14 AD) became emperor of Rome, he initiated several changes in the organization of the Roman legions. One of these changes was the development of a Roman Medical Corps and a Veterinarian Corps. Physicians (*medici*) were responsible for setting the physical standards for all men entering military service, maintaining their health while in service, and processing them for discharge or retirement. Military medicine was aimed at the legionnaires. Prevention of disease and injuries was as important as rehabilitation. *Capsarii* (medical corpsmen) rendered advanced first aid to legionnaires as first responders on the battlefield and later assisted health care professionals inside field hospitals. During the Roman Empire, thousands of soldiers suffered from epidemics of communicable diseases. Roman physicians developed techniques for hygiene and sanitation at Roman military hospitals and during normal military activities. Soldiers with contagious diseases were isolated and confined. Physicians developed techniques for pain management and infections that occurred after ancient battles. Roman physicians even developed perioperative anesthetic methods. Wound care employed the use of antiseptics prior to bandaging a wound. Several herbs to manage pain and address fever were also employed. Roman physicians also were able to address stress disorders through pharmacological and non-pharmacological means. The Romans were the first army of antiquity to employ mobile field hospitals, triage, and the hemostatic tourniquet.[7]

The Roman Veterinary Corps was indispensable to the maintenance of healthy horses fit for combat during antiquity. The *Veterinarius Medicus* (Veterinary Corps officer) and his staff were responsible for the treatment of battle wounds inflicted on horses by enemy weapons. The Veterinary Corps also treated complications associated with wounds such as fever, pain, and infection. The Veterinary Corps also treated injuries and sickness in horses to ensure that the cavalry was always fit for expected or unexpected battles.[8]

ROMAN MILITARY HOSPITALS

Roman camps (*castrae*) and forts (*castella*) occupied an area of five to ten acres in addition to the fortified ditches, stockades, and other defensive devices. The average hospital (valetudinarius) occupied an area of 6,000 square feet and could accommodate 250-500 patients. In the event of mass casualties, ward tents could be set up near the hospital. Every hospital had wards, corridors, administrative offices, a dining hall and a drainage system. In addition, there was a surgical suite, lavatories, kitchen, storage cabinets, and baths with hot and cold water. The bath area was also used as an exercise room for physical therapy. Military hospitals had a staff of physicians (*medicus ordinarii*), nurses (*nutrices*), orderlies (*miles medicii*), and specialists. Surgeons and ophthalmologists were among these specialists. The *medicus primus* (chief medical officer) was in charge of the hospital. He reported directly to the *praefectus castrorum* (prefect of the camp). The chief medical officer was assisted by *optio valetudinarius* (hospital executive officer). Convalescent care was under the direction of the *optio convalescentium* (superintendent of convalescence). The duties of this man were similar to a modern physician's assistant. A *seplasiarius* (pharmacist) was responsible for the preparation of medicines ready for administration to patients. The hospital commander was in command of hospital personnel. However, he rarely interfered with the work of specialists except in obvious cases of negligence or malpractice.[9] Campbell's studies demonstrate that hospitals in military forts were better equipped and staffed than the medical clinics in military camps.[10]

DENTAL HYGIENE

The Romans were the first army of antiquity to practice a significant level of hygiene and sanitation in their military hospitals. Community hygiene was an important issue among the legionnaires that centurions (captains) strictly enforced. Roman physicians took steps to reduce sepsis and separated sick and wounded soldiers in the hospitals to minimize the spread of contagious diseases. Celsus recommended recreation, rest, a varied diet, exercise and frequent bathing.[11] Legionnaires also practiced oral hygiene. Soldiers had a choice of several mouthwashes. A favorite was salt in mild vinegar.[12] Soldiers also practiced brushing the teeth and gums with a brush of made of horse hair. Tooth powder consisted of an abrasive such as chalk, a detergent such as balsam and a sweetening agent such as cinnamon.[13]

Dental probes during periodical medical examinations also helped to promote dental hygiene. Physicians rinsed the buccal area clean and then used probes and retractors to search for cavities, periodontal disease, abscesses, wear and chipping. Medicii employed hand-held curettes and scalers to scrape off plaque and calculus from the

teeth. The physicians had an array of instruments to deal with dental problems. They had scalpels scissors, dental forceps, clamps, sutures, tweezers, cauterizers, elevators, burnishers, chisels, hand files, a hand-operated rotating dental drill (dentalis terebro) and other materials and instruments to address wounds and diseases of the teeth and gums.[14]

DENTAL CARIES AND ROMAN PROSTHESES

Caries is tooth decay; progressive decalcification of the enamel and dentin of a tooth. Early detection and dental restorations offer the best form of control once caries form.[15] If the case of incipient caries, when the decay is limited to the enamel, the physician used the hand drill and other instruments to remove diseased portions of the tooth. After drilling the medicus applied linen soaked in vinegar and honey to the surgical area. If the carries penetrated the dentin and pulp of the tooth extraction was the only available option. The process began when a dental assistant washed the patient's mouth with water and then a mouth wash consisting of salt in mild vinegar.[16] Physicians applied a powdered mixture of cinquefoil root (Pontentilla reptans), henbane root (Hyoscyamus niger), salt, opium (Papaver somniferum) and mandrake (Mandragora officinarium) to the surgical site as a local anesthetic prior to the operation.[17] Physicians used a forceps (dentiducem) and pincers to remove the tooth. To remove a stump left after an extraction the medici used stronger forceps called a rizagran in conjunction with scalpels to remove it.[18] After drilling the medicus applied linen soaked in vinegar and honey to the surgical area.[19] Then the soldier received a portable covering of fabric which contained might contain a local anesthetic.[20] After the area of extraction completely healed there were two primary methods of prosthetic replacement. The first method involved the medicus tapping an ivory, gold or steel implant into the jawbone. The implant was in the form of a peg created by an artist who specialized in this area.[21] The second method was to insert the artificial tooth into a metal bridge with a metal pin and fitting it onto the remaining teeth. A gold wire was sometimes added for supplemental support.[22] Patients were on bland, soft diets for some time after these procedures.

During the implantation process the surgeons addressed infection, bleeding and pain. The medici used vinegar as an antiseptic and an assistant boiled all surgical instruments and materials prior to use. The medicus opened abscesses with a scalpel and drained the pus. The patient then used the mouth wash of salt and mild vinegar for a period of time. If fever developed the soldier received a draught of a powder made from the bark of a willow tree (Salix).[23] Physicians controlled bleeding by applying pressure to the site and used anti-hemorrhagic agents such as acacia or tragacanth[24] They applied cauterization only in extreme cases. The medici controlled pain by use of the aforementioned analgesics from the most mild, salicylic acid, to the harshest, opium.[25] Writings by Roman physicians contain no case studies to validate the success of Roman prostheses and implants. However, the Constitution of the Roman Republic known as The Twelve Tables. Table 10, Law 15 (Concerning religious Law) does provide validation. It states in part: "Gold, no matter in what form it may be present, shall, by all means, be removed from the corpse at the time of the funeral; but if anyone's teeth should be fastened with gold, it shall be lawful to burn, or to bury it with the body."[26] Thus, Roman prostheses and implants were common and successful enough for mention in the highest law of the Roman State.

PERIODONTAL DISEASE AND BATTLEFIELD INJURIES

Periodontal disease is a disease of the supporting structures of the teeth, the periodontium, including alveolar bone to which the teeth are anchored.[27] In the early stages of the disease Roman medici removed plaque and tartar deposits on the tooth and root surfaces. This process helped gum tissue to heal and periodontal pockets to shrink. Physicians encouraged patients to brush and use mouth wash on a regular basis with thyme (Euphorbia chamaisyce) and sage (Salvia) added to the preparations.[28] In more advanced stages Roman surgeons (medici chiurgi) performed gingivectomy, gingivoplasty and surgery into the bony architecture of the teeth. Medici performed surgery to remove inflamed tissues and reduce the damage to bone that has formed around the teeth. Surgery allows the physician access to areas under the gum and along roots where tartar and plaque accumulate. It is sometimes necessary to extract a decayed tooth. Celsus writes: "the affected gum should be lanced, the tooth extracted, and the splinter, if any be detached, is to be removed; while, if there is be any unsound bone remaining, it ought to be rasped."[29] Battlefield injuries to the mouth caused extensive bleeding, pain and the potential for serious infection. Medical corpsmen would have performed advanced first aid on the battlefield and transported the injured legionnaire to the field hospital as quickly as possible. Although Roman soldiers wore helmets and carried large shields, wounds of the mouth occurred. If a missile such as an arrow or sling lodged in the buccal area Physicians removed it by special surgical instruments developed by the Greeks and Romans. Wounds inflicted by swords or spears often required bone grafts and injured tissue a soft-tissue graft. Teeth might have to be extracted and replaced. A severed lingual artery presented a special problem. The medical corpsman would apply pressure to the area while stretcher-bearers or a cart transported the soldier to the hospital. The hospital team aggressively worked on the wound with pressure, coagulating medicines, and if the use of clamps and a tamponade. Some physicians cauterized the area as a last resort. However, most patients did not survive a severed lingual artery. The medici treated dislocation of the lower jaw by reduction. This involved placing the bones in the proper position with or without surgery.[30] Physicians took care to avoid rupturing a large nerve, artery or vein.

Galen, perhaps Rome's greatest physician, developed a technique for healing severed arteries. In his words: "I prepared one of the hemostatic medications of the emplastic type, then carefully brought the division together, immediately placed medication on it, and bound on a very soft sponge and bandage. Keep the bandage as it was, only moistening the sponge. When having released it on the fourth day, I found that the division had conglutinated completely. I applied the medication again, binding it in the same manner without releasing for many days."[31] Some surgical procedures were painful enough to require general anesthesia rather than local anesthesia.

GENERAL ANESTHESIA

Roman anesthesiologists employed the Dissociative (sedation) (twilight) method of anesthesia. The patient received a sedative, analgesic and local anesthetic and experienced catalepsy, amnesia and marked analgesia.[32] The patient drank powdered opium (Papaver somniferum) in a draft of wine.[33] However, the Romans imported opium from the East via The Silk Road and might not be available. In that case the anesthetist administered powdered mandrake (Mandragora officinarium) in a draft of wine.[34] Mandragora grew in Italy. The sedative of choice was Corn Poppy added to the wine. (Papaver rhoeas).[35] A common local anesthetic used by Roman surgeons was a powder made from Henbane seeds (Hyoscyamus niger) and administered In a small quantity of wool fat to the surgical site.[36]

Prior to surgery the soldier would bathe, abstain from food and drink for eight hours. Prior to the application of the local anesthetic a medical staff member applied vinegar (acetum) to the area.[37] The surgeon performed the operation as quickly as possible. After surgery the physician sutured the wound, washed it with vinegar, and applied honey (mel) to the wound site.[38] Then, he applied soothing herbs and water to the patient.

Bleeding and infection were the main issues of concern. If inflammation should occur aloe, (Aloe vera) applied as a lotion, displayed some anti-inflammatory effects.[39] Vinegar and honey were the main external ingredients designed to prevent and control infection. The medical staff gave patients a draught of a powder made from the bark of a willow tree (Salix).[40] When the fever was quite high, the head of the patient was kept cool with ice or cold compresses and the body kept warm with blankets. Roman physicians had an array of medicines to treat coughs, diarrhea, constipation, nausea and vomiting and other ailments.

Diet was also important to patients recovering from surgery. The patient began eating light foods such as broth made from meat, poultry and seafood. As the patient's health improved, he received bits of meat, legumes, leafy greens white mushrooms, and finally, a regular diet.

CONCLUSION

Vegetius writes that military leaders selected only the healthiest, strongest citizens for service.[41] To maintain physical fitness legionnaires exercised, trained and consumed adequate quantities of healthy foods. Dental injuries and diseases interfered with the intake of proper nourishment. Roman commanders understood the importance of dental care to the overall well-being of a fighting soldier. Medical inspections and treatment including dental care allowed soldiers with medical problems to return to the battlefield as soon as possible. Medical and dental treatment acted as a force multiplier to give the Roman army an advantage in war.

REFERENCES

1. Vegetius, Epitome of Military Science, 1-6.
2. James Wynbrandt, The Excruciating History of Dentistry (New York: St. Martin's Griffin, 1998) 20-21.
3. Wynbrandt, The Excruciating History of Dentistry, 30.
4. Kiran Panesar, "Advances in Wound Management," U.S. Pharmacist, 2013; 6: 1-16.
5. Richard A. Gabriel, and Karen S. Metz, A History of Military Medicine. Volume I, From Ancient Times to the Middle Ages (New York: Greenwood, 1992), 2.
6. Clayton L. Thomas, Taber's Cyclopedic Medical Dictionary, (Philadelphia: F.A. Davis, 1997), 509.
7. Pedanius Dioscorides, About Medical Materials, trans. Lily Y. Beck, (Zurich: Weidmann 2017); Claudius Galen, Method of Medicine, trans. Ian Johnston and G.H.R. Horsley (Cambridge: Harvard University Press, 2011); Paulus AEgineta, The Seven Books of Paulus AEgineta, trans. by Francis Adams, (London: The Sydenham Society, 1846); Aulus Celsus, On Medicine, trans. G.F. Collier (London: Simpkin and Marshall, 1831); Flavius R. Vegetius, Epitome of Military Science, trans. N.P. Milner (Liverpool: Liverpool University Press, 1993).
8. Valentine Belfiglio, "Treatment of Flesh Wounds in the Roman Army," *The International Journal of Interdisciplinary Civic and Political Studies* 9, no. 1 (2014): 1–8; Valentine Belfiglio, "Acute Pain Management in the Roman Army," *Anesthesia, Pain & Intensive Care*, 2017; 21(3): 383–86.
9. Valentine Belfiglio, "The Treatment of Equine Flesh Wounds in the Roman Army," *The International Journal of Interdisciplinary Civic and Political Studies*, 2018; 12(4): 1–7.1998), 29.
10. Davies, *Service in the Roman Army*, 209–35; Polybius, *The Histories of Polybius* (London: William Heinemann, 1922); 6: 19–42.
11. Duncan B. Campbell, Hospital Staff in the Roman Army: Running the Valetudinarium," Ancient Warfare, 2019; 13(1): 54-57.
12. Celsus, On Medicine, I.1-2.

13. Dioscorides, About Medical Matters, 5.13.3. Vinegar contains acetic acid, which is an antiseptic. Salt (NACL) is an antibacterial.
14. Celsus, On Medicine, 5.1,5; Dioscorides, About Medical Matters, 1.14.
15. AEgineta, The Seven Books of Paulus AEgineta, 6.28; Celsus, On Medicine, 6.9; Galen, Method of Medicine, 6.6 (445K-446K).
16. Thomas, Taber's Cyclopedic Medical Dictionary, 320.
17. Dioscorides, On Medical Materials, 5.13. Vinegar contains acetic acid, an antiseptic.
18. Celsus, On Medicine, 6.9. Cinquefoil has tannins which act as an astringent and anti-inflammatory. Henbane has hyoscine, a local anesthetic. Salt has anti-bacterial properties. Opium is an analgesic containing morphine, codeine and thebaine. Mandrake is an analgesic which contains scopolamine, hyoscyamine and atropine Celsus, On Medicine, 7.12.1.
19. Dioscorides, On Mdical Materials, 2.82.1-2, 5.13.1. Honey has several antibacterial components. These components include: defensin-1, hydrogen peroxide and methylglyoxal. The high sugar contents. And low pH adds to its antibacterial qualities.
20. AEgineta, The Seven Books of Paulus AEgineta, 6.28.
21. Eric Crubzy, Pascal Murail, Louis Girard, & Jean-Pierre Bernadou, "The History of Dental Implants," Nature: The International Journal of Science, 1998; 391: 29.
22. Celsus, On Medicine, 7.12.
23. Dioscorides, On Medical Materials, 1.104.
24. Celsus, On Medicine, 5.1-2.
25. Dioscorides, On Medical Materials, 1.104, 4.64.
26. Roman Republic, The Twelve Tables, tab. 10, law 15.
27. Thomas, Taber's Cyclopedic Medical Dictionary, 1444.
28. Dioscorides, On Medical Materials, 3.33, 4.169. Thyme contains thymol which is an antiseptic, deodorizer and anti-inflammatory. Sage contains rosmarinic acid and an essential oil which give the herb anti-inflammatory, antibacterial and antifungal properties.
29. Celsus, On Medicine, 6.13.
30. Celsus, On Medicine, 7.5; AEgineta, The Seven Books of Paulus AEgineta, 6.29, 6.62.
31. Galen, Method of Medicine, 5.7-335-336K.
32. Thomas, Taber's Cyclopedic Medical Dictionary, 101.
33. Dioscorides, De Materia Medica, 4.64.3. Opium is a powerful analgesic containing morphine, codeine and thebaine.
34. Dioscorides, De Materia Medica, 4.75.3. Mandrake is a less potent analgesic containing scopolamine, hyoscyamine and atropine.
35. Dioscorides, De Materia Medica, 4.63.2. Corn poppy contains rhoeadine, a mild sedative.
36. Dioscorides, De Materia Medica, 4.68.3.
37. Dioscorides, De Materia Medica, 5. 13.1. Vinegar contains acetic acid which is an antiseptic.
38. Dioscorides, De Materia Medica, 2.82.1-2, 5.13.1. Honey has several antibacterial components. These components include: defensin-1, hydrogen peroxide and methylglyoxal. The high sugar contents. And low pH adds to its antibacterial qualities.
39. Dioscorides, De Materia Medica, 3.22.4.
40. Dioscorides, De Materia Medica, 1.104. Willow bark contains salicylic acid, an anti-febrile.
41. Vegetius, Epitome of Military Science, 1-6.