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- Increasing interest among dentists in dental history.
- Encouraging dental schools to develop historical collections on dentistry, and to offer adequate instruction in dental history.
- Developing a broader understanding of the facts of dental history among the leaders in dentistry in order to aid them in their attempts in solving important problems in dental education and practice.
- Stimulating more thorough and comprehensive research in dental history, thereby extending the boundaries of dental knowledge, giving substantial support to growing professional culture.
- Creating an authoritative body to which important questions relating to dental history could be referred for factual verification.

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2011 Hayden-Harris Award Presented to Dr. Sheldon Peck

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From the Archives: Vol. 3, Nos. 7 & 8

Book Shop
Clifton Orrin Dummett, the nation's best-known historian of African-American participation in dentistry, brought to the profession an extensive knowledge base in the history of our profession. For several years, Dr. Dummett and I had many telephone conversations about American dentists who distinguished themselves in our field. The nonagenarian's mind was sharp and his memory almost impeccable. However, it was his many publications which allowed me to gain insight into his countless years of research. This enabled our telephone discussions to last at a minimum of two hours each.

His wife, Mrs. Lois Doyle Dummett, was a major contributor to and co-author of many of his publications. In a recent telephone conversation, she made it clear that "[her] marriage to Dr. Dummett was not like this modern generation." They were a team and she "supported her husband one hundred percent."

Clifton Dummett was the second dentist of a family which produced three generations of dentists. Alexander Adolphus Dummett (1874-1949), his father, practiced dentistry in Georgetown, British Guiana. His son, Clifton O. Dummett, Jr. (1944-2006) held the position of head of the Louisiana State University Department of Pediatric Dentistry.

Dummett earned a Bachelor of Science degree from Central Y College (now Roosevelt University), and a Doctor of Dental Surgery degree from Northwestern University Dental School. He earned his MScD degree in Periodontics from the same institution. In 1947, as a Fellow of the Julius Rosenwald Fund, Dummett earned a Master of Public Health Dentistry from the University of Michigan, making him the first African-American dentist to earn an MPH. Dr. Dummett was licensed to practice dentistry in Alabama, Illinois, Tennessee and Massachusetts. He was a Diplomate of the
American Board of Periodontology and a Diplomate of the American Board of Oral Medicine.

Clifton O. Dummett began the earliest phase of his career at Meharry Medical College School of Dentistry in 1942, where he was charged with creating a department of periodontics. In 1949, he was appointed Dean of the dental school, thereby becoming, at age 28, America’s youngest dean of a dental college. At Meharry, the young dean expressed his aversion to racial segregation by resigning in protest of the agreement by Meharry Medical College to participate in the southern states’ “Regional Plan.” The plan would advocate and strengthen segregation, frustrating the efforts made by many for African-Americans to obtain equal rights under the US Constitution.

An appointment in 1949 as Chief of Dental Services at the Veterans Administration Hospital in Tuskegee, Alabama, and later at the Veterans Administration Research Hospital in Chicago, allowed Dummett to embark upon the second phase of his career.

Dummett joined the US Armed Services, was commissioned Major, USAF Dental Corps in 1954, and was assigned to Elmendorf Air Force Base, 5005th Hospital, Anchorage, Alaska, where he served as chief of periodontics and oral medicine, base preventive dental officer, and consultant in periodontics to the Alaskan Air Command. He was promoted to Lieutenant Colonel USAF, and continued in the Reserves as Medical Service Liaison Officer and Mobilization Augmentee to the Command Dental Surgeon, Air Force System Command, Andrews Air Force Base, Washington, DC. He retired after 24 years of service in 1979.

In 1966, Dr. Dummett left the Chicago Veterans Administration Research Hospital to become the Dental Director of the University of Southern California (USC) South Central Multipurpose Health Services center in Los Angeles. Two years later he was appointed associate program director and health center director, becoming the first dentist in the United States to head an Office of Economic Opportunity Neighborhood Health Center. In 1968, he was appointed Assistant Dean for Hospital and Extramural Affairs, and inaugurated the Department of Community Dentistry at USC dental school.

Dummett retired from USC in 1989 and gained an international reputation for his scholarship (312 articles and 10 books), and as a speaker. He was the recipient of numerous awards and honors including honorary Doctor of Science degrees from his alma mater Northwestern University; the University of Pennsylvania, and Meharry Medical College. He held positions in many dental organizations including Editor-in-Chief at the National Dental Association (NDA) for 22 years. In 1987, he received the Hayden Harris Award, the highest honor conferred by the American Academy of the History of Dentistry.

Dummett also served nine years with the American Association of Dental Editors, of which he was elected President. He was past president of the International Association for Dental Research, the American Academy of the History of Dentistry, and the Los Angeles Dental Society. Dr. Dummett was a Fellow of the American College of Dentists, the American Association for the Advancement of Science, the American Public Health Association, the Association of Dentistry International, and the International College of Dentists; and was one of the first three dentists in the nation elected to the prestigious Institute of Medicine of the National Academy of Science.

Though he will be missed by us all, Dr. Dummett’s literary contributions and spirit will guide future dental historians in preserving and expanding our knowledge of dental history.

—Ernest J. Goodson, DDS, MS, MPA
Bremner Award for Pre-Doctoral Dental Students

A certificate, $500 cash prize and up to $500 travel and related expenses will be awarded to the winning unpublished essay on:

1) A subject relevant to the history of dentistry
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Eligibility: Contest open to all predoctoral students of dentistry in the US and Canada, including undergraduate students preparing for admission to dental school. Purpose is to encourage the student and research of the history of dentistry.

Entries must be original essays, not more than 5,000 words, on a subject relevant to dental history.

Selection: A special committee of the Academy will judge all entries received prior to May 1, 2012, for the current year's award. The winner will be announced prior to July 1, 2012, so that said winner may be in attendance at the annual meeting of the Academy.

Application: Send typed essays (in triplicate), following the Instructions for Authors for the Journal of the History of Dentistry, along with a statement of authenticity by the Dean or responsible faculty, by May 1, 2012.

The Award is presented at the annual meeting of the American Academy of the History of Dentistry.

Please submit papers prior to May 1, 2012.

Please direct correspondence to:
Dr. Arden G. Christen
7112 Sylvan Ridge Road
Indianapolis, IN 46240
Dr. Sheldon Peck (left) receives the 2011 Hayden-Harris Award from AAHD Executive Director Dr. David Chernin.

Dr. Sheldon Peck was presented the Hayden-Harris Award for lifetime contributions to the field of dental history at the 60th Annual Meeting of the American Academy of the History of Dentistry, in Charleston, South Carolina. We honor Dr. Peck as a humanist and clinical scientist, who throughout his distinguished career has supported and encouraged the study, teaching and appreciation of the history of dentistry. Sheldon has become known as the definitive biographer of Edward H. Angle, as well as the authority on the beginnings of modern orthodontics. Through his monumental four-volume set about Dr. Angle’s letters and activities, which he compiled and edited, Dr. Peck set a new standard for dental historical research.

The Hayden-Harris Award was established by our Academy to recognize individuals, such as Sheldon Peck, who distinguish themselves in strengthening the three pillars of our Academy: organization, education and literature. Sheldon articulates for our Academy the practical as well as cultural value of dental history which is essential to our profession.

Our Academy has been honored to have Sheldon serve on its Executive Board and Editorial Review Committee. He has been ever-generous with his time and expertise, and is always willing to mentor new dentists and share with them his expanded vision and passion for dentistry and history.

He is also known widely for his other scholarly interests and publications, in the fields of physical anthropology and art connoisseurship, extending the boundaries of knowledge in both.

Dr. Peck attended the University of North Carolina at Chapel Hill, graduating with a BS degree with Phi Beta Kappa distinction, and a DDS degree with Omicron Kappa Upsilon distinction. He went on to study orthodontics at Boston University under Dr. Herbert I. Margolis, earning an MScD degree. He is Secretary Emeritus and Historian for the Edward H. Angle Society of Orthodontists (EHASO), having served as its Secretary for 14 years.

For over 20 years, he was involved in teaching and research in post-doctoral orthodontics as Clinical Professor of Developmental Biology at the Harvard School of Dental Medicine. Today, he is Adjunct Professor of Orthodontics at the University of North Carolina at Chapel Hill. Dr. Peck continues practicing orthodontics part-time in Newton, Massachusetts.

His avocational pleasures include the study and collection of European old-master artworks, and adding to his collection of rare books related to the history of dentistry and orthodontics. He enjoys spending summers with his wife Dr. Leena Peck (an orthodontist too!), their daughter Anya and son Mark at their family retreat in Finland.

Engaged and learned Academy Fellows, exemplified by Sheldon Peck, continue to enrich our Academy and our profession with their scholarly passions and historical insights. By honoring Sheldon with the 2011 Hayden-Harris Award, we are in effect honoring all.
Oral and dental healthcare was a major medical concern in 16th- and 17th-century England. The analysis of a representative corpus from *Early English Books Online* (EEBO) reveals that the general principles and therapeutic management of baby teething were found most often in pediatric and midwifery treatises. The chapters devoted to this babyhood process usually gave information on factors determining teething onset, eruption schedule, order of appearance, associated disorders and short-term prognosis. Among the remedies available to alleviate children’s pain, the authors mention anti-inflammatory herbal ointments, soothing fomentations, periodic mouthwashes, and minor surgery. Although the selected chapters on baby teething do not include detailed accounts of teething-related symptoms, one can find consistent data in the different descriptions and recipes provided. This scholarly agreement indicates systematic medical and midwifery practices to deal with a predictable, but frequently troublesome, stage of children’s development.
Introduction

Oral and dental healthcare was a major medical concern in 16th- and 17th-century England. Academic treatises and manuals for professionals commonly contained one or more monographic chapters on mouth problems, usually consisting of the description of the disorder (toothache, cancer in the mouth, rotten tissue, caries, stinking ulcers, etc.) and a set of instructions for preparing handmade products to cure or relieve the condition. By contrast, popular remedy books, easy-to-follow compendia, and receptaries were written with a non-specialist reader in mind, and hence were more interested in the practical side of medicine. As a rule, these books avoided in-depth investigation into the theoretical and pathological aspects of mouth diseases, instead concentrating on the elaboration and application of proven medicinal substances; that is, they were intended as guidebooks for healers and laymen, who eagerly received pharmaceutical recipes to treat the broad array of illnesses that affected the early modern English population.

The analysis of 16th- and 17th-century corpus shows that the chapters on baby teething are found particularly in pediatric and midwifery books. On this basis, it is possible to surmise that this babyhood process fell within the scope of health professional practice, and that both trained physicians and midwives could have given therapeutic advice to parents with teething children.

A simple title keyword search (i.e. “children AND treatise”) was performed in the digital full-text collection Early English Books Online, 1475-1700 (EEBO). It initially produced 369 occurrences in 79 books, but the number of books was reduced to nine after eliminating results unrelated to medicine. Translations from languages like French and Dutch were also excluded, as it was assumed that they conveyed knowledge from other European healthcare systems and environments. Of the nine books remaining, the present study corpus comprises six books, three on the subject of pediatrics, and three on midwifery books. Interestingly, just one treatise on children’s diseases was printed in the 16th century (1546), the other two being published in England in 1653 and 1697, respectively.

The following section outlines and discusses the content of the chapters devoted to baby teething in the books selected, which have been divided in two groups: treatises on children’s diseases, and midwifery books.

Treatises on Children’s Diseases

In The boke of chyldren (Fig. 1), by Thomas Phayer (1546), Phayer speaks of “Breedynge of teeth” in chapter eight, which is composed of two distinct parts. The first part addresses basic aspects of primary tooth eruption and defines baby teething as a natural process that begins around the seventh month of life. However, eruption may start early, and children who sprout deciduous teeth at an early age often go through a less troublesome teething experience. Phayer then says that most babies are sore and irritated due to various concomitant diseases and pains, such as gum inflammation, swollen jaws, restless crying, fevers, cramps, palsy,
diarrhea or rheum. Associated bodily disorders become more serious if the teething process takes longer than normally expected, or when teeth are cutting through the gum line.

In the second part of this chapter, Phayer reports some tested therapeutic options to treat the painful symptoms of teething. According to him, the most effective remedy is anointing the baby’s gums with a sticky unguent made of hare’s brain mixed with an equal quantity of both capon’s grease and honey, although he also promotes the curative properties of each of these three ingredients in isolation, since they are wholesome enough to soothe the gums and alleviate sinew affectation. Phayer also notes that rabbit’s brain is a perfect alternative to hare’s brain. His argument is based on a simple analogy: if a rabbit’s maw is known to have even more therapeutic properties than a hare’s maw, this fact should be assumed likewise true for other body parts.

Another remedy involves washing the child’s mouth twice or thrice a week, using a warm decoction of chamomile, hollyhock and dill. To enhance the mixture’s therapeutic efficacy, Phayer reports that some renowned scholars recommend co-administration of this medicinal water with a natural product made of fresh butter (or honey), a little barley flower, fine frankincense powder, and licorice. However, Phayer neither mentions the resultant pharmaceutical form of the mixture, nor the correct mode and timing of application.

Finally, the author proposes an oily formula to be used in specific clinical conditions, namely: when the baby seems to suffer great, intolerable pain accompanied with gum abscess or inflammation. Ideally, the remedial agent should contain rose oil and nightshade juice, but if the caregiver lacks, or cannot elaborate, this product, he can anoint the internal jaw surface with a little quantity of fresh butter and some honey.

Chapter 6 of De Morbis Puerorum, by Robert Pemell (1653) refers to primary teething as the most grievous disease children ever endure. Pemell lists the habitual signs and symptoms of this process by exciting some fragments from Hippocrates’ Aphorisms. Aphorism 3.25, in particular, states that teething is associated with gum itch, fears, convulsions and diarrhea. These four disorders frequently appear when teeth are cutting through the gum tissue, and they mainly affect fatter children whose abdomens feel tight and hard to the touch.

Pemell says that babies are sometimes born with natal teeth grown out. As illustrative examples, he names two Roman honorable personages: Manius Curius—who was nicknamed Dentatus after this particularity—and Cneius Papyrius Carbo (as recorded in Pliny the Elder’s Natural History; Book VII, ch. 16). The author also recalls the case of a girl born with two lower “cutter” teeth, as Baldvini Ronsei witnessed (De hominis primordijs, 1564).

As to the eruption schedule of primary teething, Pemell indicates that the process starts around the seventh month of age. The incisors—known as “cutters” or “shearers” appear first, soon followed by the canines or “dog teeth” (in allusion to their greater length than the rest). The “eye teeth” come next; they are so called not because their roots reach the eye orbit—in fact, they sit no higher than the nostril area—but because eye teeth carry branches of the oculomotor nerve. Although Pemell distinguished between the canines and the eye teeth as though they were two different types of teeth, they together constitute the four canines in humans; the “eye teeth” refer to the upper or maxillary canines, whereas the “dog teeth” are the lower. The last baby teeth to grow are the molars, or “grinders” due to their pulverizing action; the hindmost molars are called “wisdom teeth” since they do not break through the gum tissue until men come to the age of discretion and wit which, according to Pemell, happens around 28-30 years old or later. However, Pemell’s age range for the eruption of wisdom teeth could be considered late by modern standards, as today it is generally observed to occur between the ages of 17 and 25. Pemell closes the paragraph indicating that some people’s wisdom teeth never grow in, but he does not go into further explanation as to why.
Pemell reports that the first sign of teething onset is great itching of the gums, followed by a needle-pricking sensation on the root surface. This is accompanied by severe pain, wakefulness, gum inflammation, fears, diarrhea and convulsions, especially when the “dog teeth” and “eye teeth” are erupting. Around the seventh year of age, deciduous teeth start falling out, pushed by permanent teeth, but this is typically a painless procedure.

Although babies are unable to report their suffering, Pemell points out that some factors can be helpful to determine primary teething onset; namely: the approximate time of first tooth eruption; children’s tendency to put their fingers into the mouth to alleviate pain; the mother or wet nurse’s more wrinkled nipples; as well as swollen and white gum tissue. He then repeats that teething babies are prone to wakefulness, diarrhea, fears and convulsions, also establishing that pain is the cause of associated sleep disorders, agitation and gum inflammation. However, “fluxes of the belly”—an expression Pemell uses to refer to diarrhea—are due to some excess of choleric humor (yellow bile) which usually brings about soft or fluid-like stools.

In relation to prognosis, the author thinks teething is a very troublesome stage in children’s lives due to several associated disorders and their symptoms. In the 17th century, the ancient Hippocratic belief that baby teething was sometimes responsible for many child deaths—particularly when fever and convulsions aggravated the process—was still widespread among medical intellectual circles. In fact, Pemell warns the reader against the dangers of deciduous teething by paraphrasing some key aphorisms from the Hippocratic treatise De dentione, including: (i) the longer primary teeth take to grow, the more dangerous it is for children’s health; (ii) teething babies with loose stool are less prone to convulsions than others; (iii) drowsy and sleepy children are in a permanent lethargic state that also prevent convulsions; and (iv) children having acute fever seldom experience convulsions because this fever neutralizes the pathological activity of the causing factor (“the matter”).

Pemell also refers to the Hippocratic theory of seasonal influence on teething pains, and how these pains could be more or less bearable depending on the period of the year. Thus, babies who start cutting teeth in winter are less afflicted than those starting in summertime; however, infants who begin teething in winter can stand the pain if they have adequate help. Pemell comments that painful and difficult teething usually brings about a little cough; that children with prickling sensation and needle-like pain in the gum become too lean; and that the worst teething phase is when dog- and eye-teeth are erupting, since the pain is more serious and felt more sharply.

The last section of the chapter is devoted to natural and homemade remedies for teething symptoms. To treat sore gums, Pemell recommends rubbing them often with honey, or a mixture of honey and butter. Alternatively, hare’s brain alone—or concocted with both capon’s grease and honey—is equally efficacious for the purpose. If the healer cannot get hare’s brain, he may substitute it with coney’s (rabbit or pika) brain. Another remedy consists in rubbing the gum tissue with red coral, and then washing the baby’s outer cheek with the decoction of mallow and chamomile flowers (or with mallow juice mixed with butter). When the gums are swollen and extremely painful, Pemell suggests preparing a semi-solid product made of rose oil and nightshade juice. In the event that teeth do not break through and the baby’s pain worsens, it is necessary to cut the gums with a sharp instrument. Pemell indicates this minor surgical intervention can save many children’s lives, as he himself has witnessed in his daily professional practice.

Lastly, the author writes a few lines about the wet-nurse’s diet, which should be moderate and based on cool meals (rather than hot). As soon as the baby starts cutting his milk teeth, the wet-nurse should start drinking barley water cooked with oats, lettuce and endive; by contrast, she must abstain from all kinds of salty and sharp products in the meantime.

In Chapter 17 of John Pechey’s A General Treatise of the Diseases of Infants and Children (1697) (Fig. 2), titled “Of breeding Teeth,” Pechey does not consider primary teething to be a disease per se, but a natural and unavoidable. However, the author
admits that baby teething has been traditionally included in treatises on children’s diseases because it is understood as a kind of oral pathology that could become a serious health issue.

Regarding the stages of baby teething, Pechey says that all children are born with natal teeth which are kept hidden underneath the gums until cutting time. There are also exceptional newborn infants who already present a first set of grown-up teeth at birth; like Robert Pemell in De Morbis Puerorum, Pechey mentions the famous case of Marcus Curius [sic] recorded in Pliny the Elder’s Natural History. Pechey reports that as a rule, children start teething around the seven months of age in this order of eruption: the front teeth appear first, followed by the dog- or eye-teeth and, later, the pre-molars and molars.

Pechey states that a series of preternatural teething disorders arise as a result of the wounds caused by the gums breaking and piercing. The first symptom of incipient teeth eruption is gum itching, an uneasy irritating sensation which soon develops into needle-pricking pain; other symptoms include restless wakefulness, gum inflammation, fever, diarrhea and convulsions. Pechey stresses that they are especially common throughout deciduous maxillary canine eruption. The author warns that, according to ancient beliefs, parents should not reckon much on their children’s lives until the canines come forth wholly. The first baby teeth loosen and fall out around the age of seven to make room for permanent ones. Pechey says that second dentition is painless because gum tissue has been properly indented and perforated during primary teething.

Pechey concurs with Robert Pemell in telling that parents may determine the onset of primary dentition not only by their children’s age, but also because teething babies usually put their fingers in their mouth, or gum the nursing woman’s nipples harder to relieve pain. Pechey likewise mentions that children show whitish gums where new teeth are to grow, and have some of the general symptoms aforementioned (pain, wakefulness, diarrhea and convulsions).

Pechey describes teething as a risky situation because some children die from concomitant diseases or symptoms. He also explains that infants having loose stools during primary dentition are less prone to convulsions, just like those presenting with acute fever; in fact, it was thought that fever somehow stopped the action of the agents causing convulsions, as if it were some kind of counterbalance physiological measure. To close his account on prognosis, Pechey points that winter is the best season for primary teething (as the Hippocratics believed).

The last paragraph refers to the therapeutic treatment of primary teething. Pechey says that it is extremely important to relax and soften the child’s gums, since this action allows easier cutting and growing. Moreover, the application of cooling products containing emollient ingredients is useful to assuage pain and inflammation. Pechey’s therapeutic proposal includes rubbing sore gums with honey alone, honey mixed with butter, or a portion of hare’s brain; letting the child bite a candle made of pure (“virgin”) wax; or anointing the gums with mucilage of quince seeds obtained from boiling them in mallow water. He also recommends
preparing a fomentation to be smeared over both jaws carefully; this topical product could be obtained either from a decoction of marshmallow, chamomile flowers and dill, or from mucilage of quince seeds and marshmallow mixed with an egg yolk. If the baby’s gums are inflamed, the fomentation has to contain the juice of nightshade or lettuce too. To prevent worsening of the child’s symptoms, the nursing woman should also follow a special and healthy diet based on cool food, including oatmeal, barley broth, poached eggs, prunes, endives or lettuce; however, she must avoid all salty products, acid meats and wine.

**Midwifery Books**

_The Compleat Midwifes Practice_, by Thomas Chamberlaine _et al._ (1656) (Fig. 3) contains the chapter “Of breeding Teeth.” It begins stating that children endure great physical pain throughout the teething period. Then, Chamberlaine and his colleagues concur with Robert Pemell and John Pechey in saying that uneasiness and distress are evident signs of onset; that, around the seven month of age, the child often puts his fingers into the mouth and bites them hard to alleviate discomfort; and that the nursing woman may notice the infant grasps her nipples more tightly. _The Compleat Midwifes Practice_ makes reference to signs and symptoms already mentioned: visible white points in the gums, wakefulness and a very painful sensation in the oral cavity.

As therapeutic remedies, Chamberlaine _et al._ advise anointing swollen areas with a portion of boiled hare’s brain, or with its fat matter. If there is gum inflammation, the tissue surrounding incipient teeth should be washed with a mixture of rose oil, white wax and nightshade juice. If it becomes...
ulcerated, the midwife (or caregiver) has to rub the sores gently with an ointment made of unsalted butter, a little honey and frankincense powder.

In chapter 14 (“Of Breeding of Teeth,” of Directory for Midwives; or A Guide for Women (Fig. 4), by Nicholas Culpeper (1662), Culpeper explains that teething is a necessary evil for all children, which causes great pain due to the comorbidity of different symptoms. Primary teething usually begins at about seven months of age, according to this sequence or eruption pattern: the front teeth (“fore-teeth”) are the first to emerge, then the canines (“eye-teeth”), and, lastly, the molars (“grinders”). Culpeper says that when a tooth is ready to erupt, infants experience gum itch, some needle-piercing sensation on the tissue, and pricking as sharp bones break through. The process is indeed painful and brings about wakefulness, gum inflammation, fever, diarrhea and convulsions (these are especially frequent during eye-teeth eruption and growing time).

The second paragraph focuses on signs and symptoms of primary dentition. Culpeper agrees with other authors about the time of teething onset (around the seventh month). He also mentions that the child often puts his hands into the mouth to mitigate pain, as well as his tendency to hold faster to the wet-nurse’s nipple when teeth are about to cut through the whitish gum tissue. According to Culpeper, the initial stages of teething are characteristically febrile since excessive wakefulness, pain and burning in the mouth cause inflammation of yellow bile (i.e., the liquid is hotter and abnormally active).

As Robert Pemell did, Culpeper resorts to Hippocratic authority (De dentione) to affirm that long-lasting teething processes are especially dangerous for babies and may lead them to death in case of high fever and convulsions. However, loose-bellied teething children do not suffer convulsions, and fevers alone are said to reduce, or consume, any pathological excess of humors.

Culpeper, like John Pechey, believes that it is very important to mollify hard gums for less painful and quicker teething. Culpeper recommends rubbing the tissue with the finger dipped in honey mixed with butter, or let the child chew a small portion of a virgin-wax candle. Sore gums can be anointed with mucilage of quince seeds which have been boiled in mallow water; or with hare’s brain instead. The author also gives instructions to prepare a topical fomentation to be smeared over the child’s cheek; it is a medicated compound made of the decoction of althæa and chamomile flowers, some dill or mallow juice, and a piece of fresh butter. If there is gum inflammation, this fomentation has to be further prepared with nightshade juice and lettuce. Lastly, Culpeper also says that the nursing woman should change her eating habits, introducing more cool food (such as oatmeal, water-gruel, soft-boiled eggs, prunes, lettuce and endives) and avoiding sharp, biting or peppered meals, salt and wine.

In the anonymous treatise Everywoman her own Midwife: or a Compleat Cabinet opened for Child-Bearing Women (1675), chapter 30 is titled “A
most excellent Medicine to cause children to teeth easily.” It does not consider any theoretical aspect of primary teething, but goes straight to the point and offers a therapeutic solution to ease children’s pain and irritability. It consists in elaborating an unguent made of pure capon’s grease (in a quantity the size of a nutmeg), which has to be well clarified before mixing it with twice as much of pure honey. After both ingredients are duly combined, the caregiver should use it to rub the child’s gums three or four times a day. This ointment softens the flesh little by little and makes teeth to break through the gum tissue less painfully, also soothing the effects of both the ague and other symptoms produced by concomitant mouth disorders.

**Conclusion**

The six chapters studied more or less follow the same structural pattern to organize the information into a short theoretical framework on baby teething, and a section presenting several therapeutic options to treat its associated disorders. The information acquired from this corpus analysis attests that the knowledge on baby teething was reused in 16th- and 17th-century medical and midwifery treatises. This hints at some derivative tradition that, in most cases, dates back to Hippocratic writings and confirms a long-lasting, well-rooted classical tradition in English medicine.

In Early Modern England, baby teething was commonly defined as a natural, unavoidable process rather than as a disease in itself. However, experts were fully aware of the complications involved, which ranged from mild physical pain to serious risk of early death. Four of the six authors make reference to the schedule of infant teething and give some guidelines about the expected eruption order. Therapeutic choices were largely based on herbalism (botanical medicine) and natural remedies available at that time. A wide range of anti-inflammatory ointments were proposed to reduce swelling or soothe irritated gums, alongside topical emollients, painkilling fomentations and cooling mouthwashes. Some authors also recommended performing minor surgical incisions to let teeth grow out without hard tissue constraints, as well as promoting the wet-nurse’s healthier dietetic habits.

While the chapters on baby teething are not in-depth, detailed accounts of this condition, one can find consistent data in the different physiological descriptions provided. Likewise, the authors coincide as to the principal symptoms of teething onset and gradual sprouting, as well as to the guidelines for therapeutic management. This scholarly agreement points to a systematic medical and midwifery practice to deal with a predictable but usually troublesome process.
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Diagnostic Pulp Testing in Dentistry: How Far Have We Come?

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Techniques of pulp testing to determine vitality or sensibility have been in use for decades. While very little has changed in our methodologies, our understanding of the biology of the health and disease of the dental pulp has been enhanced. However, without thorough data collection using appropriate tests, and an integrated synthesis and analysis of this data, there is little chance of arriving at a diagnosis that will determine the proper course of treatment. While this need was clearly identified by Dr. Truman W. Brophy over 130 years ago, we are still faced with these challenges today.

Recently, the American Association of Endodontists conducted a major conference in an attempt to come to a consensus on numerous issues related to the health and disease of the dental pulp and periapical tissues. One particular focus was on the metrics, hierarchy and predictive value of various parameters and methods used in pulpal and periapical diagnosis. Some of the major outcomes identified in this area were that the dental clinician is not able to assess the exact status of the dental pulp, because of its location within the tooth, and because tests used to establish the health and disease of the dental pulp lack sensitivity and specificity. However, in the delivery of contemporary dental care, the diagnostic tests available are limited in uniqueness, number, scope and accuracy. Exactly how limited? How unique? One has to examine the diagnostic approach used over 130 years ago to know that the approach to testing and making a diagnosis using the available data have remained basically unchanged.

In 1879, Dr. Truman W. Brophy, a renowned oral surgeon, reported on a case which he was consulted on by a patient’s family physician. The patient was a 35-year-old woman with a systemic diagnosis of anemia and an extraoral abscess that had been present for two years in the canine fossa of the left maxilla. It had been lanced by her physician at a point “just below the orbit and to the right of the infra-orbital foramen” at which time it drained.
freely. However, the physician noted that the area never healed, and that there was a constant discharge of a seropurulent fluid from an excoriated area on the surface of the skin that approximated 40mm in diameter (Fig. 1). Since the physician had not been successful in his treatment, he referred the patient a surgeon, who treated the patient for the next year. The surgeon’s approach was to introduce “a seton [a small length of rubber tubing through the fistula, tied in a knot and stitched so that it moves freely keeping the area drained] into the fistula, passing it downwards, and carrying it through the mucous membrane, at a point where it folds upon itself (the gingivo-labial groove).” Additionally, injections of solutions of carbolic acid were made on a regular basis. Neither of these interventions, however, led to the healing of the skin lesion.

During this lengthy course of treatment the patient became despondent and physically weaker, and while losing her faith in her “medical attendant” she drifted from one practitioner to another trying to find a cure for her problem. Some physicians even diagnosed her condition as cancer, and she was given two years to live. During this time she was under the care of a “practitioner of dentistry” who had “skillfully filled the six anterior teeth, which were carious on the labial surfaces about the margins of the gums.” At no time during these procedures were the pulps exposed, nor was there coronal discoloration or other objective symptoms that may be observed in a tooth with a necrotic pulp.

Dr. Brophy examined the fistulous tract on the patient’s face and passed a probe into the tract, that reached denuded bone (identified by Dr. Brophy as being a space about one and a quarter inch in diameter). Based on this finding, and not having any of his instruments with him during the initial consultation at the physician’s office, he improvised the following pulp test methods:

With a small round file heated, I ascertained by applying it to the gold fillings (had there been no fillings, I would have applied it to the teeth), that the left canine tooth was devoid of sensation: and it was at the apex of the fang of this tooth where caries of the bone was found. This enabled me to make a diagnosis of the case.

Subsequently, Dr. Brophy took the patient to his office where he:

[Ver]ified his diagnosis by drilling through the palatal surface of the non-sensitive canine tooth, when I found, as I had anticipated, the pulp canal filled with sero-pus, and by introducing the point of a syringe into the cavity in the tooth, liquid was forced through the pulp canal into the abscess and out the fistulous opening on the cheek.

Once he was convinced that his diagnosis was correct, Dr. Brophy proceeded to do periapical surgery where he “cut away the exposed portion of the root and the carious bone surrounding it, then filled the canal with gutta percha, and smoothed it off carefully at the apex.” Ultimately the bone healed as well as the skin lesion below the patient’s eye. It was then that Dr. Brophy lashed out at the practice of incising these extraoral lesions of dental origin:
The practice, so frequently restored to, I regret to say, of lancing alveolar abscesses externally, cannot be too vigorously condemned. Unsightly scars are thus made, all of which might be avoided by opening these abscesses within the mouth.

Throughout his entire consultation, diagnosis and treatment, Dr. Brophy came to the conclusion that no medical practitioner or surgeon had ever ascertained the fact that the patient had received a traumatic blow to the tooth, which ultimately resulted in the demise of the pulp; knowing this may have negated the long and inappropriate treatment that had been rendered. Needless to say he was a voice crying in the desert, as the medical profession at that time had little understanding of the diseases of the oral cavity and their sequelae.

I have no doubt that a very large percentage of the cases of caries and necrosis of the maxillary bones, as well as trigeminal neuralgias, with all their complications, emanate from lesions of the dental organs. And it is not too much to say that if, instead of resorting to their indiscriminate removal, they were treated upon scientific principles, as other diseases are, the requirement of humanity would be far more effectually subserved.

This historical scenario highlights the use of our so-called contemporary tests (thermal, sinus tract tracing, test cavity) along with the need to always take a thorough patient history prior to diagnosis and treatment. Furthermore, it emphasizes that our present tests are not unique, and have undergone little change. What has changed, however, is our understanding of pulpal biology, along with how these tissues respond to irritation, infection and inflammation. Moreover, even with our better understanding of these biological processes and how they might relate to the nature of these tests and their findings,

...we remain committed to these tests presently as one part of the diagnostic method but also take into consideration the symptoms the patient presents with (and duplication of these symptoms), the signs noted in a thorough clinical examination, past dental history, radiographic examination, and medical history if applicable.²

Therefore, in many respects, we may wonder: just how far have we really come? And where do we go from here?

References


Mozart: The Toothache Of A Genius

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The medical history of Wolfgang Amadeus Mozart (1756-1791) has been pieced together from his letters and from anecdotes, but his dental health is one aspect which has been somewhat overlooked. It is known that, from an early age, he suffered from toothache and tooth abscesses, problems that may even have had other medical repercussions. In this paper, the authors explore and consider whether these negative experiences might have influenced Mozart’s work and his attitude to teeth and dental pathologies. Two pieces of evidence from the life and work of this great composer provide clues: the aria entitled “A tooth decayed and sensitive to cold” (KV 209 a) (1772), containing the lament of a “sick man” suffering from toothache; and the first of the “Zoroastrian Riddles,” which Mozart proposed during a masked ball in 1786, and whose solution is “teeth.” Close examination of these two creative feats demonstrate that Mozart’s attitude toward dental pathologies was calm and rational, so much so that he even managed to use the topic as a source of inspiration for a small jewel of a composition.

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Introduction

The scientific literature contains various attempts to study the health of Mozart through analysis of his correspondence and of anecdotes about him.1-9 This investigation does not propose to shed additional light on the reasons for the composer’s relatively premature death, nor to confirm the authenticity of what is presumed to be his skull, stored at the Stiftung Mozarteum in Salzburg, Austria.10,11 It is clear from Mozart’s vast collection of letters that he repeatedly suffered from dental problems. Indeed, it has been asserted that Mozart had several tooth abscesses. Each could have led to subacute bacterial endocarditis in a patient with a heart already damaged by rheumatic fever, as proposed by some investigators.5,12,13

But apart from the possible medical repercussions of these dental conditions, it may be wondered whether and to what extent these negative experiences influenced Mozart’s attitude to teeth and dental pathologies, and whether this attitude may have been reflected in his work. To explore this question, we analyze two fascinating moments in this great composer’s life and work.

“A Tooth Decayed and Sensitive to Cold”

Mozart’s first trip to Italy lasted from December 13, 1769 to March 28, 1771. The composer, then fourteen years old and accompanied by his father Leopold, travelled the peninsula, stopping off in various cities. One was Verona, where in January 1770 the young man had his portrait painted by Saverio Dalla Rosa (Fig. 1). Among their various visits, the Mozarts also stayed in Rome, from the beginning of April to the beginning of May of that same year. It was there on April 15, 1770, Easter Sunday, that Wolfgang was received by Pope Clement XIV, who subsequently made him a Knight of “the Order of the Golden Spur” on July 4, 1770. “The papal order read in part, ‘Hearkening to the supplications humbly submitted to us on thy behalf in this matter, we hereby make and create thee—whom we understand to have excelled since thy earliest youth in the sweetest sounding of the harpsichord—Knight of the Golden Spur.’”14

On April 28, 1770, Leopold wrote to his wife: “Wolfg. is well, thank God, although he has a slight toothache—as usual it’s just on one side of his face.”15

On April 28, 1770, Leopold wrote to his wife: “Wir befinden uns, Gott Lob, gesund: der Wolfg: hatte dieser täge ein wenig auf einer Seite seinen Zähnfluß mite in wenig geschwulst” (Translation: “Thank God, we are well: in the past days Wolfg. has had abscess in his tooth, with a slight inflammation on one side of his face.”)

Fig. 1. Portrait of Mozart aged fourteen (1770), by Saverio Dalla Rosa. The young maestro is depicted performing one of his own works.

*Ed. note—Zähnfluß literally meaning tooth secretions or drainage, it would appear that Wolfgang had developed a sinus tract from an infected tooth opening on to the side of his face. The development of this sinus tract possibly contributed to an alleviation of his underlying dental condition. It is conceivable that the disfigurement of Mozart’s face when he contracted smallpox in 1766 may have obscured and possibly camouflaged the occasional opening on his face.
Mozart’s recorded dental afflictions have been summarized as follows: April 1770, November 1770, December 1774, and April-May 1790.8,16

After a second visit to Italy (August 21–December 5, 1771), for the composition and triumphant première of his theatrical *serenata* “Ascanio in Alba,” again in Milan, Mozart spent ten months in Salzburg before returning to Milan (November 4, 1772–March 13, 1773) to compose “Lucio Silla.” This opera had a chaotic première, starting three hours late, but gained popularity over the next scheduled 26 performances.14

During time spent in Salzburg, between July and September 1772, Mozart composed an aria, of which there remains quite a long fragment of the original manuscript (Fig. 2) and score (Fig. 3) now stored in a private collection in Switzerland. This aria, set for bass vocalist and orchestra (horn, violin, cello and bass), is fascinating from the perspective of the history of dentistry. It is titled “A tooth decayed and sensitive to cold,” and it was not until the sixth edition that it was listed (dated 1775) in the Köchel catalogue of Mozart’s works, as entry KV 209a. The date was later revised to mid-1772 by Plath in 1976.17

Fortunately, there exists, to date, a recorded performance of this piece (“Mozartfragmente” [ORF CD433, 2005, Austria] preformed by the Georgian bass S. Macharashvili, accompanied by the Ensemble der Kunst Universität Graz). It was only recently, in 2009, that it was performed again in public in a recital on Lorenzo da Ponte (Mozart’s most famous librettist, who had an obsession with losing his teeth). The text of the aria goes as follows:

Un dente guasto e gelato
dai vermi divorato,
m’ha fatto tanto dolor!
Tanto dolor! Oh… Oh!
L’ho mostrato:
Ferro e pellicano
Ferro e pellicano,
ma non ha voluto
ritornar sano
non ha voluto ritornar

A tooth decayed and sensitive to cold
devoured by the worms
gives me so much pain!
So much pain! Oh… Oh!
I have showed this:
elevator and pelican
but he would not restore
to health
but he would not restore…

It is clearly indicated in the score that the bass vocalist plays the narrator of this piece. Musically, it is a comic song, perfectly suited to an Italian *opera buffa*, and “the fragment is interesting and contains a very unusual and unexpected modulation.”18

The text is not entirely original: Mozart was no doubt inspired by “Aria di Rubicone”, (a name which, in Italian, sounds like a cross between rubicondo—ruddy; and briccone—rogue) from “The Market of Malmantile” a comic play by “Polisseno Fegeio,” (“Pastor Arcade”) with music by Domenico Fischietti, first performed at the Grimani theatre in Venice in 1758. The personage behind the pseudonym...
was actually the great Italian writer of comedies, Carlo Goldoni, who was also a fine librettist. The composer, Domenico Fischietti (1725-1810) studied at the Naples Conservatory and debuted there with his opera “La Arminda.” In 1755, he went to Venice to present “The Apothecary,” his first opera with libretto by Goldoni, which was a resounding success. From then on, he acquired considerable fame, setting to music a number of Goldoni’s plays: “The Return to London” (1756), “The Market of Malmantile” (1758), “The Doctor” (1758) and “The Fair of Sinigaglia” (1760). In 1766 he was appointed Master of the Chapel Court in Dresden, a position he retained until 1772, when he moved to Salzburg to become Kapellmeister at the court of the Prince-Archbishop (where Leopold Mozart served as his deputy and first violinist). Fischietti is known to have remained in Salzburg until 1783, when he retired.

The aria is in Act 1, Scene 1, verses 86-94 of the opera. Rubiccone is a charlatan who, in Malmantile (a small fortified city near Florence famous in the 1700s for its market) boasts of his capacity to cure any illness. He even goes so far as to offer the governor of the city a “miraculous” powder...

Ecco un arcano
da cui vedrà portenti,
la polve mia per
rissanare i denti.
Denti guasti, gelati
dal verme divorati,
deboli, traballanti
nelle mascelle infranti
senza ferri,
tanaglie e pulicani
colla polvere mia
ritornan sani.

Here is a secret means
capable of miraculous things,
my powder for
healing teeth.

Teeth decayed and sensitive to cold
devoured by the worms
weak, unstable
broken in the jaw
without elevators,
forceps and pelicans
With my powder
are restored to health.

We can hypothesize that Mozart’s composition of his piece, at the age of sixteen, stemmed both from his personal recollection of the toothache and tooth abscess he had suffered not long after turning fourteen; as well as from his knowledge of Goldoni’s piece, and his youthful fascination with Fischietti. Even though it does not appear from his letters that Mozart ever attended performances of the opera set to Fischietti’s music, there is no doubt that he knew of the man and was kept abreast of what he was doing. Indeed, a letter written from Milan by Leopold Mozart to his wife, dated December 5, 1772, ends with a postscript handwritten by Wolfgang which contains the following: “der Fischietti wird wohl bald anfangen an seiner opera buffa—auf Teüschi—an seiner nährischen opera zu arbeiten” (Fischietti will soon start work on his opera buffa—in German—on his “strange” opera). Since there is no known opera buffa in German by Fischietti, and given that this was precisely the period in which Fischietti went to Salzburg to become Kapellmeister, it can be supposed that this remark was meant slightly ironically.

“The Market of Malmantile,” the pièce de résistance of the era’s best bass voices for opera buffa, was a famous work in its time, performed in London,
Madrid, Vienna, Dresden, and other cities. Vittorio Alfieri, one of the Eighteenth Century’s finest Italian tragedians and poets, wrote of this opera: “The brio, and the variety of that divine music made a great impression on me, leaving me with, so to speak, a harmonious ring in my ears and in my imagination, and stirring every deepest fibre of my being, such that for many weeks I remained immersed in an extraordinary, but not unpleasant, state of melancholy.”19 Goldoni’s libretto was appreciated so much that it was later set to music again by G. Scarlatti (in 1774), and Cimarosa (in 1784).

**The First “Zoroastrian Riddle”**

Thanks to accounts by a number of renowned music historians and biographers of Mozart,14,18,20 we know that there is at least one other instance in which the topic of teeth arises.

On February 19, 1786, the composer, dressed as an Eastern philosopher, attended the Carnival masked ball held in the Redoutensaal of the Imperial Palace in Vienna. He began distributing leaflets on which were written eight riddles and fourteen proverbs, invented by him. They were entitled “Excerpts from the Fragments of Zoroastrian,” printed for “the edification of the masked ball.”

For a long time, only one riddle and seven of the proverbs were known (salvaged because Mozart’s father passed them on to a Salzburg newspaper, which published them anonymously). In 1970, the rough copy of the other seven riddles was found in the Hermann Hartel Collection at the Staatsbibliothek Preußischer Kulturbesitz in Berlin and published in 1971.

The first of these rediscovered riddles (Fig. 4) reads:14,21

> We are many sisters; it is painful for us to unite as well as separate. We live in a palace, yet we could rather call it a prison, for we live securely locked up and must work for the sustenance of men. The most remarkable thing is that the doors are opened for us quite often, both day and night, and still we do not come out, except when one pulls us out by force.

The solution, of course, is “teeth.” A careful rereading of the riddle gives us an idea of how the thirty-year-old Mozart thought about teeth in general: they give us pain when they erupt and fall out, but they will come out only if extracted by force. This was a rather whimsical view of a topic that, as we know, was a nightmare even for many of the rich and powerful.

**Conclusion**

Close analysis both of the aria KV 209a, and of the first Zoroastrian riddle reveals that Mozart’s attitude to dental pathologies was calm and rational, so much so that he even managed to use the topic as a source of inspiration for a small jewel of a composition.
Acknowledgements

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References


The Unicorn and the Narwhal: A Tale of the Tooth

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From as far back as the early Roman era, detailed descriptions and artistic images of the unicorn have been imagined. In Europe, the Mediterranean and the Far East, this creature became accepted as real. Although such an animal had never actually been seen, it was said to have the appearance of a horse, the beard and cloven hooves of a goat, the tail of a lion, and a single, spear-like horn protruding from the center of its forehead. The unicorn myth originated shortly after unidentified horn-like objects, from six to ten feet long, began to appear in ancient European marketplaces. Physicians quickly ascribed outlandish healing properties to these horns, pulverizing them for the treatment of various diseases. In 1638, a Danish zoologist challenged these claims and provided evidence that the so-called “unicorn horn” was actually the tusk (tooth) of the narwhal from the Arctic seas. However, his findings remained unheeded for the next 100 years.

This paper explains how the myth of the unicorn and the purported powers contained within the substance of its magical horn evolved from the ages-old spoils of the Arctic fishing trade, where the narwhal was primarily speared for food and secondarily, for the export value of its ivory tusk. This unusually long, pointed and protruding single tooth, which breaks through the upper lip and the left jaw of each male narwhal, became a highly valuable commodity over the following centuries, due to its believed supernatural origins and curative qualities.

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Historical & Biblical References to the Unicorn

Approximately 1,800 years ago, a certain curious-looking tusk, of unknown origin, was described by the Roman naturalist Aelian (ca. AD 170-ca. AD 235) as being the horn of a unicorn. Although he had no proof that such a creature roamed the earth, he came to this conclusion after comparing the tusk with the horn of a rhinoceros. What could have led him to such a deduction?

Unicorns are mentioned earlier, in Greek natural history. Ctesias (390 BC), Aristotle (350 BC), Strabo (before 24 BC) and others described these horse-like creatures as wild asses, fleet of foot, with one long horn, colored red, white and black. In medieval times the unicorn served as an archetype of Christ, and its horn became a symbol of both divine and earthly power. Throughout the ages, positive artistic views of this heraldic beast have appeared in countless images.

The Old Testament refers to an animal called the re'em—the wild ox. Job 39:9-12 describes the animal as being of great strength and agility, with a powerful horn or horns. Later, the King James Bible translation substituted “unicorn” in place of the Hebrew re'em, in order to make the animal more recognizable as being an “unruly beast.”

When spear-like spiraled tusks began to appear in marketplaces, the unicorn myth took on a life of its own. During the medieval period, these mysterious objects, up to nine feet long, were being exported from the Arctic to Europe by the Vikings, who were hunting mammals called “narwhals” in their native waters and also acquiring them from Arctic natives. The long tusks of this unusual species of whales initially reached Western Europe, then the Mediterranean, and eventually the Far East. To the ancient world, the fact that these unattached, physically identical appendages existed was sufficient evidence to prove that the unicorn was real.

The ancient Assyrians, Chinese, Greeks, Romans and other peoples envisioned the unicorn as a genuine, awe-inspiring creature who possessed both magical and medicinal powers. In those days, many members of the medical community ascribed curative properties to the horn. It was to be ingested in a powdered form as a treatment for various ills, including epilepsy, impotence, sterility, stomach ailments, rabies and the plague. It was also touted as an antidote for poisons, a means of purifying water, and even as a way to raise the dead! Chinese, Japanese and Vietnamese mythologies have their own versions of a unicorn-like creature. In studying four brass unicorn figures contained in the palace of the King of Ethiopia, a 6th-century merchant of Alexandria (Cosmos Indicopleustes), who wrote works on cosmography, stated:

It is impossible to take this ferocious beast alive; all its strength lies in its horn; when pursued and in danger of capture, it throws itself from a precipice and turns so aptly on falling, that it receives all the shock upon its horn and so, escapes safe and sound.

Because people of medieval times were so vulnerable to disease and other environmental dangers, they would desperately try newly professed cures. In 1546, a gravely ill Martin Luther was medicinally treated with the powdered “unicorn horn” (the tusk of a narwhal), but the potion failed to save his life. In spite of its questionable efficacy rate, the pulverized “unicorn horn” became so highly prized as a nostrum that its value rose to ten times its weight in gold.

While many 16th-century physicians utilized this regimen for financial profit, some doctors, who remained true to their calling, staunchly opposed this exploitative practice. In his famous 1582 tome entitled, “Discourse,” the noted French surgeon Ambroise Pare (1510-1590) stated that the therapeutic use of either mummified human remains or unicorn horns in powdered form was merely superstition, which “though fashionable and expensive, is worthless.”

Even members of royalty attributed magical curative powers to the horn. To counteract the possibility of becoming poisoned, some French monarchs exclusively used eating utensils carved from what they supposed to be this substance. The horn’s monetary worth increased as its reputation grew. In 1598, Paul Hentzner, a German on a
royal tour of England, saw a “unicorn horn,” while viewing the crown jewels of Queen Elizabeth I. He noted: “We were shown here (at Windsor Castle), among other things, the horn of a Unicorn, of about eight spans in length, which was valued at 10,000 pounds, an amount which then exceeded the cost of an English nobleman’s castle!”

Kaiser Karl V of Austria actually traded two “unicorn horns” as payment for a large national debt. Additionally, a so-called “unicorn scepter,” embedded with diamonds, rubies, sapphires and emeralds, had been fashioned for the Austrian Hapsburgs. The staff of Ivan the Terrible and the sword handle of Charles the Bold were also carved from what was then believed to be unicorn horn.

During the Gothic era, (12th-16th centuries), the unicorn figured prominently in French and Flemish tapestries. Of the famous Unicorn Tapestries, six hang in the Cluny Museum in Paris (Fig. 1), and seven are displayed at the Cloisters Museum in New York. These works of art were given as a wedding present to Jean Le Viste, a nobleman in the court of King Charles VIII. The legendary creature, portrayed in white (a symbol of purity), has the basic appearance of a horse, the beard and cloven hooves of a goat, the tail of a lion, and a single, spear-like appendage protruding from the center of its forehead.

Of the unicorn’s disposition, it was said:

It was credited with such remarkable strength, that it could impale and carry away three elephants on its horn. However, it was unable to shake them off and usually died from starvation or from the stench of the elephants rotted. Unicorn hunters had to go to the mountains or deserts to find their quarry, and an encounter with the beast might daunt the stoutest heart: “There was nothing more horrible than the voice or braying of it, for the voice is strained above measure”—Also, it “biteth like a lion and kicketh like a horse”—and had no fear of iron weapons. The unicorn was very bad tempered with its own kind, even with the females, “except when it burneth in lust for procreation.”

An unknown 16th-century author described the lion and the unicorn as deadly enemies who battled against each other:

Wherefore as soon as ever a Lion seeth a Unicorn, he runneth to the tree for succour, that so when the Unicorn maketh force at him, he may not only avoid his horn but also destroy him; for the Unicorn in the swiftness of his course runneth against a tree wherein his sharp horn sticketh fast... Then the lion seeth the Unicorn fastened by the horn, without any danger at all, he falleth on him and killeth him.

In contrast, since 1603, when England and Scotland were first united under James I, a variety of Great Britain’s coats of arms have shown the unlikely scene of a lion (depicting England) and unicorn (depicting Scotland) holding up a common shield. (Fig. 2)

In the early 17th century, Isadore of Seville claimed that the only way to eventually overpower and kill a unicorn was first to have a nobly-born virgin lure it into submission with her charm.
Immediately upon seeing the creature, this supernaturally empowered maiden would entice it to lay its head upon her lap or “jump up into her bosom, and there be overwhelmed with her love.” Then, Isidore says, “As he leaveth all his fireness and sleepeth in that wise,” the trusting beast could be “slain with darts of hunters.”

In a public lecture delivered in 1638, Ole Wurm, a Danish scholar and zoologist, attempted to refute the unicorn legend by demonstrating that the prized horn material actually came from the male narwhal. However, his evidence went unheeded, and the myth persisted. Finally, in 1746, British physicians, confronted with mounting proof, abruptly stopped prescribing the horn as a wonder drug. Still, Dutch traders continued to peddle narwhal ivory well into the nineteenth century, and many purchasers resold it, touting its physically restorative powers.

Not a conventionally beautiful animal, the narwhal has mottled and splotchy black and white spots on its back and upper sides, solid white flesh on its underside, and dark, speckled marks on its face. It has small, almost hidden eyes and a thick layer of fatty tissue beneath its skin. This blubber has the dual function of insulating the whale’s internal organs and storing its energy sources.

Because this mammal has about 50 percent body fat and no dorsal fin, it can easily swim under the Arctic ice. However, it must continually keep moving in order to discover breaks in the solid surface where it can come up for air. In its natural habitat, it has a typical life span of at least 100 years. Narwhals fast in summer, but during winter, they dive to extremely deep levels, where they gorge on Greenland halibut, polar and Arctic cod, shrimp and Gonatus squid. Their descents, which reach ocean depths of more than 3,300 feet, can last as long as 25 minutes. Contrary to popular legend, they do not use their tusks to spear fish. Engulfed in total darkness, narwhals suck prey into their mouths and swallow them whole.

Narwhals often swim in groups (called...
“pods”) of 20 to 30, and during migration, they cluster in herds of up to 1,000. They tend to travel with those of their same gender and age group. Sometimes, a group of narwhals will raise their heads and half of their bodies in unison above the water level, and point their tusks upward. (Fig. 3) The strong movements of their tail fins allow them to accomplish this feat. While 50,000–80,000 of these mammals are estimated to exist in the wild, their numbers may be considerably higher.

Although relatively little is known about the secretive and unpredictable narwhals, a 2006 book entitled Greenland’s Winter Whales uncovers new and interesting data. The authors, Heide-Jorgensen and Kristin Laidre, call the narwhal, “possibly the worst study animal in the world.” In their May 2009, Smithsonian article, they state:

Narwhals live in the cracks of dense pack ice for much of the year. They flee from motorboats and helicopters. They can’t be herded toward shore like belugas, and because they are small (for whales) and maddeningly fast, it’s little use trying to tag them with transmitters shot from air rifles. They must be netted and man-handled…Narwhals are hopelessly hard to see and never come when you want them to, swimming far offshore and underwater the whole time. You think you’ll catch a whale in three weeks—you probably won’t. Whole field seasons go by and you don’t even see a narwhal. They cannot be studied because they die shortly when in captivity…The species is practically a blank slate.

These animals have been hunted for many centuries by the Inuit people of Northern Canada, Greenland, Baffin Bay and its estuaries. Every summer, large pods of narwhals that arrive in these areas from their northern haunts are harpooned by natives traversing the waters in kayaks. Their skin, called “muktuk,” is rich in vitamin D. Most of the human body’s vitamin D is produced internally, as a response to sun exposure; but in the arctic zone, where there may be little sunlight for months at a time, dietary supplementation of this nutrient is essential. Narwhal skin is considered a delicacy, and is eaten with gusto by Arctic inhabitants. Hunters frequently export narwhal tusk ivory for its high commercial value. A government-approved subsistence hunt currently pays approximately $125 per foot for narwhal tusks. A nine-foot tusk in prime condition may fetch $2,000 for the original seller, and $5,000 for a retailer.

The Narwhal’s Tusk Is A Tooth

Technically, “a tusk is an unusually long, pointed or protruding tooth, which typically grows in pairs, as manifested in the elephant, walrus and wild boar.”

In the male narwhal, however, a “single, swizzling-stick tusk (tooth) breaks through the upper lip and sprouts from the upper left jaw.” In their May 2009, Smithsonian article, they state:

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While it is extremely rare to find a male with two of these appendages, such an anomaly has occurred. However, the right maxillary half of this pair almost always remains undeveloped and embedded in the jaw. Scientists have yet to determine the growth pattern of this solitary tooth, which can extend from six to 10 feet, become as thick as a lamp post, and weigh up to 22 pounds. On living whales, this protrusion is typically green with algae and at its base, and infested with sea lice. Narwhals develop no functional teeth inside of their mouths.

The purpose of the narwhal’s lengthy tooth remains unknown, although its function has been speculated upon for centuries. Early explorers rationally but erroneously supposed that the tusk was used as a tool to punch holes in thick ice, and thus allow the narwhal to breathe. Jules Verne, in his novel 20,000 Leagues Under the Sea, incredulously described how a narwhal tusk could “clean through, as easily as a drill pierces a barrel.” After collecting data on this strange appendage, Tucker has conjectured:

No one’s sure precisely how or why it evolved—it has been called a weapon, an ice pick, a browsing rod for determining fertile females, a sensor of water temperature and salinity, and a lure and attractor. Herman Melville joked that it was a letter opener. Everybody has a theory on this…
Charles Darwin speculated in “The Descent of Man” that the ivory lance was a secondary sex characteristic, like a moose’s antlers, useful in establishing dominance hierarchies.

Adult male narwhals have a high incidence of broken tusks, body scars and head wounds, suggesting that they may sometimes attack one another. Since the tusk develops only on male narwhals, Darwin’s speculation may be correct that the tusk originally evolved as an implement for display and competition.

**Recent Dental Histological Studies of Narwhal Tusks**

Since the year 2000, Dr. Martin T. Nweeia, a general dentist on the faculty at the Harvard School of Dental Medicine, has served both as the principal investigator of Narwhal Tusk Research and as a research associate in the Marine Mammal Program at the Smithsonian Institution. In these capacities, he has intensely studied and analyzed the anatomy, purpose and functions of the narwhal’s tusk. His reports reveal that although the anatomical features of human and narwhal teeth have a few similarities, (e.g., both possess an odontoblastic cell layer), they are markedly different. Most human teeth have an inside pulp chamber lined with a layer of odontoblasts (dentin producing cells with many small tubules, which, if healthy, do not open up to the tooth’s surface). In contrast, the crowns of narwhal teeth, which have no enamel, are covered with a hard type of cementum and contain on their outer surface an estimated 10 million continuous, relatively open tubes that tunnel their way into the tusk’s central nerve. Presumably, this biological configuration allows these animals to measure minute environmental changes, including water temperature, barometric pressure, motion, particulate presence and salinity. These tusks are able to flex up to one foot in any direction, without cracking or breaking.

*Fig. 3. A pod of male narwhals swimming above the ocean’s surface and crossing tusks with one another.*
How the Narwhal Acquired Its Tusk
(An Inuit Legend)

Bastian and Mitchell relate the following Inuit legend:

Once there was a blind boy whose mother was very cruel to him. Even though he helped kill a polar bear that wandered by, his mother would not let him have any of it to eat. He could smell meat cooking, but his mother would not give him any. The boy’s sister, however, hid some of her supper and later, gave it to him while their mother was out. The boy decided to find an opportunity to kill his cruel mother. Sometime later, when the boy was outside, a large loon carried him off to its nest on the edge of a cliff. The loon then dove into the water with the boy and repeated the process several times until the boy’s eyesight was restored…

When he returned to his home, his mother realized that he could now see and be more careful around him, so she started to treat him more kindly. One day, while the mother and son were hunting narwhal, she asked him to aim for only the small ones. This he did, and they soon were feasting on the blubber…However (later), the boy aimed at a large narwhal and his spear stuck deeply into the animal’s flesh…The narwhal struggled to get free and as it pulled away from shore, its force was so strong that it broke loose. The mother, who became entangled in the rope that had held it, was dragged into the water, trailing behind the creature. She yelled for the boy to toss her a knife so she could free herself, but he refused, and the cruel woman was drowned. Then, the woman herself became a narwhal. Her hair, which in life, had been worn in a twisted knot on top of her head, became a tusk. From then on, narwhals have had twisted tusks.9

Throughout the world, various cultures continue to revere the long tusks of these immense marine animals.14 For example, in Japan, two crossed narwhal teeth adorn the entrance to the Korninkaku Palace; and in Denmark, multiple narwhal tusks comprise the frame of the Danish throne.15 Like the unicorn, the narwhal adorns a coat of arms: that of Nunavut, the arctic Canadian province home to a largely Inuit population (Fig. 4). The twisted tusk of this intriguing species is has spun a range of mythical lore worldwide. Like the unicorn, the narwhal captures the human imagination.

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The Unicorn and the Narwhal: A Tale of the Tooth


The Great Revolution of the 20th Century: Antimicrobial Agents

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Early Research

In a letter sent to the Royal Society of London dated September 7, 1674, Anton van Leeuwenhoek (1632-1723) described that by using a magnifying instrument of his invention, he had discovered in fresh water the presence of minute swiftly-moving particles. This initial description of microorganisms was expanded in his thirty subsequent letters to the Royal Society, with descriptions of different microorganisms, including those in the human mouth. However, Leeuwenhoek never connected these “animalcules,” as he called them, to disease.

The theory of microbes as a cause of disease had been expressed by several authors before Leeuwenhoek’s time, but was not proven until the 1860s when the French chemist Louis Pasteur (1822-1895) (Fig. 1) proved that microorganisms caused fermentation and putrefaction of organic matter, as well as diseases of the silk worm. Subsequently, Pasteur and the German physician Robert Koch (1843-1910) (Fig. 2) identified the bacteria responsible for many illnesses, and developed the science of bacteriology that we know today.

Methods to eliminate these minute invaders, however, were not yet known. The first step had been taken, prior to Pasteur’s discovery, by the American physician and Harvard professor and dean Oliver Wendell Holmes (1809-1894) in Boston, and the Hungarian physician Ignaz Semmelweis (1818-1865) in Vienna, who established the importance of

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hygiene to prevent puerperal infections. However, they did not relate this to microbes.

Two decades after the initial papers by Pasteur, the surgeon Joseph Lister (1827-1912) (Fig. 3), first in Glasgow and later in London, developed antiseptic methods to combat surgical infections; this was followed by the Germans Ernst von Bergmann (1836-1907) (Fig. 4) and Theodor Billroth (1839-1894) (Fig. 5), who pioneered the aseptic approach to prevent surgical infections, which remains in use to the present day.

Despite the development of preventative measures, diseases of bacterial origin still lacked a treatment to destroy the responsible microorganisms. It became necessary to explore the possible antibacterial effect of an assortment of chemical substances. This plan was first provided by Paul Ehrlich.

Paul Ehrlich (1854-1915) (Fig. 6) a German physician and bacteriologist, and disciple of Robert Koch, had been interested in investigating the use of aniline dyes to stain cells and tissues. His efforts resulted in the classification of blood cells according to their cytoplasmic staining qualities and the configuration of their nuclei. The classification of blood cells into lymphocytes, monocytes and polymorphonuclear cells, and these into neutrophils, basophils and acidophils (later eosinophils) persists to this day, and earned Ehrlich the recognition as a "Father of Hematology." He also made important contributions to the field of immunology, for which he received the Nobel Prize.

In 1899, Ehrlich was appointed Director of the Royal Institute for Experimental Therapy, and developed a plan based on his early research. Knowing that the aniline dyes would selectively attach to specific cells, including bacterial cells, Ehrlich thought of adding to the dye molecule substances that would be toxic to bacteria. His idea was finding a "magic bullet" that would kill bacteria while not injuring the body cells. His initial research in this area was directed at a cure for trypanosomiasis, an endemic disease of tropical Africa caused by the trypanosome carried by the tse-tse fly.

His initial trials were disappointing. In 1909 the Japanese investigator Sahachiro Hata (1873-
1938), who had experience in infecting animals with syphilis, joined the group, and Ehrlich directed Hata to try dye compounds with arsenobenzenes against trypanosomes as well as against spirochetes like those responsible for syphilis. Trial #606, which used arsphenamine, was found to be successful against spirochetes. The drug was named Salvarsan, and was widely used for the treatment of syphilis until the advent of penicillin. Ehrlich’s findings proved that synthetic chemical substances could cure diseases. Unfortunately, Ehrlich’s death in 1915 halted this line of research for many years.

The Birth of Sulfa Drugs

Gerhard Domagk (1895-1964), who had experience in infecting animals with syphilis, joined the group, and Ehrlich directed Hata to try dye compounds with arsenobenzenes against trypanosomes as well as against spirochetes like those responsible for syphilis. Trial #606, which used arsphenamine, was found to be successful against spirochetes. The drug was named Salvarsan, and was widely used for the treatment of syphilis until the advent of penicillin. Ehrlich’s findings proved that synthetic chemical substances could cure diseases. Unfortunately, Ehrlich’s death in 1915 halted this line of research for many years.

Gerhard Domagk (1895-1964)3,7-9 (Fig. 7) was born in Lagow, Germany, not far from Berlin, and in 1914 entered the University of Kiel to study medicine. His plans were soon interrupted by the outbreak of the First World War, and Gerhardt and a group of friends volunteered to serve in the army. After brief training, he was assigned to serve as a medical assistant at the Russian front, where the suffering of the wounded soldiers impressed upon him deeply. The infection of wounds in WWI was much more frequent and lethal than in previous wars. In earlier wars, such as the Napoleonic wars, or the 1870 war between France and Germany, battles lasted a few hours or days, but then the soldiers lived in camps or went on long marches to other sites. In WWI, by contrast, soldiers lived in trenches carved in the fields of Europe. These fields had been manured for centuries, and were surrounded by mud and animal and human waste. Wounded soldiers could not be easily evacuated, and infections were extremely common and severe. Domagk returned from the war determined to devote his life to the study of infections and their treatment.

Domagk graduated in 1921 and later traveled to the University of Munich, where he became interested in pathology as a means to study and solve the problem of wound infections. In 1927, he accepted an offer from the Bayer Co., part of a conglomerate of chemical industries (I.G. Farben), to become Director of Research in the Laboratory of Experimental Pathology and Bacteriology, in the city of Eberfeld, near Düsseldorf. The general director at Bayer was the chemist Heinrich Hörlein, who assigned Domagk to continue the line of investigation begun by Paul Ehrlich, but this time directing the research towards finding a solution to the most common infections of the Western world, those produced by Streptococcus and Staphilococcus.

Domagk started to work with the chemists Josef Klarer (1898-1953) and Fritz Mietzsch (1896-1958). The plan was that the chemists would prepare different azo-aniline dyes, and Domagk would test their effect on mice infected with Streptococcus. Azo dyes were among the dyes prepared by Bayer for the textile industry. After several years of trying different dyes, the chemists prepared one called Kl 730 (Kl after Klarer) which added para-amino benzene sulfonamide to the basic aniline molecule called sulfanilamide. Sulfanilamide had been synthesized in 1909 by the Viennese chemist Paul Gelmo.

In 1932, the year Adolf Hitler won the German elections and his party started the policies of remilitarization and anti-Semitism, Domagk made a pivotal research discovery: that Kl 730 fully protected mice from otherwise lethal injections of the most virulent strains of Streptococcus. The autopsies showed that the control animals had large masses of bacteria in numerous organs, while the treated animals were relatively free of harmful bacteria. Repeated trials confirmed the results and showed that even the higher dosages were well-tolerated by the animals and had no side effects. Domagk, Klarer and Mietzsch were happy to report these findings to Hörlein, and Bayer gave the drug the name Streptozon.10
Kl 730 had one unexpected peculiarity: it was very effective in-vivo but not in-vitro. The investigators could not understand its mode of action, and this delayed Bayer from patenting the drug. The chemists continued to believe that the antimicrobial activity resided in the azo dye and that the sulfa only activated its effect. In early 1933, human trials began and it was found that the drug temporarily stained patients’ skin red.

In April 1934, Domagk and his group developed Kl 821, which consisted of the sulfa group without the dye. The investigators were surprised to see its excellent antimicrobial action. The trials were repeated numerous times with the same result. In spite of this success, they were told, probably by Hörlein, to discontinue the investigation of Kl 821 and return to their research on aniline dyes.

Finally, Bayer patented Kl 730, changing its name to Prontosil rubrum. At that time Domagk young daughter developed a septicemia after having injured a finger with a knitting needle. In a few days the infection extended, she was hospitalized and physicians planned to amputate the arm. In his desperation, Domagk administered high doses of Prontosil to his daughter, and the girl recovered completely. Domagk published the results of his experiments on animals at that time, but did not relate the case of his daughter until years later.

Prontosil started to be widely used all over the world. Soon, the French chemist Ernest Fourneau (1872-1949) and his research group at the Pasteur Institute in Paris requested some samples of Prontosil from Hörlein to investigate its action. At first, Hörlein found excuses not to comply with the request, but finally at the insistence of the French investigators sent them samples of the drug.

The French researchers found that the active drug was the sulfamide component, without the azo dye. (This is what Domagk and his group had discovered when they tried Kl 821, but the line of research had been prematurely stopped.)

This finding had many consequences, both scientific and economic. From the scientific viewpoint, it clarified why the drug worked in vivo but not in vitro: the dye blocked the action of the sulfa in vitro, but in vivo the components separated and the sulfa could exert its antibacterial action.

From an economic standpoint, sulfamide was a compound already used frequently in the chemical industry, and therefore could not be patented. This meant that any pharmacological company could freely prepare and sell the drug. It is possible that Hörlein had delayed the announcement of the discovery because he hoped to obtain a patentable variant of the drug.

Soon numerous sulfas were rapidly developed and marketed throughout the world for the treatment of various infections. After a few years, more than 5,000 drugs were developed.

Two historic cases brought Prontosil to the public’s awareness. In November 1936, the son of President Franklin Delano Roosevelt, Franklin D. Roosevelt, Jr., a young and athletic man, developed a complicated sinusitis that risked leading to septicemia by hemolytic Streptococcus. He was treated with Prontosil with excellent results.

In 1943, Winston Churchill was returning from a summit meeting in Tehran and stopped in Tunis for a few days’ rest. He developed influenza, which became pneumonia. Treatment with sulfas saved his life.

In 1939, Domagk received notice from the Swedish Committee of the Nobel Prize, informing him that he had been selected to receive the award in Medicine and Physiology, and inviting him to Stockholm to receive it. Hitler had decreed in 1936 that the reception of a Nobel award by a German citizen was considered an affront to the state. Domagk did not respond to the Nobel Committee, and a few days later he was arrested by the Gestapo, and forced to sign a letter which they had prepared declining the award.*

*Gerhard Domagk was not a Nazi, but he had to be very careful not to express his ideas because he and his family could be in great danger. He was not anti-Semitic, he never became a member of the Nazi party, he never put in front of his house, as most did, the swastika flag. Very seldom did he salute with a “Heil Hitler” and his right hand up. One can imagine the constant anguish in which he lived.*
The early 1940s were very dangerous for the German population, with constant bombardments, shortages of food and necessities such as clothing, shoes, fuel, etc. In May 1942, the Ruhr industrial area where the Bayer plant and laboratories were located, and the city of Wuppertal, where the Domagk family lived, were heavily bombarded. After the war, the Allied Forces allowed the Bayer Laboratories to be rebuilt and to resume pre-war activities. Domagk’s laboratory was reopened, but by that time, penicillin was in full production. Penicillin was ultimately superior to sulfa drugs because while sulfas are bacteriostatic, penicillin is bactericidal.

In 1947, Domagk was invited again by the Nobel Committee to travel to Stockholm to finally receive his 1939 award. This was a triumphant moment for Domagk, who received his gold medal from King Gustav V. Unfortunately, the substantial cash prize that went with the award had, following the policies of the committee, been returned to the general funds and already spent for other purposes.

Domagk continued his research, now focusing particularly on the treatment of tuberculosis and cancer. He died in Burgberg in 1964.

The Discovery of Penicillin

Alexander Fleming (1881-1955)3,11-15 (Fig. 8) was born in Scotland and obtained his medical degree from the University of London in 1906. Upon graduation, he entered the Service of Immunology of Saint Mary’s Hospital in London, founded and directed by Dr. Almroth Wright, a well known immunologist. His appointment included the practice of clinical medicine at the hospital.

During the years of the First World War, Fleming, together with Wright and other members of the department, were sent to the North of France where, like Domagk, they witnessed frequent and severe wound infections.

After the war, Fleming returned to his laboratory at St Mary’s Hospital in London and to his medical practice. In the 1920s, Fleming made two extremely important discoveries: lisozyme and penicillin. In 1928 he was appointed Professor of Bacteriology at the University of London.

Both of Fleming’s great discoveries involved an element of serendipity, but Fleming also had the great sagacity to recognize the importance of each finding and follow up on their analysis.16 Lisozyme was discovered when, in London’s cold winter of 1921, Fleming was in his lab examining bacterial colonies. A drop of secretion fell from his nose to the Petri dish. Shortly after, he saw the colonies near the drop dissolving and disappearing. He then discovered that lisozyme is present in practically all body fluids such as saliva, tears, sperm, blood and breast milk, as well as in egg whites and some vegetables and fruits.17

In 1928, Fleming found that a Petri dish with Staphylococcus colonies had become accidentally contaminated with a green mold. He realized that the mold produced some antimicrobial substance, and after consulting with a mycologist (the American Charles Thom), identified it as Penicillium notatum, and named the active substance penicillin.

The concept of antibiosis had been known for many decades. In 1877, Pasteur mentioned in a paper on anthrax that the growth of bacteria responsible for the disease could be inhibited by other bacteria, and concluded expressing the hope that this could some day be useful in treatment.18 The word “antibiosis” was coined in 1889 by the French investigator Paul Villemin, who defined it as a microorganism destroying other microorganisms, and added that it is the opposite of symbiosis.19 The paper published
by Papacostas and Gâté in 1928\textsuperscript{20} reviews an extensive bibliography on antibiosis prior to Fleming’s discovery.

Fleming published his classic paper on penicillin in 1929,\textsuperscript{21} but his further attempts to isolate and purify penicillin were frustrated by lack of funds and by the resignation of his colleague, the biochemist Harold Raistrick. Fleming abandoned the penicillin project.

Howard Walter Florey (1898-1968)\textsuperscript{3,22-26} (Fig. 9) was an Australian physician who headed the team that purified penicillin, analyzed its antimicrobial effect and directed the first human trials. He obtained his medical degree from the University of Adelaide in 1922. Firmly devoted to research, he obtained a Rhodes scholarship and went to Oxford University to study in the Honors Physiology School, and later spent a year at Cambridge, and another year in the US with a Rockefeller Foundation scholarship.

In 1935, Florey was appointed Professor of Pathology at Oxford, and invited the German biochemist Ernst Boris Chain (1906-1979) (Fig. 10) to join his research group. Chain was a brilliant chemist who was forced to leave his native country due to its anti-Semitic policies. Florey and Chain studied lipoyme at first, and then turned their interest to penicillin.

Domagk’s discovery of sulfa drugs in the mid-1930s had renewed interest in finding antibacterial substances. Florey and Chain rediscovered Fleming’s 1929 paper and decided to investigate penicillin. Florey obtained substantial support from the Rockefeller Foundation in the US, and the UK Medical Research Council. He gathered a research team with Chain, the chemist Norman George Heatley and the physician Margaret Jennings.

After numerous biochemical and biological experiments, the Oxford team succeeded in isolating and purifying penicillin and demonstrating its extraordinary antibacterial action, as well as its lack of toxicity to host cells.\textsuperscript{27} Penicillin gradually became not just an interesting laboratory drug, but a potential tool for saving patients with infectious diseases and battlefield wounds.

The final trials with penicillin were conducted from May through July 1940, analyzing its effect on laboratory animals with experimentally induced infections.\textsuperscript{28,29} Once its antibacterial effect was determined, researchers had to establish the minimum dose, and the best mode and frequency of administration needed. The astonishing results were published in The Lancet on August 24\textsuperscript{th}, 1940\textsuperscript{29}, just one day after the bombardment of London by the Luftwaffe began.

While bombs fell on London, Florey, Chain and their colleagues were feverishly working. Luckily, Oxford was not bombarded because it was not considered to have strategically important factories.

The situation was desperate, and the invasion of the British Isles by the German forces appeared imminent. If the Nazis invaded and took the country, the scientists had been instructed to
destroy their laboratories and all evidence of their work so that the benefits of science would not fall on enemy hands. The work of Florey’s group was not only important scientifically but also strategically.

If the researchers had to evacuate their places of work, they needed to find a way to carry samples of their special strain of *Penicillium notatum* to continue their work.

Heatley found the way. All the researchers rubbed spores of the mold in their jackets and overcoats where they could remain for years (unless they were sent to a dry cleaner), and could be easily hidden, transported, and retrieved when they restarted their research.24

All the laboratory and clinical studies of penicillin were very positive, and the next step was to increase the production of the drug so that more extensive clinical studies with many different infections could be done. The British pharmacological firms were not able to fund a project of that magnitude and Florey and Heatley traveled to the US in June 1941 to get the support of American companies.

The development of methods to produce penicillin at industrial levels started in Peoria, IL, at the Department of Agriculture’s Northern Regional Research Laboratory.24

In early 1943 the production of penicillin was very limited, both in the US and the UK, being used mostly for military personnel. Towards the end of that year the pharmaceutical companies Merck, Lederle, Squibb and Pfizer began, with US government help, to produce the drug.

In the first four months of 1943, the US produced 400 million units of penicillin, and in the last seven months, 20.5 billion units. By June of 1944, when the invasion of Europe by the Allies began, 100 billion units were produced per month. Between 1943 and 1945, the price of one million units of penicillin went from $200 to $6.24

Florey, Chain and Fleming received the 1945 Nobel Prize in Medicine and Physiology. Florey and Fleming were knighted, and Florey also became Baron Florey of Adelaide and Marston. Fleming died in London in 1955 and is buried in the crypt of Saint Paul’s Cathedral, near the graves of Admiral Horatio Nelson and the Duke of Wellington. Lord Florey died in 1968 and is buried in Westminster, and a plaque was placed near those honoring Charles Darwin and other famous scientists. Chain emigrated to Italy where he became Director of an Institute for Biochemical and Microbiological Research. He died in Ireland in 1979.

The development of penicillin as a useful clinical tool by the Oxford group was followed by the discovery of many other antibiotics. Many soil microbes were found to possess antibiotic properties. Selman Waksman (1888-1973)30 was born in Ukraine and emigrated to the US where he attended Rutgers University and the University of California, Berkeley, where he obtained his PhD in biochemistry. Back at Rutgers he investigated the soil microorganisms and discovered actinomycin, streptomycin and neomycin, and was awarded the Nobel Prize in 1952.

It is important to mention that evolution caught up with the microbial wars since the first antibiotics started to be used. Microorganisms mutated gradually to forms resistant to the existing antibiotics. Excessive use of antibiotics, and the use of antibiotics to combat diseases of viral rather than bacterial origin, have added to the problem increasing the speed of evolution. New antibiotics had to be and are constantly needed to cope with the new forms of bacteria.

**Antibiotics In Clinical Dentistry**

Immediately after penicillin became available in the 1940s, numerous laboratory researchers and clinical practitioners investigated its possible role in the treatment of oral infections.

The role of penicillin in the treatment of necrotizing ulcerative gingivitis was investigated by several authors using different doses and different modes of application: intramuscular injections,32-34
and locally using pastilles,\textsuperscript{35-37} lozenges,\textsuperscript{38} packs,\textsuperscript{36} topical application,\textsuperscript{39-41} or injection into the gingiva.\textsuperscript{41} In general, excellent results were reported.

Other antibiotics investigated were aureomycin\textsuperscript{42} for treatment of oral infections, and the combination of penicillin and streptomycin in root canal therapy.\textsuperscript{43}

The investigation and development of antibacterial agents has involved chemists, biologists, bacteriologists and immunologists; as well as physicians of many different specialties, including dentistry and several of its subspecialties. The incorporation of antibacterial agents to several branches of dentistry (oral surgery, periodontics, endodontics, etc.) has solved and/or prevented many clinical problems as well as permitted the development of sophisticated and delicate surgical techniques. It has indeed been a revolutionary development in clinical dentistry.

References


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**Additional Bibliography**


Waldemar Wilhelm (1913-1994) was honored by the Asociación Colombiana de Cirugía Oral y Maxilofacial (Colombian Association of Oral and Maxillofacial Surgery) as the Father of Oral and Maxillofacial Surgery in Colombia. Born in Karlsruhe, Germany, Wilhelm graduated as a dentist from Johann Wolfgang Goethe University in 1936. He emigrated shortly thereafter to Colombia, receiving his dental license there in 1943. He completed his oral and maxillofacial surgery training at Nordwestdeutsche Kieferklinic, under the tutelage of Prof. Dr. Dr. Karl Schuchardt in Hamburg. In 1950, he settled in Bogotá, where he joined the Universidad Nacional School of Dentistry, opened Colombia’s first oral and maxillofacial surgery department at Hospital San José, and trained the first maxillofacial surgeons in Colombia in 1958.

**Introduction**

Waldemar Wilhelm (Fig. 1) was a prolific German oral and maxillofacial surgeon who settled in Bogotá, Colombia in 1950. There, he earned an outstanding reputation among Latin American dentists, physicians and surgeons for his pioneering theories and techniques regarding the surgical approach to the maxillofacial complex. When he died in 1994 at the age of 81, he left behind a rich legacy which included the formal training of the first maxillofacial surgeons, the establishment of surgical services, the guidance of the youth, and a fierce fight against Colombian plastic surgeons and otolaryngologists who wanted to bar dentists from practicing maxillofacial surgery. But most important of all, Wilhelm had left behind a way of thinking that would guide his students and eventually shape the way oral and maxillofacial surgery is practiced in Colombia. Dr. Juan Manuel Chiriví, one of his residents at Hospital San José from 1969 to 1972, described his mentor as “the visionary man who was able to forge, with his profound medical knowledge, the discipline of oral and maxillofacial surgery in Colombia.”

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**Student Life and First Trip to Colombia**

Otto Waldemar Wilhelm was born on November 7, 1913 in Karlsruhe, a city in southwest Germany, near the French border. Wilhelm enrolled at Heidelberg University in the spring of 1933 to pursue a DDS degree, then transferred to the University of Bonn in October, and passed his first Medical Licensing Exam in 1934. He continued his dental training at Johann Wolfgang Goethe University, where he graduated on October 6, 1936 with highest honors.2

*Fig. 1. Waldemar Wilhelm (1913-1994)*

Little is known about the circumstances under which Wilhelm came to Colombia in early 1937. What is certain is that he entered Colombia through Buenaventura, a seaport in the Pacific Coast, and settled in Cali for a year. Later, he moved to Bogotá, where he worked as a dental technician during the next five years. In 1943 he obtained his dental license from the Colombian Ministry of Education, following examination at the Universidad Nacional de Colombia. The license allowed him to work as a dentist with a specialization in the field of stomatology.3

**Surgical Training and Final Settlement in Bogotá**

Soon after the Ministry of Education issued his dental license, Wilhelm traveled to Hamburg, Germany, where he completed his oral and maxillofacial surgery training at Nordwestdeutschen Kieferklinik under the tutelage of Prof Dr. Dr. Karl Schuchardt. On February 23, 1950, Wilhelm received his doctoral degree (Fig. 2) in dentistry from Johann Wolfgang Goethe University with a dissertation on the oral manifestations of leishmaniasis,4 and returned to Bogotá shortly after graduation. From his previous stay in Colombia he had learned that Universidad Nacional de Colombia at Bogotá, Universidad de Antioquia at Medellín and Universidad de Cartagena at Cartagena were the only universities there with dental schools. With few options available, he applied for a teaching position at Universidad Nacional de Colombia, where he would remain virtually for the rest of his life, respected by patients, dentists, physicians and surgeons.5

In order to understand why Waldemar Wilhelm made such an impressive impact on the Colombian dental, medical and surgical community, first it is important to recognize the fact that before his arrival, Colombian dentists did not have any formal training in oral surgery; moreover, medical doctors did not allow dentists to enter the operating

*Fig. 2. Waldemar Wilhelm’s Doctoral Degree. Frankfurt, February 23, 1950.*
room. There were no dentists dedicated exclusively to surgery, but in their dental offices, a few of them had gained a great deal of surgical experience and knowledge through casuistry, clinical practice, and study. Dr. Alfredo Bárcenas, for example, was a national authority in oral pathology and oncology. Other nationally-recognized oral surgeons were José Rezk (Fig. 3), José Vicente Plata, Jorge Antorveza, Alberto Barriga, and Jorge Convers (Fig. 4) who had studied dentistry in France at Paris Dental School.6

Dr. Wilhelm joined Universidad Nacional de Colombia Dental School in 1950, and immediately introduced the techniques and principles of a virtually unknown dental specialty called oral and maxillofacial surgery. This provided new horizons for Colombian dental students, dentists and even medical doctors. From 1950 to 1956 he taught oral surgery and periodontology; general anesthesia from 1950-1953; and later became Head of the Oral and Maxillofacial Surgery Division.7 In 1952, he was invited by Dr. Schuchardt to his 200-bed clinic, where he learned about temporomandibular joint disorders. Wilhelm also spent some time at Oberärzte der Klinik, (Fig. 5) where he met maxillofacial surgeons from all over the world (Fig. 6).

In 1958, the Sociedad Quirúrgica de Bogotá (Bogotá Surgical Society) and Universidad Nacional de Colombia signed an agreement by means of which Colombia’s first Oral and Maxillofacial Surgery Department was created at Hospital San José, then headed by Dr. Guillermo Fergusson. Perhaps Wilhelm’s greatest achievement during his early years in Colombia was not the creation of this Department, but the creation of a three-year Oral and Maxillofacial Surgery Residency program, which was the first advanced dental degree offered in Colombia to general dentists. Wilhelm’s first residents were Mildardo Sepúlveda, Gabriel Anchique and Alfredo Villamarín.

What the first oral and maxillofacial surgeons trained in Colombia did upon graduation was monumental in the consolidation of the specialty. Dr. Sepúlveda, who assisted Wilhelm during nine years at Hospital San José, replaced his mentor as Head of the Department in 1978, and later founded the Oral and Maxillofacial Surgery Residency Program at Universidad San Martín. Dr. Anchique, a superb, dedicated student, later studied medicine and specialized in epidemiology and internal medicine. Dr. Villamarín joined Universidad de Cartagena Dental School in 1961 to establish the Oral and Maxillofacial Surgery Department.8

**Surgical Societies and Other Activities**

The Sociedad Colombiana de Cirugía Dento-Maxilo-Facial (today Asociación Colombiana de Cirugía Oral y Maxilofacial—ACCOMF) had been founded in Medellín at Universidad de Antioquia Dental School on June 7, 1958 by oral surgeons Alberto Arango-Escobar, Jorge Restrepo, Pablo Velásquez, Alberto Buenaventura and Gustavo Ulloa.9 The Society had few members until 1961, when it was reorganized in the city of Paipa at the First Colombian Congress of Oral Surgery. It was a productive meeting where the society adopted a new name: Sociedad Colombiana de Cirujanos Orales. Among the surgeons who participated in this meeting was Dr. Wilhelm, who...
became President from 1978 to 1982.10

Dr. Waldemar Wilhelm also participated in the creation of the Asociación Latinoamericana de Cirugía Bucomaxilofacial (Alacibu) founded in Bogotá on August 31, 1962, becoming president in 1964.11 He was an active member of other surgical societies such as the German Society of Oral and Maxillofacial Surgery, the Colombian Society of Aesthetic and Reconstructive Surgery as well as the Colombian Dental Federation.12 Due to Wilhelm’s efforts, recognized surgeons such as Hinds, Hessler, Schuchardt, Eschler, Korkhaus and Gillies visited Colombia and lectured on different topics.13

In 1968 he became Head of the Oral and Maxillofacial Surgery Department at Hospital Militar Central, a combat casuistry hospital run by the Colombian Ministry of Defense, replacing Dr. Tomás García-Angulo. Wilhelm remained director until 1977, when he tendered his resignation and appointed his senior resident, Dr. Manuel Torres-Mosquera. In 1992 Dr. Torres was replaced by another resident of Wilhelm, Dr. Enrique Amador Preciado.14

Wilhelm the Writer

In a time when Colombian dentists did not see the importance of sharing their ideas through the publishing of scientific articles, Dr. Waldemar Wilhelm must be recognized a pioneer in the production of papers in the field of oral and maxillofacial surgery. One wonders how this Germany-born person, who learned Spanish at age 25, and who had a strong German accent when speaking his second language, was able to produce so many eloquent, grammatically-correct articles. Wilhelm was interested in the surgical correction of maxillary deformities, pre-prosthetic surgery and treatment of osteomyelitis. Titles published in various Colombian dental journals include “Epidermis graft in the correction of reduced alveolar bone for prosthetic procedures” (1953),15 “Surgical reconstruction of the parotid duct” (1964),16 “Asymmetric positions of the maxilla and its surgical treatment” (1965)17 (Fig. 7), “Surgical correction of mandibular prognathism” (1966) and “Bone marrow hyperplasia” (1975).18

Back to Germany

Dr. Waldemar Wilhelm retired from Universidad Nacional de Colombia in the late 70’s, but kept practicing surgery at the private level. After a few more years of work, he returned to Germany with his wife Fanny, with whom he had no children.
He had served well, not just the dental profession, but Colombian society in general. He was Honorary Professor at Universidad de Cartagena starting in 1960, was a curriculum designer, and in 1982 was recognized by Sociedad Colombiana de Cirugía Oral (today ACCOMF) for his “tireless spirit as founder and guide of oral surgery in Colombia” (Fig.8). Dr. Waldemar Wilhelm died in Herrenalb, Germany on November 17, 1994 at the age of 81. His wife Fanny died in Bogotá in 2004.

**Conclusion**

In 1982, the year in which Sociedad Colombiana de Cirugía Oral recognized Dr. Wilhelm’s efforts towards the birth, structuring and consolidation of oral and maxillofacial surgery in Colombia, it was clear he deserved the title of Father of Oral and Maxillofacial Surgery in Colombia. Solely to him belonged the credit of introducing the specialty in Colombia. He had been the first surgeon to open a hospital-based oral and maxillofacial surgery department, the first to train residents—including the first women: Mercedes Herrera and Yolanda Bernal—the first who saw the importance of publishing scientific papers, the first dentist in Colombia who overcame the objections of plastic surgeons and otolaryngologist for the right of dentists to be in the operating room.

In a time when a myriad of Colombian dentists thought plastic surgeons would never allow them practice maxillofacial surgery, Dr. Wilhelm remained calm, knowing the battle had to be won through knowledge, skill and self-confidence; and it was precisely these attributes which he taught his residents. More than surgical procedures, techniques and diagnostic methods, Wilhelm filled them with confidence, calmness and self-control. A superb surgeon with exceptional moral values, (although sometimes rude and opinionated), Wilhelm’s disciples have spread two of their mentor’s sayings among the new generation of oral and maxillofacial surgeons: “Small incisions, big problems,” and “When one is thrown out through the door, one must come inside though the window.”

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**Fig. 7.** Title page of “Asymmetric positions of the maxilla and its surgical treatment” by Dr. Wilhelm.

**Fig. 8.** Sociedad Colombiana de Cirugía Oral honors Dr. Waldemar Wilhelm for the “tireless spirit of a founder and guide of oral surgery in Colombia.”
Acknowledgements

In Colombia, I wish to thank Drs. Doris Ballesteros, Juan Manuel Chiriví, Enrique Amador Preciado, Jaime Rodriguez, Manuel Torres-Mosquera and Jimmy Matiz Cuervo. In Germany I am in great debt to Dr. Dr. Wolfgang Busch, President of the German Association of Oral and Maxillofacial Surgeons, Prof Dr. Dr. Hans-Jurgen Hering, and Mr. Mathias Ball at Frankfurt University. Their help and assistance was invaluable in the preparation of this article. Many thanks to Kathryn Pope, David Tripp and Rosa Garza-Mourino at Antioch University (Bridge Program) in Los Angeles, CA.

References


2. Ibid. p. 11.

3. Taken from Waldemar Wilhelm’s records at Goethe-University Frankfurt am University Archives.


5. Ibid. p. 439.


This British photographic postcard is probably a graduation picture. Published in 1910, it depicts a rather shy-looking young nurse outfitted in her uniform. The photograph was taken by F. Bustin in Bristol, England. The caption under the print announces “NURSE LLOYD: The Greatest Lady Tooth Extractor in England.” Below it, an inscription reads, “Vide Press and Public Opinion.” In examining the claim stated on this card, the question arises, who was this woman and what were her actual professional accomplishments?

By 1880, Florence Nightingale had transformed nursing into a reputable and even heroic vocation. It was she who first advanced and promulgated the idea that nurses should have distinctive uniforms which would set them apart from the barely-trained female medical aids working in civilian and military hospitals at that time. As a result of her efforts, the rank of a nurse was now signified according to the color of ribbons attached to her hat. The color scheme progressed from pink, to blue, through other pastel colors, ultimately to black, the highest status. Initially, a trainee was not even allowed to wear a hat until she had completed the first three months of her required program. Even this privilege could be revoked if she was discovered exhibiting any unseemly behavior, such as smoking in the hospital, or being too familiar with male employees.

When nurses traveled to visit patients in their homes, they wore cloaks, coats, gloves and warm hats, during cold weather. Indoors, they donned their crisp white aprons over their starched uniforms and added a white three-cornered hat.
Dental Postcards XLVIII

Collected and analyzed by
Arden G. Christen, DDS, MSD, MA
Joan A. Christen, BGS, MS
Indiana University School of Dentistry

with a gathered, shoulder-length train. Nurse Lloyd, as shown in this postcard, is wearing a black cloak over a fitted white dress. Attached around her neck is a stiff, highly-starched (and undoubtedly uncomfortable) buttoned collar. She wears a dark hat with a gauze train, and her hat pin, secured into the right side of her upswept hair, holds her headgear in place. A crisp, white bow, balances her photogenic-yet-professional countenance.

Born Henrietta Thomas, she lived most of her life in the Mumbles district, an outlying area in the seaside community of Swansea, Wales. Her father, a draper-master, worked on Wind Street at the Golden Goat Shop, which sold work clothing to seamen. She married Mr. Lloyd, who was a ships’ carpenter, and the couple had a daughter, Olwen. Around 1895, Henrietta trained as a midwife in St. Thomas Hospital, London, about 175 miles east of the family home. “Nurse Lloyd” became the first credentialed maternity nurse in Mumbles. Due to the high infant and maternal mortality rates during those times, Nurse Lloyd was determined to establish a public clinic that would treat poor and destitute mothers and their infants. Her hard work and tenacity were rewarded on June 14, 1917, when she opened The Mumbles Maternity and Baby Welfare Association in her home at 3 Myrtle Terrace.

Following World War I, social, economic and health problems abounded in the United Kingdom. War casualties, injuries and high unemployment rates left many families in poverty. Thus, new mothers became highly dependent on Lloyd’s organization to provide milk and other essentials for their young children. To supply these much-needed resources, the Mumbles Maternity and Baby Welfare Association relied heavily on volunteers, monetary donations and social services from the local population and the medical community. By 1921, the organization had been moved to Victoria Hall in Swansea, where it continued to operate for years.

During the late 1800s and the early 1900s, health care providers were aware that British citizens, particularly underprivileged women and their dependents, were rife with dental disease. The rate of extractions among the poor was astronomical. Nurse Lloyd was undoubtedly burdened by the alarming fact that most of her patients desperately needed dental treatment. In a description of her duties we read:

Nurse Lloyd also took mothers along to Mr. Thomas the dentist on Wednesday afternoons and a record was kept of each case. The mother’s paid half the fees and the association paid the other half, but where they could not afford to do so, the Association would pay all... During the year March 1921-22, there had been 277 extractions, 12 fillings and 9 scalings performed and 19 dentures fitted.*

Dr. A.F. Merriman apparently had such a lofty opinion of his Fragrant Kalliodont products that he imagined a billboard-type advertisement on one of California’s biggest trees (Figs. 1 & 2). Fragrant Kallidont was purported to:

- preserve and beautify the teeth and gums
- be free of acid and injurious matter
- make for fragrant breath, especially for smokers and other tobacco users
- leave a pleasurable sense of cleanliness to the mouth.

Merriman’s *Hints of Care to the Teeth* are quite surprising coming from over a century ago. If one were not aware that the card came from the 1880s, the recommended toothbrush handling methods, flossing and quill toothpick advice, the suggestion for people to see a dentist, and the idea that a competent person should be attending to a child’s teeth, could all be taken as sound modern-day preventive oral health care advice.

Another trade card shows a voluptuous corset-wearing woman in her boudoir, clutching a bottle of Kalliodont (Fig. 3). Such an image was quite risqué for the time and would have captured much attention.

A variation of the advertising trade card was the four page “fold-over” or “folder.” Bigger than a card, but smaller than a booklet, some Victorian advertisers chose to offer much more information about their services or products using this four-page format. The Merriman folder pictured here (Figs. 4-7) displays every aspect of Kalliodont oral health products, including instructions and results of use, recognition awarded the products, and even how the labels appeared in the marketplace. (The Merriman Kalliodont products had no relation to a European dentifrice of the time that also was advertised on trade cards: Kalodont Creme Dentifrice in France, and Kalodont Zahncreme in Germany).

The intricate artwork and colors of the tree card and folder are particularly ornate and well rendered and serve as splendid examples of the finest Victorian chromolithographic art.

The text on both the tree card and the folder states that Dr. Alvin Fox Merriman developed Kalliodont after 35 years of practice. The card was copyrighted 1883, so that would indicate that Merriman started practicing dentistry in about 1848. Polk’s Dental Register shows Alvin Fox Merriman and Alvin Fox Merriman, Jr. in Oakland, California continually from 1893 to 1928. They are both listed as “Demonstrator of Operative Dentistry” at the College of Physicians and Surgeons in San Francisco.

In the Transactions of the California State Dental Association, 25th Annual Session (1895), A.F. Merriman, Jr. published an article entitled “Dentistry in Two Thousand.”* In that work, Merriman, Jr. predicts that in 105 years, tooth decay would be rare, gout and syphilis will have “not been heard of for nearly forty years;” and there would be preventive washes for children’s teeth, applied daily by dental nurses. One wash, he prognosticated, “entirely prevents tartar and stain and still another tends to harden the teeth, obviating decay almost entirely.” Another prediction was a dental cement that was “such a perfect reproduction of the natural teeth that it is simply impossible to discern it after the teeth are filled.” Merriman, Jr. also imagined airships that would carry passengers, including dentists, from Europe to the United States.

Dr. Merriman’s Fragrant Kalliodont

Fig. 1. Lithographer: S. Crocker & Co., San Francisco

continued on following pages...

Fig. 2. Reverse.
Fig. 3. Lithographer: Bancroft, San Francisco
Fig. 4. Lithographer: Dickman-Jones, San Francisco

Fig. 5. Lithographer: Dickman-Jones, San Francisco
DR. MERRIMAN'S
CELEBRATED
DENTAL
PREPARATIONS

Our Fragrant Liquid Kalliodont Efficacy,

A delightful, fragrant dentifrice, by the use of which the Teeth and Gums are preserved, and health and beauty greatly enhanced. After thirty-five years of dental practice, Dr. A. F. Merriman offers this valuable dentifrice as the result of his long experience, believing all who give it a trial will appreciate its worth. Guaranteed free from acid and all injurious matter. The highest diploma was awarded this preparation at the Industrial Exhibition in San Francisco. There is nothing that adds so much to personal loveliness and beauty as a set of pearly teeth, and pure sweet breath. By using Dr. Merriman's Fragrant Kalliodont Liquid, with Kalliodont Paste, or Powder, the teeth and gums are kept in perfect order and a fragrant breath assured. Although prepared as a toilet wash, the liquid possesses remarkable healing properties for inflamed gums and sore mouth. The large sale of this dentifrice in so short a period after introduction is accounted for by the fact, that when once used it leaves such a pleasing sense of cleanliness to the mouth, and beauty to the teeth and gums, that it is considered almost indispensable. Smokers, and all who use tobacco in any form, will find Liquid Kalliodont a pleasant remedy for the breath.

Our Fragrant Kalliodont Tooth Paste.

By the use of this Paste, freshness is imparted to the mouth; the teeth are freed from stain; the gums are benefited and a healthy tone secured.

Our Fragrant Kalliodont Tooth Powder.

We can recommend this Powder as superior to any article in the market for removing discolorations and preventing the accumulation of tartar, and anti-practically, imparting a refreshing coolness to the mouth. An excellent article for cleansing artificial teeth.

Our Astringent Wash,

is Detergent and Haematotic, recommended (after extracting) as soothing and healing to the gums, preparatory to the insertion of artificial teeth. Try it, and you will be convinced of its efficacy.

Salicylic Acid Mouth Wash.

Our Salicylic Acid, which has been comparatively recently introduced into therapeutics, possesses remarkable properties as a disinfectant, being without smell, it advantageously replaces Carbolic Acid, to which, in respect to alluded to, is highly preferable in the form of Mouth Wash or Gargle in Aphtous or Soothing Conditions of the Mouth. This Wash contains Salicylic Acid, in proportion, according to one of the best formulas.

SOLD BY ALL DRUGGISTS AND DEALERS IN TOILET ARTICLES.

Fig. 6. Lithographer: Dickman-Jones, San Francisco
HINTS ON THE CARE OF TEETH

FIRST. Cleanliness is of absolute importance, and its neglect cannot be atoned for by dental skill.
SECOND. Thoroughly cleansing the Teeth each night is ordinarily sufficient.
THIRD. The articles necessary to its thorough accomplishment are the Brush, Pick, and Tooth Powder or Tooth Paste.

USE KALLIODONT TOOTH POWDER.

FOURTH. The Brush, to accomplish its purpose, should be given an upward motion on the lower, and a downward motion on the upper Teeth; and no portion of any Tooth should escape its action. Using KALLIODONT TOOTH PASTE.

FIFTH. The passage of silk floss between the Teeth is essential to the cleansing of their approximal surfaces.
SIXTH. A rightly trimmed quill pick is useful, especially after eating.

We are aware that a Spurious article of our goods has been offered to the public. Therefore to protect our patrons and ourselves we shall from this date place

OUR “COLORED MONOGRAM SEAL”

upon each package of our goods, being our guarantee of their being genuine and up to a perfect standard.

DECEMBER, 2nd 1889.

SEVENTH. Children’s Teeth require daily cleansing, by some competent person, from the time they commence to take solid food, with FRAGRANT KALLIODONT.
EIGHT. For Tartar or other special conditions, consult your Dental.

Being desirous of producing the best preparation in the world, we have revised during the past year our formulas; until we can say in all sincerity, that we have succeeded.
Our preparations are all scientifically combined from the best known materials, chemically united and prepared to insure the best results upon the dental organs and their surroundings.

VOURS SINCERELY,

A. F. MERRIMAN & SON,
MANUFACTURERS OF

Dental Toilet Specialities

FRAGRANT KALLIODONT,
KALLIODONT TOOTH PASTE AND POWDERS, SALICYLIC & ASTRINGENT MOUTH WASHES, AND DENTAL POLYCHRESTS.

Home Office: OAKLAND, CAL., U. S. A.

Fig. 7. Lithographer: Dickman-Jones, San Francisco
 Photographs from our 60th Annual Meeting

AAHD Vice President Dr. Staci Gaffos delivers the 2011 Orland Lecture: “Dr. Neill Macaulay: His Life and Passion for Dental History.”

AAHD President Dr. Peter Meyerhof, Dr. Carlos Salinas, Dr. George Bause

Dr. J. W. Jamerson, III, presenting his lecture, “Georgia’s African-American Dentists, 1856-2006.”

Dr. Sheldon Peck & Dr. James Gutmann
AAHD Executive Director Dr. David Chernin, former governor of South Carolina Dr. James Edwards, and AAHD Vice-President Dr. Staci Gaffos.

Ms. Mary Miller prepares for her presentation on Dr. B. A. Rodrigues Ottolengui.

Dr. Harry Hutchins displays a rare antique slave badge.

Dr. Ernest Goodson, after his presentation, “African-Americans in Orthodontics.”

Judge Alexander Macaulay recalls anecdotes about his father, Dr. Neill Macaulay.
Dr. Charles Millstein introduces the video interview he conducted with Dr. Charles A. McCallum, Jr.

Books in the collection of the Waring Historical Library.

Ms. Mary Kreinbring & Dr. Arden Christen relaxing at our opening reception.
Photographs from our 60th Annual Meeting

Dr. Ernest Goodsoon & Dr. Samuel Wexler on a tour of the Macaulay Dental Museum.

Artifacts at the Macaulay Dental Museum.

Plaque commemorating the presentation of the 1973 Hayden-Harris Award to Dr. Neill Macaulay.
From the Archives: Vol. 3, Nos. 7 & 8

Volume III, No. 7  July 1955

BULLETIN OF THE HISTORY OF DENTISTRY

Official monthly publication of American Academy of the History of Dentistry

JOHN HUNTER AND HIS COLLABORATORS

Dr. Lloyd G. Stevenson, Associate Professor of the History of Medicine at McGill University, in the Journal of the History of Medicine and Allied Sciences, No. 2, 1955, p. 182-196 has contributed an article entitled "The Elder Spence, William Combe, and John Hunter" in which he discusses the extent to which the dentist Spence and the journalist William Combe shared in the production of Hunter's two works on the teeth. From the evidence available, the author is unable to determine whether or not Hunter received any important collaboration. The account does not include any information concerning William Rae who, according to tradition, gave public lectures on dentistry at Hunter's suggestion and in the latter's house in 1782.

BIOGRAPHICAL NOTE ON SALLES CUNHA

Ao Atualidades Odontologicas) 2:No. 10, p. 5, 1955 gives a short account of the work of dentist Professor Ernesto de Salles Cunha with portrait. Salles Cunha is the most prolific contributor to the history of dentistry in Brazil and is the author of Historia de Odontologia no Brasil which has appeared in a second edition.

ETRUSCAN AND PHOENICIAN PROSTHESIS AGAIN

Amedeo Bobbio in Ao Atualidades Odontologicas), 2:No.10, p. 12-16, 1955 has discussed under "A Odontologia dos Etruscos" the known extant pieces of Etruscan and Phoenician prosthesis. The author uses no new evidence and arrives at no new conclusions.

INTERESTING REPRODUCTIONS OF DENTAL ILLUSTRATIONS

The American Dental Association has received free of charge, a series of twelve leaflets pertaining to the history of dentistry issued by the chemical manufacturer Rheinpreussen, Moers-Meerbeck, Germany. Most of the reproductions are in color and include such subjects as Saint Apollonia, certain pages of Zene Artzney, Goethe, Benjamin Rush and various paintings. Explanatory text accompanies the pictures.

HISTORICAL EXHIBIT AT GLASGOW

An extensive historical collection by J. Menzies Campbell was on exhibit at the Hunterian Museum at Glasgow during the 75th annual meeting of the British Dental Association.

Recently Dr. Campbell has contributed a sketch of Dentistry as Practised 1800-1921 which has been published in an eleven page pamphlet and sold to aid the Benevolent Fund of the British Dental Association.
RECENT PHARMACY PUBLICATIONS

A pamphlet, National Association of Boards of Pharmacy 1904-1954 (1955) has been published by the American Institute of the History of Pharmacy in cooperation with the National Association of Boards of Pharmacy. The pamphlet consists of four chapters with a foreword. The Institute has issued a useful mimeographed list of publications on the writing of history and some bibliographical aids to work in the history of pharmacy.

BIBLIOGRAPHICAL NOTES


175 YEARS OF SCIENTIFIC PUBLICATION

The firm of Johann Ambrosius Barth on July 1 of this year is celebrating its 175th year of book publication. This firm has published many books in the field of medicine, dentistry, natural science and technics.

ESSEX COUNTY ANNIVERSARY

The Essex County Dental Society (New Jersey) celebrated its 75th Anniversary at its annual meeting May 16, 1955. The Bulletin of the Society for May includes some interesting portraits of past officers and other historical illustrations, as well as historical sketches (p. 16-45).

A HISTORY OF DENTAL PROSTHETICS


BRITISH NOTABLES OF THE PAST

Lilian Lindsay's contribution to "Personalities of the Past" in the British Dental Journal for April 5, 1955 (98:259) are IX, Samuel Cartwright (1789-1864); X, W. A. Harrison (1801-1873); and XI, Robert Hepburn (1810-1901).

BIOGRAPHY VS. HISTORY

At the Medical Library Association meeting May 18, 1955, Lloyd G. Stevenson gave an interesting paper on "Biography vs. History: with Special Reference to the History of Medicine," in which he presented some fundamental principles of historiography of interest to the dental historian.
HIPPOPOTAMUS TOOTH IN DENTAL PROSTHETICS

Luigi Casotti has contributed an interesting article on "Hippopotamus in Ancient Dentistry," (L'ippopotamo nell'arte dentaria antica) in Rivista Italiana Di Stomatologia 10:169-174, Feb. 1955. He discussed 1) the source of hippopotamus tooth for the dentist, 2) the manner in which it was prepared, 3) the manner in which the dentist worked the material, and its application to partial and complete dentures.

Casotti has omitted some of the most interesting and important points in the history of hippopotamus tooth in dentistry. Hippopotamus tooth was probably not employed by dentists before the seventeenth century, when gold, silver, ivory, and bone had already been utilized. Of all the materials used by the dentist for artificial teeth, hippopotamus tooth was the only material which was not borrowed from one of the various crafts, such as that of jeweler, stationer, or carver. This is made clear by an article in the celebrated Encyclopédie, 1765, which declared that the construction of artificial teeth "is the only use that can be made of the teeth of the hippopotamus."

The disinclination of the ivory worker to use hippopotamus was due, no doubt, to the presence of a hard enamel on the vestibular surface of the tooth. Laforgue (1802) wrote that the artisan would not saw hippopotamus and that the saws used by dentists for this purpose had less prominent teeth than those employed by the ivory workers.

The hippopotamus teeth used in dental restorations were, principally, lower canines, and to some extent, the incisors. In the professional language of the early nineteenth century, hippopotamus was frequently referred to as sea-horse (cheval marin) or walrus. (To be continued.)
WERE ARTICULATORS INVENTED 150 YEARS AGO?

An anonymous article dealing with the history of articulators (Dental Dienst 7:18-20 July 1955) asserts that one Evans of Paris introduced the straight-line articulator in the year 1805. This statement could hardly be further from the truth. Thomas W. Evans, the American dentist practicing in Paris and famous for his aid to the royal family in distress, invented an articulator in 1819, not in 1805. The anonymous writer of the article has in mind the French dentist J. B. Gariot who, in 1805, published a book on dentistry. The device which Gariot described in this book was for the registration of plaster casts of the upper and lower jaws in their median relation by means of projections on the upper cast which fitted into corresponding recesses on the lower cast. No instrument was involved. This correction of a historical mis-statement was amply documented in an article published in 1933 (G. B. Denton, "The Gariot Articulator Myth" Dental Cosmos 75:693-695 July 1933) but has persisted in various accounts of the history of the articulator.

The anonymous writer is probably also in error in accepting the oft-repeated statement that the first adaptable or "anatomical" articulator was Bonwill's. The two earliest articulators patented in the United States were those of James Cameron patented in April 1840 and that of Daniel Evans patented in August 1840. Cameron's articulator was adjustable in a number of seemingly useless ways but was, on the whole, a straight-line articulator built much like a ring stand, without lateral movement. Evans' articulator however, if constructed according to the diagram in the patent, was adaptable and had considerable lateral movement. In the articulator as actually manufactured by Horatio G. Kern of Philadelphia, this lateral movement was lacking.

BOURDET ADDED TO AMERICAN DENTAL ASSOCIATION LIBRARY

A fine copy of Bourdet's Recherches et observations.....in the 1786 edition was presented to Dr. Harold Hillenbrand August 17 at the French Embassy by Dr. Jean Deliberos on behalf of Maurice Brenot, the donor. This is a valuable addition to the collection of rare books of the Association.

HYPNOTISM IN EIGHTEENTH CENTURY DENTISTRY

W. Herzog has published a short article on the early use of hypnosis in dental practice ("Geschichtliches zur Hypnose in der zahnärztlichen Praxis," Zahnärztliche Mitteilungen 43:60 January 15, 1955). A facsimile is given of a page from a newspaper of 1765 discussing the use of a "magnetic steel" to cure toothaches.

HISTORY OF AMERICAN DENTAL ASSISTANT'S ASSOCIATION

The July-August 1955 number of The Dental Assistant announces a history of the American Dental Assistant's Association from its beginning in 1925 through 1954. The author is Juliette A. Southard. Copies may be had for fifty cents.
Book Shop: New Titles

150 Years of the American Dental Association

Published by the American Dental Association
color, hardcover, 200 pages

For 15 generations, the American Dental Association has been recognized as the world’s largest and oldest national association within the profession. This new 200-page, full-color hardcover book explores the rich 150-year history of the ADA. The text and rare photographs offer a valuable resource for the dental historian and the dentist’s personal library. Additionally, it may offer an interesting read for patients in the reception room. Its 300 historical photographs, many of which are especially intriguing, were principally taken from the archives of the ADA.

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by Gerald Shklar, DDS, MS  
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By John M. Hyson, Jr., Joseph W.A. Whitehorne & John T. Greenwood
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