



Dr. Spencer R. Atkinson searches for clues among his hundreds of skulls.

OUR BEST KEPT SECRET

The Spencer R. Atkinson Library of Applied Anatomy

skeletons in the closet

By Dorothy Dechant, PhD

Unlike any other place in the building, the sixth floor of the UOP School of Dentistry remains a quiet, seemingly unfrequented, and decidedly mysterious area of the school. It's known as the "research" floor. Such impressive addresses as Clinical Sciences Research Laboratory, Cell Physiology Research Laboratory, Periodontal Research Center, and Craniofacial Research Instrumentation Laboratory can be found there. Recently in the elevator, after someone pushed the sixth floor button, a veteran student turned to acknowledge in a guarded but admiring tone, "Ah, you're going to the forbidden zone."



Dean John Tocchini (center) and Dr. Fred West (left) receive the shipment of skulls destined for temporary storage in San Francisco while awaiting construction of the new dental school at Webster and Sacramento.

Some staff of over ten years have been to the sixth floor “maybe twice.” One student was found using its hallways as a quieter place than the library to study for finals. Superficially the “research” floor seems a non-stimulating environment, but behind its closed doors significant discoveries are being made.

It is on the sixth floor, under the watchful eye of Dr. Dorothy Dechant, curator of the Institute of Dental History and Craniofacial Study, that impressive cabinets protect one of the dental school’s little-known treasures, The Spencer R. Atkinson Library of Applied Anatomy. Not a library of books, but one of skulls, this prize had been the private collection of internationally-renowned orthodontist Dr. Spencer R. Atkinson. On December 27, 1964, after months of negotiation amongst Drs. Atkinson, George Hollenback (then professor of prosthetic dentistry at UOP), John Tocchini (then dean of the dental school), and Robert Burns (then president of UOP), the skull collection was acquired for the UOP School of Dentistry by benefactor Dr. George M. Hollenback and dedicated to the memory of his late wife, Florence E. Hollenback. The acquisition was the result of the friendship between Drs. Atkinson and Hollenback.

On July 2, 1962, the College of Physicians and Surgeons officially became part of the University of the Pacific. In 1964, when the skull collection arrived at the dental school on 14th street, it went into temporary storage. Plans were under way to build a new dental school at the corner of Webster and Sacramento streets by the

end of 1964, but insufficient funding delayed construction for several years. With the May 7, 1967 opening of the new dental school came an attentive caretaker, novel name, and special facilities for the skull collection. Dr. Frederick T. West, a 1917 graduate of the P&S dental school and past president of the American Association of Orthodontists, was appointed curator of The Spencer R. Atkinson Library of Applied Anatomy, situated on the second floor of the new building.

Dr. Atkinson explained his preference for the title “Library of Applied Anatomy” in his unpublished book *Orthodontia as a Life Factor* (1939), noting that it emphasized the contribution made by “dry bones” to our understanding of the anatomical changes that take place during life:

A skull is a book which may be read: a fine piece of source material from which a scientist may recognize many actual happenings not apparent in the living person. These happenings occurred, affecting the growth and development of the complicated and delicate human mechanism. A group of books constitutes a library. A group of skulls also constitutes a library, the contents of which can inspire the student who is eager to learn. If this student will but recognize what he sees and apply his findings to the work that he does with his patients, much practical knowledge will be gained.”

On November 8, 1974, the A. W. Ward Museum of Dentistry, then located on the second floor between the Student Lounge and the Spencer R. Atkinson Library of Applied Anatomy, had its opening. Twelve individuals representing the alumni, administration, faculty, and student body comprised a committee assigned to oversee the operation of the museum. It was not until October 1993 that a new umbrella title,

“The Institute of Dental History and Craniofacial Study” was established to encompass the five collections assembled at UOP since 1967. These include the Spencer R. Atkinson Library of Applied Anatomy, the A.W. Ward Museum of Dentistry, the James Campbell, Jr. Dental Radiology Collection, the College of Physicians and Surgeons Historical Society Collection, and the P & S Comparative Anatomy Collection. The Pacific Coast Orthodontic Consultation Group has generously donated over \$65,000 in recent years to ensure proper security, storage, and display of the Atkinson collection.

Today, a seventeen-member Museum Committee decides policy and directs future planning of the institute. Committee members include Drs. Robert Boyd, Richard Rutter, and Kenneth Snowdowne (Department of Orthodontics); Dr. Dorothy Burk and Mr. Gary Richards (Department of Anatomy); Drs. Jack Hadley and Thomas Schiff (Department of Radiology); Dr. Stefan Highsmith (Department of Biochemistry); Dr. Dorothy Dechant (institute curator); Dr. Gary Thodas ('77, general dentist, chair, Museum Committee); Ms. Kara Sanchez (director of public relations); Dr. Paul R. Thomassen, Jr. ('51, faculty emeritus); Dr. Martin Rayman (pediatric dentistry, adjunct faculty); Mr. Neal Johnson (manager, Faculty Computer Laboratory); Mr. Douglas Varner (librarian, Health Science Library); and Ms. Amy Lowe and Ms. Ilian Jimenez-Minter (dental students, Class of 2002 and 2003).

The mention of skulls instantly elicits curiosity and, when overhearing discussions of the collection, students and staff at the school typically respond, “Skulls, what skulls? I didn’t know the school had a collection of skulls.” As primarily a research asset, its exposure and use have been restricted to study by postgraduate students, faculty, and visiting professionals in general dentistry as well as in specialties such as orthodontics, periodontics, biological anthropology, and craniofacial surgery. Internationally, awareness of the existence and availability of this unique assemblage has increased steadily over its near thirty-five years of residence at UOP. Unusual in size and composition, the collection consists of approximately fourteen hundred skulls including an extraordinarily well-preserved age graded series of over four hundred juvenile specimens ranging from fetal to early adulthood. Fourteen countries and six continents are represented by the sample. What is the history behind this unusual collection? Started by Dr. Spencer R. Atkinson in the early 1900s, its evolution is bound intimately to the life of an orthodontist with a vision.

Born September 2, 1886 on the family plantation in Camden County near Brunswick, Georgia, Spencer Roane Atkinson was the son of a pioneer Georgia dentist. Following his preparatory education at the Marist College in Atlanta and the Georgia School of Technology, he turned his attention to dentistry, graduating with a DDS

degree in 1917 from the Atlanta Southern Dental College, later Emory University.

From 1917 to 1924 Spencer Atkinson taught anatomy and orthodontics at Emory. During those same years, his Atlanta practice was dedicated exclusively to orthodontics. His decision to specialize in dentistry for children, and particularly in orthodontics, was reached after considerable thought. In *Orthodontia as a Life Factor*, Dr. Atkinson explains:

Is orthodontia necessary? It took me four years to find my first answer. I had seen so much damage by orthodontic attempts that I thought, as a great many people still think today, that crooked teeth are the lesser of the evils. I began in college to specialize in dental plates. This seemed to me to be the field wherein I could be of greatest service to the world. Man's work seemed most needed in this most artificial practice of serving the old folks. Progressing further in my college studies, I realized that the edentulous mouth was not the right beginning for a young man with ideals. Why do plate work when I might be able to save some of those teeth? So I studied bridge work. The same ideal took me step by step into a decision to attempt to prevent bridges by specializing in inlays, and then into a study of prophylaxis to make inlays unnecessary. Just before graduation, I had determined on children's dentistry."

Fortunately, to the benefit of subsequent orthodontists and their young patients, he chose to dedicate his life's work to a better understanding of the nature of facial and dental growth and development.

It was not long before Dr. Atkinson realized the harmful nature of crooked teeth in children. Not only were they disconcerting cosmetically but, more importantly, they led to decay and other dental problems. He decided that only by specializing in the study of orthodontics could he become proficient at treating the underlying causes of a poor dentition and thereby provide the best health care possible to his patients.

With this goal in mind, he set out to understand the relationship of facial growth to tooth development in children. Early on in his quest he became disillusioned with the obstacles placed in his path. "An orthodontist works almost altogether with patients who are from two years to twenty years of age. Yet never in my studies had I ever been allowed to dissect a child's head, nor to work on a juvenile skull," he recalled in *Orthodontia as a Life Factor*. He realized that the cadavers and anatomical specimens available to students and practitioners of dentistry and medicine were nearly all those of newborn infants or of mature adults. How was he to understand the normal relationship between the growing face and the erupting teeth of juvenile individuals if he had nothing to observe and analyze?

His attempts to find appropriate materials to study were frustrated. When he approached his alma mater, the Atlanta Southern Dental College, he found three or four juvenile skulls in the



museum, but again his goals were thwarted. As he wrote:

"I was permitted to "study" them, weigh them, measure, and even x-ray them, but it was forbidden me to make sections of them or to dissect them in any way. A child's skull was considered too rare to be mutilated. The effect was about the same as if I had gone to the college library and called for a book, and when the book was produced, was told that I could weigh, measure, or x-ray it but I must not open it and read what is written inside. Our early teachers made many mistakes."

In hopes of finding juvenile skulls available for study elsewhere, Spencer Atkinson traveled to colleges on the East Coast, but to no avail. Determined to accomplish what he knew he must for the sake of his patients, he decided to accumulate personally a large, representative sample of human skulls—an anatomical sample that would allow him to investigate the internal manifestations of normal facial and dental growth and development in all phases of human life. In 1919, he purchased five juvenile human skulls, aged three to fourteen years, through an anatomical supply company in Germany. Thus began a collection that would ultimately become the Spencer R. Atkinson Library of Applied Anatomy.

In late 1919, Dr. Atkinson made contact with Dr. Edward H. Angle, then renowned master of the nascent specialty of orthodontics, who had recently moved to Pasadena, California, for health reasons. Angle, impressed with Atkinson's knowledge of anatomy, invited him to participate as one of three students in private classes being taught out of his home. Dr. Atkinson accepted the invitation and attended during the year 1920. Four years later he moved his family and practice to Pasadena where he had accepted a teaching position at the newly-incorporated Angle College of Orthodontia. While a resident at the school for six years Dr. Atkinson taught technique and etiology of malocclusion, was assistant

Dr. Len Warren, an active member of the Pacific Coast Orthodontic Consultation Group, has been instrumental in stimulating the group's generous support for the skull collection. Purchased with their gift of \$65,000, museum-quality storage cabinets and individual archival-quality trays ensure long-term preservation of the S.R. Atkinson Library of Applied Anatomy.



in the clinic, and eventually received the title of superintendent.

It was in the mid-1920s, when teaching at the Angle School of Orthodontia, that Spencer Atkinson began to question the validity of orthodontic methodology being practiced at the time. Techniques that advocated prolonged, strong pressure to move teeth were too violent and unnatural to be of lasting benefit to the patient. The work of Dr. Albin Oppenheim (professor of orthodontic research at the College of Dentistry, University of Southern California during the early 1900s) had a profound influence on the thinking of Spencer Atkinson. Dr. Oppenheim advocated the use of light pressures that would allow the natural processes of bone resorption and deposition to take place at an unhurried pace. When bone is allowed to adapt to subtle force, effective and permanent tooth movement can be achieved.

Encouraged by the findings of Dr. Oppenheim and by his own observations of facial growth and development, Dr. Atkinson decided he could improve the orthodontic appliance. He began to design an innovative orthodontic device and, on October 28, 1929, his Universal Appliance was patented. A modification that incorporated the advantages of two of Angle's inventions, the ribbon arch and the edgewise arch, the Universal Appliance was unique in using a rectangular double-channel (or double-action)



Above: In 1963, through the generosity of benefactor Dr. George M. Hollenback (left), the private skull collection of Dr. Spencer R. Atkinson (right) was acquired by the University of the Pacific School of Dentistry.



Right: Dr. Dorothy Dechant, curator of the Institute of Dental History and Craniofacial Study, stands with the bust of Dr. Spencer R. Atkinson in front of a new UOP exhibit documenting his professional life.

bracket capable of holding single or combinations of multiple small flat or round arch wires. Designed to allow precisely controlled four-dimensional movement of the teeth around first molar anchors, configuration of the arch wires in association with single—and double—contraction coil springs could be modified according to individual case requirements. All components of the Universal Appliance were designed to apply subtle pressure to the teeth moving and guiding them with intermittent gentle forces throughout the treatment period.

Working with Dr. Atkinson, Mr. Ret Alter, a machinist and graduate engineer from the California Institute of Technology, began to produce the new appliance for Dr. Atkinson's use and for several practicing orthodontists in the Pasadena area. Interest in the Universal Appliance increased and Mr. Alter's business began to prosper. At that time the patent was owned by Cal Tech. Dr. Atkinson had the royalties assigned to the school's Basic Sciences Department to stimulate research in orthodontics.

When Ret Alter passed away, the Consolidated Electrodynamics Corporation, owned by Ed Mayo and Frank Johnson, purchased his business. As demand for the Universal Appliance grew among orthodontists, sales rose and the business thrived. The company paid royalties to Cal Tech until the patent expired and then decided to open a new division called Unitek, an abbreviation derived from the name of their popular product—the Universal Technique Appliance.

Increased demand led to rapid growth and in 1948 a separate headquarters was established for the Unitek Corporation. Expansion led to development of new products, growth in the physical plant, increase in the number of employees, and a steady rise in profits. During the first ten years

of operation, Unitek became the world's largest manufacturer of orthodontic appliances. In 1961, Unitek incorporated a subsidiary in Zurich, Switzerland, marking the expansion of services to an international level. By 1973, Unitek was "the world's largest supplier of orthodontic materials, attachments, instruments, and equipment, both in volume of sales and in the breadth of its product line...with approximately 12,000 different orthodontic items stocked..." Today, Unitek thrives as a division of the 3M Company.

In 1934, a graduate orthodontic department was established at the University of Southern California with Spencer Atkinson appointed director. During his tenure at USC, the skull collection he had started in 1919 continued to expand. Originally kept in his home in Pasadena, the accumulating assemblage soon outgrew its allotted space, and Dr. Atkinson built an eight-room, fireproof, air-conditioned building adjacent to his house to accommodate the specimens. Fully equipped for his research purposes, the laboratory housed a number of cameras, microscopes, an x-ray unit, and a darkroom facility. Over the forty-five-year period that the skulls were in his possession, Dr. Atkinson typically began his day at 4:00 am, sectioning, examining, x-raying, photographing, and writing about the growth of cranial bone as it related to the teeth.

Throughout his professional life, Dr. Atkinson continued to acquire specimens for his skull collection. Some were purchased from biological supply companies while other were acquired during visits to Central and South America. Numerous colleagues from abroad, aware of his unusual private collection, brought specimens to him in admiration of his dedication to the advancement of their specialty.

By the 1950s Dr. Atkinson had accumulated 1,000 skulls in his private laboratory. Most of his professional publications resulted from continued observation, comparison, and measurement of the facial growth patterns and dental attributes exhibited among specimens of his collection. Always eager to share knowledge, he openly invited colleagues and dental students to his laboratory to conduct their own studies. Seminars and study groups were held at his home.

Spencer Atkinson was recognized widely for his innovative approaches to teaching and research in orthodontics. Described as "an ortho-

dontic ambassador of good will," he generously shared his expertise with local and international colleagues. In appreciation of his commitment and collegiality, he received many honors at home and abroad. His teaching accolades included appointments as visiting professor of orthodontics and odontology at the National University of Mexico in 1938, as honorary professor of orthodontics at the University of Guadalajara in 1941, and as honorary professor of orthodontics at the University of Merida, Yucatan, in 1950. In 1946, to convey its profound esteem, the Mexican Government honored Spencer Atkinson with the highest decoration given to a civilian, the Order of the Double Aztec Eagle, Insignia Grade.

In addition to serving as director of the Graduate Orthodontic Department at the University of Southern California for twenty years, Dr. Atkinson was appointed to the faculties of four other universities in the United States. The College of Physicians and Surgeons enjoyed a long and fruitful association with Dr. Atkinson in his capacity as visiting professor of orthodontics from 1938 to the late 1960s. Of Dr. Atkinson's numerous honors within the U.S., several outstanding ones include: diplomate of the American Board of Orthodontics, recipient of the Albert H. Ketcham Memorial Award (1953), fellow of the American College of Dentists, member of the International Association of Dental Research, and member posthumously of the University of Southern California Hall of Fame (1979) for teaching excellence.

In 1961 Spencer Atkinson became a member in good standing of the Pacific Coast Orthodontic Consultation Group. Founded in 1957 the study group initially consisted only of orthodontists using the Universal Appliance in their practices. Dedicated to the teachings of Spencer Atkinson, their intent as a group was to share professional experiences, disseminate an understanding of the Universal Technique, and promote use of the Universal Appliance in academic, clinical and professional settings. The first issue of their bulletin, *Orthodontic Consultant*, published in July of 1969, was dedicated to Dr. Spencer R. Atkinson. Of Dr. Atkinson the editors wrote:

"With pride and admiration the first issue of the *Orthodontic Consultant* is dedicated to Dr. Spencer R. Atkinson. Thus, in a small way, we

can express our appreciation for his unselfish contributions to the advancement of orthodontics and his services to humanity...

From Dr. Atkinson's deductions of observations of hundreds of anatomical sections evolved the philosophy of light force application in appliance therapy. Thus we have the origination of the Universal Appliance, designed and adapted for physiological tooth movement. The principles of the appliance are conducive to early recognition and early treatment of dentofacial abnormalities."

Though more recent advances in the field of orthodontics have succeeded use of the Universal Appliance, members of the Pacific Coast Orthodontic Consultation Group continue to feel a strong indebtedness to Spencer Atkinson for his unique contributions to the development of their profession.

On October 31, 1970, Spencer R. Atkinson passed away. In 1963 he expressed hope that the skull collection would continue to serve as an inspiration to future professionals:

"If a library of skulls were available to all scholars and research workers, especially those of the various specialties in medicine, dentistry, physical anthropology, art, etc., many leads for further research would be discovered. The researcher or student would be inspired to penetrate further into the realms of the unknown."

Since 1967, hundreds of researchers have visited the University of the Pacific School of Dentistry to study this unique collection. They represent such fields as general dentistry, orthodontics, craniofacial surgery, biological anthropology, and anatomy. They have come from many different local, national, and international institutions. Numerous publications have resulted from their studies.

Today the institute's new research facility, centered in Room 612, continues to attract visiting professionals, faculty, and their students. Location in a screened area on the sixth floor guarantees an environment conducive to research and teaching small classes using skulls from the Library of Applied Anatomy. A generous donation from the Pacific Coast Orthodontic Consultation Group in 1996 provided funding for high-quality storage cabinets for preserving the skulls and computer equipment for storing images and descriptive information. Recently acquired osteometric measuring instruments and photographic equipment purchased through the school's Thayer Fund awards have facilitated study of the collection.

During the last year, craniofacial biology classes for the orthodontics residents and selective courses for the classes of 2001/2002 covering advanced head and neck anatomy for dentists and research in craniofacial growth were held in the institute's facility. Since 1990, fifty-five faculty and visiting researchers from as far away as Spain and Japan included anatomical specimens from the Library of Applied Anatomy in their scientific studies. The skulls have provided a large, di-



Dr. Fred West, a close friend and colleague of Dr. Atkinson, became the first curator of the Spencer R. Atkinson Library of Applied Anatomy.

verse sample for testing new three-dimensional digital x-ray imaging techniques developed by Drs. Baumrind and Boyd at UOP in the orthodontics department's new Craniofacial Research Instrumentation Laboratory.

The Library of Applied Anatomy continues to grow. Recently, the institute has acquired one hundred and thirty-five skulls originally purchased from anatomical supply houses for use by the first-year dental students. Accessioned as a subset of the main research collection, these specimens are available for loans to dental school faculty for teaching purposes. Within the last two years, donations of half-a-dozen skulls purchased by alumni during their dental school days have contributed to expansion of the collection.

In addition to the institute facilitating on-site access to this invaluable resource, plans exist to increase awareness and study of the Library of Applied Anatomy through the Web. For each skull, critical descriptive and morphometric information accompanied by photographs and x-rays will be provided using database and digital imaging applications. As a compliment to Web access, these data and images pertaining to individual specimens will be available on CD-ROM.

Dr. Dugoni is committed to the preservation and use of this most tangible reflection of Dr. Spencer Atkinson's lifelong dedication to orthodontics. The difficulty in obtaining specimens has made the collection even more valuable. Support from organizations such as the Pacific Coast Orthodontic Consultation Group and other interested individuals will ensure the long-term conservation and maximum research accessibility of this invaluable legacy, the Spencer R. Atkinson Library of Applied Anatomy. □

Author's Note: The following is a list of resources used in the preparation of this article:

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