NATIONAL ACADEMY OF SCIENCES

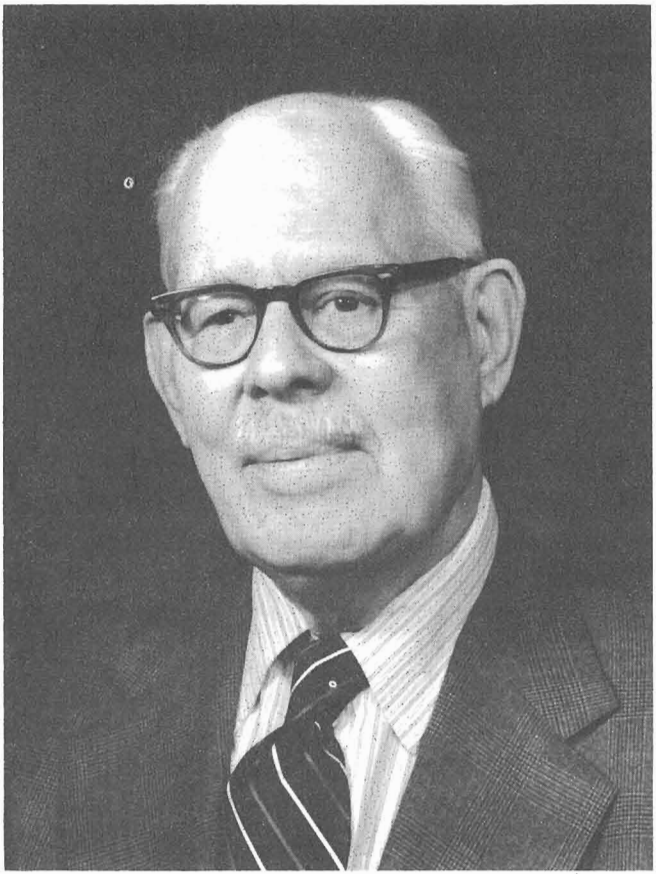
WILTON MARION KROGMAN

1903—1987

A Biographical Memoir by

WILLIAM A. HAVILAND

Biographical Memoir



Wm Krogman

WILTON MARION KROGMAN

June 28, 1903–November 4, 1987

BY WILLIAM A. HAVILAND

IN THE DEVELOPMENT of physical anthropology in North America, few have been as influential as Wilton Marion Krogman. Until 1980, virtually all professionals in this field with degrees from institutions in the United States traced their academic lineage either from Ernest Hooton at Harvard or to Krogman, first at the University of Chicago and later at the University of Pennsylvania.

His initial professional publication, which appeared in 1927, was the first comprehensive review of research on primate dentition and is regarded as a cornerstone in the subfield of dental anthropology, in which Krogman was active throughout his long career. In subsequent papers he contributed as well to osteology, racial studies, genetics, medical anthropology, paleoanthropology, constitutional anthropology, and human engineering. His major interests and most important contributions were, however, in the areas of child growth and development and forensic anthropology. The latter specialty was practically invented by Krogman, and his book *The Human Skeleton in Forensic Medicine* (1962) remains a definitive source for medical and police professionals alike. Similarly, the standards developed in Krogman's growth studies are used by health

professionals throughout North America to evaluate the growth of children.

PERSONAL HISTORY AND EDUCATION

Born to Lydia Magdalena Wriedt and Wilhelm Claus Krogman in Oak Park, Illinois, Wilton (or Bill as he was commonly called) was one of four children, one of whom was a fraternal twin. Having emigrated from Germany, his parents were attracted first to Forest Park by the presence there of so many other German immigrants. With his brothers, Bill's father was a carpenter and builder, and in Oak Park they built the first house designed by Frank Lloyd Wright. He developed a reputation for perfection in his work and insisted in personally choosing each piece of lumber that he used. As he himself later realized, Bill was deeply affected by his father's rigorous standards of workmanship and the integrity that went into his work.

Although Wilhelm had only a grade school education, he absorbed the German cultural and national emphasis upon education, both formal (schooling) and informal (reading, going to public lectures, and so on). Whenever he went to downtown Chicago, as he frequently did to buy hardware and other materials, he almost always stopped by second-hand book counters. Thus, Bill grew up in a house surrounded by old books and journals, and remembered poring over books on Asia, Africa, and Europe at an early age, so that, as he put it:

> The peoples of the world passed before my eyes. I do not think it an overstatement to say that these formative years at home were important influences in my later interest in ethnology, archaeology and cultural anthropology.[1]

One event from Bill's early childhood that made a lasting impression upon him occurred when he was eight or

nine years old. As he described it, he and his twin brother Wes often pretended to dig for pirate treasure:

One day, in a prairie area not too far from home . . . , we were about 3 feet deep when the spade struck a resistant object. We began to paw the dirt away with our hands or a piece of wood that was handy. The object was bone! A man?—"dead men tell no tales" we had learned—no, it was an animal skull, and that animal proved to be a horse. Horses were far more numerous in 1911–12 than they are today, so we had a good idea of the bony parts of such an animal: behind the head is a neck, then comes a "shoulder" and two front legs, then a long backbone, then a "hip" and two end legs, then a tail. With this framework in mind we slowly removed the dirt from the entire skeleton of a horse, lying on its side. We did not do a job which would win the approval of a modern archaeologist, but we did do a digging-out that attracted all the children in the neighborhood, as well as a few adults. . . . Here, I venture to say, was an early foray into future Comparative Anatomy, and even Physical Anthropology.[2]

Another important experience occurred when Bill went on to high school, something Wilhelm encouraged his twin boys to do even though he himself and his two older children had not done so. The need to earn money for books and other school expenses prevented young Bill from becoming involved in most extracurricular activities, although he did participate in the debating club, something that taught him to "think on his feet." At first, he was an A student, but then as a sophomore he began to lose ground. He himself described what happened next:

My desk-room teacher, Miss Wilson, called me in one day, after school, and said, "Wilton, what is happening? You are not doing as well as you should!" I replied, "Oh, Miss Wilson, I work after school, I deliver papers in the morning, I work Saturdays. . . . I'm so tired after supper, I just fall into bed. . . . I'm sorry." She then said, with what I now realize was wonderful foresight, "Wilton, you are growing so fast (I grew 8" in 1917–18) that you are putting all of your energy in your body. Try your best to keep pace—even though slower—with your classmates." By the end of my Sophomore and the beginning of my Junior year I was Honor Roll once more. That wonderful, understanding, advice "carried" me along![3]

From the time he was a first grader, Bill was always at least half a head taller than his agemates, which often led to his being singled out to open or close windows, clean off chalk boards, or anything else where large size was an asset. Surely, both the trials and satisfactions associated with exceptional growth had something to do with Bill's later professional dedication to the study of child growth and development!

In September of 1921 Bill took the Competitive Scholarship Entrance Examination of the University of Chicago, placing first among 490 contestants. Having received a very religious upbringing in a German Baptist home, it was Bill's intention to study for the ministry. But in the course of his studies he was so deeply impressed with the presence of so many common elements in the world's religions that he decided to take a course in "Primitive Religion" in the anthropology department.

It was thus that in my Sophomore year, in 1922, I first entered the field of anthropology. I never left it. I became convinced that Man was a part of an age-old evolutionary process. This meant that I could not, and did not, accept the concept of Man as an object of special creation by God. In 1922 to be an "evolutionist" was serious in the eyes of many religious peoples and groups. I asked to be released from my pre-divinity status. I told my Pastor and my Board of Deacons that I could not be a hypocrite: believe one thing, preach another. They understood. I told them, which I then believed and which I have always tried to practice, that I might live a ministry by deed and by precept, as I worked with young college people. My faith in God as the Creator of all life has never wavered.[4]

So it was that Bill became an anthropology major with minors in biology and geology-paleontology. Then in his senior year an event occurred that set him on his life career.

In a course which was a praktikum in physical anthropology, Dr. Fay-Cooper Cole assigned me as a term paper the general subject of the anthropol-

ogy of the teeth. I began to study; my first studies were on the Cope-Osborn theory of the evolution of the mammalian molar. Then I focused on the dentition of the Primates, including Man. As I read several names became passwords to me: William King Gregory, paleontologist; Milo Hellman, orthodontist, dental morphologist; T. Wingate Todd, anatomist and physical anthropologist. As I studied I moved on to jaws, to facial structure, to craniofacial complex, and—most important of all—the dynamics of growth and development, and of progressive changes in and through time.

In the Summer of 1925 the Krogmans (mother, father, daughter, twin sons) took an auto trip from Chicago to New York City. The day after we arrived the others went sight-seeing, and I went to 57 W. 57th St. to see Dr. Hellman. With the brashness of youth I literally descended upon him! With me was my term paper, "Anthropological Aspects of the Human Teeth and Dentition." I gave it to Milo's Receptionist and she took it into his operatory. In about five minutes he came out and said, "Cancel the rest of my appointments for the afternoon [it was then about two-o'clock]. I want to talk with this young man." The upshot was that he told me to tidy up a bit here, a bit there, and submit it for the annual Morris L. Chaim Prize of the First District Dental Society of New York City for a contribution to dentistry, either in the area of basic science or clinical service. I recast the paper as Dr. Hellman suggested and submitted it to the Chaim Prize Committee. I won First Prize of $250.00, and the paper appeared in its entirety in Vol. 7, No. 7, of the *Journal of Dental Research* for 1927.[5]

One of the judges of Bill's paper was none other than Todd, who was impressed enough to stop by Chicago to meet him. As Bill told it:

A few weeks later I received a letter from Todd which began, "The time for commendation has passed. Now . . ." and he then took the paper literally apart! Achilles-like I sulked in my room for three days before common sense took over. I realized that he had done the finest service a senior may render a junior: vigorous, objective and constructive criticism. I recast the paper.[6]

As a graduate student at Chicago, at the same time that he pursued his interests in physical anthropology, Bill gained archeological experience as he was placed in charge of the summer "digs" of the Archaeological Survey of Illinois. Then

in 1928–29, Todd arranged a fellowship for Bill at Western Reserve University, where he wrote his dissertation. In 1929 he received his Ph.D. from the University of Chicago.

PROFESSIONAL DEVELOPMENT AND CONTRIBUTIONS

Bill's first job was as lecturer at Chicago, filling in for Fay-Cooper Cole in introductory anthropology. The experience was a sobering one, as the following typical Krogman anecdote reveals:

> As a brand-new Ph.D. I felt impelled—as I'm sure many other beginning teachers felt—to pour all the vials of knowledge into one teaching quarter's bottle. For my lecture on kinship and marriage I chose the eight-class marriage system of the Warramunga, a tribe of Australian Aborigines. I began, "If A marries B, the children go to C, but if A marries D they go to B. . . ." and so on, with an increasing complexity that taxed my memory and just "lost" my captive audience. Finally, a young man in a carrying stage whisper said, "When does A go to P?" The spell was broken, the snarl reduced to absurdity, and I dropped the ill-chosen illustration. That lesson stayed with me, for I never again sacrificed clarity to unimportant obfuscation.[7]

In 1930–31, Krogman was a National Research Council fellow with Sir Arthur Keith at the Royal College of Surgeons in London. The purpose of this fellowship was to develop a man and a viewpoint, rather than to produce a specific piece of work. Besides having many a fine discussion with Sir Arthur, Bill studied biostatistics with Karl Pearson's son, shared a lab with Louis Leakey, and got to meet with most of the prominent English anatomists and physical anthropologists of the time. From all this came a deep appreciation of the kind of cooperative research in both multi- and interdisciplinary approaches that Bill was to put into practice himself later on.

In 1931 Bill Krogman became Todd's colleague at Western Reserve, as associate professor of anatomy and physical

anthropology. At this time, Todd's department was a kind of mecca for physical anthropologists, providing the opportunity to meet and interact with most of the current leaders in the field, including Ales Hrdlicka and Franz Boas, both of whom Bill greatly admired. While with Todd, three main avenues of teaching and research opened up for him. The first was longitudinal observation and analysis of the biobehavioral growth and maturation of Cleveland children. In Todd's laboratory there were two endowed research programs: the Brush Foundation (with Todd as director), which focused on the overall physical and psychological development of the child, and the Bolton Fund (directed by B. Holly Broadbent, Sr., D.D.S.), which focused on the faciodental growth of the child. Krogman was part of the team that helped perfect the Broadbent-Bolton roentgenographic cephalometer, the principle of which is now in worldwide use for serial growth studies and clinical evaluation by orthodontists.

It was also in Todd's department that Bill began craniological studies that extended into the 1940s. During these two decades he studied and reported on over 65 percent of all the skulls excavated in the Near and Middle East by the Oriental Institute of the University of Chicago and the University Museum of the University of Pennsylvania. These were from sites in Anatolia and Iran, covering a span of c. 4000 B.C. to 500 A.D. From these sites came crania in sufficient numbers to provide accurate determination of "racial" types in a time sequence.

Again with Todd, Krogman began to develop his interest in what later became known as forensic anthropology. Together, the two men pioneered the development of this anthropological specialty. Central to Krogman's advancement was access to two world-famous skeletal collections by

Todd: one of humans and the other of primates. There were 3,300 human skeletons (2,000 white, 1,300 black, both male and female) all carefully documented by age, sex, race, medical history, and so on. In the 1930s nearly 50 percent of the known gorilla, chimpanzee, orang, and gibbon skulls and skeletons were housed in Todd's laboratory. These were the basic materials that aided Krogman in learning cranial and skeletal variabilities with reference to age, sex, race, age changes in later life, and so forth. In 1939 he wrote the official F.B.I. "A Guide to the Identification of Human Skeletal Material" (widely considered to mark the beginning of forensic anthropology in the United States) and in 1962 the definitive volume, *The Human Skeleton in Forensic Medicine* (updated and revised in 1986).

In 1938 Krogman returned to Chicago with a dual appointment as associate professor of both anatomy and physical anthropology. This marked the beginning of his career teaching graduate students (a list of whom would read almost like a "Who's Who" of physical anthropologists). Needless to say, with a full load of teaching and lab work in both departments, Krogman's own research was slowed. Still, he did secure data on the somatometry and maturation of children at the university elementary school. Although the series was too small for definitive results, the effort did serve, in hindsight, as a kind of "dress rehearsal" for his later work at the University of Pennsylvania. Another accomplishment of his Chicago years was publication, in 1941, of *The Growth of Man*, a work of which he was particularly proud.

A year after his return to Chicago, Krogman was afflicted by failing vision in his right eye, along with an anesthetic cornea. Clinical tests and x-rays revealed an endocranial neoplasm, for which surgery was indicated. All this hap-

pened at the opening of the fall quarter, with two anthropology courses to teach. Typical of the man, Krogman suggested finishing each course before his scheduled surgery. The students rose to the occasion, meeting evenings and weekends, so that exams and papers were completed and graded by mid-November when the surgery took place. Another setback occurred in 1941, when vision in his left eye weakened. Exploratory surgery revealed adhesions on the left optic nerve, which were removed. However, Krogman was left blind in his right eye and had no feeling or chewing muscles on that side of his face. Because of his partial blindness, colleagues and friends learned not to get too close on that side, lest a vigorous gesture on Bill's part might unthinkingly land a blow on them.

In 1947 Krogman was called to the University of Pennsylvania as professor of physical anthropology in both the Graduate School of Medicine and the School of Dental Medicine. Along with these went a position on the staff of the Children's Hospital of Philadelphia, an ex officio appointment in the university's Department of Anthropology and a curatorship in the university museum. In such a multifaceted position, Krogman was able to realize his research goals to a degree hitherto impossible. With the cooperation of the medical and dental schools along with Children's Hospital, he founded the Philadelphia Center for Research in Child Growth (later renamed, in his honor, the W. M. Krogman Center for Research in Child Growth and Development), for the purpose of developing standards of growth for normal healthy children of elementary and high school age, boys and girls, whites and blacks.

In 1948 Krogman began the longitudinal research required to develop such standards. With the cooperation of the Philadelphia Board of Education and the Archdiocese

of Philadelphia, the initial "normal" sample of 600 white boys and girls, all medically and dentally healthy and representing an ethnic cross section of the city's population, was enrolled. Thereafter, they were seen annually, and a series of black children were added some ten years later. This research was supported almost continuously until Krogman's retirement in 1971 by the National Institutes of Health and involved the participation of literally hundreds of graduate students in anthropology, dentistry, and medicine.

Although basically a research facility, the center served immediate practical purposes as well. All children receiving orthodontic care at the dental school were also enrolled at the growth center, and their growth data became part of their treatment plan. The center's data were also applied in cases of endocrine disorders, pediatric "growth failures," orthopedic problems, the faciodental development of children with cleft lip and/or palate, mandibular resections in oral surgery, and facial growth related to tooth development and eruption in pedodontics.

Krogman published the Philadelphia standards for the physical growth of male and female, white and black, children of elementary and high school age in 1970 as a monograph of the Society for Research in Child Development. The data are used by medical groups across the nation to diagnose and treat growth problems in children. Two years later he published one of his most widely known books, *Child Growth.*

"Retirement" is not the proper word to describe Bill's activities upon becoming professor emeritus at the Univerisity of Pennsylvania in 1971. He then moved to Lancaster, Pennsylvania, to become director of research at the H. K. Cooper (cleft palate) Clinic. Here, he continued research-

ing and publishing on oral and facial development and growth. Finally, failing health forced him to retire from active service at the clinic in 1983. But even then he did not "quit"—in collaboration with M. Yasar Iscan, he revised his classic, *The Human Skeleton in Forensic Medicine.*

POSITIONS, SERVICES, AND HONORS

Bill Krogman admired Ales Hrdlicka, the "father" of American physical anthropology, for the unselfish way in which he worked for his discipline, and so Krogman also gave unstintingly of himself. From 1933 to 1945 he served as secretary of Section H (anthropology) of the American Association for the Advancement of Science, becoming chair of that section in 1948–49. In 1937–39 he served as president of the Central Section of the American Anthropological Association. Two years after Hrdlicka stepped down in 1942 as president of the American Association of Physical Anthropologists (a position he had held since its founding), Krogman assumed the post, which he held until 1949. From 1947 to 1951 he chaired the Committee on Research in Physical Anthropology of the National Research Council, and from 1955 until 1971 he was chair of the Department of Physical Anthropology in the Graduate School of Medicine at the Univeristy of Pennsylvania. From 1959 until 1961 he was president of the Society for Research in Child Development, having served on its Board of Governors in 1949–50 and again during 1957–59. Finally, in 1962–63, he served as president of the International Society of Cranio-Facial Biology.

Krogman's list of richly deserved honors includes Phi Beta Kappa, Sigma Xi, Omicron Upsilon (honorary dental society), and Alpha Kappa Delta (honorary sociology society). He was also an honorary member of numerous other

societies: American Association of Orthodontists, American College of Dentists (fellow), American Society of Dentistry of Children, Canadian Dental Society, New York Academy of Dentistry (fellow), Pennsylvania Dental Association, and the University of Illinois Orthodontic Alumni Association. In 1950 he was awarded the Viking Fund Medal in Physical Anthropology for outstanding contributions to the field. In 1958 he received the Drexel Institute Award for contributions to child growth and development. Election to the National Academy of Sciences came in 1966. A year later the Ohio State Dental Association bestowed on him its Callahan Award and Medal, and in 1969 he received the Ketcham Award from the American Association of Orthodontists. In 1971 Krogman's portrait was commissioned by the University of Pennsylvania to be hung in the School of Medicine. In 1973 he became honorary senior president of the Third International Orthodontic Congress in London. The American Association of Orthodontists conferred its annual award on him in 1982, and the American Cleft Palate Association followed with its honors award a year later. Honorary degrees were awarded by Baylor University (LL.D. 1955), the University of Michigan (D.Sc. 1969), and the University of Pennsylvania (D.Sc. 1979).

PERSONAL STYLE

When Bill Krogman described Todd as "one of the most inspirational men I ever knew . . . a human dynamo . . . sturdily built, literally exuding vitality . . . vigorous in action and speech" with "a strong will, but tempered . . . with an innate kindness and consideration and a ready wit,"[8] he might just as well have been describing himself. He was a big man physically, with a big voice and a "big heart." Students remember him as a superb teacher, whose lectures

were models of clarity, significance, and dramatic presentation. That they were liberally spiced with anecdotes and reminiscences served to make the material in them all the more memorable. Bill's teaching, however, was not restricted to the classroom. He was a readily accessible man, always willing to share his thoughts and offer advice. One learned from just being around him. I never knew a more supportive teacher myself, not just in terms of encouraging the research interests of students and providing jobs for them at the growth center, but in providing jobs for spouses as well, and helping students find jobs after completion of their degree work. He truly cared about his students.

The kind of feelings the man engendered in students and coworkers alike is captured well in this piece by the social worker of the Lancaster Cleft Palate Clinic:

> I was fortunate to be one of the many who benefitted from working with Bill and I stress the word *with.* Although he was my supervisor, he always treated me as a colleague. He was intellectually stimulating, encouraging his staff to aim high and supportive if they didn't reach their goal. He was totally selfless in that he always placed the goals of patients, clinic and the profession ahead of his self interest. During a time when professional selfishness and unethical behavior [are] too common, Bill Krogman displayed the highest standards of professional ethics and generosity. He was quick to share praise and honors with his supervisees [sic].[9]

To many outside his profession, Bill was widely known as "The Bone Detective." He was often consulted by the police and F.B.I. when bones were found in unexpected places, and he frequently spoke about his more interesting cases to interviewers from the popular media or to lay audiences. Few who heard him speak about the "Princes in the Tower" (based on the bones of two young boys discovered in an out-of-the-way part of the Tower of London, which he was called in to examine) or the "Improbable Case of the Cinder Woman" (based on the pseudohypothesis that the body

contains so much entropy that it can suddenly burst into flames) soon forgot the experience. In line with his "bone detection," Bill was also an avid Sherlock Holmes fan. A member of the Sons of the Copper Beeches, the Philadelphia branch of the Baker Street Irregulars, he wrote several articles on the stories of Conan Doyle (including "Sherlock Holmes as Anthropologist"). He also loved to "ham it up," appearing with deerstalker hat, curved-stem pipe, and magnifying glass.

As the latter indicates, Bill had the same kind of playful streak that has been noted in many another people of brilliance (the physicist Richard Feynman, for example, immediately springs to mind). He played as hard as he worked, and some of my fondest memories are of him chortling with glee as his son Mark and I prepared to fire an old Civil War salute cannon or as he ate raw mussels pulled up while fishing, drinking beer, smoking cigars, and telling stories (of which he had an endless store) on my boat off the coast of Maine. For twenty-seven years, he spent the summers with his second family (wife Mary Helen Winkley and sons John W. and Mark A; his first family consisted of Virginia Madge Lane, daughter Marian K.—now Baur—and son William L.) in Sargentville, Maine, where his chief delights were fishing, swimming, beach walking (with some sort of walking stick, he always looked like the archetypal beach comber) and the daily trek to the post office. Having been brought up in a close family himself, it is not surprising that Bill was devoted to his own family. Just how much his family meant to him is revealed, I think, by an experience I had just before I went into the field in 1959. I was talking to him in his office when, instead of talking about future career concerns, as one might expect with a graduate student finishing his course work, out of the blue

he said, "Well, you've now reached the point where you will want to think about starting up a family soon." I've never forgotten that.

IN ADDITION TO THE sources already cited, this memoir owes much to obituaries by Francis E. Johnston (*American Journal of Physical Anthropology* 80:127–28) and M. Yasar Iscan (*Journal of Forensic Sciences* 33:1473–76). Above all, I am indebted to Mary Krogman for supplying various newspaper clippings and other information, as well as to her and Mark for allowing me to share in their reminiscences about "The Old Professor." I value their continuing friendship highly and hope that this memoir will serve Bill Krogman's memory well.

NOTES

1. W. M. Krogman, Autobiographical Statement, National Academy of Sciences, Washington D.C., 1966, pp. 2–3.
2. Ibid, p. 3.
3. Ibid, p. 5.
4. Ibid, p. 8.
5. Ibid, pp. 9–10.
6. Ibid, p. 10.
7. Ibid, pp. 11–12.
8. W. M. Krogman, "Fifty Years of Physical Anthropology: The Men, the Material, the Concepts, The Methods," *Annual Review of Anthropology*, 5(1976):2.
9. Phil Starr, Letter to the Editor, *Lancaster New Era*, November 10, 1987.

SELECTED BIBLIOGRAPHY

1927

Anthropological aspects of the human teeth and dentition. *J. Dent. Res.* 7(1):1–108.

1930

The first Americans. *School Sci. Math.* 30(1):25–30.

Studies in growth changes in the skull and face of anthropoids. I. The eruption of the teeth in anthropoids and Old World apes. *Am. J. Anat.* 46(2):303–13.

Studies in growth changes in the skull and face of anthropoids. II. Ectocranial and endocranial suture closure in anthropoids and Old World apes. *Am. J. Anat.* 46(2):315–53.

The problem of growth changes in the face and skull as viewed from a comparative study of anthropoids and man. *Dent. Cosmos* (June).

1931

Studies in growth changes in the skull and face of anthropoids. III. Growth changes in the skull and face of the gorilla. *Am. J. Anat.* 47(1):89–115.

Studies in growth changes in the skull and face of anthropoids. IV. Growth changes in the skull and face of the chimpanzee. *Am. J. Anat.* 47(2):325–42.

Studies in growth changes in the skull and face of anthropoids. V. Growth changes in the skull and face of the orangutan. *Am. J. Anat.* 47(2):343–65.

The archaeology of the Chicago area. *Trans. Ill. St. Acad. Sci.* 23(3):413–20.

1932

The morphological characters of the Australian skull. *J. Anat.* 66(3):399–413.

With Sir Arthur Keith. The racial characters of the southern Arabs. In *Arabia Felix*, ed. B. Thomas, pp. 301-33. New York: Scribner.

Skeletal material from the Vergin and Weise Mounds. *Ind. Hist. Bull.* X(1):69–72.

1933

The cranial types. In *The Alishar Hüyük, Seasons of 1928 and 1929,* Part II of Oriental Institute, Vol. 20, pp. 122–38. Chicago: Univ. of Chicago Press.

1934

Racial and individual variation in certain facio-dental relationships. *J. Dent. Res.* 14(4):277–96.

Biometry in orthodontic research. *J. Am. Dent. Assoc.* 21(6):986–96.

The racial composition of the Seminole Indians in Florida and Oklahoma. *J. Negro Hist.* 19(4):412–30.

The physical anthropology of the Seminole Indians of Oklahoma. *Comitato Italians Per Lo Studie Dei Problemi Della Popolazions.* Serie III, Vol. II, pp. 119. Rome, Italy.

The population of the Indians of the U.S. from earliest times to the present. *Z. Rassenk.* 1:90–91.

Life histories recorded in skeletons. *Am. Anthropol.* 37(1) 92–103.

Missing teeth in skulls and dental caries. *Am. J. Phys. Anthropol.* 20 (1):43–49.

Vital data on the population of the Seminole Indians of Florida and Oklahoma. *Human Biol.* 7(3):335–49.

The "New Deal" for the American Indian. *Z. Rassenk.* 3:77–81.

1936

Tibet: The birthplace of the Plains Indian. *Z. Rassenk.* 3:202–3.

The cephalic type of the full-blood and mixed-blood Seminole Indians of Oklahoma. *Z. Rassenk.* 3:117–20.

The inheritance of non-pathologic physical traits in man. *Eugen. News* 21(6):139–46.

1937

Cranial types from Alishar Hüyük and their relations to other racial types, ancient and modern, of Europe and Western Asia. In *The Alishar Hüyük, Seasons of 1930–32.* ed. H. H. von der Osten, Part III of Oriental Institute, Vol. 30, pp. 213–93. Chicago: Univ. of Chicago Press.

Are the North American Indians increasing in numbers? *Z. Rassenk.* 4:203–4.

1938

Physical anthropology in the U.S.A. *Z. Rassenk* 7:87–89.

With Adolph Schultz. Anthropoid ape materials in American collections. *Am. J. Anthropol.* 24(2):199–234

Dental arch form and facial growth pattern in healthy children from prehistoric populations. *J. Am. Dent. Assoc. Dent. Cosmos* 25:1278–89.

The role of urbanization in the dentitions of various population groups. *Z. Rassenk.* 7:41–72.

The skeleton talks. *Sci. Am.* 159(2):61–64. (see also *Read. Dig.* 33(8):104–6).

1939

Medical practices and diseases of the aboriginal American Indians. *Ciba Symp.* 1(1):11–18.

Thomas Wingate Todd. *Science* 89:143–44.

Contributions of T. Wingate Todd to anatomy and physical anthropology. *Am. J. Phys. Anthropol.* 25(2):145–86.

Facing facts of face growth. *Am. J. Orthod. Oral Surg.* 25(8):724–31.

A guide to the identification of human skeletal material. *F.B.I. Law Enforcement Bull.* 8(8):3–32.

The skeleton talks. *Fingerpr. Identif. Mag.* 21(6):3–8.

1940

The skeletal and dental pathology of an early Iranian site. *Bull. Hist. Med.* 8(1):281–348.

The peoples of early Iran and their ethnic affiliations. *Am. J. Phys. Anthropol.* 26(1/4):269–308.

The pathologies of pre- and protohistoric man. *Ciba Symp.* 2(2):430–43.

The medical and surgical practices of pre- and protohistoric man. *Ciba Symp.* 2(2):444–52, 463–64.

Racial types represented at Tepe Hissar, Iran, from the late fifth to the early second millennium B.C. *Verh. K. Ned. Akad. Wet., AED. Naturkd.* XXXIX(2):1–87.

A study of four skulls from Seleucia-on-the-Tigris, dating from 100 B.C. to 200 A.D. *Human Biol.* 12(3):313–22.

Is there a physical basis for race superiority? *Sci. Mon.* 51:428–34.

Trend in the study of physical growth in children. *Child Dev.* 11(4):279–84.

1941

A Bibliography of Human Morphology, 1914–1939. Chicago: Univ. of Chicago Press.

The human family tree. *Ciba Symp.* 3(1):790–803.

Aboriginal physical types in the Western Hemisphere. *Ciba Symp.* 3(1):804–12.

The antiquity of man and his culture in the Americas. *Ciba Symp.* 3(1):813–24.

The historical aspect of the study of constitutional types. *Ciba Symp.* 3(9):1058–65.

Methods of studying human constitutional body types. *Ciba Symp.* 3(9):1066–76.

Interpretations of human constitutional types. *Ciba Symp.* 3(9):1077–87.

1942

The physical anthropology of the hand. *Ciba Symp.* 4(4):1297–1306.

1943

With W. H. Sassaman. Skull found at Chanhu-daro. In *Chanhu-daro Excavations 1936–40,* vol. 20, ed. E. J. H. McKay, American Oriental Series, New Haven, Conn.: American Oriental Society.

Principles of human growth. *Ciba Symp.* 5(1–2):1458–67.

The measurement of the human body. *Ciba Symp.* 5(1–2):1467–77.

Factors affecting human growth. *Ciba Symp.* 5(1–2):1478–85.

What we do not know about race. *Sci. Mon.* 57(2):97–104.

The role of the physical anthropologist in the identification of human skeletal remains. *F.B.I. Law Enforc. Bull.* 12(4):17–40, 12(5):12–28.

The anthropology of the eye. *Ciba Symp.* 5(8):1607–16.

Ales Hrdlicka, March 29, 1869–September 5, 1943. *Science* 98:254–55.

1944

Morphology in ancient times. *Ciba Symp.* 6(7):1878–83.

Morphology during the Renaissance. *Ciba Symp.* 6(7) :1884–93.

Morphology in recent times. *Ciba Symp.* 6(7):1893-1905.

1945

The concept of race. In *The Science of Man in the World Crisis,* ed. R. Linton, pp. 38–62. New York: Columbia Univ. Press.

Bibliography in physical anthropology, 7–1–44 to 6–30–45. *Am. J. Phys. Anthropol.* 3(4):367–417.

1946

The growth of man. In *Tabulae Biologicae,* vol. 20, pp. 1–963. The Hague: W. Junk.

The skeleton in forensic medicine. *Proc. Inst. Med. Chicago.* 16(5).

With Mary Jane McCue. The reconstruction of the living head from the skull. *F.B.I. Law Enforc. Bull.* 15(7):11–18.

1947

The "Case of the Divided Skeleton." *Interne* 13(7):301–5.

1948

The physical growth of the child. In *Successful Marriage,* eds. N. Fishbein and W. W. Burgess, pp. 293–310. New York: Doubleday.

The contributions of Milo Hellman to physical anthropology. *Am. J. Orthod.* 34(1):61–82.

Physical anthropology and race relations: A biosocial evaluation. *Sci. Mon.* 66(4):317–21.

The skeleton tells its story. *Bull. Phila. Cty. Dent. Soc.* 12(8):210–13.

With J. McGregor and B. Frost. A problem in human skeletal remains. *F.B.I. Law Enforc. Bull.* 17(7):7–12.

The role of growth analysis in orthodontic interpretations. *Am. J. Orthod.* 34(9):708–13.

The racial type of the Seminole Indians of Florida and Oklahoma. *Fla. Anthropol.* 1(3–4):61–74.

1949

The human skeleton in legal medicine: Medical presentation. In *Medicolegal Problems, Series Two,* ed. S. A. Levinson, pp. 1–92. Philadelphia: Lippincott.

Ancient cranial types at Chatal Hüyük and Tell al-Judaidah, Syria,

from the late fifth millennium B.C. to the seventh century A.D. *Belleten* XIII:407–77.
Talking skeletons. *Gen. Mag. Hist. Chron. Univ. Penn.* 51(2):79–83.

1950

The growth of the "whole child" in relation to dental problems. *Oral Surg., Oral Med., Oral Pathol.* 3(4):427–45.
The assessment of degree of deviation from the normal in face and teeth. *Oral Surg., Oral Med., Oral Pathol.* 3(4):446–61.
The concept of maturity from a morphological viewpoint. *Child Dev.* 21(1):25–32.
A handbook of the measurement and interpretation of height and weight in the growing child. *Monogr. Soc. Res. Child Dev.* 13(3):1–85.
Major aspects of physical growth as they may effect the personality. Newsletter of the National League to Promote School Attendance, Dec., pp. 11–17.

1951

The problem of "timing" in facial growth with special reference to the period of the changing dentition. *Am. J. Orthod.* 37(4):253–76.
Craniometry and cephalometry as research tools in growth of head and face. *Am. J. Orthod.* 37(6):406–14.
The role of physical anthropology in dental and medical research. *Am. J. Phys. Anthropol.* 9(2):211–18.
T. Wingate Todd: Catalyst in growth research. *Am. J. Phys. Anthropol.* 9(2):211–18.
Scars of human evolution. *Sci. Am.* 185(6):54–57.

1952

Next stop? A human biologist looks at social trends. *Angle Orthod.* 22(2):65–73.

1953

Summary and discussion of reports and papers. *Angle Orthod.* 23(2):103–12.
The improbable case of "the cinder woman." *Gen. Mag. Hist. Chron., Univ. Penn.* 55(2):61–69.

1954

Factors of physical growth of children as they may apply to physical education. (R. Tait McKenzie Lecture for 1954). In *Proceedings of the 1954 Convention of the American Association for Health, Physical Education, and Recreation,* pp. 53–68. Washington, D.C.

The problem of the cleft palate face. *Plast. Reconstr. Surg.* 14(5):370–75.

1955

The growth of bone: Some concepts of import to dental medicine. *J. Dent. Med.* 10(1):8–14.

Sherlock Holmes as an anthropologist. *Sci. Mon.* 80(3):155–62.

The human skeleton in forensic medicine. (Parts 1–2). *Postgrad. Med.* 17(2):A48–A62, 17(3):A34–A46.

Physical growth and development in relation to student success. *Bull. Natl. Assoc. Second. School Princ.* 39:449–56.

Child growth and football. *J. Health, Phys. Ed. Rec.* (Sept):12, 77–79.

The physical growth of the child. In *Successful Marriage,* rev. ed., eds. M. Fishbein and E. W. Burgess, pp. 281–98. New York: Doubleday.

1956

The integrity of optimum growth and development. *Merrill-Palmer Q.* 2:80–83.

Man, measurement, and machine. 20th Annual Meeting of the Industrial Hygiene Foundation of America, Pittsburgh, Pa., pp. 65–75.

The physical growth of children: An appraisal of studies 1950–1955. *Monogr. Soc. Res. Child Dev.* XX(1):1–91.

1957

With Viken Sassouni. *A Syllabus in Roentgenographic Cephalometry.* Philadelphia: College Offset Press.

The physical growth of the child. In *Modern Marriage and Family Living,* eds. M. Fishbein and R. J. R. Kennedy, pp. 417–26. New York: Oxford Univ. Press.

1958

Changing man. *J. Amer. Geriatr. Soc.* 6(2):242–60.

The meaningful interpretation of growth and growth data by the clinician. *Am. J. Orthod.* 44(6):411–32.

Problems in growth and development of interest to the dentist. In *Dental Clinics of North America,* ed. L. Burket, pp. 497–514. Philadelphia: Saunders.

Validation of the roentgenographic cephalometric technique. *Am. J. Orthod.* 44(12):933–39.

1959

Let's get our teeth into problems of growth. *J. Canad. Dent. Assoc.* 25(7):417–23.

Maturation age of 55 boys in the Little World Series, 1957. *Res. Q. Am. Assoc. Health, Phys. Educ. Rec.* 30(1):54–56.

The princes of the tower: A reappraisal. In *Leaves from the Copper Beeches,* pp 109–20. Philadelphia: Livingston Publishing Co.

1960

The relation of growth to the cleft palate problem. In *Dental Clinics of North America,* pp. 373–80. Philadelphia: Saunders.

Oral structures genetically and anthropologically considered. *Ann. N.Y. Acad. Sci.* 35(Part 1):17–41.

1961

The growth of the head and face studied craniometrically and cephalometrically, in normal and cleft palate children. *Congenital Anomalies of the Face and Associated Structures,* ed. S. Pruzansky, pp. 208–36. Springfield: Thomas.

Today's challenge to mankind. *N.Y. J. Dent.* 31(6):197–202.

A human biologist looks at the contemporary scene. *Child Dev.* 32:417–22.

1962

Geriatric research and prosthodontics. *J. Pros. Dent.* 12(3):493–515.

Physical growth as a factor in the behavioral development of the child. In *New Dimensions in Learning,* ed. W. B. Waetjen, pp. 8–23. Washington, D.C.: Publ. Assoc. Supervision Curric. Dev.

The Human Skeleton in Forensic Medicine. Springfield, Ill.: Thomas.

Man's posture: Where from? Where to? In *Clinical Orthopaedics,* ed. C. W. Goff, pp. 98–109. Philadephia: Lippincott.

A problem in the ageing of human remains. *J. For. Sci.* 7(3):255–64.

1963

Golden lives and golden opportunities. *Am. J. Orthod.* 49(8):598–604.

Growth of the body and growth of the head. One-hour recording, visual, sound, with 80 figures, under the auspices of the American Orthodontic Association, distributed by C. V. Mosby, St. Louis, Mo.

With P. Randall, and S. B. Jahina. Mandibular growth in Pierre Robins syndrome. In *Trans. Third Int. Conf. Plastic Surg.*, Series #66, pp. 294–99. Washington, D.C.

1964

With F. E. Johnston. Patterns of growth in children with Thalassemia major. In *Problems of Cooley's Anemia*, ed. Harold Fink, pp. 667–80.

With M. M. Album, D. Baker, and P. H. Colwell. An evaluation of the dental profile of neuromuscular deficit patients: A pilot study. *J. Dent. Child.* 31(3):204–28.

1965

Radiography in forensic medicine: The skeleton. In *The Science of Ionizing Radiation*, ed. L. E. Etter, pp. 632–54. Springfield, Ill.: Thomas.

1967

The role of genetic factors in the human face, jaws, and teeth: A review. *Eugen. Rev.* 59(3):165–92.

1968

Biological timing and the dento-facial complex. *J. Dent. Child.* 35:175–85, 328–41, 377–81.

With Donn Chung. The craniofacial skeleton at the age of one month. *Angle Orthodon.* 35(4):305–10.

1970

Bertram Shirley Kraus: A biographical sketch. *Am. J. Phys. Anthropol.* 33(1):1–8.

Growth of head, face, trunk and limbs in Philadelphia white and

negro children of elementary and high school ages. *Monogr. Soc. Res. Child Dev.* 35(3).

Physical anthropology and forensic medicine. In *Anthropology and the Behavioral and Health Sciences,* eds. O. von Mering and L. Kasdan, pp. 206–20. Pittsburgh: Univ. of Pittsburgh Press.

1971

William Walter Greulich. *Am. J. Phys. Anthropol.* 35(3):317–19.

With R. E. Moyers, eds. *Craniofacial Growth in Man.* London: Pregamon Press.

1972

Introduction to "use of computers in orthodontic analysis and diagnosis" *Am. J. Orthod.* 61(3):219–20.

Child Growth. Ann Arbor: Univ. of Michigan Press.

With E. R. McCown. The manual and oral strengths of American white and negro children, ages 3–6 years: Data relevant to the development of a safety closure. In *Proceedings of the 58th Mid-Winter Meeting, May 14–17, 1972, of the Chemical Specialties Manufacturing Assocation,* pp. 58–69.

1973

Man: Molder of destiny. *Bull. N.Y. Acad. Med.* 49(3):197–221.

Forty years of growth research and orthodontics. *Am. J. Orthod.* 63(4):357–65.

Craniofacial growth and development: An appraisal. *J. Am. Dent. Assoc.* 87(Special Issue):1037–43.

1974

Lancaster Cleft Palate Clinic joins the Pennsylvania State University. *Am. J. Orthod.* 66(6):675–78.

Cranial material. In *Discoveries in the Wadi ed-Daligeli,* ed. D. R. Hillers. Report of American Schools of Oriental Research, Cambridge, Mass.

1975

With M. Mazaheri, R. Harding, K. Ishiguro, G. Bariane, J. Meier, H. Canter, and P. Ross. A longitudinal study of the craniofacial growth

pattern in children with clefts as compared to normal, birth to six years. *Cleft Palate J.* 12:59–84.

With K. Hanada. A longitudinal study of post operative changes in the soft tissue profile in bilateral cleft lip and palate from birth to six years. *Am. J. Orthod.* 67(4):363–76.

With J. Meier, H. Canter, P. Ross, M. Mazaheri, and S. Mehta. Craniofacial serial dimensions related to age, sex, and cleft-type from six months of age to two years. *Growth* 39:195–208.

1976

With K. Ishiguro, M. Mazaheri, and R. L. Harding and consultation with J. Meier, H. Canter, and P. Ross. A longitudinal study of morphological craniofacial patterns via P-A x-ray headfilms in cleft patients from birth to six years of age. *Cleft Palate J.* 13(2):104–26.

Craniofacial growth and development: An appraisal. In *1974 Yearbook in Physical Anthropology*, Series 18, pp. 31–64.

Physical anthropology and the dental and medical specialties. *Am. J. Phys. Anthropol.* 45(3):531–38.

Fifty years of physical anthropology: The men, the material, the concepts, the methods. *Ann. Rev. Anthropol.* 5:1–14.

1977

With M. Mazaheri, R. L. Harding, R. T. Millard, and S. Mehta. Longitudinal analysis of growth of the soft palate and nasopharynx from six months to six years. *Cleft Palate J.* 14(1):52–62.

Redefining the assessment of physical growth. *Clin. Ped.* 16(9):763.

Editorial comment on "anterior fontanel bone." *Clin. Ped.* 16(9):796.

With B. G. Sarnat and Joel A. Feigenbaum. Adult monkey coronoid process after resection of trigeminal nerve motor root. *Am. J. Anat.* 150(1):129–38.

1978

The planned planting of Piltdown: Who? Why? In *Human Evolution*, eds. S. L. Washburn and E. R. McCown, pp. 239–54. Menlo Park, Calif.: Cummings Publishing Co.

With P. Starr and Herbert K. Cooper, Sr. *Cleft Palate J.* 15(4):412–14.

1979

Co-editor with H. K. Cooper, Sr., R. L. Harding, M. Mazaheri, and R. T. Millard. *Cleft Palate and Cleft Lip: The Team Approach in the Clinical Management and Rehabilitation of the Patient.* Philadelphia: Saunders Publishing Co.

Craniofacial growth: Prenatal and postnatal. In *Cleft Palate and Cleft Lip: The Team Approach in the Clinical Management and Rehabilitation of the Patient,* eds. H. K. Cooper et al., pp. 23–107. Philadelphia: Saunders Publishing Co.

The cleft palate team in action. In *Cleft Palate and Cleft Lip: The Team Approach in the Clinical Management and Rehabilitation of the Patient,* eds. H. K. Cooper et al., pp. 145–62. Philadelphia: Saunders Publishing Co.

With J. A. Riski. Appendix: The measurement of form and function. In *Cleft Palate and Cleft Lip: The Team Approach in the Clinical Management and Rehabilitation of the Patient,* eds. H. K. Cooper et al. Philadelphia: Saunders Publishing Co.

Maturation age of the growing child in relation to the timing of statural and facial growth in puberty. *Trans. Studies, Coll. Physicians, Phila.* 1(1):33–42.

Will "Mr. X" please come forward? *Del. Med. J.* 51:399–413.

1980

With M. Baer. Age at death of pharaohs of the new kingdom: Determined from x-ray films. In *An X-ray Atlas of the Royal Mummies,* eds. J. E. Harris and E. F. Wente, pp. 188–223. Chicago: Univ. of Chicago Press.

1981

Fay-Cooper Cole, 1881–1961. *Am. J. Phys. Anthropol.* 56(4):467–72.

1982

With R. B. Jain and R. E. Long, Jr. Sex differences in craniofacial growth from one month to 10 years in cleft lip and palate. *Cleft Palate J.* 19(1):62–71.

With R. B. Jain and S. W. Oka. Craniofacial growth in different cleft-types from one month to 10 years. *Cleft Palate J.* 19(3):206–11.

With R. E. Long, Jr. and R. B. Jain. Possible sex-discriminant vari-

ables in craniofacial growth in clefting. *Am. J. Orthod.* 82(5):392–402.

1983

With R. B. Jain. Cleft-type and sex differences in craniofacial growth in clefting from one month to 10 years. *Cleft Palate J.* 20(3):238–45.

With R. B. Jain. Craniofacial growth in clefting from one month to 10 years as studied in p-a headfilms. *Cleft Palate J.* 20(4):314–26.

1986

With M. Yasar Iscan. *The Human Skeleton in Forensic Medicine,* 2nd ed. Springfield, Ill.: Charles C. Thomas.