Giants In Orthopaedic Surgery

Giants In Orthopaedic Surgery: Sterling Bunnell MD

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Monumental innovations and discoveries often occur in far-off places. The advances of human history confirm this observation. Indeed, isolation from the

Note from the Editor-in-Chief: In “Giants In Orthopaedic Surgery,” a columnist explores the life and achievements of an orthopaedic surgeon who changed our profession, by interviewing other surgeons whose lives the “Giant” touched through mentorship or collaboration, or by using other historical sources that provide similar insight. We welcome reader feedback on all of our columns and articles; please send your comments to eic@clinOrthop.org.

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epicenters of orthodoxy may be a prerequisite for originality. Albert Einstein redefined time and space while working in a Swiss patent office rather than at a university in Berlin, London, or Paris. Benjamin Franklin, a printer, clarified the nature of electricity, and invented the lightning rod in the wilds of early Philadelphia, an ocean away from the intellectual centers of Europe.

Medical history echoes this pattern. Ronald Ross, a physician in remote colonial India, solved the puzzle of malarial transmission when he discovered the causative parasite in the gastrointestinal tract of an *Anopheles* mosquito [7].

Some of the most remarkable developments in orthopaedic surgery might never have occurred had their young innovators been encumbered by the oversight of naysayers from the great institutions of their time. John Charnley needed distance from London to develop total hip replacement, especially after many of his first 350 cases failed because he selected the wrong material (Teflon) for the low-friction acetabular component [10]. Gabriel Ilizarov, working at a veterans' clinic in distant Siberia, became the object of derision by Moscow's orthopaedic elites when he claimed

that controlled distraction could form new osseous tissue in the widening gap of an osteotomy site [11].

California in the first half of the 20th century was far from the orbit of orthopaedic power and authority that revolved around Boston and New York. Sterling Bunnell was as Californian as one could get. His father was a Gold Rush pioneer. His cousin, among the first white men to enter the Yosemite Valley, proved instrumental in naming the glacial basin for its native inhabitants rather than the expedition's leader [6].

Born in San Francisco on June 18, 1882, (Asa) Sterling Bunnell received his undergraduate degree from The University of California, Berkeley in 1904, and was awarded his MD degree by the University of California, San Francisco School of Medicine in 1908. He opened an office to practice medicine and surgery in San Francisco without any significant additional specialty training. That facility, now called The San Francisco Shoulder, Elbow & Hand Clinic, continues to carry on the tradition of excellence Bunnell started more than a century ago.

Between medical school graduation and America's entry into World War I, Bunnell became interested in tendon

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repair surgery. He overcame his isolation from the nation's academic centers of gravity by submitting a paper on the subject to America's most prestigious surgical journal of the era: *Surgery, Gynecology & Obstetrics*. The editors requested revision. After resubmission, the paper was once again rejected.

Finally, after 18 resubmissions, the Californian's persistence paid off. The oft-cited manuscript [4] was finally published in 1918. By that time, Bunnell, like so many of his countrymen, had gone off to fight in The Great War. Bunnell served as the Chief of Surgical Services at an Army base hospital in Beaune, France during the winter of 1918 [6]. There, he witnessed firsthand the needlessly high amputation rate for upper limb injuries, and resolved to do something about it. Upon returning to civilian life, Bunnell turned his attention to restoration of function for injured hands, even as he worked towards developing new strategies for dealing with congenital and developmental hand disorders [6].

Meanwhile, his recreational endeavors focused on hunting, fishing, and flying his newly acquired Curtis-Wright biplane. Tragedy struck Bunnell when he fractured his hip (and a friend, who was a passenger, died) after crash-landing his plane in Yosemite Valley, located in the northern mountains of California. As a

result, Bunnell had a femoral neck nonunion — unsuccessfully treated by Marius Smith-Petersen using his new-fangled Triflange Nail — that plagued him for the rest of his life [6]. Perhaps that injury led to Bunnell's preference for performing surgery in the seated position.

Between the end of World War I and American involvement in World War II, Bunnell applied his inquisitive mind, incisive scalpel, and inexhaustible pen to numerous then-unsolved problems in hand surgery. He published articles on tendon repair and transfer, nerve grafting, arthroplasty and capsulectomy, club hand, and pollicization [12]. Despite this prolific publication streak, Bunnell never affiliated with an academic institution.

Although he is often considered the founding father of hand surgery [13] (Fig. 1), developments in the field date back to ancient Egypt and Mesopotamia. Improvements in the care of hand disorders — lancing abscesses, stabilizing fractures, ligating bleeders, aseptic surgery — mirrored advancements in medicine and surgery throughout history. Unlike Californians Hewlett and Packard, or Jobs and Wozniak, Bunnell's true innovations were biological, rather than technological; he created, starting with himself, a new species on this planet: *Homo Chirurgimanus* (The Hand Surgeon).

This creature, as unique and well-suited to its environment as the leaf-cutter ant or African weaver bird, sets itself apart from other members of the biota by its behavioral characteristics. *H. Chirurgimanus* is a being who works with the delicacy of a Monarch butterfly at a flower's nectary, the patience of a Madagascar bark spider spinning a web, and the industry of a Stickleback fish fashioning its nest. Yet, like a baboon, *H. Chirurgimanus* spends a substantial portion of its time seated on its haunches.

Fig. 1 Bunnell is often considered the founding father of hand surgery. Reprinted with Permission from the American Society for Surgery of the Hand.

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Bunnell, who had a lifelong interest in the evolution of the cephalad appendicular skeleton, [2] would be the first to acknowledge that the well-known characteristics that define hand surgeons do not emanate from their DNA; they can be tall or short, light or dark, male or female or indeterminate, and still possess all the distinctiveness of the species. This occurs because *H. Chirurghimani* are made, not born. In fact, Bunnell traveled from one Army hand center to another, creating the breed's uniqueness by establishing a total of nine hand centers [3] during World War II.

Here's how it happened.

During the decades between World War I and II, Bunnell spent time hunting and fishing with Dr. Norman Kirk, a friend and Chief of Surgery of the U. S. Army's Letterman General Hospital at the Presidio in San Francisco [6]. A Maryland native, Kirk enjoyed a distinguished career as a military surgeon, increasingly focusing his attention on orthopaedic problems. He soon became the first Army surgeon certified by the American Board of Orthopaedic Surgery. Kirk's book on amputations became the subject's standard text. By 1941, Kirk, now a General officer, was Chief of Surgery at Walter Reed National Military Medical Center in Washington D.C. He soon established a major

rehabilitation center for wounded soldiers in Battle Creek, Michigan [6].

America's entry into World War II coincided with the end of duty for Army Surgeon General James McGee, so it fell to President Franklin D. Roosevelt to appoint McGee's replacement. Roosevelt, who acquired paralytic poliomyelitis in adulthood, was more familiar than most of his predecessors or successors with the specialty of orthopaedic surgery and rehabilitation. He appointed Kirk to the post of Army Surgeon General. Kirk was the first, and to this day, only, orthopaedic surgeon so ordained. He, in turn, asked his friend and colleague, Sterling Bunnell, by then 62 years old, to establish a series of centers for surgery and rehabilitation of the hand (Fig. 2). Bunnell shut down his San Francisco practice for 2 years and applied himself to the task. Simultaneously, he completed his enduring opus magnum: *Surgery of the Hand* [5].

Between 1944 and 1947, Bunnell traveled the country by railroad and private plane, training the young surgeons who staffed the hand centers. Their names are enshrined in the evolution of the species *Homo Chirurghimanus*. In Mendelian genetic parlance, this F1 lineage included Littler, Fowler, Phalen, Barsky, and Pratt [8].

In 1946, Joseph H. Boyes, building upon an idea from his mentor Bunnell, formed The American Society for Surgery of the Hand (ASSH) at a hand surgeons meeting in Chicago [1]. The original ASSH consisted of 35 founding members, many of whom worked for the Army hospital hand centers previously developed by Bunnell [1]. The descendants of the ASSH founders, the F2s, are now the senior surgeons in the field [13].

Since the creation of a true *H. Chirurghimanus* occurs during fellowship training, preliminary surgical education can occur in a variety of fields. Typically, orthopaedic surgeons can choose to convert themselves into hand surgeons if they possess the potential and mindset to do so. Sterling Bunnell would have it no other way. He was the first to recognize that the extensive knowledge and skill set needed to treat a complex anatomically localized part of the human body would require a unique species of medical doctor.

The Modern Theory of Evolution incorporates Punctuated Equilibrium, a hypothesis which holds that genera and species remain relatively stable until a cataclysmic ecological episode causes major changes in the biosphere [9]. Additionally, the progenitor of a new species was often geographically isolated from the parent stock prior to the

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Fig. 2 Between 1944 and 1947, Bunnell traveled the country training young surgeons and establishing a series of hand centers for surgery and rehabilitation. Reprinted with permission from the American Society for Surgery of the Hand.

event. World War II clearly constitutes such a cataclysm; the evolution of *Homo Chirurgimanus*, with Sterling Bunnell as the phenotypical prototype, confirms this concept.

However, it was hardly the first time in human evolution that war has caused major changes in our species. It was during World War I that the precedent organism of *H. Chirurgimanus* —appropriately called *Homo Ostorthopus* (Bone Straightening Man) — first emerged under nearly identical circumstances, with Sir Robert Jones of Manchester as the prototype.

But that is another giant for another day.

References

1. American Society for Surgery of the Hand. History of ASSH quick facts. Available at: <http://www.assh.org/media/Pages/HistoryofASSHQuickFacts.aspx>. Accessed: Sept. 16, 2013.
2. Bunnell S. Aeronautics of Bird Flight. *The Condor*. 1930;32:269–287.
3. Bunnell S. Preface. In: Bunnell S, ed. *Surgery in World War II. Hand Surgery*. Washington D.C.: Office of the Surgeon General, Department of the Army; 1955:1–447.
4. Bunnell S. Repair of tendons in the fingers and description of two new instruments. *Surg Gyn Obstet*. 1918;26:103–110.
5. Bunnell S. *Surgery of the Hand*. Philadelphia, PA: JB. Lippincott; 1944.
6. Carter P. The embryogenesis of hand surgery: A story of three great americans—A politician, a general, and a duck hunter. *J Hand Surg*. 2003;28A:185–197.
7. Centers for Disease Control and Prevention. Ross and the discovery that mosquitoes transmit malaria parasites. Available at: <http://www.cdc.gov/malaria/about/history/ross.html>. Accessed: Sept. 16, 2013.

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8. Doyle JR. Learning from armed conflicts. *Tech Hand Up Extrem Surg.* 2007;11:129.
9. Gould SJ. (1989) *Wonderful Life: The Burgess Shale and the Nature of History.* New York, NY: W. W. Norton and Company; 1990:1–352.
10. Green S. The evolution of medical technology; lessons from the burgess shale. *Clin Orthop Rel Res.* 2001; 385:260–268.
11. Green S. Ilizarov's orthopaedic methods. *AORN J.* 1989;49:215–220.
12. Newmeyer WI. Sterling Bunnell, MD: The founding father. *J Hand Surg.* 2003;28A:161–164.
13. Rayan G. Raymond Curtis: The prototypical hand surgeon. *J Hand Surg.* 2003;28A:555–560.