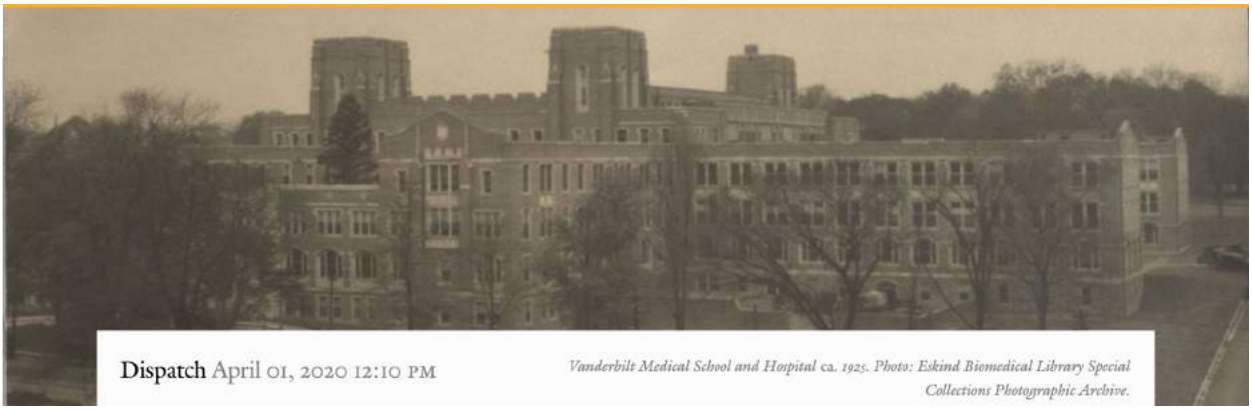
The New Criterion



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Vanderbilt Medical School and Hospital ca. 1925. Photo: Eskind Biomedical Library Special Collections Photographic Archive.

Chickens and eggs

by Timothy Jacobson

On the "Edison of Medicine" and his contribution to the study of vaccines.

In a recent column for *The Wall Street Journal*, Peggy Noonan noted another drawn-for-the-occasion adaptation of the famous photograph of marines raising Old Glory atop Mount Surabachi at Iwo Jima in March 1945. Giving credit where credit is due, the cartoonist Mike Luckovich depicts a doctor, a scientist, a nurse, and a first responder hoisting the flag. Noonan judged it "hokey and beautiful and true." No argument here. The particular cast of characters appears correctly mixed. I suggest one refinement. For the scientist: a dead southern white man.

In the fight against the COVID-19 pestilence, which calls to mind public-health crises of ages past, a little humility toward history would not be out of order. Our culture's infatuation with modern medicine may be touching, but like romance generally it disappoints as much as it excites. There was a time, roughly from the early 1900s through the 1930s, when this truth was more readily acknowledged than now. At that time, the marriage of inductive science and clinical medicine was still young and richer with promise than product. One of the doctors who understood this best, and who is my candidate for the dead white

man with a hand on the flagstaff, was one of the twentieth century's great pathologists: Ernest W. Goodpasture.

Chances are that, when today's white-coat heroes come up with a COVID-19 vaccine, they will have employed techniques evolved from the one that Goodpasture, then a professor of pathology at Vanderbilt, hit upon in 1931 as a cheap and easy means for cultivating in the laboratory uncontaminated viruses that could be used in the manufacture of vaccines. Goodpasture was a 1912 graduate of the Johns Hopkins Medical School, with its legendary faculty of physician-scientists: William Osler, William Welch, William Halsted, Howard

Goodpasture (top right) and William Welch (bottom, second from left) at Johns Hopkins Medical School ca. *1912.*

Kelley, Francis Mall, and others. Their students became the missionaries of modern medical education, fanning out from Baltimore to other schools across America to make or remake them in the Hopkins image. None was a closer replica than Vanderbilt.

Goodpasture began working with viruses in the 1920s, particularly fowl pox, one of the family of "pox" diseases well known to farmers like his grandfather, with whom Goodpasture spent his boyhood summers in Montgomery County, Tennessee. They called it "sorehead" after the eruptions it caused around a bird's neck and head. Easier to work with (in those pre–electron microscope days) than other viruses and non-contagious to humans, fowl pox was where Goodpasture started. Besides, chickens as experimental animals were cheap. It was the egg, however, not the chicken, that soon became his subject and made him famous.

Goodpasture suspected that the chicken egg—an abundant and self-contained package of living matter—could be used as a host for uncontaminated viral growth. His tools and procedure were not complicated. He cut a small window in the shell of an egg, inoculated fowl pox virus onto the exposed chorioallantoic membrane, covered the hole with a glass coverslip, sealed it with paraffin, placed the egg in a small commercial incubator, and settled in to wait. In a few days, he had the hoped-for result: the embryo manifested a blotchy appearance and other symptoms of the disease, clear signs that the virus was multiplying rapidly. Though at first his discovery aroused faint comment, rather like the ho-hum response just a few years earlier to Alexander Fleming's green mold that secreted a microbe-killing juice called penicillin, Goodpasture persisted to find out what other viruses might also grow in the egg and how they could be harvested, preserved, and transmitted across several generations. Smallpox, it turned out, worked nicely, a single egg producing enough untainted viral material to vaccinate a thousand children. Herpes simplex, which produces cold sores and fever blisters, thrived on the egg. Other researchers followed Goodpasture's lead, using the same technique to create vaccine-ready cultures of yellow fever, typhus, Rocky Mountain

spotted fever, influenza, and equine sleeping sickness, an exceptionally nasty item that in humans killed seventy percent of those stricken.

Goodpasture with the egg ca*. 1950. Photo: Eskind Biomedical Library Special Collections Photographic Archive.*

Goodpasture's technical innovation found far-flung practical application by the 1940s. Widely told and heard, his story took on an almost newsreel quality, depicting the triumphant march of science in service to mankind. Thousands of GIs in World War II and Korea survived in hostile climes without a single case of typhus or yellow fever. Whole nations in Europe, Africa, and South America could be

vaccinated against smallpox, so cheap had the vaccine become. Influenza epidemics that had been the scourge of World War I and its aftermath were a small threat during World War II. The narrative of miraculous medicine, while correct in its general outlines and most of its particulars, still had some holes, however, as Goodpasture well knew. Mumps cultures did not grow in the egg (though Goodpasture figured that one out too—using monkeys, not eggs). The great crippler polio remained invincible until 1955. COVID-19 remains a challenge today.

By his own judgment, Goodpasture used the egg to two ends. The first was purely therapeutic: to further the development of cheaper vaccines, the achievement for which he was lionized as the "Edison of Medicine" and "America's Pasteur." The second was more purely scientific: to advance medicine's understanding of the biological nature of these intracellular parasites, the viruses. This proves a long road still. Except for the Nobel, which many said should rightly have been his, the medical community showered this doctor who never saw patients with all its honors. This was before the age of celebrity, and none of the attention went to his head. If he hadn't stumbled upon the enormous utility of the egg, others, he knew, soon enough would have, such coincidence being typical of scientific discovery.

Today, something around half a billion eggs are used every year in the production of immunizations worldwide. The technology is sophisticated, and the eggs are not the eggs you buy at the grocery store. We have come a considerable distance from Goodpasture's quaint world of glass coverslips, pipettes, and paraffin. Yet the egg culture remains a pivotal discovery. Though other methods are also being employed, research into a vaccine for COVID-19 remains heavily egg-based. When the scientists find it—which they probably will, whether with an egg or without it—the dead white man from Tennessee who died in 1960 will doubly deserve his place at the mountaintop.

Timothy Jacobson writes from the Shenandoah Valley in Virginia.

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