Donald Hopkins, MD ’66, hunts down his worst enemy in remote African villages

by Katie Scarlett Brandt

If Donald Hopkins has his way, Henrietta will be the last of her kind.

Hopkins, MD ’66, preserves the dead Guinea worm in a jar on his desk—a symbol of his pledge to eradicate this sub-Saharan scourge.

A pale parasite resembling a strand of spaghetti left soaking too long in a pot of water, the Guinea worm causes dracunculiasis—roughly translated, “afflicted with little dragons.” The Latin derivative is an apt description of the pain patients suffer as the Guinea worm weaves its way through its hosts.

In the remote African villages that are the front line in the fight against the Guinea worm, some still attribute the disease to evil spirits, others to a curse imposed on victims as punishment for some horrible wrongdoing.

To Hopkins, it’s a pest to be purged from the planet. And that’s something with which Hopkins has personal experience.

While working for the U.S. Centers for Disease Control and Prevention in the 1960s and ’70s, Hopkins became a key figure in ridding the world of smallpox. He’s well on his way to seeing the same success with the Guinea worm. Worldwide, about 3.5 million cases of dracunculiasis were estimated in 1986; it’s estimated that fewer than 20,000 cases exist now, most concentrated in sub-Saharan Africa. The disease has so far been eliminated from 11 of the 20 countries affected in 1986.

“The smallpox eradication program proved for the first time that a disease of humans could be completely eradicated,” Hopkins said. “It also showed how individual and national efforts were inadequate.”
Smallpox could only be eradicated when the entire world resolved to join together to do so."

Working from Chicago, Hopkins helps lead the worldwide campaign to eradicate Guinea worm and other diseases. A former deputy director and acting director of the CDC, he now serves as vice president for health programs at the Atlanta-based Carter Center, founded by former President Jimmy Carter and wife Rosalynn, and chairs the International Task Force for Disease Eradication.

He is determined to make dracunculiasis the first disease to be conquered without a vaccine or medicine—and to see that Henrietta becomes the last Guinea worm on the face of the earth.

**An ancient parasite**

Guinea worms are an age-old enemy. So old, in fact, that scientists have found them in Egyptian mummy remains. Some people consider them the “fiery serpent” in the Old Testament, the same that tortured Israelites in the desert. As larvae, they are ingested by water fleas, or copepods, which people in many poor African and Southeast Asian villages then ingest from unfiltered drinking water gathered from stagnant ponds and dams. Abdominal acids kill the water fleas, but the worm larvae survive. They live unnoticed in people’s bodies, likely feeding off their nutrients, for about a year. They penetrate the stomach and intestines, incubate and mate; the males die and the females continue to grow—sometimes up to a yard long—into what Hopkins refers to as “essentially a huge uterus packed with larvae.”

When the female worm prepares to evacuate, she typically winds through the victim’s body to the lower extremities. Somewhere on the legs, a painful blister forms, out of which the worm eventually will work its way. Worms also have exited through people’s arms, nipples, eye sockets or any other part of the body. And though they themselves aren’t deadly, the open wounds created by the worms become prime entryways for secondary bacterial infections and viruses.
As Hopkins can attest, pulling a single worm from a person’s body can take weeks, sometimes even months. The patient usually writhes in pain as a local health worker or village volunteer winds the worm around a small stick slowly out of the blistered opening. Children tend to scream and cry; older men often try not to, but they turn their perspiring faces away, twisted in agony. This old practice of removing worms is thought to be depicted in the symbol of medicine—the snake-entwined staff of Asclepius.

To eradicate Guinea worm, Hopkins uses some of the same techniques he employed in fighting smallpox. During the latter’s heyday, only 2 to 3 percent of a country’s population had the disease at any given time. Initially, Hopkins and his colleagues thought it best to attack by vaccinating at least 80 percent of the population. As they progressed, however, their strategy evolved. Instead of vaccinating whole populations, they located those infected and worked outward from them in circles, vaccinating those closest—live-in family members and neighbors—first. That technique eventually wiped out the disease.

**A lifelong pursuit**

Hopkins’ relentless determination was shaped early. Born seventh of 10 children in Coconut Grove, Fla., his earliest memories are of his desire to become a doctor. Hopkins was the only sibling to earn an MD. One of his sisters is a nurse, and his older brother, born third, also wanted to be a doctor. However, their parents couldn’t afford to put three kids through college at the time and asked their son if he could put off his education for a year. Hopkins’ brother couldn’t stand to wait and instead ended up “making a career out of the Air Force.”

While his brother battled one type of enemy, Hopkins fought a different kind. A trip abroad during his undergraduate days at Atlanta’s Morehouse College piqued his interest in tropical and infectious diseases. He spent a year studying in Vienna, and during a break had traveled to Egypt with friends. There, adults and small children with flies buzzing around their eyes caught his attention. He didn’t know at the time, but these people had trachoma—the world’s leading cause of preventable blindness—and the flies were helping spread the disease.
It would be years—after medical school and marriage—before another infectious animal would change Hopkins' life. After Morehouse, he was accepted by the University of Chicago Medical School. Several of his Morehouse professors were Chicago grads, but it was a letter from then-Dean Joseph Ceithaml, PhD ’41, that motivated Hopkins to move north. Ceithaml was so intent on Hopkins joining the student body that he’d already sent his particulars to scholarship funds—and he let Hopkins know it.

Hopkins earned his MD from Chicago, where microbiology professor Robert M. Lewent encouraged his interest in parasitology, then a master’s in public health from the Harvard School of Public Health. For the next 20 years, he worked for the CDC.

Now, Hopkins is back in Chicago, in a deep, two-story house on a quiet, tree-lined street not far from Lincoln Park Zoo. He met his wife, Ernestine Mathis, at the university. She was working in the medical center as an electron microscopist when he was a med student. Ironically, poor eyesight almost caused her to pass him by; she had ignored him in a hallway not long after they’d met, but only because she didn’t recognize him without her glasses. They married in ‘67.

Hopkins works primarily from a second floor office in their home. He has fastened about a half dozen painted, wooden woodpeckers to the wall behind his desk. The variety among the species fascinates him, and he picked up the first of these wooden ones at an antique shop when his sisters visited Chicago years ago. To visitors, they signify that Hopkins isn’t the only worm hunter in the room.

Hopkins makes two trips a month to Atlanta and four a year to Africa in order to find his worms. In 1980, the CDC began the global Guinea worm eradication campaign. United Nations agencies eventually jumped on board; the Bill & Melinda Gates Foundation and others followed later. In 1986, Carter urged his center to take on the cause, spurred by a Hopkins speech he attended, as well as advice from other advisors.

A core change

“We can’t change the worms,” Hopkins said plainly. And since there’s no effective agent or vaccine, he’s attempting to change people’s behavior instead. Hopkins’ team—which includes government employees, nongovernmental organizations, local political leadership and village volunteers—takes a grassroots approach, going directly to the people in remote African villages from Ghana to Sudan.

Jimmy Carter played a key role early on. At a lunch with Edgar Bronfman, the Seagram’s liquor heir, he demonstrated with a napkin the technique of filtering copepods out of water. Bronfman used his major stake in the DuPont chemical company to have DuPont scientists develop a tough, fine mesh now used to filter water. In the villages where people used this filter to purify their drinking water, the worm began to disappear.

However, filtering isn’t the only tool. Hopkins’ team empowers the villagers in other ways too. In Uganda, they taught elderly men to act as pond caretakers, protecting the water from worm contamination by keeping infected people from using the ponds as a pain reliever as the worms exit their bodies. Victims know that the water will ease their pain, but “that’s exactly what the worm wants,” Hopkins said, because the water immersion causes the blister to burst and thousands of larvae can escape to the water.

Because villagers often believe in curses and myths, not everyone was quick to jump on Hopkins’ bandwagon. Typically, though, some would begin to filter their water. Those who didn’t often changed their minds a year later when only they had to cope with worms.

“That’s one of the lasting things of this effort,” Hopkins said, “It’s empowering.”

In Ghana, he said, thousands of Red Cross women have joined as volunteers in this project. In Benin, women’s clubs have helped monitor water and educate villagers. Thanks to Hopkins’ team, school attendance is up, and crop production has increased in many areas.

“The potential for disease eradication to permanently improve quality of life worldwide is tremendous,” he said. “By working to eradicate these diseases, we are helping millions of poverty stricken people see how they can make improvements in their own lives. Families and communities can fulfill their potential, and people regain their faith that government and public services can change things for the better.”

Although the nay-sayers insist that a parasite like the Guinea worm can never be completely eliminated, Hopkins insists he’s heard that before.

“People said that smallpox could never be eradicated,” he recalled in his Chicago office, backed by his own army of worm hunters—and Henrietta on his desk as a reminder.