

**E**arly this year, Eritrea severed a scientific lifeline almost as old as the African nation itself. The Eritrean National Health Laboratory in Asmara cut long-standing ties with Washington University School of Medicine in St Louis, Missouri, potentially setting back many gains that the country had made in public health. “St Louis supplied everything: American doctors, expertise, chemicals, materials,” says Assefaw Ghebrekidan, an Eritrean ex-freedom fighter who now heads the public-health programme at Touro University in Mare Island, California. “And now it’s all over.”

Eritrea, an impoverished country of 3 million people on the Horn of Africa (see ‘A troubled corner’), is not known for its science. It ranks 177th out of 187 countries on the United Nations Human Development Index. It comes in last in terms of press freedom and is the eighth most militarized country in the world. The World Health Organization estimated that there were just 5 medical doctors per 100,000 people in the country in 2004.

But against this depressing backdrop, the country’s medical-research partnerships have been a source of promise and pride. Eritrea built its first medical school in 2003, aided by scientists from the Central University of Las Villas in Santa Clara, Cuba. After US universities helped to establish postgraduate training and research programmes in paediatrics, surgery, and obstetrics and gynaecology at the institution, Eritrean medical scientists published their first papers in international, peer-reviewed journals. Public health has benefited. In 1991, Eritrea was cursed with the highest maternal mortality rate in the world — 14 deaths per 1,000 births. In 2010, it was on track to meet the Millennium Development Goal of cutting that rate by 75% by 2015.

But progress in Eritrean science has now gone into reverse, say a number of scientists and doctors in exile. In response to mounting criticism from the United Nations and the United States over the country’s human-rights record, Eritrean President Isaias Afwerki is severing partnerships with all US universities, says Ghebrekidan. “Everything that Eritrea has worked so hard to achieve is at stake.”

Jon Abbink, an anthropologist at the Free University of Amsterdam, says that these actions will have widespread negative effects, “in the education system, in the constant ‘brain drain’ of educated people to greener and freer pastures, and in the inhibition of international scientific cooperation”. Eritrea, he says, is one of the few remaining countries in Africa that have failed to embrace scientific freedom. “It’s out of sync with global trends,” says Abbink.

Eritrea was once a colony of Italy, but the United Nations handed it over to Ethiopia after the Second World War. In 1961, Eritrea started to fight for its independence in a war that would last three decades: the United States



ANGESOM TEKLEHAIMANOT BOKRU



High-quality pharmaceuticals and intravenous fluids were prepared and surgeries performed in Eritrea’s ‘longest hospital in the world’ during the country’s fight for independence.

# ERITREA’S SHATTERED SCIENCE

BY SHANTA BARLEY

*An impoverished African nation was making promising strides in medicine — before the government clamped down on its foreign partnerships.*

supplied Ethiopia with guns and money, but the rebels, led by Afwerki and the Eritrean People’s Liberation Front (EPLF), persevered.

The liberation movement had remarkable credentials. “It was led by 29 doctors of medicine,” says Ghebrekidan, who was head of the EPLF’s medical services. “No other rebel movement has ever had so many intellectuals.” Even Afwerki had abandoned a degree in engineering to lead the fight.

Another academic, Melles Seyoum, was working as a pharmacist at an Ethiopian hospital when the war broke out. He coolly stole US\$140,000 worth of antibiotics, microscopes, surgical blades and stethoscopes and delivered them to Eritrean freedom fighters, wrote journalist Michela Wrong in her book *I Didn’t Do It For You* (HarperCollins, 2005). Seyoum became an integral member of the EPLF, teaching soldiers how to test blood and

prepare Petri dishes in a hospital 5 kilometres long and dug into the side of a rocky valley — a clinic known as ‘the longest hospital in the world’. After a visit in 1987, a British doctor wrote<sup>1</sup> about the impressive standards of care at the hospital: a 1-tonne machine manufactured antibiotics every day; a doctor performed facial reconstructions; and amputees played basketball.

## POWER STRUGGLE

In 1993, after the war ended and Eritrea gained independence, Afwerki was elected president by a national assembly largely composed of former members of his rebel army. He promised that within four years, Eritrea would have parliamentary and presidential elections, press laws and a new constitution. Seyoum enthusiastically backed Afwerki and was, in return, appointed director of the prestigious National Health Laboratory, which performed most of the country’s clinical testing and worked on developing treatments for disease.

But following a failed assassination attempt in 1996, the president postponed elections indefinitely and refused to implement the constitution that had been drafted. In 1998, he invaded Ethiopia, triggering a humiliating two-year war that caused the deaths of more than 60,000 Eritreans and a temporary loss of one-quarter of Eritrean territory. Afwerki’s popularity plummeted, and many of the academics who had helped to rebuild the country moved abroad.

On 3 October 2000, some of them decided to use their friendship with Afwerki to persuade him to hold elections or step down. From a conference hotel in Berlin, Ghebrekidan and 12 other scientists and professionals, many of whom had been involved in drafting the constitution, composed a letter to the president.

“Much of the world community, including our fellow Africans, perceive the Eritrean government and its leadership as aggressive and irresponsible,” wrote the group, urging Afwerki to implement the constitution, hold democratic elections and set free the growing number of people his regime had jailed. “We urge you most sincerely to seize this moment of crisis and turn it into an opportunity to reclaim your hard-earned reputation as a leader.” Four days later, after it had reached Afwerki, the letter was leaked to the press, igniting Eritrea’s first-ever public debate about leadership.

To its members’ surprise, the group — which became known as the G-13 — was invited to Eritrea for discussions with Afwerki. One member, Mohammed Kheir, later wrote that he was nervous that it might be a trap. But they accepted the invitation and flew to Eritrea. After waiting for several days, the president agreed to see them. Soldiers escorted the academics to his office, where Afwerki berated them for leaking the letter to the media — something that they denied — and cast them as traitors. The group was escorted back to the

airport. Since then, no members have returned to Eritrea; most now hold prestigious positions at US universities. “It is very fortunate that we escaped,” says Haile Debas, now head of the University of California Global Health Institute in San Francisco.

Although the plea failed to sway the president, it encouraged others to criticize him openly for the first time. In July 2001, Semere Kesete, leader of the student union at the University of Asmara — Eritrea’s only institute of higher learning — criticized the government for reducing academic freedom. He was arrested and thrown into solitary confinement, causing riots at the university. When the government demanded that the students do extra national service — on top of the 18 months required of all men and women — they didn’t turn up. In retaliation, the government bussed all of the students to the Danakil Depression in southern Eritrea, one of the hottest places on Earth, to build roads. Two students died from the heat.

## CRACKDOWN

A month later, Afwerki launched his biggest crackdown yet. He shut down all private media, threw 10 journalists in jail and imprisoned 11 politicians who had demanded elections — many of whom were old comrades in arms. He also began to dismantle the University of Asmara.

“What could be the justification for killing the only university we had capable of producing students that could be accepted by universities abroad?” asks an Eritrean scientist who lives out of the country and wishes to remain anonymous because of concerns about the safety of family members still in Eritrea. “The aim was simply to prevent the students from all being in one place, where they had the power to rise up,” says Debas. In place of the university, the government built a number of small colleges, arguing that these would be more accessible to students.

Even as Eritrea lost its only university, it continued to make progress in medicine. In 1997, the country had gained a proactive health minister, Saleh Meki, who helped to develop

crucial partnerships with US universities including George Washington University in Washington DC; Washington University in St Louis; Columbia University in New York City; Stony Brook University in New York; and the University of California, Berkeley. By bringing experts into Eritrea, these partnerships helped the country to pass scientific and public-health milestones. A polio-immunization campaign extended coverage to 95% of all one-year-olds and eradicated the disease. An anti-malaria drive from 2000 to 2004 reduced morbidity and case fatality by 84% and 40%, respectively.

In 2003, Haile Mezgebe, then a surgeon at George Washington University, was part of the group of medics who helped to set up the Orotta School of Medicine in Eritrea. Mezgebe moved to the country to run the collaboration; he was joined by Mary Polan, who travelled regularly from the department of obstetrics and gynaecology at Columbia University, and other US doctors and surgeons who worked to treat and train Eritreans. In 2009, Orotta graduated its first class of 39 doctors. “It was quite extraordinary,” says Jack Ladenson, a doctor based at Washington University. “Suddenly, in one day, there was a 30% increase in the number of doctors in Eritrea.”

## SUCCESS STORY

Meanwhile, clinical testing and research was taking off at the National Health Laboratory. In 1998, the only blood tests available in Eritrea had been done on a single machine. Scientists from Washington University installed new equipment at the lab and trained technicians to perform a range of chemical tests, including the haemoglobin A<sub>1c</sub> test for diabetes and a test for thyroid malfunction. They also launched a national diabetes-management programme and a long-term research project to gauge its progress; in 2007, the project leaders found<sup>2</sup> that the programme had significantly improved Eritrean diabetes management. Ladenson, Seyoum and others co-authored a paper<sup>3</sup> showing that the overall quality of chemical tests for disease at the national lab was on a par with that at Washington University. “A simple but sustainable national laboratory system has been established in the developing nation of Eritrea,” the paper said.

But outside the medical arena, the situation was less rosy. Richard Reid, a historian at the School of Oriental and African Studies in London, visited the Eritrea Institute of Technology in Mai Nefhi, one of the unaccredited colleges set up after the University of Asmara was shut down. He was told that students who cheated on exams or skipped classes were jailed on site. Military training was mandatory between 4 and 7 a.m., and students wryly referred to digging trenches as ‘digology’, adds Reid.

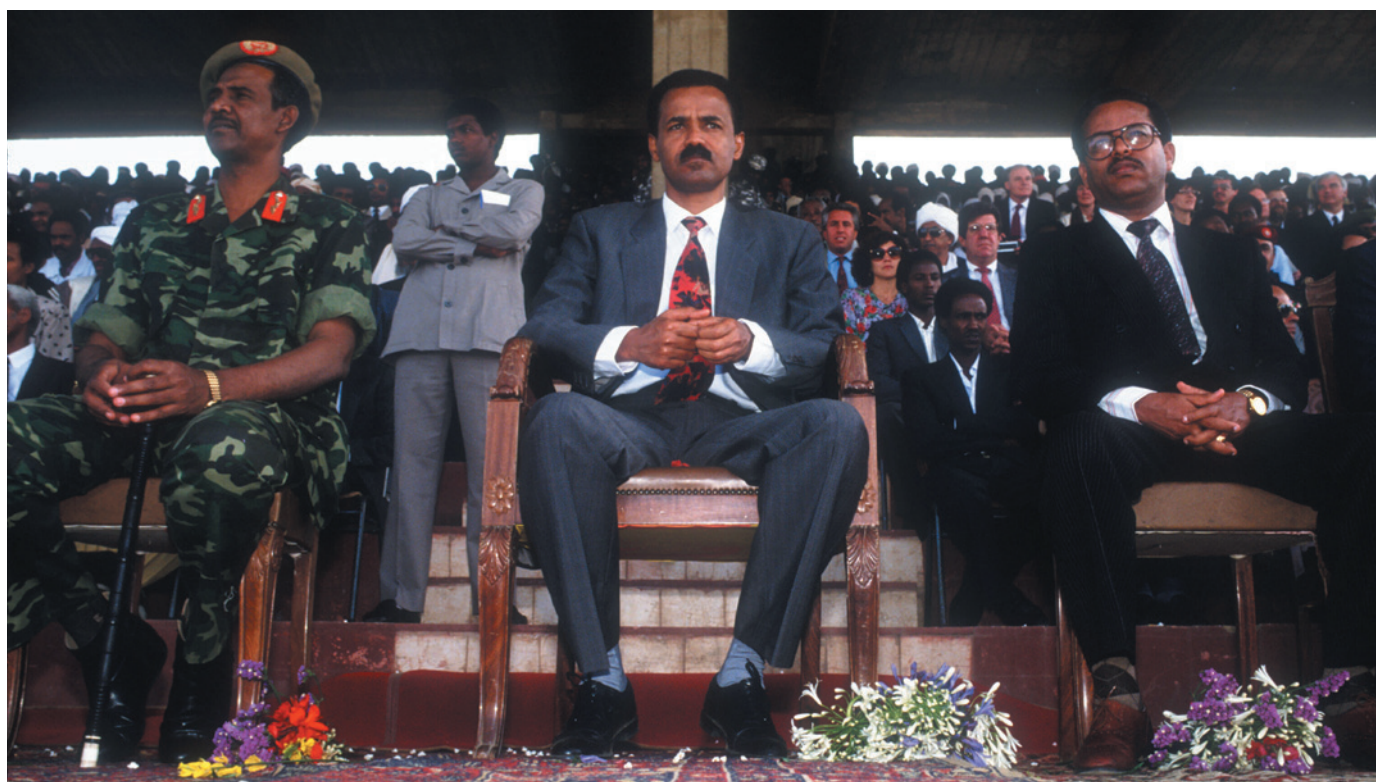
And any success in science and medicine was short lived. In 2008, without explanation, Meki was removed as health minister, along with the coordinator for US–Eritrean scientific

## A TROUBLED CORNER

Eritrea won independence from Ethiopia in 1993 after 30 years of war.







S. PETERSON/LIAISON/GETTY

Isaias Afwerki (centre) in 1992, a year before he became Eritrea's first president. He has recently halted the country's collaborations with US medical schools.

partnerships. The chair of the paediatrics department at Orotta was arrested because of his religious views. And in 2011, Afwerki ordered all scientists from George Washington University — including Mezgebe — to leave the country.

At the start of 2012, Afwerki cut off the partnership between the National Laboratory and Washington University in St Louis. Several sources, who wish to remain anonymous for fear of retaliation against friends and relatives, report that Seyoum, the lab's director, was "frozen", an Eritrean term for the practice of stripping government employees of their titles and duties while restricting them from travel and other jobs to silence them. *Nature* contacted officials in the Eritrean government and its US and UK embassies repeatedly by phone and e-mail for a response to these allegations, but had received none at the time of going to press.

The severing of ties may be a backlash against the United States and the United Nations over their criticism of Afwerki's human-rights record, says Ghebrekidan. In 2009, the United States imposed sanctions on Eritrea for supporting Islamist insurgents in Somalia. A highly publicized cable from US ambassador Ronald McMullen, later released by Wikileaks, said that "Eritrea's prisons are overflowing, and the country's unhinged dictator remains cruel and defiant". In July, the UN Human Rights Council established a special rapporteur to investigate reports of rights violations by Eritrean authorities, amid stories

## "THE GOVERNMENT HAS PERSECUTED NOT ONLY SCIENTISTS, BUT ALSO THE SCIENCE."

that Afwerki keeps his critics in solitary confinement in shipping containers.

Berhane Ghebrehwet, an Eritrean immunologist at Stony Brook University, says that Afwerki's distrust of foreign involvement and aid in Eritrea is understandable. The United States did, after all, support Ethiopia during the fight for independence. "You cannot cripple a man and then accuse him of having limped," he says. "All the president dreams of is to make Eritrea a prosperous and self-reliant nation at peace with itself, its neighbours and the rest of the world."

Others are less sympathetic. "Afwerki is getting more and more paranoid," says Ghebrekidan. "He thinks that the American doctors who come to save Eritrean lives are actually CIA agents."

Afwerki has effectively destroyed intellectual freedom in Eritrea, says Abbink. "No independent academic research in any field is possible." Fundamental research "or what is left of it" is now under pressure to pursue "practical" issues with immediate applications to development, he concludes.

Yet some scientists are still proud of the

progress Eritrea has made. Andemariam Gebremichael, dean of the Orotta School of Medicine, wrote in an e-mail that he aims to create "an environment where individuals develop their intellectual potential", adding that he hopes to produce another 150 doctors to bring the country up to international standards. It will be a significant challenge, writes Gebremichael. Only seven foreign teaching doctors — all Cuban — remain at the institution.

After a year in solitary confinement, student-union leader Kesete escaped with his guard to Ethiopia, and from there to the United States. "We walked for six days and nights, surviving on nothing more than biscuits," he says.

Kesete sees little prospect of change, and despairs of his country's future. "The government has persecuted not only scientists, but also the science itself," he says. He calls international collaborations a "waste of resources and energy", because Afwerki will not hesitate to eject foreign scientists, no matter how crucial they are to Eritrea's development. Rumours that the University of Asmara may reopen this year are preposterous, he adds. "It is safe to say that academia is dead." ■

**Shanta Barley** is a freelance writer in Perth, Australia. [SEE EDITORIAL P.8](#)

1. Powell, H. D. W. *Br. Med. J.* **295**, 1637–1639 (1987).
2. Windus, D. W. *et al. Clin. Chem.* **53**, 1954–1959 (2007).
3. Scott, M. G., Morin, S., Hock, K. G., Seyoum, M. & Ladenson, J. H. *Clin. Chem.* **53**, 1945–1953 (2007).