

A New Kind of Rescue Hero

It's not a toy fireman—or even a real one. It's a death's head cockroach, and Ben Epstein '78 is outfitting it to save lives.

By Karen McCally '02 (PhD)

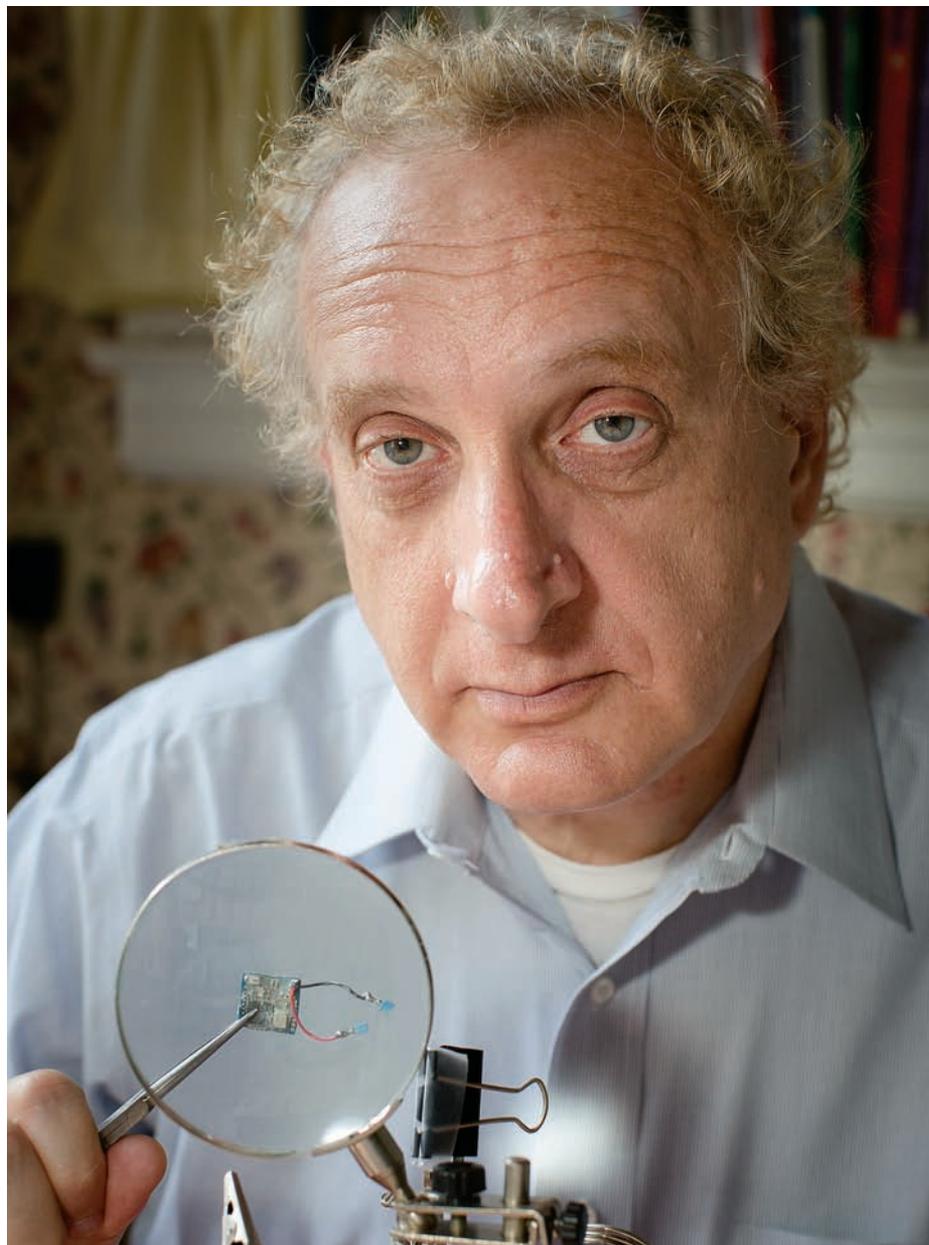
IT'S A WEDNESDAY MORNING IN MAY IN A lab at Texas A&M University, and **Ben Epstein** '78 is filming as a technician removes a two-inch long cockroach from a plastic box, rubs it with a cotton cloth, and dabs a splotch of adhesive on its back.

Next, the technician presses a small circuit board to the adhesive, connecting a tiny radio, microphone, and battery. The whole package fits on the roach like a backpack, and in a few minutes, the roach and several others like it will be released onto the cement floor of a large shed, where they will scurry away like grade schoolers dashing to the bus stop.

It's all part of the field test for the OrthopterNets program, a project of Op-Coast, a two-person New Jersey tech company specializing in networking and wireless systems. Epstein and the company's other half, David Rhodes, are both electrical engineers with doctorates, a long line of published articles, and about three decades of experience in the field.

"If you have enough insects with these radios, they can form what's called an ad-hoc radio communications network," Epstein says, explaining the OrthopterNets project. The release of hundreds of outfitted cockroaches could form a network allowing search officers, stationed at receivers, to communicate with people trapped in mines, buildings, or caves. The project could make this particular species of cockroach—the supersized death's head cockroach, which likes nothing more than to wander in dark spaces—an unwitting search and rescue hero.

OrthopterNets is funded by the Defense Department's Army Research Office. The Defense Department has funded research that's had significant commercial applications, and Epstein hopes that Orthopter-



Nets is no exception. He predicts, however, that it will draw interest mostly from public and private entities that carry out search and rescue missions.

"I don't see people buying these things on Amazon," he jokes.

▲ **LOW-TECH HIGH-TECH: Cockroaches outfitted with tiny electronic equipment form wireless communications networks in a Defense Department-funded project led by Epstein.**

That said, the death's head cockroach is, in fact, a bargain. The low-tech facilitator of high-tech operations comes at a pittance. "It barely even appears in our budget," says Epstein of the cost of the roaches, which he obtains from a local supplier. Not even the circuitry itself is expensive, he adds. For commercial users, "most of the cost would be in mounting the circuits—the manual labor involved."

The project is in the prototype phase and Epstein estimates that it will take another

year to make OrthopterNets operational. Part of the challenge is making the equipment as small, light, and powerful as possible. On the one hand, the death's head cockroach is a hearty creature. During the May field experiment, roaches were carrying two grams of equipment—about half their total weight. And, Epstein noted, “They don’t seem to mind.”

Nonetheless, about four minutes into the field experiment, at least one of the roaches slowed considerably, as first the battery, and then the circuit board, slipped from its back. “Batteries are the biggest limitation,” says Epstein, who says that’s why the team is focused on developing the circuit board to consume less power.

The OrthopterNets project is one of many that the Defense Department has sponsored that harness “cyborgs”—short for cybernetic organisms—for military purposes. Several years ago, the department’s Defense Advanced Research Projects Agency, or DARPA, funded a program called HI-MEMS, or Hybrid Insect Micro Electromechanical Systems, to develop technology to control insect locomotion. Epstein attended a HI-MEMS briefing. “I was very impressed with the work that I saw,” he recalls. Noting that HI-MEMS focused on insect movement, “I thought why not do something involving communication with insects?”

He constructed a team of experts on everything from insects to integrated circuits. His partners—Hong Liang of Texas A&M’s mechanical engineering department along with Byunghoo Jung and Harry Diamond of Purdue University’s School of Electrical and Computer Engineering—describe Epstein as “highly creative.” “I’ve always enjoyed our collaborations with Ben,” adds Diamond, who worked with Epstein on the development of a digital array radar for the U.S. Army.

A tinkerer by nature, Epstein says his childhood bedroom in Cherry Hill, N.J., was littered with deconstructed gadgets. At Rochester, he had less time for informal experimentation. “To be quite honest,” he confesses, “I was just studying so much.”

There were exceptions. Just for fun, he helped a professor test the theory that flatworms, or planarians, emitted electrical fields. If the fields could be manipulated, Epstein says, “you could make planarians grow two heads.”

Alas. “We never got that far,” he concedes. **R**

In the News



GAME CHANGER: Ayub founded the Afghan Youth Sports Exchange.

ALUMNA ONE OF 33 WOMEN FEATURED IN ESPN MAGAZINE’S ‘BEYOND IX’

ESPN Magazine named **Awista Ayub** ’01 one of “33 women who will change the way sports are played” in an article, “Beyond IX,” in its June 11, 2012, issue commemorating the 40th anniversary of the passage of Title IX. A section of a larger education bill, Title IX prohibited discrimination in any federally subsidized educational program on the basis of sex, and led to major improvements in athletic programs for women and girls. In 2003, Ayub founded the Afghan Youth Sports Exchange to use athletic competition to teach leadership and conflict resolution. The exchange brought Afghan girls to the United States to play soccer and to return to Afghanistan as ambassadors for the sport. The program eventually resulted in a league of 15 girls soccer teams in Afghanistan (See “Supporting a ‘Home’ Team,” *Rochester Review*, November–December 2009). Ayub is now helping to bring basketball and tennis, as well as soccer, to war-torn regions as director of South Asia programs for the nonprofit Seeds of Peace.

VITTORIO GRILLI ’86 (PHD) NAMED ITALY’S MINISTER OF FINANCE

In July, Italian Prime Minister Mario Monti appointed **Vittorio Grilli** ’86 (PhD) as minister of finance. A native of Milan, Grilli had previously served as deputy minister of Italy’s Ministry of Economy and Finance, and before that, in Italy’s treasury. Grilli also worked in the private sector as managing director of the London office of Credit Suisse First Boston. After earning his doctorate in economics at Rochester, Grilli taught economics at Yale and at the University of London.



GRILLI: New Italian finance minister

GRADS NOMINATED BY PRESIDENT OBAMA TO KEY POSTS

President Barack Obama has nominated **Allison Macfarlane** ’87 and **Emil Kang** ’90 to key administration posts. Macfarlane, a geologist, was tapped to chair the Nuclear Regulatory Commission. A professor of environmental science and policy at George Mason University, she served previously on Obama’s White House Blue Ribbon Commission on America’s Nuclear Future, which studied nuclear waste disposal. Kang, a musician and the director for the arts at the University of North Carolina at Chapel Hill, was nominated to be a member of the National Council on the Arts. The council advises the chair of the National Endowment for the Arts on issues concerning grants, funding guidelines, and new initiatives.

Some History—and Tips—on ‘Taps’

A retired Army bandmaster marks the 150th anniversary of the nation’s most famous bugle call.

By Karen McCally '02 (PhD)

EVERY EVENING, **JOSEF OROSZ** '55E TURNS on a CD recording of “Taps,” and broadcasts it, via loudspeakers outside his home, to the small, southeastern Pennsylvania town of Bedford.

“It is in honor of all the fallen heroes of the day,” says the retired Army bandmaster.

This summer marked the 150th anniversary of the first time the famous bugle call was played. And to mark the occasion, Orosz published a booklet, “The History of ‘Taps,’” summing up the origins of the piece, and including some instructions on playing it.

“‘Taps’ is a military bugle call, not a symphonic trumpet solo,” says Orosz. Decrying common variations of the piece in both

ORIGINS: A painting by Sidney E. King depicts the birth of “Taps” 150 years ago, a story told by Orosz in a new booklet and online.

dynamics and phrasing—the “Hollywood version,” he calls it—he says, “If someone is going to play ‘Taps’ at a funeral, it must be exactly as it was intended: a prayer for the fallen hero. No changes, no variations.”

Orosz enlisted in the Army following his graduation from the Eastman School, joining the U.S. Army Field Band on the bass fiddle and tuba and 10 years later had advanced to Army bandmaster. In the 1960s, one of his roles was to train band members to play “Taps” at the funerals of soldiers who lost their lives in the Vietnam War.

He hopes that an understanding of the historical context of the piece will impress upon performers the importance of playing the piece not as they might intend, but as Union Brigadier General Daniel Butterfield intended, on the bitter evening of July 2, 1862, on a plantation near Charles City, Va.

As Orosz explains, the Confederacy had mounted a steep challenge to Butterfield’s Third Brigade during the one-day Battle of Gaines’s Mill, in which 600 Third Brigade

soldiers perished. Butterfield, who couldn’t read music, had nonetheless composed a bugle call specifically for his regiment. Played immediately before any additional calls (bugle calls, along with drum rolls, were the means of communication on the battlefield), the call indicated that the following instructions would be for his regiment only.

But on that devastating evening, the general recalled years later, the call “did not seem to be as smooth, melodious, and musical as it should be.” He summoned his bugler, Private Oliver Norton, to rework the call. Norton “practiced a change in the call of ‘Taps’ until I had it to suit my ear,” Butterfield told *Century Magazine* in 1898.

Norton, in turn, told the magazine, “The music was beautiful on that still summer night, and was heard far beyond the limits of the Brigade. The next day, I was visited by several buglers from neighboring brigades, asking for copies of the music, which I gladly furnished.” 

Orosz’s history of “Taps” may be read in its entirety at <http://joseforosz.com/taps2012.htm>.



ROCHESTER LIVES

'The Pilgrim'

Arriving from Burma in 1868, Theodore Thanbyah, Class of 1871, would become Rochester's first graduate from Asia.

By Nancy Ehrich Martin '65, '94 (MA)

ON JUNE 28, 1871, THEODORE THANBYAH—believed to be the first student from Asia to receive a Rochester degree—stood at the podium and delivered his senior oration at University commencement. The title of his oration was “The Contest for Commercial Supremacy in Asia.”

Thanbyah was born in Bassein, Burma, located west of Rangoon on the delta of the great Irrawaddy River, in September 1843. At that time, there was an active Baptist mission in Bassein working among the Karen people, an ethnic minority group from the higher elevations, in eastern Burma, toward Laos. The Burmese looked down upon the Karens and they suffered some persecution.

Among the more prominent of the first missionaries to work with the Karens was E. L. Abbott, the father of Willard Abbott, Class of 1858. We know from this relationship that there was a link between the Bassein mission and the University.

It is likely that the Baptists recognized Thanbyah's great potential as a scholar and possible clergyman, as he was sent to the United States for further education. He prepared for college in a special department in connection with Shurtleff College, a Baptist institution in Upper Alton, Ill.

Thanbyah entered the University in September 1868, at the age of 26, along with 14-year-old Henry Hooker Van Meter, Class of 1872, a son of Baptist missionaries in Bassein. Thanbyah and Van Meter may have been sent out from Bassein together and prepared together. We know they entered the University together.

Thanbyah entered the University as a sophomore and followed the classical course of Greek and Latin. After graduating in the Class of 1871, Thanbyah attended the Rochester Theological Seminary, graduating in 1874, at which time he also received an AM degree (a rough equivalent to today's master of arts degree) from the University. In August of that year, he departed for Burma.

Thanbyah had a long and vigorous career back in his home country. From 1874 until his death in 1920, his address remained Karen Quarter, Kemendine, Rangoon. Among the posts he held were pastor, Rangoon (1875–81); municipal commissioner (1885); teacher, American Baptist Mission (1875–96); Rangoon Karen Home Mission Society (1891–1920); and president, National Karen Association (1881–1903).

He was also the author of several books



including *Sermons in Karen*; *A Karen Arithmetic*; *A Karen Mensuration of Plane Surfaces with Land Surveying*; *Karen Customs, Ceremonies and Poetry*; *The Karens: Their Persecutions and Hardships, 1824-1854*; *The Karens and Their Progress 1854-1914*; and *Karen Folk-lore Tales*. He even produced an abridged version of *Robinson Crusoe* in the Karen language.

Thanbyah's own life story, *The Pilgrim*, published posthumously in 1925, perhaps would prove the most interesting. Unfor-

▲ **MISSION OF BURMA:** Thanbyah, the University's first graduate from Asia, was recruited by Baptist missionaries.

tunately, however, it has never been translated into English. In 1926, Thanbyah's nephew, P. Tamlatoo, presented a copy of the memoir to President Rush Rhees. In acknowledging this gift, Rhees lamented, “I profoundly regret that I am unable to read this biography. Your uncle was held in high regard here, and we shall cherish this memorial.” This copy of *The Pilgrim* remains on the shelves of the Rush Rhees Library in the Department of Rare Books and Special Collections.

The University honored Thanbyah in 1918 by bestowing upon him an honorary doctor of divinity degree “in recognition of your long and faithful service as a minister of the Gospel and as a leader of the intellectual life of your people.” The degree was given in absentia, as it was impossible for Thanbyah to be present. In fact, it is unlikely that he ever returned to the United States after completing his education in 1874.

Thanbyah lived a long and productive life. In a letter to the University from his son, A. M. Thanbyah, dated Nov. 12, 1920, we learn: “It is with deep regret that I have to inform you of the death of my father on the 29th of October 1920, after a short illness. He conducted his last Pastor's Bible class on the 22nd of October and that same evening influenza set in from which he never recovered. . . . Three out of eight children survive him.”

Today, Thanbyah's senior oration remains his written work that a modern reader finds most accessible. It begins:

“It has been a prominent desire of the European nations ever since the light of civilization shed its rays upon them to grasp the wealth of Asia.

“History shows that the commercial control of the East has rendered the nation possessing it the master of the world.”

Thanbyah's senior oration has been preserved in the University Archives. You may read it in its entirety at <http://www.lib.rochester.edu/index.cfm?PAGE=4849>. Martin is the John M. and Barbara Keil University Archivist.