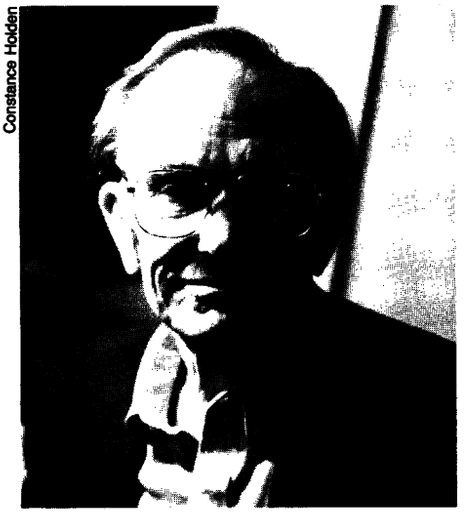
Constance Holden

Thomas Eisner *proposes large-scale chemical prospecting in the tropics.*

needed, he said, are methods aimed not at wholesale eradication of insects but at selective inhibition based on knowledge of the insects' physiology, predators, and life cycle, an approach often called Integrated Pest Management.

Nor have pesticides eliminated insect-borne diseases, also in part because of the rapid development of resistance. "Insect vector diseases are killing more people today than ever," said Robert Gwadz of the National Institute on Allergy and Infectious Diseases. Malaria is on the rise again—in Africa it now causes 1 million deaths each year among children under 5. "DDT didn't eliminate malaria," Gwadz said ruefully, "but it did eliminate the malariologists."

Among other significant health threats transmitted by insects are onchocerciasis (river blindness), of which there are 40 million cases, mostly in West Africa, and filariasis (elephantiasis), of which there are now 400 million cases and which may be the world's fastest spreading disease. The main contribution of medical entomologists, Gwadz said, might be to tailor eradication programs based on evaluations of the specific relations among insect vectors, pathogens, and the human host. But Gwadz said, "more is known of the genetics and biology of *Drosophila* [the fruit fly used in medical research] than any other insect."

Tackling all these problems will clearly place enormous demands on the discipline of entomology. Yet research and training institutions do not appear to have produced a cadre of qualified people to meet the demand.

Until the mid-1970s, enrollments in entomology programs were healthy, but then they began to drop and some undergraduate programs were phased out. Although entomology has been rolled into biology departments, there has been a loss of "discipline identity," said Donald McLean of the University of Vermont.

The number of new Ph.D.'s in the field, averaging about 170 per year during the 1970s, fell to 123 in 1987 and 133 in 1988. (By way of contrast, annual production of Ph.D.'s in molecular biology has gone up from 136 in the 1970s to 362 in 1988, according to the Commission on Professionals in Science and Technology.)

Funding has also declined. The value of all research funds allocated to entomology by the USDA and the states has decreased by 28% since 1971 when federal and state funds were sufficient to support 755 full-time research workers. In 1988 the number was 541.

This decrease has had subtle and not-so-subtle effects. The direct result is a lack of qualified personnel. Gwadz, for example, says, "we've been forced to go outside the sphere of medical entomology and find people in other fields, such as genetics or physiology," to fill medical entomology fellowships in his unit. "These people can make valuable contributions in a specific area, but they never become medical entomologists in the full sense because they don't have that orientation or training."

The damage to insect taxonomy seems particularly severe. People are forgetting "the value of understanding a group of organisms for its own sake," says Wilson. Although insect collections in museums grew rapidly between 1976 and 1986, the number of Ph.D.'s working in them remained constant at about 110, according to the Association of Systematics Collections.

There also seems to have been a decline in insect taxonomists at land-grant universities, where many are concentrated, according to a recent survey by K. C. Kim of Pennsylvania State University. Says Wilson: "We've allowed insect taxonomy to decline to the point where it's going to be very tough to get it up to the needed level."

Wilson also sees a subtler problem relating to morale. One result of the general weakening of organismal and evolutionary biology, he says, is that "you get people who are less bold. I can't imagine a first-rate molecular biologist taking 'No' for an answer if he has a new idea in cancer research and he's looking for funding. But by now someone in insect taxonomy may be quite used to being told 'No.' "

How can these problems be corrected? Not surprisingly, each Centennial speaker has his own idea. Eisner envisions chemical prospecting as a collaboration among developing countries, universities, industry, and the banking community. Screening laboratories in developing countries might be fi-

Good News for Superconductors

What looked like a mountain 6 months ago now seems more like a molehill, as researchers from AT&T Bell Labs have found a way to mend a major problem with high-temperature superconductors. By irradiating a crystal of $YBa_2Cu_3O_7$ with neutrons, Bruce van Dover, Michael Gyorgy, and Lynn Schneemeyer increased 100-fold the amount of current the crystal could carry.

Although high-temperature superconductors have been touted for their commercial potential, they generally have been unable to carry enough current for many applications, such as magnets and electrical generators. Last spring, several researchers suggested that this flaw might be difficult or impossible to overcome (*Science*, 26 May, p. 914). The problem lay in the superconductors' flux lattices, which are quantized lines of magnetic flux that appear when the material is immersed in a magnetic field. Too much current passing through the superconductor causes the flux lines to move, creating resistance and destroying the superconductivity.

The solution, reported in the 2 November issue of *Nature*, was to put small defects into the superconductor by exposing it to high-energy neutrons. These defects snag the flux lines as they try to move past and pin the flux lattice in place, van Dover says. Before irradiation, the maximum current the Bell Labs crystal could carry without losing its superconductivity was 6,500 amperes per square centimeter at 77 K. After treatment, that jumped to 620,000 amperes per square centimeter.

Van Dover notes that the 100-fold improvement came in only one crystal, so Bell Labs researchers must learn how to do it consistently and optimally. Because the neutron enhancement method is not practical for commercial production, they will also be looking for different ways to produce the defects. And several other hurdles, such as the brittleness of the materials, still face commercial development of high-temperature superconductors. "This work doesn't mean applications are imminent," van Dover says. "It just means one problem can be solved." ■ **ROBERT POOL**