Libya Gets Unwelcome Visitor from the West

International relief officials are mobilizing a worldwide effort to make sure that the screwworm's stay in Africa is a short one

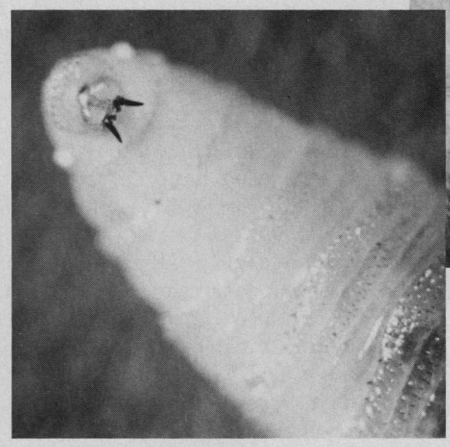
WHEN THE SCREWWORM, a parasite that afflicts both cattle and humans, took up residence in Libya 3 years ago, it presented the United States with a dilemma. It was the first time the parasite had been seen in Africa, and if it were to spread throughout the continent, the economic and social consequences would be devastating. It could "make locusts look like nothing," says Allen Showler, an official with the U.S. Agency for International Development (AID) office of disaster assistance. But if U.S. scientists, who have developed successful techniques for dealing with the pest, were to assist in efforts to wipe out the Libyan infestation, the United States would risk appearing to aid its old nemesis, Colonel Muammar al-Qaddafi.

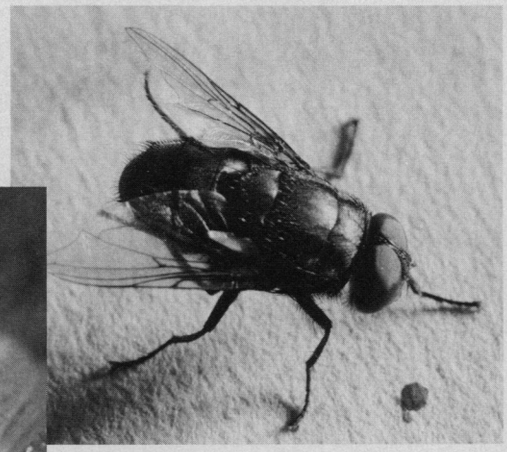
In the end, U.S. officials decided they had no other choice. The Administration and Congress have quietly approved the use of U.S. technology in an international eradication effort that should get under way later this year.

The screwworm fly (*Cochliomyia hominivorax*) is known all too well in the United States. It is indigenous to both North and South America and the Caribbean and has played havoc with livestock here for more than 100 years. The female lays her eggs in any open wound—even one as small as a tick bite—on any warm-blooded animal, including humans. The eggs hatch in about 24 hours, releasing hundreds of larval worms that burrow into the wound and feed off the animal's flesh. An infestation in the umbilical cord of a newborn calf can lead to death within a few days, and a grown steer can be killed in a week if worms enter through a dehorning wound and get into the brain. The fly has also been known to kill humans by entering the brain or the lungs.

After a week of feasting, the worms drop from the animal and pupate, forming a tough outer cocoon from which they emerge in a week or more (depending on ambient temperature) as adult flies. What makes the screwworm a particular menace is that it feeds only on living flesh, unlike its cousin the blowfly which happily dines on carrion.

In the late 1950s, scientists at the U.S. Department of Agriculture (USDA) came up with an extremely successful eradication method. By raising flies on an artificial medium, and then irradiating pupae with gamma rays just before they become adult flies, researchers created vast numbers of sterile male flies. The sterile males are released in infested areas where they compete with healthy males for females. Since a female fly typically mates only once, and the eggs she lays after union with a sterile male do not develop, the fly is eventually wiped out. This technique removed the fly from the United States by 1966. Since then, the pest has been pushed south through Mexico, where it is now confined to an area south of the Isthmus of Tehuantepec. "Sterile flies are now being dropped in Belize and Guatemala with the idea of perhaps someday eradicating the fly down through Central America," says Richard Peterson, an entomologist with USDA on detail to AID.





USDA

Parasitic pest. *The adult screwworm fly,* Cochliomyia hominivorax, *is about twice the size of a housefly. The larval worms grow to about half an inch, and feast on living flesh.*

USDA officials believe the fly arrived in Libya about 3 years ago with a shipment of livestock from South America. At present, the infestation is restricted to an area of 20,000 square kilometers around Tripoli. Some 1900 cattle were reported infested with screwworm last year. There have also been 30 confirmed cases in humans, according to Showler, and there are probably hundreds more.

But this is just a harbinger of what could occur if the fly spreads to the rest of Africa. According to a study conducted for USDA by R. W. Sutherest and G. F. Maywald of the entomology division of Commonwealth Scientific and Industrial Research Organization in Queensland, Australia, the fly is most likely to thrive in the more tropical regions of Africa, but could form a permanent beachhead along the Mediterranean coast. Although the Sahara forms a natural boundary preventing the fly from heading south directly, should it reach the Nile River in neighboring Egypt, it could easily travel to more hospitable climates. There even exists the possibility of seasonal incursions into Europe.

These prospects were enough to prompt the United States to assist in battling the infestation. As Paula Henstridge of USDA's legislative affairs office puts it, "You have a humanitarian cause here that you can't really turn your back on"—even though the outbreak is in Colonel Qaddafi's backyard. But first USDA had to get permission to make the U.S. sterile fly technology available in Africa.

In a tactful letter transmitting proposed legislation to Congress on 5 January, Secretary of Agriculture Clayton Yeutter omits any mention of Libya, saying merely that the fly had turned up in northern Africa, and, were it to spread, it would become "the most devastating livestock and wildlife pest on the African continent." Congress quickly adopted the bill, and President Bush signed it on 15 March.

The next step was to work out rivalries that had sprung up between the USDA and AID. USDA's international division has been handling the joint eradication programs with Mexico and Central America, so it seemed natural that it should take on the African program. But AID has a substantial

number of programs in northern Africa with countries friendly to the United States, such as Egypt, Sudan, Tunisia, Niger, and Morocco, all of which could be hard hit by the screwworm problem. As things stand, USDA will manage the production of sterile flies at a joint U.S.–Mexico facility in Tuxtla Gutiérrez, and AID will provide some financial support to the countries around Libya to establish prevention programs.

Neither USDA nor AID, however, will be in direct control of the African eradication program. That job will fall to the United Nations Food and Agriculture Organization (FAO), which intends to begin a pilot release program in September and a full-scale program perhaps 3 to 4 months later. The 2-year program is estimated to cost $117 million. Lucas Brader, who directed locust control operations for FAO, will be in charge of the operational side of the program. "The problem we have is to find the money to pay for all this," Brader said in a telephone interview from his office at FAO headquarters in Rome. Libya is kicking in $24-million worth of cash and services, and neighboring countries have provided some $2 million in similar support. Brader says FAO will start the program once there are commitments for $30 million to $40 million, and he is hopeful that can be achieved shortly.

If the money is found, most are confident the program will be a success. "There's really no technical reason why it should not work without a flaw," says Peterson. Entomologists at the USDA agricultural research station in North Dakota have shown that the African female fly will mate with Mexican sterile male flies. And FAO has shown that the flies can withstand the long airplane journey from Mexico to Africa.

But success is not guaranteed. Showler says there is concern about wildlife or even large birds helping the fly escape from Libya. "You also have a lot of nomadic tribes, and that is a definite possibility for spread," he says.

If the screwworm does establish itself in Africa, Showler says the problem would "probably be permanent, not cyclical, and insidious. You can't see thick swarms of screwworm flies blotting out the sun like you can with locusts. So it has a lower profile in a way, and it is more directly damaging." He says if the control efforts fail, the screwworm could be particularly devastating for some nomadic tribes. "These people's culture revolves largely around livestock. Each cow has a pedigree that goes back for hundreds of years. If you pull that out from under them, the culture will go extinct, and a lot of those tribes may very well go extinct." ■ JOSEPH PALCA

House Stifles DOE Research

At a time when "competitiveness" dominates political debate and business management is becoming less centralized in response, it is ironic that Congress may be undermining the capacity of the nation's energy laboratories to move quickly into promising new fields—by reducing their autonomy. Last month, the House of Representatives voted to eliminate funding for what may be the most inventive research performed at those labs. If the Senate follows suit later this year, much of the flexibility now present in Department of Energy research programs will disappear.

The House has taken the ax to the independent research and development funds that DOE laboratories amass by "taxing" other DOE research projects at rates varying from 2 to 7%. For more than 5 years, such funds have been used to support new research that spans traditional disciplines or falls between the cracks of existing programs. Expenditures from the funds are subject to regular financial audits, but neither Congress nor the DOE exercises direct control over them. Instead, this money is distributed at the discretion of laboratory directors.

The official line from the House appropriations subcommittee that initiated the move is that the cut was a natural result of a tight fiscal situation. But the lack of budgetary control may be a more likely explanation. "While no doubt many of the projects bear very useful results, the potential for misuse of these funds is equally prevalent," states the report of the House appropriations energy subcommittee. (Aaron Edmondson, a staff assistant to the subcommittee, was unable to provide a single example, however.) "[T]he committee is very concerned with the amount of funds spent on activities which have not been reviewed by the Department [of Energy] or Congress."

The weekly newspaper *Space News* last week reported another possible explanation for the cut, quoting unnamed congressional sources who said the House action was actually a rebuke to outspoken Lawrence Livermore physicist Lowell Wood. An abrasive champion of strategic defense, Wood had recently used discretionary funds to research the possibility of undertaking a manned mission to Mars with cheap inflatable spacecraft.

Whatever its reasons, the House's move is prompting cries of anguish from the labs. "The consequences would be almost unbelievably severe," says John Holzrichter, director of the independent research program at the Lawrence Livermore National Laboratory. "It's almost a statement that Congress doesn't believe in modern management, that it doesn't trust the directors of the labs, the project managers, and the senior scientists. It's sort of the ultimate insult from your government."

"Nobody's saying, 'don't do any original thinking,' " replies Edmondson. "We're saying, do it for a sponsor who's paying for it."

The amount of money at stake is small—$130 million, compared to a DOE appropriation totaling $15.6 billion—but its impact is disproportionately large. Several laboratory officials emphasized that the rigidity of DOE's funding process leaves the independent research system as the only way to keep up with scientific developments. "We often have to justify our projects 2 years before they're authorized," says Martha Krebs, an associate director at Lawrence Berkeley Laboratories. "A lot can happen in 2 years. Administrators need some flexibility to choose directions that match the current frontiers. When we were seeing breakthroughs in high-temperature superconductivity, we didn't have time to rearrange programs. Our labs were able to get started through independent research funds."

For precisely those reasons, the 1983 Packard commission on national laboratories recommended that laboratory directors retain control over 5 to 10% of their annual budget so that taxpayers might reap the greatest return from federal R&D expenditures. At Livermore, researchers are using independent funds to explore a tunneling microscope that may improve reading of the human genome, experiments in massively parallel computing, and the development of a precise mass spectrometer to measure the genetic effects of exposure to toxic chemicals.

The future of the independent research program now lies with the Senate, which may be less inclined to make the cut. "I don't know whether we have the same level of concern as the House on this," says a staff member of the Senate appropriations subcommittee on energy. "I'm not sure that we even understand the House concerns." ■ DAVID P. HAMILTON