

Malaria Parasite Gaining Ground Against Science

Agrim report details financial and scientific shortfalls in the campaign against the disease

THESE ARE GRIM DAYS IN THE BATTLE against malaria. According to a new report* from the Institute of Medicine (IOM), humans are on the retreat after making significant progress against the parasite in the 1940s and 1950s. The disease is still felling victims in 102 countries, killing more than 1 million people a year—most of them children. Though chiefly confined to poor nations, malaria recently has come knocking in the United States: A few new cases turn up each year among the migrant workers around San Diego, and just last week, two mysterious cases appeared in suburban New Jersey. Meanwhile, antimalaria drugs have lost some of their effectiveness, and efforts to create vaccines using the powerful new tools of biotechnology have come up short.

Researchers and fieldworkers battling malaria are hampered by more than the biology of the disease. The African countries where 90% of the malaria deaths occur have been ravaged by warfare, making it more difficult to combat the disease, and the rich nations that fund most malaria research are cutting their budgets.

If the authors of the IOM report had their way, the United States would recognize the gravity of the crisis and immediately renew the battle on all fronts. But this may not happen. Says James Jensen, a member of the IOM panel and a professor of microbiology at Brigham Young University, there's a real danger that antimalaria programs will "fall through the cracks." "We didn't want [this report] to look like a fishing expedition for more money," he adds, but "you can't read it without realizing we've got to spend more."

The IOM report makes it clear that scientists still have a long way to go in unraveling malaria's basic biology. For example, it's not known why some people living in malarious areas become violently ill while others develop an immunity. Nor do researchers understand why drugs derived from the bark of the Peruvian chinchona tree control the parasite in the bloodstream, although the curative power of chinchona—

the source of quinine—was recognized centuries ago. As for the best modern drug, chloroquine, researchers don't know exactly how it worked when it was first developed—or why it has been losing its potency over the past 40 years. Vaccine development, meanwhile, has languished after a big push in the late 1970s and early 1980s, when the U.S. Agency for International Development (AID) invested heavily in targeted research.



Explosive biology. One mosquito bite can inject up to 500 malaria sporozoites, each yielding up to 30,000 daughters.

Overall U.S. Government Support of Malaria Activities					
Agency	Funding (\$000)				%
	1987	1988	1989	1990	
USAID	21,243	20,117	21,793	16,309	57.01
NIAID	6,122	6,803	7,467	8,337	20.61
DOD	7,862	7,810	5,430	5,152	18.84
CDC	1,105	1,151	1,214	1,471	3.54
TOTAL	36,332	35,881	35,904	31,269	100

But the IOM didn't confine its survey to basic research. One of the panel's assignments was to survey the entire field of antimalaria work and report back on promising new approaches. This proved difficult because the field is splintered into many competing camps—basic researchers, clinicians, and mosquito-control experts.

In the end, the IOM panel did not single out any particular strategy for special attention, but instead embraced them all. One reason for this, according to committee members, was that the panel included representatives from every specialty. Even so, the panel did agree on some specifics:

■ Nations in the endemic malaria zone should try to develop long-term malaria-control strategies, and multinational businesses should be asked to "contribute substantially" to these control efforts.

■ The United States could offer the greatest help by expanding research on vaccines and potential new drugs. It is "essential," the panel says, that this work be continued. Panel member Stephen Hoffman, director of malaria research at the Naval Medical Research Institute, adds that the recent discovery of two new immune-stimulating proteins isolated from the malaria parasite has "regenerated the excitement" about a bio-engineered vaccine. The IOM panel, voicing "concern" that private companies are not involved, recommends that "new mechanisms" be created to induce them to join the effort.

■ A massive screening program by the World Health Organization that checks 140 million blood slides each year (detecting only 3%-5% positive) should be "reoriented" to collect more specific data, focused on high-risk groups and potential epidemics.

To coordinate these and other initiatives in the malaria battle, the IOM authors urge the government to create a high-level advisory committee among the four U.S. agencies involved in the battle. This advisory group, say the IOM authors, should serve under the auspices of a "neutral and nationally respected scientific body." They also add that funding decisions should be "based

on scientific merit as determined by rigorous peer review, consistent with the guidelines of the National Institutes of Health...." This has not always been true in the past. For example, the research effort on vaccines supported by the AID was criticized in the mid-1980s for lacking strong peer review. Indeed, it was partly because AID ran into management troubles that it joined with other agencies 2 years ago to ask for this study (see *Science*, 26 January 1990, p. 399).

Despite this all-encompassing embrace, some members of the IOM panel felt the report focused too much on technology. One of the authors—Awash Teklehaimanot, Ethiopia's chief malaria official—wrote in a dissent that "there is too much emphasis in this report on malaria research while little attention is given to malaria prevention and control." Yet the U.S. participants argue, as Jensen says, that conquering malaria is "not just a matter of will," because even with superior efforts at prevention, the parasite would gain ground through its growing resistance to drugs and pesticides. Jensen concludes: "We desperately need new tools."

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*Malaria: Obstacles and Opportunities," Committee on Malaria Prevention and Control, chaired by Charles C. Carpenter, Brown University.