

Malaria Control—A Glimmer of Hope

The quotation that follows is from *The Lake Regions of Central Africa* by Sir Richard Burton (1821-1890). Sir Burton was an adventurer whose visits to the Far East and Africa brought him into contact with the greatest killer of humanity, *Plasmodium falciparum*.

The approach of malignant fever is very insidious. An attack begins mostly with an ordinary chill, attended by no unusual or marked symptoms. Sometimes the patient has had a light chill a day or two before this, which he has neglected. Sometimes he has felt slightly unwell for ten or fourteen days; has complained of loss of appetite and general weakness; but as these symptoms are not very marked, they are very apt to be overlooked, especially with newcomers.

The real attack may begin with a chill or with a fever, but its effects are, in either case, at once evident in a peculiarly yellow skin and haggard countenance. In fever there is profuse perspiration, a rush of blood to the head, high and irregular pulse, and general prostration. Sometimes the body is hot, but dry. Thirst is urgent, but the stomach rejects whatever is drunk.

If the paroxysm (sudden attack) of fever returns, it is with renewed force, and the third attack is commonly fatal. Before death the patient becomes insensible; there is violent vomiting, which is, in fact, regurgitation of ingesta, mixed with green and yellow fluid. Immediately after the chill, and even before this has passed off, the urine becomes dark red or black. The pulse is very irregular, the breathing slow and finally the patient sinks away into a state of coma and dies without a struggle.

Malaria is still a fact of life—especially in Africa. Nearly 300 million people are afflicted annually, and a third of them die. The fight against this disease has centered on two fronts: elimination of the mosquito species (*Anopheles*) known to carry the *Plasmodium* parasites and treatment of infected persons with antimalarial drugs. In the fight against mosquitoes, DDT was employed successfully in the 1950s and 1960s. Its use greatly reduced the incidence of malaria by the middle 1960s. Mosquito-control programs, however, began to lose their effectiveness, largely because mosquitoes evolved resistance to DDT. DDT has also been found to be a highly persistent pesticide. It retains its toxicity for many years and can build up to lethal levels in aquatic and terrestrial environments. Its use became less effective and more expensive—both in economic and environmental terms. Other pesticides are now being used, but mosquito resistance is becoming a problem with these pesticides, too.

Even more serious is the worldwide development of resistance by Plasmodium parasites to antimalarial drugs, such as chloroquine.

As bleak as this picture sounds, scientists and health officials are optimistic that malaria will eventually be conquered. Recent advancements in molecular biology and immunology are being employed in the development of antimalarial vaccines. Some vaccines are now being tested. Researchers have found that the complexity of the disease presents special problems in vaccine development. Not only does each Plasmodium species require a separate vaccine, but also each stage of the life cycle of a single species requires a separate immunological vaccine component.