

Book Review

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The Elusive Malaria Vaccine: Miracle or Mirage?

By Irwin W. Sherman

Washington, DC: American Society for Microbiology (2009)
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Seeking Success—The Search for an Effective Malaria Vaccine

Malaria kills a child every 30 seconds. The World Health Organization currently estimates 247 million cases of malaria annually, with just under a million dead each year. Most of those are children under the age of 5, living in sub-Saharan Africa. Beyond the enormous health burden, major economic effects are also evident, reflecting in large part the loss of productive capacity due to illness. Malaria is estimated to have reduced the Gross Domestic Product of endemic countries by up to 50% over the last 30 years, compared to non-endemic countries.

Today, malaria is largely confined to tropical and subtropical areas of the world, but as recently as 150 years ago it was also found across much of Europe, large swathes of Asia, throughout the eastern United States, and along the Pacific coast as far north as Vancouver Island. Any disease of such import attracts many people who want to cure or prevent it, be they motivated by a desire to do good or to win glory. Toward the end of the 19th century, malaria research was hot: the blood-stream parasite was identified by Laveran in 1880 and the mosquito stages and transmission by Ross in 1897 and 1898, respectively. Vaccinology was also making important strides, including successful vaccines using weakened and killed pathogens. The two fields were synergistic. With the pathogenic agent for malaria in hand, the search for a vaccine was on. Today, over a century later, the search continues.

In *The Elusive Malaria Vaccine: Miracle or Mirage?*, Irwin Sherman recounts the pursuit of a malaria vaccine over the last century, writing from the perspective of ~50 years studying the biochemistry of malaria parasites. The book is both a history and a compendium of information about malaria vaccine research, supplemented by basics in parasite biology, immunology, and vaccinology. Key discoveries are described, along with the scientific milieu in which they were made. Approximately half the book discusses contemporary vaccine studies, including the pros, cons, and principal antigens for vaccine strategies that target different stages of the malaria parasite life cycle. Sherman also includes the sort of lore that begins as common knowledge, but then fades into obscurity: the idiosyncrasies of bird, rodent, and monkey

malarias; immunological observations made during malaria therapy for syphilis.... For those who enjoy such tidbits, the book is a delight.

The book is engagingly written and should be of great interest not just to malaria researchers but also to anyone interested in the history of infectious diseases and interventions. (For those unfamiliar with malaria terminology, it may be useful to keep a thumb in the excellent index so that details can be checked as needed.) The historical aspect of the book is especially well done. Sherman reports key findings in malaria research and allied fields with more detail than usual, not just providing more information about key figures but also naming those whose contributions are often overlooked. Biographical information for well-known figures of the past—Pasteur, Koch, and Ross, to name just a few—is spiced with stories that convey the personalities and foibles of these giants. In another twist from the usual, similar information is included for contemporary scientists as well. Overall, Sherman chronicles the mysteries and answers, the hopes and disappointments, and the passions, bitter rivalries, and occasional scandals that have accompanied the search for an effective malaria vaccine.

There are a few distractions. Some sentences, typically long, complex ones, may need a second read to grasp the point. The recitation of results from early vaccination studies with animal models suffers from dryness and lacks a summation of what was learned from these experiments. And figures to illustrate the relationships of immune system components and to show the location of candidate vaccine antigens on the parasite would be helpful for readers unfamiliar with these. But these are small issues.

It is especially fitting to review the history of malaria vaccine research at this time. RTS,S, the most successful malaria vaccine candidate to date, has just entered a Phase III trial in 11 African countries. Although its effectiveness is only ~30%-50% (depending on the metric tested), it may reduce malaria deaths substantially. Initial trials are imminent for vaccines consisting of live attenuated parasites, delivered by mosquito bite. In the meantime, numerous labs around the world continue to search for the elusive malaria vaccine. It has been trumpeted many times that a malaria vaccine is imminent, with hopes dashed afterward. Major strides in malaria research during the last decade, coupled with increased visibility and funding for malaria vaccine research in the last decade, have raised hopes again. But is it enough? Sherman speculates in his final chapter that an effective malaria vaccine will take another 20-30 years. I can only hope that his prediction will prove to have been pessimistic.