President's Symposium

Parasitology Research in the United States Department of Defense

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Today we’ve heard several distinguished speakers talk about the importance of parasitology in delineating biodiversity, food safety, natural selection, and in human health. The breadth of these subjects shows the grand diversity of parasitology, and I believe it is this diversity and collaborations among the entities that makes our discipline exciting and strong. I will discuss another aspect of that diversity: the role of the Department of Defense (DoD) in the study of parasites.

Why is the military interested in parasites at all? Historically, infectious diseases have had more of an impact on military conflicts than bullets and bombs. Specifically, more man-days are lost to infectious disease agents than to bullets. What is the current number 1 infectious disease threat to military operations? Which disease therefore receives most of the infectious disease research resources? Malaria. Malaria eclipses other agents of military medical interests such as enteric pathogens, dengue and other flaviviruses, hemorrhagic viruses, and rickettsia because malaria is debilitating to service members. It takes them out of action and ties up vital medical resources.

Malaria has been a major problem of military campaigns throughout history. Not only in the tropics, but also in Europe, Great Britain, and the United States. During the Vietnam conflict, entire divisions were rendered ineffective due to large numbers of malaria cases. Today, malaria is still a grave concern for military leaders when they consider potential deployments to malaria endemic areas. These areas are usually tropical but may be temperate. For example, in South Korea Plasmodium vivax malaria has recently reemerged. The concern for malaria is amplified by the increasing prevalence of drug-resistant vectors and parasites throughout the world. It is hard to imagine trying to protect a human against insect-vectored disease in areas such as sub-Saharan Africa, where every individual receives approximately 300 infectious bites each year. More dramatically, these are some of the regions in which our best prophylactic agents have failed (e.g., chloroquine, mefloquine, doxycycline). Other drugs such as halofantrine and sulfadoxine–pyrimethamine induce side effects that limit their utility. The future of malaria chemoprophylaxis to protect travelers in malarious areas isn’t particularly rosy. The side effects of the much-anticipated new drug tefanoquine have led to a temporary suspension of use although the drug is in phase III studies.

So, what to do? “Easy, just make a malaria vaccine.” Immunologists, parasitologists, molecular biologists, and vaccine workers have been trying to crack that nut for years. The promise of a viable malarial vaccine “available in just 10 years” is now decades old, and we are no closer to predeployment protection from malaria than we were during the Vietnam conflict. Thus, the major thrust of the DoD Military Infectious Diseases Research Program is malaria research including prophylaxis using both vaccines and drugs; treatment, especially for severe malaria; and basic research in malarial genomics and proteomics.

Is all DoD parasitology malariology? Certainly the lion’s share of available resources go to malaria research; however, other parasites have been studied and will continue to be studied where they play a role in troop morale and health.

The fear of contracting a disfiguring parasitic disease such as elephantiasis or mucosal leishmaniasis, endemic in local inhabitants, has a very real erosive effect on troop morale and health. Other parasitic infections significantly impact the health and readiness of combat soldiers. Dr. Pat Carney of the Uniformed Services University describes Schistosoma japonicum as “the savior of Taiwan.” Hundreds of thousands of communist Chinese military personnel training in the contaminated Yangtze River valley prior to a planned invasion of Formosa contracted S. japonicum infections. The Formosan invasion was