

Parasitology Research at the School (continued)

rate. Cutaneous leishmaniasis, however, may resolve over several months. The primary determinant of this outcome rests within the host.

"In humans, non-healing infections are characterized by the production of high amounts of antibody and little cell-mediated response," says Dr. Farrell, professor of parasitology, who has been studying the disease for 25 years.

T lymphocytes, which are required for both humoral and cell-mediated immune responses, are composed of two distinct subsets — T helper 1 (TH1) and T helper 2 (TH2) cells. TH1 cells stimulate the cell-mediated immune response, which is associated with healing cases of leishmaniasis; TH2 cells potentiate humoral immunity, which is typically exhibited in non-healing infections.

Working with mice infected with *Leishmania*, Dr. Farrell, who heads the School's Laboratory of Parasitology, manipulates in-vivo levels of cytokines that control T lymphocyte differentiation. This research, he says, could lead to the development of effective human drug treatment protocols that integrate immunomodulatory agents with conventional drug therapies.

Dr. Scott, who is a member of WHO's steering committee on the development of a *Leishmania* vaccine, is designing

vaccines that incorporate cytokine adjuvants that preferentially induce TH1 cell production and, thereby, cell-mediated immunity. This experimentation will have far-reaching effects, he predicts.

"What we learn from our studies of *Leishmania* may be applicable to other chronic diseases in which inappropriate immune responses can lead to severe disease," says Dr. Scott, professor of microbiology and immunology, who cites leprosy, tuberculosis, AIDS and cancer as a few such examples.

Also exploring immune response to disease is Dr. Chris Hunter, assistant professor in the Department of Pathobiology. An opportunistic infection in immunosuppressed patients, toxoplasmosis is caused by a ubiquitous parasite, *Toxoplasma gondii*. Dr. Hunter, who recently received a Burroughs Wellcome Young Investigator Award, uses immune-deficient strains of mice to study the immune response to *Toxoplasma*. This work has important public health implications.

"We're now at the stage at which we can start to rationally design and formulate new vaccine and treatment strategies," says Dr. Hunter, who has been studying *Toxoplasma* for nearly a decade.

Also key to the development of parasite control strategies is the construction of computer programs that quantify para-

site transmission, therapy and prevention data. Dr. Gary Smith, professor of epidemiology and population biology and director of the School's Center for Infectious Disease and Food Safety, is developing mathematical models for ruminant parasites, including *Fasciola hepatica*, *Haematobia irritans* and several trichostrongylid nematodes; *Ichthyophthirius multifiliis*, a protozoan parasite that afflicts farmed fish; and *Ixodes scapularis*, the tick that transmits the spirochete that causes Lyme disease in dogs and humans.

"The goal in each case is to construct a computer model of transmission dynamics," says Dr. Smith, who developed similar software for gastrointestinal nematodes of cattle, now marketed by Merck AgVet.

The software will help educate the public about parasite transmission, and lay a foundation for comparing existing control strategies and inventing new ones. Dr. Smith says the School's dedication to parasite research plays a key role in enhancing the quality of human life.

"The majority of these infections have a worldwide distribution and threaten human health directly, as in the case of Lyme disease, or indirectly, through their effects on the supply of protein for human consumption." — Joan Capuzzi



The Brandywine Polo Club hosted a benefit for New Bolton Center on September 8 at the Brandywine Polo Club grounds. The club played the British Military Polo Team. It was a beautiful, exciting afternoon. Unfortunately, the home team lost. One of its star players was Dr. Cindy Mason, V'96, whose mother, Mrs. Peggy Mason, was instrumental in organizing the event.

The funds raised were for the renovation of the farrier's laboratory. Shown here are Dr. and Mrs. Kelly and the British team.