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SLOAN SIEGRIST

Doctoral student, Department of Immunology and Infectious Diseases

Sloan Siegrist, a resident of Guam, hopes one day to return there—to open her own lab, perhaps to study waterborne pathogens. Her interest in emerging viruses and infectious diseases was sparked in high school, when she saw the film *Outbreak* and read *The Coming Plague* and *The Hot Zone*.

Sloan went on to Stanford University and majored in human biology. After graduating in 2002, she began looking for a graduate research program in microbiology. In addition, she says, “I wanted to study something that was personally satisfying and had global significance. I liked the broader aims of public health.”

Sloan is now in year two of her doctoral program in immunology and infectious diseases at HSPH. After an intense first year of classes and laboratory rotations, she is spending more time in the lab of her adviser, Dr. Eric Rubin, researching the role of protein secretion in the cell-to-cell spread of *Mycobacterium tuberculosis*. She has just completed the training necessary to work independently in the school’s Biosafety Level Three Laboratory.

Sloan manages to combine her academic responsibilities with a serious commitment to running. Representing Guam, she won silver and bronze medals at the South Pacific Games in Fiji and recently ran the 800-meter race at the World Track and Field Championships in Budapest. She’ll also represent Guam at the 2004 Summer Olympics.

DEPARTMENT OF IMMUNOLOGY AND INFECTIOUS DISEASES

THE DEPARTMENT OF IMMUNOLOGY and Infectious Diseases focuses on the biological, immunological, epidemiological, and ecological aspects of viral, bacterial, protozoan, and helminthic diseases of animals and humans and the vectors that transmit some of these infectious agents.

Research in the department emphasizes basic pathogenic mechanisms that may lead to better diagnostic tools, the development of vaccines and other interventions for prevention and control of infection and disease, and the identification of new targets for antiviral and antiparasitic drugs. Laboratory-based research within the school may be supplemented by field-based studies of epidemiological and ecological aspects of infectious disease transmission and control. Diseases of developing countries are emphasized.

Members of the department take a multidisciplinary approach that includes immunology, molecular biology, public health entomology, cell biology and ultrastructure, biochemistry, pathology, virology, epidemiology, and ecology. The faculty undertakes research both within the school and around the world.

Infectious diseases currently under study include protozoa (malaria, leishmania, ameba, giardia), helminths (schistosomes, filaria, onchocerca), viruses (HIVs, leukemia retroviruses, West Nile and eastern equine encephalitis), and bacteria (Lyme disease

agents, ehrlichia, tuberculosis). Further immunologic studies focus on genetic regulation of the immune response, molecular mechanisms of the regulation of class II genes, the function and regulation of T-cell-derived cytokines, and cytokines involved in the regulation of inflammation.

Degree Programs in Immunology and Infectious Diseases

As described below, the department offers doctor of science (SD) and doctor of philosophy (PhD) degree programs. No master of science programs are available.

Students in both programs choose among the areas of interest described below:

Immunology The curriculum currently focuses on genetic regulation of the immune response, molecular mechanisms of the regulation of class II genes, and the function and regulation of T-cell-derived cytokines. Students take courses in cell biology, immunology, and molecular immunology.

Immunology and molecular biology of parasitic and other infections This area of interest introduces students to recent advances in the biology of parasitic and infectious diseases and provides background for conducting research on these diseases. The program emphasizes molecular biology, immunology, cell biology, and the epidemiology of parasites.

Infectious disease epidemiology and tropical public health This area of interest provides a solid understanding of epidemiology, ecology, and control of infectious diseases in developing countries. It emphasizes control and prevention measures and the biological basis of diseases caused by pathogens that range from viruses to parasites.

Vector biology, ecology, and control This area of interest focuses on the manner in which blood-feeding arthropods interact with their various vertebrate hosts and with the human pathogens that they transmit. These interests combine biological experimentation, epidemiological analysis, and population studies. Students become familiar with the various arthropods that are associated with human disease and learn the ways environmental change may result in ill health. Students conduct studies on mechanisms of transmission of vector-borne pathogens, both in the laboratory and in the field, and devise novel intervention strategies.

Virology This area of interest is designed to prepare a future generation of experts for new developments in the pathogenesis and prevention of AIDS and other infectious diseases. At present the program emphasizes the epidemiology, biology, and vaccinology of AIDS as an example of a complex infectious disease. Students take courses in virology, vaccine development, and related fields.

Doctor of Science in Immunology and Infectious Diseases

The SD program is designed for those interested in immunology, molecular biology, virology, and the epidemiology of infectious diseases. The program prepares students for postdoctoral research fellowships; junior faculty positions at academic institutions; and positions in independent research institutions, governmental agencies, and the biotechnology industry.

Applicants to the SD program should have a clinical degree (MD, DVM, DMD, or equivalent). This program is also available to candidates without a clinical degree who wish to apply to the interdisciplinary area of interest in the epidemiology of infectious disease. To enter the program through the Department of Immunology and Infectious Diseases, candidates must have adequate background in modern biology, including microbiology.

This program aims to develop the basic skills in laboratory techniques and data handling necessary for undertaking original research. Course work during the first one or two years emphasizes cellular and molecular biology, virology, immunology, and genetics. Course work for students focusing on the epidemiology of infections also emphasizes epidemiology, biostatistics, and ecology. Electives are chosen according to a student's needs and interests. Courses may be taken at Harvard Medical School, the Graduate School of Arts and Sciences, and MIT, as well as at HSPH.

Students are encouraged to participate in the numerous seminar series and informal discussion groups offered on the Longwood campus. The department emphasizes publication of

COURSES OF INSTRUCTION

Please note that courses listed are subject to change and some are not offered every year. Complete course descriptions are available at <http://www.hsph.harvard.edu/registrar/courses>.

Malaria and Human Affairs

Ecology, Epidemiology, and Control of Important Parasitic Diseases of Developing Areas

Tuberculosis: The Host, the Organism, and the Global Threat

Survey of Immunology

Principles of Public Health Entomology

Immunology of Infectious Diseases

Cellular and Molecular Biology of Parasites

Design and Development of a Vaccine

Independent Study, Tutorials



research results in the standard research literature, and most doctoral students publish several papers before completing the degree. The doctoral thesis is based on intensive laboratory research under the guidance of a faculty adviser in the student's area of interest. Students choose a faculty adviser whose research interests match their own when beginning to research their thesis topic. For information about schoolwide requirements for doctoral degrees, see page 58.

Limited funding is available to qualified SD students who are U.S. citizens or permanent residents. A training grant from the NIH Fogarty Institute also provides some support for international students.

Doctor of Philosophy in Biological Sciences in Public Health (Immunology and Infectious Diseases)

Students wishing to study cellular and molecular biology, immunology, virology, or physiology as it pertains to major problems in public health should apply to the PhD program offered by the Division of Biological Sciences through the Harvard University Graduate School of Arts and Sciences. The PhD program is designed to train scientists in state-of-the-art concepts and methods in immunology, immune system disorders, virology, the biology of parasites, or important infectious diseases. For more information about the PhD program, see page 55.

Related Offerings

Interdisciplinary concentration in the epidemiology of infectious disease, see page 56.

Contact Information

For more information about the SD program in immunology and infectious diseases or other departmental inquiries, please contact the main departmental office, Department of Immunology and Infectious Diseases, 651 Huntington Avenue, Boston, MA 02115.

Phone: 617-432-2334

Fax: 617-739-8348

Web: <http://www.hsph.harvard.edu/Academics/iid/index.html>

DEPARTMENT FACULTY

Please note that some faculty members may be on leave during academic year 2004–05.

Department chair: Myron (Max) Essex, DVM, PhD; John LaPorte Given Professor of Infectious Diseases. Role of retroviruses as infectious agents in AIDS; mechanisms of immunosuppression by retroviruses; African HIVs.

Barry R. Bloom, PhD; Joan L. and Julius H. Jacobson Professor of Public Health and Dean of the Faculty of Public Health. Mechanisms of resistance and pathogenesis of diseases, particularly tuberculosis and leprosy; genetic analysis of host resistance; genetically engineered vaccines against tuberculosis.

Barbara Burleigh, PhD; Assistant Professor of Immunology and Infectious Diseases. Molecular and cellular basis of *Trypanosoma cruzi*–host cell interactions; host cell invasion; signal transduction; *Trypanosoma cruzi* differentiation.

Manoj T. Duraisingh, MSc, PhD; Assistant Professor of Infectious Diseases. Molecular basis of the mechanisms underlying the pathogenesis of *Plasmodium falciparum* malaria; vaccine and drug strategies for control of the disease.

Laurie H. Glimcher, MD; Irene Heinz Given Professor of Immunology. Genetic regulation of the immune response; the role of 1a (class II) major histocompatibility complex molecules and T-cell receptor proteins in T-lymphocyte activation.

Michael J. Grusby, PhD; Professor of Molecular Immunology. Molecular and genetic analysis of the JAK/STAT signaling pathway.

Donald A. Harn, Jr., AM, PhD; Professor of Tropical Public Health. Regulation or direction of immune responses due to molecular composition of particular antigens; synthetic peptide and DNA vaccines for parasitic diseases.

Phyllis J. Kanki, DVM, SD; Professor of Immunology and Infectious Diseases. Pathobiology of human and simian retroviruses; characterization of the immune response to various viral antigens and their correlation to stage of infection or disease.

Igor Kramnik, MD, PhD; Assistant Professor of Immunology and Infectious Diseases. Immunology and immunogenetics of infectious diseases; diagnostic tools for predicting the susceptibility to tuberculosis in experimental models and human populations.

Tun-Hou Lee, SM, SD; Professor of Virology. Virology of human immunodeficiency viruses; design of an HIV vaccine.

Eric J. Rubin, MD, PhD; Assistant Professor of Immunology and Infectious Diseases. Virulence factors of mycobacteria; acquisition of virulence determinants by *Vibrio cholerae*; generalized transposon mutagenesis systems for bacteria.

Andrew Spielman, ScD; Professor of Tropical Public Health. Epidemiology of vector-borne disease; physiology and ecology of mosquitoes and ticks; development of infectivity of pathogens in mosquitoes and ticks.

Ali A. Sultan, MB, BS, PhD; Assistant Professor of Immunology and Infectious Diseases. Biochemistry and molecular pathogenesis of parasites.

Dyann F. Wirth, PhD; Professor of Infectious Diseases. Mechanisms of drug resistance in malaria, including molecular genetic analysis and field-based studies; genetic analysis of malaria transmission; analysis of gene expression.

Secondary Appointments

(primary appointments at Harvard Medical School)

Marcia B. Goldberg, MD; Associate Professor in the Department of Immunology and Infectious Diseases. Characterization of the molecular mechanism and function of unipolar localization of *Shigella lcsA*; mechanism of actin assembly by *Shigella lcsA*.

Donald A. Goldmann, MD; Professor in the Department of Immunology and Infectious Diseases. Epidemiology of nosocomial infections; epidemiologic approaches to medical outcomes assessment and hospital quality improvement.

Martin S. Hirsch, MD; Professor in the Department of Immunology and Infectious Diseases. Pathogenesis and therapy of human retrovirus and herpes virus infections.

I-Cheng Ho, MD, PhD; Assistant Professor of Immunology and Infectious Diseases. Molecular mechanisms regulating the development and differentiation of T cells.

Kenneth McIntosh, MD; Professor in the Department of Immunology and Infectious Diseases. Pathogenesis, prevention, and treatment of pediatric respiratory viral diseases; coronaviruses; new methods in viral diagnosis; epidemiology and pathogenesis of respiratory infections.

Edward A. Nardell, MD; Associate Professor in the Departments of Environmental Health and Immunology and Infectious Diseases. Airborne transmission and infection control of *Mycobacterium tuberculosis*; air disinfection with ultraviolet irradiation.

Edward T. Ryan, MD, DTM&H; Assistant Professor in the Department of Immunology and Infectious Diseases. Enteric infections and the development of vaccines protective against such infections.

Joseph G. Sodroski, MD; Professor in the Department of Immunology and Infectious Diseases. Role of the HIV-1 envelope glycoproteins in virus entry; topological and structural analysis of the HIV-1 envelope glycoproteins; generation of HIV-1 neutralizing antibodies.

Adjunct Faculty

Kenneth H. Mayer, MD. Brown University School of Medicine.

Thomas P.C. Monath, MD. Vice President, Research and Medical Affairs, Acambis, Inc.

Abhay R. Satoskar, MD, PhD. Ohio State University.

