

ASCB Course in Tanzania Takes Up Theme of “One Health”

Teaching molecular and cell biology techniques that underpin infectious disease research, surveillance, and intervention strategies was the goal of a recent ASCB course in Africa. Synergies in human and livestock disease research were a major focus as well. The training workshop for African scientists took place in August at Sokoine University of Agriculture (SUA) in Morogoro, Tanzania. Its title: “One Health: Understanding Human and Veterinary Diseases from Molecular Cell Biology to Successful Interventions.” This course was supported by a grant from Carnegie Corporation of New York to the ASCB, with additional support from the Jenner Foundation. ASCB member Keith Gull (University of Oxford, UK) and Paul Gwakisa (SUA; currently at the Nelson Mandela African Institute of Science and Technology, Arusha, Tanzania) designed the workshop to teach young African scientists. International faculty from the University of Oxford (UK), the Institute for Animal Health (IAH) at Pirbright (UK), SCYNEXIS (USA), the Southern African Centre for Infectious Disease Surveillance (SACIDS), and SUA participated. The students were 24 early-career researchers from eight African countries (Burkina-Faso, Egypt, Ethiopia, Kenya, Tanzania, Uganda, South Africa, Zambia). They were selected from 270 applicants.

From Basic Concepts to the Biology of Disease

The week was organized as a series of lectures, group discussions, and case studies. Simon Spiro and Richard Wheeler (Oxford) introduced basic concepts in cell biology and immunology. These themes were expanded in lectures by Gwakisa, Gerald Misinzo (SUA), Claudius Luziga (SUA), Christopher Kasanga (SUA), and Eva Gluenz (Oxford). They discussed specific diseases and the biology of the viruses, bacteria, and protozoan parasites that caused them. Eson Karimuribo (SUA) talked about the realities of field data collection in rural Africa, and showed the transformative impact of new mobile technologies on disease surveillance.

Case Histories in Disease-Related Research

The major part of the week was dedicated to four longer case studies, which gave students first-hand accounts of how theory and methods are applied in practice. First, Bakela Nare (from the U.S. drug discovery and development company SCYNEXIS) took the students on a tour through the drug discovery process. He vividly illustrated each stage in the long path from a chemical to a drug. Nare used as an example a new compound (SCYX-7158) against Human African Trypanosomiasis (HAT) currently under development at SCYNEXIS; he showed how an antiparasitic compound that looked promising in the lab was subjected to a rigorous series of defined tests. He emphasized that both scientific and economic criteria must be satisfied to progress to the next stage.

The second case study was molecular diagnostics and surveillance of Foot and Mouth Disease (FMD). Don King (IAH) gave an overview of diagnostic tools, emphasizing the critical importance of molecular analysis. Using examples from the 2001 and 2007 outbreaks of FMD in the UK, he showed the power of sequence analysis in outbreak investigation. Students then analyzed FMD phylogenetic trees based on real data to practice data interpretation. They also explored Web-based tools for design of diagnostics. For some, this was a first attempt at sequence retrieval and primer design. There was clear feedback that these were areas of particular interest.

Sarah Gilbert (Oxford) focused on vaccines, discussing the current status of vaccine development for malaria and other diseases where this proves challenging. The students worked in small groups to “design” a vaccine against Rift Valley Fever (RVF). This required application of many of the concepts raised in



Students debated whether human tuberculosis could ever be eradicated.



Students learned to use Web-based tools for sequence analysis and design of diagnostic assays.



Young African scientists completed the ASCB course on "One Health" in Tanzania.

lectures, from virus biology and the differences between T cell vs. antibody-mediated immune response to trial design and the economics of vaccine production. Each group rose to the challenge and presented its solutions to the whole class.

In the final case study John Anderson (IAH) told the remarkable story of how the devastating cattle disease Rinderpest was eradicated, effectively bringing together the main themes of the workshop. Rinderpest is only the second disease in history to be completely eradicated. Anderson highlighted as key factors in this success the development of appropriate diagnostic assays, technology transfer, and training of local scientists. Could

other diseases be eradicated too? The students were asked to consider HAT, RVF, FMD, and tuberculosis (TB). After scoring these diseases against eight biological characteristics considered important in the eradication of smallpox and Rinderpest, each group concluded that the prospect of eradicating them was slim. It was, however, a valuable exercise in looking at the "bigger picture." This resonated with the students' desire to engage in research with a perceptible impact on Africa's disease burden. In conversation, many students focused on the lack of modern equipment in their laboratories, which they feel leaves them at a disadvantage in the global competition with scientists from the "North." Here was a powerful illustration how cutting-edge technology is not always required to succeed; dedicated individuals working together toward a common goal, using what John Anderson called "appropriate" technology, can have a major impact.

Career Advice, Informal Discussion

In addition to the scientific sessions, we provided one-on-one advice on writing CVs and research proposals. Athena Markides (UK) concluded the career advice focus with examples of well-crafted application letters. Lively discussions during those sessions indicated that the students appreciated this mentorship, which will continue by email exchange.

Tea breaks and lunch times offered plenty of time for informal discussions. We even learned about an unconventional approach to diagnostics: We attended a training session for giant African pouched rats (www.apopo.org) that detect TB in clinical samples by smell! This rounded off a stimulating workshop. The workshop left students and faculty alike with new knowledge, friendships, and the feeling that, as scientists, we have a chance to make a real difference in the world. ■

—Eva Gluenz, on behalf of the ASCB Tanzania teaching team