November 2012

SSI News

A newsletter from the Sustainable Sciences Institute

A Busy Year at SSI!

Once again, I am happy to report a very busy and productive year at SSI. At SSI-Nicaragua, we are thrilled to have Dr. Lionel Gresh join the SSI team as Program Coordinator and Onsite Director. He brings a broad range of experience, a unique French-Cuban heritage, and a wonderful personality; he has picked up incredibly quickly and has already become an indispensable member of SSI. After more than two years, our Study Coordinator Hilary Haber has moved on, and we wish her all the best! These are exciting times scientifically, with our extraordinarily competent team managing a complex nested arrangement of dengue and influenza studies. This year, SSI successfully competed for an NIH IRIDA grant directly to Nicaragua with Dr. Angel Balmaseda as the PI—one of very few grants awarded by NIH directly to foreign countries. This, and other grants that SSI has been awarded recently, are particularly significant, given the current difficult funding situation.

I am also very pleased to report that SSI's programs in Egypt are moving forward successfully against all odds. A Memorandum of Understanding with key Egyptian institutional partners has been signed, and training of promising investigators continues despite the political turmoil.

Lastly, our Capacity Building Program is still going full force. I was recently in Panamá, where SSI has conducted an impressive 21 workshops in nine years, most with funding from the Panamanian SENACYT. We plan to celebrate 10 years of SSI in Panamá next year! We have also started an important new initiative on screening for Human Papilloma Virus (HPV) infection in Central America, where more than three times more women die from cervical cancer than in childbirth.

All in all, it has been an amazing year at SSI—but we need your support, especially now in these difficult times, so that SSI can continue to be at the forefront! —*Eva Harris*

Much Ado About "Macho"

Using mHealth tools in Nicaragua to help engage men in maternal and child health

mHealth tools in action in rural Nicaragua.

From March 2011 through October 2012, SSI-Nicaragua's ICT for Health Program supported an innovative mens' peer counseling component of the "Superviviencia Materno-Infantil" project, a collaboration between Catholic Relief Services (CRS-Nicaragua) and the Nicaraguan Ministry of Health (MINSA). One of this project's strategies was to target behavior-changing activities to engage men in helping improve prenatal, obstetric and neonatal care-seeking by women. Efforts included general community outreach (such as health education radio messaging and baseball game health advertising) and the establishment of a direct peer-to-peer men's counseling program at the community level to address more than 20 key behavior changes. For example, male peer counselors encouraged men to commit to participating in prenatal visits, helping with household savings for diapers and other costs and setting up an emergency transportation plan for obstetric and neonatal emergencies. The peer counselors routinely visited their respective "dad-participants" to follow up, offer information about prenatal and neonatal health risks and dangers (and how to prevent them) and generally provide support to their male peers during pregnancy, after delivery and in the first years of new fatherhood.

SSI's ICT for Health team identified CommCare—an open source mobile phone software application designed by Dimagi, Inc. (an SSI collaborator since 2008)—as an excellent candidate mHealth tool to simplify and streamline the program, while improving information quality, quantity and access. This easy-to-use but relatively sophisticated software runs on low-cost phones and offers decision support for community health workers during client

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Capacity Building with SSI: 13 Years and Counting

Instructor Nelba Tabora (standing) teaching viral detection techniques in El Salvador.

Last September, the workshop, "Strengthening Capacity for Diagnosis & Characterization of Critical Viral Infections" trained 32 health science professionals in molecular virology techniques to improve research and diagnosis of dengue virus and human papilloma virus (HPV) in El Salvador. This training, sponsored in part by the Conservation, Food and Health Foundation, a long-term partner and funder of SSI's Capacity Building Program, was accompanied by more than $25,000 worth of laboratory equipment and reagents donated by Roche; the University of California, Berkeley; the University of California, San Francisco, and SSI.

Maria Elena Peñaranda, SSI's Scientific Director, describes some of the highlights and challenges faced in her week in San Salvador—as well as her impressions of the impact of the work—during one of the 66 workshops SSI has conducted thus far.

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Introducing: Lionel Gresh

SSI manages several studies on dengue and influenza in Nicaragua as the Instituto de Ciencias Sostenibles (ICS), in partnership with the Nicaraguan Ministry of Health. The SSI/ICS-Nicaragua team includes more than 80 local personnel, including medical doctors, nurses, laboratory technicians, field and support personnel and project coordinators. In March 2012, SSI/ICS welcomed Dr. Lionel Gresh as the new Program Coordinator and Onsite Director of SSI/ICS-Nicaragua. We asked Lionel to introduce himself to the SSI community.

Lionel Gresh, PhD

I was trained as a molecular biologist at the Pasteur Institute in Paris, France, where I completed my MSc and my PhD. At Pasteur and during my postdoc in Vienna, Austria, I worked with mouse models of human diseases, such as polycystic kidney disease and colorectal cancer. In 2008, I moved to South Africa and discovered a whole new scientific area: infectious diseases, in particular tuberculosis and HIV/AIDS. In 2011, my wife, my two-year-old daughter and I moved again! This time we were headed to Nicaragua. As soon as we arrived, I started looking for job opportunities in my field and discovered SSI. I was immediately impressed by the breadth of the scientific research and capacity building being done by SSI. I thought, "This would be a great place to work!" I guess the feeling was mutual; soon after my interview I was offered the position. I think my ultimate goal would be to strengthen SSI's structure in Nicaragua. We have grown quite a lot in terms of scientific studies and personnel and it is essential to find new, streamlined ways of operating. I think my biggest challenge is to keep up with all aspects of SSI activities in the country: from scientific research to administrative oversight, capacity building and day-to-day operations. Definitely not an easy job! But I've had a lot of support from SSI team members both in Nicaragua and California; it is truly an amazing team. I consider that I have been given a tremendous opportunity. I think that through my new position I will be able to contribute to the development of sustainable scientific research in Nicaragua and Central America. Sharing the knowledge I have gained through my education and experiences and learning new things from people I work with, that is what excites me! —*Lionel Gresh*

Dengue Torpedo: Gaming for Health

A 24-month pilot study of a web and cellular phone service designed to motivate community residents to report and eliminate mosquito breeding sites is being launched in a *favela* (marginalized community) in Rio de Janeiro, Brazil. Dengue is largely preventable by elimination of its mosquito vectors, but the job of removing every container of water where the insects breed is practically impossible for municipal government agencies. An innovative web- and cell phone-based app called Dengue Torpedo (an SMS message is referred to as a "torpedo" in Brazilian Portuguese) harnesses the power of crowdsourcing and local knowledge to encourage urban residents to address the problem of dengue locally. Dengue Torpedo employs gameplay to allow users to report mosquito breeding sites—such as flower pots, trash or old tires—eliminate these sources, and document the result by submitting photographs. Users of the app earn points for identifying and eradicating sources of mosquito breeding sites and for recruiting new players. These points can be traded for rewards ranging from "dengue warrior" badges and stickers or free texting and cell phone minutes to community prizes, such as park benches, trash cans and books for the local community library. Dengue Torpedo was developed by James Holston, codirector of the Social Apps Lab at the Center for Information Technology Research in the Interest of Society (CITRIS) and his group at UC Berkeley, in collaboration with SSI Executive Director Josefina Coloma and SSI President Eva Harris. Dengue Torpedo employs a "capillary" collaborative strategy of research and development that involves local user-residents in researching, testing and designing the application itself. The pilot study will result in a fully developed app that can be deployed in larger urban areas in Brazil and globally.

... ICT for Health, continued from Page 1

visits and facilitates the collection, storage and transfer of information to a central database. The capacity of the CommCare software platform to allow for offline data collection and storage was an important element, since many of the peer counselors live and work in communities where there is limited or non-existent cell phone or internet connectivity.

Using mobile phone technology to engage a young father in his baby's care.

Although the cell phone component of the project was only a pilot, we saw promising results! For example, when using CommCare, the time necessary for an information feedback loop between peer counselors and their supervisors was reduced by roughly 50 percent. Not surprisingly, another major impact of the project was improvement in communication channels during obstetric and neonatal emergencies. We documented multiple cases of lifesaving interventions and successful emergency transports from isolated communities facilitated by the peer counselors using project phones to coordinate with health centers in the municipal capital. In addition to supporting more cost-effective use of resources, the peer counselors felt that the mHealth tool allowed them to do their job better and more efficiently, and having a phone dedicated to their work allowed them to support other community health activities—such as calls and coordination of emergency response—more effectively. The SSI team is now working on applying the lessons learned in this pilot to other mHealth projects being implemented with MINSA Nicaragua.

Dengue and Influenza Studies in Nicaragua

SSI-Nicaragua's team, located at the National Virology Laboratory, with Eva Harris (back, third from left).

The past year has been very exciting for our dengue and influenza studies in Nicaragua. We continued running the Pediatric Dengue Cohort Study (PDCS), now in its ninth year. The value of the dengue cohort is all the more apparent in light of the results of the first dengue vaccine efficacy trial, which make it clear that more work is needed to understand dengue immunity. As arguably the longest continuously running dengue cohort studies in the world, the PDCS provides unique samples that enable studies to define immune correlates of protection from disease and develop assays that can help guide vaccine evaluation. We also continued our hospital-based dengue study, as well as the Pediatric Influenza Cohort Study (PICS), funded by the NIH's International Centers for Infectious Disease Research (ICIDR) Program. The PICS is now in its second year. Furthermore, we celebrated the first anniversary of our Influenza Birth Cohort, an active surveillance study where infants are enrolled at birth and are visited at least once per week by our team to collect symptom surveys and identify potential respiratory illnesses. It is a logistically challenging setup, but very rewarding, as it bring us even closer to the community in which we work. Every year, the study children take part in the five-week long annual sample collection. In an incredible effort, this year's collection resulted in 3,750 blood samples, with approximately 650 collected directly in the participants' homes. Other activities included interviewing participants and their parents to identify individual and household risk factors; measuring children's height and weight, updating participants' data and enrolling new participants (440 this year); conducting a breast-feeding questionnaire with mothers of study infants, and processing all samples at the National Virology Laboratory, including the meticulous preparation of 1,000 samples of peripheral blood mononuclear cells (PBMCs) for immunology studies. The latest addition to our portfolio of community-based studies is the Influenza Household Transmission Study, part of the ICIDR Program. In this study, we identify index cases of influenza and enroll household members for 30 to 45 days. This setup allows us to study transmission parameters at the household level, which is where up to 70 percent of transmission of influenza may occur.

We have also initiated a collaboration with Colorado State University to identify metabolomic biomarkers for dengue and severe dengue using noninvasive samples (urine and saliva), as well as serum. We are collecting samples from suspected dengue cases in both the PDCS and our hospital-based dengue study. We hope to discover biomarkers that could be used for dengue diagnosis and prognosis of disease severity. This study was recently awarded funding from NIAID/NIH as part of a new R21/R33 program. In addition, SSI—with Dr. Balmaseda as Principal Investigator—was awarded a competitive International Research on Infectious Disease grant from NIAID/NIH to study 3rd and 4th dengue virus infectious. The longevity of the cohort allows specific questions about these repeat dengue virus infections to be addressed in detail for the first time. The resulting data are critical for improving understanding of immune correlates of protection from dengue in natural infections and have important implications for vaccine design. Based largely on this study, we submitted a Program Project grant application to NIH as a consortium of 15 institutions, led by UC Berkeley and SSI. This is a unique opportunity to leverage existing research infrastructure and resources and to continue the long-term prospective PDCS.

Raising the profile of our activities in Nicaragua, we hosted a site visit and scientific symposium over two days in April 2012. The attendees included: Dr. Sonia Castro, Minister of Health of Nicaragua; Dr. Carlos Saenz, National Director of Epidemiology; Dr. Jorge Luis Prosperi, PAHO country representative; Dr. Jaime Sepulveda, Director of Global Heath Sciences at UCSF, Dr. Michele Barocchi, Head of Molecular Epidemiology at Novartis Vaccines in Siena, Italy; Drs. Kate Williams and Poornima Parameswaran from UC Berkeley; Professors from the Universidad Nacional Autónoma de Nicaragua en León, and members of the Ministry of Health. We also hosted an external evaluation of our Camino Verde Random Controlled Cluster Trial in January 2012 by Dr. Amy Morrison from Peru and Dr. Ann-Marie Sevcsik, our Program Officer at the UBS Optimus Foundation. We also hosted a site visit from the NIH in September 2012, including Dr. David Spiro, a Section Chief of the Respiratory Diseases Branch of NIAID and Dr. Erik Stemmy, our Program Officer for the ICIDR grant. Congratulations to the SSI-Nicaragua and CIET-Nicaragua teams for all their hard work and resulting success!

In August 2012, Eva Harris presented a certificate of gratitude to Leonel Perez thanking him for eight years as SSI's legal representative in Nicaragua.

SSI-Nicaragua Researcher Wins National Prize

On Oct. 1, 2012, the Nicaraguan Council for Science and Technology presented the 2012 National Innovation Prize. The first prize was awarded to Dr. Angel Balmaseda (far right), director of SSI's Nicaraguan Virology Program and director of the National Center for Diagnosis and Reference and the National Virology Laboratory. The prize was presented to him by the Vice President of Nicaragua and the Head of the National Assembly. Dr. Balmaseda's laboratory's work on the "Development of an IgM ELISA kit for dengue diagnosis" was selected from among 58 submissions from all regions of the country and all disciplines. The kit was developed with the support of the Nicaraguan Ministry of Health and SSI. Congratulations to Dr. Balmaseda from all SSI team members!

... Capacity-Building, continued from Page 1

Day 1: It is three days before the start of the workshop and I head to El Salvador with three enormous suitcases packed with laboratory supplies and equipment. I am joined by two SSI instructors, Elsa Videa (from Nicaragua) and Nelba Tabora (from Honduras), who are experts in dengue and Human Papilloma Virus, respectively. We are met by four enthusiastic young scientists appointed by the University of El Salvador medical school, in charge of helping us with logistics and setting up the laboratories. Our first stop is a famous eatery on the way from the airport for delicious "pupusas," the local culinary specialty. After getting to know each other and eating way too much, we arrive at the Centro de Investigación y Desarrollo en Salud (CENSALUD) to deliver the materials, store reagents in freezers and ensure all the equipment necessary for the training is in place. This research facility at the University of El Salvador will be our host institution for the week.

Instructor Elsa Videa organizing donated supplies at the workshop in El Salvador.

Day 2: We return to the airport to retrieve one of the three suitcases that did not arrive with us, and proceed again to the CENSALUD laboratories. We spend the entire day preparing aliquots, calibrating equipment and standardizing the protocols we will teach during the workshop. As we know from our experience, it is likely that experiments have to be adapted to the local conditions. We succeed!

Day 3: It is Sunday and the CENSALUD labs are closed! So our plans of setting up the space for the workshop have to wait. Instead, we are taken around El Salvador to visit villages, see volcanoes and lakes and end up at a town fair for souvenir shopping and a feast of local foods.

Day 4: We rise early for the first day of the workshop, which starts with a formal inauguration by the Dean of the Medical School and the director of CENSALUD, followed by oral presentations from local experts working in the fields of Dengue and HPV and from SSI instructors. More than 60 people, including the 32 workshop trainees, are present.

Day 5: On the first day of laboratory training, we divide the participants into groups by disease topic, distribute the manuals, start with the theory behind the diagnostic techniques and familiarize the participants with the materials and equipment. We perform our first amplification of the viral genomes using the polymerase chain reaction (PCR).

Days 6 & 7: We perform experiments to visualize the results of the previous day's experiments, troubleshoot those that did not work and repeat others until every participant succeeds in correctly identifying the viruses in the samples provided—four serotypes in the case of dengue and eleven for HPV.

Day 8: During the last day, we analyze the results obtained and interpret them in the context of each viral disease. We discuss the possibilities of introducing these techniques to the public health system in El Salvador. Finally, the last hours of the workshop are spent discussing the different ways participants will apply the new knowledge to their work and future research.

Follow-up: Although the 32 participants had very little background in virology techniques prior to the workshop, a post-workshop assessment quiz on the methods result in an average score of 98.2 percent! Several months later, we are very pleased with the outcomes of the workshop. We have witnessed the revival of a defunct laboratory that the Faculty of Medicine at the University of El Salvador has turned into a new research facility outfitted with the equipment that SSI donated. We have also learned of multi-center collaborations including research projects on dengue serotyping between the Ministry of Health and the university and overall, a new awareness of the need for widespread HPV testing in the country.

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SSI's Program in Egypt

Waleed Abu Baker Abdel Galil (left), Asmaa Mosbeh Mostafa Abd-Elmaksoud and Mohamed Sobhy Abdel Motty in the new University of Minufiya laboratory.

Our Hepatitis C Program in Egypt continues with great success despite the local political vicissitudes. A Memorandum of Understanding (MOU) between SSI and the National Liver Institute (NLI) at the University of Minufiya has been signed and approved by the University Council, which is the highest authority at this prestigious institution. This MOU provides assurance for the continuity of SSI's projects with our Egyptian colleagues. The Director of the new NLI-SSI Collaborative Research Center, Dr. Mohamed Helmy Abdel-Rahman, is mentoring two new laboratory researchers: Waleed Abu Baker Abdel Galil and Asmaa Mosbeh Mostafa Abd-Elmaksoud, who are both pursuing PhD degrees from the University of Minufiya through the Genetic Engineering and Biotechnology Research Institute. SSI will support them with partial scholarships. Galil will be studying "KIR genotypic diversity and its functional consequences in disease progression and response to therapy in Egyptian HCV and HCC patients." He is planning on an internship in the near future in Dr. Stewart Cooper's laboratory at the California Pacific Medical Center (CPMC) in San Francisco, with Dr. Adil Ed Wakil as his co-advisor. Abd-Elmaksoud will study the role of the BAP1 gene in the pathogenesis of liver, biliary and pancreatic tumors under the direction of Dr. Rahman in Egypt.

A New Home for Researchers

The Technical Training Foundation (TTF), our long-term supporter of the Hepatitis C Program in Egypt, purchased a house in San Francisco to host visiting researchers from Egypt and collaborators from other institutions while they are teaching or in training in the Bay Area. SSI is in charge of managing the house and hosting guests while they are in San Francisco. We are thrilled by the extended support from the TTF to help improve understanding of liver disease worldwide. Dr. Adil Ed Wakil (right) and Dr. Ugur Halac, a researcher from Belgium who moved into the house with his family in October, move a donated table into the dining room of the main floor. The house is furnished primarily through donations, so thank you to all who contributed!

SSI Loves Our Collaborators!

Janet Ikeda - Quetzaltenango, Guatemala

For the past 18 years, Janet Midori Ikeda has been the Executive Director of the Asociación de Investigación, Desarrollo y Educación Integral (IDEI), a not-for-profit organization based in Quetzaltenango, in the highlands of western Guatemala. IDEI is dedicated to HIV/AIDS prevention and treatment in the mostly indigenous Mayan community. Partnering with local programs, Ikeda has designed and implemented an integrated care clinic dedicated to patients co-infected with tuberculosis (TB) and HIV. Ikeda has tirelessly researched the integration of TB and HIV services, early initiation of antiretroviral therapy (ART) among TB patients and mobile phone technology for promoting adherence to ART among rural populations.

Ikeda first overlapped with Eva Harris in 1995, at a workshop for PCR techniques that Harris and her colleagues presented to microbiologists in Guatemala City. Then in 1999, Ikeda learned of the establishment of SSI through Harris' former student Ana Maria Xet Mull, who was doing her Masters thesis on the molecular diagnosis of TB among women in Guatemala City. Last year, when Ikeda needed to find a used PCR machine, Xet Mull connected her with SSI and Ikeda realized that she and SSI shared a vision of building scientific capacity in the developing world. SSI soon donated equipment and materials, which traveled to Guatemala in several overfilled suitcases. "I believe SSI can assist us with finding appropriate technology to improve diagnosis and further care improvement in the western part of the country," says Ikeda.

There are four HIV clinics linked to a hospital in the western part of Guatemala, and their laboratories do not have the capacity to diagnose simple opportunistic infections. Ikeda firmly believes that securing used equipment for the laboratories in western Guatemala will make a significant impact on their ability to perform. Part of IDEI's process in improving HIV and primary health care in Guatemala is to decentralize the technology to the provinces, explains Ikeda, to focus on universal access for all who need diagnosis of opportunistic infections and HIV.

SSI is organizing a workshop with Ikeda in Quetzaltenango from November 19 to 23, 2012, funded in part by the Abundance Foundation and IDEI. SSI will train 25 local laboratory workers how to detect histoplasmosis in the urine of HIV patients and how to use molecular biology techniques for detection of TB and human papilloma virus. With SSI's commitment to improving local scientific capacity in the developing world with a focus on Latin America, Ikeda says, "I believe that SSI and IDEI make a good team to foster our mutual goals."

2012-2013 Operating Budget: $1,311,800

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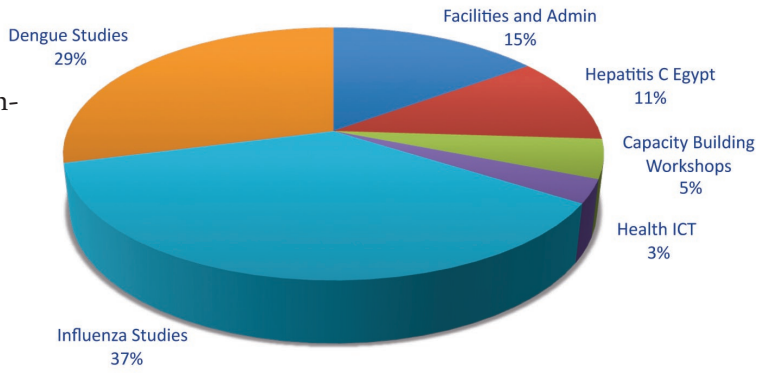

SSI launched our new Web site this year! **www.sustainablesciences.org**

Sustainable Sciences Institute

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The many doctors, nurses, lab technicians, drivers and administrative assistants who participate in our work.

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