



Photo courtesy of Eva Harris.

A Nicaraguan *brigadista* holds a test tube containing larvae of *Aedes aegypti* mosquitoes, which transmit dengue virus.

PUBLIC HEALTH

Science, Sustainability and the South

By Karen Levy

Envision a Bohr model of an atom, but replace the little electrons zipping around the nucleus with ideas buzzing around the head of a single person. Seemingly disconnected words and ideas fly around, constantly jumping energy levels, yet maintaining a constant orbit — DNA, social movements, capacity-building, polymerase chain reaction, south-south partnerships, dengue hemorrhagic fever, plasma leakage, palm pilots, *abuelitas*, electrophoresis, reggaeton. Somehow Dr. Eva Harris provides the central atomic core tying all these ideas together, making their connections seem so obvious that you wonder why others don't link them as she does.

And yet few could match the atomic energy levels that she brings to her work. Dr. Harris, virologist at the UC Berkeley School of Public Health, appears to have boundless energy for practicing science within its social milieu. She blends

an enthusiasm for high caliber scientific research with a passion for the people that her science serves. Her work shows that the way one approaches academic questions can in fact transcend the details of the questions themselves.

At CLAS, Harris squeezed three lectures into one by speaking at three times the speed of most professors. “I probably should've chosen one, but I couldn't help myself,” she said. Her talk focused on the programs she has created over the past 20 years to tackle dengue fever — a mosquito-borne illness which has reached epidemic proportions in Latin America since the mid-1990s — using biomedical research, information technology and community participation.

Harris knows how to talk to a diverse audience. “Don't get scared, it's DNA, but it's okay,” she said as she quickly explained the fundamentals of molecular biology. She

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A blenderfuge created in a Bolivian lab.

Photo courtesy of Eva Harris.

then went on to discuss examples of the ways in which her science has informed public health problems in Nicaragua and in other countries in Latin America in real-time.

In 2000, she helped diagnose an outbreak of dengue fever in Paraguay using the tools of molecular biology and working with the Ministry of Health. “In Paraguay they were like, ‘help!’” she recounted. “The CDC was busy, Brazil was busy, so they said, ‘Eva, can you come help us?’” Using molecular diagnostics, she and the Paraguayan team were able to determine that the dengue strains were coming in from Brazil via the border bus stations. The Ministry of Health was then able to target interventions to the specific locales where the epidemic was entering the country and, by acting quickly, was able to keep it from spreading.

Discussing her work in Bolivia, she described the laboratory equipment improvised by her colleagues there. In order to make a centrifuge, they fused faucet widgets with a blender to create the “Blenderfuge.” They also took an old record player and transferred the circular motion to horizontal motion in order to make a lab shaker. These researchers were inspired by a concept that she used at the onset of her career. She wrote a manual about how to carry out polymerase chain reactions — the fundamental tool of molecular biology — in something akin to coffee cans.

“What you do in this country is buy a \$10,000 machine.

If you just know you need to buy a machine, you’re stuck. But if you understand the biophysical properties of DNA hybridization and annealing... you can do what the machine does yourself.”

Ironically, her colleagues in Nicaragua have now convinced her to also do the reverse: to use high tech equipment in her community work. They have piloted the use of geographic information systems, palm pilots and fingerprint scanning technology to systematize a large study of dengue virus in children. “I don’t know how many of you have ever been to Managua, but there are no addresses,” she said. “People say ‘go to where the Pepsi sign was before the earthquake,’ which was in 1972. And then you get there, and it looks different because it rained the night before.” Technology has helped the researchers find and then relocate the 4,000 children enrolled in the study and keep track of their records.

Of equal importance, using this equipment has enhanced the computer literacy and confidence of the health workers who have been trained to use it. “They learned to use PDAs, and now they’re emailing; they’re doing research on the Web.” But it doesn’t stop there. “The Nicaraguan government has asked us to help computerize entries of newborns to help with their national vaccination schedules. And Gates wants the Nicaraguans to train the Africans.”

These cascade effects of scientific capacity building are what feed Harris’ passion. Instead of relying on traditional approaches to combating dengue fever such as hanging posters in health centers and deploying outsiders to spray people’s homes, her group is engaging volunteer Barrio Brigades to educate the community about the disease and how to control it.

This work has rallied the community beyond her expectations. “Dengue is the banner, but in fact social mobilizing has been the result,” she explained. “Gang members have now become *brigadistas*, and the project is solving delinquency problems, which in fact are bigger in this area than the dengue problem. They are writing dengue reggaeton songs about the *larvas* and the *pupas*. It’s truly amazing to see what happens when you give them the information and let them run with it.”

“What I’ve tried to do in my life and in my work has been to take scientific capacities, knowledge and tools, and bring them to the hands of people in Latin America to use as they see fit,” she said.

Just as the electrons surrounding the Bohr atom emit energy by shifting from one orbital to another, Harris sustains her energy level by switching back and forth between the excitement of the molecular virology laboratory she runs in Berkeley and her community development work. When asked about how she manages to engage in this work,

given the intense pressures of academia, she laughed. “This is my fun stuff. I also have my virology laboratory and all of my other work that I do here as a real professor.” Yet her scientific work is far from mundane. She is one of the world’s foremost experts on dengue fever and publishes in leading scientific journals.

“You have to be able to defend your existence in academe,” she explained, “but I think it’s really important to bring something out of that science that actually benefits people, and to do that vocally and make it explicit, instead of just making sure that your grant is renewed.”

“In the end, it’s important not just to publish a paper but to put it into public health practice,” she explained. “You actually do something beyond a research project, which is really our theme.”

Eva Harris is Associate Professor of Public Health at UC Berkeley and the founder and president of the Sustainable Sciences Institute (SSI). Professor Harris was awarded the MacArthur “Genius” Fellowship in 1997. She gave a talk entitled “Infectious Disease Research in Latin America: A Platform for Scientific Capacity Building and Social Mobilization” at CLAS on October 30.

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Photo by David R. León Lara.

Professor Eva Harris.

This sign reads, “This house is being monitored by SEPA for the prevention of dengue.”

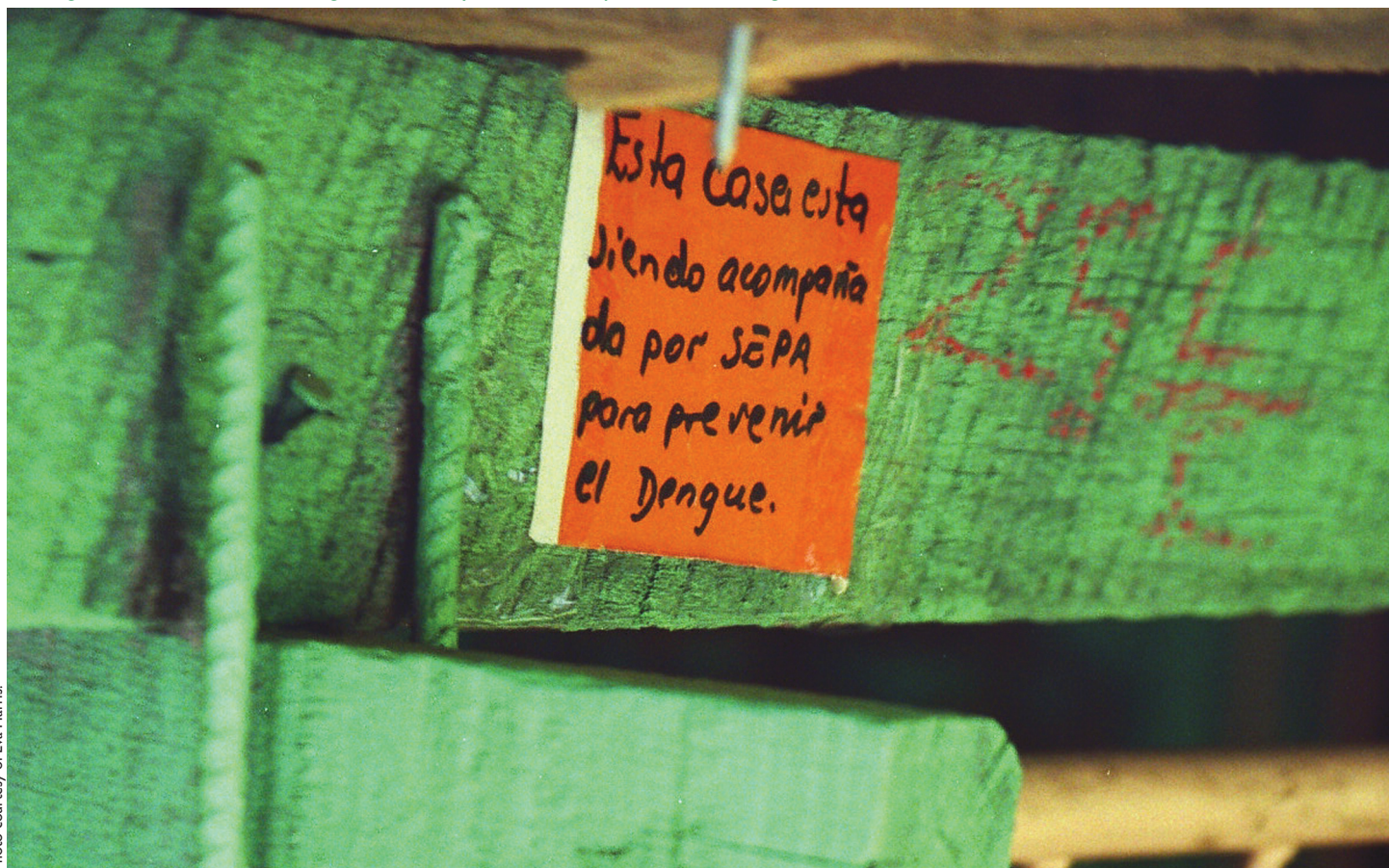


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