

Microsoft, stretched Smalley's speculative calculation even further by referring to a world of Ph.D. scientists that would soon be "90% ... Asian, living in Asia." Then he turned the prediction into a rallying cry for his domestic audience: "What can we do about this shift of talent to other countries? What can we do to stem the tide?"

That rhetoric was a bit much for other PCAST members, however. "People don't respond to stemming tides," counseled

Charles Vest, president of the Massachusetts Institute of Technology. "I think we need to send a more positive message about strengthening the domestic workforce and training better teachers." After a long discussion, PCAST asked the task force to take a second crack at the topic.

For all his concern about the nationality of future U.S. scientists, Smalley believes that most research universities will continue to recruit and welcome large numbers of

international students and foreign-born faculty members, because such openness is one of the factors that makes the U.S. scientific enterprise so potent. Recalling how his lab went from one or two foreign students in the 1980s to more than a dozen today, Smalley says, "I want the best students, and I've gotten pretty relaxed about where they come from. The world is changing, but we'll cope with it somehow."

—JEFFREY MERVIS

NEWS

A Foot in Each Country

Many foreign-born scientists who succeed in the United States are helping those they left behind—without leaving their new home

Geneticist Bruce Lahn has studied and worked in the United States for more than a decade, but a piece of his heart remains in his native China. He wants to help it compete in science at the highest levels, and he's decided that the best way to do that is to stay in the United States.

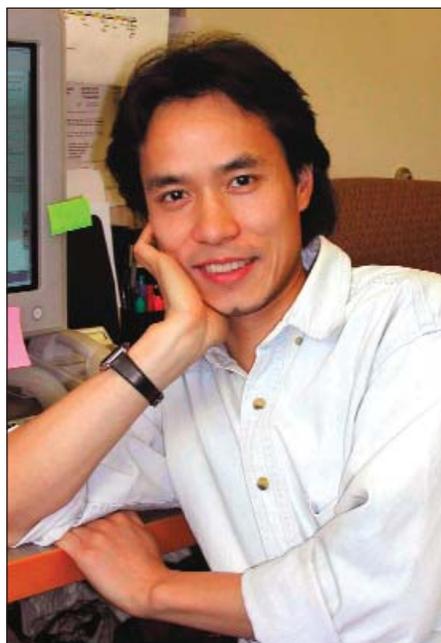
At 35, Lahn is an assistant professor at the University of Chicago and a Howard Hughes Medical Institute (HHMI) investigator. But he's also serving as chief scientific adviser to a new primate research facility in Guangzhou. The \$1 million Center for Stem Cell Biology and Tissue Engineering comprises a laboratory at Sun Yat-sen University and a primate-breeding facility an hour's drive away. Directed by Lahn's former postdoc Peng Xiang, the center aims to develop transgenic primates and isolate hundreds of lines of monkey and human stem cells.

Chinese scientists have tremendous potential, says Lahn, who came to the United States in 1988 as an undergraduate. But "they lack vision. I thought that the way to change that was not to go in as the director of some institute, but to demonstrate a new approach by being a role model." The new center, he says, will "serve as a cultural messenger of how to do science."

Lahn is part of an apparently burgeoning international phenomenon. Although the numbers remain small, foreign-born researchers are reaching out to colleagues back home while remaining anchored in the United States, says Paula Stephan, an economist at Georgia State University in Atlanta. "I can't put my finger on any hard piece of data," she says, "but there are all kinds of indications that more of this is happening."

Science has talked with more than a dozen scientists who have a foot on another continent to find out what works, what motivates them, and what advice they might of-

fer others. Although they differ greatly by field, geography, and age, the researchers are united by a desire to repay the countries that gave them their starts by transferring some of the methods, standards, and culture of science found in the United States. The



Role model. Bruce Lahn hopes Guangzhou center will send message to Chinese colleagues.

key is the connection: Researchers say they can contribute more by retaining their positions and influence in the United States than by going back home.

Anecdotal evidence suggests that such down-home collaborations are also growing more formal and ambitious. Decades ago, well-established researchers might simply invite others from their countries to work in their labs for a couple of years. Now, even

junior faculty members fly back and forth several times a year to help start institutes and businesses in their homelands. Such efforts have undoubtedly improved the quality of science in up-and-coming nations. Obstacles abound, but most researchers say such bridge-building is well worth the hassles.

Bridges old and new

Arriving in the United States shocked Tong Hyub Joh, a neuroscientist at Cornell University's Weill Medical College in New York City. "I thought I had very high standards for myself," says Joh, who immigrated from South Korea in 1959 to start graduate school at the University of Illinois, Urbana-Champaign. "But I didn't know how to tackle a research problem. I had no experience. I remember how I suffered."

After receiving his doctorate from New York University in 1971 and joining Cornell the next year, Joh decided to help other Koreans gain the research skills he had lacked. He began hosting Korean researchers for 2- to 3-year stays in his lab. Three decades later, he has trained more than 50 of them, and many hold prominent academic positions in South Korea.

At first, Joh says, his guests were mainly professors who had little research experience and weak backgrounds despite their lofty job titles. But his charges have grown both younger and better trained over the years; now, he says, they're mostly postdocs. In fact, Joh says, the quality of South Korean science has risen so much that many Koreans no longer see the advantage of coming to the United States. "In 10 years," he predicts, "it will be very hard to recruit Korean scientists."

Joh's simple but effective assistance typifies the efforts of older researchers. But younger scientists such as Yale University geneticist and HHMI investigator Tian Xu often have grander plans for their compatriots. Like Joh, Xu struggled after graduating from Fudan University in Shanghai

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and coming to the United States in 1983. For a while, he even lived in an abandoned house in Harlem. But a Yale doctorate, followed by a 3-year postdoctoral position at the University of California, Berkeley, led to a faculty appointment at Yale.

In gratitude to Fudan and Yale, Xu is helping build a bridge between the two universities. Together with Min Han of the University of Colorado, Boulder, and Yuan Zhuang of Duke University in Durham, North Carolina, Xu co-directs the Institute of Developmental Biology and Molecular Medicine at Fudan University. Funded primarily by China's National Natural Science Foundation and its Ministry of Education, the 2-year-old institute boasts five full-time faculty members and focuses on using fruit fly and mouse genetics to decipher the functions of mammalian genes. Yale beams its weekly genetics seminar to the institute by video teleconferencing, and Xu has taught a course each year at Fudan on genetic analysis. To prepare students to compete on the world stage, the institute conducts all business in English.

The institute plans to tackle large-scale mouse experiments that are "way too expensive to do in the U.S. or any other developed nation," says Xu, who spends about one-fourth of his time in China. "We're determined to do absolutely first-rate work."

The benefits of beneficence

The advantages of setting up shop overseas also appealed to physical chemist Bartosz Grzybowski of Northwestern University in Evanston, Illinois, who grew up in Gdansk, Poland. Grzybowski received his doctorate from Harvard in 2000 and last year came to Northwestern. In 2002, he and childhood friend Piotr Barski founded ProChimia Poland, a high-tech company in Gdansk that specializes in surface chemistry.

"When you're 29 and you're just out of graduate school, no serious investor in the U.S. will talk to you," he says. But in Poland, expenses were so low the two entrepreneurs didn't need any backers. "We had \$500 and we started a company with it," says Grzybowski, who spends 6 to 8 weeks a year in Gdansk. "In the States, it would be impossible, but in Poland somehow it worked." Last year ProChimia sold \$200,000 worth of reagents for making bioassay chips and other supplies to scientists at dozens of American and European universities, and it recently attracted its first American investors. Grzybowski hopes it will seed a biotech boom in Gdansk.

Country
CHINA
Surname
WANG
Given Name
LAI-SHENG

Field
PHYSICAL CHEMISTRY
Workplace
WASHINGTON STATE UNIVERSITY/
PACIFIC NORTHWEST NATIONAL LABORATORY

U.S. IMMIGRATION
ADMITTED
CLASS
UNTIL

A bloody massacre will forever be a defining moment in the career of physical chemist Lai-Sheng Wang. Like thousands of other Chinese-born researchers who came to study in the United States in the late 1980s, Wang took advantage of relaxed immigration rules following the Chinese Army's 1989 crackdown on democracy protests in Beijing's Tiananmen Square in order to stay. He became a U.S. citizen in 1998.

"I think I might have tried to stay anyway, but without Tiananmen I probably would have had to go back home," says Wang, who holds a joint appointment at Washington State University in Richland and the nearby Pacific Northwest National Laboratory.

Wang, 42, came in 1983 for graduate work at the University of California, Berkeley, and joined Washington State a decade ago after a postdoctoral stint with Nobel laureate Richard Smalley at Rice University in Houston, Texas. Since then, he has published regularly in top-tier journals and won accolades for his work probing the structure of nanomaterials. He doubts he could have done as well at home, although he says China and other nations are beginning to catch up to the United States. "The facilities and cooperation here are very advanced," he says.

Despite his accomplishments, Wang says it has "taken years, years, and years" to adapt to the more aggressive and outspoken culture of American science. "In the beginning I just wanted to study," he says. But as his English improved, "I came to realize that I was expected to ask questions and be skeptical. I had to become less passive and more confident to keep up."

Now, Wang recognizes some of the same passivity in his own graduate students, among them seven from China and one from India. "They tend to speak out only when they are absolutely sure of themselves," he says. But his efforts to encourage more debate, he adds, "sometimes succeed."

-D.M.

Although ProChimia is now profitable, many researchers with new ventures in their native land say that they give more than they get back in return. That's OK with Wayne Getz, a biomathematician at the University

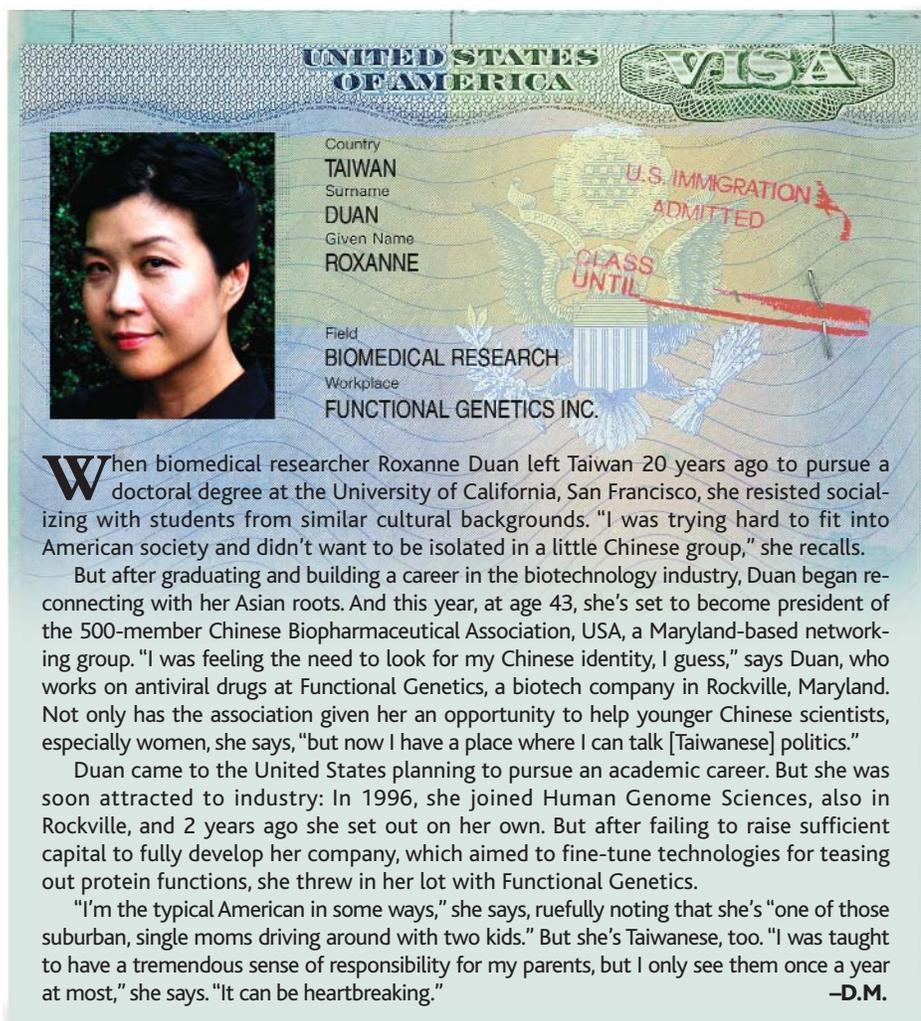
of California, Berkeley, who sees himself as a conduit funneling U.S. intellectual resources to colleagues in his native South Africa. After apartheid ended in 1994, Getz launched several collaborative projects, including a \$1.8 million, 5-year study of bovine tuberculosis in Kruger National Park funded by the U.S. National Science Foundation. Last year he helped found the South African Center for Epidemiological Modeling and Analysis in Stellenbosch, which will track the nation's AIDS epidemic.

Getz, who received his doctorate in 1976 from the University of the Witwatersrand in Johannesburg, says that being in

In range. Wayne Getz (third from right) funnels scientific experience to his native South Africa.



CREDITS: (TOP TO BOTTOM) PNNL; JENNIFER GETZ



Country
TAIWAN

Surname
DUAN

Given Name
ROXANNE

Field
BIOMEDICAL RESEARCH

Workplace
FUNCTIONAL GENETICS INC.

U.S. IMMIGRATION
ADMITTED

CLASS
UNTIL

When biomedical researcher Roxanne Duan left Taiwan 20 years ago to pursue a doctoral degree at the University of California, San Francisco, she resisted socializing with students from similar cultural backgrounds. "I was trying hard to fit into American society and didn't want to be isolated in a little Chinese group," she recalls.

But after graduating and building a career in the biotechnology industry, Duan began reconnecting with her Asian roots. And this year, at age 43, she's set to become president of the 500-member Chinese Biopharmaceutical Association, USA, a Maryland-based networking group. "I was feeling the need to look for my Chinese identity, I guess," says Duan, who works on antiviral drugs at Functional Genetics, a biotech company in Rockville, Maryland. Not only has the association given her an opportunity to help younger Chinese scientists, especially women, she says, "but now I have a place where I can talk [Taiwanese] politics."

Duan came to the United States planning to pursue an academic career. But she was soon attracted to industry: In 1996, she joined Human Genome Sciences, also in Rockville, and 2 years ago she set out on her own. But after failing to raise sufficient capital to fully develop her company, which aimed to fine-tune technologies for teasing out protein functions, she threw in her lot with Functional Genetics.

"I'm the typical American in some ways," she says, ruefully noting that she's "one of those suburban, single moms driving around with two kids." But she's Taiwanese, too. "I was taught to have a tremendous sense of responsibility for my parents, but I only see them once a year at most," she says. "It can be heartbreaking."
—D.M.

Scientific Culture—World Laboratory AIDS Research Center in Jos, which is funded primarily by the Plateau state government. Abimiku, who is director of the center, intended to focus on isolating the particular strain of HIV then emerging in Nigeria. But she soon found herself concentrating on basic screening and education to combat the epidemic. In the beginning, Abimiku spent nearly half her time in Nigeria.

Over the years, Abimiku's focus has turned back toward science—her group isolated the strain of HIV prevalent in western Africa. Funding from the Bill and Melinda Gates Foundation has helped her expand her efforts in Nigeria. "The academic contacts over here have catalyzed a lot of the things we've been able to do there," she says.

The discomforts of home

All agree that reaching back to one's homeland requires time, commitment, and sacrifice. And the locals may resent expatriates who barge in assuming they'll be the big fish in a small pond. "There are already fish swimming around trying to protect their territory," says Getz.

The indigenous scientific culture may resist change. Theoretical physicist George Sudarshan of the University of Texas, Austin, juggled dual positions in the United States and India for more than 15 years, including heading an interdisciplinary center at the Indian Institute of Sciences in Bangalore and the Institute of Mathematical Sciences (IMS) in Chennai. Although the Bangalore center eventually foundered in interdepartmental politics and closed in 2003, in its time it catalyzed the exchange of ideas across disciplines, Sudarshan says. The IMS continues to flourish.

But Sudarshan was also hoping to inspire Indian researchers to greater productivity, which didn't happen. "I was under the misapprehension that if only they had someone to guide them, they would suddenly become very productive," he says. "But they continued in their sleepy ways. ... You're fooling yourself if you think you can single-handedly change the system."

Even so, most researchers who build bridges to their homelands are willing to endure the hassles for the personal satisfaction they gain. "Even if I won the Nobel Prize," Abimiku says, "if my work doesn't help my country, then I don't think it would be very satisfying." That attitude drives foreign-born researchers to use their success in the United States to attempt bold new projects that will improve science throughout the world.
—ADRIAN CHO

Berkeley gives him the opportunity to tap into intellectual resources, particularly the knowledge of AIDS researchers in the University of California system and the San Francisco area, that are in short supply in South Africa. "What's important is the access I have to this expertise."

To forge such connections, many researchers are willing to make significant sacrifices professionally. Alash'le Abimiku, a virologist and immunologist at the University of Maryland's Institute of Human Virology in Baltimore, says that fighting the spread of AIDS in her native Nigeria at times means placing her academic ambitions on the back burner. "If I'd been in my lab full-time, I could have published much more," she says. "But I don't regret it at all."

Teammates. Maryland's Alash'le Abimiku (at left in photo) works with community leaders in Nigeria to build a network of HIV/AIDS health care facilities.

Abimiku received her doctorate in 1988 from the London School of Hygiene & Tropical Medicine and came to the United States in 1991 to work with AIDS pioneer Robert Gallo, then at the National Cancer Institute in Bethesda, Maryland. That year the two founded the International Center for

