International visitors enrich LTRR environment

By Melanie Lenart

It's one thing to discover something, such as how to turn an interest in tree rings into the science of dendrochronology, as Laboratory of Tree-Ring Research Founder Andrew E. Douglass did starting in the 1900s. It's another thing to maintain the edge since then, as his academic descendants continue to do.

How does the LTRR stay at the forefront of dendrochronology? It's partly thanks to the continuous influx of visiting scholars from around the country and the world, explained some of the faculty members who have played key roles in promoting a high international profile. Every decade, hundreds of visiting scholars spend days to months at the laboratory.

"We wouldn't be making a big impact in any of the sciences we work in if it weren't for this outreach," explained Professor Malcolm Hughes, who directed the LTRR from 1986 to 1999. "Meeting and working on a routine basis with people from different cultures is a very effective way to open people's minds."

"Much of our active outreach, as opposed to routine scientific collaboration, has been funded by private donations," Hughes added. One of these donors is LTRR supporter Agnese N. Haury, who in 1998 created a Fellowship Fund to bring scientists in a variety of disciplines from around the world to study dendrochronology at the Laboratory, typically for a two-month stint. *(For more, see page 6.)*

Other funding for visiting scholars has come from scientific agencies. For instance, the National Science Foundation supported the first international workshop on dendroclimatology, held in Tucson in 1974.

"It's where I first met my British colleagues from Belfast, even though they were only 120 miles away," noted Hughes, who hails from Liverpool, England.

The conference, which launched a new phase of international cooperation among dendrochronologists, was organized by LTRR Professor Emeritus Harold C. Fritts.

Dr. Fritts described himself as an "evangelist" when it came to promoting the uses of dendrochronology around the world.

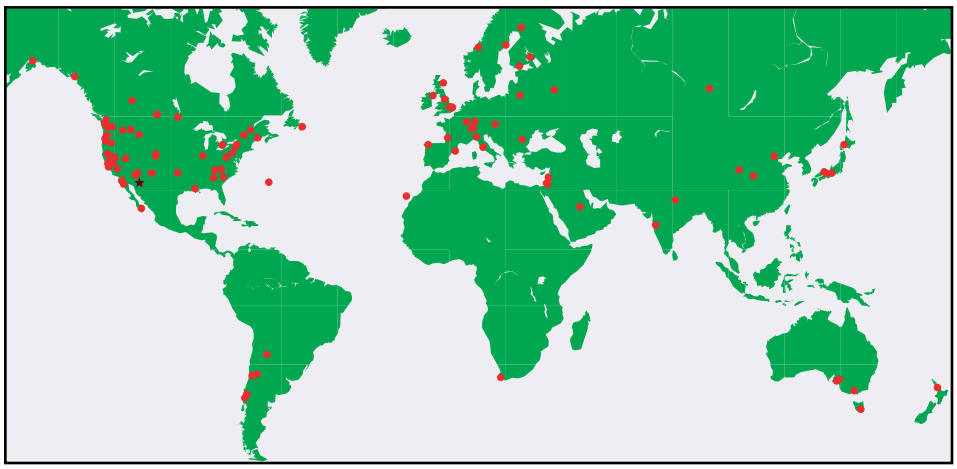
When he joined the LTRR faculty in 1961, with founder A.E. Douglass still maintaining a presence despite being 93 years old, Fritts had two objectives in mind. One was to study, understand and quantify the physiological basis for tree-ring growth under different environmental

Dendrochronology:

the science of dating events, intervals of time, and variations in environment in former periods by study of the sequence of and differences between rings of growth in trees and aged wood.

Webster's Third New International Dictionary

Dendrochronologists stress the importance of "crossdating," i.e., comparing ring patterns among trees at a site to detect missing rings or false rings, before reaching any conclusions.



Map created by Martin Munro with data-gathering assistance from Hugh Mulligan

The red dots in the map above show the origin of some of the visiting scholars who have come to the LTRR since 1992. The list is incomplete, but gives an indication of the laboratory's outreach. The LTRR's location in Tucson, Arizona, is shown in black. The two dots in the Atlantic represent Bermuda and the Canary Islands, home to two recent visitors.

conditions. The other was to work on an outreach program "to spread the word."

He succeeded on both counts, with contributions from others. His ecophysiological studies, statistical analyses and models of tree growth helped dispel then-lingering doubts about the validity of using dendrochronology to interpret climate and environmental factors. And his travels—to 26 different countries over the years—and efforts to bring other researchers to Tucson helped the LTRR gain intellectual support.

Financial support recruited from government agencies and, later, private donors further allowed the science of dendrochronology to thrive and expand.

"I think it's largely responsible for the breadth it has today," said Fritts. Areas of expertise include dendroarchaeology, dendroecology and dendroclimatology, to name some local favorites. As Fritts sees it, "Word got to the specialists in all fields, and it created new specialists."

Another LTRR innovator credited with appreciating the importance of international connections is Professor Emeritus Bryant Bannister, LTRR Director from 1964 to 1982.

His many travels included a trip with Dr. Fritts to the People's Republic of China in 1976, soon after Nixon went behind the Great Wall. They and other LTRR faculty members also began to establish ongoing collaborations with Russian scientists well before *perestroika* could be found in an American dictionary. And they wouldn't want to overlook Scandanavia, with its well-trained foresters and contribution of the best increment borer in the business, the standard tool for coring samples from trees.

Fulbright scholar focusing on pests

After working visits to the Tucson facility in 1990 and 1994, Dr. Irina Sviderskaya of Russia won a Fulbright Visiting Scholarship to support her work this year at the Laboratory of Tree-Ring Research. A researcher at the Institute of Forest in Krasnoyarsk, Russia, Sviderskaya is here refining techniques to detect insect outbreaks with tree-ring analysis.

With huge tracts of forest, Siberia all-too-often plays host to devastating insect outbreaks. For instance, the Siberian moth deforested more than 7 million acres in the mid-1950s. Sviderskaya focuses on the pine looper, which attacks only Scots pine but still manages to defoliate hundreds of thousands of acres during an outbreak. Recorded observations of insect outbreaks were rare before modern times in some of these wilderness areas.

Sviderskaya moved into the study of insect outbreaks at the urging of some friends, entomologists who had been unable to read the story in the tree rings because they were only counting rings, not crossdating to account for missing and false annual rings. (*For more on crossdating, see page 8*).

"Really, I agreed to help them because I knew it was possible. I knew that Tom Swetnam and others had done it," she explained. She is currently working on a journal article with Swetnam about Siberian tree growth responses to insect outbreaks.

This outreach, along with the Lab's world renown for its research, has long attracted distinguished visitors for brief tours or extended stays.

"We've had thousands of visitors," Dr. Bannister said. Probably tens of thousands of people have come through the LTRR's outreach program for schoolchildren and local residents. (*See back page.*) "People come from all over the world."

Some of the Lab's visitors included scholars who founded their own major laboratories devoted to dendrochronology, such as Dr. Gordon Jacoby of Columbia University's Lamont-Doherty Earth Observatory and Dr. Bruno Huber of Munich, Germany, one of Europe's more prominent tree-ring laboratories.

Some of the recent Haury Fellows have founded or plan to establish their own tree-ring programs, too. (*See page 6.*)

Dr. Thomas Swetnam, who has headed the LTRR since 1999, considers the outreach program crucial.

"If you look at all of our strengths, the outreach program has to be near the top of the list," Dr. Swetnam said. "A living and thriving laboratory needs to foster the development and extension of its sciences by serving as a midwife in the birth of other labs."

Dr. Bannister offers a similar metaphor for the LTRR's role. "This is the grand-daddy of them all."

Haury Fellows take lessons back home

Since the 1998 Agnese N. Haury Fellowship Fund was established in 1998, recipients have been coming to the Laboratory of Tree-Ring Research from around the world to hone their tree-ring skills. The accounts below explain what some Fellows have done with the knowledge they gained.

Dr. Edmund February of South Africa

There were no tree ring laboratories in all of Africa at the time I received an Agnese Haury fellowship in March, 1999. The primary purpose of my visit to the LTRR was to learn as much as possible about tree-ring research so that I could establish a laboratory. To this end, I have now been successful in that I have established a fully functional tree ring laboratory in the Department of Botany at the University of Cape Town, South Africa. With Zewdu Eshetu, I am using tree rings to establish a long rainfall record from European oak around Cape Town, among other projects.

Dr. Zewdu Eshetu of Ethiopia

Following my stay in Tucson as a Haury Fellow in 2000, I was awarded a postdoctoral research fellowship from the South African National Research Foundation to study climate changes in South Africa from tree rings, with Drs. E. February and W.D. Stock. So far, we have developed a 120-year chronology for an introduced oak species. I am also working on radiocarbon dating of a juniper species from Ethiopia to resolve problems with numerous missing and false rings. My vision is to establish an Ethiopian stable isotope and tree-ring research laboratory.

Dr. Marco Carrer of Italy

I work at the University of Padova in Italy, where I received my Ph.D. in Forest Ecology in1997. I have been trying to apply tree-ring analysis to better understand the ecology of tree species in the Alps, especially in the higher elevations where climate may play an important role in tree growth. As a Haury Fellow in early 1999, I learned cellular analysis, which gave me deeper insight. I've brought this knowledge back to my lab, where a couple of Ph.D. students now work on this technique.

Dr. Paula Gardiner of England

I came to LTRR in April, 2000, on a Haury Fellowship while I was writing up my Ph.D. Since returning to Bristol University, where I am now a Lecturer in Archeology, I regularly teach tree-ring concepts to undergraduate and graduate students. At present I am collecting and dating samples from the submerged forests in the Severn Estuary. Last year I sampled and dated Medieval barns in southwestern France with a student I am mentoring. Eventually I hope to set up a dendrochronology laboratory at Bristol University.

Linah Ababneh of Jordan

I am a Ph.D. candidate at the University of Arizona, studying geochemistry and global change. The Haury Fellowship helped me to widen my knowledge of the applications of tree-ring analysis in Near Eastern archaeology and ecological studies. For my Ph.D., I am seeking to detect the effect of increased carbon dioxide and available nitrogen on subalpine forest ecosystems.

Other Haury Fellows and their interests are listed below.

Osamu Kobayashi from Japan studied climate reconstruction for application in Asia, with plans to consider the influence of pollution on tree growth.

Olga Solamina of Russia came to the LTRR to work on interdisciplinary studies of high mountain glaciers and climate history.

Juan Carlos Aravena of Chile worked on interpreting climate and forest dynamics from tree rings.

Hemant Borgaonkar of India came to learn how to reconstruct long-term climate variability for the western Himalayan Mountains.

Michael Friedrich of Germany sought to learn how to apply information in tree rings for a variety of applications, including climate, ecology and botany.

Carlos Santana Jubells of Spain visited to learn how to use Canary Island pines to interpret climate and cultural phenomenon.

Paul Sneed from nearby Prescott, Arizona, came here to focus on historical ecology, including fire patterns.

Nora Martijena of Mexico worked on studies in population ecology and dendroecology.

Iain Robertson of the United Kingdom sought to learn more about stable carbon isotopes in tree rings to reconstruct environmental conditions.

Christelle Bellingard of France came to work on techniques for dating archaeological structures.