Inside Illinois

June 21, 2012
Vol. 31, No. 23

For Faculty and Staff, University of Illinois at Urbana-Champaign

Retired mapmaker's garden a tribute to Japanese culture

By Mike Helenthal
Assistant Editor

As a professional cartographer, master Japanese gardener and former UI faculty member, James Bier has never challenged the notion that the shortest distance between two points is a straight line.

But, as the irregularly running contours of Bier's life have shown, shortest isn't necessarily best – it's elevation that counts in the end.

Bier grew up during the Depression and World War II-era Cleveland, never dreaming he would one day attend college.

In high school, he had taken mostly trades-oriented classes, including mechanical drafting, one of the quickest and well-worn paths to a job and career at the time.

When he graduated in 1946, he went to work as a draftsman, printing press operator and darkroom photographer at Cleveland factories. But, he wanted more.

So he dusted off his classical piano-playing skills and headed to Western Reserve University to study music.

But that, too, would fall by the wayside after Bier discovered geology, which he had taken as a required general education science course.

"Geology seemed to come easy to me – I didn't even have to read the books," he said. While majoring in geology, he took a geography course in cartography.

"That was an absolute snap. It was like it was something I was destined for."

photo by L. Brian Stauffer

Home and Gardens *James Bier stands among some of the many varieties of plants that grow in his Japanese-inspired home garden. Bier, also the caretaker for the Japan House gardens, is a former UI faculty member and professional cartographer. His house and garden are part of UI Extension's Champaign County Master Gardeners 2012 Garden Walk June 23.*

He received his degree in geology and had taken enough geography courses to qualify for graduate school.

Just as he started graduate studies at the UI in 1953, he was drafted into the army at the end of the Korean War. He was sent to the Far East military mapping headquarters in Tokyo.

"I got in at the end of the war and I was only in Japan for a year," he said, "but I really fell in love with the place and started studying the culture as a hobby and part of my life."

In 1955, he returned to the UI to earn his master's degree in geography/cartography, after which, he was promptly asked to stay as the department's staff cartographer.

"It was one of the first positions of its kind in the country," he said.

He would stay on as mapmaker and instructor for the next 32 years, retiring from the UI in 1989.

Paradise scaled

Bier's map-making acumen also led to professional opportunities he never dreamed of from the seat in his high-school shop classes.

The private map-making business he started led him to opportunities in Hawaii, where he made the first atlas of the islands and then five detailed full-color maps of the six principal islands. The popular maps, first published by the University of Hawaii

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Researchers' imaging technique trolls in quiet cellular seas

By Liz Ahlberg
Physical Sciences Editor

Experienced anglers know that choppy waters make for difficult fishing, so they try not to rock the boat. Thanks to a new microscopy technique, cell biology researchers can heed that same advice.

UI researchers developed a method they call "trolling AFM," which allows them to study soft biological samples in liquid with high resolution and high quality. Led by mechanical science and engineering professor Min-Feng Yu, the group published its findings in the journal Nanotechnology.

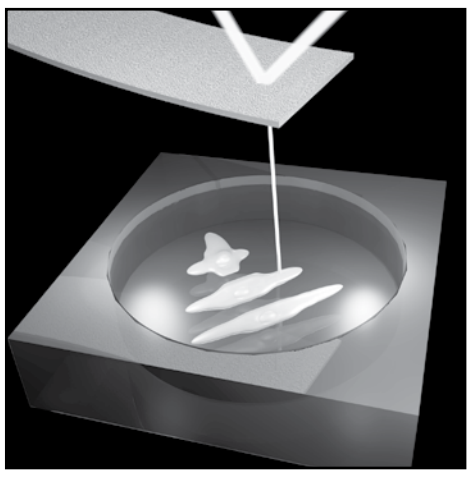

Image by Majid Minary

Trolling sample *By attaching a long nanoneedle to the end of an AFM probe, researchers can gain high-resolution images of samples in liquid while keeping the cantilever in open air.*

"We developed a highly sensitive method for high-resolution imaging of soft biological samples, such as living cells, in their physiological condition," said Majid Minary, a recent graduate of Yu's group and first author of the paper. Minary now is a professor at the University of Texas-Dallas. "We improved the quality factor of common atomic force microscopy imaging methods by two orders of magnitude," Minary said.

The widely used atomic force microscope provides images of tiny structures with high resolution at the atomic scale. The AFM has a sharp probe at the end of an arm, called a cantilever. The tip of the probe skims the surface of a sample to measure mechanical, electrical or chemical properties.

When scientists want to study cells, tissue or other live biological materials, the samples must be submerged in a liquid to keep them alive. This poses difficulties for atomic force microscopy, because the cantilever has to be submerged as well.

Cells and tissues are so soft that if the AFM probe were simply dragged across the surface, it would damage or displace the sample instead of reading it. Therefore, scientists have to operate the AFM in oscillation mode – with the probe gently tapping along the sample and detecting resistance.

But oscillation in liquid brings a tide of complications in its wake.

Oscillating a relatively large structure, such as an AFM cantilever, through liquid also causes the liquid to surge up and down with the oscillation, like waves in a tidal pool, causing even more drag.

photo by L. Brian Stauffer

Gone Fishing *Professor Min-Feng Yu's group developed "trolling AFM," a method for high-quality imaging of soft cells and tissues at atomic resolution.*

"There's a huge amount of hydrodynamic drag associated with operating such a big cantilever, compared to the resolution you're trying to approach," said Yu, "so it causes lots of disturbance, recorded as noise, which overwhelms all the actual data you're trying to get from the sample."

The high noise level requires the probe to tap harder to find a signal. This means the tip deforms a cell as the probe presses down, and only large, stiff structural elements such as the nucleus are visible, rendering AFM unable to resolve the membrane's structure, properties and contours

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