

Hundreds of blind Yeti crabs crawl on top of each other 1,000 meters underwater off the coast of Costa Rica. Scientists aboard the *Alvin* submersible first discovered the species in 2005 near Easter Island. Researchers from Assistant Professor of Geobiology Victoria Orphan's lab took this picture in February 2009, also from aboard *Alvin*. To see what Orphan's lab has been discovering on the seafloor, turn to page 12.


"PLENTY OF ROOM AT THE BOTTOM" TURNS 50

What is frequently cited as nanotechnology's seminal paper was published in these very pages in the February 1960 issue. The article, subtitled "an invitation to enter a new field of physics," is an adaptation of a talk given by Caltech's Richard P. Feynman, Nobel laureate in physics and freelance visionary. In it, he discussed possible ways to manipulate matter on the atomic and molecular scale, and what the consequences might be for information storage and chemical synthesis, among other applications.

But, like any good prophet, Feynman was too far ahead of his time to be taken seriously. The after-dinner speech, given in the year-end doldrums on December 29, 1959, at a Caltech-hosted meeting of the American Physical Society, was greeted with "amusement. . . . It simply took everybody completely by surprise," audience member Paul Shlichta (PhD '56) said later. (See "[Apostolic Succession](#)" by Christopher Toumey, *E&S* 2005, Nos. 1/2.)

And, for the most part, these things stood until the mid-1980s, when technology finally caught up. "Plenty of Room" was slowly rediscovered in the late 1980s and went viral, as it were, in the 1990s, as early explorers of the nanoworld began to realize that Feynman had, once again, been there first. In fact, things have now gotten to such a point that "it is an unwritten rule on *Nature Nanotechnology* that Richard Feynman's famous 1959 lecture 'There's Plenty of Room at the Bottom' should not be referred to at the start of articles unless absolutely necessary," wrote editor in chief Peter Rodgers in the December 2009 issue, which devoted eight pages to commemorating the anniversary. Not that Rodgers has anything against the talk, he went on to say—he'd simply like to see a little variety in his opening lines. (He forbids references to Moore's Law for the same reason.)

Among the slew of observances here and abroad, the Kavli Nanoscience Institute at Caltech will be celebrating "Plenty of Room" and the upcoming 50th anniversary of *The Feynman Lectures on Physics* on December 9 and 10 with a series of public lectures modeled after the TED conferences. Beyond the usual talks, there will be video clips of Feynman himself, as well as "entertainments" reflecting his many other interests. The details are still in flux, but bongo drumming and an appearance by the Tuvan throat singers are pretty much guaranteed. Check <http://feynman.caltech.edu> for updates.

In the end, the article's best tribute is the article itself. "Re-reading 'Plenty of Room' with its bizarre mix of angstroms and inches, with Feynman's verve and back-of-the-envelope calculations, with its insights and red herrings, with the benefit of hindsight, is always rewarding," Rodgers concludes. "If you have never read it, you really should." —DS 



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