



Digital handbook users can manipulate a Hankel function in three dimensions.

Mathematicians' Friend Gets Blown to Bits

Every mathematician of a certain age has a shelf sporting a 6.5-centimeter-thick book: the *Handbook of Mathematical Functions*, first published in 1964 by the National Bureau of Standards, now known as the National Institute of Standards and Technology (NIST). The *Handbook's* 1046 pages of formulas, graphs, and mathematical tables make it the definitive reference work, NIST says, on applied math's "special functions"—functions that occur frequently in modeling physical phenomena, from atomic physics to optics and water waves. Looking for the first 10 digits of Dawson's integral at 1.68, for example? It's right there on page 319. (If you need the definition, it's on page 298.)

While the slide-rule generation may cling to the printed original, NIST is getting set to unveil an online makeover of the *Handbook*, now called the Digital Library of Mathematical Functions. A beta version of five "chapters" is available at dlmf.nist.gov. The full 38-chapter library is scheduled for release early next year. For the fuddy-duddy demographic, NIST promises another 1000-page doorstep print edition.

Civilization's Tolls

Biologist Jared Diamond has hypothesized that the pathogens for diseases such as influenza and smallpox spread to humans from domesticated animals. Now, Australian and Japanese scientists say an important group of plant viruses got a boost from the spread of agriculture, which gave them a foothold by packing host viruses close together.

The pathogens in question are potyviruses, which account for 15% of known plant viruses, including sugarcane mosaic virus (see photo).



Sugarcane mosaic virus.

Researchers led by Canberra virologist Adrian Gibbs compared RNA sequences of 60 species, from wild and domesticated plants around the world, to work out viral family trees. They found that the first major radiation took place about 6600 years ago, when early farming populations were spreading through Eurasia. "This modern plague only started about 200 human generations ago," says Gibbs, whose report appears online 25 June in *PLoS One*. Some potyviruses hit New World squash and papaya about 500 years ago, and others turned up in Australia after colonists arrived there 220 years ago, although potyviruses were already endemic to the continents.

The study is "very significant for world history," says Peter Bellwood, an archaeologist at the Australian National University in Canberra who has collaborated with Diamond. "This evidence supports Jared Diamond's view that human viruses underwent similar proliferation at this time."

To Sleep, Perchance to Build a New Image

"Because dreams need doing."

Can that slogan inspire a new generation of engineers? A report commissioned by the U.S. National Science Foundation says engineering needs "rebranding," and surveys show that's one of the tag lines young people like.

Messages that "students must have an aptitude for and strong interest in [math and science] to succeed in engineering" are the wrong way to go, the report from the National Academy of Engineering concludes. Instead, the authors, headed by engineering dean Don Giddens of the Georgia Institute of Technology in Atlanta, call for a "nationwide engineering awareness campaign" that depicts the field as "inherently creative, ... concerned with human welfare, ... [and] emotionally satisfying." *Changing the Conversation: Messages for Improving Public Understanding of Engineering* was released last week.

Redwoods of the Reef

For years, scuba divers have called the giant barrel sponges (*Xestospongia muta*) that sprout on the Caribbean coral reefs "redwoods" for their size and presumed old age.

A project dating the beer keg-shaped sponges now bears out that nickname. After analyzing their growth rates over 4½ years, marine biologists from the University of North Carolina (UNC), Wilmington, estimate that sponges more than a meter wide are at least 100 years old, and those larger than 2.5 meters are more than 2000 years old. One sponge, discovered off the island of Curaçao in 1997, died 3 years later. But Steven McMurray, a graduate student in Joseph Pawlik's lab at UNC and lead author of the study, calculated its age from a photograph at 2300 years. Such vintages put the sponges on a par with the oldest known California redwood, the researchers report in the current online issue of *Marine Biology*. And it makes them the longest lived animal species extant today.

"I've seen the same individual barrel sponges on the Florida reefs for decades," says Niels Lindquist, a marine biologist at UNC Chapel Hill, so advanced ages seem "very likely." He would, however, like to see the researchers devise another way to date the sponges. Current techniques such as radiocarbon dating aren't up to the job.

