OFF THE **CHARTS**

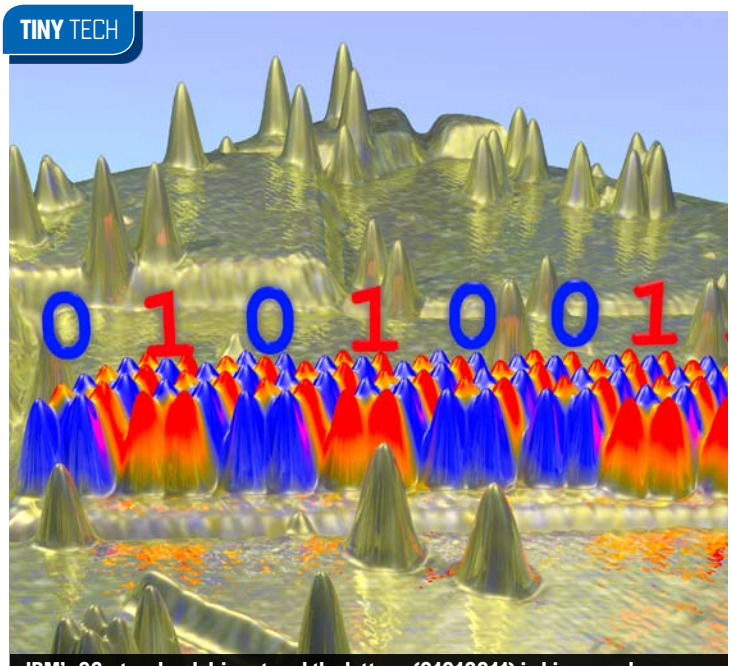
World's Smallest Vertebrate: The Frog That Chirps

Christopher Austin inched forward on his hands and knees with only a headlamp to light his way. It was 2009, and the Louisiana State University herpetologist and his graduate student were searching Papua New Guinea's damp forest floor for the source of a mysterious mating call coming from the ground foliage. They assumed an insect was projecting the high-pitched chirp, but there was no bug to be found. So the two bagged up some leaves and brought them back to camp. There, they searched each leaf, one by one, until they found the surprising culprits: not insects but tiny frogs with skin the color of the earth, one-third inch long and weighing just 0.02 gram each. Austin had to zoom in on digital photographs to examine them.

In January Austin reported that his find was a new species, *Paedophryne amauensis*, the smallest known vertebrate in the world, measuring a millimeter shorter than the Southeast Asian fish that previously held the record and one-fifteenth the length of the common bullfrog. They have shortened backbones, thumbs reduced to nubs, and an overall juvenile appearance. "One way to evolve a small body size is to never grow up," Austin says. What's the advantage? Their miniature size makes them ideal predators for even smaller invertebrates, including the mites that are abundant in the moist leaves of tropical forests. JENNIFER ABBASI

The world's tiniest frog was found in Papua New Guinea. Four of the housefly-size amphibians fit on a dime.

TINY TECH



IBM's 96-atom hard drive stored the letter *s* (01010011) in binary code.

Lilliputian Storage Wars

WITHIN THE DECADE YOU MAY BE STORING YOUR MEDIA LIBRARY, HEALTH and financial history, and every bit of data relevant to your life on a device smaller than a staple. When it happens, you can thank a handful of scientists racing to cram ever more data storage bits into smaller spaces. The frontrunner is Andreas Heinrich, a nanotechnologist at IBM's Almaden Research Center. This winter he coaxed a cluster of 12 iron atoms to store one bit of data, consisting of either a 1 or a 0. Today's hard drives require about a million atoms to store one bit. Heinrich did it by painstakingly using a microscope fitted with a tool to move the atoms into a formation. The arrangement induced each atom to take on a magnetic charge opposite that of its neighbor. This checkerboard configuration allowed far tighter packing than in current hard drives, where atoms of the same charge repel each other.

Other contenders include German physicist Roland Wiesendanger, who is applying a similar technique to cobalt, and British chemist Stephen Liddle, who is testing a molecule he created from two uranium atoms. "When everything is communicating—from your refrigerator to your car to your home heating—you'll need ways to store huge amounts of data," says Ian Steff, vice president of global policy at the Semiconductor Industry Association. "That will happen at the atomic level." ELIZABETH SVOBODA

can be done," says astrophysicist Donald Kessler, who has been trying to get us to clean up since the 1970s, when he proposed that accumulating orbital trash could cause dangerous collisions. Kessler sees another benefit to Swiss intervention: For security reasons, no country can clean up another's satellite without permission. Neutral Switzerland could provide a cleaning service for hire. Kessler finds the distinctively Swiss proclivity to clean up after themselves amusing and satisfying. AMY BARTH