Cockroach Stability

By mounting tiny cannons on the backs of cockroaches, researchers at the University of California, Berkeley, have gained support for a new mathematical model explaining how the bugs move so nimbly.

Cockroaches, such as the 44-millimeter-long *Blaberus discoidalis*, can race over rugged terrain with remarkable agility. So fast are their balance-keeping reflexes that integrative biologist Robert Full suspected that they are not controlled by its nervous system but instead are built into its mechanical structure.

Roach with exploding backpack.

To test that idea, Full worked with Princeton University mathematicians to develop a model explaining a roach's stability by the design of its muscles and exoskeleton—with its legs acting as simple springs. Then, to test the model, they ran an experiment with live roaches. With integrative biologist Devin Jindrich, now at Harvard School of Public Health in Boston, they outfitted the beasts with jetpacks, 2.5-cm-long plastic tubes filled with explosives, triggered by electrical wires that delivered 10-millisecond bursts—the length of a single roach stride. They then watched how the bugs recouped when suddenly knocked off balance by the tiny blasts. From videotapes of hundreds of cockroach runs, the researchers found that the roaches "didn't even break their stride," says Jindrich. Such rapid recovery appears to beat the fastest nervous reflexes and thus bolsters their model, the scientists report in the 15 September *Journal of Experimental Biology*.

The findings have helped Full and engineer Daniel Koditschek of the University of Michigan, Ann Arbor, design a breadbox-sized robot roach that scrabbles over rough terrain on springy limbs at 3 meters per second.

Comparative biomechanist Andrew Biewener of Harvard University's Concord Field Station in Bedford, Massachusetts, says the cockroach findings will be relevant to vertebrate movement too, meaning that the intrinsic properties of muscles and skeleton might be more important than has been thought.

Knockout Pigs Ready for Trials

Scientists say they have succeeded in disabling both copies of a gene that makes it problematic to transplant pig organs to humans. Edinburgh-based PPL Therapeutics announced late last month that it had produced the world's first piglets lacking an enzyme that generates a cell surface sugar that is rejected by the human immune system.

Last January researchers announced the birth of "single knockout" pigs that lacked one copy of the troublesome gene (*Science*, 4 January, p. 25). Now PPL's Blacksburg, Virginia, facility says it's got four new piglets that lack both copies. That means that the company can start primate trials using pancreatic islet cells, kidneys, and hearts from the modified pigs, says PPL's David Ayares.

PPL's news drew a warning from the U.K.'s Royal Society, which said scientists should be "skeptical about this so-called breakthrough" pending peer review. "This announcement," it added, "no doubt will boost the company's share price."

Ayares says the company is legally required to announce "stock-sensitive information" because it is traded on the London Stock Exchange. A paper will soon be submitted to a journal, he adds. The news has had little immediate effect on PPL's stock price, which has been sliding all year and is now scraping along at about 7 pence.

MIT report (*inset*) borrowed mask and cityscape as well as woman warrior from Radix.

Comic Infringement

For $50 million, the Army has bought a supersoldier right out of the comic books. In March, the Massachusetts Institute of Technology (MIT) won a Defense Department grant to build an Institute for Soldier Nanotechnology. Their hefty proposal included a vision of the future: a gun-totin' soldier babe in front of a hypermodern skyline.

According to comic book writer and artist Ray Lai, the soldier is a rip-off of Valerie Fiores, the heroine of his company's *Radix* comic. "We first found out when fans in California found the image in a newspaper," he said. Their lawyers sent MIT a "cease-and-desist letter," arguing that MIT is damaging Radix by showing their "fantasy" world is really "reality."

MIT has said it is sorry and didn't know the picture was cribbed. It is no longer distributing the picture but says it is within its rights because of copyright laws on material used for education and research.

Universe in a Grain of Sand

Visitors to Rodeo Beach in Marin County, California, on 13 October will be able to experience a representation of the history of time on a 4-kilometer stretch of beach that is being turned into a "Zen garden of time." Walkman-wearing strollers will view various sculptures and sand patterns while hearing the story of the universe from the big bang to the present. Created by the Antenna Theater of Sausalito, ".:. sands .:. of .:. time .:.," as the exhibit is called, definitely puts things in perspective: The past 2000 years is represented by a single grain of sand.

CREDITS: (TOP TO BOTTOM) D. JINDRICH; RAY LAI/HORIZON COMICS; JOSEPH KINYON