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# DEVELOPMENTS TO WATCH

## What's The Sticky Secret Of Mussels?

If you've ever sailed on the high seas or scuba dived in the Caribbean, you probably know how hard it is to pry saltwater mussels off a boat's bottom or an underwater rock. They produce a glue with amazing strength. And now its recipe has been deciphered by Purdue University researchers, who believe their discovery will lead to new superglues and rustproof coatings for industry. Other uses might include adhesives for closing surgical incisions or even reconnecting damaged nerves.

How do mussels adhere? Chemist and scuba diver Jonathan Wilker, who has been pursuing their secret for almost five years, just published his surprising answer in the Jan. 12 issue of *Angewandte Chemie*: They use iron to chemically "cure" their glue -- something never seen before in a biological process. In addition to superglues, Wilker says it may be possible to tweak the chemical process and create new classes of self-assembling materials with controlled electronic, magnetic, or optical properties.

## Synthetic Biology: Rewiring Mother Nature

Electrical engineers at Massachusetts Institute of Technology, Princeton University, and elsewhere are trying to program biological cells as if they were computers. The goal is to produce medical treatments -- and maybe even flowers that bloom on command. "We're trying to create behavior we'd like to see happen," says Thomas F. Knight Jr., a senior scientist at MIT in this new field, called synthetic biology. The research is still fairly basic: using enzymes to cut DNA from bacteria and mouse cells, then putting the pieces back together in new sequences. But the resulting genetic circuits contain instructions that cause cells to behave in new ways.

Ron Weiss, an electrical engineer at Princeton, thinks body cells could be programmed to fix even dire injuries, such as a severed spine. Critics, meanwhile, fret that the tools could fall into bioterrorists' hands. That's bound to fuel more debates on bioethics.

*By Faith Arner*

## Scientists In Steel Collars

Science involves plenty of drudge work. But some relief may be on the way. The Jan. 14 issue of *Nature* reports that a British team, led by computer scientist Ross D. King of the University of Wales in Aberystwyth, has developed a "robot scientist" that not only conducts and analyzes experiments but also uses the results to formulate new or revised theories for the next round of research.

Computerized research dates back at least to the 1950s, when artificial-intelligence pioneers at Carnegie Mellon University created Logic Theorist, a program for finding proofs to geometry theorems. King's brainchild goes far beyond that. Its first job was to find the genes in yeast that make amino acids. When its performance was compared with that of humans, including Aberystwyth's head of biological sciences, Michael Young, the robot beat them all in accuracy and selection of the optimum sequence of experiments. Ultimately, the team hopes its robot will discover something entirely new.

## Innovations

### Of memory, tubes, and mosquitoes

-- A new potential target for Alzheimer's drugs has been identified. Bonnie Firestein, an assistant professor at Rutgers University, and her team have zeroed in on a protein that controls the growth of brain-cell branches, called dendrites. Impairment of these branches has been linked with several brain disorders, including memory and learning problems.

-- Michael Crichton may be on to something. In his novel *Prey*, he describes swarms of nanoparticles that attack their creators. Researchers at the University of Rochester have found that carbon nanotubes measuring 35 nanometers (or billionths of a meter) in diameter could be detected in the brains of rats after being inhaled. Researchers also believe that nanoparticles in diesel fuel can cause respiratory problems in humans.

-- Mosquitoes respond to a chemical found in human sweat, according to a research team from Yale and Vanderbilt universities. Called 4-methyphenol, it is one of more than 350 chemicals contained in sweat, and it strongly activates an odor receptor found in female mosquitoes, which are the ones that feed on blood.

*By Catherine Arnst*