RANDOM SAMPLES

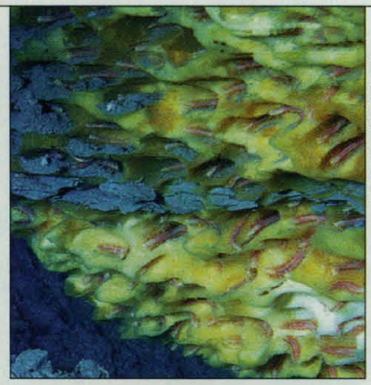
edited by CONSTANCE HOLDEN

Ice Worms From the Gulf

Colonies of strange, eyeless worms live on methane ice more than 500 meters deep in the Gulf of Mexico, researchers announced last week. Spotted by a submarine earlier this month, the ice worms are a part of a previously unknown deep-sea ecosystem. "We've got a new niche in the ocean. That's the cool thing about it," says team member Charles Fisher, a biologist at Pennsylvania State University, University Park.

The discovery came on the first leg of a National Oceanic and Atmospheric Administration–sponsored expedition to the Gulf of Mexico. Fisher and colleagues from across the country were using a deep-sea submersible to investigate mushroom-shaped outcroppings of methane hydrate—a kind of ice that forms in sea-floor sediments when gas leaking from buried organic matter combines with water molecules. The environment is harsh, because other gases like propane and ethane seep into the frigid water along with sulfides and crude oil.

But to Fisher's surprise, hundreds of flat, eyeless, pink worms swarmed on one of the methane outcrops. "When you look at it," he says, "you just go 'wow.' " When Fisher and colleagues checked videos made by past expeditions, they found telltale burrows in other outcroppings, too. "It's painfully obvious if you know what you're looking for," he says.



C. FISHER/PENN STATE

Methane dwellers. Newly discovered worms (pink) live on methane ice.

The team suspects that the worms are grazing on or living in symbiosis with bacteria that live off the methane. Although the researchers haven't isolated the bacteria yet, suspicious-looking mats drape the methane outcrops, and other experts cite the stripes of color on the hydrates. "I think the hydrates are colored yellow, amber, and red because of bacterial activity," says Roger Sassen, a geochemist at Texas A&M University, College Station.

Better Pay for Indian Scientists

Even as the Indian government pursues policies to attract more foreign high-tech companies, the private sector has been luring away government scientists, especially information scientists, with the promise of much higher salaries. Now the government is taking steps to stem this domestic brain drain with dramatic pay raises for government scientists.

The new pay scale, recommended by a commission that reviews salaries every 10 years, affects 95,000 researchers at some 500 government labs. It will boost salaries typically 68% for entry-level scientists—with special attention to electronics and computer scientists—and 108% for senior scientists. The change is expected to benefit agencies such as the Indian Space Research Organization, which in the past 5 years has lost 500 of its 7000 researchers to private jobs that pay up to four times government salaries of $188 to $500 a month. In addition, the retirement age for "outstanding scientists" will be increased, from 58 to 65 or more. The retirement age in industry and academia is 60.

The changes "will not bring about a revolution, but it certainly is a positive gesture," says Department of Science and Technology Secretary Valangiman Subramanian Ramamurthy. But Anuj Sinha, a chemical engineer and head of the Joint Forum of Scientific Officers' Association, a union of government scientists, says researchers deserve more. In particular, the union is seeking to raise the retirement age by another 2 years.

Stronger Bulwarks Against Cancer

Pledging to beef up two areas of cancer research—prevention and behavioral studies—National Cancer Institute (NCI) chief Richard Klausner last month announced that the Division of Cancer Prevention and Control, a program with intramural and extramural components that is directed by Peter Greenwald, is being transformed into two solely extramural divisions.

SUSAN WALSH/AP

Focus on control. Rimer (left), with Klausner, her new boss.

One of the new divisions, Cancer Control and Population Science, will include research programs in population genetics, epidemiology, behavior, and other issues such as the well-being of cancer survivors. It will be headed by Duke University behavioral scientist Barbara Rimer, who's resigning as head of the National Cancer Advisory Board on 1 October to take the job. Klausner plans a "national search" for a chief of the other branch, Cancer Prevention, where Greenwald will be acting director.

The new setup ends months of speculation about Klausner's plans for revamping NCI's prevention programs, which Greenwald directed for 16 years. The plan also entails moving the extramural portion of NCI's Division of Cancer Epidemiology and Genetics into the reshaped cancer control program, part of a broader scheme to separate intramural and extramural programs at NCI. In addition, "there will be new programs built in both" of the new divisions, Klausner says. For example, he says, "I'm really looking to strengthen behavioral research," such as studies on tobacco use.

Big Splat on a Small Planet

Astronomers are used to seeing planetary mayhem, but the discovery of a 450-kilometer impact crater on the asteroid Vesta, which is only 525 kilometers in diameter, has them wowed. The giant pit in one of the largest asteroids in the solar system may complete the chain of evidence that nails Vesta as the source of a common type of meteorite found on Earth.

Peter Thomas of Cornell University and his colleagues reported at the annual meeting of the Division for Planetary Sciences in Boston last week that repeated imaging by the Hubble Space Telescope of Vesta's silhouette as it rotated revealed a jagged bite out of the asteroid's southern hemisphere. The scientists mapped out a classic impact crater 8 kilometers deep with a

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raised rim and a 13-kilometer peak in the center.

Such a crater is just what some astronomers were looking for to explain how bits of Vesta have ended up on Earth. Vesta has been linked with so-called basaltic achondrite meteorites because both have a distinctive spectral color. The meteorites are believed to have come from small, similarly colored 5-kilometer asteroids that inhabit a zone in the asteroid belt from which Jupiter can gravitationally fling rocks toward Earth. Scientists assumed it would take a large impact to blast 5-kilometer chunks off Vesta. And the impact that produced a 450-kilometer crater on a body with a gravitational grasp as weak as Vesta's could have done the job, according to the group.

Meteoriticist Michael Gaffey of Rensselaer Polytechnic Institute in Troy, New York, agrees that the big impact creates a plausible connection between Vesta and its presumed meteorites. Proving the link, however, may require a robotic mission to Vesta to map its surface in detail, he says. That's a project Gaffey and others will be proposing as part of NASA's smaller, faster, cheaper approach to solar system exploration.

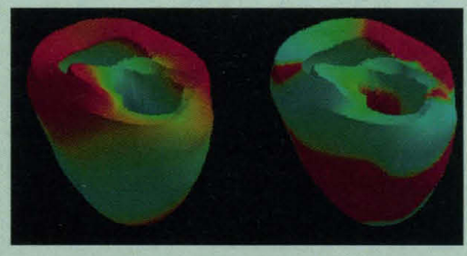
Beats and Bytes

A three-dimensional computer simulation of electrical activity in a dog's heart could help speed the design of new treatments for people with heart problems. Developed by Raimond L. Winslow, associate professor of biomedical engineering at Johns Hopkins University, and Denis Noble, professor of physiology at Oxford University, the model heart can be manipulated to malfunction and corrected with binary doses of "medicine."

In a state-of-the-heart demonstration of computational biology, the research team recreated cardiac physiology down to microscopic levels. "We're able to retain all of the biophysical detail at the single cell level," asserts Winslow, who recently presented the work at seminars in San Diego and in St. Petersburg, Russia. The canine heart is a good virtual substitute for the human organ, and there's more complete data on it, say the researchers.

In this latest work, Winslow and Noble simulated a severe arrhythmia, then restored the beat to normal by fiddling with the model's mock ion channels—imitating how antiarrhythmia drugs act on the organ. They are also working on a simulation of congestive heart failure, the leading cardiac illness in the United States.

Winslow, who with Noble has set up a company, Physiome Sciences Inc. in New York City, says the model could be a boon for drug developers and the designers of implantable devices, such as defibrillators and pacemakers, allowing them to substitute computer simulations for other more expensive screens and enabling them to rapidly make and test thousands of small modifications. Knowing the location and mechanism of an ion channel, for example, can allow drugmakers to tailor a product without scattershot experimentation.



RAIMOND L. WINSLOW/JOHNS HOPKINS UNIVERSITY

Breaking hearts. A normal heart (left) and a failing heart, showing a chaotic pattern of excitation. (Red is resting muscle; blue is excited muscle.)

Tom Paterson, vice president of Entelos Inc., a Palo Alto, California–based biotechnology firm that designs models of the immune system for drug companies, said the beauty of computational biology is that it provides a "mathematical description of the stability of a system, and disease as a mathematical perturbation of that system." The problem, he says, is that "you never have enough hard data about what's going on in these systems."

High Living Good for Runners

Live high, train low—that's the guide to faster legwork, according to a paper published last month in the *Journal of Applied Physiology*. The study shows that runners can shave crucial seconds off their times if they live at high altitudes but train closer to sea level.

The body adapts to life in the thin air of high altitudes by generating additional red blood cells, which transport oxygen. Attempts to add to athletes' oxygen-carrying capacity by having them live and train at high altitudes have generally met with little success. High altitudes can cause insomnia and suppress appetite and can prevent athletes from using their muscles intensely enough to get a benefit.

Benjamin Levine and James Stray-Gundersen, physiologists at the University of Texas Southwestern Medical Center in Dallas, wondered if it would help to live at high altitudes but train at low ones. To test the idea, they first timed 39 amateur competitive runners (27 men and 12 women) in a 5-kilometer race at sea level. Then they divided the runners into three groups: One lived and worked out at sea level, another lived and trained at 2500 meters, and the third lived at 2500 m but trained at 1200 m.

After 4 weeks, the researchers retimed the runners on the 5-km race at sea level. Those individuals who trained in the high-high and low-low conditions did not improve as a group. But the high-low runners took an average of 13 seconds off their total time—equivalent to about a 100-yard gain in a race.

Inspired by early study results, some athletes—including Scandinavian skiers—are already using a variation on the technique. George Brooks, an exercise physiologist at the University of California, Berkeley, says the researchers "are to be commended for this work," which he says is the first study with enough people to give valid results.

A New Denizen of the Deep?

A scientist at the Japan Marine Science and Technology Center (JAMSTEC) has found what may be a new species of worm living at 6500 meters, more than three times as deep as most ocean dwellers, where the pressure is 650 times that at sea level.

The 12-centimeter-long animal is believed to belong to a class of marine worms called polychaetes. Its body, 1.5 to 2 cm thick, is largely transparent, offering an easy view of its internal organs, and it has glassy, bristlelike arms it uses to row through the water. "It's a visually stunning animal," says James Hunt, a U.S. marine biologist currently on a fellowship at JAMSTEC. Hunt videotaped the creature while exploring the bottom of the Japan Trench in the Western Pacific in JAMSTEC's *Shinkai 6500*, the world's deepest diving manned submersible. Hunt hopes on next year's cruise to capture a specimen to study. He finds it significant that the worms appeared to be concentrated in a region of the trench within 70 meters of the ocean bottom. That would make them one of a group of animals that live only near the deep-sea floor. "This find confirms that a distinct bentho-pelagic fauna continues to greater depths than previously known," he says.

JAMSTEC

Ocean rower. Possible new species has transparent body.

Hunt hopes the finding will spur greater interest in the life in deep ocean trenches, which have received much less scientific attention than (typically shallower) undersea thermal vents. "Nobody really knows what is living at great depths," he says.