RANDOM SAMPLES

edited by CONSTANCE HOLDEN

El Niño Is Roaring Back

It's official: El Niño, a recurrent warming in the tropical Pacific Ocean that has far-flung weather effects, is back—big time. "We think this is shaping up into an extraordinary [El Niño] with large effects around the globe," says Ants Leetmaa, director of the National Oceanic and Atmospheric Administration's Climate Prediction Center (CPC) in Camp Springs, Maryland.

El Niño forecasters have had a hard time reading its signals against a background of unusual warmth that persisted for most of the '90s; sudden temperature jumps have intensified that warmth without warning. The current warming, which started early this year, is behaving more predictably, though: Both of the CPC's forecast techniques—a computer simulation of Pacific ocean-atmosphere interactions and a statistical analysis of Pacific climate trends—foresaw the trend as early as last fall.

Ironically, the computer model that in 1986 made the first successful El Niño prediction, the model at the Lamont-Doherty Earth Observatory in Palisades, New York, didn't see this El Niño coming. Depending solely on shifting equatorial winds, it presumably had too narrow a perspective.

The forecasters' next task is predicting how this El Niño will play out around the world. Leetmaa is assuming it will be comparable to the one in 1972, which would mean feeble monsoon rains for India this summer and water shortages in the Caribbean region. By early next year, there should be drought in Australia, South Africa, and northeast Brazil, while storms would bring extra water to California and much of the southern United States.

Progress on Artificial Chromosome Front

The race to make the ideal human artificial chromosome (HAC) has heated up with a report from researchers at the Murdoch Institute in Melbourne, Australia, who say they have identified a new, simpler DNA element that can fulfill the function of a centromere, a key chromosome component. Having a stripped-down centromere could bring the day closer when genes are delivered to an organism via the stable vector of artificial chromosomes.

In addition to ordinary genes made up of DNA, an artificial chromosome requires at least two pieces of specialized DNA: telomeres, which cap the ends of DNA strands, and a centromere, which anchors the chromosome to protein fibers that pull chromosomes apart during cell division. But while scientists know the DNA sequence of telomeres, they don't know what makes for a working centromere, although it seems to include highly repetitive DNA stretches.

Earlier this year, researchers at Case Western Reserve University in Cleveland became the first to make a functional HAC (*Science*, 4 April, p. 38), showing it could self-assemble if a cell is provided with a centromere that includes a repetitive DNA sequence called an alpha satellite. But molecular geneticist Andy Choo and his group at the Murdoch Institute, reporting in this month's *Nature Genetics*, have identified a "neocentromere" that was found 5 years ago in cells taken from a retarded child. The child's chromosome 10 had fractured in two; one piece carried the original centromere, and the other carried what Choo says appears to be a "latent centromere." Its DNA—unlike that of ordinary centromeres—has no alpha satellite repeats.

That is exciting news, because one of the big drawbacks of working with repetitive DNA is that it is notoriously difficult to clone. Says Choo, "We hope to use the special properties of the neocentromere to develop a more user-friendly way of making HACs."

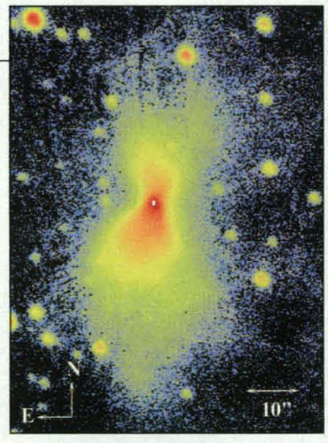
Gaia Guru Wins Blue Planet Prize

Independence has its rewards. British scientist James Lovelock of Coombe Mill, who for more than 30 years has held no formal position but visiting professorships, has won this year's $430,000 Blue Planet Prize, given by the Asahi Glass Foundation of Tokyo to those who have contributed to the resolution of global environmental problems.

The prize recognizes both the practical and theoretical contributions of the maverick Lovelock, who holds a Ph.D. in medicine. In 1957, he invented the highly sensitive electron capture detector, which made possible the measurement of ozone-destroying chlorofluorocarbons in the atmosphere and pesticides in foods. The detector produced much of the data that Rachel Carson used in her classic, *Silent Spring*, which launched the environmental movement.

Lovelock, 77, is more widely known for his offbeat Gaia hypothesis, which holds that Earth controls its climate and chemistry for the benefit of life. While scientists find the theory as a whole hard to swallow, it has helped foster their recognition of the role of biota in influencing climate, says atmospheric chemist Robert Charlson of the University of Washington, Seattle.

Lovelock thinks his award reflects a growing appreciation of global ecology. Ten years ago, "I certainly would not have expected anything like" this sort of recognition for the Gaia hypothesis, he says.



R. SAHAI AND L.-Å. NYMAN

Boomerang. Cocoon of dust and gas shrouds aging star.

Ultimate Chill

Astronomers have found the chilliest naturally occurring cold spot so far detected in the universe. In a paper to be published in *Astrophysical Journal Letters*, Raghvendra Sahai of the Jet Propulsion Laboratory in Pasadena, California, and Lars-Åke Nyman of the Onsala Space Observatory in Sweden report that gas in the Boomerang nebula has a temperature less than 3 kelvins (K), or minus 270 degrees Celsius. The work was done on a telescope that observes at submillimeter wavelengths in La Silla, Chile.

The Boomerang is a cloud of gas and dust that is being ejected by an old star before its core collapses into a stellar cinder known as a white dwarf. As the ejected gas expands at 165 kilometers per second, it cools rapidly. Sahai and Nyman compared the signal they received from the carbon monoxide in the gas, obtained by looking directly at the Boomerang, with that received from the microwave background radiation that pervades the universe. In general, the colder anything is, the less radiation it emits, and the weaker its radio signal. They found that the "on-source" (gas) signal was weaker, which implied that it is absorbing some of the background radiation. That means the gas must be colder than 3 K, the temperature of the cosmic background. "We are not aware of anything

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in nature which is at such low temperatures," says Sahai. Physicists have achieved temperatures of less than 1 K in terrestrial laboratories.

The new discovery could add to scientists' uncertainties about when and how old stars shed their mass, because it means the phenomenon may be more difficult to detect than they thought. "It raises the troubling possibility that some of the most massive of such outflows remain undetected because the expanding gas has cooled down to very low temperatures," says Sahai.

Minnesota Tenure Turmoil Resolved

Two years of turmoil at the University of Minnesota have finally culminated in a new tenure code that was unanimously approved by the Board of Regents on 13 June. Almost everybody is happy about the final version, says biochemistry professor Mary Dempsey, chair of the Faculty Senate tenure subcommittee: "Everything is peaceful and quiet and hopefully will be for a good, long time."

A year ago, the faculty came up with an arduously crafted new tenure code. The regents didn't like it, however, and hired private consultants to draft another one. That version was hailed as disastrous by faculty who claimed its provisions—such as allowing for dismissal of tenured professors whose programs were terminated—would effectively gut the tenure system. So alarmed were the faculty that earlier this year they came within a hair of unionizing.

Now the storm has been weathered. The regents who were pushing the more draconian proposals have either resigned or retired, and the new code addresses most faculty concerns. Ironically, it is "90%" similar to the one the faculty had originally proposed, says Dempsey. Some provisions:

- If a professor's performance is found wanting, a "special peer review" can be conducted on top of the usual annual salary and merit review. Sanctions for poor performance can include a salary reduction or, in the case of sustained incompetence or bad behavior, termination proceedings.
- Someone whose program is eliminated will be retrained or assigned to responsibilities "as closely related to their original field ... as is practicable."
- The maximum probationary period for a tenure-track faculty member goes from 6 to 9 years.

Minnesota now strides into the future with a new cast of leading characters including a new president, Mark Udof, former dean of the law school at the University of Texas, Austin, who comes on board 1 July, and a new head of the board of regents: businessman William Hogan, who used to teach electrical engineering at the University of Kansas, Lawrence. Says Dempsey: "We're thrilled."

New Caribbean Coral Killer

Researchers have discovered what seems to be yet another disease threatening the coral reefs of the Caribbean. The new scourge is a fast spreader and is affecting the large boulder corals that help form a reef's foundation, say James Cervino and Thomas Goreau of the Global Coral Reef Alliance. Thus far, it's been found within an area spanning about 600 square kilometers.

J. CERVINO

Wasting away. Sick coral.

Cervino and Goreau first identified the sick corals in January in reefs off Bonaire, in the Netherlands Antilles. Over the past 4 months, they have observed the same symptoms in reefs around Curaçao and near Aruba. They occur in the massive *Montastraea* and *Colpophyllia* corals but don't seem to damage the branching corals, which are vulnerable to white pox, a disease that was reported last year for the first time off Florida (*Science*, 20 December 1996, p. 2017).

Cervino and his colleagues are calling the new condition "rapid-wasting disease" because the diameter of the affected area initially spreads up to 7.5 centimeters in 24 hours before slowing down. That's "very fast," comments Esther Peters, an aquatic toxicologist at Tetra Tech Inc., an environmental consulting company in Fairfax, Virginia. Some coral diseases spread just a few millimeters a day.

What's more, while other coral afflictions generally destroy the living coral, leaving its calcium carbonate skeleton intact, rapid-wasting disease eats away at the skeleton. "It looks like someone is pouring acid on the coral head," says Cervino. Cervino, pathologist Raymond Hayes of Howard University in Washington, D.C., and colleagues will describe the new disease next month in Costa Rica at the meeting of the Association of Marine Laboratories in the Caribbean.

They have examined diseased coral samples under a microscope and observed what appear to be mycelia, the thin, rootlike filaments of fungi, suggesting a fungal infection. If that proves to be the case, then scientists have a leg up on this new disease, says Peters, as the pathogenic agents in most of the other half-dozen or so coral diseases are not known.

Remote Wheeling in Chile

A four-wheel-drive robot named Nomad, one of a new generation of robots designed to explore the moon and Mars, embarked last week on a 200-kilometer test trek through a barren desert in the high Andes of Chile.

As the robot rolled out into the dusty, boulder-strewn Atacama Desert, scientists directed its movements via satellite link from a remote command center at the Carnegie Science Center in Pittsburgh. "You've just witnessed the robot's first baby steps," said William 'Red' Whittaker, a robotics scientist at Carnegie Mellon University, where Nomad was built. "Nomad will wander the desert for 40 days, if not quite 40 nights."

The point of the trek is to test the ability of the robot, which has dune buggy wheels and a wide peripheral vision system, to explore a harsh environment while being controlled in real time by humans 8000 kilometers away. Moving at 5 kilometers a day, it's already relaying home 360-degree images of the dusty desert at a rate of 1.5 megabits of data per second. It is equipped with sensors and metal detectors that will help it search for minerals and meteorites, as well as two stereovision cameras that will send high-resolution color photos to geologists. At various points during the test, "we will configure the robot to simulate wide-area exploration of the moon, the search for signs of past life on Mars, and the gathering of meteorite samples in the Antarctic," said Dave Lavery, NASA's telerobotics program manager.

CMU

Sand rover. Chile's Atacama Desert. (Inset: Nomad.)

Nomad is designed to outperform NASA's four-wheeled Sojourner robot, which is due to land on Mars on 4 July. Sojourner is only expected to move a few meters per day and to send back one black-and-white photo daily.