RANDOM SAMPLES

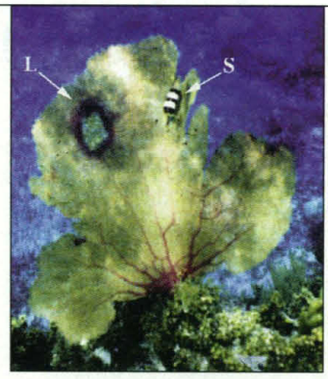
edited by CONSTANCE HOLDEN

Florida Corals in Bad Shape

Corals in the Florida Keys and throughout the Caribbean are sickening at an "accelerating" rate, according to James Porter, a marine ecologist at the University of Georgia, Athens. In a speech last week at the Smithsonian Institution in Washington, D.C., Porter also expressed alarm at the number of new diseases being identified.

As part of the Environmental Protection Agency's Coral Reef Monitoring Program, Porter and colleagues in 1995 set up 160 stations extending the length of the Florida Keys. Last year, they found several diseases in a small area (*Science*, 20 December 1996, p. 2017). Now it appears that there are more diseases than ever, and that they are widespread throughout the Keys.

Between 1996 and 1997, Porter related, the number of stations where sick corals were observed rose from 25 to 94. Of 44 species monitored, the number afflicted rose from nine to 28. And of 13 diseases, three are "entirely new to science." One causes brain coral to swell up; in another, "tissue is mowed off the skeleton in a brilliant red line"; and another is killing the tops of coral ridges. That's on top of white pox, black band, and other alarmingly named afflictions.



KIHO KIM/CORNELL UNIV.

Fungus from Africa? Sea fan with *Aspergillus*.

Scientists still don't know the causes of most of these diseases. A theory is that runoff from sewage and pesticides as well as light deprivation from turbidity are stressing corals, making them more susceptible to existing pathogens. But at least one non-marine organism has been implicated: *Aspergillus*, a soil fungus that afflicts soft corals known as sea fans. Garriet Smith, a marine microbial ecologist at the University of South Carolina, Aiken, says fungus-bearing sand may be blowing in from the Sahara.

Lauri MacLaughlin, a resource management specialist at the Lower Keys office of the Florida Keys National Marine Sanctuary, says officials are concerned about the apparent increase in disease but cautious about the implications—"We're so unsure right now what's going on. We're just trying to get a handle on it."

Cell Phones Threaten Radio Telescope

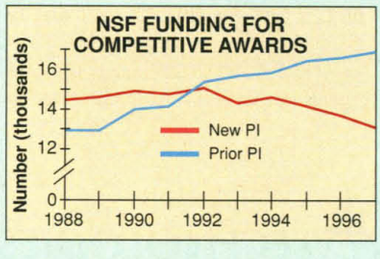
Indian officials hope to strike a deal with a subsidiary of Motorola that would prevent signal interference by company satellites with the country's Giant Meterwave Radio Telescope (GMRT). Astronomers say signals to mobile phones could hamstring the $17 million installation as it prepares to become operational next year.

GMRT, near Pune, India, is designed to be one of the most sensitive instruments in the world for exploring the early universe, with 30 antennae spread over 25 kilometers. GMRT now operates in the 50- to 1420-MHz range, but expansion is planned within the next few years to 1612 MHz. That will bring it near the 1621.35- to 1626.5-MHz range being used by Iridium India Telecom, a collection of 72 low-Earth orbit satellites—of which 39 are in place—that will offer global mobile phone service. A gateway to serve South Asia is being set up uncomfortably close to GMRT at Dighi, about 80 km away.

"Spurious radio emissions because of the cheap circuits and filters being used in the Iridium project can close important windows to view the universe," says Vijay Kapahi, director of the National Centre for Radio Astronomy in Pune. Scientists are worried in particular about interference with signatures from hydroxyl radicals at about 1612 MHz, which are important for exploring star-forming regions.

Iridium officials insist that their system won't cause trouble. "The initial experiments done at the Dighi site give favorable results that meet international requirements," says Jaydev Raja, head of Iridium. He adds that the company "has offered a radio pollution–free window for 4 hours every day very early in the morning." However, former GMRT chief Govind Swarup says "this is highly impractical" and that clear signals are required around the clock.

The interference problem is not new. This month, at the World Radiocommunication Conference in Geneva, concerns were aired about communications companies that are seeking ever higher radio frequency bands for high-capacity mobile phones and Internet services.



First time is no charm. Although the number of competitive proposals coming to the National Science Foundation (NSF) has held steady since 1992, the number with first-time NSF applicants as principal investigators (PIs) has dropped sharply in the last 3 years. "We don't know the reason," says Judy Sunley, assistant to NSF director Neal Lane. "But I'd be disturbed if the trend continues." Sunley and others speculate that fledgling researchers are staying longer in postdoctoral positions, or are involved in more team projects. In either case, the researchers would not be listed as PIs on their own grant proposals.

NSF officials hope to present a more detailed analysis of the figures, including a breakdown by directorate and discipline, in February to NSF's overseer, the National Science Board, whose members have repeatedly urged the agency to do more to encourage young scientists. One indicator that has held steady over the years: New applicants are about half as likely to get funding as those with a history of NSF grants.

Overstimulated by Early Brain Research?

Can infants develop faster if you read to them a lot and otherwise enhance their environment? That theory has been the subject of cover stories and even of a White House conference last April on "what new research on the brain tells us about our youngest children" (*Science*, 4 April, p. 23).

In fact, neuroscience has not yet come up with any evidence that a child raised in an "adequate" setting will grow a better brain with "enrichment," says John Bruer, president of the McDonnell Foundation in St. Louis, which funds research in cognitive neuroscience. Writing in the November issue of *Educational Researcher*, Bruer says that many educators and the media are misinterpreting the significance of recent findings. These include rapid growth of neural synapses shortly after birth and subsequent pruning, critical

(continued on page 1571)

(continued from page 1569)

periods of rapid brain development in which an interruption can spell long-term damage, and higher numbers of synapses in rats living in complex environments rather than by themselves.

Groups like the Education Commission of the States have used such findings to postulate a window of opportunity—generally from birth to age 3—where a child's mental development can be dramatically influenced. And the press has pumped it up: The 3 February issue of *Time* magazine, citing rat studies, enthused that "rich experiences ... really do produce enriched brains."

But Bruer notes that most research on synaptogenesis has been in animals, while data on "critical periods" relate mainly to visual systems. "There is no evidence whatever that critical periods exist" for cognitive learning, he says.

Other experts applaud his efforts to dispel some popular misconceptions. Bill Greenough of the University of Illinois, Urbana-Champaign, who studies the influence of the environment on synapse formation in rat brains, worries that such faulty thinking could make for bad policies. "It would be a real mistake to shift educational resources" away from proven areas and "focus them on zero to three, where we really don't know what to do," he says.

Sex, Eyes, and Videotape

What does a horseshoe crab look for in a mate? The right moves, according to a computer model that simulates the behavior of neurons in a crab's eye. The images generated show what a crab sees as it scans for mates. They also show how ensembles of neurons encode visual stimuli for the brain, says Robert Barlow, a neurobiologist at the Marine Biological Laboratory in Woods Hole, Massachusetts, and the State University of New York Health Science Center in Syracuse.

Barlow and his colleagues describe in the 11 November issue of the *Proceedings of the National Academy of Sciences* how they used a "cell-based" computer model of the horseshoe crab's lateral eye, made from data about what Barlow says is the "best understood eye in the animal kingdom."

The researchers put their model to a real-life test by mounting a mini–video camera, the "CrabCam," on the back of a male horseshoe crab as it patrolled shallow ocean waters in search of females. A probe attached to a single neuron in the crab's eye recorded the neuron's activity as the crab inspected moving cylinders resembling black and gray female crabs that the researchers had placed in the area.

ROBERT BARLOW/*PNAS*

Crab goes a courtin'. Male horseshoe equipped with CrabCam.

Back in the lab, they digitized the video footage and fed it to the eye model, which produced a series of neural images. When the researchers compared the single-neuron recordings with the computer's predicted activity of that particular neuron, they found "very close agreement," says Barlow. They concluded that the model was in fact producing images of what the crab actually sees. And they found that "the crab's eyes are tuned to best detect crab-sized objects, moving at crab speeds, while ignoring stationary ones," he says.

Up to now, claims Barlow, no one has been able to look at "the complete visual message sent to the brain from the entire retina." Harvard neurobiologist John Dowling says the research has "taken a step forward to show that we can model more complex and transient" responses in neural networks.

Anticancer Compound Synthesized

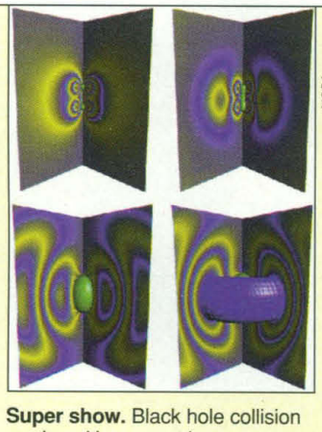
One important argument for biodiversity is the value of rare plants and animals in combating disease. Yet medical success can have a darker side: The discovery of anticancer properties in the Pacific Yew tree, for example, threatened to drive the plant to extinction until researchers figured out a way to synthesize the active ingredient, paclitaxel, using just the tree's needles.

Scientists from The Scripps Research Institute in La Jolla, California, now hope to do the same thing with a recently discovered coral that harbors similar cancer-killing properties. The compound, known as eleutherobin, was isolated from a species of coral discovered in the Indian Ocean earlier this year by a team led by William Fenical at the Scripps Institution of Oceanography. Lab tests showed eleutherobin to be a powerful killer of human cancer cells. Fenical's team also established that the drug appears to work like paclitaxel, preventing cells from dividing by binding to tiny fibers that pull DNA strands apart when cells split.

Bristol-Myers Squibb, which also produces paclitaxel, quickly obtained the license for the compound. But supplies of eleutherobin remained in short supply. Now, K. C. Nicolaou and colleagues at Scripps and the University of California, San Diego, report in the 19 November *Journal of the American Chemical Society* and the 1 December *Angewandte Chemie* that they have synthesized eleutherobin from scratch. The teams used only simple starting materials such as carvone, an oil obtained from caraway or dill seeds.

The new work "will be very helpful," says Ken Snader, a pharmaceutical chemist at the National Cancer Institute in Bethesda, Maryland. Eleutherobin could become an important weapon against cancer. And he says, "It's important to get more supplies to find that out."

Supergrid



NCSA

Super show. Black hole collision produced in concert by computers in Indiana and Germany.

The first permanent international grid of supercomputers came on line last week at the SC97 supercomputing conference in San Jose, California, and did some tricks for public consumption (see photo).

The grid, called GUSTO (for Globus Ubiquitous Supercomputing Test-Bed), links about 3000 processors at 15 sites in the United States and Europe. Instead of scheduling computer time in advance and getting the results of a calculation days later, scientists will be able to use the new network to choose an available supercomputer for a job and receive the results right away. The grid also will allow several computers to team up on a problem or enable people thousands of kilometers apart to share the same three-dimensional virtual environment.

Globus project co-leader Ian Foster of Argonne National Laboratory near Chicago predicts that the new grid will evolve as the Internet did—eventually serving to "integrate [supercomputers] into the set of tools that scientists use on their desktops." If the NSF's new high-speed backbone, called vBNS, represents the hardware of the new "metacomputer," Globus is the operating system, explains Foster, who developed it with Carl Kesselman of the University of Southern California in Los Angeles.

GUSTO still has technical problems to solve. But participants at a conference forum agreed that social and economic ones are more complicated. What, wondered one scientist, if "I want to use yours, but you can't use mine"?