

ECOLOGY

Great Smokies Species Census Under Way

For most hikers or picnickers, flies are a minor nuisance dealt with by a firm swat. For Brian Wiegmann, however, they bring the kind of delight only a dipterist can feel. When a slender black fly with orange spots alighted on Wiegmann's knee last month in Great Smoky Mountains National Park, a



They're out there somewhere. Scientists plan to catalog every species in Great Smoky Mountains National Park.

fellow fly hunter knew right away they were looking at a flower-pollinating species never seen before. By the end of the Memorial Day weekend, Wiegmann and several colleagues had collected at least five new species. "It was pretty exciting," says Wiegmann, an entomologist at North Carolina State University in Raleigh.

This was no casual fly safari: Wiegmann and gang were taking part in the kickoff of the All Taxa Biodiversity Inventory (ATBI). Led by the National Park Service and a non-profit called Discover Life in America, the ambitious project, now in a 2-year pilot phase to hash out methods, is inviting scientists to tally every species that calls the park home. It's a tremendous undertaking, considering that scientists so far have identified only 9800 of an estimated 100,000 species (excluding bacteria and viruses) in the 225,000-hectare park, which straddles the border of Tennessee and North Carolina.

Besides being a taxonomist's dream, the project aims to shed light on why some regions have a richer array of life-forms than others and how quickly species are going extinct. "It would be nice to have a chunk [of land] where we know everything that occurs," says taxonomy group leader Don Wilson, a mammalogist at the Smithsonian Institution. However, accruing such knowledge carries a hefty price tag: Adding 90,000-odd branches to the tree of life could take up to 15 years and

\$100 million, according to ATBI organizer John Pickering, an entomologist at the University of Georgia, Athens. (Not everyone thinks the cost will be that high.) "There's lots of excitement in the scientific community, but not lots of money," says Mike Sharkey, an insect systematist at the University of Kentucky, Lexington, and ATBI participant. Sharkey and others admit they don't know if they can raise that kind of money for a species census.

The original plan, conceived 6 years ago by University of Pennsylvania ecologist Daniel Janzen, was to carry out an ATBI in a swath of rainforest in Guanacaste, Costa Rica. The idea resonated with academics, thanks in part to enthusiasm sparked by INbio—a novel institute, run by the Costa Rican government with support from the pharmaceutical giant Merck, that prospects in the rainforest for candidate drugs. But this incarnation of the ATBI, expected to cost \$90 million, fell apart after Costa Rican officials opted for a limited survey (*Science*, 9 May 1997, p. 893).

Bowed but not beaten, ATBI adherents revived the idea a couple of years ago, settling on the Great Smokies park as the venue because it's one of the most species-rich temperate areas in the world, and it's much easier and cheaper for U.S. scientists to reach than Central America. Also, in contrast to the cool reception researchers encounter in most parks—where getting a permit to collect even a single species can be an uphill battle—Smokies officials welcomed the opportunity to have waves of scientists bearing down on them. "We have a management team that thinks science is important," says park biologist Keith Langdon, an ATBI organizer. The park, he says, has pledged to open up to ATBI researchers a \$3 million lab it hopes to build in 2001.

Project scientists are still working out the mechanics of their whole-earth survey. For instance, Langdon's staff has laid out 20 1-hectare plots to help scientists sample the park's various habitats. The project has a Web site logging bugs, salamanders, and other verified park denizens; it will eventually include data on each species' range, behavior, and population dynamics (www.discoverlife.org).

Impressive, maybe, but will the taxonomy community at large get fired up over a species quest in Tennessee? "The Smokies is not as sexy a place" as Costa Rica, admits Wilson, who isn't counting on seeing any new charismatic species, like mammals or birds. "From the standpoint of the scientific community, there's maybe less hoorah." Nev-

ScienceScope

One More? Radiologists and bioengineers have joined forces to lobby for a new "home" at the National Institutes of Health (NIH). The goal: an Institute of Biomedical Imaging and Engineering.

Math- and physics-based research cannot truly prosper in biomedicine until NIH dedicates an institute to them, says Ed Nagy, executive director of the Academy of Radiology Research. Representing a score of societies, the group has teamed up with the American Institute for Medical and Biological Engineering to push companion bills introduced last month by Representative Richard Burr (R-NC) and Senate Majority Leader Trent Lott (R-MS).

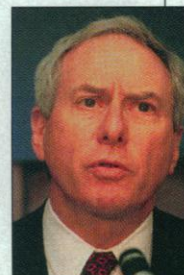
NIH officials strongly oppose the idea, saying it would be disruptive to "pull out" imaging experts and engineers from various NIH labs and stash them in a single institute. Although NIH director Harold Varmus and others have been supportive of the fields, Nagy says, a permanent home would ensure that "we don't have to depend on" the good will of individuals. The bills face an uphill road.

Stern Words One week after chiding particle physicists for being wedded to outdated technology (*Science*, 4 June, p. 1597), NASA Administrator Daniel Goldin has accused astronomers of lacking vision. But some think it's a cheap shot.

Speaking at an American Astronomical Society meeting in Chicago on 3 June, Goldin mocked astronomers who are enamored with the status quo, including the Hubble Space Telescope. He said facetiously that the agency could install the telescope in the National Air and Space Museum in Washington, D.C., and allocate "hug time" for astronomers unwilling to embrace newer technologies. He also complained that astronomers were ignoring such ideas as robotic explorers that can learn using neural networks and "genetic algorithms."

But some members of the audience think Goldin is confusing timidity with a healthy skepticism. Neural and genetic programs are not mature enough to be used on space missions, said one astronomer. And when Goldin shot back that "ignorance is not a place to be," another scientist stood up "in defense of 'ignorance'"—meaning current knowledge and expertise. No word yet on Goldin's next target.

Contributors: David Malakoff, Constance Holden, Eliot Marshall, James Glanz



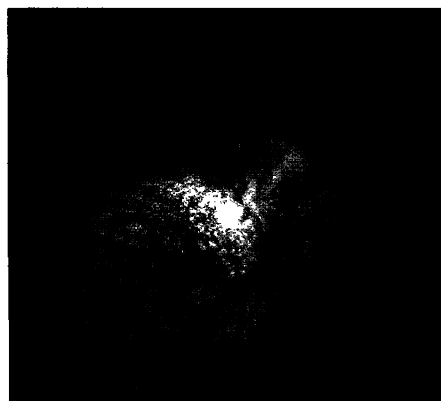
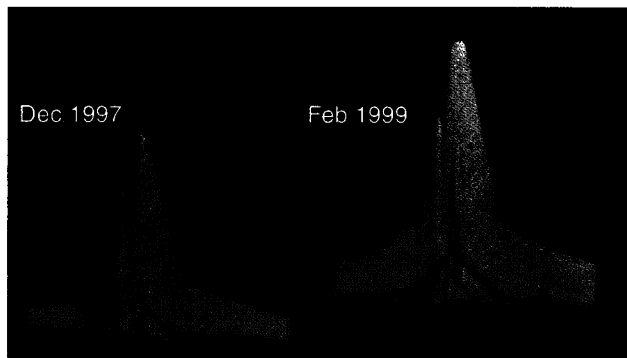
ertheless, organizers do have a bird in hand: \$150,000 this year (and perhaps future years) from the Smoky Mountains Natural History Association, as well as some matching funds. How many birds are in the bush is anyone's guess. Organizers plan to submit proposals to the National Science Foundation and other agencies and nonprofit foundations starting later this year, after they can make a more persuasive case based on data from this summer's fieldwork. "I'd say there's a huge number of taxonomists out there" who are interested, Pickering says. "We've got to convince them we've got the organization and the money."

—JOCELYN KAISER

ASTRONOMY

An Oversized Star Acts Up

CHICAGO—Is it a distress signal or just a boisterous how-do-you-do? A star called Eta Carinae is flashing a mysterious message,



Bright spot. Plots of brightness (*top*) show the change in the central star, which is shrouded in a nebula (*above*).

and theorists are struggling to make sense of it. Visible to the naked eye in the southern sky, Eta Carinae is one of the biggest stars known to astronomers; shrouded in gas and dust, it is perhaps 100 times the mass of the sun, and so bright that if it gets any brighter it should blow itself apart. But observations announced at a meeting of the American Astro-

nomical Society here last week show that over the last 2 years, it has indeed brightened—by a factor of more than two—while remaining intact. And whereas such a star would be expected to expand and cool when it brightens, Eta Carinae has heated up.

"Here's a very massive star doing some weird stuff," says Craig Wheeler, an astrophysicist at the University of Texas, Austin. So erratic is the behavior that some astronomers are speculating that, rather than being on the verge of blowing up because of its own brilliance, the mammoth star may be about to collapse, triggering an even bigger explosion called a supernova.

Astronomers at the University of Minnesota and the NASA Goddard Space Flight Center in Greenbelt, Maryland, picked up the brightening in four measurements made by the orbiting Hubble Space Telescope's Imaging Spectrograph (STIS) between December of 1997 and February of 1999. The star, which Kris Davidson of Minnesota says "reminds us a little of a geyser," has acted up before. A tremendous eruption in the 1840s belched up several solar masses of material that formed a dumbbell-shaped cloud around the star, which astronomers call the Homunculus. That event, during which the entire structure was about 10 times as bright as it is now, was followed by a smaller burp in the 1890s and a gradual brightening

in this century, probably because the central star is shining through more and more clearly as the Homunculus expands and its veil of gas and dust thins.

But this time around the star itself has brightened. When the brightening turned up in the STIS spectra, "we started questioning, 'Is this real or is it an instrumental effect?'" says Goddard collaborator Theodore Gull. The team was reassured when they checked lower resolution images by other telescopes and discovered that ground-based astronomers had missed a smaller, but rapid, overall brightening, says Roberta Humphreys of the University of Minnesota.

The brightening remains mysterious, however, because the star is thought to be very close to its "Eddington limit," where light exerts so much outward pressure that gravity is just barely able to hold the star together. So any further brightening should produce an outrush of material. But an expanding burst of gas—although still too small to be seen directly—would cool like gas rushing out of a spray can. The cooling would strengthen the star's infrared signal and turn down the ultraviolet. But the full STIS spectra showed just

the opposite pattern.

"One explanation is that the star got hotter" without changing size, says Humphreys—although theorists don't know how a star could do that. Whatever the cause, astronomers are wondering what comes next. Perhaps Eta Carinae is about to pop off as it did in the 1840s, or perhaps it is about to collapse and blow up as a supernova. Stars of that mass are also the conjectured progenitors of hypernovae—even larger explosions that might produce the cosmic blasts called gamma ray bursts. "It really is a Rosetta stone of some kind," says Wheeler. "We just don't know of what."

—JAMES GLANZ

SCIENCE AND SOCIETY

Germany Waves a Flag for Science

German scientists aren't known for blowing their own horns. Compared to their U.S. colleagues, they tend to be a bit shy about publicizing and explaining their research. Now, in response to an apparent deterioration in the German public's regard for science, resulting from conflicts on issues such as genetic engineering, animal rights, and nuclear power, Germany's science establishment is getting behind a major new effort to improve the public's understanding of—and, in theory, its appreciation for—scientific research. The initiative, called "Public Understanding of the Sciences and Humanities" (PUSH), is being financed by an initial \$280,000 grant from the Association for the Promotion of German Science, an industry-funded organization based in Essen that is spearheading the program and offering grants for scientists.

This month, the leaders of Germany's major scientific organizations—including the Max Planck Society, the DFG granting agency, the University Rectors' Conference, the Helmholtz Association of National Research Centers, the Fraunhofer Society applied-research organization, and the Science Council—signed a memorandum supporting the PUSH initiative and took part in a forum in Bonn to publicize the concept. Detlev Ganten, chair of the Helmholtz association and head of Berlin's Max Delbrück Center for Molecular Medicine, says today's German scientists should follow the examples of Albert Einstein, Alexander von Humboldt, and other renowned researchers who helped explain science to the masses. At best, he says, only about 6% of the public now understands what physicists and chemists do. The PUSH program should try to "deepen the understanding of how much science affects all areas of society—and will have even more impact in the future," he says.

The German science organizations have

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