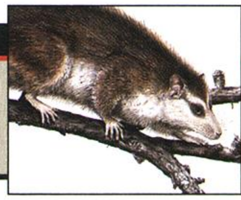
PAGE 636
Biologists abuzz over foraging gene



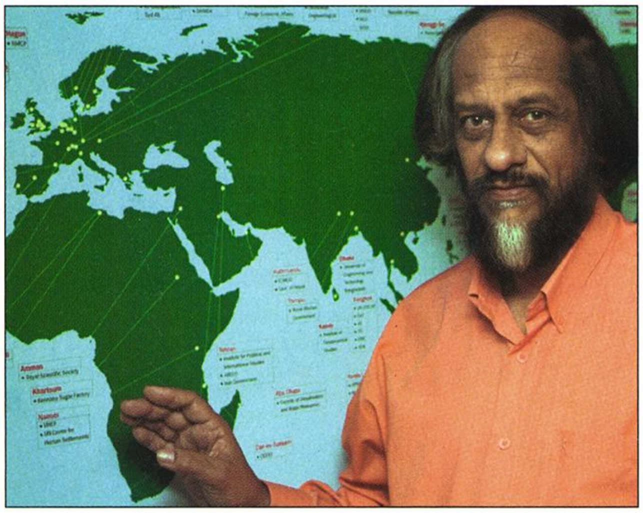
637
Earliest placental mammal

CLIMATE CHANGE

Pachauri Defeats Watson in New Chapter for Global Panel

In a pitched battle that one scientist called a political "coming of age" for the field, Indian engineer and economist Rajendra Pachauri last week became the chair of the Geneva-based Intergovernmental Panel on Climate Change (IPCC). His election has sparked speculation about the fate of a 14-year-old organization that has relied on consensus to deliver three influential reports on the likely causes and impact of global warming.

Pachauri defeated Robert Watson, chief scientist of the World Bank and a former Clinton Administration environmental official, who was seeking a second 5-year term. The vote, by secret ballot, was 76 to 49. Pachauri enjoyed the support of the U.S. government (*Science*, 12 April, p. 232), which was looking for an alternative to Watson, as well as that of most Asian and African countries, which were pleased to see someone from the developing world put up for the post. Watson was backed by many European and Pacific island states, which saw Watson as a staunch advocate of independent science and the need to take climate change seriously. José Goldemberg, a former Brazilian environment minister, emerged as a last-minute candidate but secured only seven votes. The delegates rejected a proposal that would have split the chair between a developed- and a developing-country representative.



Global reach. India's Rajendra Pachauri is the new chair of the Intergovernmental Panel on Climate Change.

The intense politicking in Geneva was a radical departure for the panel, which in the past has chosen its leaders by acclamation. Some researchers fear that the controversy could discourage the best physical scientists from participating in the next round of climate assessments, due out in 2007, and weaken IPCC's reputation for credibility and consensus. They also worry that such contentious behavior will extend to matters of science. "This is a new precedent," says James McCarthy, a Harvard University oceanographer who has co-chaired an IPCC working group. "In the past we always managed to avoid a vote" for chair.

But other IPCC officials say that the election marks a natural transition for an organization with 192 members and one that must focus more on the social and economic effects of global warming than on the scientific causes. "This is the organization's coming of age," says Ogunlade Davidson, a mechanical engineer at the University of Cape Town, South Africa, who attended the Geneva meeting. "When it was smaller, it was easier to get consensus, but that has to change."

Pachauri, head of New Delhi's private nonprofit Tata Energy Research Institute, served as a vice chair under Watson. He is the third IPCC chair—Sweden's Bert Bolin was the founding chair—and the first who is not a physical scientist. He sees the vote as a mandate for his plan to emphasize the socioeconomic effects of climate change on specific regions of the world. "This election," he asserts, "will not cast a shadow on the scientific objectivity of this august body."

However, Goldemberg fears that the hotly contested election may have damaged the panel. "I'm worried that all of this has changed its character," says Goldemberg, a physicist who is widely known in international scientific circles. Watson and Bolin "were able to attract the best scientists," he says, adding that he has "great doubts" that someone from outside the climate sciences would be able to do the same.

The U.S. delegation was unusually "subdued" in Geneva, says Pachauri, although some researchers say it was actively trying to unseat Watson. "He's the bearer of news they don't want to hear," says William Moomaw, a chemist and environmental policy professor at Tufts University in Medford, Massachusetts. Watson agrees that the Bush Administration wanted to oust him, but he questions whether their position was also an attack on the panel's credibility. "Some elements of the energy industry want to weaken the IPCC," he says. "But I don't think the U.S. government wants to."

Europeans, many of whom backed Watson, say they are ready to move on. "We are willing to close ranks and get back to business," says Bert Metz of the Netherlands' National Institute of Public Health and the Environment, who was in Geneva. Watson agrees: "The challenge is to get this discussion behind us." Watson says he is eager to continue working with the panel, but only if he has a "clearly defined role." Although Pachauri offered conciliatory words to Watson in Geneva, he did not spell out such a role for his predecessor.

—**ANDREW LAWLER**

With reporting by Pallava Bagla in New Delhi.

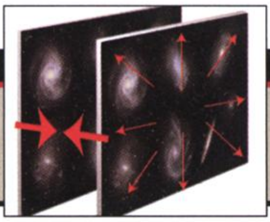
HIGH-ENERGY PHYSICS

Neutrino Census Nails Chameleon Particles

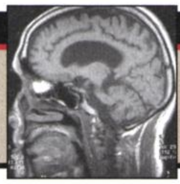
ALBUQUERQUE, NEW MEXICO—The publicity-shy particles known as neutrinos are back in the spotlight. At a meeting here this weekend,* physicists from the Sudbury Neutrino Observatory (SNO) in Ontario, Canada, released much-anticipated measurements of the flow of neutrinos from the sun and other sources. The results put the final nail in the coffin of the decades-old solar neutrino paradox and eliminate a once-favored assumption

* Joint meeting of the American Physical Society and the High Energy Physics Division of the American Astronomical Society, 20–23 April.

CREDIT: P. BAGLA

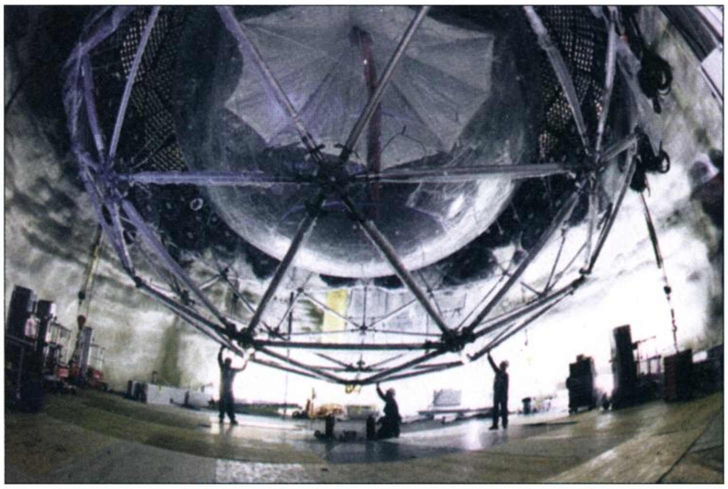


FOCUS



about a key property of the particles.

Neutrinos are incredibly hard to detect because they seldom interact with matter; they can zip through Earth without noticing it. Occasionally, one will trigger a physicist's detector, but not all neutrinos are equally easy (or difficult) to catch. Neutrinos come in three "flavors," named after the subatomic particle that each is associated with: the electron neutrino, the muon neutrino, and the tau neutrino. Electron neutrinos are the easiest to detect, because they participate in reactions involving the very common electron; tau and muon neutrinos are hard to spot. That reticence seemed to explain a puzzling deficit of electron neutrinos created in the sun's nuclear furnace: If electron neutrinos changed flavors into muon or tau neutrinos, they could escape detection.



Key ingredient. Heavy water in globe at the heart of the Sudbury Neutrino Observatory traps flavors of neutrinos that other detectors miss.

The raison d'être for SNO—a 1000-ton sphere 2 kilometers under Earth's surface—is to spot all three flavors. Unlike other big neutrino detectors, such as the Super-Kamiokande facility in Kamioka, Japan, SNO's sphere is filled with heavy water—water made with deuterium, a heavy isotope of hydrogen—rather than ordinary water. The deuterium in the detector allows SNO scientists to see neutrino reactions that others can't.

Last year, scientists first revealed their measurements of one of these reactions: the charged-current reaction, in which an electron neutrino strikes a deuterium nucleus and converts its neutron into a proton and an electron. This enabled scientists to measure the number of electron neutrinos and compare it with the total number of neutrinos that were scattering off matter (*Science*, 22 June 2001, p. 2227). The results set neutrino physicists abuzz. Not only did they give strong evidence that neutrinos were changing flavor, but they matched up well with the models of solar neutrino production. The solar neutrino deficit seemed to be accounted for.

On 21 April, SNO scientists revealed their measurements of another deuterium-specific reaction, called the neutral current, in which a neutrino of any flavor slams into deuterium and breaks it apart into a neutron and a proton. Only electron neutrinos can trigger the charged-current reaction, but the neutral current is equally sensitive to electron, muon, and tau neutrinos. By measuring the relative ratios of electron, muon, and tau neutrinos coming from the sun, SNO scientists saw that solar neutrinos, which began their journey to Earth as electron neutrinos, had changed into muon or tau neutrinos by the time they reached the detector. "This is strong evidence for flavor change," says team member Andre Hamer of Los Alamos National Laboratory in New Mexico. "And the total number of neutrinos agrees with the standard solar model prediction."

Not only is the evidence for flavor change much stronger than before—in statistics-speak, a 5.3-sigma result rather than a 3.3-sigma one—but the new measurements pin down the properties of neutrinos with unprecedented precision. "They have a significant impact on our understanding of the relative masses of neutrinos," says team member Art McDonald of Queens University in Kingston, Ontario. The results also show that another property of neutrinos related to how they interact with matter, known as the "mixing angle," must be large rather than small, contrary to what physicists believed until quite recently (*Science*, 2 November 2001, p. 987). "The small-mixing-angle solution is out," says Hamer.

Neutrino physicist Bruce Berger of Lawrence Berkeley National Laboratory in Berkeley, California, agrees. Although the case isn't closed, Berger says, "it's extremely unlikely, given current measurements, that it's a small mixing angle." Little by little, the ethereal neutrino is assuming a tangible form.

—CHARLES SEIFE

EVOLUTIONARY BIOLOGY

Darwin's Avian Muses Continue to Evolve

Charles Darwin spent just over a month on the Galápagos Islands in 1835. The peculiar finches he collected there, each species with a distinctive beak shape, helped inspire his theory of evolution by natural selection. In 1973, Peter and Rosemary Grant, a husband-and-wife team of Princeton University biologists, returned to the Galápagos to observe the evolution of Darwin's finches up close. On the volcanic island of Daphne Major, they and their students have been keeping track of every single finch from birth to death, allowing them to quantify the effects of natural selection on the birds. The ongoing study is "one of the true classics of evolutionary biology," says biologist John Burke of Indiana University, Bloomington.

Evolutionary beacon. Medium ground finch beaks wax and wane with climate shifts.

On page 707 of this issue, the Grants review 30 years of evolution among Darwin's finches. Evolution has proven predictable in the short term but unpredictable over the course of decades, they report. Climate change has been a powerful influence guiding the evolution of the finches—and its effects turn out to be surprisingly complex. Natural selection is not the only force altering the birds: So is their promiscuous sex life. The two species on Daphne Major can and sometimes do interbreed, and their hybrids—far from being mulelike reproductive dead ends—are a

CREDITS: (TOP TO BOTTOM) SNO; JOSEPH W. DOUGHERTY