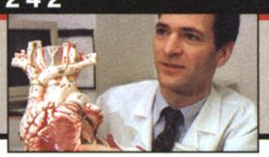
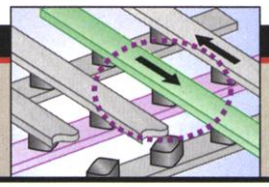




avoid a divisive vote, leading delegates are floating a compromise to split the unpaid position between the two men. Watson backs the idea, but Pachauri is having none of it. "I totally reject this proposal," he says. "Two co-chairs is an unworkable concept except for someone who is desperate to keep the title of chairman in any form."

The controversy shines a spotlight on IPCC, set up in 1988 by the World Meteorological Organization and the United Nations to assess the scientific, social, and economic issues related to human-induced climate change. The organization—which includes members from more than 170 countries—pulls together climate data and other information in comprehensive reports painstakingly reviewed and published roughly every 5 years. IPCC has profoundly altered the climate change debate; the 1995 report, for example, led to the 1997 Kyoto protocol in which political leaders acknowledged the need to address global warming.

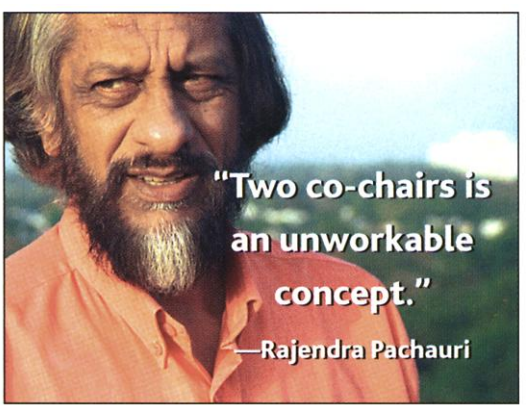
Unlike many international bodies, IPCC is small, enormously influential, and mostly run by volunteers. A small Geneva-based bureau, led by a chair and five vice chairs, oversees the panel's work. Working groups examine climate change science, the impacts of climate change, and ways to mitigate and adapt to the problem, including reducing greenhouse gas emissions. Each group has two co-chairs, one from a developed country and one from the developing world, and each report is carefully vetted and then approved by IPCC members. Although each member technically has a vote, the chair typically is elected by acclamation.

Researchers attribute much of IPCC's scientific credibility to Watson and Bert Bolin of Sweden, the panel's founding chair. "[Watson] has been absolutely extraordinary," says William Moomaw, a chemist and environmental policy professor at Tufts University in Medford, Massachusetts, who also is a longtime acquaintance of Pachauri. "He's taken on the toughest issues and gotten the best people." Adds Michael McCracken, a senior scientist with the U.S. global change research program: "[Watson] is up on the science, has the ability to encourage a wide range of information, and knows how to push toward consensus." A host of other researchers echo that praise. "He's been an impartial and driving force," says Bolin, who served two terms as IPCC chair.

CREDIT: P. BAGLA

The physical scientists who form the core of IPCC worry that a chair without a track record of research in the field could weaken the organization's reputation. "Without a strong leader, you won't draw the best scientists," worries James McCarthy, a Harvard University oceanographer who has co-chaired an IPCC working group. But nuclear engineer Tomihiro Taniguchi, head of nuclear safety at the International Atomic Energy Agency (IAEA) in Vienna and a former vice chair of IPCC, says that Pachauri's skills as an economist will be valuable because "the discussion on climate change is moving from the science, which is now well accepted, to the more complex aspects of sustainability."

The Bush Administration's support for Pachauri isn't ideological, says State Department deputy spokesperson Philip Reeker. Instead, he says, it's based on his qualifications and the value of having a panel chair from the developing world. Privately, however, Administration officials say that Watson's occasional criticism of the U.S. stance on climate change and his role in the first Clinton Administration made it impossible to renominate him. Watson is also a bête noire to U.S. energy lobbyists. Although Reeker denies that industry played a role in the decision, a February 2001 memo to the White House Council on Environmental Quality from ExxonMobil lobbyist Randy Randol claims that Watson was "handpicked by Al Gore" and should be replaced. The memo was provided to *Science* by the Natural Resources Defense Council, a New York City–based nonprofit that opposes the Administration's views on global change.



Pachauri, however, may be less sympathetic to the Bush Administration's stance than Watson is. "I am not a toady of the U.S.," he says, adding that "I was very critical of the U.S." for opposing the limits on greenhouses gases laid out in the Kyoto protocol. He also is a strong opponent of concepts favored by developed nations, such as emissions trading. "Free-market solutions will not work," he says.

Many researchers see the move as part of a wider campaign by industry and the White House to attack IPCC's credibility. "It is scandalous," says Princeton University atmospheric scientist Michael Oppenheimer. "This is an invasion of narrow political considerations into a scientific process."

But presidential science adviser John Marburger rejects that idea. "There is no evidence of a politically driven conspiracy theory," says Marburger, who attended several meetings devoted to the IPCC election. As evidence, he cites the U.S. decision to back Susan Solomon, an atmospheric chemist at the National Oceanic and Atmospheric Administration's lab in Boulder, Colorado, as co-chair of the science working group. "That's where the science needs to be focused, and she'll do an excellent job for us," he adds. Solomon would be the first American to lead that group.

Climate change scientists will be watching the Bush Administration's every move to judge the accuracy of Marburger's statement. In the meantime, a big part of the job facing the Geneva delegates will be to show that the damage to the usual spirit of consensus can be repaired. **–ANDREW LAWLER**

With reporting by Pallava Bagla and Richard Stone.

PRIMATE EVOLUTION

Gene Activity Clocks Brain's Fast Evolution

A team of molecular biologists has taken a stab at defining what makes us human. Its answer: We're set apart from other primates not so much by differences in the makeup of our genes but by relatively recent changes in how active those genes are. Such changes are most dramatic in the brain, where they've occurred at a faster rate in humans than in other primates, report Svante Pääbo of the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, and his colleagues on page 340.

In 1975, geneticist Mary-Claire King and the late biochemist Allan Wilson, both then at the University of California, Berkeley, showed that the sets of proteins (and by

extension, the genes encoding the proteins' designs) found in chimpanzees and humans were virtually identical. That left open the question of how these two species came to be so different (*Science*, 4 September 1998, p. 1432). Wilson suggested then that the key might be differences in gene expression, the rate at which messenger RNA and proteins are made from a gene. At long last, Pääbo and his colleagues have experimental evidence that supports this so-called regulatory hypothesis. Furthermore, notes Lawrence Grossman, a molecular biologist at Wayne State University in Detroit, the work "nicely supports the idea that in primates, the action in evolution [is in] the brain."

Pääbo and his team, including the Max Planck Institute's Wolfgang Enard and Philipp Khaitovich, collected brain, liver, and blood samples from humans, chimps, macaques, and orangutans that had died of natural causes. They isolated RNA from each sample and passed it over a gene chip with tags for 12,000 human genes. The more RNA registered for a gene, the greater that gene's activity. In a second experiment, they used a membrane-based array to look at about 6000 additional genes. In each experiment, the researchers studied RNA from chimps, humans, and one of the other primates.

As expected, the researchers found little difference among the species in the liver and blood samples. But in the brain, the species distinguished themselves. The team detected big differences in gene expression between humans and chimps, whereas gene expression in the chimps' and the other primates' brains was about the same.

By pairing these results with a look at the primate family tree, the team concluded that sometime in the recent evolution of humans, the human brain began evolving faster than those of other primates—faster even than that of the closest relative of humans, the chimp. Macaques and orangutans, which are more distantly related to chimps and humans than chimps and humans are to each other, helped put these rates into perspective. Because gene expression in chimp brains was similar to that in both macaque and orangutan brains, the big boost in brain evolution occurred after chimps and humans split off from their last common ancestor, the researchers report. "This is the first piece of evidence that humans may have a faster rate" of change in the regulation of gene expression, notes Caro-Beth Stewart, a molecular evolutionist at the State University of New York, Albany.

The researchers' next step is to figure out which genes matter. Based on their RNA studies and parallel work measuring protein concentrations, "we have begun to accumulate lists of genes that have changed their expression in human evolution so that we and others can now go and study those genes in detail," Pääbo explains.

One inference drawn by Pääbo and his team is prompting some debate. They speculate that the acceleration of changes in gene expression in the brain occurred during recent human evolution, which some anthropologists say could have been as recent as several hundred thousand years ago. But studies of brain morphology in chimps and australopithecines, human ancestors that lived millions of years ago, indicate that the brain had already taken on human characteristics by the time of these early hominids. The changes Pääbo's team sees in gene expression in the brain "could have happened at any time during the course of hominid evolution," says Ralph Holloway, an anthropologist at Columbia University in New York City.

Brainpower. Studies may show that rates of gene activity separate humans from chimps, but in this movie matchup, Pierre the Chimp is definitely getting the better of actor Jerry Lewis.

CREDIT: BETTMANN/CORBIS

Despite the controversy, Pääbo's group deserves a lot of credit for showing that human evolution involves unusually rapid changes in gene expression, says Stewart, who calls the work "an important advance in our thinking." But others are not surprised that genes are expressed differently in humans than in other primates. As Edwin McConkey, an emeritus molecular biologist at the University of Colorado, Boulder, says, "If no differences had been found, then we should all have to take a course in metaphysics, and religious fundamentalists would be dancing in the streets."

–ELIZABETH PENNISI

ScienceScope

Separate But Equal U.S. researchers who want to work on new, unapproved human embryonic stem (ES) cell lines need not flee to privately funded labs, federal officials clarified last month. They can stay in their academic labs, as long as they follow existing accounting rules for what can and can't be charged to federal grants.

Last August, the National Institutes of Health (NIH) began reviewing rules that ban mixing federal and private funds after President George W. Bush limited federal funding for ES cell research to 60-odd lines. In anticipation of Bush's decision, some stem cell researchers had moved their studies to special off-campus buildings. But after lengthy analysis, NIH says that's not necessary.

In a 29 March Web posting, NIH says that researchers can derive or use unapproved cell lines "in your university-supported laboratory" as long as they don't bill the federal government for the work and the university "has in place a method of separating" overhead costs. "Many people were nervous" about how to proceed, says stem cell researcher George Daley of the Whitehead Institute in Cambridge, Massachusetts. "This is reasonable and very helpful."

One More Down Another top official at the Smithsonian Institution has resigned. Dennis O'Connor, undersecretary for science and acting director of the National Museum of Natural History, last week said he is moving to the University of Maryland, College Park, because academia offers greater intellectual rigor. He is the sixth director to leave since the controversial tenure of Smithsonian secretary Lawrence Small began less than 3 years ago (*Science*, 13 July 2001, p. 194).

O'Connor's surprise departure leaves the museum leaderless for the second time in a year. The lack of stable leadership has become "a major issue," says Jeremy Sabloff, who heads a commission that is evaluating Smithsonian science. Officials had planned to postpone a search for a permanent head until next year. Now, Sabloff's group plans to map out a hiring strategy next week.

One likely candidate is already out of the running: Former National Oceanic and Atmospheric Administration chief James Baker is moving to the Academy of Natural Sciences in Philadelphia. And sources say recently appointed museum deputy director Ira Rubinoff isn't a likely pick.

Some museum scientists blame Small for the upheaval. Says one critic: "It is time to end this experiment of running this institution as a business and ... return to the Smithsonian's traditional scholarly roots."