Meeting of minds. Japan's Norio Kaifu (front row, second from right), Taiwan's K. Y. (Fred) Lo (front row, fourth from right), China's Chen Jian-Sheng (front row, at left), and Korea's Se-Hyung Cho (second row, second from right) lead an effort to foster Asian cooperation in astronomy.

CREDIT: (RIGHT) GEORGE NIKITIN/AP

Since 1990, astronomers from the region have gotten together every 3 years or so to present recent results from their own instruments. But on 11 to 16 November, during the fifth East Asia Meeting of Astronomy (EAMA), participants broadened the scope of their discussion to include concrete ways to foster collaborations. "There is a sense of excitement about future prospects for more collaboration and exchanges and access to each other's facilities," says K. Y. (Fred) Lo, director of Academia Sinica's Institute of Astronomy and Astrophysics in Taipei.

The first actual collaboration is likely to be an East Asian very long baseline interferometry network of radio antennas. Japan and Korea are near an agreement for joint observations beginning in 2005 on radio interferometry networks now under construction in each country (*Science*, 2 November, p. 977). Chinese astronomers are eager to add two more radio telescopes to the network, making a total of 12 antennas. Adding the two antennas, now used primarily for charting star positions, would allow Chinese astronomers to investigate star formation and other phenomena. "Radio astronomy is one area where collaboration among neighboring regions would be very natural," says Se-Hyung Cho, vice president of the Korean Astronomy Observatory in Taejon.

Japanese scientists are hoping to make an even bigger splash by bringing their regional neighbors into the fold on the $650 million Atacama Large Millimeter/Submillimeter Array (ALMA), a network of 64 dishes to be built and operated by European, Japanese, Canadian, and U.S. scientists at a site high in the Atacama Desert in northern Chile. Norio Kaifu, director general of Japan's National Astronomical Observatory in Mitaka, hopes to bring other Asian scientists into the project under Japan's umbrella. "That would make it a true world telescope," he says.

Lo says that talk of greater cooperation has been a staple at the EAMA meetings. But it wasn't until recently, he says, that each of the four neighbors achieved a critical mass of scientists, funding, and observational activities to make such joint efforts worthwhile. Yoshihisa Nemoto, senior specialist for space in the space policy division of Japan's Ministry of Education, Culture, Sports, Science, and Technology, calls the move "a natural and good thing" to do, adding that the ministry would be happy at some point to review any proposals for joint projects.

The scientists who met at Taipei (some of whom are pictured at left) have set up a coordination committee to plan exchanges and the sharing of observation and computing facilities as well as additional conferences. Because of the tenuous political relations between Taiwan and mainland China, the group plans to establish smooth working relationships among scientists before approaching any government for support.

–DENNIS NORMILE

ULTRAFAST LASERS

Photoelectrons Show How Quick a Flash Is

For more than a decade, scientists have captured the breaking of chemical bonds between atoms with the world's fastest strobe lights: flashes of laser light lasting a few femtoseconds. (A femtosecond is 1 millionth of a billionth of a second.) But bond breaking is a languid process compared with the lightning-fast activity of electrons inside atoms, which zip around the nucleus and hop between energy shells in less than a fifth of a femtosecond. To track such quicksilver movements, researchers have longed to generate and measure individual pulses of radiation as short as a few hundred attoseconds. (A femtosecond equals 1000 attoseconds.) Now they've got their wish.

In this week's issue of *Nature*, researchers from the Vienna University of Technology in Austria, the National Research Council Canada, and Bielefeld University in Germany report that they have produced isolated x-ray pulses 650 attoseconds long. Using these pulses like flashbulbs, the researchers have traced the energy-level transitions of electrons in an atomic gas with a resolution of 150 attoseconds. "This is an important experiment," says Anne L'Huillier, a physicist at the Lund Institute of Technology in Sweden. "It opens the door to the study of extremely fast electronic processes occurring inside atoms and molecules."

Generating the attosecond pulse was fairly straightforward, says Ferenc Krausz

ScienceScope

Research Relief U.S. university scientists have complained in vain for 2 years that stricter arms-trafficking regulations force them to get time-consuming State Department approval for work on research satellites involving foreign graduate students and overseas partners (*Science*, 24 March 2000, p. 2138). But relief may be in sight. Condoleezza Rice (below), President George W. Bush's national security adviser and a former provost of Stanford University, has voiced her support for "open and collaborative basic research."

In a 1 November letter to Harold Brown, co-chair of the Center for Strategic and International Studies in Washington, D.C., Rice says that the Administration will review the impact of the regulations on researchers. In the meantime, she notes, a 1985 order by then-President Ronald Reagan exempting basic research from the arms regulations remains in effect—a critical point that until now has been unclear. The clarification could help "ease the universities' problems," says Eugene Skolnikoff, a political science professor at the Massachusetts Institute of Technology who has followed the issue.

Culture Clash at HHS A plan by the Department of Health and Human Services (HHS) to streamline its bureaucracy has raised concerns at the National Institutes of Health (NIH), where 27 centers and institutes now operate with relative independence.

The "workforce restructuring plan"—which carries the motto "One HHS"—has been under way for months, and NIH has already agreed to form a single personnel office. But two 8 and 9 November memos, one from Ed Sontag, HHS assistant secretary for administration and management, calling for management cuts appear to have hit some tender spots. For example, HHS wants to trim management layers and consolidate grants management and public affairs, now housed at each institute, into central offices. After seeing the memos, one NIH official, referring to the highway outside the Bethesda, Maryland, campus, joked: "Should we all go lie down in Rockville Pike [in protest]?"

NIH acting director Ruth Kirschstein led a delegation of institute directors who met with Sontag on 19 November to discuss the effort, but the group isn't commenting. NIH spokesperson Anne Thomas says only that her agency is "working collaboratively" with HHS, which wants an "action plan" by 30 November.

of the Vienna University of Technology, one of the authors of the paper. The researchers shined a strong beam of laser light at a volume of neon gas to produce x-ray photons of different frequencies. For the most part, the frequencies canceled each other out through destructive interference, leaving a spike where they added up. Because the laser flash lasted only a few wave cycles, Krausz and his colleagues were able to obtain a single spike instead of a train of spikes, something that a group of French and Dutch researchers achieved earlier this year (*Science*, 1 June, p. 1627).

Don't blink. Viennese researchers Reinhard Kienberger and Michael Hentschel work on a beam line that carries attosecond pulses.

Measuring the duration of this pulse posed a bigger challenge. The researchers shot the pulse, along with the laser beam used to create it, into a chamber of krypton gas. The x-ray pulse ionized the krypton, causing electrons to fly out of their parent atoms with a certain kinetic energy. The electric field of the laser beam then subtly changed the kinetic energy of the electrons by amounts that depended on which point in its rising-and-falling cycle the field had reached at the instant the pulse knocked the electrons loose. Changing the birth moment of the photoelectrons—that is, the time the x-ray pulse struck the krypton atoms—determined how much the laser beam altered the electrons' kinetic energies.

Shooting the x-ray pulse into the gas at various points in the laser cycle, Krausz's group observed that the change in kinetic energy rose or fell in a wavelike pattern, or modulation. The appearance of the modulation in the spectrum proved that the time of the krypton's ionization—and hence the duration of the x-ray pulse—fell within a window of time less than half the 1.2-femtosecond period of the laser cycle. "If the pulse were longer, it would not be possible to see the changing influence of the laser field as it goes through one cycle. The modulation would be smeared out," Krausz explains.

From the modulation, the researchers calculated that the x-ray pulse lasted a fleeting 650 attoseconds and that the krypton atoms released their electrons in less than 150 attoseconds. The modulation also gave information about the oscillating laser field. By combining it with the intensity of the laser beam, the researchers traced the beam's changing electric field over the course of one cycle—in effect, sketching the curve of a wave of light.

It's only a matter of time, Krausz says, before the technique they have demonstrated is applied to meaningful attosecond experiments. One is the study of inner-shell relaxation—the filling up of vacancies in shells close to the nucleus by electrons jumping in from outer orbits. Attophysics is here, says Krausz; now for snapshots of the atomic interior.

–YUDHIJIT BHATTACHARJEE

Yudhijit Bhattacharjee is a science writer based in Columbus, Ohio.

CONSERVATION BIOLOGY

When Is a Coho Salmon Not a Coho Salmon?

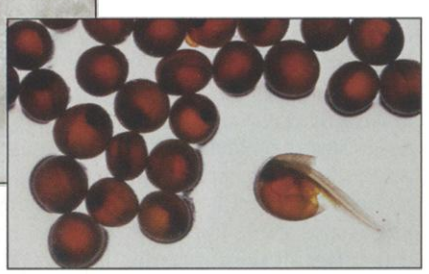
Should hand-reared fish be counted in efforts to save wild, imperiled salmon? A U.S. federal judge has said yes, and the U.S. government earlier this month decided not to challenge the ruling. As a result, up to two dozen West Coast salmon runs could be stripped from the endangered species list. These developments have outraged conservationists, who say counting hatchery fish is like tallying zoo animals when deciding whether their wild brethren are threatened with extinction. "It just doesn't make sense," says Bill Bakke of the Native Fish Society in Portland, Oregon.

For more than a century, the government has used hatcheries to bolster commercially valuable salmon runs, often to make up for spawning habitat lost to dams. The fish are dumped into rivers while they're still juveniles, then they swim out to sea and spend several years in the ocean maturing before returning to the hatchery. But although the pampered hatchery fish are the same species as their wild kin, they don't always act the same way: Behaviors and traits that help hatchery fish do well in captivity differ from those needed to survive in the wild.

The National Marine Fisheries Service (NMFS), as a result, has ignored the hatchery fish when deciding whether a "distinct" salmon population—such as one that uses a specific river or coastal area—needs protection under the Endangered Species Act (ESA). In 1998, for instance, when NMFS listed the wild Oregon coast coho salmon as endangered, it did not take the hatchery fish into account because biologists said they weren't essential to the long-term survival of the struggling wild population.

Two years ago, the Pacific Legal Foundation, a property rights group in Sacramento, California, that is critical of the ESA, challenged that omission in federal court. On 10 September a U.S. district judge agreed, ruling that NMFS had been "arbitrary" in distinguishing between "two genetically identical" salmon "in the same stream." On 9 November, NMFS's parent agency—the National Oceanic and Atmospheric Administration—threw in the towel. It declined to appeal the ruling, signaling a change in policy. "It's time to stop fighting and start fixing" salmon runs, says Robert Lohn, NMFS Northwest Region administrator.

But critics fear the decision will result in less protection for endangered salmon, because including hatchery fish will likely boost some populations beyond the threshold for protection. The agency must immediately delist the Oregon coast coho salmon, they note, and it must also consider re-



Hatching a dispute. Coho salmon raised from eggs in hatcheries may look the same as their wild cousins, but biologists say they act differently.

CREDITS: (TOP) F. KRAUSZ/VIENNA UNIVERSITY OF TECHNOLOGY; (COHO SALMON AND EGGS) NATALIE FOBES/CORBIS