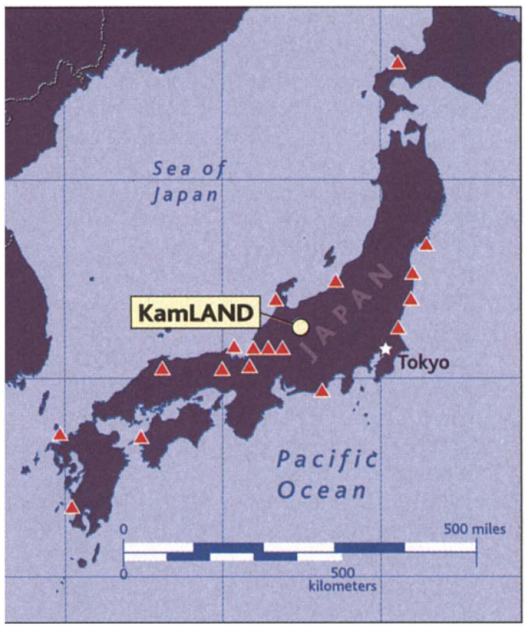
of the particle, you get a consistent result," says John Learned, a KamLAND collaborator at the University of Hawaii, Manoa.

"This is what everyone expected, but nature could have fooled us," says Bahcall. If neutrinos and antineutrinos behaved differently, they would violate an important principle in particle physics known as CPT symmetry. Physicists have tested the principle in the sector of physics that has to do with the strong force (and quarks and gluons), but KamLAND's result is the first to verify it with any degree of accuracy in the realm of the weak force (and neutrinos).

Furthermore, because the antineutrinos are created in nuclear reactors rather than in the core of the sun, physicists needn't worry that incorrect assumptions about the sun's inner workings might mess up their calculations. "There was a possibility that [the sun's] magnetic fields were flipping the spins of the neutrinos," says Learned. "The caveats about solar neutrino measurements are all eliminated in one grand stroke."



Ground truth. The subterranean Kamioka Liquid Scintillator Antineutrino Detector spots particles from Japanese reactors (triangles).

SOURCE: INTERNATIONAL NUCLEAR SAFETY CENTER AT ANL (OCTOBER 2002)

With more data and a refined understanding of the detector's properties, KamLAND scientists should be able to pin down the difference in mass between two species of neutrinos, says Giorgio Gratta, a KamLAND team member at Stanford University. That's one of the key parameters that dictate their properties. But even the first results are narrowing the possible range of the mass difference, Gratta says: "I'm very happy."

The KamLAND team hopes eventually to spot neutrinos coming from deep inside Earth. They are the product of the decay of radioactive elements that keep the planet's center so hot. The number of neutrinos from these nuclear reactions will give geologists a direct measure of the amount of radioactive material buried in the heart of the planet.

–CHARLES SEIFE

GENETIC MODIFICATION

Europe Prepares for Arrival of GM Foods

BRUSSELS—The European Union (E.U.) appears set to lift its 4-year ban on foods made from genetically modified organisms (GMOs), following the drafting of a new directive on food labeling late last month. The European Parliament is expected to give its final approval of the new rules next March, and the European Commission last week put in place the mechanism to make the new system work: the European Network of GMO Laboratories (ENGL).

The new rules will require a GMO label on any food containing more than 0.9% GMO material, a threshold designed to allow for some accidental contamination. "These are among the tightest regulations [on GMOs] in the world," says Barry Mc Sweeney, director-general of the commission's Joint Research Centre (JRC). JRC's main laboratory in Ispra, Italy, will coordinate the ENGL network of more than 45 institutes in the 15 E.U. member states and 10 countries that are expected to join in 2004. These labs will randomly test foodstuffs to ensure that they are GMO-free if they claim to be, or that they contain only approved GMO materials. "We need harmonized procedures and methods to ensure that we get the same results" all over Europe, says Guy van den Eede, coordinator of ENGL.

In the future, any food or feed company that wishes to market a new GMO will have to submit reference material and a specific testing method to the Ispra ENGL lab. ENGL will validate the test and, if approved, it will be registered as an international standard. All the ENGL labs will then use the test in their countries.

The idea behind the new legislation is to allow consumers to choose GMO-free food if they wish, while allowing biotech companies to market their wares. Although most environmental organizations welcome the strict regulations, one proposal drew fierce opposition. For a 3-year period, the commission wants to allow foods containing 0.5% of "GMO material unauthorized in the E.U., but which has undergone a favorable risk assessment." Peter Riley of Friends of the Earth in the U.K. says unlicensed GMOs should be completely banned: "If the U.S. is growing crops that are not accepted worldwide, it is their problem."

But E.U. Research Commissioner Philippe Busquin says the network "provides

ScienceScope

GM Corn OK Ending years of controversy, the Philippines has become the first Asian nation to approve the sale of genetically modified (GM) corn seed. The government's agriculture department last week gave Monsanto permission to market a strain modified to resist corn borers, a common pest. Monsanto's corn is the first major GM food crop to gain approval in Asia.

Size Counts NASA Administrator Sean O'Keefe says the international space station's crew is likely to grow after 2006. The prediction, made last week at a Tokyo meeting, was a relief to many scientists, who say that little meaningful research can be done with the current crew of three. O'Keefe told project partners that the Bush Administration's 2004 budget proposal, due in February, would include "the appropriate financing" to allow station science to expand by 2007 —a goal embraced by Europe, Japan, Canada, and Russia.

New Stem Cell Law Australia's Parliament this week approved national stem cell legislation that will harmonize a jumble of state and territorial rules. Under the new law, which was the subject of extensive debate (*Science*, 6 September, p. 1627), researchers will be able to use existing human embryonic stem cell lines and create new lines from excess embryos created for in vitro fertilization prior to 5 April 2002. Biologist Martin Pera of Monash University says the rules will allow research "to go forward on a sound ethical basis."

NIH Litmus Test? Concerns that the Bush Administration is blackballing ideologically incompatible science advice (*Science*, 15 November, p. 1323) now extend to the National Institutes of Health's (NIH's) advisory councils. In a 21 November letter to Department of Health and Human Services Secretary Tommy Thompson, Representative Edward Markey (D–MA) and three other lawmakers ask why one nominee to a National Institute on Drug Abuse panel was questioned about his voting preferences and his views on needle exchange, abortion, and drug legalization. The nominee, psychologist William Miller of the University of New Mexico, Albuquerque, says he was apparently rejected last January after giving incorrect answers. In this case and others, the lawmakers want to know "why ... this information is relevant" to providing scientific advice.

Two years ago, federal biologists concluded that commercial fishers catching pollock and other groundfish posed a serious threat to the sea lion's recovery, and they imposed major restrictions on Alaska's $1 billion fishery. That alarmed Senator Ted Stevens (R–AK) and other members of Congress, who ordered the academies' study.

In a preliminary report issued 4 December, a panel led by zoologist Robert Paine of the University of Washington, Seattle, concludes that fishing probably isn't the major cause of recent population losses. But it says that commercial catches can't be ruled out as a significant problem. In hopes of resolving the issue, the committee recommends setting up four experimental zones in Alaskan waters. Fishing would be banned for up to 50 nautical miles around two sea lion breeding colonies and permitted near two others. Biologists would then compare sea lion population trends. The experiment "is the only approach that directly tests the role of fishing in the decline" while controlling for other factors, such as climate change, the panel says.

Fishing industry representatives appear relieved that the academies didn't put the blame squarely on them. And ecologists are pleased by a renewed call for what they say would be one of the biggest real-world ecological experiments ever, albeit a tardy one. "It should have been done 10 years ago; it's a shame we've waited this long," says Andrew Trites, a marine mammal specialist at the University of British Columbia, Vancouver.

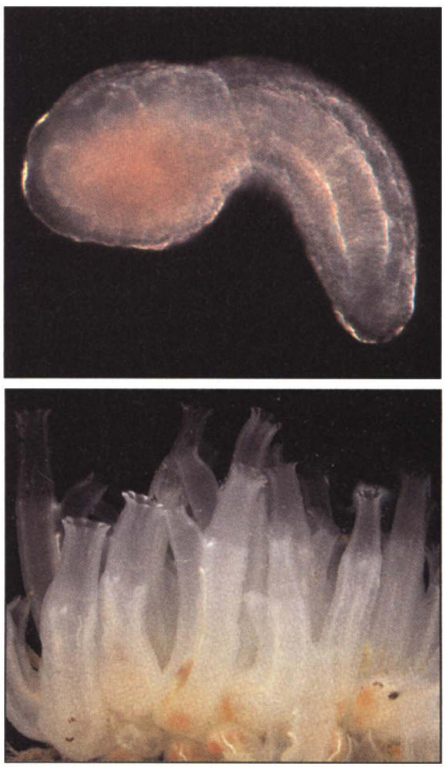
The National Marine Fisheries Service must approve any test, and no decision is expected until sometime next year. The panel will shortly release a final version of its report. –DAVID MALAKOFF

COMPARATIVE GENOMICS

Tunicate Genome Shows a Little Backbone

This week, researchers are unveiling the DNA code of one of the most unusual creatures sequenced to date: the sea squirt. These tiny marine animals have long captivated biologists because even though the adults are typical, squishy invertebrates, their larvae might be modern doppelgängers of the ancestor to the vertebrates.

The genome sequence of the sea squirt *Ciona intestinalis* "will help us unzip several evolutionary changes that occurred at the transition between invertebrates and vertebrates," says Paolo Sordino of the Zoological Station in Naples, Italy. *Ciona*'s branch on the evolutionary tree puts it closer to humans than are other invertebrates whose genomes have been sequenced, such as nematodes and fruit flies, but farther away than mice are. As such, it offers a different view of the history of human DNA.



Telltale tunicate. Vertebrate-like traits in the sea squirt larva (*top*) prompted the sequencing of its genome.

Sea squirts have puzzled biologists for more than a century. The adults live attached to pilings, rocks, and boat bottoms. Their bodies are cloaked in a leathery sheath, or tunic—hence their scientific name, tunicates. Charles Darwin thought they were relatives of mollusks. In the mid-1800s, Russian biologist Alexander Kowalevsky countered that the mobile tunicate tadpole, with its dorsal cartilaginous column resembling a spine, should be grouped with vertebrates and not clams and snails—even though tunicates never develop a backbone. His view stuck: Now any species that even temporarily possesses a dorsal nerve cord, notochord, primitive brain, and a few other traits is considered a chordate, a member of the phylum that includes vertebrates.

Some evolutionary biologists once argued that tunicates gave rise to backboned critters. That view has been abandoned in favor of a history in which the two simply share a common ancestor. Nonetheless, this sequence "is an opportunity to peek into the [early] chordate condition from a genomic point of view," says Sean Carroll, an evolution and development (evo-devo) researcher at the University of Wisconsin, Madison.

In early 2001, sea squirt researchers Nori Satoh of Kyoto University in Japan and Michael Levine and Daniel Rokhsar of the University of California, Berkeley, convinced the sequencers at the Department of Energy

CREDITS: P. DEHAL *ET AL.*

ScienceScope

Mass Protest The rectors of Italy's 77 state universities resigned en masse this week to protest government plans to cut budgets and freeze hiring. The dramatic move came as Parliament debated plans to cut spending at some universities and research institutions by up to one-third.

The resignations—which can still be withdrawn—are "a consequence of a policy of dismantling research and university culture," says Flaminia Saccá of Rome University, who also handles research policy for Italy's largest opposition party, the "Democrats of the Left." The protesters want lawmakers to restore budget increases promised by previous governments or to at least minimize cuts.

Italy's finance ministry called the move "impetuous," because lawmakers are still hammering out the final budget. But the rectors say the risky gesture was necessary to call attention to academia's financial plight. As *Science* went to press, researchers said the issue could be resolved soon.

Chain Reaction Saddled with legal bills, a Japanese researcher once accused of industrial espionage is suing a former friend for $770,000. Hiroaki Serizawa, a biologist at the University of Kansas Medical Center in Kansas City, has told a Tokyo court that he was deceived by Alzheimer's researcher Takashi Okamoto, who allegedly asked him to hold biological materials taken from the Cleveland Clinic in Ohio (*Science*, 18 May 2001, p. 1274).

Last year, U.S. prosecutors charged the two scientists with conspiring to export "trade secrets." They later dropped the espionage charges against Serizawa, who remains in the United States, but they are still seeking to extradite Okamoto from Japan for trial in Ohio. Serizawa is prepared to testify against Okamoto, says Serizawa's attorney, Patrick McLaughlin of McLaughlin & McCaffrey in Cleveland. In the meantime, he needs to pay legal fees—and he is suing Okamoto for help. The Tokyo court will start hearing the case next week. Okamoto's attorney could not be reached.

Serizawa is also job hunting after being denied tenure by the University of Kansas. But that task has been complicated by his decision to plead guilty to one count of giving the FBI false information. It's difficult, says McLaughlin, "to recover from damage like that to one's professional reputation."

Contributors: Pallava Bagla, Andrew Lawler, Leigh Dayton, Jocelyn Kaiser, Alexander Hellemans, Dennis Normile