A phase II clinical trial of the drug in people with mild or moderate Alzheimer's, coordinated by Colin Masters of the University of Melbourne in Australia with technical assistance from Bush, should start to answer questions about both the safety of long-term use and, perhaps, the drug's efficacy. The team expects to have the results from the trial in about a year. **–LAURA HELMUTH**

PARTICLE PHYSICS

The Final Tally Leaves LEP a Probable Loser

LONDON—The future of research at CERN, the European particle physics laboratory near Geneva, is proving only slightly easier to resolve than the identity of the next occupant of the White House.

Due to be dismantled in September, the lab's Large Electron-Positron (LEP) collider was granted a 1-month reprieve to continue experiments suggesting it had found evidence for the Higgs boson, a theoretical particle that physicists have coveted for decades. Last week LEP scientists presented the new data to CERN's management, saying the case for the Higgs was strong enough to merit another, longer reprieve. But management didn't budge. On 8 November, CERN's director-general announced that LEP would be scrapped to make room in the 27-kilometer-long tunnel to begin installing the Large Hadron Collider (LHC).

With LHC waiting in the wings, LEP scientists this summer had pushed the machine's beam energies to the max. On 2 November, after a month of extra operation, the team crammed into CERN's auditorium to review the latest evidence. The scene was not unlike a recount. One event once seen as evidence for the Higgs was withdrawn, while another event was added. Evidence gathered last summer was recalculated and revealed to be less significant than thought. But the new evidence was clearly stronger. Summing up the case for the Higgs, Peter Igo-Kemenes drew loud laughter and prolonged applause when he dryly remarked that "all this is very exciting." The four experimental teams jointly called for another year's operation to settle the matter.

But the elation evaporated at a private meeting straight after of the committee of scientists from CERN and elsewhere who oversee LEP. "It was subdued," one committee member told *Science*. "Nobody banged on the table. And that reflects the data, which is 50–50." Although models gave the combined results only about a 1% probability of being due to chance, the LEP committee knew that such statistics do not tell the whole story (*Science*, 29 September, p. 2260). The signal was getting stronger with time, the panel agreed, but there was no guarantee that the trend would continue.

The committee did agree that spending $62 million to keep LEP running for another year was worth it. But not at the cost of delaying the LHC by a year—a decision with financial and political ramifications, because the LHC program includes partner countries with no stake in LEP. Thus the committee split on LEP's future. This came as a blow to rank-and-file LEP scientists, who argued that the LEP committee should have focused on the machine's scientific potential and disregarded the impact on LHC.

CERN's senior management—the directorate—then took up the issue. A consensus favored moving ahead with LHC, but the decision was not final. Four days later, the lab's research board, of which the directorate forms a subset, was convened.

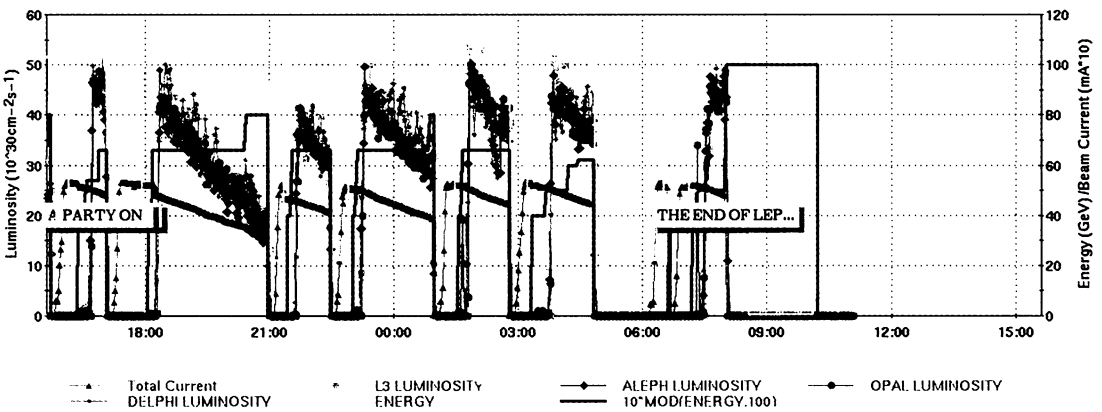
According to LEP experimentalist David Miller of University College, London, one of two outside scientists on the board, this panel, too, was split. CERN's management team opposed an extension, whereas many of those representing the lab's various experiment committees and specialist divisions were in favor. "It was a painstaking meeting," Miller says, in which every aspect was scrutinized. "In no way was the directorate trying to rush through its own ideas."

But in the end the research board remained split, leaving the decision in the hands of director-general Luciano Maiani. George Kalmus, chair of the Science Policy Committee that advises CERN's ultimate masters, the council of delegates of the member states, told the director-general that an e-mail poll of his top-level committee revealed a small majority in favor of shutting LEP down. And that is what Maiani decided to do.

Originally, the director-general left the final ratification of that decision to a council meeting scheduled for December. Then, perhaps to head off further discussion, a special committee of the council was called for 17 November, presumably to sign the death warrant. In a very unusual move, the executive committee of CERN's staff association spoke out against the decision, expressing "astonishment and incomprehension" and saying that the case against LEP had not been made clearly enough. So although LEP looks dead, it's not over till it's over—as they say in Palm Beach County, Florida.

–OLIVER MORTON

Oliver Morton is a writer in Greenwich, England.



Flatlined. LEP's beam intensity at four experimental stations before the plug was pulled at 8:00 a.m. on 2 November.

CREDIT: CERN

GEOPHYSICS

Core Takes a Page From the Sea Floor

There's probably no stranger place in all Earth's layered interior than the intersection of the molten iron of the core with the bottom of the rocky mantle, 2900 kilometers down. This boundary produces the most dramatic effects on seismic waves traveling below the near-surface. Exactly what the core and mantle might be doing to each other to affect seismic waves so powerfully, however, has remained a mystery. Now one group of geophysicists is suggesting that the boundary most resembles an inverted sea floor, with liquid-iron–laced sediments collecting on the roof of the core.

The case is made on page 1338 of this issue by geophysicist Bruce Buffett of the University of British Columbia in Vancouver, seismologist Edward Garnero of Arizona State University in Tempe, and mineral

physicist Raymond Jeanloz of the University of California, Berkeley. They argue that a slow, inverted rain of precipitates rising to the core-mantle boundary and settling into a kilometers-thick layer might explain a variety of observations, from a subtle nodding of Earth's axis to seismic speed zones at the boundary. "I actually kind of like the idea," says mineral physicist Quentin Williams of the University of California, Santa Cruz, adding that core sedimentation might explain at least some of the "very weird structure in the bottom 40 kilometers of the mantle." But he's not completely sold: "It's a speculative story that's going to be very difficult to verify."

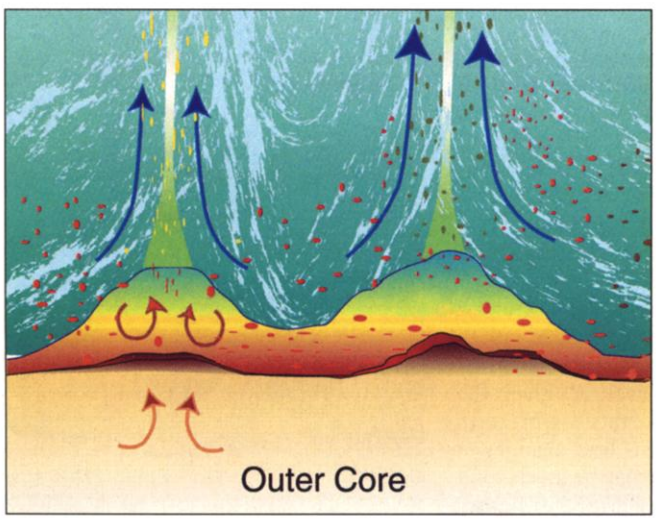
Difficulties seem inevitable, because painting a portrait of the core-mantle boundary depends on such indirect geophysical evidence. Williams and others believe mantle rock next to the hot core melts partially. Such melting, they say, could explain "ultralow-velocity zones"—thin patches of mantle at the boundary that slow seismic waves passing through them a whopping 10% to 30%, depending on the type of wave (*Science*, 31 January 1997, p. 614).

But other, even more indirect probes hint at a different sort of boundary. A decade ago, Buffett analyzed the subtle nodding or nutation of Earth's rotation axis. From the magnitude of the annual nutation, they concluded that there is probably a thin layer of something at the boundary that magnetically connects the fluid core to the solid mantle. The power driving such a connection would come from the tidal forces of the moon and sun that shake Earth. That shaking sloshes the planet's fluid interior about, carrying the core's magnetic field through a presumed conducting layer at the boundary. That in turn would tug on the solid mantle and make Earth nutate ever so slightly. Buffett likens monitoring this sort of nutation to feeling a shaken jug of milk for signs of its contents.

Geodecists Piravonu Mathews of the University of Madras in India, Thomas Herring of the Massachusetts Institute of Technology, and Buffett have analyzed a longer record of Earth nutation, soon to be published in the *Journal of Geophysical Research*, and "the nutation evidence seems to be getting stronger," says Buffett. That implies there really is a layer conductive enough to link core and mantle magnetically, he says.

How did a layer more electrically conductive than molten mantle come into being? Buffett, Garnero, and Jeanloz invoke inverted ocean-style sedimentation. The core has been cooling for billions of years, with pure iron crystallizing onto the solid inner core. Both the cooling and the crystallization should tend to drive impurities dissolved in the outer core out of solution, the team reasons, the way cooling and evaporation of a hot brine will precipitate salts. Being less dense than iron, the sandlike particles coming out of solution would rise to the core-mantle boundary the way particles in the ocean sink to the bottom. As the boundary sediment layer thickens, the pressure of the underlying sediment would slowly squeeze out most of the molten iron caught between particles. But taken together, the iron throughout the sediment pile would provide enough conductivity to explain the nutation results, the group calculates, as well as enough fluid to produce the observed slowing of seismic waves.

Other geophysicists are intrigued but cautious. "It's a very plausible idea," says David Stevenson of the California Institute of Technology in Pasadena. "It's also obviously a speculative thing." One problem, he says, is that mineral physicists know so little about the behavior of materials at core temperatures and pressures. And telling what's going on from the surface will be difficult, although perhaps not impossible. Seismic techniques may help distinguish mantle from core sediment the way they can separate ocean sediments and crust, says Peter Olson of the Johns Hopkins University. The work could end up adding a layer to the "onion" model of Earth structure that now includes surficial sediments, crust, mantle, core, and inner core.



CREDITS: (TOP TO BOTTOM) MICHAEL YORK/AP; SOURCE: ADAPTED FROM E. GARNERO

An active place. Sediments (brown) may be filling inverted "basins" at the core-mantle boundary, or the core may be infiltrating (red) or melting (yellow) the mantle.

–RICHARD A. KERR

ScienceScope

Mongrel Salmon? In the latest twist in a long-running controversy, the U.S. Fish and Wildlife Service this week moved to list as endangered the few hundred remaining wild Atlantic salmon that breed in Maine rivers. But state officials and some scientists question the move, saying the fish aren't genetically distinct enough to merit protection (*Science*, 6 February 1998, p. 800). They claim the salmon are mongrels descended from hatchery fish dumped into rivers over the last century. A lawsuit to press their case could come by year's end.

Legal Retreat Saying its actions have been "increasingly misunderstood," the Institute for Advanced Study (IAS) in Princeton, New Jersey, announced last week that it is withdrawing its legal bid to get rid of astrophysicist Piet Hut. The IAS, which has been disappointed in Hut's research, went to federal court last July to force Hut to abide by a pledge, signed in 1996, to leave by 2001. Hut claimed he had been coerced into signing, and supporters argued that the institute was impinging on his academic freedom (*Science*, 27 October, p. 683).

The institute "did not anticipate" that the contract dispute would blossom into an academic freedom fight, director Phillip Griffiths said in a statement. So, in what University of California, Berkeley, astrophysicist Frank Shu calls a "wise" move, the IAS withdrew the suit on 9 November. Both sides have agreed to continue talking.

Another Contested Election The results are finally in—almost—on a bid by New York University grad students to join the United Auto Workers. Last week, following a National Labor Relations Board ruling that the graduate assistants are "employees" (*Science*, 10 November, p. 1069), officials finally counted ballots from a union vote held last spring. The tally in favor of organizing was 597 to 418, but not included were an additional 295 ballots cast by grad students—most of them in business and science. The union claimed they were ineligible. The parties this week agreed to count 156 of the votes—not enough to change the outcome. NYU now must make a choice: Negotiate with the union, or risk getting hauled to court by the labor board. So far, says NYU spokesperson John Becker, "no decision has been made."

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