the LGN axons had linked up with the cortex but before the columns had formed. The doubters were wrong again: These ferrets still formed normal-looking ocular dominance columns.

Even that finding has not closed the case against neural activity, however. Shatz points out that the Duke scientists did not check to see whether the columns they saw after they removed one eye alternated in responding to either the right or left eye as they should. Thus, it could be—as Shatz has found in the past in cats—that removing one eye altered the visual system such that seemingly normal ocular dominance columns formed, but they all responded to the remaining eye. And Stryker points out that the study did not rule out the very real possibility that activity in the brain—say, from the LGN—is necessary for column formation even if that from the eye isn't.

Katz concedes that these arguments are valid, although he doesn't believe they explain his findings. He's now aiming to identify the molecular signals that he thinks guide the formation of ocular dominance columns. Says Katz: "My gut feeling is that we need to look in a different direction."

–INGRID WICKELGREN

NEUROSCIENCE

An Antibiotic to Treat Alzheimer's?

NEW ORLEANS—An antibiotic once used to treat traveler's diarrhea might battle Alzheimer's disease as well, researchers announced here last week at the Society for Neuroscience's annual meeting. The drug dissolves Alzheimer's-like plaques in mouse brains, apparently by trapping the copper and zinc that stud these deposits. A clinical trial to test whether the drug helps people with Alzheimer's is already under way.

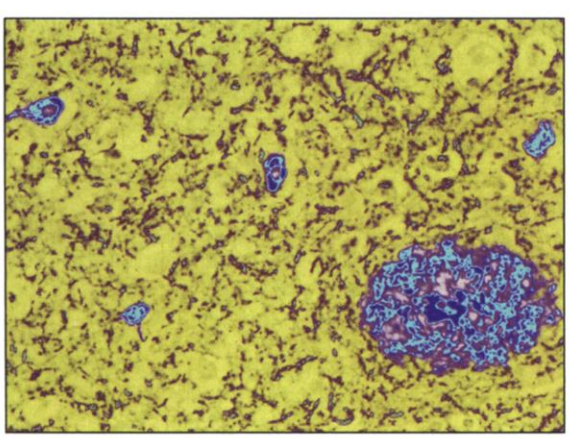
Deposits called amyloid plaques riddle the brains of people with the disease—who now number about 4 million in the United States and may reach 14 million by 2050. The plaques' primary ingredient is a protein called β amyloid (Aβ) that occurs normally in the body and doesn't appear dangerous in its soluble form. "We're not trying to stop [Aβ] from being produced—we're trying to stop it from being accumulated," says Ashley Bush of Massachusetts General Hospital in Boston.

To do so, Bush has been studying the effects of copper and zinc on Aβ. About a decade ago, he found that these metals allow enzymes to cut Aβ from a larger protein; he later discovered that they influence the properties of Aβ itself. Adding zinc to the protein in a test tube, for instance, can cause clumps of Aβ to form, and compounds that bind to copper and zinc can dissolve amyloid plaques in postmortem brain tissue from people who died with Alzheimer's disease.

In search of a candidate drug, Bush's team screened dozens of antibiotics and anti-inflammatory drugs known to bind metals. An antibiotic called clioquinol proved the most potent, efficiently dissolving plaques in postmortem tissues and reducing amyloid's ability to clump together. To test whether clioquinol could clear up amyloid plaques in the brain of a living animal, the team gave the drug to young mice engineered to develop Alzheimer's-like deposits. The drug appeared to inhibit plaques from forming: The animals developed fewer plaques overall, and some 30% developed no detectable plaques. In a second study, the drug appeared to clear up plaques in mice old enough to have developed substantial deposits. Those given the drug for 9 weeks had 50% less amyloid deposited in their brains than untreated animals had.

The mouse studies are "very impressive," says Alzheimer's researcher David Morgan of the University of South Florida in Tampa, showing "a dramatic reduction [of plaques] in a very short time." Other approaches, including vaccinating mice against Aβ, also clear plaques from mouse brains (*Science*, 9 July 1999, p. 175).

The Food and Drug Administration approved clioquinol decades ago as an antibiotic. The drug was used for about 500 million patient days, Bush says, but was pulled from the market after a few people developed an acute vitamin B-12 deficiency while taking the drug. Although the B-12 deficiency can be addressed with supplements, Morgan cautions that the drug has not been tested for the long-term use necessary to help people with Alzheimer's.



CREDITS: (TOP TO BOTTOM) FRED CHARTRAND/AP; SIMON FRASER/PHOTO RESEARCHERS

Dissolved. Extracting metal shrinks amyloid plaques (in purple and blue).

ScienceScope

On the Stump Canadian scientists are being promised wheelbarrows of cash if the governing Liberals are returned to office in the 27 November election. Prime Minister Jean Chrétien (below) last month unveiled a campaign platform that calls for doubling annual federal research spending to $3.95 billion within a decade.

Hoping to put more distance between his Liberals and the right-wing Alliance Party, Chrétien promised to make Canada "a hotbed of research and investment." In particular, the Liberals call for boosting annual research outlays by at least $670 million within 4 years. The Canadian Institutes of Health Research would get an unspecified "major increase," while a quarter of the new monies are pegged for environmental research on toxins and children's health; clean air; and soil, water, and food safety. The remainder would be disbursed among the granting councils and in-house labs like those at the National Research Council.

The opposition Alliance also vows to increase granting council budgets by an unspecified amount and would appoint a "Chief Scientist of Canada to coordinate science activities in all government departments and ensure that science, not politics, prevails."

Mad About the Cow Concern about a surge of "mad cow disease" in France has proved a boon to the country's prion researchers. Prime Minister Lionel Jospin announced this week that the government will triple funding for research into prions, the abnormal proteins that are suspected of causing mad cow disease and its fatal human version, vCJD.

The move came after the agriculture ministry reported that there have been 80 cases of mad cow disease in France so far this year. That is equal to the number of cases over the previous 11 years, but still far short of the 170,000 cases recorded in the United Kingdom since 1988. And although France has documented just three human cases of vCJD, compared to 85 in the United Kingdom, news of the surge sparked what the press has called "a national psychosis." Jospin's package to calm fears, according to the newspaper *Le Monde*, includes an indefinite ban on giving livestock feed that contains animal bone and tissue, which is believed to spread the disease, and boosting the prion research budget to $27.5 million, starting next year.

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."

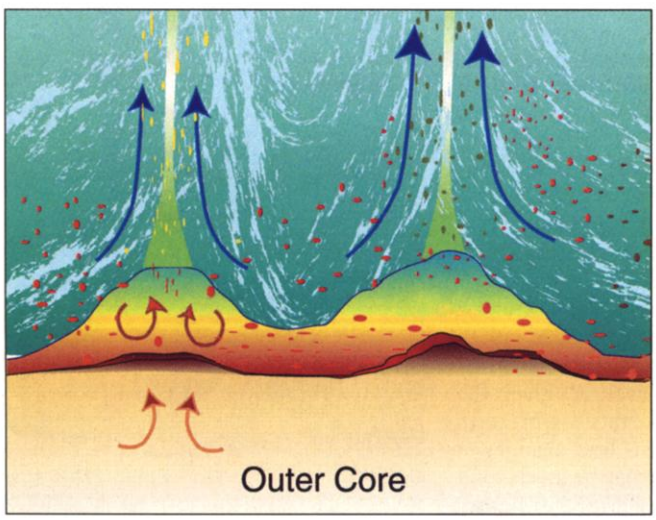
Difficulties seem inevitable, because painting a portrait of the core-mantle boundary depends on such indirect geophysical evidence. Williams and others believe mantle rock next to the hot core melts partially. Such melting, they say, could explain "ultralow-velocity zones"—thin patches of mantle at 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."

Contributors: Wayne Kondro, David Malakoff, Constance Holden