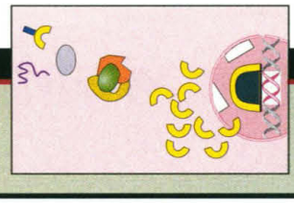


gram, the discovery that prions can lurk in organs long before people show signs of disease has another alarming implication: that surgical instruments used on those people could pass on the disease. It has long been recognized that the infectious agent responsible for the classical form of CJD can be transmitted that way. In one case, brain electrodes that had been sterilized passed the infection from one patient to a second. They were sterilized again but passed the disease on to a third patient. SEAC says spread by surgical instruments is an "unlikely mode of transmission" after an appendectomy, particularly as the scalpel blade is thrown away. But Calman has set up a new expert group to carry out further assessment of procedures used to decontaminate instruments which "will start shortly." —NIGEL WILLIAMS

PLANETARY SCIENCE

Lunar Prospector Probes Moon's Core Mysteries

Most planetary scientists suspect that far beneath the cold craters and dusty seas of the moon lies an important clue to its fiery past—a dense core. Now the modestly outfitted Lunar Prospector spacecraft has gathered gravitational and magnetic data that offer support to those suspicions and hint at the size of this small metallic nugget. The new findings, presented with other Prospector results on page 1475 of this issue, fit with a theory that the core is the remnant of a violent crash between the infant Earth and a Mars-sized body that spawned the moon 4.5 billion years ago.

The discoveries lengthen a string of successes by NASA's desk-sized $63 million robot, launched in January, which spotted signs of frozen water at the moon's poles last winter (*Science,* 13 March, p. 1628). Skimming just 100 kilometers above the moon's surface, Prospector has put together detailed magnetic maps as well as the most thorough lunar gravitational atlas to date, which reveals hidden concentrations of mass. "These [gravity field] images are remarkable in their clarity," says geophysicist Gregory Neumann of the Massachusetts Institute of Technology and NASA's Goddard Space Flight Center in Greenbelt, Maryland. "They resolve aspects of the moon that we couldn't see before."

Researchers charted the moon's gravitational peaks and valleys by using Earth-based radio telescopes to track gravity's subtle tugs on Prospector. The resulting map let them calculate how mass is parceled out in the moon's interior five times more precisely than before, says team leader Alex Konopliv of NASA's Jet Propulsion Laboratory in Pasadena, California. The calculations indirectly constrain the core's radius to between 220 and 450 kilometers—toward the small end of the range if the core is pure iron, and toward the larger end if it is made of a less dense alloy such as iron sulfide.

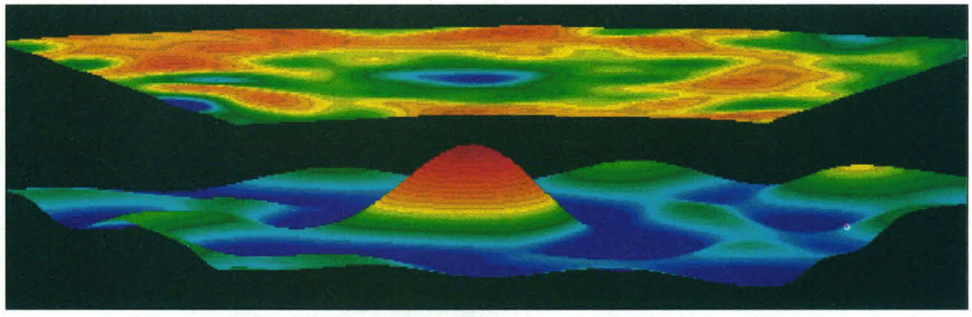
Such a core would hold 1% to 4% of the moon's mass, says the team. That's good news for proponents of the leading theory of the moon's birth: that it coalesced from the debris of an impact between a Mars-sized protoplanet and the half-formed Earth, 50 million years after the solar system arose. "The giant-impact theory has no problem explaining a core of that size," says planetary scientist Robin Canup of the Southwest Research Institute in Boulder, Colorado. The iron came mostly from the shattered core of the impactor, according to models by Canup and astrophysicist Alastair Cameron of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts. Other scenarios of lunar origin, such as coformation with Earth, capture of a large asteroid, or fission from the young Earth's mantle, call for a larger iron core or none at all, Canup notes.

Lunar Prospector's gravity survey also exposed several new "mascons," dense blobs of rock, beneath impact basins that are not filled with smooth lava. This suggests that the stronger pull of gravity over these areas results from plugs of dense material that rose toward the surface from the mantle, rather than from lava fills, Konopliv says. "That's a surprising result," says planetary geophysicist Roger Phillips of Washington University in St. Louis. "It means the moon's outer layers must have cooled off rapidly, within half a billion years, to become rigid enough to support mantle upwarpings."

Refining the moon's early thermal history may help scientists understand how long the core itself stayed hot. Prospector data suggest it remained molten until at least 3.6 billion years ago, when the era of giant impacts on the surface came to an end. The probe's magnetometer picked up traces of magnetism locked into patches of crust—perhaps sites where big impacts shocked the rocks strongly enough for them to capture an imprint of the magnetic field. The strength of this fossil field implies that at the time, the dynamo action of flowing metal in the core was generating a magnetic field perhaps as strong as Earth's today.

One patch of lunar crust is so intensely magnetized, in fact, that it deflects the solar wind's charged particles away from the surface, just as Earth's own magnetic field does. The phenomenon, first seen in less detail by the Explorer 35 orbiter in 1967, could be "a signature of a strong dynamo field from a molten iron core in the past," says physicist Robert Lin of the University of California, Berkeley. However, magnetic-field expert Norman Ness of the University of Delaware, Newark, cautions that the crustal imprints could have come from a strong interplanetary magnetic field rather than one internal to the moon.

The gravity and magnetic data seem to "tell a consistent story" about the moon's core, says planetary scientist Lon Hood of the University of Arizona, Tucson, a co-author on both studies. Future probes such as next year's Japanese Lunar-A mission, which will take seismic x-rays of the moon by im-



ALEX KONOPLIV, NASA JPL/CALTECH

Lunar lump. A new gravity survey by Lunar Prospector suggests that a plug of dense mantle material (red, bottom) underlies the Mendel-Rydberg impact basin (blue, top).

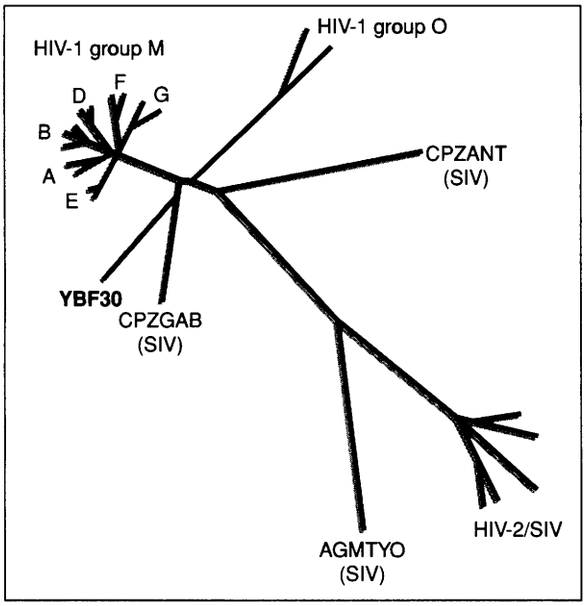
planting seismometers on opposite sides, may offer the definitive word on the core's mass and size. Still, Prospector scientists say that NASA's first moon mission since Apollo has taken more than a small step forward in lunar exploration. **–ROBERT IRION**

Robert Irion is a science writer in Santa Cruz, California.

AIDS RESEARCH

New HIV Strain Could Pose Health Threat

The human immunodeficiency virus (HIV), which causes AIDS, comes in so many genetic varieties that it is hard to keep them straight without a scorecard. Now, a team of AIDS researchers from France, Cameroon, and Gabon has added yet another branch to HIV's convoluted family tree: It has isolated a version of the virus from a Cameroonian woman who died of AIDS in 1995 that is sufficiently different from known strains that it may evade current blood tests. This new strain—which currently seems to be rare and localized—may provide new clues about HIV's origins, including when and how some viral strains might have jumped to humans from other primates.



Close cousins? New HIV-1 strain YBF30 may share a common ancestor with chimp SIV (CPZGAB).

Worldwide, most AIDS patients are infected with HIV-1, although a second virus, HIV-2, is responsible for some cases of a milder form of the disease in West Africa. HIV-1 itself is further subdivided into two genetically distinct groups, each of which is split into numerous subtypes separated roughly according to their geographical distribution. The new variant, designated YBF30, appears to be a member of an entirely separate third HIV-1 group, according to analyses published in the September issue of *Nature Medicine*.

The new strain was identified by a team led by virologist François Simon of the Bichat Hospital in Paris. The group includes French AIDS research pioneers Françoise Brun-Vézinet, also of Bichat Hospital, and Françoise Barré-Sinoussi of the Pasteur Institute in Paris. In 1994 and 1995, the researchers were conducting a study of HIV-1's genetic variability in Cameroon when they encountered a patient infected with a viral strain that was not detected by tests for the two already known groups of HIV-1: The M ("major") group, which accounts for the overwhelming majority of infections with HIV-1, and the O ("outlier") group, which is found almost exclusively in Cameroon. YBF30 did, however, react positively in a test for a strain of SIV—the simian version of HIV—isolated earlier from a chimpanzee in neighboring Gabon.

When YBF30's genome was later sequenced, the results confirmed that it belonged to a previously unknown group, which the team proposes calling the N group. Moreover, the sequence of one key part of YBF30's genome placed it much closer on the evolutionary tree to chimpanzee SIV than to either M group or O group HIV-1, although some other sections of the genome appear midway between chimpanzee SIV and M group HIV-1. AIDS researchers who spoke to *Science* found no reason to doubt that the YBF30 strain is the first discovered representative of a new HIV-1 group. "The data look good to me," says molecular virologist Beatrice Hahn of the University of Alabama, Birmingham.

The similarities between YBF30 and chimpanzee SIV suggest that the evolutionary ancestors of N group viruses might have been transmitted to humans from nonhuman primates. A similar scenario is thought to be responsible for the evolution of HIV-2, which is genetically similar to SIV strains that infect sooty mangabeys. Hahn says that chimpanzee-to-human transmission is a "likely" explanation for the existence of N group HIV-1, although she adds that it would be "hard to prove." Simon Wain-Hobson, an AIDS researcher at the Pasteur Institute, also cautions against drawing such conclusions too quickly, pointing out that only a

ScienceScope

SOCIETIES LEAP INTO CALIFORNIA STANDARDS FRAY

The battle over science instruction in California is moving to a new front. This week, a group calling itself the "Scientists' Standards Project"—backed by the American Physical Society, the American Chemical Society, and the American Astronomical Society—charged that a draft set of science standards for state schools released in July stresses facts at the expense of concepts. They want the state Board of Education to give them a chance to revise the standards before the state finalizes them in October.

The debate erupted last fall, when the state got caught in a tug-of-war between two groups that wanted to draft the standards—one emphasizing facts and the other concepts (*Science*, 12 December 1997, p. 1885). Members from both groups produced a consensus draft of the standards in July. The draft represents a "very hard fought compromise," says Scott Hill, executive director of the California standards commission. He doubts substantial changes will be made before the October deadline.

EPA TO EXPOSE HORMONE IMPOSTORS

Environmental scientists are preparing for a massive chemical hunt. This month, the U.S. Environmental Protection Agency (EPA) finalizes plans for its endocrine disrupter screening program, which will require companies to spend millions of dollars to test thousands of chemicals for their potential to wreak havoc on the hormonal systems of people and wildlife.

Disrupted. Baby alligators.

Studies have shown that synthetic chemicals found in many common products—from pesticides to plastics—can mimic the behavior of estrogen and other hormones in wildlife, disrupting everything from sexual development to immune resistance. But it's not clear if the substances pose a threat to people. To find out, in 1996 Congress asked the EPA to identify the riskiest compounds.

The effort, to start later this year, won't provide all the answers, but Tufts University physician Ana Soto says screening is "an important first step."

GERRY DAVIS/PHOTOTAKE/PNI