into real-time physiology. "I think the use of calcium imaging to visualize many cells at once is a big step in the right direction," Smith says. The study, he adds, clearly refutes the idea that a given taste-receptor cell responds to many different bitter flavors.

Ryba cautions that questions linger, however. Although the study is provocative, he says, its conclusions "go further than the data allow." For one, calcium imaging is an indirect—and somewhat imprecise—measure of bitter receptor activity. What's more, he adds, the pattern of taste-cell responses might change if more bitter compounds were tested. "When you look at five compounds, you may not see much overlap in taste-cell activity," Ryba remarks. "When you look at 25, that overlap might be considerable."

Caicedo and Roper agree that they focused on the "big bitters," or most common bitter compounds, but they predict their results will hold up in further studies. They note that the amount of a bitter compound needed to provoke a calcium response in their test cells correlates with the amount that affected rat behavior in previous tests—an indication that the result reflects what's happening in living animals. "We're very interested in expanding this work," Caicedo adds. "We have a lot of questions still to answer."

–KATHRYN BROWN

Kathryn Brown is a writer in Alexandria, Virginia.

WOMEN IN SCIENCE

Court to Hear Charges By Harvard Researcher

BOSTON—Harvard University goes to court next week to defend itself in a sex-discrimination suit brought by a researcher at its school of public health. Barring an unexpected last-minute settlement, it would be the first such case against Harvard brought to trial by a scientist and only the second such case to be heard by a jury. It will also shine a spotlight on Harvard Provost Harvey Fineberg, who attended last month's meeting on equitable treatment of women at elite U.S. research universities (*Science*, 2 February, p. 806).

The suit, by biomathematician Tamara Awerbuch-Friedlander, alleges that the school refused to promote her because of her sex and then harassed her for complaining about that decision. Fineberg, who was dean of the school of public health until 1997 and is seen as a strong candidate to succeed retiring Neil Rudenstine as president, declined to comment on the case. But he disputed Awerbuch-Friedlander's account in a 1998 deposition, explaining that "there were controversies over the qualifications of the candidate" and that the field of biomathematics—her specialty—"did not appear to have sufficient priority for a faculty appointment."

Awerbuch-Friedlander arrived at Harvard in 1983 as a postdoc from the nearby Massachusetts Institute of Technology. In 1989, an internal panel recommended 4 to 1 that she be given a tenure-track assistant professor job in the biostatistics department. But Fineberg overruled the internal committee's recommendation for an appointment—by his own account a very rare occurrence. And a biomathematics position never materialized. Awerbuch-Friedlander still works as a lecturer at Harvard, currently supported by a small grant from an outside foundation.

Several women faculty members at the school declined to comment on the case but praised Fineberg as a positive force for change as dean. "He's been wonderfully supportive of women," says molecular biologist Leona Samson. "When Harvey came, there were practically no tenured women, and by the time he left there were three female department chairs," says another. Biologist Bruce Demple, chair of an internal committee on the status of women, says that "the school has been willing to commit resources to recruit female faculty." In his deposition, Fineberg said that 34% of 125 faculty searches conducted during his 13-year tenure ended with the hiring of a woman. "I believe the situation has been rectified," he added.

Awerbuch-Friedlander paints a different picture. She says that after the tenure decision, Harvard cut off her phone, warehoused her office materials, and refused her requests for administrative support because she was a woman. In court filings, Harvard officials acknowledge some of the events described but say that their actions did not constitute harassment and that there was no pattern of sex discrimination. "We didn't have a job for her, and she didn't get the message," says one Harvard faculty member.

Although they declined to comment on this case, several women at the school say that there are gender-related problems. Julia Walsh, a former health professor now at the University of California, Berkeley, says she left several years ago in frustration over gender issues; another tenured faculty member is about to do the same. And Demple says that he was disappointed in the lack of response to a 1996 study on promotion rates by his panel, which has been hobbled by the reluctance of senior women to participate.

In 1993, Awerbuch-Friedlander switched to the population and international health department, and the next year she filed a complaint with the Massachusetts Committee Against Discrimination, which was rejected by the committee. In 1997, she filed suit in the Middlesex County Superior Court.

The trial is set to begin on 26 February. Neither side expects an out-of-court settlement, although court filings by Harvard describe a $100,000 offer that Awerbuch-Friedlander refused. Court documents show that she is asking for a guaranteed 5-year position as senior lecturer, $550,000 in lost wages, and $200,000 in lost benefits.

–ANDREW LAWLER

On trial. Tamara Awerbuch-Friedlander has accused Harvard of sex discrimination.

CREDIT: TAMARA AWERBUCH-FRIEDLANDER/HARVARD SCHOOL OF PUBLIC HEALTH

ASTROPHYSICS

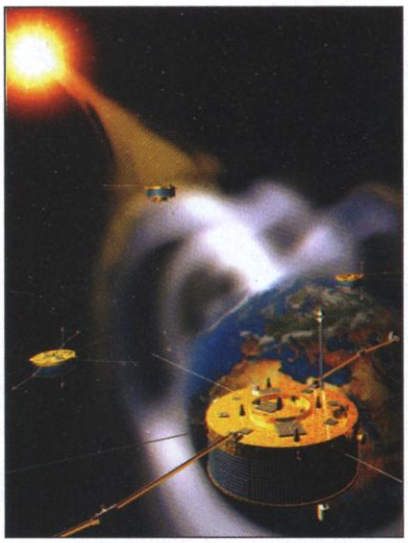
Cluster Reveals Earth's Rippling Magnetic Field

PARIS—Four satellites flying in unison have revealed a hidden wild side to Earth's magnetosphere, the magnetic field enveloping the planet that acts like a gigantic deflector shield against blasts of solar radiation. The unprecedented view, unveiled here last week at European Space Agency (ESA) headquarters, could help scientists devise better defenses against crippling magnetic storms.

ESA launched the quartet of identical spacecraft last summer, 4 years after the original set of satellites was lost in an explosion seconds after lift-off (*Science*, 28 June 1996, p. 1866). The satellites of the resurrected mission—nicknamed Salsa, Samba, Rumba, and Tango—each carry 11 instruments designed to produce the first three-dimensional maps of the magnetic fields and plasmas surrounding Earth.

Project scientists are thrilled with the data so far. "We can see things we couldn't possibly see before," says André Balogh of Imperial College in London, the principal investigator of the fluxgate magnetometer

experiment. The magnetometer has two sensors on each craft that measure the intensity and orientation of Earth's magnetic field lines. Outside experts also are impressed. "I am surprised the team has been able to extract such exciting observations so soon after launch," says Alan Gabriel of the Institut d'Astrophysique Spatiale in Orsay and president of the French sun-Earth research program.



Sunstruck. A quartet of satellites carries dozens of instruments to monitor various solar phenomena and their impact on Earth.

The Cluster spacecraft began gathering data soon after crossing the magnetopause—the outer edge of the magnetosphere, where the influence of the sun's magnetic field takes over—on 8 November. Chancing upon one of the most violent solar storms in 25 years, the spacecraft watched a barrage of particles from the sun, carried on a supercharged solar magnetic field, compress the magnetosphere to about half its usual size. It was the first time that this phenomenon has been measured in detail, says Cluster project scientist Philippe Escoubet of the European Space Research and Technology Centre in Noordwijk, the Netherlands.

More data came pouring in last month when the satellites crossed a polar cusp, a funnel-shaped gap in the magnetosphere through which charged solar particles reach the atmosphere and set off the northern and southern lights. Refuting the classic view of polar cusps as relatively stable, the satellites found the northern cusp gyrating wildly like a top, moving at speeds of up to 30 kilometers per second.

The Cluster spacecraft have found that the magnetopause, thought to be smooth, is actually corrugated and undulates like an ocean wave buffeted by wind, says Nicole Cornilleau-Wehrlin of the Centre d'Etude des Environnements Terrestres et Planétaires in Vélizy. "For years, we had been trying to find out what happens to this shield," says Cornilleau-Wehrlin, whose instruments on the Spatio-Temporal Analysis of Field Fluctuations experiment detected waves in the magnetosphere that extended for 1000 kilometers and rippled along the magnetopause away from the sun—the first proof that these waves exist, says Escoubet: "That was not possible with a single spacecraft."

Cluster's findings could soon have some practical benefits as well. The sun is entering the peak of its 11-year cycle of activity, which is expected to bring powerful solar flares that trigger magnetic storms in Earth's atmosphere. Such storms can disrupt radio and satellite communications. "Cluster is well positioned at the most complicated phase of the solar cycle to try and work out what the solar storms do to the magnetosphere," says Balogh. A better understanding of these processes, he says, could lead to the development of early warning systems that would enable satellite operators to shut off their equipment before electrical circuits are damaged.

–BARBARA CASASSUS AND ALEXANDER HELLEMANS

Casassus is a writer in Paris; Hellemans is a science writer in Naples.

PLANETARY SCIENCE

Strange Doings on a NEAR-Struck Asteroid

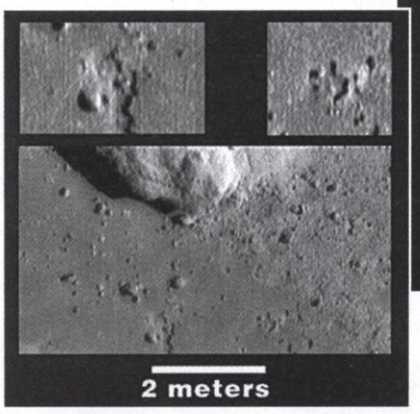
LAUREL, MARYLAND—Researchers here are puzzling over the last pictures returned by the NEAR Shoemaker spacecraft as it descended to its final resting place on the surface of asteroid Eros. At a press conference here last week at Johns Hopkins University's Applied Research Laboratory, team members showed pictures that reveal that something—no one knows quite what—is shaping the surface of Eros into bizarre "ponds" with "beaches" marked by "footprints." Something else is populating the surface with boulders. "Our jaws are just hanging out," says NEAR imaging team member Clark Chapman of Southwest Research Institute in Boulder, Colorado.

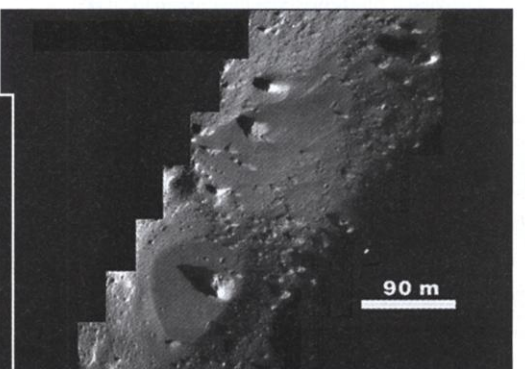
Never designed to land, NEAR Shoemaker made "perhaps the softest [planetary] landing ever" on 12 February in what was expected to be a mission-ending descent to the surface of the 33-kilometer-long asteroid. To the surprise of everyone, the spacecraft continued to beam a radio beacon back to Earth after touchdown. Telemetry was still being received 2 days later, prompting NASA to extend the mission for up to 10 days. With the barrel-shaped, half-ton spacecraft apparently propped on two solar panels, the gamma ray spectrometer was fired back up in hopes of refining the surface-composition measurements made from Eros orbit, according to spectrometer team leader Jacob Trombka of NASA's Goddard Space Flight Center in Greenbelt, Maryland.

NEAR Shoemaker's picture-taking days are over, because its telephoto lens is nearly in the dirt. But the last images it sent back should keep planetary geologists busy for years. "I never would have imagined you'd see some of these things on an asteroid," says Chapman.

The mysteries start with an abundance of huge boulders—perhaps a million of them larger than 8 meters—visible on the surface. One explanation being considered by planetary dynamicist Erik Asphaug of the University of California, Santa Cruz, and his colleagues is seismic shaking: Large impacts might so shake Eros that the surface debris would settle like mixed nuts in a can, with the big, heavy bits rising to the top and the smaller ones falling to the bottom. This "Brazil-nut effect" might have caused boulders completely buried in the surface debris to rise into view, they say.

Another mechanism probably accounts for how the very finest material not only separated out but found its way to low spots, notes imaging team leader Joseph Veverka of Cornell University. Somehow, the finer looking material has filled in low





Something's funny here. On Eros, fine debris has somehow filled in low areas *(above)*; some places have collapsed into depressions (two spots at bottom of lower left image and enlarged in insets above).

CREDITS: (TOP TO BOTTOM) ESA; JOSEPH VEVERKA/NEAR/CORNELL UNIVERSITY