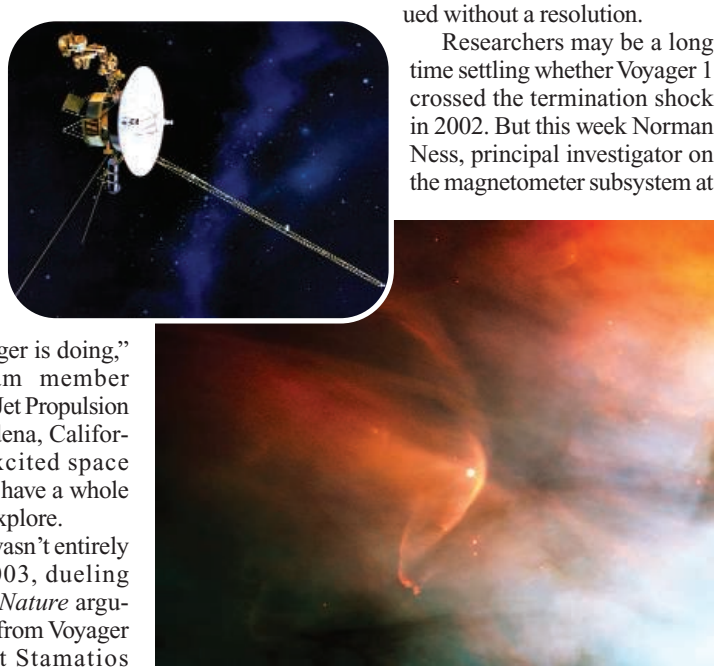
PLANETARY SCIENCE

Voyager 1 Crosses a New Frontier and May Save Itself From Termination

Talk about timing. Only last March, NASA managers had decided that the Voyager 1 spacecraft—28 years and 14 billion kilometers out from Earth—might have outlived its usefulness (*Science*, 11 March, p. 1541). It didn't seem worth the expense of waiting for Voyager to find something more interesting than the now-monotonous hum of the solar wind as the spacecraft glided into the void far beyond the farthest planets. Then this week, Voyager scientists announced that their craft had just entered a new realm, one long hypothesized but never observed, that marks the doorstep to true interstellar space. "I hope this will just reinforce the exploratory nature of what Voyager is doing," says Voyager team member Edward Stone of the Jet Propulsion Laboratory in Pasadena, California. It's already excited space physicists, who now have a whole new playground to explore.



Outward bound. Voyager 1 has entered the outer reaches of the sun's realm, which resembles this region around the star LL Ori.

CREDITS (TOP TO BOTTOM): JPL/NASA; NASA AND THE HUBBLE HERITAGE TEAM (STSCI/AURA)

At first the play wasn't entirely harmonious. In 2003, dueling papers appeared in *Nature* arguing over recent data from Voyager 1. Space physicist Stamatios Krimigis of the Applied Physics Laboratory (APL) in Laurel, Maryland, and colleagues reported that in 2002, their instrument on Voyager had detected a large increase in energetic charged particles at a distance of 85 times the distance between Earth and the sun (85 astronomical units, or AU). That rise, they said, implied that Voyager had passed beyond the supersonic solar wind that bathes all the planets and had entered the region called the heliosheath, where the solar wind has slowed to subsonic speeds. The heliosheath constitutes the outer reaches of the teardrop-shaped bubble, called the heliosphere, that the solar wind inflates in the near-vacuum of interstellar space.

By that interpretation, Voyager 1 was the first humanmade object to cross the solar system's termination shock—the region where the solar wind abruptly slows before it collides with the more distant interstellar medium, behaving much as air does when it piles up in front of a supersonic plane. Six months later, Voyager seemed to cross back into high-speed solar wind, perhaps as the solar wind gusted.

Space physicist Frank McDonald of the University of Maryland, College Park, Stone, and colleagues had a different take on their own 2002 Voyager data. Like the APL team's instruments, theirs reported an increase in charged particles—in this case, cosmic ray particles. But that was to be expected before reaching the termination shock, they said, not after crossing it. The debate has since continued without a resolution.

Researchers may be a long time settling whether Voyager 1 crossed the termination shock in 2002. But this week Norman Ness, principal investigator on the magnetometer subsystem at the University of Delaware, Newark, declared, without fear of contradiction, "We have entered the heliosheath." Ness and the rest of the Voyager magnetometer team reported at this week's Joint Assembly of the American Geophysical Union (AGU) in New Orleans that last December the feeble magnetic field dragged along by the charged particles of the solar wind intensified by a factor of 3 at a distance of about 94 AU. That increase is the key marker of a termination-shock crossing, Stone says, because slowing and thus compressing the solar wind ought to intensify its magnetic field. Instruments showed no such intensification during the supposed 2002 crossing, Stone notes.

Also at the AGU meeting, Voyager principal investigator Donald Gurnett of the University of Iowa in Iowa City added more evidence of a crossing. He reported that on 15 December, Voyager detected the same sort of plasma-wave oscillations that spacecraft ▶

ScienceScope

Manhattan Showered With Stem Cell Gifts

Philanthropists are pouring money into three New York City biomedical institutions to support stem cell research.

The latest gift comes from the Starr Foundation, which is dividing $50 million over 3 years among Rockefeller University, Memorial Sloan-Kettering Cancer Center, and Weill Medical College of Cornell University. Last year Weill received $15 million from the Houston, Texas–based Ansary Foundation to establish a center for stem cell therapeutics, and earlier this month Mount Sinai School of Medicine took in $10 million from donors for its own stem cell institute (*Science*, 13 May, p. 937).

The Starr Foundation was established by Cornelius Vander Starr, founder of the financial and insurance companies called American International Group Inc. Its Tri-Institutional Stem Cell Initiative will focus on a wide range of stem cell projects, involving cells from embryos, adult tissues, and cancerous tumors, says Sloan-Kettering President Harold Varmus. He says the gift is already influencing recruitments at Sloan-Kettering, and he hopes it might lessen the possible lure of California's $3 billion in public funding. "We don't want people leaving or young people to ignore the fact that we have a lot of support for this research in New York," he says. Weill Dean Antonio Gotto hopes some of the funds will allow researchers at its large fertility clinic to produce new stem cell lines from cloned human embryos.

–GRETCHEN VOGEL

Quality Check for Australia's Research

Australia is beginning a $2.8 million study of how the government funds research that is expected to put greater emphasis on scientific productivity.

As the first step in the process, a government-appointed panel has been asked to develop a method of ranking university departments based on the impact of publications by faculty members. The panel, led by Gareth Roberts of Wolfson College in Oxford, U.K., is looking closely at a U.K. system adopted in 1986 as well as reviewing comments from stakeholders. A 6-month trial of the new system will begin in September.

–JACOPO PASOTTI

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SOCIOLOGY

Controversial Study Suggests Seeing Gun Violence Promotes It

A longitudinal study of Chicago adolescents has concluded that even a single exposure to firearm violence doubles the chance that a young person will later engage in violent behavior. The study may once again stoke up the debate over juvenile violence; it has already triggered criticism over the unusual statistical method it employs.

The work is part of the decade-old Project on Human Development in Chicago Neighborhoods, run by Harvard University psychiatrist Felton J. Earls. On page 1323, Earls and two health statisticians describe how they used a relatively new technique called "propensity score stratification" to create, through statistical means, a randomized experiment on propensity toward violence from observational data.

Violence debate. A study of Chicago adolescents indicates that seeing a murder may lead to later gun violence by the observer.

CREDIT: *MIDLAND DAILY NEWS*, RYAN WOOD/AP PHOTO

Over a 5-year period, the researchers conducted three interviews with more than 1000 adolescents initially aged 12 to 15. In the first, they gathered extensive data on variables such as family structure, temperament, IQ, and previous exposure to violence. Halfway through the study, the subjects were asked if, in the prior 12 months, they had been exposed to firearm violence—defined as being shot or shot at or seeing someone else shot or shot at. Then at the end of the period, the 984 subjects remaining were asked if they had engaged in any violence—defined as participation in a fight in which anyone got hurt as well as firearm-related incidents, including carrying a gun.

"If you just compare exposed and unexposed, the exposed were three or four times as likely to be [violence] perpetrators," says lead author Jeffrey B. Bingenheimer, a Ph.D. candidate at the University of Michigan School of Public Health in Ann Arbor.

The authors then went to great lengths to weed out confounding factors. Subjects were ranked according to "propensity" scores: a cumulative tally of 153 risk factors that estimated the probability of exposure to gun violence. They were then divided up according to whether or not they had reported such exposure and whether or not they had subsequently engaged in violent behavior. Those with the same propensity scores but different exposures were compared with each other. In this way, the authors claim, they controlled for a host of individual, family, peer, and neighborhood variables.

Even with this analysis, exposure to gun violence predicted a doubling of the risk for violent behavior—from 9% for unexposed to 18% among the subjects who reported exposure, says Bingenheimer. And it didn't take repeated exposures—"the vast majority" of subjects reported only one, he says. Can a single experience of seeing someone shoot at someone else make an individual more violence-prone? "That doesn't seem improbable to me," says Bingenheimer. "It could be for only a minority, but a very large effect for that minority."

Developmental psychologist Jeanne Brooks-Gunn of Columbia University, one of the scientific directors of the Chicago neighborhoods project, agrees that a single exposure might have a profound effect, even on a hitherto nonviolent individual. "Nobody's done this kind of analysis before," she says, and nobody has focused just on gun violence, which "clearly is a very extreme type of violence."

But a number of other scholars have deep misgivings about both the study findings and the methodology. Psychiatrist Richard Tremblay of the University of Montreal in Canada says the study does not demonstrate that "those who are nonviolent to begin with will become violent." Indeed, the authors didn't address this point directly because a lack of subjects in the lowest-risk category led them to eliminate it from their analysis. ▶

ScienceScope

New Reporting Regs for Globe-Trotting Diseases

The world has a new set of rules for dealing with diseases, such as flu or SARS, that cross borders easily. On Monday, the World Health Assembly, an annual meeting of 192 governments in Geneva, Switzerland, approved regulations making it mandatory for countries to detect and respond to infectious diseases within their borders, notify the World Health Organization (WHO) within 24 hours of any outbreak that could threaten other countries, and collaborate in investigating and controlling such outbreaks.

Similar International Health Regulations have existed for half a century. But even the latest version from 1981 was widely considered outdated; for one, it didn't cover newly emerging infections. The revised treaty, which will formally take effect in 2007, has been debated for more than 10 years. The issue became more urgent in 2003, when China risked a wide spread of SARS by hiding the extent of its outbreak —behavior that would violate the new rules. Although WHO has no sanctions for countries that violate the new regimen, "this gives us much clearer ground rules," says WHO'S Max Hardiman.

–MARTIN ENSERINK

Embattled Berkeley Ecologist Wins Tenure

Ignacio Chapela, an ecologist whose views on biotechnology have attracted controversy, has won tenure at the University of California, Berkeley, after appealing an earlier rejection.

Chapela caused a stir with a 2001 report in *Nature* that promoter genes from genetically modified corn had been detected in traditional kinds of corn in Mexico—a finding the journal later disavowed (*Science*, 12 April 2002, p. 236). He also was a persistent critic of a $25 million deal with Novartis in 1998 for exclusive licensing of plant and microbial research.

Chapela claimed that the university denied him tenure in 2003 because of his opposition to the Novartis deal (*Science*, 19 December 2003, p. 2065). Last month, he sued the university, claiming it had also discriminated against him because he was born in Mexico. Berkeley, meanwhile, was reexamining the case as part of an earlier consent agreement, and a nine-member panel voted thumbs-up. "This was a case in which reasonable reviewers could disagree," says spokesperson George Strait. After learning of his victory, Chapela e-mailed supporters that he now fears tenure "may become a [self-imposed] muzzle."

–ERIK STOKSTAD

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