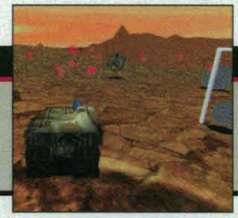


stitute's future. "Philippe is universally known as a good scientist and a good man," comments Jean-Louis Virelizier, a viral immunologist at Pasteur.

The appointment comes at a critical juncture for the institute and its 1100 full-time researchers. Since its founding in 1888 by Louis Pasteur, the institute has occupied an elite position in French biomedical research. It has a stellar scientific track record—eight Nobel laureates in physiology or medicine this century—and finances much of its current $165 million budget through donations, legacies, and income from its own activities such as patented vaccines and diagnostic tests.

"A good man." Pasteur's new chief, Philippe Kourilsky.

In recent years, however, Pasteur has been struggling with both financial problems and an identity crisis. Although income from donations and legacies has been increasing, this is not expected to continue, and some lucrative patents, particularly for hepatitis vaccines and AIDS tests, are either expiring or are being taken over by industry partners. At the same time, the proportion of state funding has been decreasing: Although annual spending has nearly doubled since 1989, the government now provides only 30% of Pasteur's budget, compared to 48% a decade ago.

Meanwhile, Pasteur researchers have increasingly been disagreeing over key issues such as the proper balance between fundamental research and public health concerns. At times these behind-the-scenes debates have broken into the open. For example, Schwartz and Pasteur medical director Philippe Sansonetti ran into stiff resistance when they tried to create an epidemiology department at the institute (*Science*, 13 November 1998, p. 1241). Sansonetti, whom some had considered the heir-apparent to Schwartz, later quietly took himself out of the running for the top job. By the time the executive board met, the widely respected Kourilsky, who has a long career in basic research but also serves as a government and industry adviser on public health issues, was the only serious choice.

"Everyone was pointing to Philippe," says Pasteur immunologist Antonio Freitas, who adds that Kourilsky is the right person to lead the institute out of its traditional ivory-tower isolation. "Pasteur needs to be modernized, to be much more open to the outside and establish collaborations with other institutions." And while Pasteur developmental biologist Margaret Buckingham praises Schwartz's efforts to put the institute "back on the map" in microbiology and other public health–related fields after some years of stagnation in these areas, she says that Kourilsky "will now be well placed to do the same" in booming areas of biomedical research such as "immunology, virology, and animal models of human disease." (Kourilsky, when contacted by *Science*, declined to comment on his appointment until he has taken up his duties.)

Whether Kourilsky will be able to resolve the issues facing the Pasteur Institute, only time will tell. But given the nearly unanimous approval of Pasteur scientists, his appointment may be the first thing they have all agreed on in years. **–MICHAEL BALTER**

PLANETARY SCIENCE

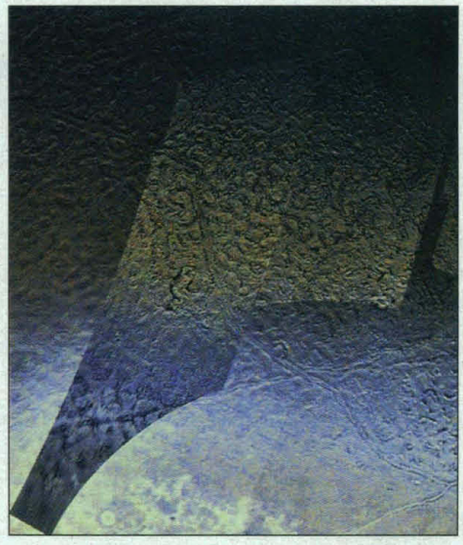
Neptune's Icy Cold Satellite Comes to Life

No planet lives forever, geologically speaking. After 4.5 billion years, Earth is in its middle age, its inner stores of heat trickling out to drive plate tectonics. Earth's moon, being smaller, has lost its life-giving heat faster; the flow of its surface-renewing lavas slowed and it died eons ago, like most of the other small bodies in the solar system. But planetary scientists are now realizing that a satellite even smaller than the moon, Neptune's Triton, is still showing signs of life.

The realization is all the more startling because it is based on reanalyses of 10-year-old observations. "This is showing us some real surprises in the outer solar system," says planetary scientist Alan Stern of the Boulder, Colorado, office of the Southwest Research Institute. Triton's meager heat from lingering radioactive decay, researchers assume, can still melt its interior of exotic ices to produce lavas or otherwise reshape and renew the surface. Recent telescopic observations even hint that geologic activity has made itself evident in recent years.

Planetary scientists use the drizzle of comets and asteroids onto a body's surface as a kind of geologic clock: The more craters there are, the longer it's been since mountain building, flooding by lavas, and other geologic processes reshaped the surface. And a young surface means a lively inner planet. In 1989, when the Voyager 2 spacecraft took the first and only close-up images of Triton, planetary scientists set to work counting impact craters. They assumed that all the craters were made by comets coming from the Oort Cloud, far beyond the outer planets. Given the calculated flux of Oort-based impactors, they eventually concluded that Triton's surface on average has been accumulating impacts for about 600 million years or less, a young face for a 4.5-billion-year-old body but hardly as young as Europa's 50-million-year-old visage.

A discovery out past Neptune has changed that view dramatically. In 1993, astronomers first spied a resident of the Kuiper Belt, a long-hypothesized disk of bodies left over from the formation of the solar system (*Science*, 23 June 1995, p. 1704). Although billions of Kuiper Belt objects (KBOs) normally orbit 1 billion to 3 billion kilometers beyond Neptune and Pluto, some of them fall inward to add to the solar system's comets, and a few of these collide with planets and their satellites. Two planetary scientists—Stern and William McKinnon of Washington University in St. Louis—have now factored in a rain of impactors onto Triton from the nearby Kuiper



Craterless? Few or no impacts have scarred the "cantaloupe" terrain (exaggerated color) of Triton.

CREDITS: (TOP) INSTITUT PASTEUR; (BOTTOM) PAUL SCHENK LPI/NASA

Belt, a flux calculated to be five times that from the Oort Cloud. Stern and McKinnon told a workshop* last month that Triton now appears to have been resurfacing itself fast enough to make the average age of its surface around 100 million years old.

The most likely implication of such youthfulness, says planetary scientist Jeffrey Kargel of the U.S. Geological Survey in Flagstaff, Arizona, is that "Triton has been very active [geologically] through 98% of its history. ... If it was active 100 million years ago, it probably still is active."

Most researchers would agree with Kargel, but another pair of planetary scientists is offering evidence of an even younger age for Triton's surface. Kevin Zahnle of NASA's Ames Research Center in Mountain View, California, and Paul Schenk of the Lunar and Planetary Institute in Houston factored in the Kuiper Belt, too, but Schenk also took another look at Voyager images and counted craters again. This time, Schenk sharpened the images with the same mathematical technique used to clarify flawed images from the Hubble Space Telescope. Now he could more easily recognize true impact craters in previously cryptic terrain.

Surprisingly, Schenk found that "all the craters are on one side of the satellite." As Triton orbits Neptune, it sweeps up debris "like a car driving through a rainstorm," says Schenk, "so the raindrops all hit on one side of the car." Where the debris came from is a mystery, but Zahnle thinks the best bet is the destruction of an inner satellite in a collision with a comet. If that's all true, Zahnle and Schenk told the workshop, Triton has been resurfaced so rapidly of late that few or no KBOs have had a chance to pock it; therefore, its surface would clearly be less than 100 million years old and quite possibly less than 10 million years old. That would make it as geologically young as Europa.

Whichever age is correct, "the important thing is Triton's surface really is relatively young," says McKinnon. Given its meager supply of heat, its youthfulness requires a resurfacing agent so easily mobilized that it can modify Triton's 37-kelvin surface. Lavas of water plus agents like ammonia or methanol that lower water's melting point are a possibility, says McKinnon. They may be rising from an "ocean" 150 kilometers down, bounded above and below by water ice, he says.

Whatever has kept Triton looking young over the eons may have been at work in recent years. Astronomers Michael Hicks and Bonnie J. Buratti of the Jet Propulsion Laboratory in Pasadena reported at the workshop that telescopic observations show Triton taking on a strong reddish tint for a few months at a time. Somehow, Buratti says, "most of the surface" is being altered. "It looks like there's something geological going on." Maybe it's just Triton freshening up once again.

–RICHARD A. KERR

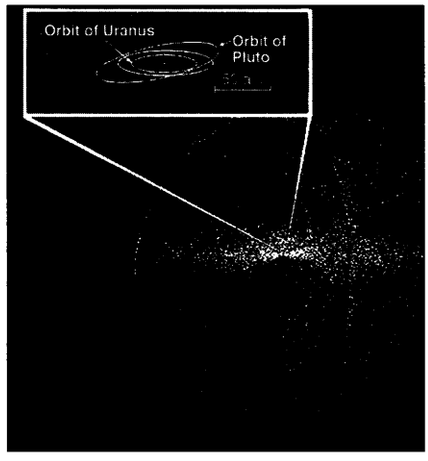
* Pluto and Triton: Comparisons and Evolution Over Time, held from 23 to 24 September in Flagstaff, Arizona. See www.lowell.edu/workshop

CREDITS: (TOP) R. STONE; (BOTTOM) DONALD YEOMANS/JPL

PLANETARY SCIENCE

Another Distant Consort for the Sun?

The age of discovery for planet-size bodies in this solar system would seem to have ended in 1930 with the discovery of Pluto. That tiny body turns out to be just the largest bit of debris remaining from the formation of the planets. Most of the smaller bits ring the sun in the asteroid belt or in the Oort Cloud, the spherical swarm of distant comets far beyond Pluto. Astronomers therefore generally take Pluto to be the end of the line for planet formation. But a small band of astronomers has kept up the search for a tenth planet, and this week, researchers announced two independent proposals for the location of yet another companion to the sun. And if they are right, it would be no Pluto-sized midget.



A tenth companion? The huge Oort Cloud of comets may harbor a relatively massive planet.

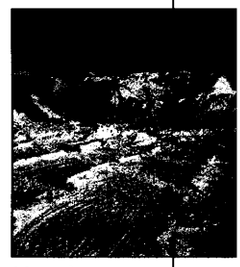
Both proposals suggest that, out among the comets of the Oort Cloud, an object several times more massive than Jupiter is orbiting some 25,000 to 30,000 times farther from the sun than Earth. Both groups argue that this unseen behemoth gravitationally perturbs Oort Cloud comets, sending them toward Earth along a distinctive sky-girdling band. But the evidence doesn't impress many other researchers. "I just don't believe it," says planetary dynamicist Harold Levison of the Boulder, Colorado, office of the Southwest Research Institute.

Attempts to track down unseen objects through their gravitational effects "has a long and not very honorable tradition," says astro-

ScienceScope

Thin ice Now may not be the best time to borrow money in Russia, but don't tell that to the Russian Antarctic Expedition (RAE). Crippled by the ruble's collapse last year, the RAE has won approval to take out an emergency loan to fund its operations during the coming austral summer.

During the Cold War, the Soviet Union maintained a vast antarctic operation, with several year-round coastal bases and the inland Vostok station. But the post-Soviet days have been bruising: The RAE must use 61% of its $5.6 million budget to finance the research ship *Academik Fedorov* and spend most of the remainder on supplies from overseas vendors. Following the ruble's plunge in August 1998, the RAE had to raid its 1999 budget to pay for last season's operations.



Vostok.

Now the government says it doesn't have the funds to keep its promise of maintaining four year-round bases. So it has authorized RAE to take out a $2.3 million loan at high interest, promising to come up with the principal by February. RAE will cobble together the interest payments from money it receives ferrying Scandinavian researchers. Says vexed RAE chief Valery Lukin, "It's a crazy situation."

Supplemental science Japan's scientists once again stand to gain from the government's efforts to stimulate the economy. Last week, the cabinet instructed ministries to draw up plans for $33 billion in additional spending on public works and "emerging technologies."

The $7.3 billion Science and Technology Agency, for example, is asking for $1.9 billion more to sweeten its efforts in information technologies, life sciences, and the environment. It also wants to accelerate work on such large projects as an ocean drilling ship and an Earth simulator for modeling climate change. Other science agencies will also request funds and it is likely that some new lab buildings and other research facilities will be financed from a pot earmarked for public works.

The ministries' requests are part of a $100 billion economic revitalization package that includes loan guarantees, local government spending, and tax cuts. The spending plan is expected to be finalized by mid-November and put into effect before the next fiscal year beginning on 1 April.