# Astronomers find abundant nitrogen on Pluto

Astronomers for the first time have detected nitrogen and carbon monoxide ice on Pluto. Moreover, the findings indicate that nitrogen is the most abundant material on the planet's frozen landscape, making up about 97 percent of its surface. Carbon monoxide ice accounts for about 1 to 2 percent of Pluto's surface, and it now appears that methane — the only material previously detected on Pluto — has roughly the same low abundance.

"Planetary scientists were uncertain about which was the most abundant ice on Pluto — methane or nitrogen," says Richard P. Binzel of the Massachusetts Institute of Technology. "Now that we know it's nitrogen, we can move forward to understanding more about the planet."

Given that other bodies in the solar system, such as Neptune's satellite Triton, contain nitrogen, the new findings were not unexpected, notes study collaborator Tobias C. Owen of the University of Hawaii in Honolulu. But he says the results are intriguing because Pluto has remained virtually unchanged since its formation several billion years ago.

Thus, Owen says, the mixture of compounds on the planet's surface offers a peek at the chemistry of the very early solar system. In particular, since astronomers believe that comets transported material from the outskirts of the solar system to the inner planets, the composition of distant Pluto may indicate the composition of the early Earth's atmosphere (SN: 9/5/92, p.150).

Before the current study, conducted in May using the United Kingdom Infrared Telescope atop Hawaii's Mauna Kea, astronomers had direct evidence only of methane ice on Pluto, based on that compound's telltale absorption of infrared light. Researchers suspected that molecular nitrogen and carbon monoxide also existed on the surface, but previous spectroscopic studies had failed to detect these molecules because they absorb only weakly in the infrared. The new observations were made with a highly sensitive spectrometer that can detect even very faint infrared absorption.

An international research team, which includes Owen, reported the work last week at the annual meeting of the American Astronomical Society's Division for Planetary Sciences in Munich, Germany.

The findings, says Owen, may shed new light on a long-standing puzzle: why researchers have detected so little nitrogen in interstellar clouds of gas and dust — the raw material for stars — even though stars themselves contain a high abundance of the element. He notes that the heat from stars would split molecular nitrogen, which consists of two atoms bound together, into single atoms, which more readily absorb light and are easier to detect.

Astronomers had theorized that much of the missing nitrogen in the chilly interstellar medium may lie hidden in its harder-to-observe, molecular form. But they lacked convincing proof. Because Pluto preserves primordial abundances of materials on its icy surface, detecting a significant amount of molecular nitrogen on the planet offers further support for the notion that the cold interstellar medium also contains lots of molecular nitrogen, Owen notes. *— R. Cowen*

# Threat perceived from emerging microbes

Developed countries such as the United States have become too complacent about medical science's ability to snuff out whatever novel infectious diseases may flare up, warns a report released last week by the Institute of Medicine, an arm of the U.S. National Academy of Sciences. As a consequence, the report concludes, modern society has left itself vulnerable to the emergence of new microbial infections, some of which have the potential to sweep the globe with the severity of AIDS.

Lyme disease, drug-resistant tuberculosis, and the mysterious streptococcal bacterium that killed "Muppets" creator Jim Henson are all 20th-century illustrations that existing antibiotics and vaccines can't completely insulate humans from infectious disease, says Robert E. Shope, who co-chaired the committee that drafted the new report.

"The medical community and society at large have tended to view acute infectious diseases as a problem of the past, but that assumption is wrong," says Shope, an epidemiologist at Yale University School of Medicine. "The danger posed by infectious diseases has not gone away — it's worsening."

The report, drafted by a 19-member panel of physicians and scientists, asserts that the United States lacks the ability to mobilize quickly against emerging infectious diseases. For example, it concludes that all of the yellow fever vaccine stocks in North America would be exhausted within several days if the disease were to break out in New Orleans — a city that was hard hit by yellow fever early in this century and that still harbors the mosquitoes capable of spreading the disease. In such an outbreak, 100,000 people would become ill with yellow fever and 10,000 would die within three months, according to the report, titled "Emerging Infections: Microbial Threats to Health in the United States."

To prevent such an occurrence, the committee calls for creating stockpiles of drugs and vaccines or establishing centers, modeled on the Department of Energy's national laboratories, that could increase production of such pharmaceuticals at a moment's notice. The committee also recommends improving current disease surveillance programs and training private physicians and small hospitals to consistently report cases of suspected new microbial diseases to the Centers for Disease Control. In addition, the committee proposes developing new pesticides to combat the organisms that spread infectious diseases.

Microbiologist Joshua Lederberg of the Rockefeller University in New York City, the other co-chairman of the committee, estimates that implementing all of the panel's recommendations in the United States would require less than half a billion dollars. "This is not a megaprogram," Lederberg comments. He adds that while the panel did not draft a budget detailing the costs of their suggested changes, "even tens of millions would make a very big difference."

"Although we do not know where the next microbe or virus will appear . . . we know that new outbreaks are certain," says Shope. "Unless we become more vigilant, some of these outbreaks could become deadly epidemics." *— C. Ezzell*

# Pinatubo deepens the Antarctic ozone hole

When it came time for the annual ozone pool this year, researchers at NASA's Goddard Space Flight Center all missed the mark. Everyone guessed total ozone concentrations would come close to, if not surpass, the record low value because the atmosphere was filled with volcanic acid from last year's eruption of Mt. Pinatubo — a factor believed to help human-made chemicals in their attack on the ozone layer. Yet satellite measurements from early October showed that ozone levels did not fall as low as expected, so the highest prediction won by default.

Measurements by balloon-borne instruments, however, now threaten to reopen that contest. In contrast to the satellite data — which indicate that this year's lowest ozone concentration was roughly 126 Dobson units — balloon measurements made on Oct. 11 show that ozone levels above the South Pole reached an all-time low of 105 Dobson units. The balloon data also suggest that sulfuric acid from Pinatubo did indeed worsen the ozone loss by allowing chlorine chemicals to attack ozone farther down in the stratosphere than normal, says David J. Hofmann of the National Oceanic and Atmospheric Administration in Boulder, Colo.

At this point, the satellite and balloon teams cannot tell which set of measure-