Although the U.S. support is welcome, some say it falls short of the $20 million that scientists recommended last year as a minimum contribution (*Science*, 23 October 1998, p. 653). "The U.S. [financial] input is disproportionately small," says Benjamin Burr, a plant geneticist at Brookhaven National Laboratory in New York. "But it could have a disproportionate impact because the labs picked have high sequencing capacities." In addition, two other U.S. groups intend to continue sequencing efforts on their own. The University of Wisconsin, Madison, a finalist in the competition for the new grants, hopes to sequence portions of chromosome 11, in part to demonstrate the effectiveness of its optical mapping technique. A group at Rutgers University's Waksman Institute in Piscataway, New Jersey, will link up with other U.S. labs working on chromosome 10.

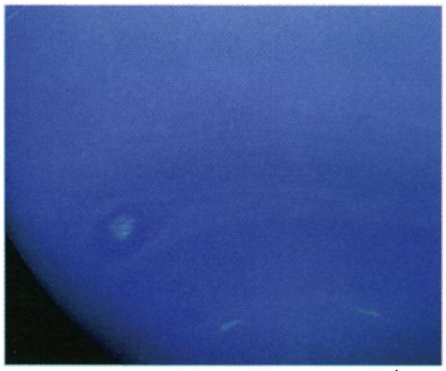
Even with the additional resources, though, Sasaki says "[he] can't promise" to complete the sequencing by 2004. For one, although groups in Canada and the United Kingdom have indicated an interest in sequencing, their governments have not yet committed money. And outside China and Japan, the other Asian groups are expected to contribute minimal amounts of sequence data because their genomics efforts are just getting off the ground. Even China's effort comes with a proviso: Its scientists are sequencing a different rice cultivar from the Nipponbare used by the rest of the international collaboration. –DENNIS NORMILE

PLANETARY SCIENCE

Neptune May Crush Methane Into Diamonds

Diamonds might become as cheap as coal if miners could ever plumb the hellish interiors of Neptune and Uranus. Laboratory researchers are now creating tiny bits of those interiors, where heat and pressure can be far more intense than in the depths of Earth. They are finding, among other surprises, tiny flecks of diamond.

On page 100 of this issue of *Science*, mineral physicist Robin Benedetti of the University of California, Berkeley, and her colleagues report that methane—a major constituent of Neptune and Uranus's deep interiors—decomposes far more easily than predicted when it is heated and squeezed in the laboratory. That decomposition, which produces diamonds and complex organic matter, could have altered the chemical composition and internal churning of those planets. "This is an exciting piece of work," says mineral physicist Russell Hemley of the Carnegie Institution of Washington's Geophysical Laboratory, "because it shows the promise of this sort of experiment in



Diamonds in the sky. Neptune's heat and pressure may forge them.

studying planetary interiors."

Experimentalists have only recently started exploring the highly fluid interiors of the gas giants—Jupiter, Saturn, Uranus, and Neptune. They first squeezed the hydrogen that makes up the bulk of such bodies to see when it might turn into a liquid metal (*Science*, 22 March 1996, p. 1667). Now they're working on methane, which becomes a prominent constituent of Neptune deeper than 4000 kilometers below the planet's visible cloud tops. Benedetti and her colleagues sealed liquid methane between the tips of two gem-quality diamond "anvils" and squeezed them together to raise the pressure as high as 50 gigapascals (GPa, equal to 500,000 atmospheres). Then they shot a laser through the diamonds and the sample until the temperature of the methane rose as high as 3000 kelvin. Under such extreme conditions, equivalent to those as deep as 7000 kilometers below Neptune's cloud tops, the methane decomposed into two identifiable forms of carbon—diamond crystals about 10 micrometers in size and complex, polymerized organic matter.

Theorists had suggested that diamonds might form in Uranus and Neptune, but only toward the center of the planets, above a pressure of 300 GPa. The shallower level for diamond formation is a surprise, says Hemley, and it means that far more of the interior could be producing a girl's best friend, with proportionately greater effects on the planet as a whole. Being denser than the fluid from which they formed, diamonds would sink, releasing heat from their store of potential energy. That heat would help churn the interior, perhaps boosting Neptune's magnetic field, which is driven by such convection. It might also add to the heat seen escaping the planet.

Methane might also be breaking down at depths even shallower than those at which diamond forms, producing byproducts such as light hydrocarbons that telescopes and spacecraft might detect. In other diamond-anvil experiments, mineral physicist Thomas Schindelbeck and his Geophysical Laboratory colleagues found that methane is unstable at just 7 GPa and 2000 kelvin. From such shallow depths, decomposition products such as ethane could waft up to the visible cloud tops—fumes from the hell a few thousand kilometers down.

The new diamond-anvil results are reminding researchers to take a critical look at the textbook picture of gas giants as being neatly subdivided into layers of unchanging composition. "One needs to take into account high-pressure chemistry in understanding the icy planets like Uranus and Neptune," says Hemley—not that the experiments so far give a complete chemical picture of the planets' innards. "The real Neptune is a more complicated soup of chemical molecules" than experimentalists have cooked up in their first tentative forays, says planetary scientist William Hubbard of the University of Arizona, Tucson. There's water mixed in with the methane, he notes, as well as hydrogen. Either one might affect reactions in the planet's interior. So recreating the depths of hell on Neptune and other planets will take a while longer. –RICHARD A. KERR

NEUROSCIENCE

India Creates Novel Brain Research Center

NEW DELHI—India is hoping to break into the front ranks of neuroscience with a new National Brain Research Center (NBRC) that opens here this week. The venture hopes to capitalize on India's large population and on a pool of talent now scattered around the world: Indian researchers now working abroad are expected to fill most of the 12 new scientific slots, working in areas ranging from developmental and computational neurobiology to the effects of malnutrition on the brain.

The center, funded by the Department of Biotechnology, will be devoted to basic research. "It will be a state-of-the-art institute ... and will have no clinical facilities attached to it," says Manju Sharma, a botanist and secretary of the biotechnology department, adding that the center will serve "as a national apex for brain research." In another unusual twist, half of its $4 million budget over the next 3 years will be earmarked for extramural research, including scientists at labs funded by other

Smart move. India's Manju Sharma announces "state-of-the-art" facility for brain science.

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