Charon formed in a tremendous interplanetary collision.

Most astronomers think that our own moon formed when a passing chunk of rock collided with Earth, knocking huge pieces of its surface rock into orbit, which later coalesced to form the moon. Because the surface rocks that formed the moon have a different composition from the rest of the planet, the two bodies should have a marked difference in elemental composition—and that's just what geochemists find. Astronomers have speculated that Charon—which was discovered in 1978, is about half the size of Pluto, and orbits its parent about once a week—also formed in a catastrophic impact. But although the spectrum of sunlight reflected from both objects has shown that they harbor molecules like ice and methane, Pluto and Charon are so faint and close together that astronomers couldn't always tell which elements are on which celestial body.

A team of astronomers led by Ryosuke Nakamura at the 8.3-meter Subaru Telescope took advantage of exceptionally good atmospheric conditions on 9 June to snap the first ground-based telescope image that shows Pluto and Charon as separate bodies. Nakamura's team produced spectra from the two bodies that showed differences in composition known from earlier measurements: Pluto is covered in nitrogen ice, while Charon is coated with water ice. The spectra also revealed small amounts of ethane on Pluto, but not on Charon.

Astrophysicist Alan Stern of the Southwest Research Institute in Boulder, Colorado, says the detection of ethane "is a nice confirmation of theoretical predictions" that the compound would be found on Pluto, either left over from the solar system's formation or formed by sunlight-driven reactions. But it is probably too early to decide how Charon formed. "Right now I'd probably come down on the side of the impact hypothesis," says University of Hawaii, Manoa, astronomer Dave Tholen, "but more data will be necessary to try and tip the scales." Nakamura's team will be returning to gather those data in the near future, after the telescope has been adapted to better correct for atmospheric blurring. **–MARK SINCELL**

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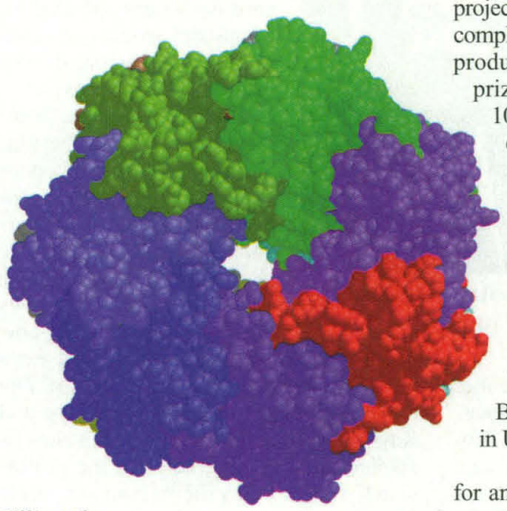
SYNCHROTRON RADIATION

NIH to Help Fund Big Physics Facilities

The National Institutes of Health (NIH) is getting into the synchrotron hardware business. Last week, NIH officials announced plans to spend $18 million this year to help pay for upgrades at California- and New York–based synchrotrons, which ricochet powerful beams of x-rays off materials to determine their atomic structure. NIH officials say they hope the money will help meet the burgeoning demand for "beamtime" among biologists looking to reveal the cell's secrets on the atomic scale.



Filling the gap. NIH funding should speed up work on determining such structures as ClpP proteasome.

The new money pales in comparison to the nearly $175 million that the Department of Energy (DOE) spends every year to operate the nation's four principal synchrotrons. Still, NIH's new direction is "tremendously significant," says Keith Hodgson, who heads the Stanford Synchrotron Radiation Laboratory (SSRL) in Menlo Park, California. A 1997 DOE advisory panel strongly backed a series of synchrotron upgrades (*Science*, 17 October 1997, p. 377). But the increasingly cash-strapped DOE has had a difficult time coming up with the extra money. "Given the difficult budget climate at DOE, I think the [upgrades] would have been difficult to pull off," says Hodgson.

NIH's support for the facilities comes in response to the mushrooming demand among biologists for access to the stadium-sized machines. According to a recent DOE advisory committee report, biologists have grown from about 5% of all synchrotron users in 1990 to nearly one-third in 1997. Among protein crystallographers, the growth is even more rapid: The number of protein structures solved with the help of synchrotron x-rays jumped from 16% to 40% in just 5 years. With the genome project churning out new protein sequences by the hundreds, demand is only projected to grow. "We said we have to do something about this," says Marvin Cassman, who heads the National Institute of General Medical Sciences in Bethesda, Maryland.

The first part of that something—$14 million of the $18 million of NIH funds—will kick off a $53 million upgrade of the central electron storage ring at SSRL, a project expected to take almost 4 years. When complete in 2002, the upgraded ring, which produces the tightly focused x-ray beams prized by users, is expected to generate 10 to 100 times its current x-ray power, enough to boost the facility from a "second-generation" to a "third-generation" machine. That newfound power will enable researchers to collect data faster and study smaller protein crystals than they can now, says Hodgson. NIH's other $4 million will support new x-ray detectors and storage ring improvements at the National Synchrotron Light Source at Brookhaven National Laboratory (BNL) in Upton, New York.

Although NIH has long helped pay for analytical equipment used by biological user groups at synchrotrons, the new money marks the first time the biomedical agency has paid for general capital improvements at any of the facilities. But DOE physicist Bill Oosterhuis notes that the new upgrades will benefit more than just biologists. "Most of the improvements will improve the quality of the x-ray beams for all the scientists," he says. **–ROBERT F. SERVICE**

EMBRYO RESEARCH

Stem Cells as Potential Nerve Therapy

Last November, U.S.–based researchers announced, with much fanfare, that they had isolated an "immortal" line of human embryonic stem cells—a type of universal cell extracted from an embryo, which can, in the right environment, transform itself into any type of human tissue (*Science*, 6 November 1998, p. 1014). The press was soon full of predictions that researchers would be able to grow new tissue, or even organs, from these cells for transplantation into sick people. Already, evidence that such therapies may be possible is emerging.

The best example so far comes from Oliver Brüstle of the University of Bonn Medical Center and his U.S. colleagues. On page 754, they report that they've taken embryonic stem (ES) cells from mice and coaxed them to form glial cells, a type of support cell in the brain that also produces myelin, an insulating sheath for neurons. When the researchers injected the glial cells into the spinal cords of rats with a genetic defect that leaves them unable to make myelin, the glia soon got to work coating the rats' neurons with myelin. "Our myelination experiments are a first example of an appli-

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