# Astronomy

## Kuiper belt object shows hint of activity

Locked in the deep freeze of the outer solar system, residents of a reservoir of comets are thought to have changed little since the birth of the solar system 4.5 billion years ago.

New observations may overturn that view. Studying four of the brightest members of this reservoir, called the Kuiper belt, researchers have found tentative evidence that one of the objects has vented enough gas and dust to generate an atmosphere, or coma.

Last year, Alan Fitzsimmons of Queen's University of Belfast, Northern Ireland, and his colleagues used the Hubble Space Telescope to take images of the Kuiper belt object 1994TB, which currently lies some 30 times farther from the sun than Earth does. Edel Fletcher of Queen's University showed the images last month at a workshop at the European Southern Observatory in Garching, Germany.

Researchers need to do further analysis to verify that the slight brightening above part of the comet's surface is truly a coma and not an artifact, Fitzsimmons emphasizes. If the finding holds up, it would mark the first time that astronomers have witnessed activity in an object so far from the sun.

"It's awfully hard to determine whether you can really see a coma" around such a distant object, notes Brian G. Marsden, who studies comets at the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass.

Although the evidence so far is inconclusive, Marsden and other scientists say they're intrigued by the possibility that an object residing in a region where the temperature is only about 30 kelvins could vent gas and dust. Astronomers have observed material venting from comets at about two-thirds of 1994TB's distance from the sun. Those comets were traveling outward from the inner solar system, and residual heat from the sun could have powered their distant outbursts. In contrast, 1994TB ventures no closer to the sun than its current distance.

Tobias C. Owen of the University of Hawaii in Honolulu notes that highly volatile gases, such as molecular nitrogen and methane, can become trapped within the ice grains that formed the Kuiper belt objects. Even a small amount of heat, generated perhaps by collisions between objects in the belt, could unleash the gases, blowing out dust and generating a coma.

The behavior of 1994TB may broadly resemble that of Pluto, which has a nitrogen-rich atmosphere and is considered by some scientists to be a large member of the Kuiper belt. The Hubble images, says Owen, "open new vistas, inviting verification [of the coma] and testing on other objects." —*R.C.*

## X-ray observatory calls it quits

After an 8-year mission in which it generated an X-ray map of the entire sky and recorded high-energy radiation from objects as far away as quasars and as close as the moon and comets, the German-British-U.S. satellite ROSAT has closed up shop. ROSAT officials announced their decision Nov. 3, after determining that the observatory's only functioning X-ray camera had suffered irreversible damage when the satellite pointed too close to the sun on Sept. 20. The accident occurred following the failure of the satellite's X-ray star-tracker system last April.

ROSAT was equipped with three X-ray cameras. Two of the devices were position-sensitive proportional counters. One of these was damaged in 1991 by overexposure to the sun. The remaining counter, which detects X rays by recording their interaction with gas molecules, has run out of gas.

Unlike the X-ray cameras, ROSAT's wide-field camera, which images objects in the extreme ultraviolet, still functions. However, it has lost sensitivity, and the operating agencies agreed that it was not worthwhile to continue the mission with only this device working, says Robert Petre of NASA's Goddard Space Flight Center in Greenbelt, Md. —*R.C.*

# Biology

## Paternity study ties Jefferson to slave

It's a story of sex, DNA testing, and a president's scandalous behavior that makes headlines everywhere. No, not Bill and Monica—that's old news. This tale, even older news in a way, concerns the long-rumored, but never proven, relationship between Thomas Jefferson and Sally Hemings, one of his slaves. A study of Y chromosomes belonging to descendants of both strongly indicates that Jefferson did father at least one of Hemings' children, although not the one most people had suspected.

Jefferson, the third U.S. president, was accused in 1802 of fathering Thomas Woodson, Hemings' first son. Many historians have dismissed this possibility, in large part due to Jefferson's vocal criticism of racial mixing. Descendants of Woodson and those of another of Hemings' sons, named Eston Hemings Jefferson, have nevertheless continued to claim Jefferson as an ancestor.

Eugene A. Foster, a retired pathologist in Charlottesville, Va., decided to bring modern science to this historical controversy. Since the president had no acknowledged sons, Foster collected DNA samples from male descendants of Field Jefferson, the paternal uncle of the president. Descendants of Woodson and Eston Jefferson also volunteered DNA. Foster then enlisted geneticists in England and the Netherlands to study the Y chromosome of each descendant. Since the Y passes relatively unchanged from father to son, scientists can compare its DNA sequences to gauge whether men are related.

The descendants of Field Jefferson shared enough genetic markers with those of Eston Jefferson, but not those of Woodson, to convince Foster and his colleagues that the chromosomal similarity was probably not due to chance. In the Nov. 5 NATURE, they conclude that "the simplest and most probable explanations for our molecular findings are that Thomas Jefferson . . . was the father of Eston Hemings Jefferson, and that Thomas Woodson was not Thomas Jefferson's son."

While this conclusion prompted many media reports that the DNA analysis offered absolute proof of a liaison between the president and his slave, Foster and his colleagues carefully acknowledged the limitations of their study. "We cannot completely rule out other explanations of our findings based on illegitimacy in various lines of descent. For example, a male-line descendant of Field Jefferson could possibly have illegitimately fathered an ancestor of the presumed male-line descendant of Eston," they noted. —*J.T.*

## Shining light on a clock's proteins

Sunlight defines day and night, and in so doing helps govern the daily activities of plants and animals. Built-in timepieces let plants and animals keep track of the day, but light continually adjusts these biological clocks to keep them accurate. The light-detecting molecules employed by such clocks have remained elusive, however.

Recently, investigators began to suspect that proteins called cryptochromes were the long-sought photoreceptors (SN: 7/11/98, p. 24). Three new reports confirm that suspicion. Together with other proteins that sense red light, cryptochromes that detect blue light govern the daily, or circadian, responses of the weed *Arabidopsis thaliana*, David E. Somers of the Scripps Research Institute in La Jolla, Calif., and his colleagues report in the Nov. 20 SCIENCE. In the Nov. 25 CELL, researchers led by Jeffrey C. Hall and Michael Rosbash of Brandeis University in Waltham, Mass., offer evidence that fruit flies with mutations in a cryptochrome gene have altered circadian rhythms. Finally, in the Nov. 20 SCIENCE, a research team headed by Aziz Sancar of the University of North Carolina School of Medicine in Chapel Hill reports that among other changes in mice lacking one of two mouse cryptochromes, their biological clocks run on a cycle 1 hour longer than those of normal mice. —*J.T.*