Distant Object Hints at the Kuiper Belt

What do astronomers do while waiting for their telescope to produce another snapshot of the night sky? David Jewitt and Jane X. Luu might have made coffee. Instead, they quickly scanned the first two images from the night's observations. To their astonishment, they found the most distant object ever imaged in the solar system – a slowly moving body in the deep freeze of space well beyond the orbits of Pluto and Neptune.

Further observations confirmed that on Aug. 30 the scientists had indeed detected a mysterious body that lies about 42 astronomical units (AU) from the sun, or 42 times the Earth-sun distance. Jewitt, of the University of Hawaii in Honolulu, and Luu, of the University of California, Berkeley, report their work in a Sept. 14 circular of the International Astronomical Union. The object's location (some 3.9 billion miles from the sun) corresponds to the inner reaches of the Kuiper belt, a proposed primordial reservoir of comets. Jewitt and Luu say that in identifying the distant body, dubbed 1992 QB1, they may well have found one of planetary science's Holy Grails: the first image of a resident of the belt.

This ring-shaped reservoir, hypothesized for several years, consists of primitive, icy bodies left over from the disk of material that formed the planets (SN: 4/21/90, p.248). Material ejected from the belt would include short-period comets that visit the inner solar system at least once every 200 years. While infrared observations have revealed extended rings of ice and dust surrounding other stars, notably Beta Pictoris, astronomers had no direct evidence of such a distant ring, or belt, orbiting the sun.

"It's a spectacular finding," says Alan Stern of the Southwest Research Institute in San Antonio, Texas. If the Kuiper belt association pans out, he adds, the observation will provide the first evidence for a "disk of comets grinding themselves down in our own solar system."

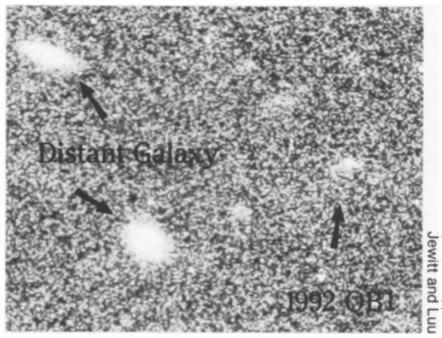
Stern notes that 1992 QB1 – with an estimated diameter of 240 kilometers, or some 20 times that of Comet Halley – matches expectations for the size of the first body found in the Kuiper belt. Although the belt would probably have a far more numerous population of smaller bodies, these would be too faint for a telescope to detect, he notes. At the other end of the scale, objects the size of Pluto – about 10 times bigger than 1992 QB1 – would appear much brighter but would occur much more rarely.

Jewitt emphasizes that because of the brightening moon, he and Luu have so far monitored the faint body for only three nights with the University of Hawaii's 2.2-meter telescope – not long enough to determine whether 1992 QB1 really belongs to the Kuiper belt. If it is indeed a member, then the slowly moving body should have a circular orbit.

But astronomers will have to study the object for two months before they can assess its orbit, Jewitt says. For now, an alternative possibility remains: Rather than circling the solar system at a fixed distance of about 42 AU, the body may have a parabolic orbit that will send it into the inner solar system sometime in the middle of the next century.

In that case, 1992 QB1 may have been ejected from a far more distant – and still hypothetical – reservoir of long-period comets called the Oort cloud. Given its current visibility so far from the sun, the body would likely become *the* comet of the 21st century, making a blazing debut as it passed the inner planets, speculates comet expert Brian G. Marsden of the Smithsonian Astrophysical Observatory in Cambridge, Mass.

But Marsden and others say further observations will probably show that 1992 QB1 does belong to the Kuiper belt. One shred of evidence, notes Jewitt, is the body's reddish color. This suggests that it has remained in the outer solar system for millions of years – long enough for galactic cosmic rays to bombard its surface and form a carbon-rich, tar-like skin that has not been altered by the sun's warming rays. (Two other large, relatively distant bodies – the comet Chiron and a recently discovered object nicknamed "Son of Chiron" (SN: 2/8/92, p.87) – also have a red appearance.)



1992 QB1, the most distant body ever imaged in the solar system.

In addition, 1992 QB1 moves nearly in line with Earth's orbital plane, an orientation consistent with the proposed location of the Kuiper belt.

Stern recalls that when he first heard about the discovery, some of his colleagues lamented that an old but tantalizing problem had been solved. But he views the finding differently, looking ahead to the 1995 launch of the European-built Infrared Space Observatory, which might actually glimpse the full Kuiper disk. Says Stern: "Now there's a whole new game in planetary science." *– R. Cowen*

Body temperature: Don't look for 98.6°F

In 1868, Carl Wunderlich published a seminal paper on body temperature in 25,000 adults. His more than 1 million measurements indicated that while temperatures of healthy individuals varied, they averaged 98.6°F (37°C). Texts on fever still cite Wunderlich's study, one of the few to investigate normal temperatures, and accept as dogma the 98.6°F average-body-temperature figure, notes Philip A. Mackowiak at the University of Maryland School of Medicine in Baltimore. However, his new data suggest the average should be 98.2°F.

Mackowiak's group measured oral body temperature digitally up to four times daily for three consecutive days in 148 volunteers. The healthy men and women ranged in age from 18 to 40.

Like Wunderlich, Mackowiak's team found that normal temperatures vary between individuals (by as much as 4.8°F) and even within individuals over the course of a day (by up to 1.09°F). However, the Baltimore group found that 98.6°F "was not the overall mean temperature, the mean temperature of any of the time periods studied, the median temperature, or the single most frequent temperature recorded." Indeed, they report in the Sept. 23/30 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, 98.6°F accounted for just 8 percent of their 700 readings.

Maximum normal temperatures varied from a 6 a.m. low of 98.9°F to a 4 p.m. high of 99.9°F. Though age did not appear to influence readings in this group, women tended to be about 0.3°F warmer than men, and blacks about 0.1°F warmer than whites. Mackowiak's team also observed a 2.44-beats-per-minute increase in heart rate with each 1°F rise in body temperature.

Mackowiak described Wunderlich's data collection as awesome, noting that thermometers then took 15 or 20 minutes to obtain temperatures and had to be read while still in place – the armpit. Today, however, physicians eschew such underarm readings because of their unreliability. *– J. Raloff*