Voyager 2 enters home stretch to Neptune

As Voyager 2 accelerates toward its Aug. 24 close encounter with Neptune, scientists gathering at the Jet Propulsion Laboratory control center in Pasadena, Calif., relish each new finding about the planet.

On Aug. 3, less than a week after researchers identified Neptune's third known satellite in the spacecraft's photos, Voyager officials announced the discovery of three more. The number had not grown by Aug. 8, but imaging team member Richard J. Terrile of the Jet Propulsion Lab noted that "we've seen more moons while we're still far away than we did at Uranus. Seeing these so far away means there are probably a lot more."

The three newest moons, temporarily known as 1989 N2, N3 and N4, follow nearly circular paths around the planet's equator and travel in the same direction as Neptune rotates. This makes Neptune's big moon Triton even more of an oddity: It travels backward, or retrograde, in an orbit tilted nearly 30° to the equator (see story, p.111).

Innermost of the new moons is 1989 N3, which circles the planet every 8 hours, 10 minutes, about 17,000 miles above Neptune's cloud tops. Next is 1989 N4, taking 10 hours, 20 minutes to orbit 23,200 miles out from the clouds. Most distant is 1989 N2, orbiting every 13 hours, 30 minutes, 30,000 miles out.

All three are close enough to Neptune to pass through the partial "arcs" thought by some to encircle the planet (SN: 8/5/89, p.87). Researchers have proposed that such moons may play an important role in gravitationally holding the arcs in position. As of Aug. 8, however, Voyager 2 had failed to detect any arcs.

Scientists analyzing Voyager 2 photos of Triton report it possesses a substantial amount of "limb darkening," a darker appearance near its edges than near the center of the disk. But it remains unclear whether this indicates overlying haze or a surface similar to those of the brighter satellites of Saturn.

Compared with the cloud features of other giant planets, Neptune's look most like those of Jupiter, says Andrew P. Ingersoll of the California Institute of Technology in Pasadena. As on Jupiter, Saturn and Uranus, the winds of Neptune seem to blow in horizontal bands whose speeds correlate with latitude.

By Aug. 8, the spacecraft had found no signs of Neptunian radio emissions or other evidence that the planet has a magnetic field. *– J. Eberhart*

Baby bee odor lures cradle-robbing mites

French researchers have identified a compound tempting to a troublesome bee parasite. One whiff of this scent, emitted by honeybee larvae, sends a female bee mite scurrying toward it. The team suggests the chemical "could become the basis of new approaches" to controlling the tiny pest.

When female mites finish dining on an adult bee, they follow their "noses" to a honeycomb cell housing a bee larva, preferably a drone (male). There they find male mites, which spend their entire lives in the cells. The mites mate, and both adults and offspring feed on the body fluids of the bee larva. Feeding mites disrupt the larva's growth, sometimes sucking it dry and killing it. And in adult bees, mite bites invite secondary viral infections.

Researchers hold the mite responsible for the loss of hundreds of thousands of hives in Europe and Asia. It has yet to cause significant damage in the United States, where it first appeared in 1987. U.S. beekeepers control the intruders with pesticides, but biologists worry the species might develop resistance.

The mite, *Varroa jacobsoni*, attacks worker bees as well as drones of the *Apis mellifera* species, commonly called the European honeybee. Some researchers question whether the compound would serve as an effective bait to trap mites. Bee experts agree, however, that chemical baits hold promise.

The French team made extracts from whole drone and worker larvae and identified 10 potential attractants in them. They then placed female bee mites in the center of an X-shaped chamber. Each arm of the chamber wafted either plain air or one of three types of fragrance sources: live drone larvae, the larval extracts or commercial versions of the 10 compounds. Testing each mite individually and observing which arm it entered, the researchers found that plain air and seven of the compounds held no attraction. Many mites homed in on the live drone larvae and the extracts, preferring drone over worker extract. But the winner was an ester called methyl palmitate, the team reports in the Aug. 11 SCIENCE.

While the researchers have yet to field-test the alluring ester, they have set simple traps in laboratory hives, says coauthor Guy Ourisson of the Institut de Chimie des Substances Naturelles, in Gif-sur-Yvette. "A piece of blotting paper impregnated [with methyl palmitate] and placed at the bottom of the beehive will attract mites," he told SCIENCE NEWS. *– S. Hart*

Chilling an atom in solitary confinement

Just as human behavior can turn into a soap opera as the number of participants increases, atom behavior gets more complicated as the atomic crowd grows. Seeking a clearer understanding of how atoms behave, some scientists isolate individual atoms and try to calm their normally dizzying motions to a standstill (SN: 6/21/86, p.388).

Isolating atoms and rendering them motionless might lead to more precise atomic clocks and better satellite navigational systems, researchers say.

Physicists at the University of Washington in Seattle now propose a way of isolating electrically charged barium atoms and completely stopping the frenetic twirls and vibrations these ions normally perform at room temperature and pressure. Eventually, they hope to monitor how stilled, solitary atoms respond to probes such as precise jolts of energy from lasers.

So far the group has succeeded in isolating single ions for up to four days but has yet to cool them to a motionless state, says Warren Nagourney, who works on the project with Hans Dehmelt and Nan Yu. As the barium ion relaxes to lower energy states, it emits photons in the visible region of the electromagnetic spectrum. "You can see the atom blinking," notes Nagourney, who describes the experiment in the August PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES (Vol.86, No.15).

Earlier this year, four other physicists became the first to trap single mercury ions and cool them in this way to about 50 millionths of a kelvin above absolute zero, the coldest and stillest an atom can be. "These [two] experiments are very similar," says David J. Wineland, who led the effort at the National Institute of Standards and Technology in Boulder, Colo.

Nagourney concurs but says his group will use a modified ion trap (now undergoing initial tests), which cancels stray electrical fields that otherwise gently jostle a confined atom, and a novel method of verifying that the trapped ion actually cools to absolute zero.

Both teams use an electric field oscillating at radio frequencies to trap individual ions within a metal loop enclosed in a near-perfect vacuum. In a back-of-the-envelope calculation, Nagourney estimates that the distance between the confined ion and atoms outside the loop is analogous to the distance between a person in Boston and one in Washington, D.C. Even so, the ion performs a lively dance, which scientists quell with a laser that makes the ion absorb and reemit photons, each of which carries away a bit of the ion's energy (SN: 7/23/88, p.52). *– I. Amato*