Astronomy

A moon for Dionysus

Dionysus, the hard-partying god of wine in Greek mythology, never lacked for a companion. Dionysus, the near-Earth asteroid, also has a partner in its wanderings. Astronomers have found evidence that the rocky body formally dubbed 3671 Dionysus has a moon of its own. Although several other asteroids are suspected of having a companion, this represents only the second confirmed case of such a phenomenon.

Scientists working at the European Southern Observatory's La Silla Observatory in La Serena, Chile, made the discovery while monitoring fluctuations in the amount of sunlight reflected from the surface of Dionysus. They expected to see small, periodic fluctuations associated with the asteroid's rotation and irregular shape. Stefano Mottola and Gerhard Hahn of the German Aerospace Research Establishment in Berlin were puzzled by an additional dip in reflectivity. The discovery suggested that an unseen body had moved in front of the asteroid, eclipsing some of the reflected sunlight at precise intervals.

The team successfully predicted the next time they should see such an eclipse. In addition, astronomers Petr Pravec and Lenka Sarounova of the Ondrejov Observatory near Prague recorded another eclipse of Dionysus.

The European Southern Observatory announced the finding in late July, and astronomers plan to continue observations through December, when Dionysus will no longer be visible in the southern sky. Discovered in 1984, the asteroid passes relatively close to Earth once every 13 years; its most recent such approach occurred July 6. Bad weather on Earth prevented follow-up observations in August and early September. However, newly reported analyses of earlier data suggest that the moon has a diameter of about 0.5 kilometer, roughly half the size of tiny Dionysus, and that it orbits the asteroid from a distance of just a few kilometers, Hahn told SCIENCE NEWS.

In contrast, the moon known as Dactyl, which the Galileo spacecraft discovered and photographed when it flew past asteroid 243 Ida in 1993, measures about 1.5 km, or only one-fortieth the diameter of Ida. —*R.C.*

Water among the outer planets

Often dubbed the European Space Agency's answer to the Hubble Space Telescope, the Infrared Space Observatory (ISO) spends much of its time studying dying stars in the Milky Way and emissions from galaxies lying far beyond it (SN: 3/16/96, p. 168). The Earth-orbiting observatory also casts its eye closer to home. Recently, ISO measured the concentration of water vapor in the atmospheres of Saturn, Uranus, and Neptune.

Water vapor there is about one-thousandth the concentration in Earth's atmosphere, report H. Feuchtgruber of the Max Planck Institute for Extraterrestrial Physics in Garching, Germany, and his colleagues in the Sept. 11 NATURE.

Donald M. Hunten of the University of Arizona in Tucson notes that the measured concentrations do not exceed 20 parts per billion. Hunten, who was not involved in the study, adds that the measurements appear to be at odds with an 11-year-old theory, recently bolstered by new data, that thousands of small, house-size comets pelt Earth each day. These icy bodies, as yet unseen, could have delivered enough water to account for Earth's oceans (SN: 8/23/97, p. 117).

All comets are thought to originate in the deep freeze of the outer solar system. Thus, the number of house-size bodies per unit area bombarding the outer planets should far exceed the number reaching Earth. The amount of water delivered to the outer planets should be correspondingly greater. However, the water vapor recorded by ISO is only one ten-thousandth the concentration that would be expected if the proposed population of these comets were delivering the molecule, Hunten says. —*R.C.*

Biology

Spiders spurn firefly femmes fatales

Just in time for the end of summer and firefly season comes news that the light show can be part of a bait-and-kill strategy that ultimately wards off spiders. The elaborate ruse is the work of females of one firefly genus, *Photuris*. They can flash in a pattern that attracts males of another genus, *Photinus*. When a male comes calling, expecting to mate, the female quickly devours it.

Entomologists have known for decades about these femmes fatales and have regarded their behavior as simply a macabre method of feeding. Now, Thomas Eisner of Cornell University and his colleagues show that in addition to a meal, the female gets a dose of a chemical that repels spiders and even birds.

After female *Photuris* fireflies ate *Photinus* males offered to them in the laboratory, their blood registered significant amounts of lucibufagins, steroids similar to the venom of *Bufo* toads. Unfed females had little of these compounds. When jumping spiders were offered unfed females, the spiders feasted, but they dropped females that had downed a *Photinus* male. Similarly, females collected from the wild were left alone when they had high concentrations of lucibufagins. The fireflies' invulnerability "proved to be a remarkably precise correlate" of their lucibufagin content, the researchers report in the Sept. 2 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES.

A jumping spider preys on a defenseless firefly that had not ingested lucibufagins.

It's common for insects to sponge defensive chemicals from others, the researchers conclude, but the "aggressive mimicry" of the *Photuris* firefly sets it apart. In just a few days, a single female in the lab could eat as many as six males. —*C.M.*

The burden of bee-ing an undertaker

It's a dirty job, but some bee's got to do it.

Entomologist Gene E. Robinson and his colleagues at the University of Illinois at Urbana-Champaign say that bees which serve as undertakers—removing dead bees from the hive—appear to be a distinct cadre of developmentally advanced, midcareer workers. Undertaker bees, which make up only 1 percent of the population at any time, perform their thankless function for only a day or so, then move on to foraging before their peers do, the researchers report in the September BEHAVIORAL ECOLOGY AND SOCIOBIOLOGY.

The study provides the first close look at the undertaker bee's lot in life. The scientists identified the undertakers, marked them with colored, numbered plastic tags, and monitored their development.

Like most advanced social insects, bees display temporal polyethism, a tendency to perform different sets of tasks at different ages. In general, young bees work near the center of the hive. Middle-aged bees, those 14 to 24 days past the pupa stage, keep busy near the hive's periphery, building honeycomb, storing food, and, for some, dragging out bodies. Older bees work outside the hive, mainly as foragers. Former undertakers begin foraging 2 or 3 days ahead of other bees.

Robinson's earlier work showed that some bees are genetically inclined to serve as undertakers. He also found that some undertakers are less efficient than others and their performance doesn't seem to get better with experience. —*S.P.*