

Astronomy

Ron Cowen reports from Berkeley, Calif., at a meeting of the American Astronomical Society

A comet's fiery finale

Broken into some 20 icy fragments that line up like pearls on a string, Comet Shoemaker-Levy has dazzled astronomers ever since its discovery in late March (SN: 4/10/93, p.231). But its expected demise next year promises to be even more spectacular: a fiery death in Jupiter's atmosphere that could release as much energy as a billion megatons of TNT.

Researchers say they are now certain that last July, Jupiter's gravity tore apart the comet, which is currently about 49.5 million kilometers from the center of the giant planet. Moreover, the fragments have a velocity just under that needed to escape the planet's tug. So, on or about July 22, 1994, scientists calculate, the fragments of Shoemaker-Levy will likely crash into the Jovian atmosphere at a speed of 60 kilometers per second. If the biggest pieces measure about 10 kilometers across, they may create a cataclysm so powerful it would rival the impact suspected of wiping out the dinosaurs on Earth, reports one of the comet's discoverers, Eugene M. Shoemaker of the U.S. Geological Survey in Flagstaff, Ariz.

Alas, notes Shoemaker, next July's Jovian fireworks won't be seen from Earth, since the comet's fragments are expected to strike the planet's nightside. However, the sites of impact — thought to lie in Jupiter's southern hemisphere — should rotate into view a few hours later.

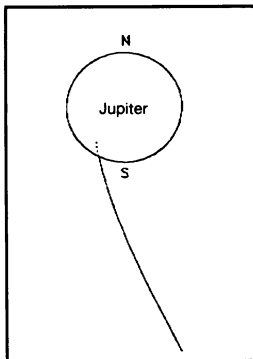
Zdenek Sekanina, a comet specialist at the Jet Propulsion Laboratory (JPL) in Pasadena, Calif., says dust created by the explosions could temporarily increase the amount of sunlight reflected from Jupiter's atmosphere, an effect perhaps detectable from Earth. He likens the phenomenon to the increase in nighttime brightness reported soon after an unidentified body, now known as the Tunguska object, struck Siberia in 1908.

Writing in the June 10 NATURE, Clark R. Chapman of the Planetary Science Institute in Tucson notes that the amount of sunlight reflected from Jupiter's moons may also increase after Comet Shoemaker-Levy's fiery finale. But he adds that Jupiter's cloudy atmosphere might prevent researchers from glimpsing such an increase. Other scientists suggest that the explosion could create a lasting disturbance, similar to the planet's Great Red Spot.

Paul Chodas and Donald K. Yeomans of the JPL calculate that the comet will approach within 38,000 kilometers of Jupiter's center of mass — well within the 75,000-kilometer radius of this gaseous planet. In fact, notes Chodas, the fragments will burn up long before they reach that depth. Sekanina estimates that massive fragments will burn up a few kilometers below the visible cloud tops of Jupiter, while lighter fragments might disintegrate 100 kilometers or so above.

Using different coordinates for the position of Jupiter, Brian G. Marsden of the Smithsonian Astrophysical Observatory (SAO) in Cambridge, Mass., calculates that the comet will enter the Jovian atmosphere closer to July 25 and that its orbit will take it in within 45,000 kilometers of the planet's center. Marsden agrees that the comet will hit on Jupiter's nightside. Another comet researcher, Andrea Carusi of the Istituto di Astrofisica Spaziale in Rome, Italy, concurs.

Chodas says he is "more than 95 percent certain" that Shoemaker-Levy will plunge into Jupiter. Says Gareth Williams, who works with Marsden at the SAO: "It's very unusual to have such agreement between these groups of researchers."



Predicted path of Comet Shoemaker-Levy as it plunges into Jupiter's nightside next year.

Biology

Elizabeth Pennisi reports from Tempe, Ariz., at the annual meeting of the Society for Conservation Biology

Heavy cougar traffic at city edges

Many southern Californians would be surprised to learn that they live within striking distance of mountain lions.

Between 1988 and 1993, wildlife biologist Paul Beier placed radio transmitters on 32 cougars, including nine young animals, living in the Santa Ana Mountains east of Anaheim. Juveniles leave their mothers around 18 months of age to seek out their own turf, which can cover up to 200 square miles, says Beier. His radio tracking revealed that this leads them to the edges of the wilderness. There, they explore the urban boundaries until they find "corridors," narrow strips of seminatural habitat that connect the Santa Ana Mountains with other undeveloped environments. These corridors include, for example, a freeway underpass that leads into a stable, says Beier, now at Northern Arizona University in Flagstaff.

Five of the cougars used such corridors, he reports. One animal crossed under a highway 22 times; another lived temporarily in a 4-mile stretch "basically within a stone's throw of thousands of homes," Beier says. Yet people reported only three sightings of these cats during the study period.

Beier says his work shows that animals immigrate through corridors, which can help reduce the threat of extinction.

What is biodiversity, anyway?

Despite its use in headlines and despite a recent international convention on the issue (SN: 5/8/93, p.303), biodiversity remains an enigma for many. In April, telephone interviews with 1,209 randomly selected adults in the continental United States revealed that 73 percent were unfamiliar with the notion of the loss of biological diversity. The idea was new even to many of the 210 additional interviewees who belonged to environmental organizations, reports Stephen R. Kellert, a social ecologist at Yale University.

Moreover, very few people connected the destruction of habitat with the loss of species. Instead, most blamed pollution and the overexploitation of natural resources, says Kellert.

During the 25-minute interviews, researchers assessed people's attitudes toward and knowledge of biodiversity and explained the concept to those unfamiliar with it. Defenders of Wildlife, based in Washington, D.C., sponsored the survey.

Of late, many advocates for preserving biodiversity have stressed its potential economic value for agriculture and medicine. But ethical concerns — a desire to preserve species for future generations and a sense of obligation to save species because of their ecological roles — ranked much higher among those interviewed. "I think we tend to overestimate the importance of economic value," Kellert says.

Concerned with how few people understand biodiversity, Rodger Schlickeisen, president of Defenders of Wildlife, suggests replacing "biodiversity" with a more jarring descriptor on par with "acid rain" or "global warming." Two possibilities he's come up with: "biocrisis" and "extinction crisis."

Mild-mannered rattlers leave people alone

Some rattlers prefer to lie low rather than rattle and attack, and thus pose less of a threat than most people realize, conclude two wildlife biologists who conducted field experiments in which they walked by and hopped over the snakes.

Kent A. Prior and Patrick J. Weatherhead of Carleton University in Ottawa, Ontario, inserted temperature sensors and radio tags into a dozen eastern massasauga rattlesnakes to monitor their movements through a national park in Ontario. During that summer, the team located some snakes every few days and either walked within 2 feet of the coiled animals, sometimes pausing for 30 seconds, or stepped over them. The snakes rattled in only 60 percent of the encounters and never tried to strike during these disturbances, says Prior.