

Postmortem of a cometary suicide

Don Yeomans

Impact Jupiter: The Crash of Comet Shoemaker-Levy 9. By David H. Levy. *Plenum*: 1995. Pp. 290. \$25.95, £20.76.

The Great Comet Crash: The Collision of Comet Shoemaker-Levy 9 and Jupiter. Edited by John R. Spencer and Jacqueline Mitton. *Cambridge University Press*: 1995. Pp. 118. £16.95, \$24.95.

RECENT estimates suggest that a comet is captured by, and collides with, Jupiter once every several thousand years. What extraordinary luck that it happened on our watch in July 1994. It seems likely that comet Shoemaker-Levy 9 was captured by Jupiter around 1929 and spent several years in chaotic orbits about the



SPL/Clark, Pryor, et al., McDonald Observatory

Infrared images of the collision of comet Shoemaker-Levy 9 with Jupiter, made at the McDonald Observatory, Texas.

planet. In July 1992, the comet passed very close to Jupiter's surface, whereupon the planet's tidal forces split the comet into several fragments. After one final two-year orbit, all the comet's fragments collided with Jupiter during the week of 16-22 July 1994. Fortunately, the comet was discovered in March 1993 by Gene and Carolyn Shoemaker and David Levy, allowing the astronomical community 16 months to prepare for the impact events.

David Levy has provided his personal account of the discovery of this extraordinary comet and the events and circumstances that swept him and the Shoemakers into the media limelight for several months. Their frenzied activities included several press conferences and meetings with the president and vice-

president of the United States. Designed for the general reader, Levy's book is a well-illustrated account of the comet's discovery, the events leading up to the collision events and a summary of the scientific consensus resulting from the impacts themselves. In characteristically lucid and entertaining style, Levy presents the reader with his reminiscences and anecdotes, interesting historical background items and an overall outline of what was expected and what actually transpired.

Many in the scientific community predicted that the impacts would fizzle; and, in the unlikely event that the various impact sites would be visible on the surface of Jupiter, that they would be white and observable only with the largest telescopes. The actual impacts were far from the expected fizzle. Although they were most dramatic at infrared wavelengths rather than in the visible region, the energies of the fragment collisions dwarfed any terrestrial nuclear explosions and the resulting black scars on Jupiter were easily observable with modest amateur telescopes. Each impact happened just behind the visible limb of Jupiter but the camera system on board the Galileo spacecraft, which was on its way to a Jupiter encounter in December 1995, was in a position to see several of the hits directly.

For a more in-depth treatment of the scientific issues surrounding the collision of Shoemaker-Levy 9 with Jupiter, readers should turn to the work edited by John Spencer and Jacqueline Mitton. Each chapter is written by an expert in the field, and although there is some overlap among the chapters, the book presents a comprehensive review of the discovery observations, as well as the pre-crash observing plans and post-crash results. The volume is well written and handsomely illustrated with images from ground-based telescopes, the Galileo spacecraft and the Hubble Space Telescope (which had recently had its optical system repaired).

There are readable summaries of what was learned about Jupiter's atmosphere and the comet itself. The existing models of Jupiter's atmosphere seem fairly accurate but the current model of the comet's nucleus has been called into question. Rather than its being a single body of ice and rock that the low-resolution images of comet Halley seemed to reveal, the tidal break-up of Shoemaker-Levy 9

suggests that this comet, and perhaps others as well, was an extremely fragile body with sizeable kilometre- or sub-kilometre-sized fragments of dust, rock and ice. At the time of the break-up in 1992, all of the fragments were bound to one another with little more than self-gravity. Perhaps this comet spent its first 4.5 billion years since the origin of the Solar System gradually losing the ice that initially glued the various fragments together. Toward the end of its lifetime, the suicidal comet was reduced to a feeble collection of fragments that had the misfortune to plunge into Jupiter's atmosphere.

In Levy's book, Gene Shoemaker is quoted as saying: "[N]ow what are the odds to have such a rare event happen in the decade that all the new infrared detectors became available, as the Galileo spacecraft was in position to see the hits directly, and only six months after the Hubble [Space Telescope] was fully operational and before the expected cutbacks [in NASA's budget] make the money run out? Folks, we had a bloody miracle." Indeed, and these two books make an excellent choice to document that miracle. □

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