

Heads Up!

There is nothing we can do to prevent a comet from striking Earth.

COMETS

Creators and Destroyers.

By David H. Levy.

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By Marcia Bartusiak

IT will be this summer's cinematic disaster du jour. Hollywood is now launching a barrage of comets and asteroids on movie theater screens across the country. If viewers' interests are piqued (or if their nerves need soothing), "Comets" is a handy digest to put these celestial visitors into perspective.

It would be hard to find a writer better suited to the task. David H. Levy has been the discoverer or co-discoverer of 21 of them, including Comet Shoemaker-Levy 9, the series of icy chunks that crashed into Jupiter so spectacularly four years ago. But as a former graduate student in English literature, Levy is also able to transform his scientific facts into a charming and accessible story. His book is liberally sprinkled with personal accounts, historical anecdotes and literary references from John Keats to J. D. Salinger. His telescope, a 16-inch reflector, is named Miranda, for the Shakespeare character who spoke of a "brave new world."

Comets have been an obsession for Levy since childhood, starting with a sixth-grade assignment. That's when he learned a comet was a miles-wide blackened snowball, a conglomeration of ices mixed with dustlike particles. Some have short periods, like Comet Encke, which returns every three and a third years. Others have a looser tether to the Sun, like Comet Hale-Bopp, which appeared last year and will travel entirely out of the solar system before returning in a few thousand years to glow once again as it is bathed by the Sun's radiation.

Levy has lost none of his childhood wonder; he describes his vocation as "the world's slowest sport, in which scores are measured not in afternoons but in lifetimes." He began searching in 1965 and spent more than 900 hours at his telescope before finding his first comet 19 years later. So what keeps him and others coming back, to what seems like a wearying endeavor? For some it is the chance to inscribe their name on a sliver of the universe. "For me," Levy answers, "comet hunting is a field of dreams." But "it helps," he adds, "to have the perseverance of an Arctic explorer, the heart of a poet and the patience of Job" when facing the nighttime wind and cold.

Over the centuries, humanity has experienced a love-hate relationship with comets. At first, comets were feared as omens of doom — it was counted significant that one showed up in 44 B.C., the year Julius Caesar was assassinated. The British astronomer Edmond Halley at last demystified them when, calculating from Newton's laws of gravity, he confidently predicted that a comet he had seen in 1682 would reappear in 1758. It did. Comets, he showed us, are simply planetoids in constant, if eccentric, orbit around the Sun.

More recently, though, comets have been reclaiming their old reputation, ever since evidence emerged that 65 million years ago some form of monstrous meteor slammed into Earth

off the coast of Yucatan with the force of 100 million hydrogen bombs. Whatever it was, it gouged out a crater 100 miles wide and 25 miles deep, spewing out enough debris to darken the planet for decades and kill the dinosaurs. No wonder Hollywood is taking note. Yet there was a silver lining to the devastation. It gave mammals the opportunity to rule the world.

Comets and asteroids may be mere specks — solar system trash. But Levy aptly demonstrates that this debris has decidedly affected our lives, starting five billion years ago. Earth's tilt is probably due to the impact of a large object at its birth, giving us the seasons. Another collision by a Mars-sized planetesimal tore enough material out of our planet to forge the Moon. Meanwhile, a continual hail of smaller comets provided Earth with both water and organic building blocks. Hubble telescope observations of Hale-Bopp showed the comet shedding nine tons of water each second.

Comets were multitudinous eons ago. Now they lurk either in a disk beyond the orbit of Pluto (which is actually an oversize comet) or in a halo farther out called the Oort cloud. Jupiter was the housekeeper: it acted as a gravitational vacuum cleaner, either sweeping the comets outward or consuming them. Comet Shoemaker-Levy was just the latest example, and Levy explains how it was discovered almost by accident, during a fitful survey on a bad-weather night. What resulted "was a scramble to put together the largest telescope armada ever assembled in the history of astronomy to observe a single event," he writes.

HERE was the dress rehearsal for what will (not may) happen to Earth in the future. Levy weaves a haunting tale of what would occur if a comet like Shoemaker-Levy, with its 21 separate pieces, made a direct hit. What's most disturbing is reading that comets are rarely found more than a year before they enter our terrestrial neighborhood. We'd have little warning. Given our current level of technology, there would be nothing we could do to prevent an impact. "Changing the orbit of a 10-mile-wide comet hurtling toward us at a high velocity is, one scientist insists, like trying to move a tank with a popgun," Levy notes. We have a better chance of keeping tabs on (and maybe even altering) the paths of asteroids, a failed planet's rocky remains that continually crisscross the inner solar system.

"Comets" was obviously not written to be a definitive reference work. Its level and pace are most appropriate to interested newcomers who want a quick overview on topics ranging from Mars rocks to shooting stars. Shooting stars, by the way, are really pieces of comet dust, each no bigger than a grain of beach sand, left behind in a comet's trail. When Earth crosses that wake, these particles vaporize in a streak of light. Levy reports that a spectacular show, as many as 150,000 meteors per hour, will take place on Nov. 17, 1999, when Earth travels through the litter left by Comet Tempel-Tuttle this year. "Those who are lucky enough to witness the spectacle," he writes, "will get a glimpse of what the earth was like during its primordial age. As cometary debris rains out of the sky, the remnants of destruction and creation of life will light up the sky just as they did at the dawn of life on Earth."

Readers will be convinced that comets are far more than illuminated shuttlecocks that occasionally cross the heavens. Homo sapiens might not have evolved without them. □

Marcia Bartusiak is the author of "Thursday's Universe" and "Through a Universe Darkly."