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BOOKSHELF

‘Zwicky’ Review: Going Supernova

The life of a caustic visionary who skirmished with fellow scientists but discovered that stars could explode.

By *Marcia Bartusiak*

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Though Fritz Zwicky is not well known to the public today, astronomers around the world, decades after his death in 1974, still gleefully gossip about his infamous professional battles and outrageous behavior. He is astronomy’s *enfant terrible*. Supremely confident of his superior intelligence, Zwicky often declared that most of his colleagues were “spherical bastards.” “A term that employed the language of physics,” John Johnson writes in his engaging biography “Zwicky,” “to describe a person that, no matter what frame of reference was used, remained a bastard.”

Zwicky had every right to brag: He correctly predicted that stars could actually explode, leading to the formation of a neutron star (more than three decades before the first one was discovered); that cosmic rays were released in those stellar blasts; that dark matter permeated intergalactic space; and that distant galaxies could act like giant magnifying glasses, as light gets bent around them following Einstein’s relativistic rules. Such “gravitational lensing” is now one of astronomy’s handiest tools for studying the far universe. Later, Zwicky would play a crucial role in jump-starting the infant fields of jet propulsion and rocketry in the 1940s and ’50s.

That writers in the U.S. did not earlier leap at the chance to chronicle such rich and diverse accomplishments is partially due to Zwicky’s family, who have fiercely guarded his reputation

ZWICKY

By John Johnson Jr.

Harvard, 352 pages, \$35

over the years. But Mr. Johnson overcame those obstacles, gaining the cooperation of two of Zwicky's three daughters. His insightful interviews with them, coupled with access to diaries and archival papers, reveal a life that is far deeper and more nuanced than the caricature.

Zwicky wasn't destined for astronomy. Born in Bulgaria to a Swiss father and a Czech mother, he was expected to follow his merchant father into business but shifted to science when he displayed a keen aptitude for mathematics. A self-described "lone wolf," Zwicky had high standards for close friendship. While attending the elite Swiss Federal Institute of Technology (where Einstein had studied), one of his few confidants was Tadeusz Reichstein, a lifelong friend who went on to win the Nobel Prize in 1950 for isolating a number of hormones produced in the adrenal gland, including cortisone.

A specialist in the physics of crystals, Zwicky appeared headed for a lackluster academic career until he became a tour guide for two American recruiters visiting the Institute in 1925 on a mission to lure one of the its top mathematicians to America. So impressed were they by their escort's sharp mind and brash confidence that they offered him the fellowship instead. The Americans chose Caltech as his destination solely because Zwicky, an avid mountaineer, had wanted a place to continue climbing. (He was sorely disappointed to see that the San Gabriel mountains near the university were mere foothills compared with the Alps.)

It took Zwicky a while to make his mark in California. As he once put it, he yearned for "examples of success which . . . we have done alone, something no one can take from us." It was this longing, according to Mr. Johnson, that later fueled Zwicky's "feeling that the things he did find were stolen from him by men with lesser imaginations. Sometimes this suspicion was justified; at other times, it was evidence of an unflattering streak of distress and insecurity that would drive away friends and allies alike."

Zwicky's mediocre prospects abruptly changed in 1930 when his Caltech mentor, the distinguished physicist Robert Millikan, challenged him to come up with an original idea. "You name the subject," said Zwicky. To which Millikan replied: "Astrophysics."

Zwicky stumbled at first. Hating the idea of an expanding universe, of space-time itself stretching and making cosmic light waves longer (and hence redder), Zwicky said that the photons were merely losing energy as they traveled through space, a now discredited idea that he hung on to as if battling with a "demonic force," in Mr. Johnson's words. But then in 1933, working in collaboration with the noted astronomer Walter Baade, Zwicky made his triple play on supernovas, the origin of cosmic rays and neutron stars. This thrust Zwicky, who was a savvy public communicator, into the media spotlight. He became the Carl Sagan of his day.

The fruitful Baade-Zwicky partnership—his theories matched with Baade’s observations—bitterly unraveled by the end of the 1930s, partly due to politics (the German-born Baade appeared sympathetic to Germany as it prepared for war, while Zwicky sensed great danger, accusing Baade of being a Nazi). “The breach would never heal for Zwicky,” Mr. Johnson writes. From that point on, he became more isolated, more volatile in his relationships with his colleagues.

Not a standard biography, “Zwicky” reads more like a stylish Sunday magazine profile, which is not surprising given Mr. Johnson’s many years as a science reporter for the Los Angeles Times. It’s a breezy and absorbing narrative, though at times it fails to provide the full background on the astronomy being discussed. In a brief paragraph, for example, Mr. Johnson seems to suggest that Zwicky was the first to imagine the existence of black holes, but it was J. Robert Oppenheimer and two of his graduate students who carried out the challenging theoretical physics to reach that conclusion, a fact unfortunately hidden away in an endnote.

Particularly captivating is Zwicky’s career through World War II and into the postwar years. Coaxed into becoming head of research for a jet-propulsion startup, Aerojet, Zwicky contributed to 18 patents involving rockets and jet engines. He was then on the team that got German rocket wizard Wernher von Braun to relocate to the U.S. and was later sent to Hiroshima and Nagasaki to help assess the atomic bomb’s aftermath. In 1946, using an old German V-2 rocket, he attempted to explosively launch a bevy of metal slugs into orbit from its nose cone. If this scheme had succeeded (the explosive charge failed), the U.S. might have started on a full-scale satellite years earlier. Over this time, Zwicky also taught, searched for supernovas, amicably divorced his first wife (a California socialite), and in 1947 married Anna Margarita Zürcher, an 18-year-old from Switzerland.

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It is through his family life, affectionately described by his daughters, that we see a genial and loving Zwicky. A devoted husband who doted on his children (though with rules), he was an early feminist. “He was very modern in his advice that they should have a profession to fall back on, so that they would not have to depend upon a man,” notes Mr. Johnson. Zwicky’s home was a sanctuary from the many battles he once again faced at Caltech after the war. There were his relentless harangues during university colloquiums, attacks on fellow astronomers in print, and charges that others got credit for his work. So fierce were these conflicts that a new

policy was established to prohibit retirees (that meant him) from observing on the big telescopes. Zwicky had been kicked off the mountain.

Upon his death, “Zwicky was transformed into either a cartoonish bumpkin or an agent of pure malice,” writes Mr. Johnson. And even though he did make some bizarre suggestions during his career (such as lassoing planets and towing them toward the sun to make them habitable), Mr. Johnson provides a sympathetic reassessment of his overall legacy. Zwicky organized humanitarian aid to the war-weary needy, was the first foreigner to be awarded a Presidential Medal of Freedom for his service to the U.S., and at times did indeed fail to get the credit he was due. As they say, it’s not paranoia when they’re really out to get you.

—Ms. Bartusiak is a former professor in the MIT Graduate Program in Science Writing. Her latest book is “Dispatches From Planet 3: Thirty-Two (Brief) Tales on the Solar System, the Milky Way, and Beyond.”

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