



Carl Sagan (9 November 1934–20 December 1996)

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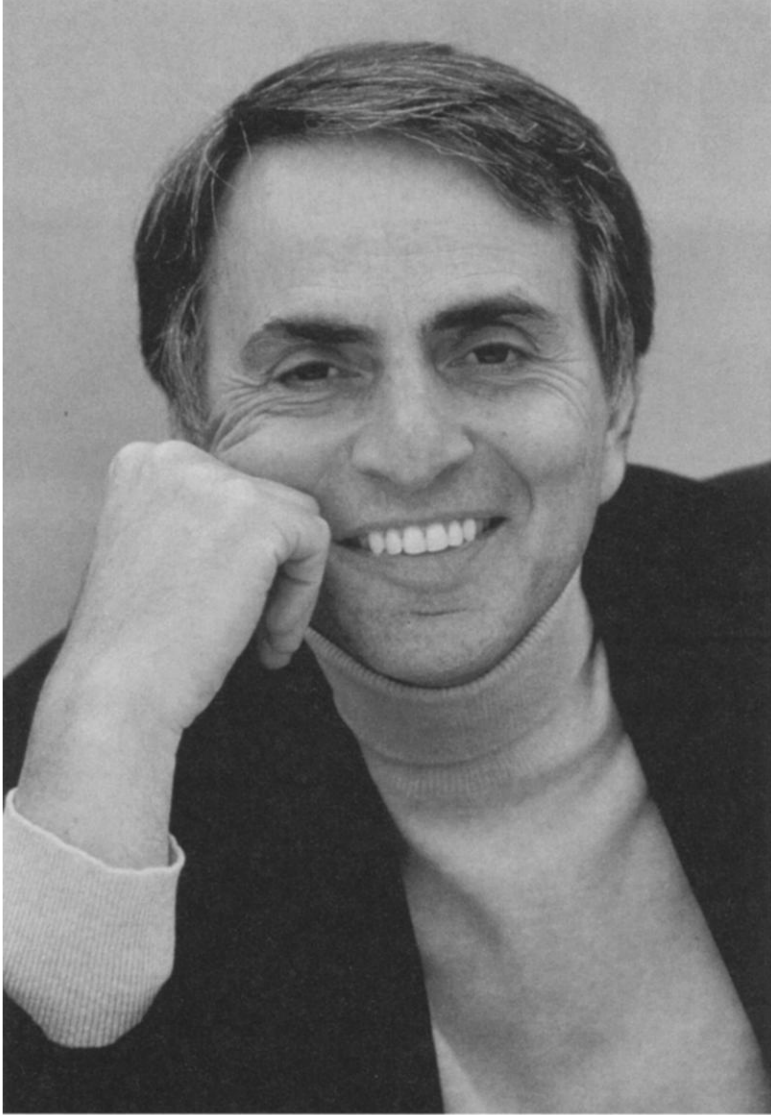
Carl Sagan, an astronomer passionately interested in spacecraft exploration of the solar system and the search for extraterrestrial intelligence, became, through his articulate interpretations, a leading spokesman for American science.

Sagan was born on 9 November 1934 in New York City, to an American mother and a Russian-immigrant father. Though themselves relatively uneducated, Carl's parents encouraged him to think and read and count from a very early age. Winning a scholarship to the University of Chicago, he received a broad undergraduate education there, and by 1960 he completed his doctorate in astronomy and astrophysics from Chicago, working on planetary astronomy with Gerard Kuiper. In a series of papers beginning at that time, he argued that microwave emissions were evidence of a high surface temperature on Venus, sustained by the greenhouse effect of a thick carbon dioxide atmosphere. His greenhouse model was subsequently confirmed by the Mariner spacecraft observations.

Following postdoctoral years at Berkeley and at Stanford, he took up a position at Harvard and the Smithsonian Astrophysical Observatory, securing an assistant professorship in a department with no tradition whatsoever for such an appointment. There, in collaboration with a graduate student, Jim Pollack, he proposed a wind-blown dust explanation for the seasonal changes in the light and dark patterns on the Martian surface.

While at Harvard and Smithsonian he first came to public attention through his co-authorship with the Russian astrophysicist I. S. Shklovskii of *Intelligent Life in the Universe* (1966). The book was a translation of Shklovskii's Russian original, with Carl's interspersed running commentary.

Subsequently he was approached by an agent who said, "I write books for people. I am going to write your next book!" Carl signed the contract, but wrote the book himself. He composed each chapter mentally while driving between the East Coast and the Jet Propulsion Laboratory in Pasadena. Each mid-afternoon of the commute he would pull into a motel with a swimming pool and write out the chapter that



he had created on the road. The chapters became *The Cosmic Connection* (1973), the first of eight popular expositions of science for which he was sole author. One of these, *Dragons of Eden* (1977), dealing with the evolution of the human brain and consciousness, received a Pulitzer Prize in competition with all nonfiction books except biography and history.

From Harvard, Carl, not yet thirty-four, went to what would soon become a life-long tenured professorship at Cornell, in part accomplished through the vision and persuasiveness of Tommy Gold, who recognized his potential as a star scientist. With the position came the foundation of a Laboratory for Planetary Studies, which Carl directed as long as he lived. From 1970 to 1990 Carl was part of the imaging team for the two Voyager spacecraft, which made close flybys to the giant planets. With collaborators at Cornell, he argued that the dark bands on these planets are complex organic molecules produced by the action of sunlight on the abundant methane, a process they demonstrated in the laboratory.

In the early 1980s, aware of the role of dust in the tenuous Martian atmosphere, Carl joined with colleagues (including former students) to explore the consequences of airborne dust and soot following large-scale nuclear warfare. The widely publicized “nuclear winter” scenario, although it turned out to have been somewhat overestimated, nevertheless highlighted the limitations of earlier models and had a salutary deterrent effect on nuclear saber-rattling. Throughout his life he was a staunch opponent of nuclear testing and nuclear weapons development. Typically he made sure to contact Edward Teller to verify some points of science; a stickler for accuracy, Carl preferred to interact with political adversaries rather than disseminate misinformation.

Late in 1973, Carl appeared twice on late-night television, before the ten million devoted fans of Johnny Carson. His flawless ability to extemporize about the fascination of astronomy and his appealing analogies captured the audience’s attention. He was invited back, appearing twenty-six times in about a dozen years, enough to transform him into a national celebrity. His infectious enthusiasm made him a favorite commentator for NASA press briefings during their spacecraft explorations of the solar system.

Recognizing the potential impact of television on the understanding of science, not to mention public interest in planetary exploration, Carl worked energetically to raise funds for a Public Broadcasting System science series. Eventually “Cosmos” became one of the most ambitious productions with which PBS had ever been involved. Carl, occasionally burned by the way television stations had edited his

remarks, wrote a contract for “Cosmos” to guarantee his final control over the text. The executive producer, Adrian Malone, who had such series as Jacob Bronowski’s thirteen-part “Ascent of Man” to his credit, was not used to such a concession, and eventually a clash of egos meant that the two principals were barely on speaking terms. In the opening sequence, where some of the planned transitional images failed to materialize, Malone inserted views of Carl looking dreamily into space. When Carl objected to this solution, Malone reputedly replied, “You may have contractual control over the text, but I am the artistic director!” While the opening episode was attacked by the critics as making Sagan look excessively egocentric, the series as a whole proved to be a major success, winning Emmy and Peabody awards and bringing science to a wider audience—well over half a billion viewers—than ever before. The book based on the series remained on the *New York Times* best seller list for over a year.

Except during the year “Cosmos” was filmed (1980) and the best-selling book was written, Carl kept up a prodigious output of scientific papers, averaging more than a dozen a year. He served for twelve years as editor of the planetary sciences journal, *Icarus*; he co-founded (with Bruce Murray) the Planetary Society, now a hundred thousand members strong; and he helped establish the Planetary Science Division of the American Astronomical Society. In 1992 he was denied membership in the National Academy of Sciences in an unusual and highly contentious floor debate, but two years later Carl received the Academy’s highest honor, its Public Welfare Medal. During his lifetime he received more than twenty honorary degrees and numerous other awards including the NASA Medal for Distinguished Public Service (twice), the Rittenhouse Medal of the Franklin Institute, the Oersted Medal of the American Physics Teachers Association, and the Annenberg Foundation Prize for astronomy education from the American Astronomical Society.

Carl was married thrice; as Philip Morrison has written, “There was passion, affection, and intellectual partnership in all three marriages. It is the individual qualities of these three women that command our admiration.” Carl met Lynn Alexander when they were both undergraduates at Chicago; partly under his influence she decided to pursue a career in biology. The marriage lasted seven years, and two sons were born, but the divorce proved more successful than the union. Lynn Margulis (her name after remarriage) has gone on to become a well-known cell biologist. In 1969 he married an artist, Linda Salzman, who would help produce the famous plaques on the outward-bound Pioneer spacecrafts; one son was born to them. An agonizing breakup

occurred when Carl left her in 1977 for Ann Druyan, a collaborator on the “Cosmos” project. The happy Sagan-Druyan relationship, which produced a series of joint projects including a daughter and a son, lasted twenty years, broken only by Carl’s death.

Throughout his career Carl maintained a deep suspicion of religion, often citing the historical atrocities carried out in its name. Nevertheless, near the end of his life he had started reading through the entire Loeb Library edition of the Church Fathers, and he recognized that religious communities were natural allies in his strong environmentalist concerns. In 1995 he was diagnosed with myelodysplasia, a rare disease that often leads to leukemia, and despite two bone marrow transplants he succumbed to complications from the disease on 20 December 1996. Among other memorials, a very moving and widely attended service was held at the Cathedral of St. John the Divine in New York City.

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