

The exploration instinct

Howard E. McCurdy

Pale Blue Dot: A Vision of the Human Future in Space. By Carl Sagan. *Random/Headline*: 1994/1995. Pp. 429. \$35, £25.

In *Pale Blue Dot*, Carl Sagan continues on the voyage of exploration that he began in his wildly popular book and television series *Cosmos*, a celebration of the human quest to understand the Universe. Here he stays somewhat closer to home, guiding readers through the wonders of our own Solar System. The journey comes none too soon. Initial probes, especially of the crater-pocked Mars, disappointed a generation of space enthusiasts raised on images popularized by such people as Percival Lowell and Edgar Rice Burroughs. Sagan's descriptions rekindle the sense of wonder necessary to maintain public interest in exploration.

The images Sagan presents are based extensively on findings from remotely controlled spacecraft that probed the Solar System during the past two decades. In February 1990, one of these spacecraft completed an assignment of little scientific but enormous philosophical value. The Voyager 1 spacecraft, well beyond and above the orbits of Neptune and Pluto, pointed its camera back along the path from which it had come and took a portrait of the Solar System.

There were the larger planets, bright dots stretched across the expanse of the void. Barely distinguishable against the glare of the Sun, a pale blue dot appeared. No civilizations, no great nations, no signs of world commerce could be seen — only a speck of blue against the cosmos. It would take a race of idiots, Sagan observes, to conclude that the small blue sphere called Earth by its inhabitants sat at the centre of creation. Using this image as a point of departure, he constructs the philosophy of space exploration that is the book's greatest contribution.

Astronomy is a humbling and character-building experience, he reminds us. For centuries humans took comfort in the belief that the Sun, Moon and stars rotated around the Earth and that God had created humans in His own image for a special purpose. Astronomy devastated these beliefs. The Earth is a pale blue dot orbiting an inconspicuous star on the outer reaches of one of at least 40 billion galaxies. There are certainly other solar systems with inhabitable planets and probably intelligent creatures on them. Humans were created through the mechanics of evolution and, according to Sagan, the best evidence currently available does not support the need for a grand designer.

"Human beings cannot live with such a

revelation," Sagan quotes the British journalist Bryan Appleyard as saying. Sagan seems to agree. The great demotions, as he calls them, have created a more mature view of nature, but they have also devastated the human spirit. Maturity is painful; it is easier to think like a child. The new view of the cosmos tends to breed a sense of hopelessness in human affairs.

Sagan believes that space exploration can revitalize the human spirit made sombre by astronomical discoveries. "Once we overcome our fear of being tiny, we find ourselves on the threshold of a vast and awesome Universe that utterly dwarfs — in time, in space, and in potential — the tidy anthropocentric proscription of our ancestors." Phenomenal discoveries will soon be made about our own Solar System, and new instruments will allow us to inspect objects orbiting nearby stars. Humans may move off the Earth and settle on other planets. The human race, as impious as Sagan admits this sounds, may join in the process previously reserved for gods by creating habitable planets out of lifeless spheres. All this, in Sagan's view, will excite epochs of discovery far more enriching than those possible under the doctrines of old.

People were meant to roam the cosmos, he further suggests. The need to explore is firmly set in the genetic make-up of our species, a product of natural selection. Nothing lasts forever, and only peoples who crave to move on protect their descendants from the inevitable catastrophes that follow. "For all its material advantages, the sedentary life has left us edgy, unfulfilled."

If Sagan is correct, then the pioneering philosophy he advances will be remembered thousands of years from now. As he freely admits, the obstacles are formidable. The cost of spaceflight is now far higher than space enthusiasts had ever predicted. A single shuttle flight to and from low-Earth orbit costs some \$400 million, hardly economical to the settlers who must travel the twenty-first-century equivalent of the Oregon Trail. Nearby spheres are far less hospitable than places on Earth as yet unsettled, but Sagan holds that the former can be transformed into habitable environments for human beings.

Sagan believes we have little choice. Humans take a foolish risk by binding themselves to Earth. In the long run, he argues, every galactic civilization is obliged to become space-faring for the most practi-

cal of reasons: staying alive. He is especially concerned about the inevitability of asteroid strikes, whose potential force far exceeds the destructive power of all the nuclear weapons left on Earth.

Sagan ultimately concludes that we will move into space not because of practical reasons such as mining the asteroids, but because it is in our nature to go. This philosophy draws him into a discussion of the saving power of frontiers, a position every bit as controversial today as were Copernican theories of the Universe four centuries ago. Modern historians are engaged in a major campaign to debunk the idea that ingenuity and democracy depend on the existence of frontiers.

A final word needs to be said about Sagan's writing style. Sagan stands in a line of popular science writers that includes figures such as Willy Ley and Wernher von Braun. But he is almost alone in his capacity for communicating the wonders of the cosmos. Ley's and von Braun's prophecies were lucidly written in their time, but they read like engineering manuals compared with Sagan's prose. If Sagan's vision succeeds, it will be due in no small part to his skill in communicating it. □

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Science Book Prize

JOHN Emsley has won this year's £10,000 Rhône-Poulenc Science Book Prize for *The Consumer's Good Chemical Guide: A Jargon-Free Guide to the Chemicals of Everyday Life* (W. H. Freeman/Spektrum, £18.99, \$24.95).

In a review in *Nature* **371**, 214 (1994), John Mann wrote that "this accessible and entertaining book deserves to be widely read by the general public and contains much information that will be of use to teachers of elementary chemistry courses. It may also persuade those journalists and environmentalists who persistently misrepresent chemicals to give chemistry the credit it deserves."

The winner of the junior prize is Jay Young's *The Most Amazing Pop-Up Science Book* (Watts). The prizes are awarded annually for the best science books published in the United Kingdom for a general readership.

Other shortlisted books in the adult category were *The Language Instinct* by Steven Pinker, *The Snows of Olympus* by Arthur C. Clarke, *The Book of Man* by Walter Bodmer and Robin McKie, *Journey to the Ants* by Bert Hölldobler and Edward O. Wilson and *The Covenant of the Wild* by Stephen Budiansky. □