

CARL SAGAN

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A VISION OF THE  
HUMAN FUTURE IN SPACE

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PALE BLUE DOT

THE NEW YORK TIMES BESTSELLER

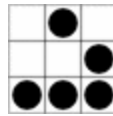
# **Pale Blue Dot**

A Vision of the Human Future in Space

by

**Carl Edward Sagan**

1994



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**Pale Blue Dot**

A Vision of the Human Future in Space

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The sequel to "Cosmos: A Personal Voyage" and inspired by the "Pale Blue Dot" photograph, for which Sagan provides a sobering description. In this book, Sagan mixes philosophy about the human place in the universe with a description of the current knowledge about the Solar System. He also details a human vision for the future.

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## **FOR SAM**

Another wanderer,  
May your generation see  
Wonders undreamt.

## SPACECRAFT EXPLORATION OF THE SOLAR SYSTEM NOTABLE EARLY ACHIEVEMENTS

### UNITED STATES

- 1958 First scientific discovery in space-Van Allen radiation belt (*Explorer 1*)
- 1959 First television images of the Earth from space (*Explorer 6*)
- 1962 First scientific discovery in interplanetary space -direct observation of the solar wind (*Mariner 2*)
- 1962 First scientifically successful planetary mission (*Mariner 2* to Venus)
- 1962 First astronomical observatory in space (*OSO-1*)
- 1968 First manned orbit of another world (*Apollo 8* to the Moon)
- 1969 First landing of humans on another world (*Apollo 11* to the Moon)
- 1969 First samples returned to Earth from another world (*Apollo 11* to the Moon)
- 1971 First manned roving vehicle on another world (*Apollo 15* to the Moon)
- 1971 First spacecraft to orbit another planet (*Mariner 9* to Mars)
- 1973 First flyby of Jupiter (*Pioneer 10*)
- 1974 First dual-planet mission (*Mariner 10* to Venus and Mercury)
- 1974 First flyby of Mercury (*Mariner 10*)
- 1976 First successful Mars landing; first spacecraft to search for life on another planet (*Viking 1*)
- 1977 First flybys of Saturn (*Pioneer 11*)
- 1981 First manned reusable spacecraft (STS-1)
- 1980- First satellite to be retrieved, repaired,  
1984 and redeployed in space (*Solar Maximum Mission*)
- 1985 First distant cometary encounter (*International Cometary Explorer* to Comet Giacobini-Zimmer)
- 1986 First flyby of Uranus (*Voyager 2*)
- 1989 First flyby of Neptune (*Voyager 2*)
- 1992 First detection of the heliopause (*Voyager*)

- 1992 First encounter with a main-belt asteroid (*Galileo* to Gaspra)
- 1994 First detection of a moon of an asteroid (*Galileo* to Ida)

## SOVIET UNION/RUSSIA

- 1957 First artificial satellite of the Earth (*Sputnik 1*)
- 1957 First animal in space (*Sputnik 2*)
- 1959 First spacecraft to escape the Earth's gravity (*Luna 1*)
- 1959 First artificial planet of the Sun (*Luna 1*)
- 1959 First spacecraft to impact another world (*Luna 2* to the Moon)
- 1959 First view of the far side of the moon (*Luna 3*)
- 1961 First human in space (*Vostok 1*)
- 1961 First human to orbit the Earth (*Vostok 1*)
- 1961 First spacecraft to fly by other planets (*Venera 1* to Venus;
- 1962 *Mars 1* to Mars)
- 1963 First woman in space (*Vostok 6*)
- 1964 First multi-person space mission (*Voskhod 1*)
- 1965 First space “walk” (*Voskhod 2*)
- 1966 First spacecraft to enter the atmosphere of another planet (*Venera 3* to Venus)
- 1966 First spacecraft to orbit another world (*Luna 10* to the Moon)
- 1966 First successful soft landing on another world (*Luna 9* to the Moon)
- 1970 First robot mission to return a sample from another world (*Luna 16* to the Moon)
- 1970 First roving vehicle on another world (*Luna 17* to the Moon)
- 1971 First soft landing on another planet (*Mars 3* to Mars)
- 1972 First scientifically successful landing on another planet (*Venera 8* to Venus)
- 1980 First approximately year-long manned spaceflight (comparable to Mars flight time) (*Soyuz 35*)
- 1983 First full orbital radar mapping of another planet (*Venera 15* to Venus)
- 1985 First balloon station deployed in the atmosphere of another planet (*Vega 1* to Venus)
- 1986 First close cometary encounter (*Vega 1* to Halley's Comet)
- 1986 First space station inhabited by rotating crews (*Mir*)

## WANDERERS : AN INTRODUCTION

But tell me, who are they, these wanderers ...?

– RAINER MARIA RILKE, “THE FIFTH ELEGY” (1923)

We were wanderers from the beginning. We knew every stand of tree for a hundred miles. When the fruits or nuts were ripe, we were there. We followed the herds in their annual migrations. We rejoiced in fresh meat. through stealth, feint, ambush, and main-force assault, a few of us cooperating accomplished what many of us, each hunting alone, could not. We depended on one another. Making it on our own was as ludicrous to imagine as was settling down.

Working together, we protected our children from the lions and the hyenas. We taught them the skills they would need. And the tools. Then, as now, technology was the key to our survival.

When the drought was prolonged, or when an unsettling chill lingered in the summer air, our group moved on – sometimes to unknown lands. We sought a better place. And when we couldn't get on with the others in our little nomadic band, we left to find a more friendly bunch somewhere else. We could always begin again.

For 99.9 percent of the time since our species came to be, we were hunters and foragers, wanderers on the savannahs and the steppes. There were no border guards then, no customs officials. The frontier was everywhere. We were bounded only by the Earth and the ocean and the sky – plus occasional grumpy neighbors.

When the climate was congenial, though, when the food was plentiful, we were willing to stay put. Unadventurous. Overweight. Careless. In the last ten thousand years – an instant in our long history – we've abandoned the nomadic life. We've domesticated the plants and animals. Why chase the food when you can make it come to you?

For all its material advantages, the sedentary life has left us edgy, unfulfilled. Even after 400 generations in villages and cities, we haven't forgotten. The open road still softly calls, like a nearly forgotten song of

childhood. We invest far-off places with a certain romance. This appeal, I suspect, has been meticulously crafted by natural selection as an essential element in our survival. Long summers, mild winters, rich harvests, plentiful game – none of them lasts forever. It is beyond our powers to predict the future. Catastrophic events have a way of sneaking up on us, of catching us unaware. Your own life, or your band's, or even your species' might be owed to a restless few – drawn, by a craving they can hardly articulate or understand, to undiscovered lands and new worlds.

Herman Melville, in *Moby Dick*, spoke for wanderers in all epochs and meridians: “I am tormented with an everlasting itch for things remote. I love to sail forbidden seas ...”

To the ancient Greeks and Romans, the known world comprised Europe and an attenuated Asia and Africa, all surrounded by an impassable World Ocean. Travelers might encounter inferior beings called barbarians or superior beings called gods. Every tree had its dryad, every district its legendary hero. But there were not very many gods, at least at first, perhaps only a few dozen. They lived on mountains, under the Earth, in the sea, or up there in the sky. They sent messages to people, intervened in human affairs, and interbred with us.

As time passed, as the human exploratory capacity hit its stride, there were surprises: Barbarians could be fully as clever as Greeks and Romans. Africa and Asia were larger than anyone had guessed. The World Ocean was not impassable. There were Antipodes.<sup>[1]</sup> Three new continents existed, had been settled by Asians in ages past, and the news had never reached Europe. Also the gods were disappointingly hard to find.

The first large-scale human migration from the Old World to the New happened during the last ice age, around 11,500 years ago, when the growing polar ice caps shallowed the oceans and made it possible to walk on dry land from Siberia to Alaska. A thousand years later, we were in Tierra del Fuego, the southern tip of South America. Long before Columbus, Indonesian argonauts in outrigger canoes explored the western Pacific; people from Borneo settled Madagascar; Egyptians and Libyans circumnavigated Africa; and a great fleet of ocean going junks from Ming Dynasty China crisscrossed the Indian Ocean, established a base in Zanzibar, rounded the Cape of Good Hope, and entered the Atlantic Ocean. In the fifteenth through seventeenth centuries, European sailing ships