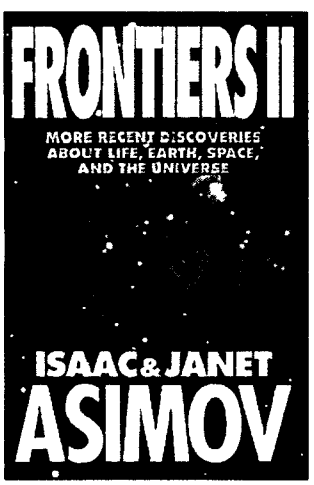
From Aborigines to Zircons: Science Facts by the Asimovs

By Simson L. Garfinkel

SCIENCE doesn't sit still, and neither did Isaac Asimov. During his 72 years on this planet, Asimov published nearly 500 books of science fiction and science fact, with everything from instructions on how to use the slide rule to Bible criticism. On a good day, Asimov could produce 3,000 words of finished prose. But despite his frenetic pace, nearly everything that Asimov wrote was a polished gem: clear and concise, easy to understand, and a good story to boot.

Asimov's last book, "Frontiers II: More Recent Discoveries About Life, Earth, Space, and the Universe," is a collection of his weekly science columns distributed by the Los Angeles Times Syndicate. In its pages are reports sent back from the edge of human exploration – tales of research that is happening right now and approachable explanations of why scientists do what they do, all told by one of the world's masters of science storytelling.

BOOKS



FRONTIERS II: MORE RECENT DISCOVERIES ABOUT LIFE, EARTH, SPACE AND THE UNIVERSE
By Isaac and Janet Asimov
Truman Talley/Dutton
369 pp., $23

The power of these stories is that they show science as a process, rather than as a sequence of finished results. On more than one occasion, Asimov writes about mistakes that have been corrected, formerly accepted "facts" that have been found untrue, and theories that have gone out of vogue – sometimes to return again with more force. Taken together, these columns paint a picture of humanity slowly discovering more about itself, its past and its future.

Readers of Asimov's weekly column never knew what to expect: biology, geology, anthropology, chemistry, space science, or computers – Asimov made everything understandable.

"Saturn's rings are the most beautiful objects in the solar system," he writes of that planet's slowly vanishing rings. "While the other outer planets have rings, those that Jupiter, Uranus, and Neptune possess are thin, dark, and unimportant in appearance. Saturn's rings are large, bright, and glorious."

In this book, Asimov also explains how scientists have been able to make diamonds that are harder than those made by nature, describes how anthropologists date findings at archaeological digs, and lays waste to the notion that somebody might grow rich one day by figuring out how to extract gold from seawater (two Massachusetts Institute of Technology chemists discovered that there simply isn't enough). He writes about new findings that shed light on the origins of the human brain and intellect and wonders why Europeans missed the supernova of 1054 when the event was recorded by both Chinese and native American astronomers.

When Isaac Asimov became ill in the winter of 1991-92, he began sharing the work of writing his columns with his second wife, Janet. After Isaac's death, Janet Asimov continued the series on her own. A quarter of the stories in "Frontiers II" are her work, and they make equally good reading.

Comparing the work of the two Asimovs makes an interesting project. Isaac is an unquestioned technological optimist, ready to have mankind create colonies in space if we should happen to make Earth uninhabitable.

Janet has a much more cautious tone toward the supposed benefits of technology. Perhaps this is a result of her training as a psychiatrist: She seems more worried about humanity's self-destructive tendencies – especially where the environment is at issue.

Janet is also far more cautious about presenting her own opinions as fact – especially opinions about the importance of scientific exploration. For Isaac, the discovery of new knowledge was an end in itself: there was no need to justify spending money to find out the makeup of matter, the history of mankind, or the geology of Mars. Janet is much more concerned at placing scientific work within a social context. It's a refreshing point of view that is all too often missing from science journalists.

The problem with collections such as "Frontiers II," of course, is that each of the columns was designed to stand on its own, rather than to be published as a unified body of work.

In the first quarter of the book, which collects the stories about the life sciences, many of the columns repeat the same basic facts: that organic life began in the sea, that it started 3 billion years ago, that animals are relative latecomers to this world, and so on. Although "Frontiers II" is an easy book to pick up and dive into, it's also an easy book to put down.

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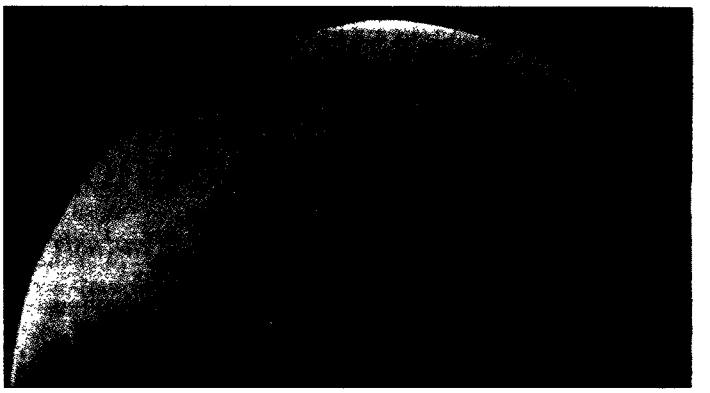


'RED PLANET': *The current mission will produce an in-depth portrait of surface featu*

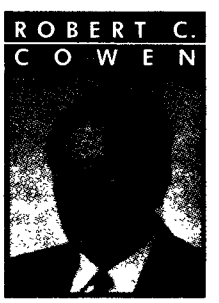
Ballooning Dreams of Ma

THE first human footfall on Mars still lies in the indefinite future. But robotic study of that intriguing planet is entering a phase that could be the next best thing to being there.

Encouraged by this prospect, planetary explorers are dreaming ambitious dreams they can reasonably expect to fulfill over the next couple of decades.

They hope to gain an intimate on-site knowledge of the Red Planet by studying it from the outside in. That's why they view the arrival next week (Aug. 24) of the National Aeronautics and Space Administration (NASA) Mars Observer spacecraft as just the beginning of a new saga of planetary exploration.

Mars Observer is to produce a geological map of the entire planet, including the mineral composition of its surface. It is to follow Martian climate through at least one full Martian year (687 Earth days) of seasonal cycles. That's the outside view. It should yield a wealth of new scientific knowledge.



But the big payoff will come when advanced robotic explorers reach the surface to verify what Mars Observer sees from orbit and gather the kind of intimate detail that "down-in-the-dirt" geologists probe for on Earth. That's what the planners' dreams are about.

They already have at least one – and probably two – such follow-up missions in hand. Russia's Mars '94 mission, now due to head for the Red Planet in November 1994, is to deposit two instrumented landers and two ground-penetrating probes. Like Mars Observer, this is a mission with wide international participation on its scientific team. Meanwhile, NASA's fiscal 1994 budget, now awaiting Senate approval, includes funds for a "Pathfinder" mission with a simple landing craft that would deploy a small robot rover.

Farther down the line, Russia hopes to launch another international mission in 1996 that would also deploy a robot rover plus a French instrumented balloon. But Mars '96 is not yet fully funded.

It's beyond these approved – or nearly approved – missions t dreaming of planners such a Bourke starts. Dr. Bourke is mai Mars advanced missions at t fornia Institute of Technology's pulsion Laboratory (JPL) in P. Calif. JPL manages these prog NASA.

To begin with, Dr. Bourke and leagues see the Pathfinder missi "proof of concept" for what they Mars Environmental Survey (M program. This would land a net ground stations for long-term observations, including seismic n ing. A fleet of relatively inex spacecraft would carry these sta rectly to the Martian surface.

Looking further Bourke suggests it m be possible to use MI return a Martian surfa ple to Earth. A unit into a MESUR packag be able to grab a sam carry it to an orbiting ship that would bring terial home.

Bourke notes tha have "a memory of wh on early" in the plane logical history. The kind of ex analysis that could be done in laboratories could reveal that his cluding any evidence that Mars o surface water.

Yet Bourke explains that san turn is, at best, "ambitious and c and, at worst, "may not be affo One alternative might be a fleet loons that would carry instrum analyze the surface at relativel range over wide areas.

The French balloon on the M mission would begin this kind o ration.

But balloons go where the wi them. Bourke suggests that rem trolled survey aircraft being de to fly in Earth's upper atmosphe ably could also operate on Mars.

Right now, these are spe ideas. Yet, as Bourke notes, "it esting to see the technologies loons, airplanes, and microele opening new ways for exploratio kind of "dreaming" could becon tical reality over the next 20 yea