

A lens upon the heavens

By THOMAS CURWEN

Beyond

Visions of Interplanetary Probes

Michael Benson

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STEP outside beneath the night sky, break away from the glow of city lights and the moon's bright cast, and the universe arches above you. Space becomes time and time a pathway to the instant of creation.

As sailors once stood on Europe's western shore, as pioneers crowded the banks of the Missouri, today we gaze overhead and contemplate a wilderness of inconceivable

proportions and surprising beauty. Space may be the province of astronomers and physicists, geologists and cosmologists, but it will always be the wonderment of humanity.

When Galileo published "Sidereus Nuncius" in 1610, he dazzled the world with his new ideas and his crude but wondrous sketches of the moon. "The Starry Messenger" sold out within a week, was read as far away as China and signaled a new epoch in our understanding of the universe.

No less a claim can be made of the present age. As surely as we have marveled at the images coming to us from Mars this last week, we must also feel slightly smug. In the last 40 years we have learned more -- and seen more -- of our solar system than in our collective history.

An armchair tour of our planetary neighbors, Michael Benson's *Beyond* is not only a tribute to an era of discovery more grand than Galileo's, but it is also an aesthetic revelation. These color and black-and-white images of the sun, the planets (except Pluto, of which we know and have seen so little), their moons and the main asteroid belt -- taken from the unmanned spaceflights from 1967 to 2002 -- are a spectacular melding of science and art, and their publication could not be more inspired or timely.

With NASA's Spirit rover sending us photographs of the Martian surface; with Opportunity, Spirit's twin, scheduled to arrive later in the month; with the Cassini probe en route to Saturn and its moon Titan (ETA late 2004); with the Messenger probe scheduled to begin orbiting Mercury in 2009 and the New Horizons spacecraft to be launched for Pluto in 2006, future data streams seem especially bright. As we look ahead to these rendezvous -- and with two recently failed missions, it is important to realize how difficult this process is -- we thumb the pages of *Beyond* with awe. Never have the remnants of creation seemed so beautiful in all their fiery, icy and imperfect splendor. We see them in the blue and brown configurations of ocean and land, the icy continents and white clouds that cover the Earth, in the dark lava flows and strange etchings beneath Venus' cloudy sheath, in the orange sand dunes and craters of Mars, the yellow calderas of Io and the aquamarine serenity of Neptune.

Let quasars and pulsars limn the more recondite reaches of space, but the sun, the asteroids and planets decorate its nearer shores and are -- as captured in these pages -- our inheritance. Is it any wonder that Benson dedicates *Beyond* to his son, Daniel, a child whose first word, he tells us, was "moon"?

Living in Ljubljana, Slovenia, Benson conducted his forays into space via the Internet. "It takes only the briefest of Net-mediated shunts," he writes, "to vault from the slate-gray drainpipes and cracked flagstones of Vrhovceva Street No. 4.... And once you've escaped Earth's gravity, the universe unfolds, revealing vistas across space and time...." "Never has a local call had such reach.

Space may be plumbed by science, but as writers from Jules Verne to Gene Roddenberry have shown us, it must first be colonized by our

imagination. Beyond is therefore an invitation to wander: to step across a pockmarked moon with the sun pearly its lambent light across the surface; to feel the fog of Mars on your cheek, the stinging sandstorms; to watch a dust devil filigreeing its path across the planet; to imagine the strange and stormy vistas of Jupiter from one of its many moons.

Here superlatives are less descriptions of unbounded amazement than statements of fact (the highest mountain and longest valley in the solar system, for instance, are found on Mars), and in these pages the curiosities of Copernicus, Galileo, Tycho, Kepler and Newton come alive. Look closely at these pictures and you will see chalk marks on distant blackboards -- the $F = ma$, the $e = mc^2$ -- spring to life.

For latent in these images is the moment in time when the universe existed only as a mere mote of energy, when in less than a millionth of a second all was in flux, all was dispersing, when quarks, protons, neutrons, helium and hydrogen flooded the void and matter started to coalesce into broad and languid swirls.

That such an explosion, that such pure energy could coalesce -- had to coalesce -- is the miracle to which we owe our lives. That such symmetries, such arcs, ellipses, crescents, circles, orbs became the first measure of our notions of beauty only attests to the millenniums we have stared into these skies -- knowing and unknowing -- and let their forms become part of our identities.

As Benson reminds us, we owe a tremendous debt to the space probes Galileo, Orbview 2, Terra, Aqua, Lunar Orbiter, Magellan, Mariner, Yohkoh, Soho, Trace, Mars Pathfinder, Mars Global Surveyor, Mars Odyssey, Viking, Near, Cassini and the Hubble Space Telescope. And we must acknowledge the scientists and engineers who designed them, working mostly at NASA's Jet Propulsion Laboratory in Pasadena.

If these dragonflies, as Benson affectionately calls them -- "encased in scarabaeoid shells, festooned with scopes and scanners, and driven by solar-powered cells and radio-isotope thermo-electric generators" -- are the heroes of the story, then the real trailblazers (in these pages at least, for Pioneer is curiously absent) are the Voyager 1 and 2 spacecraft.

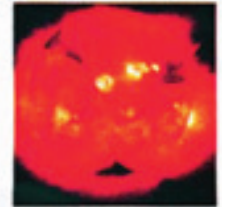
More than 26 years old, about 8 billion and 7 billion miles, respectively, from Earth and entering the turbulent region of the solar system's outermost edge, where particles of the sun meet interstellar winds, they have produced an amazing oeuvre despite the most extreme conditions. Arriving in 1986 at Uranus, for instance, a mere one minute after its calculated rendezvous, Voyager 2 sped by the planet at 50,000 miles per hour. Its signals took 2 hours and 45 minutes to reach Earth, and the pictures it delivered are ethereal and pristine.

No wonder then that writer and futurist Arthur C. Clarke so easily anthropomorphizes these machines in the foreword, going so far as to suggest that humans are merely incidental steppingstones in evolution, a bridge between the primordial ocean and space, where only these robotic creations, these *Machina sapiens*, belong.

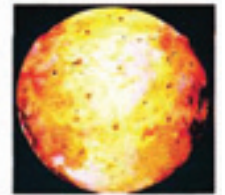
If his words seem extreme, measure them against his disappointment that for more than a generation, since the last lunar landings, "no human has ventured beyond a few hundred kilometers in Earth orbit." Some may speculate about the focus of our current space program, measure its risks and costs against its gains, but these pictures suggest the folly of such a tally and in fact beg for more.

That space is the source of our dreams and hopes, a record of our past and the direction of our future, is commonplace wisdom, and although it may be the *tabula rasa* upon which we can project our fears, we must also place our imaginative enthusiasms in its limitless boundaries.

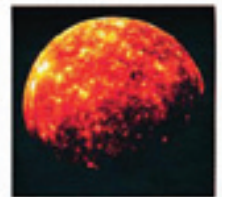
In the beginning, we are told by the ancients, the creatures of this Earth leaned forward and looked to the ground -- all but for humans, who stood upright and could direct their eyes to the stars. Never has a gift come with such responsibility. Never has a series of photographs, as compiled in *Beyond*, served as such an important reminder.



VIOLENT: The sun, photographed by Yohkoh.



JOVIAN: Io, in a mosaic image from Galileo in 1999.



JUPITER'S MOONS: Callisto, shot by Voyager 1.



BLUE WORLD: Neptune, photographed by Voyager 2.



RED PLANET: Mars on the Viking Orbiter 1 approach in June 1976.