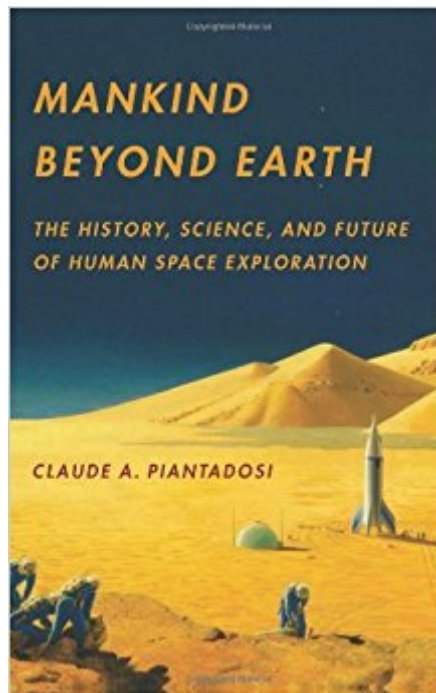


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Mankind Beyond Earth: The History, Science, And Future Of Human Space Exploration



Synopsis

Seeking to reenergize Americans' passion for the space program, the value of further exploration of the Moon, and the importance of human beings on the final frontier, Claude A. Piantadosi presents a rich history of American space exploration and its major achievements. He emphasizes the importance of reclaiming national command of our manned program and continuing our unmanned space missions, and he stresses the many adventures that still await us in the unfolding universe. Acknowledging space exploration's practical and financial obstacles, Piantadosi challenges us to revitalize American leadership in space exploration in order to reap its scientific bounty. Piantadosi explains why space exploration, a captivating story of ambition, invention, and discovery, is also increasingly difficult and why space experts always seem to disagree. He argues that the future of the space program requires merging the practicalities of exploration with the constraints of human biology. Space science deals with the unknown, and the margin (and budget) for error is small. Lethal near-vacuum conditions, deadly cosmic radiation, microgravity, vast distances, and highly scattered resources remain immense physical problems. To forge ahead, America needs to develop affordable space transportation and flexible exploration strategies based in sound science. Piantadosi closes with suggestions for accomplishing these goals, combining his healthy skepticism as a scientist with an unshakable belief in space's untapped—and wholly worthwhile—potential.

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Customer Reviews

An important book by a visionary with his feet planted on the ground. (Kirkus Reviews) Finally, a

give-it-to-me-straight account of why space exploration matters. In *Mankind Beyond Earth*, Claude A. Piantadosi folds together science, politics, and culture to demonstrate why a civilization without a spacefaring future is doomed to extinction. (Neil Degrasse Tyson, astrophysicist, American Museum of Natural History, author of *Space Chronicles: Facing the Ultimate Frontier*) In this engaging book, Claude A. Piantadosi presents a concise and accurate history of how our nation's space program arrived at its current uncertain juncture, supplementing it with powerful insights into a wide range of fields, from planetary science to human physiology. This is a compelling work from a scientist committed to expanding the human exploration of our universe. (Michael L. Gernhardt, NASA astronaut, manager of the Environmental Physiology Laboratory at the Lyndon B. Johnson Space Center) Recommended for readers intrigued by the real-life requirements of space exploration. (Library Journal) This nicely written volume will appeal to the general public and space enthusiasts who want to learn about the hazards of human space exploration. (Choice) Piantadosi's goal throughout the book is to explain to the lay audience why space exploration is difficult and important. He achieves this first goal in a clear manner, very accessible to someone without a technical background. (Lisa Messeri MetaScience) Piantadosi assembles and presents the best of the vast amount of information we have accumulated; it will kindle in many a sense of excitement for some of the great adventures still awaiting us as a nation. (SirReadaLot.org)

Seeking to reenergize Americans' passion for the space program, the value of further lunar exploration, and the importance of human beings on the final frontier, Claude A. Piantadosi presents a rich history of American space exploration and its major achievements. He emphasizes the importance of reclaiming national command of our manned program and continuing our unmanned space missions, and he stresses the many adventures that still await us in the unfolding universe. Acknowledging space exploration's practical and financial obstacles, Piantadosi nevertheless challenges us to revitalize American leadership in space exploration to reap its scientific bounties.

This is a very enjoyable book about the possible path of human space exploration. The topics covered are those that often come up in conversation about spaceflight and whose problems are hand waved away by the enthusiasts. This book is a useful antidote. The author builds up the problems of deep space flight, nicely explains the increasing biological (life support) issues, and culminates the book by showing that star flight across the galaxy is well nigh impossible, even with ships traveling at near light speed. I read this book over a few days, finding it totally absorbing. Whether you agree with the author's analysis or not, I recommend this book for your library.

Posits a convincing argument about why humanity's future in space begins with us returning to the Moon. I now agree 100%!

Covers history and physiology of space exploration and the technical difficulties to be faced in the future while remaining very readable. Makes a great gift for a family member interested in space or your Congressman.M Lynch

Dr. Piantadosi thoroughly covers what we have learned so far about the effects of microgravity on human physiology and the anticipated negative environmental factors in space we might face because of extended stays. Like me, he feels the next logical step is the Moon.

Carl Sagan said that mankind would have to explore space to survive. Yet budget and programme cuts mean NASA has to pay Russia \$62.7 million per astronaut they carry to the International Space Station aboard Soyuz vessels. Written from an American point of view, but ultimately the view of humanity's future, this factual book reassesses the benefits and difficulties of space exploration. Robots are cheaper and easier to send as explorers than to send all the support systems required by fragile humans. Yet manned space missions have given spinoff benefits, such as Teflon, better prosthetics, telemedicine, better preserved foods, better kidney dialysis machines and advances in aviation safety. Space science has given us satellites, so improved communications, forecasting and views of changing climates - and detection of near-flying asteroids. Research will benefit humanity, whether in the field of pure physics or seeing if a biodome can grow enough food to support life on the Moon. Claude Piantadosi supports returning to the Moon, as a testing ground for the survival systems we will need to explore Mars. He analyses problems at NASA, explaining that when innovators get stifled by red tape and budget cuts they skip off to private industry. We have come an awe-inspiring distance since the start of the twentieth century, when heavier-than-air flight was first achieved by the Wrights. We have landed a robot on Titan, Saturn's largest moon, and Mars Rovers trundle across that planet and send back data. Biomedicine explores how we can live under stressful conditions, such as a year or more in space. We see comparisons with Tibetan and Andean populations, each of which has found a different physiological adaptation to altitude. Polar explorations and undersea work are all steps along the journey. Space exploration to date is of course reprised, including the tragic accidents and misfires. Living off local and recycled resources is the only way to establish a stable habitat beyond

the Moon, as the cost and difficulty of resupply would be prohibitive. The current technology for space travel is explained and combinations can be used, from solar power to nuclear power. Recycling and discovering local water and oxygen are top priority for any new base. Growing food and providing nutrients will be vital, as away from sunlight our vitamin D levels drop, and combined with microgravity our bones become brittle. The author explores the currently understood physiological alterations of space travel on astronauts, from osteoporosis to cancers. Radiation is a major hazard, both solar and background. And what to do with the trash, from human waste to food packaging? Is it ethical to start a waste dump on Mars? As to where we can go, Venus is unfortunately a hazardously hot environment so Mars is the obvious challenge. We could also visit small bodies such as asteroids - the large Ceres would be a good target - or some moons of large but further planets, such as Titan and Ganymede. As for other stars, we would need fast propulsion to reach those in any reasonable timeframe. I was astonished that Piantadosi still thinks Mercury is tidally locked to the sun (page 56). Possibly this was just badly phrased? We know now that due to orbital factors we see the same face each time it comes around, but the small planet does rotate and each 'day' on Mercury lasts two of its 'years'. A certain level of astrophysics is required to get the best out of this book, but even looking up the Lagrange points on a site like Wikipedia will give helpful diagrams (there are diagrams in this book too) and astronomers from teens to adults will be fascinated. So many combined sciences are represented that we can see biologists, medics, engineers, chemists and mechanics will all be needed if Earth people are ever to call another planet home. If one section is outside your experience the next section may prove easier to understand. The omission which surprises me most is that of the Three-D Printer, by which an astronaut could insert a diagram for a tool or other item and the printer would build it layer by layer. We are also told nothing about intelligent glass and graphene. As a lifelong science fiction fan I enjoyed catching up with some of the latest space exploration science in MANKIND BEYOND EARTH.

I am a huge reader of science texts. I've read all the popular books and I like to delve into the less well known. I've honestly never heard of Professor Piantadosi nor have I read his work before. The author looks at the history of space exploration and the barriers facing us in the future. As he says, space travel is not just about technology, it also about biology. He makes the point more than once that it is also about finances and politics. He starts off showing the passion of the people who made it to the moon and explains the difficulties they faced. As we go through the book, he explains the importance of sustenance, waste removal, air for breathing, propulsion, distances, the effects of radiation on physiology and technology and so much more. Who will be the people exploring, what

will they explore and how will they do it. Some people may not like his style of writing. Like many scientific texts, it's written in a mostly informal essay style. While everything he says is related, he tends to jump around a bit. In the space of just a few pages, he explains the measurements we'll use in space (not just KM and light-year but AU and parsec), biomedicine, stress and the effects of radiation. Stuck in there is a great discussion of the people who live above 12,000 feet and how they have adapted to that life. I say some people may not like it, but I found the entire thing to be fascinating. I've never seen some of the concepts explained as well as the author does it. There are a lot of topics I have never seen addressed for the layman. This book is sort of like National Geographic for the Space Explorer. Maybe even a little popular mechanics thrown in for good measure. I really enjoyed it and recommend it to anyone who likes general space science. Give it a few chapters to decide whether or not to finish. If you can make it to chapter 3, you'll have a good feel for his writing. I found it to be a bit quirky but, in the end, a great way to approach so many topics. Space travel really is complicated, more so than many people believe.

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