the spread of this speculation and subsequent inspiration of
the public. Such an approach to astrobiology is needed to
foster wide support for the science and the space exploration
on which its mission depends.

**Jamison Brewer**
Emory University
Atlanta, Georgia 30322, USA

---

**Moon Lander** by Thomas J. Kelly. Smithsonian Institution
Press, Washington, D. C., USA, 2001, 283 pp., $27.95 cloth

Many readers of MAPS periodically write proposals for
funding to NASA or some other national science support
agency. **Moon Lander** is the memoir of the lead author on one
of the most important funding proposals of all time. In 1962, a
100-page proposal by Thomas Kelly and his team managed to
convince NASA to award the contract for building the lunar
landing module (LM) to Long Island's Grumman Corporation,
despite that company's limited previous experience with the
space program.

Obviously, Kelly is a capable stringer of prose. Don't let the
five page list of acronyms at the beginning fool you. This
memoir is written in an approachable style, and if you have
even a passing interest in space exploration it will grip your
interest. It constitutes an important primary source for the
history of human exploration. The culture of NASA and its
contractors in the 1960s is documented from the perspective of
a key actor in NASA's greatest triumph. After writing the
winning LM proposal, Kelly went on to serve as Chief Engineer
for most of the detailed design phase, and he was later (and not
voluntarily, he admits) shifted to supervising the Manufacturing
and Test operations.

The ungainly looking LM was the Kelly team's answer to a
unique design challenge: a vehicle for transporting humans
exclusively in airless space. Weight and safety were the
overriding concerns. The book describes many difficulties that
Kelly and his colleagues overcame in the detailed development
of the LM. The LM's weight kept gradually creeping up between
1962 and 1965, as preliminary conceptual models for parts were
replaced with actual prototype hardware. Draconian measures
had to be implemented before the weight finally stabilized at
about 15 tons (~1.5 times the initial concept).

In today's "tech" era, it is impressive to note that the Apollo
hardware was designed when a high priority (and cause for
"bragging within Grumman...for weeks") was acquisition of a
few of IBM's latest "Selecric" typewriters. Throughout the
book, Kelly implicitly acknowledges that he was merely one
player on a colossal technology team. A great many other
important people are described, thoughtfully and
compassionately, including some colorful descriptions of
Apollo astronauts. Kelly seems humble, and commendably
frank about the mistakes he and his team inevitably made in
their work. The Apollo 8 mission, which turned out to be a
terrific success as a Christmas appetizer before the actual (July
1969) lunar landing, was only flown because Grumman was a
few months tardy with delivery of the LM. It was tardy in part
because Kelly had made a poor selection for the materials initially
used for wiring and connectors.

The last few chapters of the book relate how during the
Apollo landing missions Kelly and other Grumman personnel
interacted with NASA to rapidly diagnose and overcome rare
LM-related malfunctions, some of which occasioned great
suspense. The LM won special renown when it served as the
"lifeboat" for Apollo 13. Thanks to improvements in the Saturn V
launch vehicle, the final three LM's were allowed to be heftier,
and they packed a more powerful set of hardware for scientific
exploration, including the lunar rovers.

This book is a flat-out good read. I recommend it highly.

**Paul H. Warren**
Institute of Geophysics
University of California
Los Angeles, California 90095-1567, USA

---

**Noble Gas Geochemistry** by Minoru Ozima and Frank A. Podosek.
Cambridge University Press, Cambridge, United Kingdom
2002 (Second Edition), 286 pp., $80.00 hardcover. (ISBN
0-521-80366-7).

When my students have asked me for a good textbook about
noble gases, the answer has always been, "Read 'Ozima and
Podosek'. It is an excellent introduction and not too thick."
Since quite a while, however, I have had to add, "Well, it has
become a bit outdated, but there is no comparable more recent
text." Now, after almost 20 years, the long-awaited second
edition of this classic has appeared. I expected this to be a
much thicker volume than its predecessor, since, in the authors
words, "This discipline [noble gas geochemistry] was still
comparatively underdeveloped [in 1983], and few people
seemed to expect that this apparently arcane subject would
become one of the major tools of geochemistry." Actually,
however, this is still a concise book, inviting rather than
discouraging reading. So, how did the authors manage to
accommodate the tremendous amount of work over the last
two decades? Basically by having produced an almost entirely
new book. Most sections have been completely rewritten and
the entire volume has been reorganized. Many of the highly
useful data tables have been updated or replaced without
considerable overall expansion. Of course, there are also