

Publications Watch

Notes on recent books and articles pertaining to SETI and bioastronomy.

Book Review by Andrew J. LePage

Kraus, John, **Big Ear Two: Listening for Other-Worlds**, Cygnus-Quasar Books, P.O. Box 85, Powell, Ohio 43065, 1995, 370 pages. ISBN 1-882484-12-6 (paperback), \$14.95.

When I was asked to review this book, I agreed to do so with a bit of trepidation. Over the years I have seen dozens of books published on SETI, but few that provided any truly new insights into the subject. I already know about the Drake Equation, why communicating using radio or light is better than using interstellar probes, the difficulty of locating magic frequencies, and so on. Judging from the title, I feared I would have to endure more discussions on the same old topics.

Before I was even a dozen pages into the book, I came to the realization that it was not what I expected. This is not a work devoted primarily to SETI: Only the last fifth deals with that topic in any way. Nor was it a book devoted to the history or science results of the famous Big Ear radio antenna. Combined with the portions of the book on SETI, this accounted for less than one-half of the text. Rather, this book is an autobiography of the professional career of John Kraus and the path that led him to the frontiers of radio astronomy. To my surprise, as I read more, I discovered someone I already knew. This was something more than a case of "Oh yeah, it was John Kraus who did that." I found I could easily appreciate his life experiences, for they are shared by many scientists and engineers, myself included.

Big Ear Two is the up-to-date second edition of John Kraus' book *Big Ear*, first published in 1976. This book is broken up into 33 chapters that average just ten pages each. Each chapter is an artfully crafted, non-technical vignette about the author's life that can be comfortably read individually in the space of a coffee break or read one after the other during a rainy night reading binge. Regardless of which method is used, the reader will slowly discover that an enjoyable mosaic is being produced before his or her mind's eye one tile at a time.

The book begins in the early 1920s with the growth of radio and how it affected a young John Kraus. Like many children of his time and since, Kraus relates how he and his friends first set up a neighborhood telegraphy, then later a telephone system. He continues to tell of his experiences in high school with early ham radio and later in college when he studied electrical engineering.

Eventually, these two avenues lead him to his first claim to fame: antenna design. In the late 1930s, John Kraus built the first directional flat top beam antenna based on his readings of an obscure theoretical technical paper. In a series of classic articles

in several popular ham radio periodicals, he single-handedly made this and several other of his new designs the most popular directional antennae among amateur radio operators of the day.

By the late 1940s, after starting his long career at Ohio State University, John Kraus developed the highly directional helical beam antenna which still has wide application today. He also wrote textbooks on antenna theory and electromagnetics. I discovered that I had used one of the updated editions on electromagnetics as a supplementary text when I was a physics student decades later.

John Kraus' interest in radio astronomy started while he was a graduate student at the University of Michigan in the early 1930s. Inspired in part by Karl Jansky's early radio astronomy

work, the author and a fellow graduate student made use of experimental 1.5-centimeter radio equipment in 1933 to perform an impromptu search for solar radio emissions. While this first-of-its-kind attempt was unsuccessful, the experience stuck with the author. Eventually these and other events led Kraus to build the first radio telescopes at Ohio State in 1953, using an array of helical antennae of his own design.

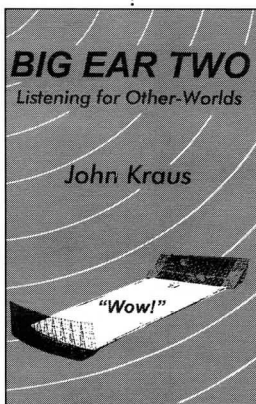
By the time I reached Chapter 15 and the beginning of the story about the Big Ear radio telescope project, I was hooked. I had totally forgotten my initial misgivings about this book. The story of the building of Big Ear, which at this early stage of

radio astronomy was among the largest radio telescopes in the world, was truly fascinating. The fact that such a powerful instrument was built on a shoestring budget primarily through the use of student and faculty labor should be inspiring to present-day SETI enthusiasts. The same engineering and cost constraints that led to the Big Ear design are equally valid today. Perhaps lessons here will inspire SETI radio amateurs to build their own scaled-down, yet powerful versions of this antenna.

The book goes on to describe the now famous radio surveys conducted with the Big Ear facility. Of course there is the obligatory starting-with-the-basics discussion about SETI. While this section of the book broke no new ground on the topic for me, it is well-written and would be enjoyable to the uninitiated.

The only major complaint I have with the book involved the last handful of very short chapters. They appear to have been tacked onto the end of the book as an afterthought. Ultimately, I feel the book takes an unexpected left turn into the realm of environmentalism and other topics that on the surface appear to have little to do with SETI. While I can understand Kraus' intent and the fact that in his later life environmentalism became important to him, I found it to be a bit too preachy for my taste. Still, viewing the book as a whole, I consider this to be only a minor distraction.

John Kraus' career did not follow a straight-line progression



from boyhood fascination with radio to radio astronomy and SETI. In addition to the work and interest in radio, there are stories of the author's tour of Europe in 1934 during the rise of Nazi Fascism and the most oppressive days of Collectivism in the Soviet Union. Kraus's career detours included holding a job during World War Two as a operator of a cyclotron—a machine that attempts to find means of defeating magnetically-triggered mines.

Like most engineers and scientists, John Kraus' career was not a straight path to some predetermined goal. Kraus worked on many unrelated projects before circumstances and luck led him to the new science of radio astronomy. It is this unpredictable tale of one man's professional life journey with all of its twists and turns that makes this book worth reading. Combined with its insights into the history of radio astronomy, I think that *Big Ear Two* should be read by everyone with an interest in SETI. See the article by Dr. Robert Dixon in SETIQuest Vol.1 No.3 for more information on OSU SETI and *Big Ear*. 📖

Books in Brief by Larry Klaes

Fogg, Martyn J., *Terraforming: Engineering Planetary Environments*, Society of Automotive Engineers, Inc., Warrendale, PA, 1995, ISBN 1-56091-609-5 hardcover, \$49.00, 544 pages.

This book is likely to become the definitive reference work on the subject of changing other planets into Earth-like worlds for some time to come. Fogg looks at the numerous methods, both past and present, on how to convert currently barren and hostile planets, such as Venus and Mars, into places where Earth life might one day exist and thrive. Ideas are presented on how we might bring life to the Cosmos. Perhaps ETI have done or will do the same with the worlds of their own solar systems and beyond.

Forward, Robert L., *Indistinguishable from Magic*, Baen Books, New York, 1995, ISBN 0-671-87686-4 paperback, \$5.99, 372 pages.

With essays and stories, physicist Dr. Forward explores the more speculative realms of scientific concepts such as starships, faster than light drives, and space warps. In the future, these may be the methods we — and perhaps other intelligent beings — will use to attain and colonize the stars.

Heidmann, Jean, *Extraterrestrial Intelligence*, Cambridge University Press, New York, 1995, ISBN 0-521-45340-2 hardcover, \$24.95, 235 pages.

Translated into English from the 1992 French edition, this work is a primer on most facets of exobiology and the search for its intelligent manifestations. See the book review in the September, 1995 issue of *Astronomy* magazine, page 100. Heidmann is the author of the 1992 book *Life in the Universe* (McGraw-Hill, New York), translated from the 1989 French edition.

Zuckerman, Ben, and Michael H. Hart, Editors, *Extraterrestrials, Where Are They?*, Cambridge University Press, New York, 1995, ISBN 0-521-44335-0, hardcover, \$39.95, ISBN 0-521-44803-4 paperback, \$19.95, 228 pages.

A revised edition of the 1982 collection of essays, this book primarily features the opinions of biologists on the existence of life beyond Earth. Most of the authors tend to hold negative views on the subject. They feel that if even a few ETI developed technological civilizations in the distant past, they should have colonized the Milky Way galaxy by now and we should see clear evidence of their existence. The fact that we have yet to detect such signs seems to indicate that ETI at least do not exist in our galaxy. See the book review by Robert Naeye in the November, 1995 issue of *Astronomy* magazine, page 100, and the ordering information on page 103 of the same issue. 📖

Periodicals by Larry Klaes

Ad Astra

July/August, 1995, Vol. 7, No. 4

Savage, Marshall T., "Dawn of a New Millennium," pages 40-43.

The founder of the First Millennial Foundation tells why and how the human race needs to colonize the stars if we hope to survive and flourish in the coming centuries. The Foundation has its own World Wide Web (WWW) site at: <http://www.csn.net/~mtsavage>.

Bennett, Gary L., "Stargate: Fact or Fiction?," pages 44-47.

The distances between most stars in the Milky Way galaxy are tremendous. They are so vast, in fact, that even light—traveling at 300,000 kilometers (186,000 miles) per second—requires years to traverse the distances between even the nearest of these suns. Since nothing yet known can move faster than light (FTL), this means that those who might someday explore the galaxy in starships will require anywhere from decades to millennia to reach other star systems, even if their craft can attain a velocity of 99 percent light-speed.

Perhaps, however, ways can be found to circumvent this cosmic speed limit so that we may access areas of the galaxy using velocities and time factors that are presently considered only science fiction. The author examines a number of potential FTL methods that were explored at the May, 1994 NASA and JPL workshop on "Advanced Quantum/Relativity Theory Propulsion." Some possibilities include wormholes (tunnels in the fabric of space-time), faster-than-light particles known as tachyons, and even warp drive. Some of these methods may have already been discovered and utilized by very advanced ETI, along with concepts which we have yet to learn of.

We need to consider ways to expand our habitat into the galaxy, as it eventually becomes a necessity for all living beings who dwell on planets orbiting stars, since every sun has