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Chapter 3

Krafft Ehrlicke at 100 Years: The Moral Imperative of Space Exploration*

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Abstract

Space visionary Krafft Ehrlicke, who would have celebrated his 100th birthday last year, is known for his concept of the “Extraterrestrial Imperative.” He believed that space exploration is not simply a succession of individual missions, but a necessary long-term journey, to discover new scientific principles, and to create new civilizations for mankind. He explained that space was “imperative,” because within the “closed” Earth, mankind would reach the point of competition for dwindling resources. This would lead to conflicts and could lead to war. The exploration of the Solar System provides mankind with an “open” world, without limits. But in addition to the practical considerations and benefits of spaceflight, Krafft Ehrlicke was most concerned with the philosophical and moral imperative that space exploration exemplifies. What will guide mankind into the future, Krafft Ehrlicke believed, was “the moral law within him,” and his “power of reason.” He fought passionately for this philosophical view when the notion of limits to growth and anti-science movements were becoming “popular.” This commitment to challenge what was popular, and fight for a positive future,

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distinguished Krafft Ehrlicke from the great majority of space professionals and enthusiasts.

I. Introduction

Krafft Ehrlicke was one of the most remarkable men of the Twentieth Century, whose work, more than 30 years after his death, still embodies the moral imperative and provides the guideposts along the pathway to the future. Although his contributions to space exploration spanned the entire range of scientific and engineering concepts, from the utilization of Earth orbit, to the industrial development of the Moon, and exploration throughout the Universe—most of which, decades later, still remain to be realized—what distinguished him from other talented and creative visionaries was his uncompromising and passionate commitment to the future of mankind.

To Krafft Ehrlicke, space exploration was not simply an end in itself—no matter how important that practical end may be—but embodied the rekindling of the noblest qualities of humanity. The incorporation of man into the Universe would be a concrete expression of his creative potential, and that of the Universe, itself. In his view, the mastery of the universe would require that mankind recapture the morality as well as the creative qualities that were under threat, and almost entirely destroyed, by the anti-human, anti-growth, and anti-science Malthusian disease of the 1960s. He was able to see that the logical consequence of this self-destructive pathway could be the very end of civilization. This gave great passion and urgency to his life's work, dedicated to make available to mankind the alternative “extraterrestrial imperative,” to realize the great potential that lies within civilization, and just beyond the Earth. But in order to accomplish this evolution of man, mankind would have to marshal not only his science and technology, but “the moral law within himself.”

One may wonder why Krafft Ehrlicke's name is not a household word in the history of spaceflight, like that of Wernher von Braun, who, in fact, lauded Krafft Ehrlicke's contributions to his own work. The reason is that Krafft Ehrlicke never bowed to popular opinion. He never changed or “toned down” his thinking in order to become acceptable to the ideological mores of the time. While his universal principles were recognized and greatly admired by his peers, with the zero growth cultural paradigm shift of the late 1960s, they had become “unpopular.”

At the Fusion Energy Foundation, we came into contact with Krafft Ehrlicke after he had read the April 1981 issue of *Fusion* magazine, with a cover story on using fusion propulsion for colonizing space. He wrote a letter to the

editor, stating that he had also developed concepts for using fusion energy in space. The editor invited him to contribute to the publication, which he happily did. Krafft Ehricke's concepts for the advanced fusion propulsion that could take man beyond the Moon, followed upon his development, in the 1960s, of the world's first energetic liquid hydrogen upper stage, which earned him the moniker, "father of the Centaur rocket." The Centaur opened up the entire Solar System for exploration by the robotic representations of man's intelligence.

While an Associate Editor of *Fusion*, I met Krafft Ehricke in October 1981 at his home in La Jolla, California. He showed me a file of letters from publishers, rejecting his manuscript for a 1971 book titled, "The Extraterrestrial Imperative." The publishers objected that the book was "too optimistic," and promoted technologies such as nuclear energy, which were "unpopular." Indicative is a letter dated 5 January 1976 from Praeger Publishers: "It certainly deserves to be published. However, I am afraid that because of its theoretical and futuristic or long-range perspective, it is not suitable for Praeger's Special studies division." The book has never been published.

When the Fusion Energy Foundation and the Schiller Institute were organizing a Krafft Ehricke Memorial Conference in 1985, following his death in December the previous year, a German-born scientist at NASA who was asked to participate, declined, saying that Krafft Ehricke stubbornly would not change or adapt his ideas to make them more acceptable. This is the societal sickness that Krafft Ehricke passionately fought against his entire life.

To Krafft Ehricke, there was no compromise with principles or the sanctity of the human mind, which was a central characteristic of his philosophical outlook. When discussing how he mentally survived Nazi rule in Germany, in an interview, excerpted in a 1960 book by space historian Shirley Thomas, *Men of Space*, Krafft Ehricke said he

"always had the tendency to reserve ardent judgment on important things. I would go along only so far, then I just wouldn't be told. No matter what it was, what the field, I wanted to think it out for myself. This was instinctive at first; later I was consciously afraid to surrender my capability of judgment. With the change in government, the advent of Hitler in 1933, this trait protected me—though it also got me into great difficulty ... it helped me very greatly in holding a line of thought in the Nazi era ... I like to paraphrase the saying 'my home is my castle.' To me, my mind is my castle. A part of it no one may enter ... I must have this ultimate, internal refuge, in which I am completely myself; only then am I really in individual."

Today, despite stunning advancements, such as long-term living and working in space, exploring every major body in the Solar System, and increasingly uncovering the secrets of the universe, scientists have, in many cases, accepted

limits on their vision for the future. Krafft Ehrlicke insisted that there are no limits on man, except those that he imposes on himself.

II. The Power of Reason

Krafft Ehrlicke never doubted that man would develop the technologies that would take him into space. But in 1957, even before the opening of the Space Age with the launch of *Sputnik*, he crafted what he considered to be most crucial—the philosophical worldview that should guide whatever progression of technologies would be developed to explore space. His three laws of astronautics were included in an article under a title curious for the usual writings about space policy: “The Anthropology of Astronautics.” Krafft Ehrlicke’s 1957 “Three Fundamental Laws of Astronautics” state:

- “1. Nobody and nothing under the natural laws of this universe impose any limitations on man except man himself.
2. Not only the Earth, but the entire Solar system, and as much of the universe as he can reach under the laws of nature, are man’s rightful field of activity.
3. By expanding through the Universe, man fulfills his destiny as an element of life, endowed with the power of reason and the wisdom of the moral law within himself.”

The ultimate anthropological meaning of spaceflight, Krafft Ehrlicke says in the article, will be mankind’s ability to “live elsewhere.”

In 1970, when the zero-growth counterculture was becoming hegemonic and Krafft Ehrlicke was preparing the manuscript for his book, *The Extraterrestrial Imperative*, he created a chart to make explicit why development, representing a Renaissance view of man, was imperative. The graphic depicting Growth Versus No Growth, makes starkly clear what the consequence of a philosophy of limits would be. While the choice of growth leads to an educated population, international cooperation, and advances in technology and science, the “No Growth” pathway leads to regional chauvinism, geopolitics, mass starvation, epidemics, and war. Look around the world before you, and you see the consequences of the “No Growth” path that Krafft Ehrlicke warned, more than 40 years ago, would result from a bestial view of mankind.

The depth of Krafft Ehrlicke’s understanding that it was not technology, per se, that would enable man to create new civilizations beyond Earth, but a revolution in cultural, moral, and political values—those embodied in the European Renaissance, the German Classics, and the United States Constitution—found a coherence with those of the Schiller Institute, which was founded by Helga Zepp-

LaRouche in 1984. Moreover, the Institute, and other organizations founded by Lyndon and Helga LaRouche, were also engaged in a fight to create a cultural and political paradigm shift, back to the Renaissance ideals that had created the New World.

The Institute was founded to promote a return to classical culture, scientific advance, and economic development, as the alternative to the destructive economic, geopolitical, and counterculture policies that were destroying the Western Alliance, and the future of mankind. Krafft Ehrlicke joined the Advisory Board of the Schiller Institute. Helga Zepp-LaRouche described this coherence of ideas: Like herself, she said, Krafft Ehrlicke

“was also convinced ... that only through space travel, only when man lifts his eyes from the Earth, looks into the stars and actually thinks what his role can be, can we achieve what Schiller called the dignity of man. And only if we start to think about space, and the colonization of space, will the Age of Reason that the great humanists of European civilization were thinking of accomplishing, be possible. That was the belief of Schiller, that was the belief of Krafft Ehrlicke. The fact that man is capable of reason, even under the most horrible conditions of crisis, is our most fundamental belief.”

In November 1984, the Schiller Institute held its third international conference. Unable to attend due to illness, Krafft Ehrlicke sent the following message to the meeting, locating his prescription for the future of mankind in space, within the long sweep of history that should inform mankind’s future path:

“Greetings to the Friedrich Schiller Institute, to its Chairman, Helga Zepp-LaRouche; to its goal of a strong, revived American alliance with Europe, and to the defeat of the neo-Malthusian ‘Green’ parties menacing Western Europe.

I have been from the Moon to light years out and never found a limit to growth ... Growth is the increase in knowledge, in wisdom, in the capacity for growing in new ways. Crises must be solved by leaping over the apparent limits to growth ... At the present point in history, our highly technological civilization faces another crisis of energy, materials, production space, and means of material processing. But man’s capacity for reason allows him to establish a ‘third earth’ in the extraterrestrial environment based on a more concentrated form of energy—nuclear fission and fusion ... If four or five or six billion people will fall back on a lifestyle of a very embryonic mankind, it will destroy mankind by billions, and it will devastate the biosphere.

Civilization is the ascendancy beyond brutality, beyond the recognition of plurality, the recognition that there are various ways to live and in which to explore nature ... Medieval European civilization, frozen in the narrowness of its small, rigidly controlled communities and tightly bound to all-powerful religious dogmas, was in the Twelfth and Thirteenth Centuries dangerously close to [be]coming another static civilization, like those of ancient China, Japan, India, or the Incas on this continent. The sudden recog-

nitition that here there was the wide and beautiful Earth waiting to be taken by man, overwhelmed and emboldened the great thinkers of that time ... This was the crowning achievement of the Renaissance.

Now we begin to realize that the Solar System, and probably even parts of this Galaxy, can be ours. The consequences, for all phases of human existence, of the practical application of the second law of astronautics, during the coming centuries, almost defy our imagination, just as the world of today would be almost inconceivable to the Renaissance pioneers. We today are merely the shipbuilders for the men and women who will enter a new era of discoveries and lay the foundations for those who will come after them, those who will develop planetary technologies and create cosmic civilizations.”

Krafft Ehrlicke’s assertion that “civilization is the ascendancy beyond brutality,” was under existential threat, no different than that under fascism in the 1930s. On 28 November 1981, Krafft Ehrlicke gave a presentation in New York City, having just returned from a speaking tour in Europe with Helga Zepp-LaRouche.

Riding in the car from the airport in New York to Manhattan, he was clearly shaken by his encounter with violent anti-nuclear Green mobs at speaking venues in Germany. He opened his presentation on the extraterrestrial imperative, stating: “It is a little bit disconcerting that the same shock troop kind of tactics stand at the end of one’s life as I have seen as a young man in Berlin in [19]29, [19]30, [19]31.” He continued, “The youth of West Germany and other nations have unfortunately been greatly misled ... today, if a person even talks about space flight or nuclear energy, then the ‘ecopaths,’ the cultural pessimists, and associated professional chaoticists literally characterize this to be an outright provocation that they will do their utmost to prevent.” The police had to be called to prevent violence when students at a university venue tried to bar the speaker’s entry.

The Greens have no positive proposals, Krafft Ehrlicke said. But assume that it is true, that there are limits to growth, and the “technological clock had to be turned back to more primitive times, in order to ‘save’ the planet.” What are the consequences? To what agony do we condemn a majority of mankind? What is our moral imperative? To Krafft Ehrlicke, the answers to these questions were not academic, but would test the “moral law” within mankind.

“Let’s for the sake of argument assume that their view [of limits to growth] is correct. Are we thus to suffer indefinitely, because relief-providing technology could be misused? In 1979, of all things, in the Year of the Child of the United Nations, there were 12 million children who did not reach their first birthday. That’s 50 percent more than all battle deaths in World War I, in four years. And that is an outrage to a species that calls itself civilized. This is to say nothing of the suffering of those children before they died, to

say nothing of the suffering of the mothers who bore those children, just to see them die and not be able to feed them. This is unbelievable agony.”

The myths that were perpetrated as the Apollo program ended, prematurely, enforced the cultural pessimism that was created by the policies of a war of each against all for a supposedly diminishing supply of the basics of life.

Krafft Ehricke and collaborator Elizabeth Miller wrote a yet-unpublished book, titled, “Exploration of the Solar System and Interstellar Space,” in which they list “Paradoxical Attitudes Detrimental to our Future in Space. **First Paradox:** In one brief decade, the US space program has been vigorously supported and then allowed to dissipate on the eve of its greatest achievement thus far: manned lunar landing. **Second Paradox:** Manned lunar landing is thought of as the end. It is only the beginning. **Third Paradox:** Meanwhile, initial space program spinoffs have benefited not only science, technology, management and industry; but, for example, defense, education, medicine, communications, and many aspects of the American economy. In spite of this, the American public erroneously believes that space program expenditures deny progress in the later four areas. **Fourth Paradox:** The biggest thing about the space program is its demonstrated and potential value—not its budget. Considering the program’s innovative impact upon mankind, never has so much been accomplished with so few dollars.”

In an effort to combat this cultural paradigm shift that had taken place over the previous decade, and to give direction to a new President, Krafft Ehricke wrote a letter to the fortieth President of the United States, Ronald Reagan, on 3 March 1981. He described dramatically the moral crisis faced by mankind. While he naturally outlined his concepts for the steps the President should take in space exploration, he located them not in an academic or even scientific argument, but minced no words in placing them in the context of what gave them great urgency.

“Space,” he said, “will not turn this planet into a paradise, but will help to combat a much more important problem—to prevent it from becoming a hell... . Indeed, Earth becomes an evermore unpleasant ‘space ship’ at an increasing rate for an increasing part of its population. Rising poverty, wrong economic and social agendas, wrong energy policies ... and spreading political intolerance causing immeasurable suffering to millions of refugees in Africa and Southeast Asia, as well as Central America—these inhuman realities are with us, not because of what technology and industry do, but because of what they are prevented from doing.”

Referencing his extraterrestrial imperative, Krafft Ehricke outlined for the new President the manned missions, lunar development, space applications, and series of robotic Solar System missions that should be the center of his space policy. He concluded his letter on this philosophical note:

“The history of flight is a history of overcoming limits to growth through human courage and engineering creativity, through [a] thirst for freedom and a commitment to infinity. It has led us into the extraterrestrium with countless challenges to our courage, resolve and creativity—forward-oriented, solution-oriented and, finally free from the recriminations of past history, if we can humanly rise to this challenge.”

III. Living in the Future

Six weeks before his death, and while gravely ill, Krafft Ehrlicke traveled from his home in California to Washington, DC, and delivered the keynote address at the “Lunar Bases and Space Technology of the 21st Century” conference, held 29–31 October 1984, sponsored by NASA and hosted by the National Academy of Sciences. The organizers of the conference—lunar scientists from NASA’s Johnson Space Center in Houston—had recently become familiar with Krafft Ehrlicke’s work through a series of articles he had written for *Fusion* magazine, which I had given them at an earlier lunar conference in Houston. Wendell Mendell, the moderator of the Washington conference, had never met Krafft Ehrlicke before this event, but easily recognized the unique quality of the speaker.

Mendell, in introducing the keynote, said there were a number of colleagues and friends who had asked to make preliminary remarks. One was Fred Durant III, a man with an impressive career himself, as a World War II Navy flight instructor, president of the American Rocket Society, president of the International Astronautical Federation (IAF), and top official at the National Air & Space Museum, from 1964 to 1980. He died two years ago [2015], at the age of 98. Fred Durant met Krafft Ehrlicke in the early 1950s, and related how, in 1952, he presented a paper for Krafft at the third IAF Congress. After reviewing some of what Krafft Ehrlicke had accomplished, he observed:

“But Krafft is not happy unless he is writing what *can* be done, and what our progeny, what our grandchildren may see. I will say that is a lonely world where Krafft lives part of the time, because it is the future...”

In 1948, one year after arriving in the United States, Krafft Ehrlicke wrote (in English), “Expedition Ares: A Saga from the Dawn of Interplanetary Travel.” Set more than 400 years in the future, the story looks “back” at the history of space exploration and at Expedition Ares, a manned mission to Mars that took place in the year 2000. At the turn into the Twenty-first Century, Krafft Ehrlicke wrote, “circling Earth in small scout rockets, scientists and engineers, dreamers and adventurers, found themselves on the brink of vast emptiness beyond which new worlds lured and stimulated their desire to remove the barriers erected between man and star. The first attempt to realize these dreams is known in history

as Expedition Ares.” Later missions, in his story, would take crewed ships to every planet in the Solar System.

The vehicles, and propulsion system, the necessary in-space maintenance and repair of the ship, the dangers through the Asteroid Belt and encounter with a previously unknown asteroid, are told in great detail. Many of the challenges, and failures, faced on these missions would happen in real life, throughout what would later become the first 60 years of the Space Age.

Twenty years later, after the Space Age were well underway, during a symposium by the American Astronautical Society in 1966, Krafft Ehrlicke presented his view of what the Space Age would hold 34 years later, at the turn of the century, in 2001. Michel van Pelt, in the introduction to his recent book, *Dream Missions*, included the following from Krafft Ehrlicke’s presentation at that symposium: “Today, in the fall of 2000, the interplanetary flight corridors from Mercury to Saturn are alive with manned vehicles of relatively luxurious and sophisticated design, driven by quite advanced propulsion systems ... Our helionauts ... have covered the solar system from the sun-scorched shores of Mercury to the icy cliffs of the saturn moon Titan. They have crossed, and some have died doing so, the vast asteroid belt between Mars and Jupiter and have passed through the heads of comets...” As van Pelt observed: “Looking back at the short history of the space age up to that point, you can understand the optimistic extrapolation through which Ehrlicke and others arrived at a glorious interplanetary infrastructure 34 years into their future.”

But while at the turn of the century, these manned missions did not materialize, van Pelt reported, in that same presentation, regarding nearer-term unmanned space systems, Krafft Ehrlicke was largely on the mark. He predicted that by 2001, “Unmanned probes have approached the Sun as close as 0.15 AU. Large and very advanced unmanned probes have reached out as far as the planet Pluto, and at this moment rove the vast, dark regions of trans-Pluto and interstellar space.” Van Pelt observed that “Ehrlicke was even more on target with his 1966 vision of the future of Earth-orbiting satellites,” anticipating that “satellites of many nations began to form a virtual super-structure above the surface of our planet; forestry, plant disease detection, weather observation, communication, air and sea traffic control have become matters of global concern.”

But exploring and utilizing near-Earth space, industrializing the Moon, and exploring our neighboring planets was not a limit for Krafft Ehrlicke. His goal was the ultimate freedom for mankind—to completely cut the bonds to Earth.

IV. To Roam the Solar System

Krafft Ehrlicke proposed a stepwise development of space, leading to his long-term goal, which he articulated in a 1974 paper presented at the 25th International Astronautical Congress. "I believe the true goal of Man's space capability is not destination Moon or Mars or any other point in the space-time continuum of the universe," he wrote. "The goal is destination mankind—the realization of its noblest dreams and aspirations. In dedication to this goal we will go anywhere, consistent with the laws of nature. Without this dedication," he warned, "we will go nowhere."

The first step would entail the use of near-Earth orbits, to be populated by unmanned satellites, for Earth applications, scientific experiments, and astronomical observatories. A small space station, for a dozen crew, serviced by a reusable shuttle, would begin the process of learning to live in microgravity. He proposed that this small space base could become a major international facility.

Following the industrial development of the Moon, which could supply raw materials, manufactured goods, and fuel, Krafft Ehrlicke's city in orbit, Astropolis, would be built.

In an undated manuscript for perhaps a short book, titled simply, "Man in Space," Krafft Ehrlicke described the transition to a self-sustaining space community in orbit, which he called "Astropolis," or a city in space.

"Human civilizations have so far been planar, completely Earth-bound, and therefore two-dimensional. The civilizations that extend into space will be three-dimensional. In the benign environment of space orbits they will construct architecture that will be more enduring than anything ever built on Earth.

Once self-sustaining, self-reproducing space communities are in existence, three-dimensional civilization will have been fully developed. Unquestionably, the first of these communities will be in satellite orbit about the Earth. They will—and indeed must—be an integral part of mankind. This means they must be international in population, and a common achievement of nations—reflecting mankind's new awareness of planetary responsibility and the realization that new beginnings can be made to give ever greater substance to the spirit of international cooperation on Earth. This will be sparked and catalyzed by Earth's citizens' 'new experience' in space and its social implications.

The space city-state of the future will be supplied with raw materials not only from Earth, but from Moon and other planets. In fact, they are likely to maintain their own prospecting ships in the asteroid belt and their own mining operations on other planets.

Let us, therefore journey some 30 or 40 years into the future and visit the first completely self-sufficient man-made world beyond Earth.

Astropolis—city of the stars—races around its mother planet from pole to pole at 17,000 miles per hour. It is a magnificent island in space—home of the first space university, the first orbiting hospital, the first large-scale manufacturing and hydroponic farming facilities in our skies. It is also a vacation resort. Initial resident population: 1000.

Should you decide to be one of the first tourists, your round-trip ticket will be about \$3000; and your hotel accommodations, including meals, around \$80 per day.

Astropolis is just 30 minutes from Earth via fast passenger transport ... Fully supplied and occupied, Astropolis would weigh about 12,000,000 pounds on Earth. It took ten years to build and two years to assemble in space.”

A detailed description of the architecture followed, and a set of line drawings, showing a structure with four wings, with a central Hub at the axis of rotation. The city-state included a shopping mall, a space university, and cultural/recreational facilities. The university consisted of several laboratories with varying gravity levels. There were “biological and space operational testing grounds. But, like botanic gardens, aquariums or zoos, they not only served science and advanced space technological services. They were also popular tourist attractions, and are in constant demand by motion picture corporations.”

In the 1974 paper, which is titled, “Space Stations: Tools of New Growth in an Open World,” Krafft Ehrlicke provides a very detailed description of this man-made city in space. It is a rotating structure with different simulated gravity levels at different distances from the Hub. The Residential Modules have apartments and a public space, plus a multi-storage business and supply center. The Research Section is organized for basic and applied research on Astropolis.

The partial-Earth gravity environments of the Moon, Mercury, and Mars could be simulated, which they could not be on Earth. There could then be Other World enclosures where the fidelity of the planetary simulations would increase as samples from other worlds became available for study, he proposed.

Astropolis would be an urban facility, and the first step in “extraterrestrialization.” But it would still be dependent upon the Earth and the Moon. The next step would not only be the creation of “new Earths,” but the ability to “set them free.”

Russian space visionary Konstantin Tsiolkovsky “suggested in 1895 that mankind may eventually ‘reconstruct’ the solar system so as to use more efficiently the biologically valuable region around 1 A.U. from the Sun to utilize essentially the total solar energy output,” Krafft Ehrlicke summarized in an unpublished work, “Long Range Aspects of Interstellar Exploration.”

“Earth, of course, occupies only a tiny section of the huge circumference of its orbit, which could accommodate 70,000 Earths if we line them up side by side like a string of pearls.” In the future, he asserted that “the establishment of planetellas for a few thousand and eventually a few million peoples [*sic*] is a modest undertaking which should be realizable in the next one or two centuries.”

Later, Krafft Ehrlicke would refine Tsiolkovsky’s concept, suggesting that with fusion power, it would not be necessary to move mass around the Solar System to make new planets to be placed in orbit in the “habitable zone” occupied by Earth. You could create fusion-powered “suns” and take them to where the mass in the Solar System resides, creating new habitable zones there. These new planets, which Krafft Ehrlicke called “androcels,” if outfitted with their own life-giving “sun” and propulsion systems, would be free to roam the Solar System and beyond, giving mankind his ultimate freedom.

In “Long Range Aspects of Interstellar Exploration,,” Krafft Ehrlicke explained that

“...advances in nuclear fusion technology lays [*sic*] the technological foundations for the development of artificial sunlets (helioids) ... [which] provide the necessary prerequisites for opening the outer solar system to human colonization. Instead of reconstructing the solar system by transposing more planetary matter into the Sun’s ecosphere, as surmised by Tsiolkovskii, there is an alternative—which could not be envisioned by Tsiolkovskii—of carrying the nuclear fire into the outer solar system by establishing helioids in orbits about the major moons of the Jovian planets (moving them, if necessary, out of radiation belts) and about Pluto...

These helioids circle their worlds at relatively close distance, not radiating omnidirectionally which would be quite inefficient, but illuminating and irradiating their primary by means of a directed beam—Ptolemaic systems in which the sun revolves about the habitat instead of vice versa as in the Copernican system...

Expansion of human communities throughout the solar system on the basis of giant nuclear transport, planetellas, ecto-agriculture and helioids, lays the techno-scientific and operational foundations for the development of little solar systems, capable of functioning independently,” not only of Earth, “but of our Sun-planet system.”

Finally, man would have cut the umbilical cord to Earth.

The civilization of these “roaming, self-sufficient worlds,” Krafft Ehrlicke explained, “is truly three-dimensional... . [They] can circle our Sun in independent orbits.” It was a “politically independent city-state, trading with the Earth, Moon, orbiting manufacturing facilities, and other places, forming new cultural cells of a mankind whose choice of living in space has increased tremendously, thereby adding to the plurality of human civilization.” Krafft Ehrlicke could imag-

ine future pioneers off to explore and develop the entire Solar System, much the way explorers during the first Age of Exploration created a new civilization in the New World.

But for Krafft Ehrlicke, the Solar System did not set the boundary for mankind's exploration.

In 1970, he outlined his view that by going into space, man had created a three-dimensional civilization, but that adding time into the concept made it four dimensional. Interstellar flight, he proposed, "particularly to stellar migration and interstellar or galactic nomadism, are the theater of action on which civilization will grow into four-dimensional (space-time) proportions," he explained. While this may seem fantastic, he assured us that, "Travel beyond our Solar System, to distant stars, sounds as unreal today as a manned landing on the Moon must have seemed just a generation or two ago."

Krafft Ehrlicke wrote what appears to be four chapters of a book, which are undated, and unpublished, dealing with fundamental questions of interstellar flight. The logical sequence of the chapters begins with Sub-Relativist Interstellar Flight. These encompass flights at speed up to 13.4 million miles per hour. But even at that speed, it would mean travel for decades to reach the nearest star, he advises.

Next comes Relativistic Interstellar Flight, which focuses on a detailed study of Einstein's Special and General Relativity. Chapter 3 is Beyond Relativistic Flight, discussing Einstein from a scientific and philosophical standpoint.

The fourth chapter describes Long Range Aspects of Interstellar Exploration. The objects of interstellar exploration have been delineated as having two main purposes: either the search for alien life, or science. Krafft Ehrlicke proposed that

"the ultimate meaning ... relates solely to its effect on the evolution of the human species ... In the last analysis, interstellar flight will be an extension of the process of learning through which we mature.

Interstellar operations—more than lunar or planetary operations—reject the divisive aspect of [religious] variations as atavistic and irrelevant, and focuses our perspective on humanity. Interstellar operations will be experienced by the human species and in terms of a human civilization, or they will not be experienced at all."

V. The Moon

Krafft Ehrlicke was well known for saying: "Some people used to say, 'If God had wanted man to fly, he would have given him wings.' Now we can say,

‘If God wanted man to become a spacefaring species, he would have given man a Moon.’”

His lunar industrialization program, expanded over the 1970s, became an elegantly detailed engineering blueprint, motivated by his concept of the Extra-terrestrial Imperative, as his proposed follow-on to the Apollo missions. A five-stage program culminates in the completion of his city on the Moon, Selenopolis; not a base, not a habitat, but a city with thousands of citizens, who create a new civilization, economically, politically and sociologically independent from the Earth. “A new branch of psychology, exopsychology, and of sociology, exosociology, will evolve,” he wrote, as “the transition beyond Earth is very profound.” With that existing infrastructure, with the resources from the Moon, such as helium-3 for fusion power plants, mankind would be ready to move civilization out into deep space.

For Krafft Ehrlicke, the first step in the true extraterrestrialization of space would be the industrial development of the Moon. At the time of his death, Krafft Ehrlicke had completed a book, the culmination of more than a decade of intensive research, titled “The Seventh Continent: The Industrialization and Settlement of the Moon,” which has yet to be published.

He described the Moon

“as the prime model of developing a new world at the outset of androspheric expansion, for several reasons. The Moon is our partner in this double-planet system only 2.5 to 3 flightdays away, less time than it takes an oil tanker to get from the Persian Gulf to New England. The Moon is a potential source of raw materials and a suitable place for materials processing and for establishing the first extraterrestrial biosphere. Its surface area almost equals the area of the Americas, which lends it enough gravity for human comfort and plant growth.” The Moon, he also said, will offer us “a new world of great beauty.”

Selenians

“can trek through the lunar world into the mountains, to the picturesque ‘coastlines’ of the *mare*, the wilderness ranges at the poles... . When the Sun sets, Earth stands out as a crescent in the sky of the Moon’s near side. The slowly waxing mother planet bathes the moonscape in mild light of rising intensity.

The Selenians live truly on the shores of the interplanetary ocean. They will travel with ease between the one-sixth ‘g’ surface gravity [of the Moon], and the weightlessness of their circumlunar outposts, and later between their world and those of Mars, asteroids, and the moons of Jupiter and Saturn. The Selenians indeed live in a cosmically Open World.”

By the middle of the next century, he said,

“I see a polyglobal three-dimensional civilization. In retrospect, its foundations were laid in the twilight of the past millennium, by those who under-

stood the magnificent call of the extraterrestrial imperative... . But there were those among them who did not have the capacity for understanding that their world reaches to the stars; and so they rooted and burrowed into the ground. They regressed, whining and shouting slogans. Fearful to grow, they atrophied to barren stumps on a clump of earth and became still births of the biosphere... . In a miserable world of stagnation, poverty, and backwardness, they may indeed manage to trigger the ultimate catastrophe of releasing nuclear energy in an entropic holocaust.”

But this was not preordained. Instead, “the new humanity, *Homo sapiens extraterrestris* ... will set sail on a new course into the Open World of limitless growth—negentropically, and steady as you go!” As his family will attest, Krafft Ehrlicke applied great intensity and concentration to his work. He was driven by a passion to enable the real potential for creative discovery, to apply science and technology to end the degradation of a great portion of the world’s people, and to demonstrate that our most noble aspirations would be fulfilled by the civilizations we would create off the Earth.

President Donald Trump has tasked NASA with returning Americans to the Moon. Other nations are also planning lunar exploration programs. These modest efforts should be the first steps toward developing the unlimited potential of mankind.