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## Chapter 9

# Krafft Ehrlicke's Extraterrestrial Imperative: A Memoir\*

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### Introduction

Krafft A. Ehrlicke was one of the most remarkable space visionaries of this century. Like Hermann Oberth, the Father of Space Flight, he contributed to the science of astronautics to enable man's exploration of near-Earth space, the Moon, and beyond. Like Wernher von Braun, he was a tireless promoter, lecturer, and public proponent of space exploration, willing to defend his views even when they were "unpopular." Like science writer Willy Ley, he had a breadth of knowledge and range of interests that spanned nearly every discipline of science.

But unique to Krafft Ehrlicke was his understanding of the philosophical underpinnings of man's exploration of the Solar System. He traced the roots of what he termed the "extraterrestrial imperative" to the European Renaissance, when the celebration of man's creativity led to the exploration and creation of the New World, and breakthroughs in natural science that laid the basis for the modern era.

It is most important today to recall Krafft Ehrlicke's contributions, when the very idea of space exploration is being questioned by budget-balancers who claim there is no money for space; by zero-growthers who insist we live in a

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closed world that is shrinking and running out of resources; and by pessimistic, radical environmentalists, who believe that mankind can do nothing to improve and then supercede his terrestrial home.

## I

Krafft Ehrlicke was one of the German space pioneers who became interested in space exploration as a teenager in the late 1920s and decided at that time that he would pursue the then-infant field of astronautics as his life's work. In 1938 he was one of the founding members of the Society for Space Research in Germany and continued to write for its journal, *Space*, even during the Second World War.

Having filed two patents on rocket technology before the War, Ehrlicke was noticed by the German Army command, and was transferred from the eastern front to the Army rocket research program at Peenemünde in 1942. There, he was assigned as an assistant to propulsion expert Dr. Walter Thiel, and in that capacity investigated the potential use of nuclear fission for rocket propulsion.

Ehrlicke did not come to the United States with Wernher von Braun and the Peenemünde specialists that joined him there in 1946, but arrived one year later after he had successfully located his wife, Ingeborg. After working with American military and industry personnel to familiarize them with the wartime V-2 technology, Ehrlicke became head of the Gas Dynamics Section at the Redstone Arsenal when the German team was transferred to Huntsville, Alabama in 1950.

Restless with the slow pace with which work was progressing in the Army rocket program, Ehrlicke joined his former commander and friend Walter Dornberger at Bell Aircraft in 1952 and continued a career in the aerospace industry at General Dynamics and Rockwell International until he established his own company, Space Global, in California a few years before his death in 1984.

Just as the Space Age was finally dawning, with the Soviet launch of Sputnik in November 1957, Ehrlicke felt it was important not only to develop the science and engineering to engage in this new endeavor, but also the philosophical underpinnings.

## II

"Astronautics is the science of operating in space and traveling to other worlds," Ehrlicke wrote in 1957. "The implications are such that it now becomes increasingly important to develop the philosophy, as well as the utilitarian aspects, of this new science."

In his 1957 piece, "The Anthropology of Astronautics," Ehrlicke states: "The concept of space travel carries with it enormous impact, because it challenges man on practically all fronts of his physical and spiritual existence. The idea of traveling to other celestial bodies reflects to the highest degree the independence and agility of the human mind. It lends ultimate dignity to man's technical and scientific endeavors. Above, all, it touches on the philosophy of his very existence. As a result, the concept of space travel disregards national borders, refuses to recognize differences of historical or ethnological origin, and penetrates the fiber of one sociological or political creed as fast as that of the next." That is, Ehrlicke saw space travel as a universal activity of this unique human species.

To summarize his philosophy of astronautics, Ehrlicke generated three laws. The first is that "nobody and nothing under the natural laws of this universe impose any limitations on man except man himself. Second Law. 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. Third Law. 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."

Ehrlicke observed that there was criticism of the space program from various quarters even before the Apollo program was announced. During the 1960s, therefore, he developed his concept of the Extraterrestrial Imperative, based on the laws of astronautics he had promulgated to guide the space program, in the previous decade.

### III

The Extraterrestrial Imperative is based on Ehrlicke's distinction between multiplication and growth. Multiplication is a phenomenon that abounds in nature; growth is unique to man, he proposed.

The establishment of the Club of Rome in 1969 codified the view that there are **limits to growth** and gave it institutional clout. To Ehrlicke, this view denied the fundamental character of man that separated him from the rest of the Earth's creatures.

"The 'Limits to Growth' people see Earth as a life raft in hostile space. Hence, they see man's world as a closed system—restricted to Earth. I don't. Humanity's action world is no more closed than it is flat," he stated in 1974. "Meadows and Forrester ... in their book 'The Limits to Growth,' compare the growth of mankind to the mindless and senseless multiplication of lilies in a pond. I never considered mankind a lily in a pond, senseless and mindless ... Growth, in contrast to multiplication, is the increase in knowledge, in wisdom,

in the capacity to grow in new ways," he stated in a 1982 article for *Fusion* magazine.

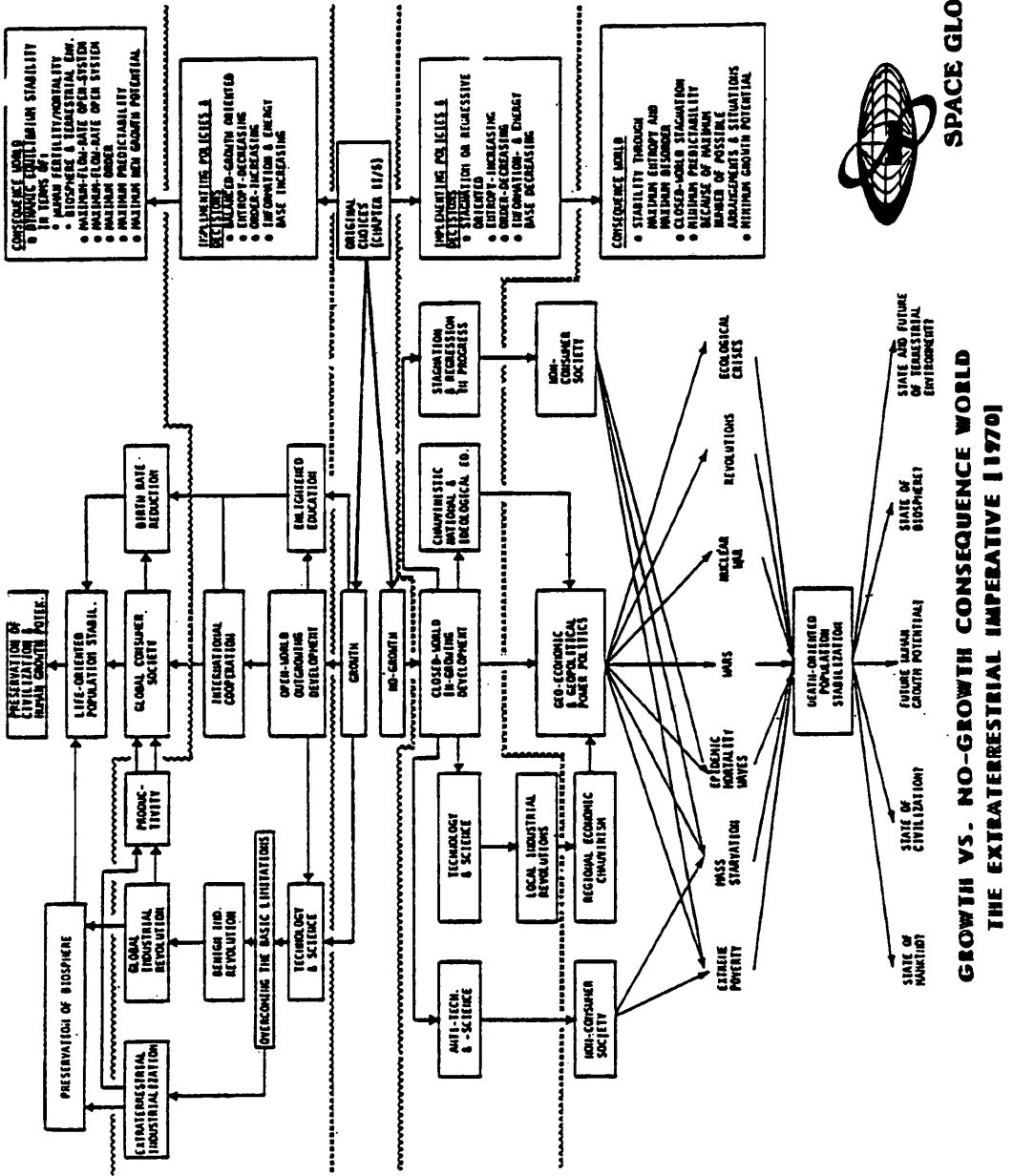


Figure 1 Source: Courtesy of Krafft A. Ehrlicke.

Ehricke believed that the fundamental issue was a philosophical one. In an article about Hermann Oberth written in 1973, Ehricke described the European Renaissance as based on the ideal “which again placed man in an organic and active relationship with his surrounding universe and which perceived in the synthesis of knowledge and capabilities its highest ideals.” At that time, “the concepts of ‘limit’ and ‘impossibility’ were each relegated to two clearly distinct regions, namely the ‘limit’ of our present state of knowledge and the ‘impossibility’ of a process running counter to the well-understood laws of nature.” This, he believed, was the way in which to look at the problems facing mankind at the present moment.

Unlike others attempting to make the case for the necessity for space exploration, Krafft Ehricke was fully aware of the very real consequences of following a path of no-growth. A chart Ehricke produced for his unpublished book, *The Extraterrestrial Imperative*, states that a no-growth policy will lead to anti-science, anti-technology movements, chauvinistic national ideologies, economic stagnation, and an increase in entropy (See Figure 1). The result of stopping the hands of progress and retreating into an unscientific world view would eventually be extreme poverty, mass starvation, geopolitical and power politics, wars over raw materials, and ecological crises. In 1970 these forecasts doubtless seemed a bit alarmist. When one looks around the world today, they seem quite prescient.

By the 1960s, the philosophical view Ehricke expressed could also be given concrete form through the opening of the Space Age and the possibilities for man to travel beyond the Earth. How could people maintain that there are limits because we live in a closed world, when space, and man’s ability to create ways to explore and utilize it, are infinite?

Krafft Ehricke spent the last decade of his life giving exquisite detail to a plan to explore and exploit the Moon. He often would say: “If God wanted man to explore space, He would have given him a Moon.” The Moon’s size and proximity have made it an irresistible object of man’s drive to explore. The very fact of such a program of exploration gives lie to the idea that there are limits to growth, Ehricke insisted (see Figure 2).

#### IV

Krafft Ehricke described the Moon as the “seventh continent” of the Earth. Just as the settlement and economic development of the New World opened a new era of human possibilities, so the economic development of the Moon would open up the treasure trove of the universe to man. “Ours is a binary planetary system,” he stated. “There is no reason that only half of it should be inhabited, merely because life originated there ... Instead of searching for and speculating about life elsewhere, we will put it there.”

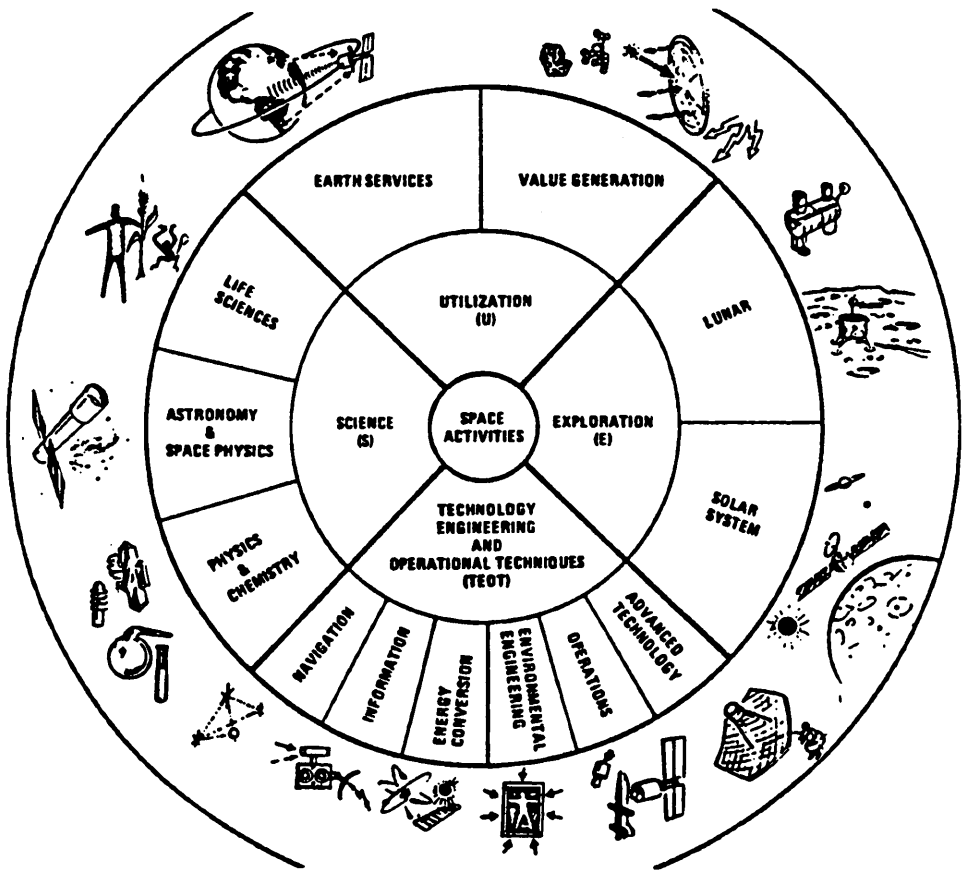


Figure 2 Source: Krafft A. Ehricke, "Space Applications for Earth-To-Low-Orbit Shuttle Vehicles," October 1970.

Five evolutionary stages of lunar development were envisioned by Ehricke leading to the establishment of Selenopolis—the lunar city which would be the capital of the new civilization. Each stage required advances in energy and transportation technologies (see Figure 3).

In the first stage, detailed prospecting of the Moon would take place using unmanned lunar landers. Ehricke stressed there was little appreciation for how little the Moon has been surveyed on the level of detail necessary for human habitation and exploitation. To aid the prospecting work, the perpetually shadowed regions of the Moon would be illuminated by an orbiting Lunetta reflector. Extending an idea first proposed by Hermann Oberth in the 1920s, Ehricke detailed the construction of both earth- and lunar-orbital mirrors for a variety of purposes.

In stage two, a Circumlunar Space Station would be placed into lunar orbit to act as a "control and operations center for more sophisticated ground systems dispatched from Earth directly to the lunar surface." This CLSS would function as a habitat prior to quarters being established on the surface of the Moon, and



as an engineering and biological laboratory, experimenting with samples of lunar material brought to it by automated returners.

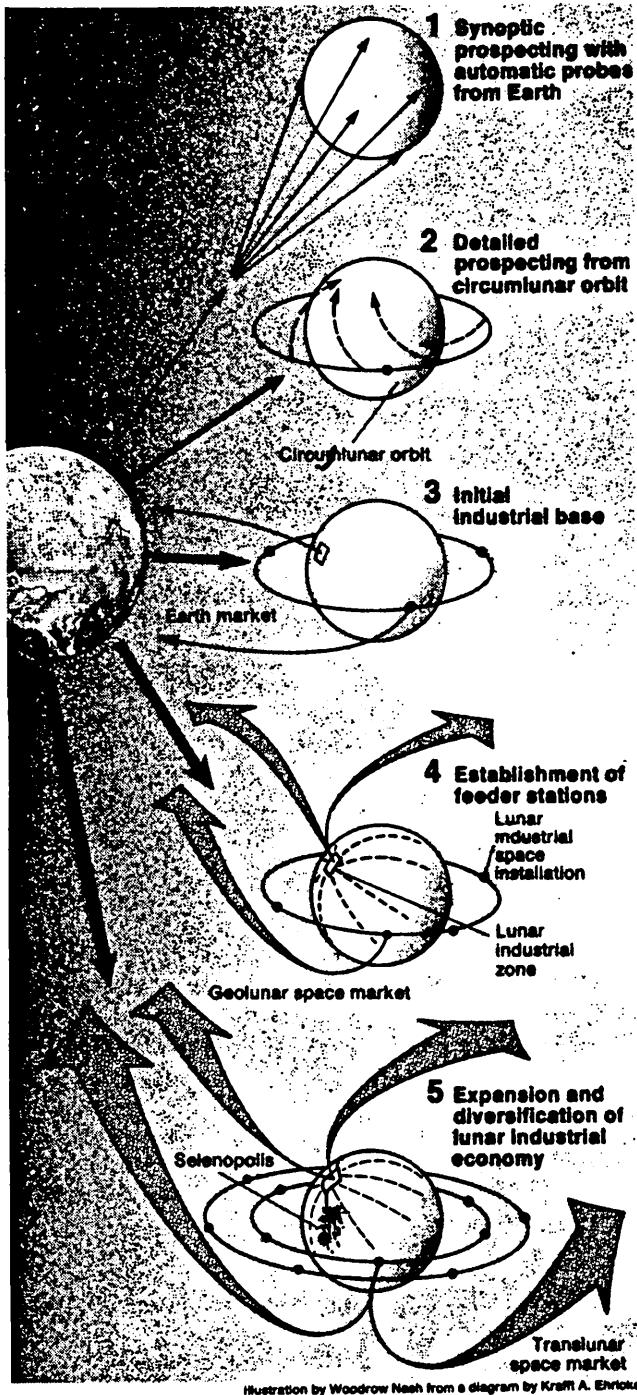
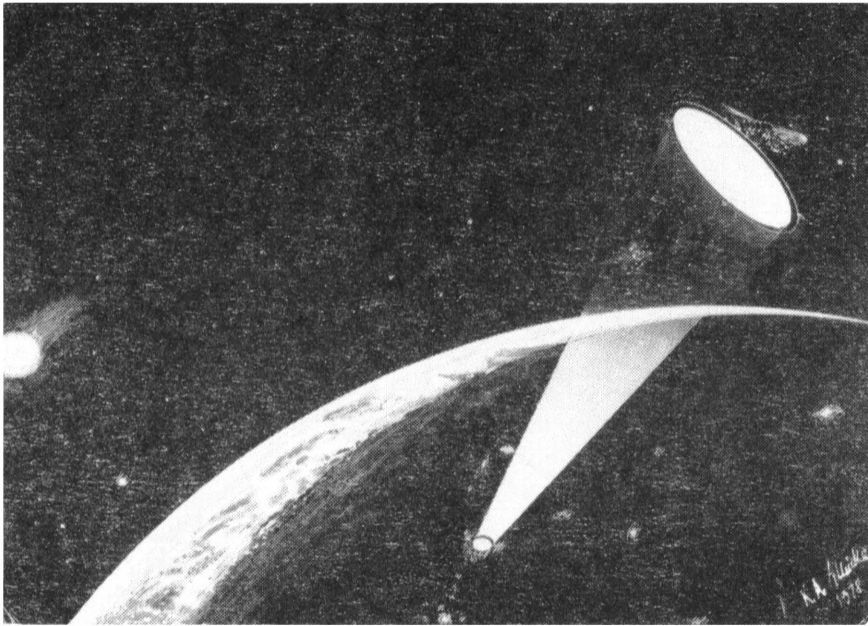


Figure 3 Source: Kraft A. Ehrlicke, "Industrializing the Moon," *Fusion*, Vol. 6, No. 1, May-June 1984.

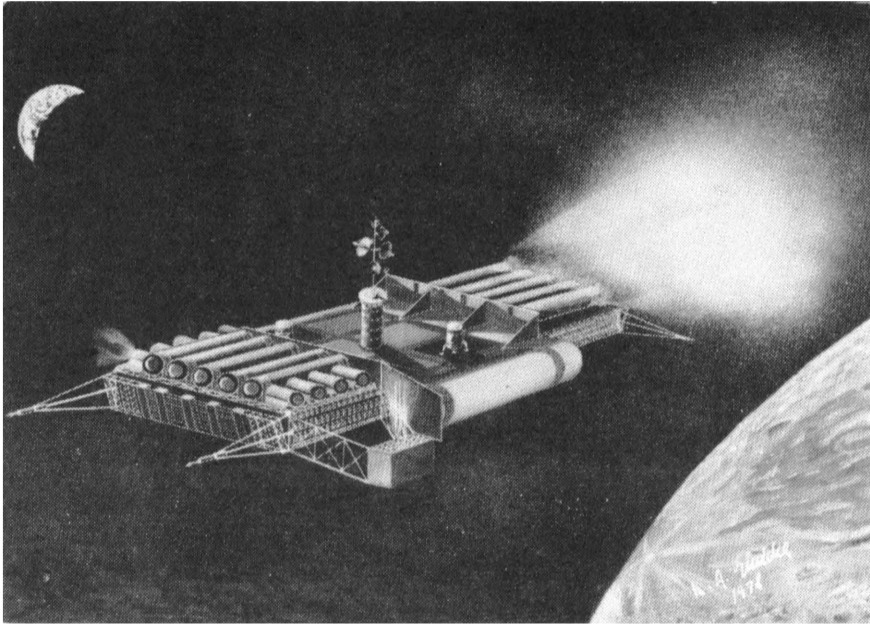


**Figure 4** In this painting, Krafft Ehricke represents an Earth-orbital mirror attached to the Space Shuttle. It is reflecting the light from the Sun to an area which is in darkness on the Earth. Such a Lunetta would allow economic activity to take place on a 24-hour basis.

In stage three, a first-generation Central Lunar Processing Complex with a nuclear power station would be built, beginning the industrialization of the Moon. Ground personnel would be assigned to 9-12 month shifts to begin the production of lunar oxygen, silicon, aluminum, iron, glass, and other materials. Raw materials processing would lead to the start of manufacturing.

In the following stage, feeder stations would be established “at places that were identified at stages one and two as having a greater local abundance of certain raw materials,” similar to the development of mining operations on Earth at concentrations of particular ores and minerals. The stations would be unmanned and controlled and operated from lunar orbit. A full array of nuclear technologies—including high-temperature reactions, nuclear-electric arc techniques, underground atomic ovens stoked by small fission or fusion detonations, and direct plasma processing—would be deployed.

Finally, the lunar population would have become large enough for Selenopolis to be built. It would replicate the diversity and specific characteristics of various climates on Earth—cold winters, warm agricultural sections, dry and subtropical and semiarid climates. Ehricke stated that the energy needs of such a vast complex could only be met through the use of thermonuclear fusion, and proposed that advanced fuel-cycle fusion reactions, such as deuterium and helium-3, would create a superior quality of energy.



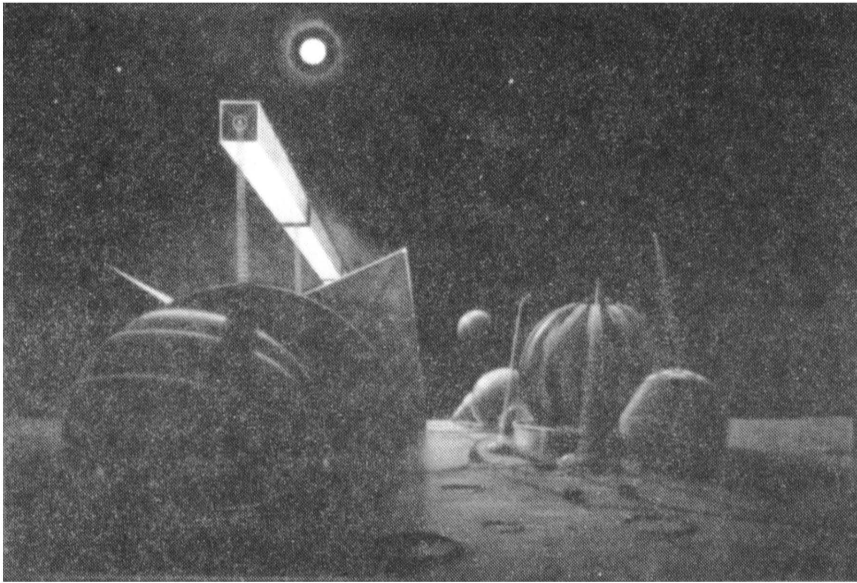
**Figure 5** Krafft Ehrlicke devoted his life to the development of space exploration, and published articles about industrializing the Moon in *Fusion* magazine. The concept seen in this painting by Ehrlicke is of a superfreighter, using lunar oxygen and lunar aluminum for fuel, en route between the Moon and the Earth. After his death Ehrlicke was slandered as a Nazi by the same antigrowth, pro-Soviet institutions that had led the attack on Arthur Rudolph.

A panoply of new transportation capabilities would be required for this industrialization of the Moon, including advanced chemical and nuclear-powered freighters carrying lunar product to Earth orbit.

Civilization would only be getting its infant start away from the home planet by civilizing the Moon. Ehrlicke saw polyglobal civilization created not only on other bodies of the Solar System but also in heliocentric orbit, becoming new planets revolving around the Sun.

Krafft Ehrlicke gave his last presentation of his concept of lunar industrialization and the “birth of polyglobal civilization” just weeks before he died of leukemia, at a symposium on Lunar Bases and Space Activities of the 21st Century held in Washington, D.C. in October 1984. He received a standing ovation from the hundreds of scientists, engineers, and space enthusiasts.

For them, as author Shirley Thomas had written 25 years earlier, Krafft Ehrlicke was “the embodiment of his belief—the only limitations are those man places on himself, and the universe is man’s rightful field of activity.”



**Figure 6** Selenopolis was the name Krafft Ehrlicke gave to the city on the Moon which would become its capitol. On the right is a series of tokamak machines producing thermonuclear fusion power for the city, its transportation, and industry. Due to the lack of an atmosphere on the Moon, the superconduction magnets which resemble slices of an orange, can be left exposed (Artwork by Christopher Sloan).

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