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The Ultimate Necessity of Space Travel

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News reports concerning this country's efforts toward the conquest of Space are alarming in several respects. The most alarming fact, however, is not that we may be lagging behind Russia but that our engineers and scientists have difficulty justifying Space projects more ambitious than the establishment of an Earth satellite. There seems to be general agreement that these satellites will have at least a half dozen practical uses. Yet, when a trip to the Moon or some more ambitious Space project is mentioned, the men who will make that trip operational must struggle for justification of their plan.

For example, in a story from *Newsweek* magazine (Dec. 16, 1957, pp 66-68), the American Rocket Society was reported to have sent President Eisenhower a 20-year project proposal the goal of which is to place American scientists on the Moon. This program was authored by a 15-man group, which included Krafft Ehricke of Convair-Astronautics and Dr. Wernher von Braun, the Army missile expert. Ehricke, architect of the program, said, "I really don't know what good it is to go to the Moon, but the very fact that we don't know is reason enough to scientists for going."

It appears that the brilliant men who will make Space travel possible are too close to their subject to see its most practical side. Perhaps a more reflective view can be provided by some of the older sciences—geology for example.

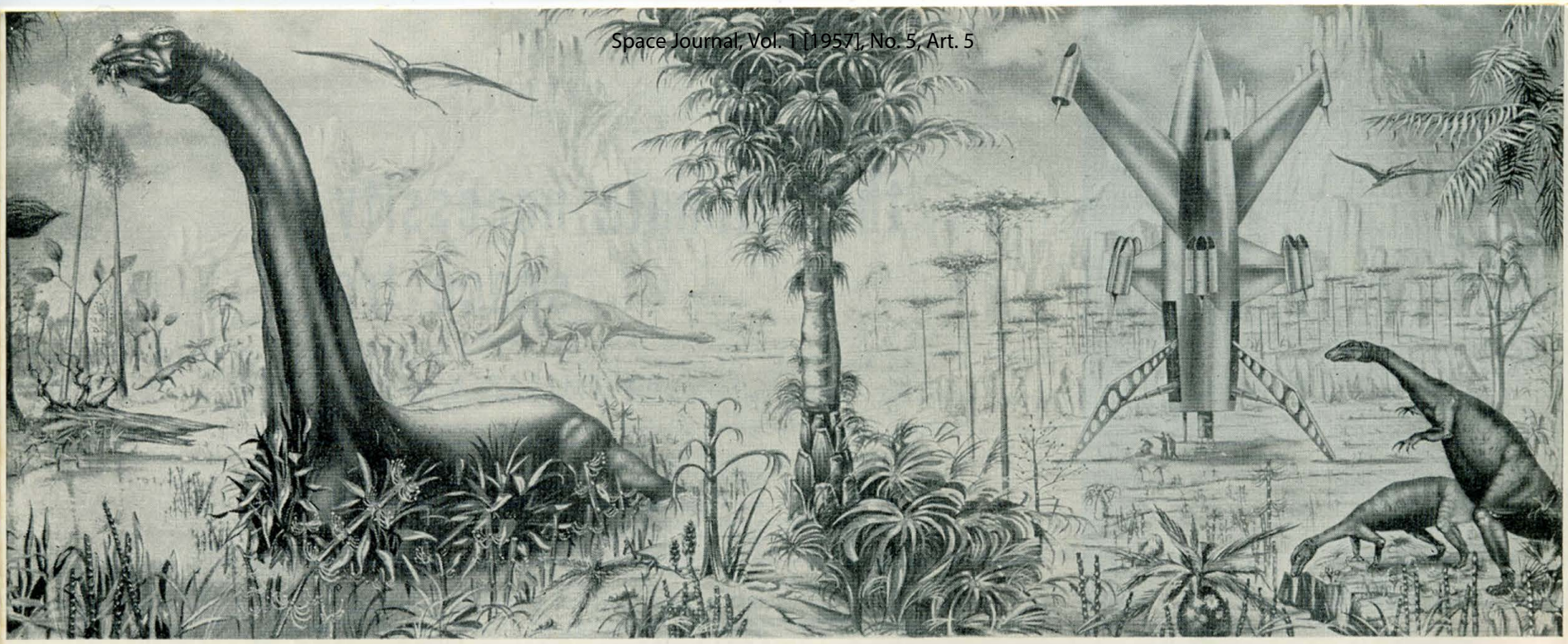
Geology deals with the history of Earth, and because this history covers billions of years, geologists are used to thinking in terms of billions of years. Apparently, most rocket scientists and engineers, like most people, conceive of time in such short duration as to be only an instant, geologically speaking.

In conjunction with the other sciences, geology has made increasingly rapid strides forward since the turn of the present century. All of this new knowledge makes more secure man's climb to outer Space. As will be shown subsequently, specific geologic contributions appear to be: (1) more reliable and detailed interpretation of past Earth environments, (2) more exact dating of past Earth events, and (3) corroboration and augmentation of cosmogonic data. Although far more remains to be learned about Earth than is known, some pertinent conclusions can be drawn from available geologic and allied data.

Earth formed, more or less synchronously, with the other planets of our Solar System some five billion years ago. This figure represents a currently acceptable age to geoscientists.

During the past few billion years, life evolved on Earth from nonplant-nonanimal ancestors of the most primitive marine organisms; to terrestrial plants and animals; and, finally, though not necessarily ultimately, to man. Therefore, it may be said that life on Earth has struggled for billions of years to reach the prevailing state of awareness.

This state of awareness permits limited



prognostication. Cosmogonists have presumably worked out the evolutionary development of stars like our Sun. By projecting the Sun's development, cosmogonists predict destruction of Earth through gradual "burning out" of the Sun. Reportedly, effects from changes in the Sun will become significant within 50 billion years.[1]

Whether figures and hypotheses cited here are absolutely correct is not important. Cumulative evidence clearly points to the fact that Earth had a beginning some billions of years ago, and it shall certainly have an end some billions of years hence. This conclusion immediately answers the question of why we must venture into Space.

When one considers that our planet is doomed, at least as far as life is concerned, it is impossible to put meaningful value on the titanic forward struggle of life on Earth through billions of years. This struggle, whether conscious or not, appears agonizingly futile if the gigantic mass contribution can not be perpetuated.

Fortunately, this contribution can be perpetuated regardless of its development on doomed Earth. The obvious answer is that all achievement must be transplanted from Earth prior to a significant change in our Sun. If this appears impracticable, it should be recalled that billions of years are available to achieve the proposed goal. In view of the present rate of progress, this would seem to be far more than adequate time. Human frailty may, however, precipitate through war another and successive Dark Ages so that we can never achieve this goal.

Thus, the question is no longer why must we become proficient in Space travel but rather where do we want to go in Space. We must escape beyond our Solar System to environments approximating that of Earth.

In this regard, some cosmogonists, perhaps the majority, think that planet formation is a natural result of star formation. That is, it is possible that many stars, when formed, develop a system of planetary satellites like our own Solar System. Therefore, it is reasonable to believe that there are many billions of planets, because there are many billions of stars in our galaxy alone.

The nearest star to Earth is in Centaurus 4.3 light years away. Available telescopes cannot define planets orbiting about this or any other star. However, the probability of other solar systems is so high that we can safely assume their presence and let actual discovery and the means of reaching them await further technological developments.

By the time escape from Earth is practicable, cosmologists will have chosen a star in our galaxy similar to our Sun and with a satellite planet much like Earth. The important difference will be that the new Sun will not be so far along in evolutionary development as the Sun we now have. Geologists will be able

[1]See "Life on Other Stars," SPACE Journal, spring issue, 1958, p. 16.

to assist in selecting the plant by extrapolating knowledge of the Earth.

It is interesting to speculate on the surface appearance of our proposed new home. If the cosmologists are able to find a planet virtually identical to Earth in so far as gross properties are concerned, adjustment of life there to the overall environment should be simple. Assume, however, that the cosmologists chose a planet only some four billion years old but otherwise identical to Earth. In this event, it is possible that the new planet would have about the appearance of Earth during late Pre-Cambrian time (approximately one billion B.C.). During this period only the simplest forms of marine organisms inhabited Earth; land surfaces were barren of plants and animals; and the atmosphere

probably was deficient in oxygen. On the other hand, if a planet about five billion years old were chosen, it possibly would appear similar to present-day Earth, having, among other forms of life, intelligent beings.

Thus, if the cosmologists can determine accurately the age of the planet to be colonized, it may be possible for geologists to predict approximately, on the basis of historical geology, the environment to be expected by the colonists. For further illustration, assume that in the year 2500 A.D. all is ready for colonization of a carefully selected planet. Assume also that by this time the age of Earth has been determined as 5.5 billion years, plus or minus several million years, and that the age of the Earthlike planet has been determined as 5.4 billion years, plus or minus several million years. Then, other things being similar, the colonists might encounter an environment like that on Earth around 100 million B.C., when reptiles ruled the land. Dinosaurs, flying reptiles, and other terrestrial and marine animals and plants might confront the colonists, who, through geologic deduction, would be prepared for such a spectacle.

In addition to assisting in selection of planets for colonization, geologists will make other important contributions to the conquest of Space. Ores from which Space vehicles will be made and some of the fuels which will propel them will be found and produced by employing geologic principles. Furthermore, firsthand geologic examination of any visited Space target will be most important in establishing suitability of these bodies to human purpose. Consequently, geologists will be among the first scientists landed on Space targets.

This necessary endeavor should have a profound and beneficial effect on the human race. The project is so huge in scope that no single country will be able to carry it through; the physical and mental resources of all the world will be required. This unified effort should produce nonviolent political and religious revolutions terminating in world harmony. These revolutions will be based on education, and they have already begun. It is difficult to see how any of the existing formal religions or political plans, except democracy, will survive scrutiny by a world population applying the scientific method to all phases of life. Maximum freedom of fidelity and self-expression will be demanded by a scientific world population, and democracy is the only form of government that satisfies these requirements. When, through education, superstition and fear are replaced by truth and courage, a new world religion based on fact and closely allied with nature will replace present religions.

In addition to the harmony required to make interplanetary colonization possible, there may be another good reason for its achievement. Whichever major theory of origin of the Universe is accepted, there is no reason to believe that we are the most intelligent life in our galaxy, to say nothing of the Universe. (The existence of extra-Earth intelligence is considered to be about as probable as the existence of other solar systems and only awaiting discovery.) On the one hand, life may have been in existence for an infinity of time, or as long as there has been a Universe. On the other hand, life may be on the order of the age of Earth. Granting the first possibility, some universal intelligence may be unbelievably greater than our own. Granting the second possibility, environmental differences may have promoted far greater development of intellect on some planet other than Earth. Presumably, these advanced intellects plan and may even have carried out interplanetary colonizations for the same reason that we must. As a planet, we will have to be acceptable at least to galactic society; or we may not be permitted to survive.

In conclusion, it appears that we have adequate resources and more than adequate time to make Space travel a certainty. The weakest rung in man's ladder to outer Space is the human element, whereby fanatics may repeatedly obliterate progress by plunging the world into war and physical and intellectual wretchedness. Annihilation of the human race seems possible. Clearly, education is the first duty of all concerned—everyone on Earth. Although education cannot eliminate fanatics, it certainly can prohibit their rise to power in a world of enlightened people.