AFTER THE MOON WHAT NEXT?
[By THE EDITOR]

IT is abundantly clear, from the trends of scientific investigation and the speculations over a great period of history, in the writings of philosophers and astronomers, to say nothing of the spate of science fiction in recent years—devoured by an eager reading public—that man seeks to explore the Universe, and time alone will tell whether this is an unattainable dream. The great astronomer, Sir James Jeans, has suggested that astronomy may have something to say on the enthralling question of the relativity of human life to the Universe in which it is placed, and on the beginning, meaning, and destiny of the human race.

The Universe is of unimaginable magnitude. Sir James Jeans gives us a glimpse of its immeasurable—infinitesimal?—immensity when he asserts that "the total number of stars in the Universe is probably something like the total number of grains on all the seashores of the world." Or, to take another of his illustrations: "At a moderate computation, the total number of stars in the Universe must be something like the total number of specks of dust in London."

Jeans says that a few stars are hardly larger than the earth, but the majority are so large that hundreds of thousands of earths could be packed inside each and leave room to spare; while here and there are giant stars large enough to contain millions of millions of earths. One star, Antares, has a diameter of 390 million miles, or 450 times the diameter of the sun; and our sun, "a very ordinary star," is a hundred times the diameter of the earth, and a million times its volume, and has 380,000 times its weight. The very nearest star to earth is so far away from us that light travelling at the unimaginable speed of 186,000 miles in every second, takes four and a quarter years to reach us! It is 25 million million miles away. And the furthest object in the sky observed through the great telescope at Mount Wilson, U.S.A., is so distant that light from it, travelling at the same terrific speed, takes no less than 140 million years to reach us! More than 100 million years before Mount Everest, many ages ago in geological time, had been thrust up as a tropical island from the sea, the light from the star which has been caught on Mount Wilson, must
have started on its journey across the appalling depths of space.

And astronomers testify the certainty that there are celestial objects far more distant still. As one scientist has observed, "An ant trying to picture the Himalaya would have an easier task than ours in trying to comprehend the vastness of the Universe."

The Moon, the sole satellite possessed by earth, is a dead world, with a diameter of 2,100 miles, and a surface pitted with craters, often of immense size: thus, the crater Tycho is over fifty miles in diameter and three miles in depth. Whether these craters were formed by volcanic action in former ages has not been established; some astronomers have suggested that they may have been produced by meteors. The Moon is devoid of air and water. A consequence of the lack of any atmosphere is that the sky, even during the day, is black except for the brilliant disc of the sun and the bright points of light of the stars, the latter being as easily visible by day as by night, owing to the fact that the solar light is not dispersed over the whole sky as it is upon the earth.

Mars is the exterior planet of the solar system nearest the earth, and it is one-half of the diameter of the earth. Astronomic examination has shown that there is four times as much land as water on it.

MAN IS NOT ALONE IN THE UNIVERSE

Carl Sagan, Assistant Professor of Astronomy at Harvard University, in an article written for the Smithsonian Institute some four years ago, gave his opinion that man was not alone in the Universe. Among the countless galaxies, each with billions of stars, there must, he claimed, be many planets on which life was flourishing. It might not be necessary to venture beyond our solar system to find life of some kind. Discussing our neighbours in the solar system, Professor Sagan says that Mercury and the Moon are similar in many ways: little or no atmosphere, no surface water or other likely solvents, and extremes of temperature. With no atmosphere, the Moon receives intense ultra-violet radiation and proton bombardment from the sun, and no terrestrial organism could survive, unprotected, on the lunar surface for more than a few hours. He says that "the most earth-like of planets in our solar system is Mars." We are almost entirely ignorant of the availability of water on the Martian sub-surface, and this remains the chief uncertainty in assessing the possibility of life there. Plans, he says, are
being formulated both in the United States and in the Soviet Union, for a voyage of discovery to Mars, “which may, perhaps, begin before the decade is out.” Instruments have been designed, prototypes built and tested, to land in pre-selected locales, search for the presence of life, and radio the news back to earth. Television cameras will see what there is to see — perhaps only sand dunes, but perhaps foliage? fossils? footprints? In various forms, life has existed on the planet Earth for some four billion years. Thus, on a random basis, Professor Sagen points out that the probability of being alive just that decade when the first definite study is made of life beyond the Earth is about one-millionth of a per cent. To seek the beings of other worlds is the rarest of adventures — an adventure which some people now living may be fortunate enough to share.

AUSTRALIAN RUTILE IN SPACECRAFT

Probably few Australians know that the Apollo 11 spaceship, its lunar module Eagle, and the Saturn 5 rocket which put the moon vehicle into orbit, all contained large amounts of titanium metal refined from Australian rutile.

The rutile was exported to the United States by Mineral Deposits Ltd. and Queensland Titanium Mines Pty. Ltd., both members of the National Lead Group of companies.

The rutile was processed by Titanium Metals Corporation of America, the largest manufacturer of titanium metals and alloys in the world.

The rutile used to make titanium metal and alloy components for Apollo 11 came from coastal areas around Crescent Head and Hawk’s Nest, in New South Wales, and Tin Can Bay, near Gympie in Queensland.

A unique combination of properties makes titanium an indispensable metal in the construction of space craft and booster rockets. Titanium is about half as heavy as steel, but just as strong. It is extremely resistant to corrosive fluids such as acids and the gases generated by burning rocket fuel. Titanium also withstands extremely high temperatures, at which other metals would melt. The space capsule’s heat shield, which protects the cabin of the capsule against the tremendous temperatures generated by air friction when the vehicle re-enters the earth’s atmosphere, is made entirely of titanium alloys.

The main skin of the capsule (and of its Saturn rocket), fuel and pressure tanks, control surfaces and linkages and hundreds of smaller parts in the rocket-capsule combination, also are made from titanium and titanium alloys.
The same qualities which make titanium metals so important in space technology make them indispensable in the construction of modern aircraft, particularly high-performance super-sonic designs.