

to be the same everywhere. Such factors as chemical composition, including that of the atmosphere, irradiation from the sun (star), temperature and mass (gravitational force) must be considered.

The time element is also important in

SPACE

## Nations Could Own Moon

► THE SONG tells that "The moon belongs to everyone," but an Austrian lawyer told a colloquium on space law to the contrary. He said the moon and planets belong to no one.

Dr. Ernst Fasan, attorney from Neukirchen, told the International Astronautical Congress in Washington, D. C., that human life is not dependent on the moon and planets and they can therefore be occupied. For this reason it is necessary to reach an international agreement, and this should be done, he told SCIENCE SERVICE, before any-one lands on the moon.

So far no laws or international agreements have been adopted about rights and liabilities in space, and the Congress aims to draw up some form of outline to bring law and order in space.

Dr. Fasan said two opposing theories are being much discussed. One holds that heavenly bodies belong to no one; the other that they belong to everyone.

Dr. Fasan believes the sun and stars belong to everyone and can be owned by no one because they are essential to life

SPACE

## Seven Spaceships to Mars

► SEVEN SPACESHIPS, not one, will make the first manned flight to Mars. Each vehicle will be capable of returning all the men in the other ships to earth in case of accident, Dr. Ernest Stuhlinger, director of the National Aeronautics and Space Administration's Marshall Research Project Division, Huntsville, Ala., reported.

The interplanetary voyage to Mars is scheduled within the next 15 to 20 years. Of the seven ships making the trip, only three will carry landing craft. The other four, which will carry extra fuel for the return trip, will go into orbit around Mars.

Each of the three ships landing on Mars will carry sufficient fuel to take all crew men from the other two crafts back to the orbiting vehicles if trouble develops.

The propulsion system for the planned flight to Mars is still undecided, but scientists at Hughes Aircraft Company's Research Laboratories, Malibu, Calif., believe it will be an operational model of an ion engine, with electrical power supplied by a nuclear reactor.

The ion engine, which operates only after being boosted into space by conventional means, uses the expulsion of ions (charged atoms stripped of their outer electrons) to provide a small but steady thrust

considering finding life on a planet. Animal species such as man last a relatively short time compared to the "life" of a planet. Man has only existed one ten-thousandth of the age of the earth.

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and men will never be able to set foot on the sun or a star to occupy them. They could be considered in international law in the same manner as the high seas.

Common consent to international space agreements does seem to exist, Dr. Fasan said. This can be seen in the words of three world leaders. The late Secretary General of the United Nations, Dag Hammarskjöld, said at the 12th session of the United Nations in 1958, that "outer space, and the celestial bodies therein, are not considered as capable of appropriation by any state."

Former President Eisenhower said in an address in the U.N., Sept. 22, 1960, "I propose we agree that celestial bodies are not subject to national appropriation by any claims of sovereignty."

Prime Minister Khrushchev supported this stand on his visit to the United States in 1959 when he said, "We regard the sending of a rocket into outer space and the delivery of our pennant to the moon as our achievement, and by this word 'our' we mean the countries of the entire world."

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for space flight. The ion engine's thrust could build up to propel a space craft at a speed of 2,000,000 miles a day. To do this, the engine must have a power supply of 30 kilowatts of electricity.

An electrically propelled space craft to Mars and back could be built with a useful payload of about half its total initial mass, Dr. Stuhlinger said.

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ASTRONOMY

## Only Ten Giant Galaxies Send Out Radio Signals

► THE SUPERGIANT galaxies, huge star systems containing millions upon millions of stars, are believed to send out radio waves into space for only a very limited part of their lifetimes.

Although all large clusters of star systems contain supergiant galaxies, only very few of them are radio-galaxies, the Russian astronomer, Dr. V. A. Ambartsumian, the new president of the International Astronomical Union, has reported. He said the radio emitting activity of such galaxies must be a short phase in the evolution of such systems.

The material causing the radio emission from the systems is apparently part of the outflow from the center, or nucleus, of energy masses even more powerful than the supergiant galaxies at a certain stage in their life cycle, Dr. Ambartsumian said.

He added that observations of huge bursts of energy from one giant galaxy do not conform to the information astronomers now have about the masses of the nuclei of galaxies. What goes on in other radio galaxies is even more difficult to interpret.

"The few facts at our disposal show that these data may come in conflict with the law of conservation of energy (and matter) as it is in its present form and perhaps require a generalization of this law," he said.

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