

RADIO ASTRONOMY

U. S. Probe to Scan Venus

A space probe with radio telescopes is planned to determine if the surface of Venus is more than 600 degrees hot or about the same as on the earth's surface, Tove Neville reports.

► THE UNITED STATES is planning to send four small radio telescopes in a space probe to explore the mysterious planet Venus. This will be the first time radio telescopes have been launched from earth.

The radio telescopes' measurements of the radio spectrum of the planet can settle whether the hot temperatures of more than 600 degrees Fahrenheit, now calculated for Venus, exist on the surface as well as in the atmosphere of the planet.

Dr. A. E. Lilley of Harvard University, Cambridge, Mass., told the International Astronautics Congress in Washington, D. C., that the telescopes will operate on wavelengths from 20 millimeters down to four millimeters.

The probe will be able to do a job close to the planet that no radio telescope on earth can do. Dr. Lilley told SCIENCE SERVICE the probe would show a bright edge around the planet if the surface of the

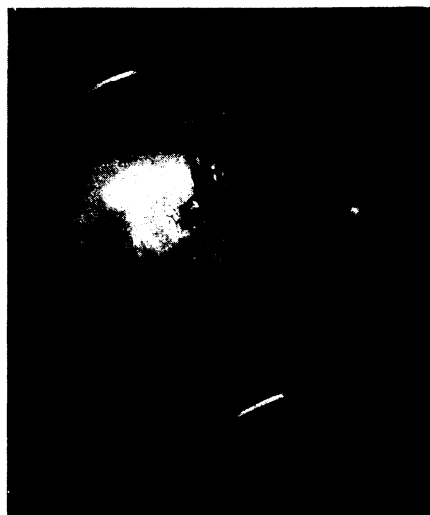
planet has a temperature comparable to that on earth and the high temperatures are concentrated in the ionosphere of Venus.

However, if the "greenhouse effect" binds the sun's heat to the planet, creating high temperatures both on the surface and all through the atmosphere, then the edge of the planet will be "seen" by the space probe as darker than the center.

Dr. Lilley said that if the surface of Venus is no hotter than the earth's, the hot temperatures in its ionosphere will be due to high densities of electrons.

This space probe will be part of the U.S. Mariner program of probes to Mars and Venus, Dr. Lilley said. He also reported that a radio telescope will be launched in a satellite to measure the properties of the oxygen molecule 30 to 80 miles up in the earth's atmosphere by microwave spectroscopy.

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POWER FOR TITAN II—The Chippewa spherical, solid propellant rocket engine is used in pairs on the Titan II missile. The 13-inch stainless steel engine, produced by the Thiokol Chemical Corporation, Trenton, N. J., uses a polyurethane propellant.

Man Not in Space

► THE PROBABILITY that man, as he is known on earth, exists anywhere else in the universe is so remote that it can be ruled out, an Italian biologist believes.

Dr. Rodolfo Margaria of the Milan University told the International Astronautical Congress in Washington, D. C., that the same geological, physical and chemical events that took place over three billion years on earth leading to life as now known would have to be duplicated exactly to create man elsewhere.

If the same elementary form of life did arise on another planet, the probability that it followed the same evolutionary path as man during the same time is so small as to be impossible to compute, he said.

Life in space, if it exists, will be far more different from man than is any other form of life surrounding man on earth, such as trees, Dr. Margaria predicts. Trees grow and have evolved under the same conditions as man and have also the same origin and ancestor as man.

Dr. Margaria believes it is unlikely man would find intelligent beings in the universe to communicate with. Such beings would have to be at least as intelligent as man as both sides would likely be handicapped by not having the same sensory organs. He pointed out how difficult it is for man to communicate with even the higher mammals which are so similar to man.

He noted that although it has been claimed that the chemical composition of the universe is fundamentally the same everywhere this claim refers to stars or solar systems as a whole.

For living forms to develop only the chemical condition of the surface of the planet is important and this is not supposed

SPACE

Break Language Barrier

► A WORLD-WIDE network of communication satellites could cut down the 6,000 languages now believed to exist in the world to three: English, Mandarin and Russian.

This was suggested by the British physicist and fiction writer who foresaw communications satellites in 1945, Dr. Arthur C. Clarke of Clarke-Wilson Associates, Colombo, Ceylon.

He told the International Astronautical Congress in Washington, D. C., that global TV could be the greatest force yet discovered for breaking down the language barriers that prevent communication between men.

Dr. Clarke pointed out that of the multitude of languages existing, only seven are spoken by half the human race. First on the list is Mandarin, spoken by 15% of all mankind. English is second with 10%. On the five percent level are five languages: Hindustani, Spanish, Russian, German and Japanese.

However, these are mother tongues, and far more people understand English than any other language. Dr. Clarke believes that unless a synthetic language comes into use the choice will be between Mandarin, English and Russian.

Another revolutionary development foreseen by Dr. Clarke is a complete change in man's living pattern caused by global communication and an enormous, rapidly increasing amount of knowledge. Since man cannot do away with time he must learn to use it to greater advantage. He will be

able to contact anyone at any time of day and night by satellite telephone or person-to-person TV. However, sleep will interfere with communication around the globe, such as between New York and Bangkok, since one city will have daylight while the other lies in the darkness of night.

The answer, says Dr. Clarke, is less but more profound sleep. He said that in the USSR it is now possible to buy a five-pound box that keeps a person in such profound sleep, through electronic pulses applied to the temples, that only one or two hours sleep is required per day. Thousands of Russians are said to be using this device already, he stated.

Dr. Clarke believes that when people can "travel" all over the world via a screen and see anyone they wish instantly over satellite TV, actual travel will be reduced. This he sees as bad for the travel business but good for business in general.

The educational value of bringing information to the uneducated millions by picture and voice will be inestimable, but transmission of conflicting ideologies may also lead to new international problems with the result of jamming satellite communication from one country by another.

For better or for worse, communications satellites will be the nervous system of mankind, which will link the whole human race in a unity no earlier age could have imagined.

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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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