ASTRONOMY

Mars Coming Close

Positive proof of low-life forms on Mars would be a "startling" discovery showing that life is not unique to earth. Astronomers hope to settle the question this year.

By ANN EWING

➤ POSITIVE PROOF of life on Mars, if only in the form of moss and lichens, would be a "startling" discovery showing that life is not unique to earth and may be found many places.

Astronomers hope to settle the question definitely this year when they train their telescopes on the ruddy planet, now making its closest approach to earth since 1941. On July 2, it will swing within 39,800,000 miles. The closest Mars can ever come to the earth is about 35,000,000 miles, which will be reached in September, 1956.

Thus the observations planned this year by the International Mars Committee at observatories all over the world will be a warm-up for the even closer approach two years from now.

Mars is visible to the naked eye as a ruddy planet in the southeastern sky a little before midnight. Its brightness on July 2 will be magnitude minus 2.3, brighter than any other star or planet, except Venus.

Neighboring Planet to Earth

Despite the fact that Mars is the fourth planet out from the sun and the earth's neighbor, it is not a striking object. Even as seen with a large telescope, Mars looks like a small orange about five yards away.

Considering that, even when it is closest, Mars as viewed through a large telescope can be seen scarcely better than the moon through a pair of binoculars, we know a surprising amount about it.

Like the earth but unlike the moon, Mars spins rapidly on its axis, and both sides can be seen. It does have an atmosphere, mainly composed of two inert gases, nitrogen and argon, which account for over 99% of it. Carbon dioxide is about 0.25%, and oxygen, water vapor and other gases less than 0.05%

In comparison, the gases that form the earth's atmosphere consist of about 78% nitrogen, 21% oxygen and 1% carbon dioxide. The rest is inert gases and water vapor, which varies greatly.

Martian atmosphere was once likened by Dr. Gerard de Vaucouleurs of the Astrophysical Institute, Paris, to that of a "terrestial desert shifted to the polar regions and lifted to stratospheric levels (about ten miles up)."

There are no trees, no flowers, not even ferns to soften the Martian scenery, it is thought. The only possible life, most astronomers agree, would be mosses and lichens such as cling to lofty, frigid mountain peaks here on earth.

A special expedition, sponsored by the Lowell Observatory and the National Geographic Society, has started a nine-month photographic investigation of Mars using the 27-inch telescope of the Lamont-Hussey Observatory at Bloemfontein, South Africa. Dr. E. C. Slipher of Lowell Observatory, Flagstaff, Ariz., is the leader of an astronomical team that will try to get an exact, direct measurement of the planet's diameter, now believed to be just over 4,200 miles, a little more than half that of earth's.

Clue to Composition

Knowing the diameter, astronomers could solve the riddle of the planet's composition, using a well-known formula that links the mass, speed of rotation, density and polar flattening of any planet with its radius.

Scientists now suspect that Mars, unlike the earth, does not have a dense iron core, but that it is made up of a uniformly distributed mass of iron and rocks. If its measured-directly diameter proves to be the same as it is now thought, then theories of the origin of the planets and of the solar system will have to be revised, Dr. Harold Urey of the University of Chicago has stated. For this would show that the red planet could never have been a liquid, fiery mass of molten chemicals, as many scientists now believe the earth once was.

The South African telescope is at a key location, since Mars will pass almost directly overhead there each night. From the Northern Hemisphere, on the other hand, Mars will be seen close to the horizon, making it hard to observe accurately. Nevertheless, the giant 200-inch Hale telescope atop Mt. Palomar in California will occasionally be turned from its studies of far-away galaxies to spy on the earth's neighbor planet.

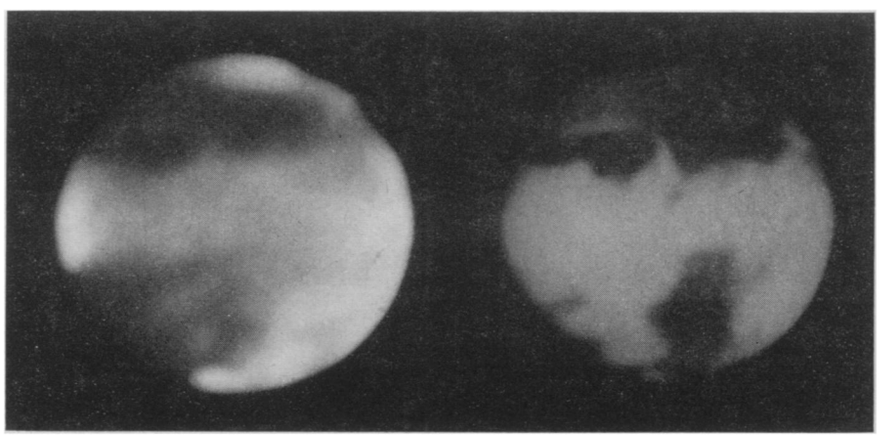
International Mars Committee

The International Mars Committee was formed last year at Boulder, Colo., by interested astronomers attending the American Astronomical Society's meeting there, to plan and coordinate astronomical work during the 1954 and 1956 close approaches.

Observations at nearly two dozen observatories around the world will be aided by amateur astronomers, who are being asked particularly to keep careful track of Martian weather. They will help map cloud cover, polar caps and other rapidly changing features.

The polar caps, once thought to be made of dry ice, or solid carbon dioxide, are known to be made up of a thin layer of ordinary ice or snow, which has been condensed at a low pressure and a very low temperature. It may be less than one inch thick, according to studies of the infra-red spectrum of the northern polar cap by Dr. Gerard P. Kuiper of Yerkes Observatory.

Dr. A. Dollfus of the Meudon Observa-



200-INCH PHOTOGRAPHS MARS—The planet Mars as photographed with the giant 200-inch Hale telescope atop Mt. Palomar in California.. Atmospheric conditions, and clouds or haze, are shown in the left photograph, taken with a plate especially sensitive to blue light. At the top and bottom are the polar caps, which appear in the fall season and disappear in the Martian spring. The right photograph, taken through a red filter on a red-sensitive plate, shows the permanent surface features of Mars. The large dark areas were mapped by the earliest visual observers and are well known.

tory, France, reproduced in the laboratory the polarization properties that have been observed on the polar cap, confirming Dr. Kuiper's discovery.

From the polar caps, which vary in size with the Martian seasons, huge dark areas extend toward the planet's equator. These are well known, having been mapped by the earliest visual observers.

Seasonal Changes for Markings

Although the general outlines of these dark areas remain relatively fixed, the markings change over the years and also with the seasons. They are a dark greenish blue in the Martian summer, turning to a browner shade as fall and winter approach. It was to account for these changes that the suggestion of the existence of plant life on Mars was first made.

The Martian temperature rises to as high as 50 degrees Fahrenheit during the day at the equator, and drops to 80 to 100 degress below zero Fahrenheit by night.

Gravity at the Martian surface is a little more than a third that on earth. A man weighing 200 pounds on our planet would weigh 74 pounds on Mars. Water would boil at 110 degrees Fahrenheit, instead of 212 degrees.

Such a picture of Mars may be a forecast of things to come for the earth itself. Mars is an old, worn-out planet, with conditions that may well prevail on earth many millions of years hence, when most of our present atmosphere has been lost and mankind has long since disappeared.

Arguments over the question of "canali," now known as canals, on Mars have raged since they were first discovered by the Italian astronomer G. Schiaparelli in 1877. Percival Lowell constructed the Lowell Observatory for the prime purpose of proving that the vague lines were in fact canals, built by thinking creatures for the purpose of irrigating arid regions of the planet.

Most astronomers, however, have come to consider the canals as nothing more than an illusion put together by the eye from faint markings that are on the threshold of visibility.

Movies With 100-Inch

It is hoped that motion pictures of Mars, taken this year with Mt. Wilson's 100-inch telescope by Dr. Edison Pettit and his associates, will solve this riddle. They plan to take movies of the red planet every night for two or three months around July 2.

The difficulty with most photographs of the planet is that in the length of time required for gathering sufficient light for a picture, our dancing atmosphere has spoiled good definition, and the outlines are fuzzy. Astronomers are hopeful that the tremendous light-gathering power of the 100-inch will allow them to catch some frames where the planet's surface is clear, during the rare moments when the atmosphere is not "twinkling." If they can do this, and if the canals are real, the markings should show clearly on some of the moving pictures.

Another aim of this year's observations is to investigate the riddle of the "blue envelope" that usually clouds the planet's surface when pictures are made by blue light, but that occasionally clears. When it does so, the Martian surface can be photographed directly in blue, instead of the usual red light.

The year 1877, a close approach of Mars, is noted not only for the Italian's discovery of the canals, but also for the discovery of two satellites by Dr. Asaph Hall of the U. S. Naval Observatory. He named them after the two mythological companions of the god of war, Phobos, fear, and Deimos, panic.

Both of them are extremely small and can be seen only with powerful telescopes. Phobos, which is about 10 miles in diameter, rises in the west and sets in the east, since its period of rotation about Mars is less than one-third of the planet's day. This is the only known case of a satellite with a period shorter than that of the rotation of its primary.

Deimos has a diameter of about five miles. Like ordinary satellites, it rises in the east, but it moves very slowly across the sky from east to west, because its rate of motion around the planet is only a little slower than the turning of Mars.

Continuous Watch Desired

A "day" on Mars is only 37 minutes longer than a day on earth. By having observatories in operation all around the globe, a continuous watch can be kept on the entire surface of the red planet.

One aim of the scrutiny will be to spot changes in the cloud formations found crossing the planet's surface on rare occasions. From these observations, scientists hope to learn more about the earth's atmosphere and weather, since the earth is buried under an ocean of air, whereas Martian atmosphere can be viewed from the top.

Observatories cooperating in the various observations include the Pic du Midi, France; Helwan Observatory, Cairo, Egypt; the Royal Observatory, Johannesburg, South Africa; KodaiKanal, India; Bosscha Observatory, Lembang, Java; Lick Observatory, Mt. Hamilton, Calif.; Mt. Wilson and Palomar Observatories, Calif.; McDonald Observatory, Ft. Davis, Tex.; Lowell Observatory; Lamont- Hussey Observatory; Griffith Observatory, Los Angeles; Commonwealth Observatory, Canberra, Australia; the Armagh-Dunsik-Harvard Observatory, Bloemfontein; Observatoria Astronomico, Eva Peron, Argentina, and several observatories in Japan that will observe Mars visually but not photographically.

Science News Letter, May 8, 1954

The *Post Office* Department has 41,000 branch offices with a $20 billion cash business last year; it owns 3,300 of its buildings, leases 25,000 complete and parts of 12,700.

Half of the 2,000,000 *machine tools* in this country are more than 10 years old.