

earth sciences

GEOLOGY

More lunar samples

The first astronauts to land on the moon will be able to return with up to twice the weight of lunar samples as was originally proposed. The long-standing plan was to limit the samples brought back by the Apollo 11 crew to 50 pounds. But a recent change in policy by the National Aeronautics and Space Administration has done away with the limit. The astronauts are now being told to bring back as much as they can carry in the two 19-by-10½-by-7½-inch sample boxes plus what Neil Armstrong collects in the contingency sample immediately after stepping to the surface. The change results from strong confidence in the lunar module's lifting ability and from a desire to free the astronauts from the time-consuming burden of weighing and packing the samples.

OCEANOGRAPHY

Sea-floor spreading rate

Studies of a recently discovered fracture in the mid-Atlantic ridge at 43 degrees north latitude provide evidence for a marked variation in the rate of sea-floor spreading at that point.

The fracture zone, indicated by distortions in the topography and magnetic symmetry in the area, was found during a survey of the ridge by the research ship *Atlantis II*. Scientists studying the data say it suggests that the sea floor on this part of the ridge has been spreading at the rate of 0.75 centimeters a year for the last 4 million years, but that during the period of 4 to 11 million years ago the spreading occurred at the rate of 1.65 centimeters a year.

The report, by J. D. Phillips, G. R. Thompson, R. P. Von Herzen and V. T. Bowen of the Woods Hole Oceanographic Institution, is in the June 15 *JOURNAL OF GEOPHYSICAL RESEARCH*.

PLANETARY SCIENCE

Iron core for Mars

The first reading of the findings by Mariner 4 that Mars was cratered, had only a tenuous atmosphere and no magnetic field led many to believe that Mars was similar to the moon in structure and history. A new theoretical study, however, indicates that Mars has a distinct iron core.

The core, reports A. B. Binder of the IIT Research Institute in the June 15 *JOURNAL OF GEOPHYSICAL RESEARCH*, seems to have a radius of 790 to 950 kilometers and a mass between 2.7 and 4.9 percent that of the entire planet.

The composition of the Martian mantle is probably not significantly different from that of earth's mantle, he says. The interior temperature of Mars may be between 800 and 1,500 degrees C., considerably lower than earth's, which is estimated at between 4,000 and 5,000 degrees C.

The new conclusions support the suggestion that in its early history Mars had a fluid conducting core and possessed a magnetic field.

The new model is based on recent findings about

earth's mantle and on precise determinations of the radius and mass of Mars by Mariner 4.

OCEANOGRAPHY

Formation of undersea hills

The first Pacific Ocean leg of the Deep Sea Drilling Project has helped decide between two theories for the formation of the small low hills on the sea-floor of all oceans.

The voyage, conducted from April 12 to June 5, obtained core samples showing that the abyssal hills were formed by extrusion—the outpouring of lava directly onto the sea floor. Then sediments settled over the lava.

Previously it was believed that the hills might have been formed by intrusion—the forcing of the lava into previously deposited sediments.

Dr. Dean A. McManus and Dr. Robert E. Burns of the University of Washington, co-chief scientists on the cruise, reported the preliminary results.

ASTRONOMY

One completed, one begun

One large telescope for the Western Hemisphere was dedicated and the mirror for another was poured during the last week in June.

Atop Kitt Peak in southern Arizona, the new 90-inch telescope of the University of Arizona's Steward Observatory was dedicated. The reflector will be the fifth largest in the United States until Kitt Peak National Observatory's 158-inch reflector is completed in the early 1970's.

At Toledo, Ohio, technicians of Owens-Illinois, Inc. successfully poured the 25 tons of molten glass for the mirror blank of the 158-inch reflector for the Cerro Tololo Inter-American Observatory in Chile. That telescope, a near twin to Kitt Peak's, is to be completed in 1973 or 1974.

SUBMERSIBLES

The Alvin found

The sunken research submarine *Alvin* has been found resting upright in two or three feet of mud in 5,000 feet of water 120 miles south of Cape Cod. The location is within 300 yards of the position predicted for it after the accident last Oct. 16 that sunk it (SN: 11/23, p. 515).

Now its owner, the Office of Naval Research, in collaboration with its operator, the Woods Hole Oceanographic Institution, must decide whether the salvage value of the approximately \$1 million craft would justify the costs of bringing it to the surface and refurbishing it. Photographs show no visible damage, but more detailed study is needed. One possibility is to try to haul it to the surface with grapples inserted into the open hatch.

The 22-foot *Alvin* was located and photographed on June 9 by the Navy's research ship *Mizar*, the vessel that located the remains of the submarine *Scorpion* in the Azores last fall.