SPACE

A Ranger's-Eye View

Ranger 8 added more than 7,000 photographs of the moon to the collection already started by Ranger 7, but scientists are still puzzled by the nature of the moon's surface.

See Front Cover

➤ FOR THE SECOND time in a little over half a year, a U.S. spacecraft has taken closeup pictures of the moon. Ranger 8, as a result of having its six cameras turned on 10 minutes earlier than originally planned, transmitted more than 7,000 pictures back to scientists at the California Institute of Technology Jet Propulsion Laboratory.

Seen on this week's front cover is a photograph of the southwest corner of the Sea of Tranquility showing flatbottomed craters Sabine and Ritter, a cone crater at the left, low ridges in the upper right and rilles parallel to the lower shoreline. The picture was taken two minutes and 15 seconds prior to impact on Feb. 20.

The last picture taken was made less than half a second before impact on the lunar surface, revealing in remarkable detail an area measuring about 300 by 400 feet. Craters and ruts no bigger than a bathtub showed clearly in the photograph.

However, despite the success of the mission, almost everything that was unknown about the moon before the pictures were taken is still unknown. The layer of rock dust (or what appears to be rock dust) covering the surface could be six inches deep, or six feet, or sixty feet. There are almost as many theories as there are scientists who have seen the pictures.

One more launch in the Ranger program is scheduled in a little less than a month, but there is no reason to suppose that Ranger 9 (now called Ranger D) will reveal any more than have its two predecessors. The question of whether a manned spacecraft landing on the moon will simply disappear beneath a cloud of dust remains unanswered.

The problem, however, will soon be subjected to the closest scrutiny that is possible without the presence of live observers. Project Surveyor is a 17-vehicle mission devoted to putting a group of automatic laboratories on the surface of the moon. The Surveyors will be equipped to measure the depth of the dust (if it is dust), its chemical composition and perhaps a few other characteristics that will be asked about in the next few months as a result of the Ranger photos.

When man gets to the moon, everything he finds will be new and strange; but hundreds of thousands of scientists and engineers are doing their best to keep the surprises to a minimum.

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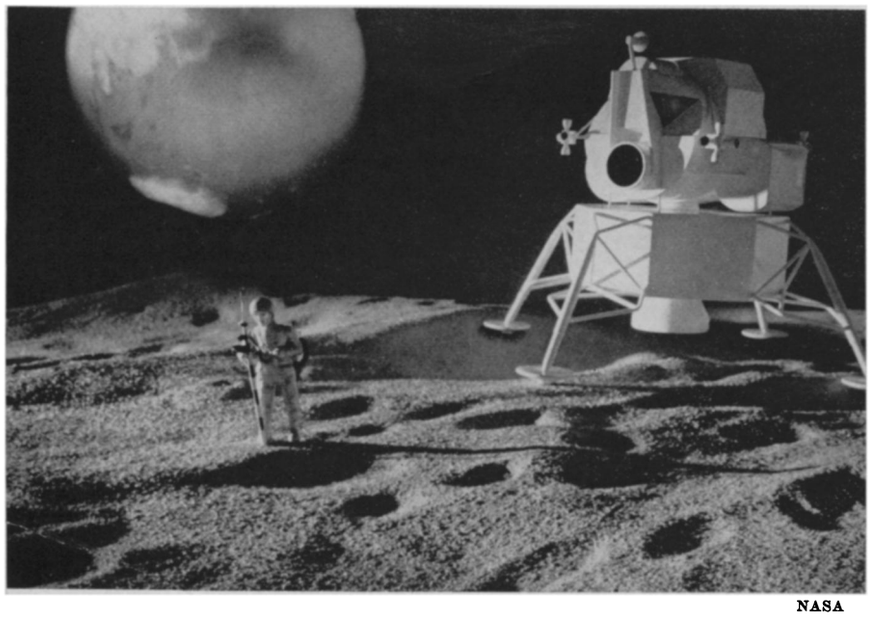

NASA

MOON DUST?—A model of a small area of the lunar surface based on a picture transmitted by Ranger 7 was made by means of a photometric scaling process developed by Dr. E. M. Shoemaker, U.S. Geological Survey Astro-Geology Branch, Flagstaff, Ariz., in which different brightness levels are used to determine relative height or depth of hills and craters.

SPACE

Small Lot on the Moon Is Mapped on Earth

➤ A PART of the moon covering less than one-fifth of an acre has been accurately mapped using a new technique developed by the U.S. Geological Survey.

The detailed contour map was made from the last photo transmitted by the Ranger 7 spacecraft before it crashed on the moon last August. Contours were measured by an electronic instrument that determined the density of the photographic emulsion. Ranger 7's last photo was taken 0.176 seconds before impact from a height of about 1,000 feet.

The map, covering an area measuring about 95 by 80 feet, shows contours at four-inch intervals. The map-makers had to optically "tilt" the photo, since Ranger's cameras were at an angle to the lunar surface when the picture was taken.

Besides the contour drawings, the Geological Survey also made several three-dimensional relief maps out of plastic as a visual aid for the National Aeronautics and Space Administration.

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RADIOLOGY

Compounds Protect Mice From Radiation Effects

➤ INJECTIONS of each of three different acid compounds ten minutes before experimental mice were irradiated gave protection to the animals, a report in Nature, 205: 815, 1965, explained.

Dr. J. H. Barnes of the Medical Research Council, Radiobiological Research Unit, Harwell, Didcot, Berkshire, England, who had previously reported on the radioprotection of pyromellitic acid, synthesized two related acids of higher basicity. He described the effects of all three.

Radioprotective doses of BPCA, short for benzenepentacarboxylic acid, showed some evidence of calcium-deficiency tetany, which is characterized by convulsive seizures and twitching of the skeletal muscles. When calcium chloride was added to the BPCA dosage, however, the tetany disappeared and survival was markedly higher.

Mellitic acid, the other synthesized radioprotector, afforded considerable protection when incompletely oxidized. Pyromellitic acid apparently does not protect the animals through an effect on calcium, Dr. Barnes said.

"The fact that the radioprotective dose is very high suggests the possibility of a physical process," he explains. Injection of this material into the abdominal cavity could lead to a hypoxic, or low oxygen, condition as a result of red blood corpuscle concentration.

A number of radioprotectors effective only in high dosage could be similarly affected, Dr. Barnes said, adding that further investigaiton of radioprotectors should be made.

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