

ASTRONOMY

**Seek "Moon" Mountains
On Tiny Planet Mercury**

USING the moon as an astronomical "yardstick," scientists are about to determine whether the planet Mercury has a rough mountain and valley studded surface like the moon.

This is announced by the Carnegie Institution of Washington in a statement describing recent work by Dr. Edison Pettit and members of the astronomical staff of Mt. Wilson Observatory. Dr. Pettit has measured the changes in intensity of moonlight as this intensity changes with the various phases through which the moon passes each month.

The observations indicate that at full moon, the earth's satellite radiates four times as much heat as the visible light it reflects. At quarter phases the moon sends off radiant heat only one-sixth as intense as the amount at full moon. At this same phase also the reflected light is only one-seventh that at the full moon maximum.

The Mt. Wilson Observatory investigators find, too, that the rough, mountainous surface of the moon greatly lessens the radiant heat given off at the crescent phases in comparison with what it should be if the moon were a smooth sphere like a celestial billiard ball. It is this lessening of radiation due to the moon's roughened surface which will provide the astronomers with the "yardstick" for determining whether Mercury, also, has a rough surface.

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ARCHAEOLOGY

**Welsh Farmhouse, 200 A.D.
Had Neat Housekeeper**

UNEARTHING a farmhouse, occupied in the second and third centuries of the Christian era, in Wales, a British archaeologist has found a prehistoric rarity—a house neatly kept.

Prehistoric houses were noted for untidy floors piled with refuse. In this dwelling, however, numerous crevices and cracks suggest to the discoverer the constant sweeping of a careful housewife.

Four farms, one still practically intact, have been excavated at Caerau Farm, Caernarvonshire, Wales, reports B. H. St. John O'Neil who directed the research on behalf of His Majesty's Office of Works, Government agency in charge of antiquities. The Welsh ex-

cavations throw fresh light on farm life on the frontier of Roman rule in early Britain. The Romans fostered farming in Britain, regarding the island as an important granary of the Empire.

Evidences of the terrace system of plowing and planting hillsides have been found, also a cobbled roadway which led to the buildings. A stone-faced turf wall protected the farm animals against raids of Welsh tribes, and wolves that infested the hills.

Walls of the circular-shaped farm house still stand four feet high. A low stone bench was along one wall. A round work room and crucible were also found, possibly where farm implements were turned out.

The ground yielded iron nails, a little bronze with Celtic curvilinear ornament, and many fragments of pottery.

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ASTRONOMY

**Plates Kept on Ice
Reveal Heat of Stars**

WITH THE use of special photographic plates so delicate that they must be kept in a refrigerator until used, astronomers at the Yerkes Observatory are learning new facts about the temperatures of the stars. Many previous estimates of these temperatures are wrong, it is believed.

Dr. William W. Morgan, of the observatory staff, is using a small six-inch reflecting telescope, attached to one of the larger instruments. With this he is photographing the spectra of stars by their infrared light and the rays of radiant heat. These are light waves too long to be observed with the eyes, and until recent developments in the preparation of extra sensitive photographic plates, they could not be recorded.

Previous estimates of the temperatures of the stars were based on a law discovered by the German physicist, Max Planck. According to it, the wavelength, or color, which is most plentiful in a star's light shifts from the red towards the blue end of the spectrum as the temperature increases. That is, a cool star of perhaps 5400 degrees Fahrenheit, would be red in color, but a very hot one, at some 50,000 degrees, would be predominantly blue. However, Dr. Morgan finds that some stars emit several times as much infrared light as they should according to the Planck formula. It therefore seems likely that the temperature estimate should be revised.

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MEDICINE

**Rickets in Rats May Be
Cured by Phosphorus**

RICKETS in rats was cured simply by adding the bone-building element, phosphorus, to the animals' diet, Drs. C. A. Lilly, C. B. Pierce and R. L. Grant of the University of Michigan Medical School reported (*Journal of Nutrition*, January).

The experiment shows definitely the place of phosphorus in the treatment of rickets, the investigators believe.

"Rickets in young rats is identical with rickets in children," Dr. Lilly stated in commenting on the possible human application of the studies.

The rats were fed on a rickets-producing diet and kept in a dark room, away from the rickets-preventing ultraviolet light of sunshine, until definite symptoms of the disease appeared. They were then divided into three groups.

One group was kept on the rickets-producing diet, with the result that the condition continued. Another group was given the same diet with the addition of a definite amount of viosterol, which is known to be a cure for rickets. The third group received the old diet plus a phosphorus ration. Both of the last two groups showed healing of the rickets within thirty days. Microscopic, chemical and X-ray examinations showed that the rats receiving the phosphorus improved as much as those receiving the viosterol.

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GEOGRAPHY

**Leningrad University Has
Chair of Polar Countries**

LENINGRAD University has established a chair of Polar countries, the first to undertake training of scientific workers for biological and geophysical explorations in the Arctic.

A special boat for practical Arctic work is being equipped for the students. Prof. R. L. Samoilovich, director of the U. S. S. R. Arctic Institute, is head of the University project.

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E FIELDS

ASTRONOMY

Young British Astronomer Awarded High Honor

THE 1935 Gold Medal of the Royal Astronomical Society of London, one of the highest honors in astronomy, has been awarded to Prof. E. A. Milne, Rouse Ball Professor of Mathematics at Oxford University, "for his work on radiative equilibrium and theory of stellar atmospheres." Prof. Milne has worked out a theory which provides for the expansion of the universe in terms of an ordinary Euclidean, or three-dimensional, geometry of space.

The Gold Medals for both of the previous two years were awarded to American astronomers—Prof. V. M. Slipher of Lowell Observatory in 1933, and Dr. Harlow Shapley of Harvard College Observatory in 1934.

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ASTRONOMY

Millions of Meteors Add Little to Earth's Size

MILLIONS of meteors, or "shooting stars," dash into the earth's atmosphere every year and the stuff they are made of is thus added to the total mass of the earth. Yet the total bulk of the annual meteor fall is so little that at the present rate it would take ten billion years to increase the diameter of the earth by one inch.

Such is the estimate of Prof. C. C. Wylie, astronomer of the University of Iowa, based on meteor counts made by other workers as well as himself. He took into account some 20 to 24 million ordinary "shooting stars" estimated to fall every 24 hours, which range in size from sand-grain to pea, and from these on up to the big meteorites that burst with a bang, which are limited in number to about ten a year. Below the smallest naked-eye meteors are the microscopic ones that make trails visible only through a telescope. Above the "detonators" are the rare immense falling masses of iron or stone that make craters where they plunge into the surface.

Counting them all together, Dr. Wylie could calculate an annual fall of 3,120,000 kilograms of matter, or roughly 3,000 tons. Spread over the earth, this would give a depth of an inch in ten billion years. But according to the estimates of most cosmologists, the earth is only about half that age. Hence, concludes Dr. Wylie, the earth's radius would be increased, through meteor falls at the present rate, by only a fraction of an inch during the entire lifetime of our planet.

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AVIATION—METEOROLOGY

Weather Research Wins Aeronautics Prize

NOT for some improved airplane or engine, but for a bettering of weather forecasting accomplished by two Massachusetts Institute of Technology scientists has the first Sylvanus Albert Reed award of the Institute of the Aeronautical Sciences been given.

Prof. C. G. Rossby and Prof. H. C. Willett divide the honor for their application of the polar front theory to American weather forecasting. Born in Norway, air mass analysis in which the polar front theory is involved is now having rapid application in official American weather studies.

Dr. S. A. Reed of New York City has just endowed this new annual award for investigations that benefit practical aeronautics.

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ICHTHYOLOGY

Seek New Fish Species In Deep Guatemalan Lake

CLIMBING a 5,000-foot tropical mountain elevation in order to go fishing with a thousand-foot line, for fish that nobody has ever seen, is part of the program of an expedition which recently went out from the Academy of Natural Sciences of Philadelphia.

High in the mountains of Guatemala lies Lake Atitlan, known to be at least 1,000 feet in depth. Very few fishes have ever been collected from its surface waters, and none from its abysses. Scientists of the Academy expedition will lower specially built wire traps on long lines—and nobody knows what they will see when they reel them in.

The expedition personnel consists of Mr. and Mrs. Rodolphe deSchauensee, with Waldemar Fioravanti of Italy.

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ENGINEERING

"One Man Symphony" Made Possible by Sound Records

THE "one man symphony orchestra" is brought into the realm of possibility by a system of electrical sound recording devised by Prof. Vladimir Karapetoff of the Cornell University Department of Electrical Engineering.

Prof. Karapetoff's device makes it possible for a single performer to produce the effects generally achieved by a number of players. Each instrumental part is recorded electrically on a separate record. These records are then synchronized into one composite recording. The final record produces the effect of a complete orchestral group. Or one part may be cut out which the operator can play himself.

A teacher of electrical engineering by profession and a musician by avocation, Prof. Karapetoff conceived the idea of using the electric phonograph as a "partner and adjunct" in actual performance by instrumentalists and vocalists, rather than as a substitute for home singing and playing.

To put this idea in actual operation, he has assembled in his residence in Ithaca an elaborate outfit for making high-grade phonograph records on cellulose acetate and has added attachments to an electric phonograph for reproducing these records in connection with playing a musical instrument.

"Ensemble playing or singing is always more satisfying to an amateur than a solo performance," he explained, "and it is a great pleasure to perform with a phonograph record to fill in the other parts."

The records of accompaniments were made by Prof. Karapetoff himself, with the correct tempi, retards, and accelerations, but without gradations of the volume of sound. This latter is controlled by a resistance operated by the performer's foot, or by a second person familiar with the piece. In this way dynamic accents are introduced at will and the accompaniment is made to sound differently, depending upon the soloist, his mood, and the acoustic conditions of the room. Such accompaniment can be made for any musical instrument, using the piano or any other desired instruments as the background.

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There are at least 44 species of the cactus family growing naturally east of the Mississippi River.