

PHYSICS

Standards Scientist Announces Final Gravity Constant Value

New Figure, the Result of Seven Years' Work by Dr. Heyl, Is the Most Accurate Determination Ever Made

THE FINAL value for the most accurate measurement ever made of the constant of gravitation, from which can be figured, for instance, the mass of the earth and the force with which the earth pulls the moon, has now been determined by Dr. Paul R. Heyl, physicist of the U. S. Bureau of Standards in Washington after seven years' work.

Speaking before the Philosophical Society of Washington, he announced that the value can be expressed by the fraction 6.670 over 100,000,000. A full technical account of this work is published in the December issue of the Bureau of Standards *Journal of Research*.

According to Sir Isaac Newton's law of gravitation, any two bodies in the universe attract each other with a force that is greater as they are more massive and less in proportion to the square of the distance separating them. The exact force is obtained in scientific units by multiplying together the two masses, dividing by the square of the distance between them and multiplying the result by the constant of gravitation. Accurate knowledge of the force of gravity is important in many branches of science, from the study of the paths of projectiles fired from guns to that of the motions of the stars. The physicist refers to the constant as G.

The First Effort

The first effort to determine G was by a Frenchman, Pierre Bouguer, in 1740, but success was not attained until 25 years later when an English astronomer, Rev. Nevil Maskelyne, found the attraction of a Scottish mountain, Schiehallien, which has a short ridge running east and west and steep sides on the north and south. He observed a plumb bob on each side of the mountain, and, by comparisons with the stars, measured the amount that the mountain pulled the plumb line from the vertical. This value was only a rough approximation, however, because it was not possible to find with precision the mass of the mountain.

In the years 1797 and 1798, an Eng-

lish physicist, Henry Cavendish, first performed the experiment with small, known masses in the laboratory. With this method, two tiny balls are attached to the end of a little rod, and the rod is balanced at the end of a long thin wire. As two large masses of metal are brought near, the small balls are pulled toward them and the wire is twisted. A tiny mirror attached to the wire near the rod turns with it, and moves a spot of light reflected from it to a distant screen. Essentially this is the method used in the new determination at the Bureau of Standards.

The largest masses used by Dr. Heyl were steel cylinders weighing about 150 pounds each. The smallest were balls of gold, platinum and glass, each weighing about two ounces. Though the attraction that the large masses exerted on the small ones was about the same as the weight of the ink in the period at the end of this sentence, this force was measured with an accuracy of a thirtieth of one per cent. Instead of merely measuring the displacement in the position when the large masses were far away and when they were near, Dr. Heyl set the small masses swinging back and forth and measured the time of their swing. This period of oscillation changed as the large masses were brought close.

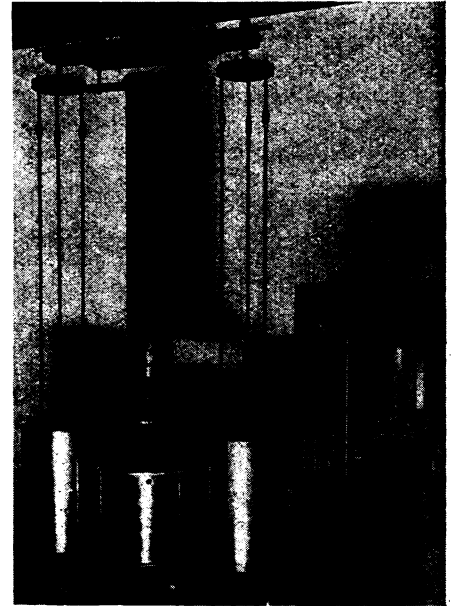
Science News Letter, December 13, 1930

MEDICINE

Leprosy Arrested But Not "Cured" Expert Says

PATIENTS discharged from the leprosy hospital at Carville, La., cannot be spoken of as "cured" of the disease, states Dr. D. E. Denny, commanding officer of the Carville Leprosarium.

A few of the discharged cases go back into active life, he said, and about 50 per cent. of those discharged go back to their families. The others have no place to go, or their families do not want them, "and we have accepted those back into the hospital for the rest of



STEEL CYLINDERS

And little gold balls replaced a mountain and a plumb line in Dr. Heyl's determination of the gravity constant. The mountain and plumb line were used by Pierre Bouguer in the first effort to find "G" in 1740

their lives. When we send these out, many of them are absolutely unable to take care of themselves. We cannot speak of them as cured. We have not restored any functions. We have simply discharged them as being no longer a menace to public health."

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MEDICINE

Health Institute To Study Diseases of Middle Age

FIFTY is now considered by many health specialists as the dangerous age, it appears from testimony offered by Dr. L. R. Thompson of the U. S. Public Health service to the House Committee on Appropriations.

"We have increased the span of life," he said, "but we have done it from the standpoint of the child, not from the standpoint of the adult. None of us who have passed our fortieth year have any reason to believe we will live any longer at all than our ancestors. In fact, we are probably not going to live as long.

Dr. Thompson outlined some of the expansions in research work planned by the National Institute of Health for 1931-32.

These include new investigations into the cause of heart disease, responsible for most adult deaths; and an expendi-