

## 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."

*Science News Letter, December 13, 1930*

## 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-

ture of around \$70,000 to lay the groundwork for extensive researches in years to come of the causes of cancer and means of preventing or curing this disease which is responsible for the second largest number of deaths among adults in this country.

Although a large cancer research program will probably be undertaken in years to come, the work will proceed slowly for a while, Dr. Thompson told the committee. It takes time to find men qualified to do the work. There is much long, slow work to be done in studying the growth and cause of the cancer cells.

Other lines of research which will be pursued during the coming year much as in past years are industrial hygiene studies, milk investigations, nutritional work, pellagra, stream pollution studies, undulant fever studies.

*Science News Letter, December 13, 1930*

#### SOCIOLOGY

### Enter Immigrants by Trades Is Recommendation

**"B**UTCHER, baker, or candlestick maker?" may be the question put hereafter to foreigners seeking to emigrate to the United States.

In his annual report just made to the Secretary of Labor, Harry Hull, U. S. Commissioner of Immigration, recommends that we forget nationalities in selecting immigrants, and allow entries on a more scientific basis.

"Power to reject at the source aliens not needed in our industrial life would result in a very large reduction in the number of aliens entering the country, and at the same time all those coming would be better qualified to make good American citizens," Mr. Hull states.

*Science News Letter, December 13, 1930*

#### GENERAL SCIENCE

## Carnegie Exhibits to Portray Variety of Researches

### Latest Facts About Sun's Energy, Metabolism and Maya Exploration Will be Pictured At Annual Showing

**R**ESearches ranging from the sun-light-capturing mechanism of plants to the structure of Maya pyramids are to be graphically presented in Washington at the annual exhibit of the Carnegie Institution of Washington, Dec. 13, 14 and 15.

A prominent place in the exhibits will be given to studies now in progress on the utilization of the sun's energy, particularly as it is gathered by plants and later released again by man for his use in food or fuel.

What we ourselves do with the energy stored in foods, is the subject of research in another department. This will be illustrated in an exhibit on basal metabolism. Basal metabolism is the energy conversion rate of the human body when resting quietly, several hours subsequent to the latest meal. The tests are usually made before breakfast. Basal metabolism tests have come to be of great importance in medicine.

Another exhibit will show motion pictures of the movements of wandering cells in the body. There will also be an exhibit demonstrating important discoveries made during the past year on the effects of glandular secretions on the development of hereditary characters. Still another will show how living cells transmit electric currents.

The year's progress in the excavation

and restoration of the splendid Maya ruins in Yucatan and Central America will be shown in pictures and models. The outstanding individual pieces of work in this field during 1930 have been the rebuilding of the "Caracol" at Chichen Itzá, which was probably an astronomical observatory as well as a temple, and the discovery of an early pyramid hidden within a later one, at Uaxactún.

In the exhibit arranged by the Geophysical Laboratory, the story of how the crystals in rocks can be made to tell something of the way they came into being will be told, with side-lights on the general physical behavior of heated crystals.

Another exhibit expected to attract much attention is one of a peculiar one-celled marine plant, *Valonia*, whose cells are so big they can be handled like eggs, and will survive surgical operations.

*Science News Letter, December 13, 1930*

#### MICROSCOPY

### New Microscope Reveals Plant Cell's Secrets

**U**LTRA-MINUTE details of cell structure never before seen are now made visible through the use of a new type of microscope lens, Prof. William Seifriz of the University of Pennsylvania has announced. Structures on the cell wall and in the living protoplasm itself one fifty-thousandth of an inch or less in width can now be examined and measured.

The secret of the new microscope is a tiny mirror of gold or platinum deposited on the inner side of the lowermost lens, in such a way that it reflects light directly downward on the object to be observed. The light is scattered by the object and reenters the lens around the sides and passes upward to the eye of the observer. It is the invention of a Swiss scientist, Charles Spierer, who has carried on some of his researches in cooperation with Professor Seifriz.



**FASTEST TRANSPORT PLANE**

A four-passenger Lockheed airplane which in preliminary tests flew 200 miles per hour. Designed to carry gasoline enough for a 2,800-mile flight, it has been ordered by the Army for the transportation of high officers to outlying posts. If Lindbergh had been flying this ship he would have crossed the Atlantic in half the time actually consumed.