

## PHYSICS

# Balance Weighs by Light

► THE most delicate balance yet made by man, one that uses a beam of light to measure weight, has been developed in Charlottesville, Va.

Instead of the conventional scales, this balance suspends the article to be weighed by using magnets. Other balances of this type have been used but have been much less sensitive than this model.

Dr. J. W. Beams of the University of Virginia developed this magnetic suspension balance while working on high speed rotors. The new balance is so sensitive that it is limited only by the motions of air molecules. These motions continue even when the weighing is done in as nearly a complete a vacuum as possible. Even then, although only a relatively few particles are present, they hit the object being weighed in their continual random motion.

This random motion is known as "Brownian motion." The darting, constantly changing directions of the air molecules can be visualized by looking at the sunlight on dust in a recently dusted room.

If this continual motion could be stopped, as it would be at absolute zero, 459.6 degrees below zero Fahrenheit, the accuracy of the balance would be greatly increased. As it is, however, the balance is accurate to one twenty-eighth of a billionth of an ounce.

To operate the balance, the material to be weighed is attached to a cylindrical ferromagnetic body, such as one made of iron, steel or Permalloy. This body is supported freely in the vertical field of a solenoid. It is in such a position that its edge scatters or reflects a light beam into a photo-electron multiplier cell.

This cell governs an electric circuit which in turn regulates the current that goes to the solenoid that suspends the cylinder. When the apparatus is properly adjusted, the suspended body shows no motion. This can be determined by looking at it through a microscope focused on scratches on the cylinder.

In actual practice, however, Dr. Beams weighs by measuring the change in the current in the circuit. This is related to the vertical force exerted on the cylinder.

This magnetic suspension balance is particularly valuable in experiments where the weighing must be done in vacuum, under a transparent liquid or where no mechanical connections to the outside are possible.

Although the apparatus is extremely sensitive, it may be used to weigh over a wide range of masses or forces, Dr. Beams states in the *PHYSICAL REVIEW* (May 15) where his new balance is described.

Science News Letter, June 10, 1950

## MEDICINE

# New Cancer Weapon

► A NEW machine for counting radioactive impulses, combined with little slips of paper, is the latest weapon in the attack on the mysteries of cancer.

Dr. Max Dunn, professor of biochemistry at the University of California at Los Angeles, who has been studying how cells grow for the past 30 years, is using the machine and the slips of paper to find out, quickly and accurately, just what part each of the 19 amino acids plays in the growth of a cell.

Proteins are made up of amino acids. Every cell contains protein. Cancer is the abnormal growth of cells. If Dr. Dunn, with this new tool, can add to the at present scanty knowledge of how a normal cell grows, that addition will contribute to the discovery of the secret of cancer.

Dr. Dunn injects radioactive material into protozoa. After the material has a chance to get into the amino acids and some growth has occurred, the acids are extracted and subjected to paper chromatography.

In paper chromatography, the amino acids are applied to little slips of paper, impregnated with a chemical which absorbs the various amino acids at different

speeds. Dr. Dunn places these slips of paper in his counting machine. The machine records on a continuous tape just where the radioactive material is which he had first injected into the protozoa.

By this method, Dr. Dunn hopes to determine where each amino acid goes when the cells of the protozoa develop, insofar as the occurrence in the proteins of those cells is concerned.

"Once we know what happens," he said, "then we will know the function of each amino acid in cell growth."

However, Dr. Dunn is not looking for quick results.

The function of growth, he pointed out, is a chemical process. In attempting to penetrate the mysteries of that function, he went on, "it is not impossible that what we are trying to do is impossible. Growth may be something too delicate, under the control of forces which we cannot understand too well. We may find out about the forces, we may know the forces, but they may be so delicate that we cannot understand the individual function of each force."

After 30 years of work with cells, Dr. Dunn warned, "Don't look for any discoveries in the near future which will tell

us too much about functions. We may talk knowingly about cell systems, but we have a very slight idea of what is going on."

Science News Letter, June 10, 1950

## METEOROLOGY

## Winter of 1949-50 Worked in Reverse

► THE winter of 1949-50 set a record for working in reverse, U. S. Weather Bureau charts show. It was warm where it should have been cold. Then it was cold when it should have been warm. At odd times, it snowed.

It was the warmest January on record in the southeastern portion of the country, the second warmest in Ohio, Delaware and Pennsylvania, the third warmest in Indiana and New Jersey. At Ann Arbor, Mich., on Jan. 25 the thermometer stood at 72 degrees; at Columbus, Ohio, 74 degrees; at Westernport, Md., on the 26th, 83 degrees.

Meanwhile, in the northern border states west of the Great Lakes, record snowfall and low temperatures were the rule rather than the exception. Montana had nine cold waves in a month's time, with a temperature of 57 degrees below zero on Jan. 25 at Chester, Mont. Seattle, Wash., had the coldest and snowiest January on record.

A severe cold wave moved into southern California. While radio comedians shivered audibly from Hollywood, citrus growers fought a losing battle against frost damage as far south as San Diego.

In February, the weather went through a complete switch. It grew warmer in the West and colder in the East. New England got its first heavy snow. Then, in the first week in March, the coldest weather of the winter came to many eastern sections.

Through March and April, temperatures were below normal in all parts of the country except the Southwest. In the last week of April, the northern two-thirds of the nation was still having unusually cold weather. In the first week of May, a cold wave brought rains to the eastern half of the country. Northern New England had a hard freeze. Frosts were felt as far south as western North Carolina.

Science News Letter, June 10, 1950

## GENERAL SCIENCE

## Science Professors Have Chance To Travel, Teach

► SCIENCE professors with a yen for seeing the world can combine their teaching with travel under the Fulbright Act. Professorships in Egypt and Iran in such fields as physics, geology and various types of engineering have just been offered for next academic year.

Deadline for making application for the awards is June 15. Details are handled by the Committee on International Exchange of Persons, located at the National Research Council in Washington.

Science News Letter, June 10, 1950