SCIENCE NEWS

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ANNUAL EXHIBIT OF THE CARNEGIE INSTITUTION

RESEARCHES ranging from the sunlight-capturing mechanism of plants to the structure of Maya pyramids are to be graphically presented to the public at the annual exhibit of the Carnegie Institution of Washington. The exhibits will be on display during the afternoons and evenings of December 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. The speed at which modern civilization is burning up the millions of years of stored sun-power accumulated in coal and oil is giving much concern to scientists, who foresee a day when the world will have no more fossil power and will have to catch its power directly from the sun as it comes every day. When that time arrives, we shall need much more efficient energy-catchers than we have at present. The best present solar energy capturers are green plants, and their efficiency is rated at only one or two per cent. For this reason, one department of the Carnegie Institution is making fundamental researches into the utilization of solar energy.

What we ourselves do with the energy stored in foods is the subject of research in another department of the institution. 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.

ATHENAEUM AT PASADENA

THE new Athenaeum of the California Institute of Technology, built at a cost of $500,000, has been completed and opened. The whole building is devoted to the social interests of the California Institute of Technology, the Mount Wilson Observatory and the Huntington Library and Art Gallery, to serve as a gathering place for scholars and visiting scientists, the staffs and research students of these institutions. It has already a membership of four hundred.

The building, designed in Mediterranean architecture to harmonize with the other structures of the campus, has a spacious lobby, a large, beautifully appointed lounge, several small dining rooms and one seating one hundred and fifty people. These may be thrown into one for important banquets, and adjoining them is a salon-hall known as the Hall of Associates, in which weekly lectures and demonstrations will be held as well as more social functions.

The second floor provides twenty-four bedrooms and four corner-suites, furnished with every possible comfort. In the Hall of Associates are twenty-six lunettes in which will be placed the arms of learned societies, academies and universities. Furnishings and draperies have all been especially designed. Three sides of the Athenaeum surround a patio with loggia and Florentine arches bordering it; while sleeping porches, tennis courts and a sixteen-car garage are also provided.

A carefully planned program of lectures includes an illustrated lecture by Dr. John A. Anderson on the progress being made with the 200-inch telescope. Dr. Robert A. Millikan speaks on "Benjamin Franklin and the Beginnings of Electrical Theory." Well-known scientific men from abroad, already at Pasadena for protracted visits, will be heard during the winter, but only by members and associates and their friends.

THE CONSTANT OF GRAVITATION

THE final value for the most accurate measurement ever made of the constant of gravitation, from which can be figured 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 Bureau of Standards, after seven years' work.

Speaking on December 6 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 his work will be published in the forthcoming December issue of *The Journal of Research* of the Bureau of Standards.

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 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 English 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, 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 towards 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.

Dr. Heyl's work has been largely inspired by Dr. G. K. Burgess, director of the Bureau of Standards, who had a personal interest in the problem. In 1901, when he was working for his doctor's degree at the Sorbonne, in Paris, Dr. Burgess did the experiment for his thesis, and obtained 6.64 for the value of G. However, the work was done under pressure of time, and he was not satisfied with the result. Then, when he became director of the bureau, he saw to it that the experiment was done more accurately than ever before so the problem was assigned to Dr. Heyl, and he was given plenty of time and the best facilities.

In 1927 Dr. Heyl announced a preliminary value for the figure, of 6.664, but then the work had only been done with the small balls of gold and platinum. Since then he has repeated the work with the glass balls, and these gave a somewhat higher value, so that the final figure, the mean of all three, is 6.670. Dr. Heyl attributes the difference to small experimental errors in the set-up, and not to any difference in the gravitational attraction for different materials. Experiments made some years ago by Baron Roland von Eötvös, a Hungarian physicist, showed very conclusively that there is no difference depending on material.

TELEVISION AND SOUND BROADCASTING

TELEVISION will now be able to follow the movies and "go sound" if recommendations made by leading television engineers are adopted by the Federal Radio Commission. The commission asked the views of those who are now putting sight as well as hearing into radio.

Until now most of the lookers-in, who are equipped with televisors and can get the signals from one or more of the eight stations that are regularly putting such programs on the air, have enjoyed silent pictures only. In a few cases, special authority has been granted broadcasters to use a general experimental wave-length for simultaneous sound broadcasting, and others have been sending out for the benefit of ordinary listeners the sound through a regular broadcasting station when the sound part had entertainment value by itself.

The present television broadcasting channels are 100 kilocycles wide, ten times the width of those used for sound broadcasting. It has been suggested that part of the television bands be set aside for simultaneous sound, but this idea was not favored by the broadcasters. It was decided, however, that the commission should allow television stations to use part of their bands for the purpose. Since future development may require even wider bands, it was also decided that a separate frequency, or wave-length, should be made available over which the television picture could speak.

One possible solution of the problem as to how enough space in the radio spectrum can be provided for adequate television seems to be the use of waves far shorter than any that are now used ordinarily. The television broadcasters urged that several bands of these very short, ultra-high frequency bands should be assigned for television. The bands selected, as not yet being otherwise assigned, are from 43,000 to 46,000 kilocycles, 48,500 to 50,300 kilocycles and 60,000 to 80,000 kilocycles. In wave-length, these are around six meters, which corresponds to 50,000 kilocycles. The present television bands are between 2,000 and 3,000 kilocycles.

In order to prevent stations interfering with each other the broadcasters also recommended that stations should not be allowed to operate at the same time within the same channel if less than 150 miles apart, except by mutual agreement. As some stations do not use the full band of 100 kilocycles, by arrangement among themselves the stations will be allowed to use different parts of the same band if they make mutually satisfactory arrangements.

In spite of the technical advances made, television is still very much experimental. This is the general opinion of those broadcasting. C. W. Horn, general engineer of the National Broadcasting Company, expressed this viewpoint when he stated that "the amateur can not be considered at present, and, except in small areas around

a station, it is impossible to guarantee any regular service.''

CELL STRUCTURE

ULTRA-MINUTE details of cell structure never before seen are now made visible through the use of a new type of microscope. Professor William Seifriz, of the University of Pennsylvania, described the instrument and its work in a recent lecture. 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 reflected back again from the object, enters 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.

Under the intimate illumination made possible by this mirror-bearing lens, the inner layer of a plant cell wall is shown to have a structure as though it were made up of a multitude of exceedingly fine rods, like a close-set pole fence. These are termed ''micelles,'' and are believed to be made up of bundles of carbohydrate molecules, which are too small to be visible by any microscopic treatment.

Living protoplasm shows a similar structure, of fine, closely parallel strands or fibers, with thickenings on them in places, in a more uniform background of gray substance. The two structural types are so similar in appearance that it is hard to tell them apart, Professor Seifriz says. However, he is not ready to commit himself to the opinion that the solid stripes of the non-living cell wall are due simply to a direct hardening or precipitation action of the fluid, living protoplasm. The settlement of this and other questions raised by the fine details made visible by the new lens, he says, must await further research.

ITEMS

A SURVEY in Pennsylvania, by J. E. Aughanbaugh, of the commonwealth's Forest Research Institute, indicates that there is hope for the native American chestnut. For the first time in twenty years, moderate quantities of chestnuts have been gathered. While the total is the merest fraction of the pre-blight chestnut crop, still it is regarded as a triumph that there are any American chestnuts at all left to be harvested. Mr. Aughanbaugh is hopeful that a goodly proportion of the sprouts may retain their apparent immunity to the fungus that blighted the original trees, and even that this immunity may be hereditary, so that it can be transmitted to a new generation of seedling trees that will sprout from some of the nuts now being produced.

THE supposed ''prehistoric animal'' reported to have been discovered preserved in ice in Alaska is almost certainly a whale. Dr. Barnum Brown, of the American Museum of Natural History, New York, advised *Science Service* that the reported presence of flippers and the dimensions of the skull indicate the carcass is that of the familiar mammal of the sea. Scientists of the U. S. National Museum, Washington, also express the same opinion.

A NEW hot spring came into existence at the Hot Springs National Park, recently, when workmen were cleaning out the old springs and installing new pipe lines. While workmen were leveling off a trench to carry away the flow from one of the springs, a projection was found in the bottom of the trench which interfered with the proper level for the pipe. To remove the projection a laborer struck it about half a dozen times with a pick, and then a stream of hot water gushed into the trench. Dr. Hugh de Valin, park superintendent, states that this spring is one of the hottest in the park, and that it is expected to have a flow of from 50 to 60 gallons per minute. It will be included in the collecting system through which the hot waters are gathered for distribution.

STEAM vents that change not only their form but their location are a frequent occurrence in Lassen Volcanic National Park, California, an area that contains the only volcano on the United States mainland that is known to be semi-active. Two outstanding examples of such change occurred recently. The vent known as the ''Big Steamer'' in the Sulphur Works area became plugged with mud and débris. This resulted in an increase of steam and pressure beneath, which caused it to blow up and scatter mud a distance of 40 feet around the vent. Now it is a large boiling spring, having changed its form after the explosion and in addition migrated several feet to the west. Another large steam vent in the southeastern end of the Devil's Kitchen has become a boiling pool about 10 feet in diameter. It now boils constantly, raising the main body of water to a height of four or five feet and occasionally sending jets up to a height of 10 feet.

DEVELOPMENT of a new method of fumigating grain in storage without incurring a fire hazard is an outstanding achievement of government investigators during the past year, according to the report of Dr. C. L. Marlatt, chief of the Bureau of Entomology of the Department of Agriculture. The new fumigant is a mixture of solid carbon dioxide or ''dry ice'' and ethylene oxide. Tests by commercial handlers of grains have proved the value of the method, which is economical and superior to the more familiar carbon disulphide treatment of grain, due to its non-inflammability.

BETTER and healthier farm animals are stocking American farms at the end of 1930 than ever before in history, the annual report of Dr. John R. Mohler, chief of the Bureau of Animal Industry of the U. S. Department of Agriculture, indicates. This progress is attributed to the increasing use of purebred sires and the activities of breeders who are supplying improved types of animal in sections where the diseased and unthrifty stock are being condemned and culled. The bureau has contributed to this improvement through its activities in combating stock diseases, whose control has encouraged farmers to invest in better stock.