SCIENCE NEWS

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MICHELSON'S LAST EXPERIMENT

DR. ALBERT A. MICHELSON'S last measurements of the velocity of light, interrupted by his death, will be completed. His associates, Dr. Francis G. Pease, of Mount Wilson Observatory, and Dr. Fred Pearson, who was Dr. Michelson's assistant for twenty years, will finish the experiment, still in progress, as originally planned by Dr. Michelson.

But the world's most precise determination of the speed of light had progressed sufficiently far before Dr. Michelson's death to allow him and his associates to arrive at a tentative value. "The tentative value for the velocity of light resulting from this experiment is about the same as that obtained by Dr. Michelson's experiment on Mount Wilson," Dr. Pease informed *Science Service.*

Just four days before his death, Dr. Michelson dictated from his sick bed the outline of the scientific paper which will eventually announce to the scientific world the most precise value of light's velocity, one of the most fundamental values in physics.

The mile-long tube in which the present light experiments are performed is located on Irvine Ranch, near Santa Ana, south of Pasadena. In erecting this unique laboratory Dr. Michelson had the cooperation and support of the Mount Wilson Observatory of the Carnegie Institution.

The long tube in which the tests are made cost $50,000 and took two years to complete. Its length was accurately measured by experts of the U. S. Coast and Geodetic Survey with an accuracy of one part in a million. It is three feet in diameter and its welded construction made it possible to exhaust practically all the air within it. To exhaust the thousands of cubic feet of air in the pipe, vacuum pumps are run day and night. Only 125 cubic feet of air are left in the tube during the tests.

The Michelson tube gives science's first opportunity here on earth for measuring light's velocity in vacuo. Dr. Michelson's previous light velocity measurements were made by sending a beam of light from a distant mountain peak to a revolving mirror on Mount Wilson, where the famous Carnegie Institution observatory and world's largest telescope are located.

The 1926 experiments on light traveling twenty-two miles from Mount San Antonio to Mount Wilson gave a light velocity of 299,796 kilometers per second, or 186,290 miles per second. This is believed to be accurate to within 4 kilometers per second or about three miles per second. So precisely will the velocity of light be known when the present experiments are completed that it will be possible to use the speed of light as a measuring stick in precise surveying.

Dr. Michelson made his first experiments on the velocity of light shortly after he finished his studies at Annapolis and while he was still in the Navy.

EXPLORATION OF GREENLAND

ALTHOUGH colonized by the Norsemen before the year 1000, Greenland is still a lure to scientific explorers.

The loss of Professor Alfred Wegener, the German geologist and meteorologist, during the past winter while returning to the coast from an observational weather station established at the center of Greenland's great ice cap, is an unfortunate sacrifice to the continued scientific study of the largest of Arctic lands.

Professor Wegener was the leader of the German expedition which, in a coordinated program of research by British, Germans and Americans, undertook to locate and maintain three weather stations in that second coldest area on the face of the earth, the great ice sheet of Greenland.

He was widely known for his elaborate theory of the drift of continents which attempted to explain the distribution of land masses of the earth upon the supposition that all continents were once joined together and that they drifted apart forming the oceans as they now exist. Professor Wegener worked out this theory during the course of a previous voyage to Greenland some years ago.

The Wegener theory of the origin of continents is not generally accepted by geologists, but his weather researches to which he sacrificed his life are likely to be of great scientific value.

Augustine Courtauld, who has just been rescued from a weather observing station established by the British expedition, nearly made the supreme sacrifice for science.

Four nations have sponsored expeditions probing Greenland weather during the past winter. An American expedition from the University of Michigan has had observers at two stations, while the British have also had two parties in the field. The Norwegians have manned one weather station.

The U. S. Weather Bureau has received regular weather reports, sometimes twice daily, from five more permanently established weather stations of the Danish Government, all during the winter. The reports for some reason probably connected with radio transmission have been somewhat irregular in the past six weeks.

This intensive study of Greenland weather is expected to yield sufficient data to estimate its influence upon the weather of America and Europe. From such research may come improved methods for forecasting some of the storms that are believed to be greatly influenced by Greenland conditions.

THEORIES OF IMMUNITY TO DISEASE

STUDIES on theories of immunity or resistance to disease were reported by Dr. Arnold R. Rich, of the Johns Hopkins Medical School, at the meeting in Syracuse, New York, of the National Tuberculosis Association. Dr. Rich's work may lead to a change in the present methods of treating certain infections.

Immunity may be acquired from vaccination with large doses of killed germs or from small doses of living germs picked up in the natural course of life. It protects the body from disease in two ways: by checking the growth of disease germs so that they die, and by preventing their spread to the rest of the body from their original point of entry.

It is a well-known fact, Dr. Rich said, that when the human body acquires active immunity to a certain disease germ, its tissues ordinarily become hypersensitive to the protein of that particular germ or bacterium. The next time the body is infected with that germ, the tissues at the point of infection are locally damaged and killed by amounts of the bacterial protein which are harmless to the normal body. Disturbing constitutional symptoms and even death may occur when amounts of the protein which would be harmless to the normal body find their way into the blood stream of the hypersensitive. The theory which Dr. Rich's studies have controverted is that this hypersensitivity to the protein of the germ is a necessary and helpful accompaniment of the development of immunity.

Dr. Rich stated that this is not the case, and described the series of experiments on which he based his opinions. He also recommended that investigators develop improved methods of freeing the body from this hypersensitiveness in infections in which it acts to endanger the life of the patient.

The problem is particularly important in connection with tuberculosis. By far the greater part of the destruction of tissue which occurs in tuberculosis is directly a result of the hypersensitivity of the tissues to the protein of the tubercle bacillus. If this hypersensitivity is not necessary for the operation of immunity to tuberculosis, prevention of its damage by means of desensitization might be of great service to certain tuberculous patients.

With Dr. Allan Chesney and Dr. T. B. Turner, Dr. Rich carried out experiments which showed that acquired immunity could be established without development of hypersensitiveness.

Next he and Dr. J. Howard Brown injected the blood of hypersensitive immune animals into normal, nonimmune ones. The normal animals could in this way be given immunity to the infection without being made hypersensitive.

In the final experiment, Dr. Rich, with Dr. F. B. Jennings, found that if the hypersensitiveness of immune animals was entirely abolished by suitable methods of desensitization, the animals lost none of their immunity, but were able to withstand millions of deadly doses of virulent germs.

Dr. Rich also described studies which showed how the spread of disease germs is really prevented in the immune body. Formerly it was thought that this was accomplished by the inflammation occurring as a result of the hypersensitivity. This was one reason why scientists considered hypersensitivity a necessary evil. Dr. Rich showed that such is not the case. Instead, the blood plasma and tissue fluids of the immune body act upon the germs, changing them in such a way that they stick not only to themselves but to the cells and fibers of the tissues they have invaded. In this way they are kept at the original place of infection and are not able to spread into the body.

THE DESTRUCTION OF COYOTES

COYOTES, according to accepted tradition the most worthless and despised of all American beasts of prey, were the cause of vehement controversy at the recent meeting of the American Society of Mammalogists in Philadelphia. A special committee of the society, appointed to study problems of predatory mammal control, came in with a sweeping condemnation of the program of the U. S. Biological Survey, especially of its use of poison as a means for destroying undesired animals.

As presented by the committee's chairman, Dr. H. E. Anthony, of the American Museum of Natural History, New York, the report stated that "a crisis confronts the mammal life of our western states," called for more exhaustive study of the predatory animal problem before wholesale destruction of any species should be undertaken, and intimated that in its attack on coyotes the Biological Survey is playing favorites to a special interest, the livestock industry. Opponents of the Biological Survey's program also stated that the distribution of poison baits results in the death of many fur-bearing animals other than coyotes, and further charged that considerable supplies of poison have been placed in the hands of livestock men who make reckless use of it.

Representatives of the Biological Survey, under the leadership of Dr. Paul Redington, chief of the survey, defended themselves and their policy with vigor. There is no time to wait for long and laborious studies, they say, at least so far as the coyote is concerned. This animal is increasing rapidly, extending its territory and adapting itself to new conditions in a most disconcerting manner. Warfare against it has to be kept up and even intensified, lest it get out of control altogether.

Strong denial was also entered to the charge that the Biological Survey is primarily a "destructive agency." Of eight million dollars available, a million was spent on research and four million on conservation, leaving less than half for all kinds of biological control work. Dr. Redington also denied that the use of poison is being greatly extended, even against coyotes. On the contrary, he stated, it is being reduced. In 1930, thirteen thousand ounces of poison were used; in 1931 this has been cut to ten thousand ounces; for 1932 a further cut to eight thousand ounces is anticipated.

Traps and other means of destruction are used in preference to poison whenever practicable, Dr. Redington stated, and it is the intention of the Biological Survey to reduce the use of poison to the minimum allowed by necessity.

Further denial was entered regarding the charge that general dissatisfaction exists among fur dealers. Relatively few animals other than coyotes are killed by the poisoned baits and fur men are becoming convinced on this point. In support of the Biological Survey's con-

tention, a letter was produced from the officers of a new association of raw fur dealers, expressing satisfaction with the control work of the Biological Survey and endorsement of its principal policies.

In the end, after more than an hour of debate, the society adopted the report, and also voted to continue the committee for another year under the chairmanship of Dr. Anthony.

TRACES OF UNKNOWN EVERGLADES TRIBE

FIRST traces of the unknown prehistoric Indians who lived in the Everglades have been discovered by Mr. Matthew W. Stirling, chief of the Bureau of American Ethnology. Mr. Stirling has returned from several months of archeological exploration in Florida.

On the very edge of the Everglades, near Lake Okechobee, Mr. Stirling encountered a great plan of earthworks, elaborately laid out in embankments and mounds, and covering an area a mile square. So large and conspicuous are these earthworks, Mr. Stirling said, that it is surprising that no previous explorer has ever reported their existence or their significance. The nearest approach to anything like them are the famous Fort Ancient earthworks in Ohio, which were also made by prehistoric mound-building Indian tribes.

The most prominent feature of the Everglades site is a flat-topped rectangle of earth built 30 feet high and 250 feet long. This was apparently the focusing point of attention for whatever ceremonies were held at the site. Earthen embankments enclose a court in front of this high place. Back of it a semi-circular bank of earth was raised.

This is only a small portion of the earthworks. A curious formation consisting of a large semi-circular bank extends in front of the high place and its court. And out from the semi-circle start a number of parallel lines of banks with circular mounds at the ends. Within the great semi-circle is a platform of earth six feet high and a quarter of a mile long.

"The whole plan is laid out with remarkable precision," Mr. Stirling reported. "The parallel lines are straight as a string, and the semi-circles are so perfect that we can imagine some Indian walking around a fixed point with a string held taut, to mark the outline."

Excavations into this important site will be made next season. In his exploration visit, Mr. Stirling found potsherds on the edge of the site, showing that the inhabitants of the place were familiar with pottery. These Indians are the people who inhabited the Everglades before the Seminoles came there from farther north in comparatively late times.

Excavation of a large burial mound made of sand was another achievement of the expedition. This mound, south of Key Marco, contained 250 burials of Calusa Indians, together with their possessions. The Stone Age of prehistoric America was almost the Shell Age in this region, for the Indians had shell hoes and axes, shell cups and ornaments. Stone was scarce, though a few stone implements brought in by traders from farther north were had.

It is Mr. Stirling's view that this mound was the burial place of the Indians who left the "biggest shell heap in the United States" famous in Florida. The shell heap, representing the refuse of some very large settlement, is two miles from the burial mound.

ITEMS

AN electro-magnet weighing 14 tons, erected at Leyden by the Siemens Halske Company of Berlin, will enable the wrenching apart of atoms as never before. This marks the realization of a dream of the late Dr. H. Kammerlingh Onnes, the first man to liquefy helium, who designed the magnet. The joint action of intense magnetic force with intense cold is likely to yield new secrets about atoms, is the belief of Professor Onnes's successor, Professor W. J. Haas, who completed the work. Dr. Peter Kapitza, of the University of Cambridge, England, has recently constructed a similar magnet for use at extremely low temperatures with the same hope in mind.

PATENTS on a plastic material similar to bakelite, but made from corn cobs treated with cresylic acid, have been granted to Professor O. R. Sweeney, and have been assigned by him to Iowa State College. The material is highly resistant to chemical and electrical action and is intended primarily for insulation.

A GIANT dinosaur skeleton, seventy feet long from nose to tail-tip and twelve feet high at its humped-up hips, has just been mounted in the U. S. National Museum, and will be ready for public inspection within a few days. The huge reptile, which belongs to the genus known as Diplodocus, has been seven years in preparation. A corps of scientists and technicians, working under the direction of Charles W. Gilmore, have spent over 2,500 working days, the equivalent of one man's time for nine years, carving the fossil bones out of their embedding matrix of stone, finding the right places for them in the skeleton and building the carefully fitted supporting framework of wrought iron.

MINERAL oil seals and preserves for more than a year between 1,500 and 2,250 dozen eggs an hour in a new electrically driven machine for processing eggs. After the eggs are properly candled, graded and cleaned they are put on an endless, moving belt in groups of three dozen and carried through a hot bath of mineral oil which hermetically seals the shells, according to *The Electric Journal*. It is said that no other chemical or physical change occurs and that weight, color and appearance remain the same.

RURAL electric power lines can be run underground cheaper than they can be strung on poles overhead, a report to the National Electric Light Association indicates. Thus it may be possible for farming areas to enjoy underground electric distribution, which is now confined largely to better business sections and exclusive residential districts. The report urges underground conductors for single-phase, or two-wire, circuits that will not be changed to three-phase, or three-wire circuits, for a number of years. The cost of installation is said to be $830 per mile.