# SCIENCE NEWS

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## THE MEETING OF THE AMERICAN PHILOSOPHICAL SOCIETY

THE ocean's floor was discussed by leading geophysicists, meeting under the auspices of the American Philosophical Society in Philadelphia on November 26. Pooling their knowledge of the inaccessible regions under thousands of fathoms of salt water, the significance of evidence brought up by their remote-control equipment was considered. No man will ever stand on the ocean floor at the bottom of some of the great deeps, but the rocks under those deeps are gradually yielding their secrets. Suggesting that nations use their warships as oceanic exploration equipment, Dr. Richard M. Field, of Princeton University, outlined the great sub-sea mapping task still before oceanographers. Structures under the sea, according to evidence he presented, seem to be continuations of structures near the shoreline on land. But extensions of structures across great ocean basins are not justified by present evidence.

SUMMARIZING results of gravity studies made last summer on board the *U.S.S. Barracuda,* Dr. H. S. Hess, of Princeton University, finds that the mountains under the sea, forming the West Indies, are an extension of the Andean Cordillera Central to the south, and connect with the Mexican highland through structures in southern Yucatan. Methods for making gravity studies at sea, where a firm base for equipment is lacking, were described by Maurice Ewing, of Lehigh University. Special pendulums, whose speed varies with the force of gravity, have been developed for use in boats. Several of these, working together, give accurate gravity reading even when the boat rolls as much as five degrees. Earthquakes give clues concerning submarine geology which may be interpreted by geophysicists as evidence of submerged structures. The speed of an earthquake wave through the sea bottom may be compared with its speed through known rocks, and the composition of the sea floor learned. Captain N. H. Heck, of the U. S. Coast and Geodetic Survey, who believes that much more work must be done before the sub-sea structures can be definitely identified, described this work. To date, the evidence collected is suggestive, rather than conclusive.

PUNCHING holes in the sea bottom, thousands of feet below the surface, to collect samples of the sea floor, has been the work of Dr. Charles Piggot, geophysicist of the Carnegie Institution of Washington. Using a specially designed gun, which shoots a hollow tube into the sea floor, he brings up ten-foot long sections of the ocean bottom. Studying these are a number of investigators whose work was explained by Dr. W. H. Bradley, of the U. S. Geological Survey, and Dr. J. A. Fleming, of the Carnegie Institution of Washington. Dr. Bradley finds that in the sea floor there is evidence of four ice ages, which can not yet be definitely correlated with the ice ages on the continents, and of two periods of violent explosive volcanic action, one during the ice ages, and one after the most recent ice age. Changes in the earth's magnetism during the ice ages, as shown by the deep sea sediments collected by Dr. Piggot's sampler, were described by Dr. Fleming, who finds that considerable changes in the earth's magnetic field have occurred in rather recent geologic time. The exact nature of these changes can be determined by further study of "fossil magnetism," and from it geologists hope to learn the causes of the shifting of the earth's magnetic field.

THE log book of Captain Nathaniel Brown Palmer, of Stonington, Conn., early nineteenth century American mariner, was offered at the recent meeting of the American Philosophical Society as proof that Captain Brown and his shipmates were the first ones to set eyes on Antarctica. Found by Colonel Lawrence Martin, chief of the Division of Maps of the Library of Congress, in the possession of Captain Brown's descendants, who still live in Stonington, the log book constitutes the first direct proof that the Yankee skipper was the discoverer of Antarctica. Captain Palmer commanded one of a fleet of seven sealers that left Stonington on August 31, 1820, to hunt seal in the Antarctic. Two months later six of the ships laid over in President Harbor in the South Shetland Islands to prepare for sealing, while Palmer was sent out to find a better harbor. On November 17 Captain Palmer in his 44-ton ship, the *Hero,* sighted the peninsula that juts out of Antarctica toward South America and which is called by geographers "the American Salient." Captain Palmer's name was given to the land, but subsequently British mapmakers persisted in naming most of it and eventually in referring to all of it as "Graham Land."

AN electrical discharge in a tube filled with gas behaves like a stroke of lightning, according to a report made by Professor J. W. Beams, of the University of Virginia, and Dr. L. B. Snoddy. Studying the speed with which luminosity traveled in a long discharge tube, a discharge was found that appeared to correspond to the "leader stroke" of lightning and a return discharge that was similar to the return stroke of a flash of lightning.

DR. E. A. CULLER stated that dual personality has been created experimentally in the psychological laboratory at the University of Illinois, by the use of the South American arrow poison, curare. Actions learned in one personality are forgotten during life in the other personality, he said. Dogs were the subjects of the experiment; the drug, by depressing the brain caused the animals to act on a different level of the nervous system. Normally, learning takes place in the cortex of the brain, but when the brain is affected by a powerful drug such as curare, learning can take place at a lower level involving, presumably, subcortical parts of the nervous system. But what is learned during the normal personality is forgotten under the influence of curare. What is learned during the

curare personality, when the animal is functioning at the lower level, is similarly forgotten when he returns to his normal personality.

DR. ETHEL BROWNE HARVEY, who worked on the problem at Woods Hole, Mass., and Naples, Italy, under a grant from the American Philosophical Society, reported that eggs of lower animals can develop without nuclei, either their own or those normally received from the sperm cells in fertilization. Dr. Harvey whirled sea urchin eggs in a centrifuge, subjecting them to a force 10,000 times that of gravity. This whirled the eggs in two, with the nuclei in the lighter halves. Then she applied chemicals and physical stimuli to the parts without nuclei, which caused the cells to divide and start development. Division and arrangement of parts went on as though the cells were normally nucleated, until there were about 500 of them in the group and they had reached a definite early stage in organic development known as the blastula stage. These rudimentary organisms without nuclei lived in some cases as long as four weeks, whereas normal unfertilized sea-urchin eggs commonly die in a day or two.

A CERTAIN kind of cancer or malignant tumor has been produced in some 100 albino rats by feeding them crude wheat germ oil made by ether extraction, according to a report by Drs. L. G. Rowntree, Arthur Steinberg, William R. Brown, George M. Dorrance and E. F. Ciccone, of the Philadelphia Institute for Medical Research. This is the first time that a produce of vegetable origin has been found to cause a malignant tumor. The finding, however, does not necessarily mean that wheat germ or any other article of diet is a cause of cancer. But since materials of this class have never before been implicated in cancer causation, a new field of investigation is opened. "An exhaustive study seems desirable," Dr. Rowntree said, "to determine the relation of certain cereal products to tumors resulting from their use."

## THE CHICAGO MEETING OF THE AMERICAN PHYSICAL SOCIETY

A HIDDEN "structure" has been discovered in water and other liquids, it was reported at the recent meeting of the American Physical Society at the University of Chicago. The seemingly formless nature of fluids, which enables them to take over the shape of any vessel containing them, is only a mask behind which hitherto unknown arrangements of atoms are in action. Professor G. W. Stewart, of the University of Iowa, described his investigations of very dilute solutions of such salts as sodium chloride and potassium chloride. Using a special kind of scattering of x-rays, known as diffraction, Professor Stewart was able to compare the "structure" of these solutions with the "structure" of pure water and to note the differences created by the addition of the salts. Using different materials but essentially the same x-ray method, Professor Frank H. Trimble, of Northeast Missouri State Teachers College, and Professor Newell S. Gingrich, of the University of Missouri, confirmed reports of a new type of atomic "structure" in liquids. Liquid sodium was the material chosen for study. It was found that with increasing temperatures the concentration of atoms about any one atom was much less than for lower temperatures. As expected the increased temperature tends to destroy this new kind of "structure."

A STRANGE shifting of the light from the distant nebulae toward the red colors was the observable fact which led to the concept of the expanding universe, advanced by the Belgian Abbé LeMaître. This so-called "red shift" was interpreted as being caused by the rushing away of these distant members of the stellar universe. The idea was analogous to the lowering of pitch of a train whistle as it shrills while rushing away from the observer. Astronomers throughout the world and particularly those at Mount Wilson Observatory supplied the bombardment of observable fact which has led to a search for a better theory than that of a universe in rushing expansion. Professor Arthur Haas, Austrian theoretical physicist, now at the University of Notre Dame, described calculations showing that the dilemma of the red shift could be circumvented if the total mass in the universe were increasing with time. An increase in mass, for each second of time, amounting to 100,000 times the mass of the sun would solve the difficulty. This concept of a universe continually growing heavier is one conclusion of a new theory of the universe which was proposed several months ago by the English physicist, Professor P. A. M. Dirac, who has won the Nobel Prize for his mathematical achievements in the field of physics. Professor Haas added that the basic hypothesis of Dirac's theory is that the total number of primordial particles of matter in the universe is equal to the square of the ratio of the radius of the universe to the radius of the electron. The ratio is an enormously large number, for the radius of the universe is about the largest imaginable number which has any real meaning and the radius of the electron comes close to being the smallest imaginable number with equal real meaning. And the square of this ratio, of course, is enormously larger. Professor Haas showed that Dirac's assumptions may be deduced from simple and plausible principles which seem to be basic in the physics of the universe.

V. C. WILSON, of the University of Chicago, reported to the physicists meeting his cosmic-ray experiments carried out in a mine in Michigan to a depth of 1,600 feet. The mine chosen had its shaft slanting at 34 degrees to the vertical so that by placing the instruments at different places along the shaft any thickness of rock could be studied for its absorption of the rays. At the maximum depth of 1,600 feet it was found that the piercing radiation still came through the great rock mass. Its value, however, was only one twenty-thousandths of the intensity at the surface.

## STUDIES IN ACOUSTICS

STUDIES of the relation between automobile noise and speech intelligibility showing that it takes ten times the intensity of speech sounds to carry intelligible conversation back to the back-seat occupant than it does for the latter to talk to the driver in front, were reported by Dr. J. C.

Steinberg and W. A. Munson, of the Bell Telephone Laboratories, New York City, at the Ann Arbor meeting of the Acoustical Society of America. Investigators of the Electrical Research Products, Inc., made the measurements from which the conclusions were drawn. Three positions of two occupants in a car were investigated. When seated side by side in front intelligible conversations could be carried on at all speeds up to 60 miles an hour with little trouble. An increase of sound intensity of only two decibels is needed and this can be obtained by raising the voice. In the test of conversation from the back seat to the driver, no shouting is needed until 50 miles an hour is reached. Then a two decibel increase is required. At 60 miles an hour a six decibel rise is needed. However, for the same position of car occupants but for conversation from the front seat to the back it is necessary to raise the voice to 18 decibels to obtain intelligible conversation at 60-mile-an-hour speeds. Actually what happens is that the driver in front soon gives up attempts to carry on the conversation. The point is that a sound intensity of 16 decibels is almost at the limit of human ability to maintain intelligible conversation. Twenty decibels is the limit. A single word can be shouted, said Dr. Steinberg, with an intensity of 30 decibels and some opera singers can attain an intensity of 40 decibels for a sustained note. But for intelligible conversation 20 decibels is the maximum.

HIGH-SPEED motion pictures of the little-known vibrations of the human vocal cords, taken at the rate of 4,000 frames a second, were exhibited for the first time publicly. The fundamental experiments in the origin of human speech have significance in solving that old, but basic, question of whether it is the cords or the shape of the mouth which predominate in determining speech characteristics. D. Herriot and D. W. Farnsworth, of the Bell Telephone Laboratories, constructed the experimental arrangement which made possible these pioneer physiological pictures. The method was to insert, far back in the mouth, a small dental mirror and by it and other mirrors reflect an intense beam of light on the vocal cords. Light reflected by the cords came back out of the mouth, then through a small hole in one of the mirrors and finally into the special high-speed camera. So fast is this camera, and so short the exposures for each frame, that it is useless for ordinary photography even out in bright sunlight. A large 2,000 watt bulb overloaded to gain greater brilliance was the light source employed. Shining and glistening are the saliva-covered cords as they oscillate in speech. Their undulations start from the bottom as they close; then progress upward and finally and suddenly they open again to repeat the process. Finally the subject, Mr. Farnsworth in this case, pauses for breath, the cords relax and the opening of the glottis enlarges as he inhales. Interest of the telephone engineers in the work centers around potential improvements in equipment, for basic knowledge of human speech leads to the design of better apparatus. For the same reason the pictures should have significance for radio and sound motion pictures.

## ITEMS

FOR twenty years Dr. E. W. Brown, professor emeritus of mathematics at Yale University, has calculated laboriously by long-hand the influence of the sun on the moon, a task that compares in complexity with "a chess problem in three dimensions, played blindfolded." He was able to report to the American Philosophical Society that these two decades of astronomical calculations were "done without an error." Dr. Brown, assisted by Dr. W. J. Eckert, by using adapted commercial calculating machines, has checked in one year's time the original calculations and proved them correct.

BLOOD stains can be made to shine in the dark through the use of a chemical spray developed by Dr. W. Specht, of the University of Jena. Fresh stains, recognizable by themselves, glow only feebly, but old and faded stains have a bright, pronounced luminescence. The spray consists of a one tenth per cent. solution of an organic chemical, 3-amino-phthallic acid hydrazid, to which soda and hydrogen peroxide have been added. It is used with an atomizer. The method is said to be so sensitive that it will detect five drops of blood dissolved in six quarts of water.

BEES have an exceedingly high blood sugar concentration during their active life as honey-gatherers, Dr. R. Beutler, of the University of Munich, has found. It is twenty times higher than the normal blood sugar percentage in man: 2 per cent. as against the human 1 per cent. This high concentration seems to be definitely correlated with flying activity, for young bees that still live in the hive and have not begun to function as honey-hunters have only .2 per cent. blood sugar. A flying bee beats her wings about 200 times a second, thereby necessitating a rapidity of movement in her principal muscles simply unheard of in the muscles of man and other vertebrate animals.

A PATENT has been granted to Mr. Glenn B. Warren, of the General Electric Company, on an adaptation of the steam turbine, one of the most highly efficient sources of power ever devised, when operating under certain limited conditions. His invention is an attempt to adapt the turbine so that it will operate efficiently under railroad conditions. Two turbines, one for low-speed and one for high-speed operation, are provided by Mr. Warren. Gearing connects or disconnects either turbine as the operating speed dictates. Unusual interest is attached to the invention by the fact that the railroad world is at present torn between adherents of steam hauling and advocates of the speedy Diesel engines that are proving themselves on many of America's crack streamliners. Attention of steam men has been directed toward developing a substitute for the impressive, yet relatively inefficient reciprocating engine that has ruled the rails since the first railroad was built. Its chief disadvantages are its inefficiency and the pounding of the rails that occurs on each stroke of the pistons. The turbine is one suggested method of overcoming this handicap of the reciprocating locomotive.