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THE SIZE OF THE SUBATOMIC PARTICLE

THE subatomic particle, discovered a year ago, is between 100 and 160 times as massive as the electron. This first estimate of the size of the most recent addition to the building blocks of the universe is reported in the *Physical Review* by Drs. J. C. Street and E. C. Stevenson, of Harvard University.

One thousand photographs of particle tracks produced by the bombardment of matter by cosmic rays were taken in order to secure one photograph of the new particle. The estimate of the size is based on the shape of the track the particle left behind it and on its penetrating power.

Discovery a year ago of the particle, credited to Dr. Carl D. Anderson, of the California Institute of Technology, and his associate, Dr. Seth Neddermeyer, occasioned a keen rivalry between the California workers and their Harvard colleagues. The official announcement of its discovery by the Californians last spring was made almost simultaneously with a similar announcement from Harvard.

The particle is believed to carry the same negative electric charge as an electron, for the two Harvard investigators made that assumption in proceeding to analyze results of their experiments.

Four Geiger counters—devices for counting atomic discharges—were lined up in an ingenious experimental "telescope" layout in order to track the new particle. The first three counters were used to guarantee that particles were coming from only one direction outside the apparatus. The last counter served to cut off the observing chamber when high energy particles, photographs of which were not wanted, passed through the counters. Had this last trap not been used 4,000 pictures—instead of 1,000—would have been necessary in order to obtain the one vital atomic portrait for which Drs. Street and Stevenson were looking.

SYMPOSIUM ON BIOPHYSICS AT THE UNIVERSITY OF PENNSYLVANIA

ARTIFICIAL gravity now makes it possible to study the physical properties of protoplasm, the life stuff out of which all cells in the animal and human body are composed. Through such studies investigators are coming nearer to an understanding of what life is, or rather what physical factors and what substances are needed in living things to make life possible. At the Symposium on Biophysics, sponsored by the American Institute of Physics and held at the University of Pennsylvania, Professor E. Newton Harvey, of Princeton University, described his experiments with the high-speed whirling centrifuge which by centrifugal force—often called artificial gravity—helps to disclose forces acting within the living cell. Surface tension, that pulls drops of water and other liquids up into a ball, is one force which can be measured by the high-speed centrifuge. Spherical cells are whirled around the centrifuge until the centrifugal force created is large enough to pull them apart. All the while, through special types of microscopes, the worker watches for the exact instant of rupture. At the exact instant when the cell breaks in two the centrifugal force exactly balances the inward surface tension force which normally holds the cell together.

DR. W. M. STANLEY, of the Rockefeller Institute for Medical Research at Princeton, N. J., who first showed that the mysterious disease-causing viruses are merely giant chemical molecules, despite their ability to reproduce and to exhibit the properties of living things, urged that the physicists show as much interest in the study of such giant molecules as they do in splitting the atom in the popular realm of nuclear physics. He laid stress on the solution of the mysterious viruses and the conquest of the dread diseases they cause; rabies, encephalitis (sleeping sickness), poliomyelitis (infantile paralysis), yellow fever and the common cold. Other virus diseases also include hoof-and-mouth disease, dog distemper, measles, certain tumorous growths and several mosaic diseases in plants. Dr. Stanley paid tribute to physical methods for the first isolation of the first virus—that of tobacco mosaic. Only by the tremendous centrifugal forces created in swift-whirling centrifuges was the isolation possible of the heavy protein molecules, which cause the mosaic disease in tobacco plants. The probable molecular weight of these giant molecules is about 17,000,000. For comparison the molecular weight of the element oxygen is 32. And even the heaviest element known—uranium—has a molecular weight of only about 476. Several other virus diseases of plants have been studied and in all cases the causative agent appears to be a superheavy molecule having a molecular weight running into the millions. Moreover, and especially significant because it is a step on the way to the study of viruses causing human disease, the use of the ultra-centrifuge of Dr. Ralph W. G. Wyckoff has isolated an animal virus which causes warts in rabbits. The giant, heavy molecule of protein isolated in this case had a molecular weight of about 20,000,000. Also in the animal field of virus research has been the disclosure that the virus causing encephalitis in horses is another, but unstable, giant protein with a molecular weight of about 25,000,000. Dr. Stanley pointed out that "The remarkable success of these two first forays into the animal virus field is a wonderful tribute to the effectiveness of the centrifugal technique."

MEETINGS OF THE AMERICAN PETROLEUM INSTITUTE

THE first ten years of one of the world's first systematic explorations of the chemical nature of petroleum were reported by Dr. Frederick D. Rossini, of the National Bureau of Standards. Still to a large extent a chemical mystery despite its wide-spread and increasing uses, petroleum has been the object of a systematic study under a joint research project begun in 1927 by the Bureau of Standards and the American Petroleum Institute,

the oil producers' and refiners' association. Considerable progress in separating the hundreds of hydrocarbon compounds, of which petroleum is a mixture, was reported by Dr. Rossini. But he indicated emphatically that the survey is nowhere nearly finished with its task. Besides new knowledge of one of chemistry's "dark continents," improved fuels are expected to follow the survey, whose chief aim is the identification of the different compounds making up oil. New processes for refining as well as new uses and oil products are also expected to be a by-product of the survey, a project unique among industrial research programs.

GREATER fuel economy, more power to enable bigger giants of the air to take off from America's relatively restricted airports, and smaller engines are the promise of high test fuels which will come into use in the near future. According to S. D. Heron, of the Ethyl Gasoline Corporation, gasolines with anti-knock ratings in excess of a hundred, when turned to by the aviation industry as the answer to present airplane limitations, will result in more power being derived from less fuel burned in less engine. "Isoparaffins of higher anti-knock value than isooctane are known. One of these at least appears to be in all respects a desirable aircraft fuel and to be not impossible of commercial synthesis." Airplane operators have been "regrettably" slow in turning to higher and higher test fuels, according to Mr. Heron, because of the higher per gallon cost. But the higher per gallon cost is more than returned in improved performance. Aviation fuels generally in use now have an anti-knock rating of 87, with the expectation that fuels rating up to 100, or of even higher value, will be in common use in the immediate future.

THREE investigators from the Texaco Company reported that automobiles do not require as high test fuel at high altitude to prevent knocking as they do at lower altitudes. Experiments conducted by Neil MacCoull, K. L. Hollister and Roy C. Crone indicated that at 4,000 feet of altitude they can use fuel at least 10 octane numbers below that needed at sea-level. Such lower-rated fuels can be economically used in seven states where altitudes of highways commonly range from at least 2,000 feet to more than 4,000 feet.

THE ELIXIR OF SULFANILAMIDE-MASSENGILL

RESPONSIBILITY for sixty-one deaths caused by Elixir of Sulfanilamide-Massengill is disclaimed by the head of the S. E. Massengill Company, of Bristol, Tenn., which manufactured the drug, in the issue of the *Journal* of the American Medical Association for November 6. His statement is accompanied by a nine-page report on the chemical and pharmacologic examinations of the elixir made under the auspices of the chemical laboratory of the association.

More deaths are expected to be reported, but there is no more of the drug to cause any new cases. The U. S. Food and Drug Administration, acting swiftly on the news of the first deaths, traced and seized every shipment and, followed it into drug stores, doctors' offices and family medicine chests. W. G. Campbell, chief of the Food and Drug Administration, is reported to have said that "If there is a spoonful of the elixir left, we don't know where it is."

The so-called elixir was a solution of sulfanilamide and diethylene glycol. Sulfanilamide has been widely hailed as a valuable remedy in streptococcus infections and gonorrhea. Diethylene glycol has been used in many industrial processes. The latter chemical caused the deaths, according to investigations by the chemical laboratory of the American Medical Association and experiments made at the University of Chicago.

Although the investigators at the University of Chicago believe from their investigations with animals that the diethylene glycol was the poisonous ingredient in the Elixir of Sulfanilamide-Massengill, the medical association points out that one must not overlook the possibility of damage to tissues when sulfanilamide is given to experimental animals or human beings with damaged kidney function. This point is now being investigated.

Summing up the tragedy of the sixty-one deaths, Dr. Morris Fishbein, editor of the *Journal* of the association, says: "This incident shows how absolutely necessary it is to have prompt action for the development of efficient food and drug legislation. Under the present laws the responsibility on the manufacturer is so slight that it is still possible to make an error causing sixty-one deaths without violating any law with a penalty more severe than a small fine."—JANE STAFFORD.

THE REORGANIZATION OF MEDICAL PRACTICE

PRINCIPLES and proposals for reorganizing medical practice in accord with changing social and economic conditions so as to bring medical care to the "forgotten man," at present unnursed and undoctored, have been presented to medical organizations by a committee of physicians.

The committee represents 430 medical men. It includes a Nobel Prize laureate and is headed by the following officers: Dr. Russell L. Cecil, *chairman,* associate attending physician, New York Hospital; Dr. John P. Peters, secretary, professor of medicine, Yale University School of medicine; Dr. Milton C. Winternitz, vice-chairman, professor of pathology, formerly dean of the Yale University School of Medicine; Dr. Hugh Cabot, vice-chairman and consulting surgeon of the Mayo Clinic.

The medical profession, although only one of several groups vitally concerned with medical care, should, in the opinion of the committee, take the lead in proposed changes and should cooperate with other interested groups. Medicine must be ready to change and not remain static if "medical men are to act as the expert advisers of those who convert public opinion into action."

Health insurance alone, the committee and its subscribers believe, does not offer a satisfactory solution on the basis of the principles and proposals they have drawn up. First of the principles indicates the view that the people's health is the direct concern of the government and that a national public health policy should be formulated. Prevention of illness is stressed as the

first necessary step toward improving the medical and health picture. Voluntary agencies, local, state and federal governments are all concerned, the committee states, in providing adequate medical care. The principles were enumerated as follows: (1) That the health of the people is a direct concern of the government; (2) that a national public health policy directed toward all groups of the population should be formulated; (3) that the problem of economic need and the problem of providing adequate medical care are not identical and may require different approaches for their solution; (4) that in the provision of adequate medical care for the population four agencies are concerned: voluntary agencies, local, state and federal governments.

The proposals made were: (1) That the first necessary step toward the realization of the above principles is to minimize the risk of illness by prevention; (2) that an immediate problem is provision of adequate medical care for the medically indigent, the cost to be met from public funds (local and/or state and/or federal); (3) that public funds should be made available for the support of medical education and for studies, investigations and procedures for raising the standards of medical practice. If this is not provided for, the provision of adequate medical care may prove impossible; (4) that public funds should be available for medical research as essential for high standards of practice in both preventive and curative medicine; (5) that public funds should be made available to hospitals that render service to the medically indigent and for laboratory and diagnostic and consultative services; (6) that in allocation of public funds existing private institutions should be utilized to the largest possible extent and that they may receive support so long as their service is in consonance with the above principles; (7) That public health services, federal, state and local, should be extended by evolutionary process; (8) that the investigation and planning of the measures proposed and their ultimate direction should be assigned to experts; (9) that the adequate administration and supervision of the health functions of the government, as implied in the above proposals, necessitates in our opinion a functional consolidation of all federal health and medical activities, preferably under a separate department.

ITEMS

THE sky's runaway, the recently discovered high-speed Reinmuth object, is being tracked to a definite path or orbit by American astronomers, though they have not as yet (November 6) reduced it to an absolute certainty. Calculations made at the Harvard College Observatory in Cambridge, Mass., indicate that the object, seemingly an asteroid, was at one time only about two or three times the moon's distance from the earth—exceedingly close for any kind of astronomical body. The Harvard figures also indicate that it is getting nearer the sun and losing visibility as it does so. The U. S. Naval Observatory has a different set of figures, based on the possibility that one date of observation got mixed in cable transmission from Copenhagen. On this assumption, the object should now be in the constellation Pegasus, about as far from the sun as the earth is, and should be losing in brilliance.

THE U. S. Bureau of Mines has reported on the conclusion of exhaustive tests that chemicals added to coal to make coal burn better have little effect on the combustion of fuel. Spurred by continual inquiries about alleged "fuel savers," the bureau investigated, both alone and in mixtures, all the chemicals known to have been marketed for this purpose, and many others, including water and chlorine. None, it was stated, were found to produce the effects claimed for them. Results of the experiments are contained in a bulletin by P. Nicholls, W. E. Rice, B. A. Landry and W. T. Reid, all of the bureau's staff, and published by the Government Printing Office.

MAN is related to the ape stock through *Australopithecus*, a strikingly man-like extinct ape represented by two fossil skulls discovered in South Africa, declares Dr. R. Broom, of the Transvaal Museum, in a communication to *Nature*. Dr. Broom's case for *Australopithecus* as a direct ancestor of man is based in part on a newly discovered molar tooth from a lower jaw, found in the same cave where he unearthed one of the two skulls. This tooth combines primitive human and ape characters in a remarkable way. In size, however, it is anything but human; it is as big as a gorilla's, and far larger than that of a human being or a chimpanzee.

A "HORNED TOAD" dinosaur, a huge but squatty creature twenty feet long and five feet wide, with a height of only four feet, was among the discoveries made by the American Museum-Sinclair Dinosaur Expedition under the leadership of Dr. Barnum Brown. Dr. Brown, has just retruned to New York. Among the finds of hitherto unknown monsters of the ancient world are the skeleton of a gigantic duckbill dinosaur, apparently bigger even than the towering spike-toothed tyrannosaur that was the "tiger" of the dinosaurian jungles. There are also some new fossil footprints and a single armbon of the "Mystery Dinosaur"—a monster that stood 35 feet high and made footprints nearly a yard in diameter and 15 feet apart. A sandstone slab containing some of these footprints has been placed on view at the museum. Dr. Brown's finds were all made in a rock formation that was hitherto yielding nothing in the way of dinosaur remains, the Mesaverde Cretaceous, dating back some 80,000,000 years. The formation also yielded plant fossils showing a strange jungle of fossil plants, a mixture of palms, figs, poplars, willows and many other species.

THE bacteria which last spring caused 500 ewes in a herd numbering more than 1,000 to abort their lambs has been identified as a germ never previously reported. Intensive study by Dr. A. M. Lee and L. H. Scrivner, of the University of Wyoming, resulted in isolation of the germ which caused such havoc in a large herd in Big Horn County in Wyoming. Size of the economic loss caused by the bacteria in this herd alone can be gauged by the fact that twenty of the ewes died and all the aborted lambs were dead at birth or died a few minutes later.