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THE MEETING OF THE AMERICAN PHILOSOPHICAL SOCIETY

THE American Philosophical Society held its annual meeting in Philadelphia on April 22, 23 and 24. Among the scientific papers presented are the following:

ONE of the least known sections of the spectrum has been investigated by Professor K. T. Compton and C. H. Thomas, of Princeton University. Professor Compton described the methods they have used to make more accurate measurements of the spectral region that lies between ordinary X-rays and the extreme ultra-violet than have hitherto been possible. Except for a small region between radio and heat waves this is the only part of the spectrum that has not been capable of receiving close and accurate study. Professor Compton and Mr. Thomas have shown that in this region of very soft X-rays iron, cobalt, nickel, carbon, copper and tungsten give out numerous characteristic radiations. In the other regions of the spectrum, such as the ultra-violet section measured by Professor R. A. Millikan, the radiations themselves can be more or less directly studied, but these very soft X-rays are so strongly absorbed and so little reflected that workers must resort to very indirect methods for their detection, such as the photo-electric methods described by Professor Compton.

THERE is much yet to be learned about the curative powers of ultra-violet light, the rays of sunlight which cause sunburn. "It is certain," said Dr. Alfred Hess, of Bellevue Hospital, "that ultra-violet rays bring about a retention of inorganic salts in the body thus helping to maintain the bony structure." As a result of this function, ultra-violet light rays, either produced naturally by the sun or artificially, have been found helpful in the treatment of rickets. During and immediately following the world war rickets or its counterpart, the so-called "hunger osteomalacia or war osteopathy," ravaged the peoples of central Europe, Austria, Germany and Poland. This was due almost entirely to insufficient food. Had it been known then that this malady could be prevented or cured merely by exposure to sunlight, much suffering could have been avoided. The calcifying properties of foods subjected to ultra-violet radiations, which have been successfully used to prevent various disorders of the bones, are due to the cholesterol or phytosterol they contain. As every cell of food so treated contains one or the other of these substances the wide application of this indirect use of ultra-violet rays is evident. The anti-rachitic vitamin has actually been made in the laboratory artificially, Dr. Hess went on to say, by treating the chemical substance cholesterol with ultra-violet radiations. This has not been accomplished in relation to any of the other vitamins.

WHAT becomes of uric acid? This is a question that Professor Withrow Morse, of the Jefferson Medical College of Philadelphia, has set himself to answer, and in a paper before the society he discussed some of the aspects of this vital physiological problem. The dietary factor operates to increase uric acid troubles in Europe more than in this country. This is due somewhat to the fact that here we take less alcohol with our meals. Uric acid has an interest more than purely medical because it represents the end product of chemical changes in the cells concerned with sex and heredity. Recent work has shown that while a little uric acid is carried off by the organs of excretion much of it is destroyed in the blood. By means of a color test, Professor Morse has demonstrated that one of the products into which it resolves itself can be found in the blood of some animals but not in others. For instance, the blood of herbivorous animals contains none of this substance, which is called allantoin, and that of human beings has a very slight amount. Professor Morse is now working on a method by which he can determine just how much of the uric acid products can be found in body fluids.

THAT the body of an animal becomes a well-behaved, well-policed unit instead of a mere anarchic mass of cells and tissues is due to invasion and conquest of its growing parts by the branches of motor nerves, is the theory put forward at the meeting by Dr. G. E. Coghill, who worked at the Wistar Institute of Anatomy and Biology. Earlier workers have held an opposite view, that the activities of the growing parts caused the nerve branches to enter and develop in them, Dr. Coghill said, but his studies have convinced him that order is brought out of the chaos of growth by the initiative of the nervous system.

SCIENTISTS are now trying to measure the rate at which the nervous system reacts to external heat and cold. Professor H. J. Bazett, of the department of physiology of the University of Pennsylvania, has introduced thermo-couples, delicate devices that give a minute electric current when heated, underneath the skin. He finds that the temperature changes in the tissues are greater on a cold day than a warm day. There is no evidence to show, he said, whether this change is the cause of the temperature sensation or the reaction to it.

WHEN you sail for Europe on a trans-Atlantic liner you may be able in the future to tell whether or not a storm will strike the ship, according to Professor William H. Hobbs, of the University of Michigan, who spoke of the plans of the university's Greenland expedition, which will soon start out. "Its primary purpose," he said, "will be the quantitative study of the air circulation above and about the ice-cap of Greenland. This ice-cap is the vast refrigerating area within the Northern Hemisphere which functions as the Northern Wind Pole of the earth, and is therefore the breeding-place of the storms over the Northern Atlantic and Europe. Weather stations will be set up at strategic points both over and out-

side the ice-cap, those of most importance being necessarily at elevations in excess of 3,000 feet. Equipped with radio it is believed that from the main station warning can be sent out two days or more in advance of the arrival of the greater storms on the coast of Europe."

PREDICTING weather accurately months or even years in advance has long been the dream of meteorologists, but we have not yet achieved complete success, said Professor Robert DeC. Ward, of Harvard University, in describing various methods which have been used in an attempt to make such forecasts. "Among the attempts to predict weather in advance are the general predictions based on the habits and characteristics of animals; the almanacs which merely contain statements of the average weather conditions of past years; forecasts based upon sequences in the weather, and the forecasts for a year ahead which rest upon no scientific foundation and are without value. The story is told of a certain widely-known American 'weather prophet' who died not many years ago. It is reported that when his health was failing a certain patent-medicine company which had been using his prophecies for advertising purposes offered him a considerable sum of money if he would make forecasts fifty years in advance!" He also told of the work of Mr. H. H. Clayton, formerly of the Argentine weather service, in making long-range predictions upon solar observations by the Astro-Physical Observatory of the Smithsonian Institution.

WHEN the eastern part of North America and most of northern Europe were thickly blanketed with ice, a hundred thousand years ago or more, the glaciers played four return engagements. Four different series of moraines or glacial hills mark the farthest south of the ice sheets, and these have been the objects of special study by Frank Leverett, of the U. S. Geological Survey. It was formerly held that the third morainal series in the east did not correspond in time with the third series in the west, so that it was supposed that the ice had been here five times. However, the recent studies have shown that the correspondence does exist, which cuts down the periods of past refrigeration to four, and makes the American series correspond with the European, where four periods have been definitely accounted for.

THE WELDING OF METALS

METHODS of welding metals together will be revolutionized by two new inventions of the research laboratories of the General Electric Company, for after years of search it is now possible to weld so that the fused metal is as strong and as ductile as if it were never in two pieces. Previous methods, using an arc to furnish the intense necessary heat, resulted in the formation of compounds of the metal with oxygen and nitrogen so that the weld was not as strong as the rest of the piece.

As the nitrogen and oxygen which unite with the metal come from the air, in these new processes the air is excluded when the weld is being made by a bath of hydrogen, water gas, wood alcohol vapor, and others which do not easily form metallic compounds.

One of the methods was developed by Dr. Irving Langmuir, assistant director of the Schenectady laboratory, and makes use of what he calls flames of atomic hydrogen, based on a discovery of Dr. R. W. Wood, professor of experimental physics at the Johns Hopkins University. Electric currents of twenty amperes and at voltages ranging from 300 to 800 were passed through two tungsten rods so as to form an arc similar to the arc between carbon rods in a street arc light.

By passing a stream of hydrogen gas into the arc from a small tube, an intensely hot flame is produced, because the molecules of hydrogen are broken up by the temperature of the arc into their constituent atoms. As the ordinary form of hydrogen is that of molecules, the atoms almost immediately recombine, but in doing so they liberate great amounts of heat, about half again as much as the oxy-hydrogen flame.

Iron rods an eighth of an inch in diameter melt within a few seconds when held about an inch above the arc, says Dr. Langmuir. Metals even harder to melt than iron, such as tungsten and molybdenum, one of the most refractory substances known, melt with ease. Quartz, however, melts with more difficulty than molybdenum, which Dr. Langmuir suggests as being due to the fact that the metals act as a catalyzer or a substance which speeds up a chemical change.

"The use of hydrogen under these conditions for melting metals has proved to have many advantages," according to Dr. Langmuir. "Iron can be melted or welded without contamination by carbon, oxygen or nitrogen. Because of the powerful reducing action of the atomic hydrogen, alloys containing chromium, aluminum, silicon or manganese can be welded without fluxes without surface oxidation. The rapidity with which such metals as iron can be melted seems to exceed that of the oxy-acetylene flame, so that the process promises to be particularly valuable for welding."

The other method of producing ductile welds was developed at the Thomson Research Laboratory of the General Electric Company at Lynn, Mass., by Peter Alexander, independently of Dr. Langmuir's work. The electric arc is passed between the metal to be welded and an iron electrode, and the gaseous atmosphere is supplied in the form of a stream around the arc, so as to keep it entirely away from air. Pure hydrogen, water gas, methanol or wood alcohol vapor, or dry ammonia can be used, as well as a mixture of hydrogen and nitrogen, for it is found that the nitrogen is not harmful unless oxygen is also present. All these mixtures contain hydrogen, and Dr. Langmuir suggests that this method also depends in part for its efficacy on the disintegration of hydrogen molecules into their atoms.

THE GERM THEORY OF CANCER

THE germ that causes cancer, if there is one, has not been discovered yet. Dr. James B. Murphy, of the Rockefeller Institute for Medical Research, has repeated the experiments of Dr. W. E. Gye and J. E. Barnard which attracted such wide attention last summer and in a report of his results about to appear in the *Journal* of the American Medical Association he holds his experiment refutes

their contention that chicken tumor is caused by a micro-organism.

The English scientists reported that they produced tumors in chickens by injections of the filtered juice from chicken tumor in the presence of a second chemical factor. They also produced tumorous growths in chickens with filtrates from malignant growths from other animals —mice, rats and even human beings, in the presence of this second factor. This necessary secondary element was nothing else than filtered juice, or filtrate of chicken tumor treated with chloroform. None of these substances would produce a tumor or cancer when used alone.

By means of a complicated ultra-microscope employing ultra-violet light they studied the cell-free filtrate and detected the presence of a micro-organism which they believed was the causative agent of cancer.

A cancer consists of rapidly subdividing cells that keep on growing and will not stop. Such a condition of normal growth is found in the rapid cell subdivision of an embryo. At the Rockefeller Institute it was decided to try to produce a cancerous growth with a filtrate from embryonic tissue used in the same way as the juice from the malignant growths. In accordance with this idea the filtered juice from ground-up bits of chick embryo and rat placenta were injected into hens along with the chloroform-treated filtrate of chicken tumor and it was found that cancer resulted just as it did following the injection from malignant growths.

Dr. Murphy says in explanation:

"Apparently the power to activate a chloroformed filtrate can not be considered as proof of the action of a living organism, for cultures of embryonic tissue or placenta are just as potent in this respect as so-called cultures of malignant tissues.

"Two possibilities present themselves in explanation of the results attained. First, that the causative agent of the chicken tumor is in the nature of an enzyme-like substance which is inactivated by chloroform and may be reactivated by a diffusible substance from malignant tumors, embryonic tissues and placental tissues. The second possibility is that the chloroform treatment does not destroy but simply attenuates the causative agent to a point at which unaided it is too weak to induce a tumor but in conjunction with some injurious or stimulating substance supplied by the 'culture' it becomes effective. The fact that a great excess of chloroform so completely destroys the agent that no reactivation is possible is rather in favor of the latter possibility. Further experiments are in progress to elucidate these points."

THE PREVENTION OF PNEUMONIA

A POSSIBLE means of curing and preventing pneumonia is the result of a new method discovered by investigators at the University of Chicago, by which, with the aid of electrical instruments, it is possible to determine the chance a patient has of recovery and how much of death.

This discovery is the culmination of a series of experiments which have been in progress for the last six years, under the active supervision of Dr. I. S. Falk, professor of hygiene and bacteriology, who is also director of surveys of the Chicago Health Department. He was associated in his work with M. A. Jacobson and H. A. Gussin. The first experiments were carried out at Yale University.

Among the first experiments was one which attempted to develop a method of measuring the killing power of pneumonia germs. The investigators chose white mice as substitutes for men, and in the investigation which followed they found that if the germs were grown in a certain way they would kill mice in much the same manner as they kill human beings.

In determining how much killing power was required in each culture in order to cause death, and how to measure the susceptibility of the germs to clot together and become agglutinated, it was found that the most potent germs are most resistant to clotting. Working on the assumption that clotting is determined by the electrical voltage between germs and the suspending solution, they built an apparatus for accurately measuring this voltage.

Through a series of similar experiments they demonstrated that the measurement of voltage on the germs is more rapid and simpler than measuring the killing power for injected animals. They thus made a discovery and improved its application simultaneously.

The same investigators have, in addition, developed methods of changing the virulence of pneumonia germs, and are able to increase or decrease this factor at will. This is said to be a distinct contribution to the study of these bacteria, for it had not been possible heretofore to retain their killing power after they had been removed from a patient and grown on artificial foods in the laboratory.

ITEMS

A HAWK that hunts snails is the unusual Florida bird discussed in the *Auk*, publication of the American Ornithologists' Union, by Donald J. Nicholson, of Orlando, Fla., who has made a detailed study of its nesting habits. The name of the bird is the Everglades kite, and it is found over a large part of the State of Florida. It likes to hover low over its marshy hunting ground, or perch on a post or stump, watching for its creeping prey. Once it spies a snail it swoops down upon it and deftly picks it off the plant on which it is feeding. It is able to extract the snail without breaking the shell, sometimes even performing this feat on the wing. More usually, however, it bears its prey back to its roosting place, which may frequently be recognized by the large number of empty snail shells scattered about it.

THE cotton boll-weevil, one of the worst enemies of American agriculture, threatens to be unusually numerous this year, according to U. S. Department of Agriculture scouts sent out against the armies of insect pests. Both in the older cotton regions of the South and in the Arizona fields the overwintering insects have been found in considerable numbers. At Tallulah, Louisiana, an examination of Spanish moss, in which the weevils usually take shelter for the winter, disclosed 280 of them per ton of moss, as compared with 16 per ton in 1924, 229 per ton in 1923 and 137 in 1917.