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SOME PAPERS PRESENTED AT THE NASHVILLE MEETING

DR. R. G. AITKEN, who is in charge of the Lick Observatory of the University of California, delivered the address as retiring vice-president of the astronomical section of the American Association for the Advancement of Science. Taking Dr. Barnard, who was a native of Nashville, and whose astronomical career largely began at the previous meeting of the association there in 1877, as the subject of his address, Dr. Aitken related many personal reminiscences. "On September 17, 1881, he found a comet and he sent word of the discovery to Lewis Swift, and through him to astronomers generally. This comet was therefore carefully observed and is known, in the annals, as Comet 1881 VI. This discovery had important consequences quite other than its bearing upon his reputation as an observer. Mr. H. H. Warner, of Rochester, New York, had offered a prize of $200 for each unexpected comet discovered by an American observer. This prize came to Barnard for the discovery of Comet 1881 VI; Mrs. Barnard felt that the money must be used for some definite purpose, and with her encouragement, and faith that later payments would be met "somehow," and that they would "manage," it was accordingly used as the first payment for a house. Faith backed by hard work had its due reward, for Mr. Warner's offer was continued for several years, and Barnard actually won enough prizes for cometary discoveries to pay for the 'Comet House,' as it is still known here in Nashville and to all astronomers." Upon the founding of the Lick Observatory in 1887 Barnard, then at the age of thirty, joined its staff. Later he went to the Yerkes Observatory, in Wisconsin. Among the many important discoveries which he made were those of the fastest-moving known star, and also the second closest, the first moon of Jupiter to be found since 1610, the "Gegenschein" or faint glow of light that appears in the sky opposite the sun, as well as numerous comets and double stars. As a great astronomer, concluded Dr. Aitken, Barnard was "honored by astronomers throughout the world. Barnard, the modest, simple-minded, unselfish, kindly man was loved by every one who knew him."

THE millions of dollars invested in the movies and the pleasure of the millions of people who daily attend them is based on chemical impurity in gelatine. This announcement, in effect, was made in a lecture given in conjunction with the meeting, by Dr. C. E. K. Mees, director of the Research Laboratory of the Eastman Kodak Company. "It has recently been found," said Dr. Mees, "that the sensitiveness of films is not due to the grains of silver bromide only, but is in some way connected with the presence on those grains of specks of some other substance, and the Kodak Research Laboratories after a long and careful study have found that these specks are produced by an accidental impurity present in the gelatine. This impurity is derived from the plants eaten by the animals from whose skins the gelatine is made. There is only a very small amount of it, but it is a compound which contains sulphur, and when the gelatine is used for making the film, the sulphur reacts with the silver bromide and produces specks of silver sulphide on the crystals. In some way or other these specks increase the effectiveness of the light to which the film is exposed in the camera and enable the light to change the silver bromide so as to form a trace of metallic silver. Then this silver acts during development as a nucleus on which more silver can deposit by the chemical process until the whole of the silver bromide crystal is turned into silver. Each of the original crystals of the film therefore, after exposure to light, becomes a grain of silver in the developed film, and it is of these grains of silver that the image projected on the screen is composed."

AN immediate investigation of the earthquake situation in the Mississippi Valley was urged by Commander N. H. Heck, in charge of the seismologic work of the U. S. Coast and Geodetic Survey, who spoke before the American Association for the Advancement of Science. Calling attention to the fact that one of the great earthquakes of all history occurred in the New Madrid region of the Mississippi Valley in 1811–12, Commander Heck intimated that there was a possibility that history would repeat itself, although it can not be foretold what the future will bring. Occasional minor earthquake shocks have been felt in the Mississippi Valley and along the Ohio River in past years and one of the sharpest of these shocks was on April 9, 1917. Another occurred at the time of the great Mississippi flood. Probably the fact that flood and earthquake came at the same time was merely a coincidence that serves to call attention to the damage that would be done by a major earthquake in that region to-day. "Thorough examination of the situation in the entire Middle Western region subject to earthquakes is desirable," Commander Heck said. "There is little doubt that the first investigation should be confined to the area surrounding the New Madrid region. Dr. James B. Macelwane, S. J., director of the Jesuit Seismological Association, has proposed such a plan, and it is endorsed by Dr. Arthur L. Day, chairman of the advisory committee of seismology of the Carnegie Institution of Washington, who is in charge of the earthquake investigation in California which is being made with the cooperation of the national government, various state institutions, including the universities, various other groups and the citizens of California. This organization has all that it can take care of in the California problem and the government activity as carried on by the United States Coast and Geodetic Survey is fully occupied with taking care of earthquake information for the United States and the regions under its jurisdiction, and operating its own observatories so that it is left for the Middle West to work out its problem. Its rapidly-growing cities make it important that this problem be attacked.

X-RAYS played a highly important part in the discussions of the biologists at the meeting of the association and its affiliated societies. Within recent months many workers in various parts of the field have discovered this type of radiation to have almost miraculous powers to change the course of events in the development of living organisms, and to leave so deep an impress on their substance that their descendants for many generations will show the effect of their ancestors' experience. Professor Winterton C. Curtis and Raymond A. Ritter, of the department of zoology at the University of Missouri, told of their researches on the effects of X-rays on the development of growing tissue. They experimented on a small marine animal related to the jelly-fish, which reproduces itself by constantly budding off new individuals very much as a tree produces branches. After exposure to the X-rays for ninety minutes the animals lost the power of producing new individuals, although the original parent portion remained alive. Professor H. J. Muller, of the University of Texas, who recently startled the scientific world by speeding up evolutionary processes over a hundred-fold with heavy X-ray doses applied to a small insect, the fruit-fly, reported further on his work and displayed specimens showing the results of his technique. Professor Frank B. Hanson, of Washington University, St. Louis, who has been collaborating with Professor Muller, reported the effects of the rays on the rapidity with which the insects reproduce. Professor Robert T. Hance, of the University of Pittsburgh, told of some of the first results of X-ray experiments on warm-blooded animals. The hair color of mice exposed to very light doses of the rays in his laboratory was radically changed. Normally "mouse-colored" mice of mixed ancestry went completely white after being rayed, while pure-bred mice of the same color changed in the opposite direction and became darker. Dr. H. J. Bagg, of Memorial Hospital, New York City, and Dr. Clarence R. Halter, of Cornell University Medical College, working in collaboration, were also among the first to obtain positive results with warm-blooded animals. Their mice developed certain marked bodily defects, such as possessing only one kidney instead of two, abnormal eyes, and legs in bad condition at birth. Such defects occur among mice bred under ordinary conditions, but not so often as among X-rayed animals.

PLANTS as well as animals respond to X-ray treatment. Professor T. H. Goodspeed, of the University of California, has obtained results in the breeding of X-rayed tobacco plants which are comparable with those of Professor Muller on fruit-flies. The new varieties produced in this way have a stronger growth and produce more flowers than their cousins descended from un-rayed parents. Professor L. J. Stadler, of the University of Missouri, has conducted similar experiments with corn and barley. In these, as in all the other animals and plants on which the treatment has been tried, the hereditary units or genes have been knocked out of place and more or less violently rearranged, resulting in forms of life wholly new to the universe.

ULTRA-VIOLET radiation, now widely used for the promotion of human health, has been shown to be able to promote plant growth as well, and to increase the production of valuable plant ingredients. Experiments in this field were reported before the Botanical Society of America by Adelia McCrea, of Parke, Davis and Company, Detroit. Miss McCrea planted two crops of foxglove plants, from which the widely-used drug digitalis is made. Part of each crop was started under ordinary glass, which shuts out ordinary light, and the rest under special glass which transmits ultra-violet. The young plants under the ultra-violet responded at once, forming new leaves faster than the others did. After they were transferred out of doors and grown to maturity under similar conditions, both crops were put through the process for extracting the drug. The irradiated plants yielded an extract of notably higher potency than the untreated controls; in the second crop the increase amounted to as much as 35 per cent.

ULTRA-VIOLET rays can sometimes be too much of a good thing, especially to the lowlier forms of animal life. Some of the effects they have were discussed by Professor E. E. Just, of Howard University. Eggs of Nereis, a sea worm, were exposed to ultra-violet rays by Professor Just. Normally the eggs of this animal possess 28 chromosomes, or bearers of hereditary qualities. After irradiation they were found to have 70. Since multiplication of these important bodies in any living organism is apt to be followed by the development of freak forms in the adult stage this discovery may come to have considerable importance in genetics. The rays have other effects on the eggs also. They lose a jelly-like substance on raying. When they begin to undergo cell division, the first partition always starts from the spot where the rays hit their covering membranes, and the young worms usually show certain localized defects traceable to their experience while in the one-cell stage. Professor Just and his students also presented papers on the fertilization of eggs of Arbacia, another lowly sea animal, in water containing potassium cyanide, and demonstrated the presence in ordinary mayonnaise dressing of structures usually claimed to be present only in living protoplasm, and thought to be of importance in life processes.

ULTRA-VIOLET light has the power to kill as well as cure. Experiments were reported by Professor A. Brooker Klugh, of Queen's University, Kingston, Canada, showing that the short length ultra-violet radiations of the sun are deadly to the minute crustacea that furnish food for the fish of commerce. For many years biologists have puzzled over the question why these tiny relatives of crabs and lobsters remained at a depth of 90 feet or more under the sea during the day and came to the surface only by night. A long series of experiments conducted at the Atlantic Biological Station, St. Andrews, New Brunswick, during the past summer has demonstrated that this particular form of food for the fishes is really fatally affected by ultra-violet light. Consequently they keep down at a considerable depth below the surface of the sea while the light from the sun is intense.

WHILE the biologists attending the meeting were listening to accounts of newly-discovered ways in which X-rays affect living tissue, the physicists heard about another new property of these rays. Dr. Fred Allison, of the Ala-

bama Polytechnic Institute at Auburn, told the American Physical Society how he had found that they change the effect of certain liquids and other substances on light. Many liquids, such as a sugar solution, have the property of turning the plane of polarized light. Ordinary light consists of vibration in an indefinite number of directions, but when polarized, the vibration is confined to one particular plane. If a beam of such light is passed through a sugar solution, it is still vibrating in one direction when it emerges, but in a different direction from that when it went in. Dr. Allison has found that even liquids which do not ordinarily have this power gain it when exposed to X-rays. When liquids, or glass, are placed in the field of a powerful magnet, they gain this property, as discovered many years ago by Faraday. When X-rays are used in addition, says Dr. Allison, the rotatory powers of the liquids are increased, while in glass, it is made to rotate in the opposite direction.

ANOTHER newly-discovered effect of X-rays, by which they impart on certain chemical substances the power of glowing when slightly heated, was described to the meeting of the American Physical Society by Dr. Frances G. Wick, of Vassar College. Dr. Wick told of work that she had done in collaboration with Miss Mabel K. Slattery, research assistant at Cornell University. Some substances, such as fluorite and calcite, have long been known to possess the property of shining in the dark after being moderately warmed, she stated. However, the investigators have found that chemicals which do not have this power acquire it when exposed to X-rays. One of these is calcium sulphate, of which gypsum is a form, mixed with a little manganese. The phenomenon is called thermoluminescence, and is of two kinds. One dies out quickly, but with the other, the power to glow when heated may continue for months.

HOW a thin layer of atoms of caesium on the filament helps the vacuum tube of a radio set to work better was described by Dr. J. A. Becker, of the Bell Telephone Laboratories in New York. Dr. Becker told of work that he had done in collaboration with D. W. Mueller, of the same laboratories. The operation of a radio tube, he explained, depends on the copious emission of electrons from the hot filament. When coated with caesium, in the form of caesium oxide, the atoms of the metal arrange themselves over the filament in a single layer. But the atoms are ionized, which means that each of them has lost one of its quota of electrons, and so is positively charged. This atomic layer is then able to act in the same way as the grid of the tube, but being so close to the filament is particularly efficacious in pulling the electrons out of the tungsten of which it is made.

THE path traced by a moving spot of light in a special vacuum tube reveals the quality of a quartz crystal to be used in keeping broadcasting stations on a constant wave-length At the meeting of the American Physical Society Dr. Karl S. Van Dyke, of Wesleyan University, told of his researches which may play a useful part in the production of these important crystals. These piezo-electric crystals, as they are called, usually consist of plates of quartz, cut from larger quartz crystals. At present, it is usually necessary to try several of them in order to find a satisfactory one, as a large number may not work at all. Some may be considerably improved with a little grinding. With the use of the cathode ray oscillograph, as the special vacuum tube is called, a stream of electrons, or cathode rays, falls on a screen, where it makes a spot of light. The motion of the stream of electrons causes the spot to trace a curve, and quick inspection of this curve reveals the quality of the crystal.

VITAMIN A, the substance needed for normal growth and health, is present in green vegetables, but the much-sought-after blanched garden products do not have it. This has been proved to be true in the case of asparagus, at least, by Dr. John W. Crist and Dr. Marie Dye, of Michigan State College, who reported their experiments before a session of the American Association. Young white rats were fed on a diet lacking in the growth-promoting vitamin. Some of them were given, as a supplementary ration, a small amount of green asparagus tips every day, while a second lot of rats, as "controls," were fed on blanched tips. The asparagus was fed both fresh and cooked. In all cases the animals receiving the green asparagus grew and throve normally, while the ones on the blanched tip diet dwindled and died. Even doubling the amount of blanched asparagus fed to one of the rat groups failed to save them.

FISH blood has its sugar radically reduced by the diabetes-curing drug, and if only the normal concentration of sugar is present the fish goes into convulsions, just as a man or a warm-blooded animal would, and may die as a result, unless a counteracting dose of glucose is injected after the insulin. These results of researches on the blood-sugar physiology of fishes were reported by Dr. Irving E. Gray, of Tulane University. Only one species of fish, the puffer, resisted the action of the insulin and did not go into convulsions. This fish normally has a very low concentration of sugar in its blood.

THERE has been a marked decrease in the incidence of hookworm in the states of North and South Carolina in recent years according to Dr. W. G. Gamble, of Charleston. After reading some of the early surveys of hookworm infestation in the southern states, especially in the Sand-Hill regions and Coastal Plains in the Carolinas, Dr. Gamble said, one wonders what the inhabitants did except to raise razorback hogs, hookworms and drink moonshine. Some of the figures for the period from 1910 to 1915 gave as high as 50 per cent. infection. In the period from 1920 to 1923 the rate was much less. Recent surveys made by Dr. Gamble and the Hygienic Laboratory at Columbus, S. C., show 17.8 and 21.8 per cent., respectively, for infestation with all intestinal parasites, a marked decrease from years ago. Hookworms still lead the list, with round worms, a poor second. Children, women, men, white and colored in the order named, showed the greatest percentage of infection.