SCIENCE NEWS

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SOME PAPERS READ AT THE WASHINGTON MEETING OF THE AMERICAN PHYSICAL SOCIETY

CREATION of the highest continuous magnetic field in the world was reported by Professor George R. Harrison and Dr. Francis Bitter, of Massachusetts Institute of Technology. Using a new type of electromagnet, the scientists split spectral lines in a field of 100,000 gauss. This is a magnetic field strength 500,000 times as great as the magnetism of the earth that turns compasses. Professor Peter Kapitza, of Russia, has previously produced brief magnetic fields of 300,000 gauss but they lasted only one hundredth of a second. The electromagnet can produce its 100,000 gauss field and hold it steady within one tenth of one per cent. for hours at a time. At its peak of operation, the electromagnet uses 1,800 kilowatts of electricity, an amount of power sufficient to operate 36 radio stations of the size of the largest commercial radio stations in the United States, of 50 kilowatts rating each. The intense magnetic field was used to produce the so-called Zeeman effect, the splitting of spectral lines in the presence of a strong magnetic field.

NEW discoveries showing that lightning strokes travel at 1,000,000,000 centimeters a second (at a rate of more than 22,000,000 miles an hour) were described by J. M. Meek, of the University of California. The initial act of a lightning discharge is to create a "pilot" streamer of comparatively low velocity which, nevertheless, speeds along at 20,000,000 centimeters a second. The electrical current in this pilot streamer is about one tenth of an ampere. The diameter of the streamer is about one eighth of an inch. It is estimated that in a cubic centimeter of its "tip" there are 100,000,000,000 ions present. The later discharge, known as the step leader, has the much higher velocity of 1,000,000,000 centimeters a second.

A NEW step forward in the study of how ultraviolet rays kill bacteria and other micro-organisms was described by Drs. F. S. Brackett and Alexander Hollaender, of the National Institute of Health. That intense ultra-violet rays destroy organisms has long been known and has recently been applied in hospital operating rooms to decrease operative infection. Similarly it has been used to sterilize public drinking glasses and to decrease bacterial growth in the quick curing of meat. Exact knowledge of just which wave-lengths in the ultra-violet spectrum are the most efficient in killing power has been scanty, however. The lethal efficiency of ultra-violet light on bacteria over the wave-length range of from 2,180 to 2,950 Ångstrom units was studied. Not all waves in this region are equally effective. The new curves plotting killing efficiency against wave-length will be extremely useful to those studying in this important field.

FOR the first time, it was reported, the same free surface of a metal has been studied for its optical and photoelectric properties. Dr. Donald M. Packer described work at the University of Rochester on the optical constants of freshly made potassium films formed in a vacuum on pieces of glass chilled to the temperature of liquid air, 192 degrees below zero Centigrade. The virgin surfaces changed so rapidly that measurements could not be repeated on any one surface.

WHAT may be the most energetic atomic bombardment yet employed by science was described by Drs. L. D. P. King, W. J. Henderson and J. R. Risser, of Purdue University. Using helium atoms, which had lost two electrons and were thus doubly ionized, atomic particles were obtained in the big Purdue cyclotron having energies of 16,000,000 electron volts. With this terrific beam of about 100,000,000,000 atomic "bullets" a second, they bombarded many substances. Using pure graphite (carbon) a previously unnoted artificial radioactivity having a half life of 2.1 minutes was produced. It can not be produced for bombarding energies less than eight or nine million electron volts.

THE curious greater absorption of the atomic mesotron particles (found in cosmic rays) in passage through air, than through an equivalent amount of dense lead, has been explained by saying that these new-found, welter-weight particles spontaneously disintegrate as they travel along. Thus in passing through large distances of air more of them are lost by self-disintegration than would be through the much shorter distance of lead having an equal absorbing power. This hypothesis may not be all the story, according to Dr. and Mrs. C. G. Montgomery and Drs. W. E. Ramsey and D. B. Cowie, of the Bartol Foundation, who described new experiments in which trays of Geiger counters, placed over a layer of two centimeters of lead, detected mesotrons entering the lead. Below the lead was another layer of counters detecting electrons resulting from the disintegrating mesotrons. The difference in the counts measured the mesotrons stopped by the lead. It was found that some yet unrecognized type of absorption is at work removing slow cosmic ray mesotrons in the lead in addition to any disintegration which may be present.

THE neutrino—a hypothetical, elusive atomic particle, has been long-sought but never found. Investigators of the University of Michigan reported that new experiments show the effects of this tiny ghostly particle. As a "ghost" the neutrino is no malevolent entity. Rather it serves law-abiding physicists in their studies of nature and helps them to avoid breaking the laws of the conservation of momentum in interpreting their atom-smashing experiments. Drs. H. R. Crane and J. Halpern, of the University of Michigan, described one such experiment that would controvert the momentum laws unless the neutrino is present.

THE most sensitive current-detecting device ever developed by science was described. Dr. James S. Allen, of the

University of Minnesota, told of a vacuum tube which will measure the minute amount of electricity carried by a single electron passing down a wire every five minutes. This corresponds to a current of 0.000,000,000,000,000,-000,001 amperes. The best previous current detector measures, in comparison, 20 electrons a second. Thus the field of sensitivity has been pushed back 6,000 times by the new device. The two-inch diameter vacuum tube—a modern Aladdin's lamp——is the product of research in television.

A NEW "camera" using 66 different "plates," all at once, is being used to study the tracks of atoms scattered by targets in the 7,000,000 electron-volt cyclotron of the University of Rochester, according to a report made by Professor T. Russell Wilkins and Dr. Gustav Kuerti. By means of this camera, Professor Wilkins said, he hopes to gather reliable data which will reveal the nature of the tremendous energy with which an atom repels the millions of atomic particles shot at it in the atom-smasher during the course of only a few minutes. The device consists of two circular plates in whose center is placed the target to be bombarded in the cyclotron. As atomic projectiles enter the ring around the target and are scattered they travel through small pin-holes into one or more of 66 slots. Each slot contains a photographic plate with a specially prepared emulsion. In the emulsion the particles make tracks, or "footprints."

ALCOHOL is a quicker pain-killer than any drug, even morphine, and six aspirin tablets are no better than one, it has been found in studies on the human body's tolerance to pain. Describing the first exact physical measurements on the threshold of pain in the human body, Drs. J. D. Hardy, H. G. Wolff and H. Goodell, of the Russell Sage Institute of Pathology, Cornell University Medical College, New York, said that the pain produced over a large area of the body is no greater than is the pain produced over a small area. Thus there is no summation of pain as there is with the sense of touch, sight or the body's detection of heat and cold. "This finding," Dr. Hardy stated, "may represent a wise provision of nature which wants the body to be very sensitive to heat but which warns the body as much for the destructive stimulus on a small area as on a large one." By injection of drugs it was found the total effect obtained by aspirin is secured after the first tablet is taken. Six tablets do no better. Rating intolerable pain as 100 per cent., the scientists reported aspirin's relative effectiveness as 35 per cent. At the same time they found that injections of alcohol rated 40 per cent. And they found that the alcohol acted within 15 minutes instead of hours required by other drugs.

PROFESSORS J. A. PIERCE and H. R. Mimno, of Harvard University reported that reflections off the radio "mirrors" high over head in the sky have disclosed the presence of swift-flying clouds of ionized atmosphere which travel with velocities as great as 310 miles an hour. These clouds, although invisible to the eye, can be shown to be thin layers.

PROGRESS in the art of depositing thin films on glass to change the original reflection characteristics was reported by Drs. C. Hawley Cartwright and A. Francis Turner, of the Massachusetts Institute of Technology. While originally ways of producing almost a complete absence of reflection from glass surfaces by the use of films were described, the new findings show ways to produce extra high reflections. They do this by depositing alternate layers of materials having high and low indices of refraction. With such a system they are able to increase the reflecting power by 80 per cent. for any pre-selected wavelength of light. By choosing film thicknesses suitably they have developed a color filter which will reflect 85 per cent. of the green light and transmit 90 per cent. of the red.

SOMEWHERE, somebody and somehow scientists may learn how to release the energy locked up in atoms of uranium but it is becoming increasingly clear that there will probably never be a catastrophic explosion of the uranium in the world as has been suggested in speculative predictions on the release of atomic power by such experiments.

At the meeting of the American Physical Society new reports of researches on the splitting of uranium and the release of its amazing stores of atomic energy show that the bombardment of uranium with a neutron has about three times the chance of merely being captured as it has of splitting the uranium atom and giving off relatively enormous amounts of energy.

Professor Niels Bohr, of Copenhagen, now at the Institute for Advanced Study at Princeton, gave the picture of the known facts about uranium's splitting to his fellow scientists. Only high speed and high energy neutrons can split ordinary uranium of mass 238, he said. The same is true for the splitting of thorium. The slow neutrons of less energy are effective only in splitting the rare isotope of uranium having mass 235.

The point is that to release atomic energy for practical purposes it is necessary to have a "chain" reaction in which a split uranium atom will give off a neutron which will split one near-by, and so on.

However, new experiments at Columbia University and elsewhere show that these secondary neutrons from uranium splitting are only weakly energetic. By theory they can split only the rare uranium of mass 235 and there is not enough of this isotope present to keep the chain going. That they can do so, moreover, is mere hypothesis for Professor Bohr's picture has not yet been checked by experiment.

Having dimmed speculation on ordinary uranium's ability to release usable atomic power the scientists must now, however, consider the idea that if sufficient amounts of uranium of mass 235 could be purified it might be possible to create a chain reaction. Efforts are being made to find some way in which this rare isotope can be concentrated in sufficient amounts to try the experiment. So far no method has given promise of success.—ROBERT D. POTTER.

ITEMS

THE American Medical Association each year classifies the deaths of all physicians and, as it has been for many years, heart disease was again the leading cause of these

fatalities in 1938. Thirty-nine per cent. of all physicians who died last year were victims of heart disease. About 12 per cent. of them died of arteriosclerosis; 10 per cent. of cerebral hemmorhage; 8 per cent. of pneumonia and almost the same proportion of cancer. The average age of death of American physicians was 65.6 years, as compared with 65.4 years in 1937. Accidental death claimed 155 American doctors, automobile accidents accounting for 81 of these. Another 81 doctors committed suicide.

AMERICAN medical graduates make much better showing in American licensing tests than candidates from abroad. Among graduates of approved schools of medicine in the United States only 11.7 per cent. failed state board examinations while 38.3 of those educated abroad failed to pass our examinations. The *Journal* of the American Medical Association says that the poor record of graduates of foreign medical schools can be only partially explained by the fact that they may not have mastered the English language, since many of those educated abroad were born and raised in this country.

MORE sky can be seen with the new McDonald Observatory 82-inch telescope, to be dedicated at Fort Davis, Texas, May 5, than with any other American telescope. This is because McDonald Observatory is farther south than any other observatory in the United States. It can be sighted upon thousands of stars that never come within range of more northern telescopes. The entire sky except for a 30-degree radius circle around the South Pole will be covered by the new telescope giant. The McDonald telescope will record star light a million times too faint for the human eye to perceive. An outstanding gathering of astronomers from this country and abroad will attend the dedication ceremonies.

A DEVICE for automatically dimming automobile headlights when one car approaches another head on has been patented by Russell E. Alley, Austin, Minn. Great simplicity is accredited to the device. Besides its automatic features, no extra equipment on an automobile is needed, the storage battery providing the electric energy necessary to "feed" the lights. An important feature of the safety headlight is a novel device wherein a single triode tube controls a single relay and this, in turn, effects tilting of the headlight beam on the approach of another automobile, with its headlights blazing. Mr. Alley has assigned one third of his patent rights to Francis N. Earl, Austin, Minn., and one third to Bennett J. Porter, Albert Lea, Minn.

AMERICA'S frontiers are being successfully defended against yellow fever invasion, according to a report of the U. S. Public Health Service. The invasion of that deadly disease enemy has threatened since the establishment of air travel between this country and South America where dangerous centers of the disease exist. The danger was two-fold: Patients infected with yellow fever might arrive in this country, *via* speedy air travel, before the sickness was detected; yellow fever-carrying mosquitoes, *Aedes aegypti*, might stow away on the planes. No yellow fever mosquitoes were found on planes arriving at the Pan American airport at Miami from Central and South America and Mexico during 1938. Fewer live mosquitoes of all kinds were found than in the preceding year. In spite of precautions taken by the airways and health authorities, live mosquitoes and other insects, however, are still being transported into this country by aircraft, the Federal Health Service reports. This seems to indicate that defenses against a yellow fever invasion must be kept up.

THE new drug sulfapyridine apparently shortens the course of pneumonia by three or four days when used in treating infants and children. Six Cincinnati physicians report on the effect of the drug on the pneumonias of infancy and childhood after a trial period at the Children's and the Cincinnati General Hospitals, Cincinnati, in the forthcoming issue of the *Journal* of the American Medical Association. Of seventy small pneumonia patients, half were given sulfapyridine and the others were used as controls. It was demonstrated that the fall in temperature and the clinical recovery were significantly earlier in the sulfapyridine group than in the control group. The optimum dosage needs further study, and the series of cases was too small to permit an evaluation of the effects of sulfapyridine in preventing the complications of pneumonia, according to the authors of the article, who are: Drs. Armine T. Wilson, Arthur H. Spreen, Merlin L. Cooper, Frank E. Stevenson, A. Graeme Mitchell and Glenn E. Cullen.

FOR the first time since sound motion pictures came into use more than ten years ago the motion picture industry has a noiseless camera which can be used inside a sound studio without any sound-proofing box, or "blimp" as it is known in the industry. The new silent camera, weighing only 60 pounds, was described at the meeting of the Society of Motion Picture Engineers at Hollywood, Calif., on April 21 by G. Laube of the Twentieth Century-Fox Film Corporation. The monitor view finder truly conforms to the image being photographed on the film so that the cameraman no longer has to make allowances for parallax. The camera turret mounts four lenses which are quickly changed, while the entire camera is sealed from the action of sand, dirt or water.

TWO Handley-Page-Harrow bombers, converted to serve as airplane tankers for refueling British transatlantic flying boats in mid-air, will be shipped to Montreal on the *S.S. Beaverburn* within the next few weeks. The British transatlantic air fleet of four Short flying boats has been designed for take-off at a gross weight of 46,000 pounds. Once in the air they will be loaded to a weight of 53,000 pounds. Each of the converted bombers can carry 1,000 gallons of fuel for refueling purposes. Montreal will be the service base terminus of the British airline, which will begin to carry mail early this summer. The British flying boats are not quite as large as the four planes to be used on the American service to be operated shortly by Pan American Airways. The American boats will take off with their full load of fuel.