SCIENCE NEWS

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DISINTEGRATION OF RADIO-LITHIUM

A NEW clue to the structure of the nucleus of the atom has been reported to workers at the Cruft Laboratory, of Harvard University, by Dr. J. D. Cockcroft. The clue was contained in an experiment recently completed by Dr. Cockcroft and his associates at the Cavendish Laboratory, Cambridge, the first ever conducted in which the emission of heavy particles has been detected from an artificially produced radioactive substance.

Dr. Cockcroft unexpectedly found that these heavy particles possessed a continuous energy distribution, something never previously discovered in reactions of this type. Dr. Cockcroft's experiments concerned the disintegration of radio-lithium, an artificially radioactive substance produced by bombarding a lithium isotope of mass seven with nuclei of heavy hydrogen atoms, an accepted experimental procedure in the study of the atom.

Not expected, however, was Dr. Cockcroft's finding that "this radio-lithium breaks up apparently not into stable beryllium of mass eight, but in general into a beryllium with a surplus of energy—an excited beryllium eight nucleus. This nucleus subsequently breaks up into two beryllium nuclei which may each have as much as six million volts energy, but in general have less." These are the unexpected heavy particles. The implications or theoretical explanations of the discovery are not yet clear, although it is expected eventually to be of considerable significance. Dr. Cockcroft believes "it may be necessary to assume that the beryllium nucleus of mass eight can exist in one or another of a number of such excited states."

ELEMENT 87

RECENT research at Cornell University may have the ironical effect of destroying one of the school's proudest contributions to science—the discovery in 1931 of element No. 87. Professor Jacob Papish and Eugene Wainer, of the department of chemistry, in that year announced their discovery of this element by using x-ray analysis. In the method, x-rays from a target supposedly containing element 87 were reflected by a crystal of calcite and the resulting spectral lines fitted into positions predicted for the then unknown element.

Now, F. R. Hirsh, Jr., also of Cornell, has performed essentially the same experiment, and used the identical calcite crystal which was a basic part of Professor Papish's apparatus. He finds that the supposed characteristic x-ray lines of element 87 are really produced by the surface irregularities of the crystal itself. Mr. Hirsh has been able to obtain the crucial and important lines when a plain copper target was substituted for the sample in which he was trying to detect element 87.

By a technique called "rocking the crystal" Mr. Hirsh was able also to make the key lines vanish, which proves that the effect was due to the peculiarities of the crystal. If the work is repeated with the same results by an independent investigator, the whole question of the discovery of element 87 will again be thrown open.

In this connection it is recalled that the x-ray detection of element 87 by Professor Papish and Mr. Wainer came at a time when Professor Fred Allison and Dr. E. J. Murphy, at Alabama Polytechnic Institute, were claiming the discovery by the magneto-optic method.

SOLAR DISTURBANCES

SOLAR eruptions, magnetic storms and great outpourings of energy, which are partly invisible and partly visible as sun-spots, are being studied by physicists at the National Bureau of Standards. Disturbances on the sun have lately been found to cause radio fadeouts or times when it is impossible to obtain any radio transmission on high frequencies.

It is this last discovery, made by Dr. J. H. Dellinger and his coworkers in the radio division of the bureau, which provides the diagnostic medium for the sun's energy ailments. At least two different and distinct types of solar radiation have been disclosed by the radio fadeout investigations. There is a sudden effect that produces visible solar activity and practically simultaneous radio fadeout. This, in medical analogy, might be called a twitch of sharp pain which passes quickly.

And there is a longer, more chronic type of solar happening which causes the so-called magnetic storms on the earth lasting a day or two. The sudden effect appears to be caused by electromagnetic radiation of ultra-violet wave-length below the limits of human seeing. These rays penetrate down to the so-called E reflecting layer, about 65 miles above the earth. The more lasting effect which causes magnetic storms and the aurora appear to be due to a different type of solar emission, possibly of the charged particle class. The scene of the effect is much higher above the earth in the F_2 layer at about 200 to 250 miles up.

Dr. Dellinger has been comparing his radio fadeout phenomena with daily bulletins from Mount Wilson Observatory on solar activity and has an additional world-wide check in the twice yearly compilations made in Switzerland from observatories everywhere. His technical report appears in *The Physical Review*.

In the same journal is reported a study of sun-spot activity for the last two hundred years, by A. L. Durkee, engineer of the Bell Telephone Laboratories. Mr. Durkee has tentatively devised a rule which may make possible the forecasting of sun-spot activity. It may also enable radio engineers to have some advance idea of how short-wave radio communication will be affected. The coming peak in the 11-year cycle of sun-spot activity will provide a crucial test for the rule.

Mr. Durkee's method is to plot the ratios of sun-spot maximum and sun-spot minimum from data assembled throughout the world in the last two centuries. Two graphs are possible in this kind of plotting: (1) sun-spot maximum against the preceding sun-spot minimum and (2) sun-spot maximum against the following sun-spot minimum. Mr. Durkee found that the first case provided much better correlation than did the second one.

This study shows that the maximum number of sun-spots, which one may hope to forecast, depends most strongly on the activity in the preceding sun-spot minimum. Using this rule, he notes that in the period from 1932 to 1934 (a minimum era in sun-spot activity) the average number of sun-spots was 8½. The approaching maximum number, therefore, should lie somewhere between 60 and 90 spots. If this forecast is correct it will mean that the average activity during the coming maximum activity will not be greatly different from the moderate values that have occurred during the previous five cycles of 11 years each. In turn, radio engineers may expect short-wave radio transmission will be but little worse than it has been in the past under similar circumstances.

PLANT FOSSILS IN THE MAKING

FOSSILS were not all made and stored in the rocks millions of years ago. The first steps in the making of plant fossils have been seen and reported to the Carnegie Institution of Washington by one of its research associates, Dr. Ralph W. Chaney, chairman of the department of paleontology at the University of California.

When the great triple-peaked volcano Katmai, in Alaska, blew up in 1912, hurling some five cubic miles of ash into the air, part of the finely powdered material settled like snow on the branches of evergreen trees, pulled off billions of their needles, and bore them down to the ground.

Now, a quarter-century after the great eruption, Dr. Chaney has revisited the region and dug down to the bottom of the foot-deep ash. There he found the tree leaves pressed down in a matted layer, mostly in the lower few inches. They closely resembled the matted fossilized leaves he has often investigated in the ancient geological deposits in Oregon known as the John Day formation, which were volcano-formed many millions of years ago.

Of course the single Katmai eruption layer had only a small fraction of the thickness of the John Day formation. Many more eruptions, covering many centuries, would be needed before the Alaska situation would resemble the Oregon beds. But the basic principle is the same; and one man has seen, well within the limits of his working lifetime, the beginnings of a true process of fossilization.

BRAIN WAVES OF NEWBORN INFANTS

ELECTRIC waves led off from the brains of babies on the first day of life, was reported to the Eastern Branch of the American Psychological Association by Dr. J. Roy Smith, of Babies Hospital and Columbia University, New York City.

The waves discovered by Dr. Smith are not the same type as those which have been tapped from the brains of adults. They seem to originate in the so-called motor area of the infants' brains which is thought to control body movements. They are slow waves occurring at the rate of about four or five per second similar to those which have been observed in older children during sleep. Such large slow waves have also previously been found in the motor areas of the brains of Mongolian mental defectives.

The occurrence of brain rhythms so soon after birth suggests that they have their beginnings even before the infant is born and also suggests the possibility that the brain of the unborn child is already functioning.

A hint that some day brain waves may be useful as an aid to diagnosis of mental deficiencies was contained in the report of Dr. George Kreezer, of the Vineland Training School, New Jersey. He found slight differences between the brain rhythms of defectives of the Mongolian type and those suffering from hereditary defects. He also found that wide differences in mental age are accompanied by differences in brain rhythm.

AMERICAN FOOD HABITS

IF 1,000 New Yorkers are at all typical of the nation's food habits, we don't by any means eat enough protein foods. Meat, fish, eggs and cheese are the chief protein foods. Our general health would be better and we would be mentally and physically more efficient if we consumed more protein in our daily diet.

Drs. Benjamin I. Ashe and Hermon O. Mosenthal have over a long period of years been studying normal, apparently healthy persons who have reported to them for health examinations. By analyzing the 24-hour specimens of urine of these normal persons they have arrived at the protein, salt and fluid intake of 1,000 residents of New York City. Their findings are reported in *The Journal of the American Medical Association.*

Various workers in nutrition state that the suitable daily protein intake is from 75 to 100 grams. The so-called minimal intake is set at 45 grams. In more familiar terms, this minimal intake is a little over an ounce, since 28.3 grams are the equivalent of an ounce. One hundred grams is less than a quarter of a pound. Drs. Ashe and Mosenthal were surprised to find that of their 1,000 New Yorkers 61 per cent. ate only 42 grams or even less protein a day. Only 40 persons of the 1,000 ate 75 grams or more protein daily.

"Nutritional" edema, fatigue, anemia, cloudy swelling of vital organs, lack of resistance to infection, pellagra and other ill effects have been cited by authorities as results of a low protein ration. Women were the chief offenders in the matter of low protein intake. Low and low-normal blood pressure readings were encountered frequently among this group, yet the high protein eater did not have high blood pressure. Underweight occurs frequently among the low protein group. Mild secondary anemia is common.

Among those who were high protein eaters there were more men. The blood pressure was not high, the weight was average (rarely any overweight) and there was rarely any anemia. The "low salt" eaters were chiefly women; the "high salt" eaters chiefly men. The conclusion is made that persons with high blood pressure do not habitually eat more protein or more salt than normal persons eat. No evidence is found that a low protein diet will materially reduce the blood pressure of those with hypertension provided there is no anemia.

NATION-WIDE CENSUS OF NESTING BIRDS

THE first nation-wide census of nesting birds, to be taken by cooperating bird students everywhere, is an-

nounced by William Vogt, editor of *Bird Lore*, official magazine of the National Association of Audubon Societies. During the spring and early summer the volunteer census-takers will do their work, and the results will be published in the October issue of the magazine.

Methods of taking the census, as outlined by Mr. Vogt, indicate that it is a job only for the thorough and patient student of nature. The numerator must select a definite area, from 15 to 150 acres in extent, and make a freehand sketch map indicating its principal features, vegetation type, and so on, and he must spot in every nest of every kind of bird in it. Where nests are too well hidden to be actually discovered, certain other criteria are accepted.

At least five times during the breeding season, at five-day intervals, the territory has to be gone over carefully, and every change in status of nests, bird pairs, unmated males and other details noted. An abbreviation summary method prevents the records from becoming too bulky. It is anticipated that the census will be repeated every year, so that study areas are to be chosen with this in mind.

In addition to the magazine publication of the census summary, the individual record maps are to be made available photographically in microfilm form by the system inaugurated by Science Service. They will thus be collected and kept on file in one central place, and copies can be made quickly and at low cost for any one, anywhere in the world, who wishes to study the detailed records.

ITEMS

THE announcement that the Massachusetts Institute of Technology will build a ten-foot diameter tunnel that will simulate conditions at 35,000 feet altitudes and speeds of 450 miles an hour, brings additional aid to the similar equipment which the National Advisory Committee for Aeronautics is already building at Langley Field. Both wind pressure tunnels follow the general plan and design of the wind tunnel of the Reich Air Ministry at the University of Goettingen at Hanover, Germany. The rarefied atmosphere and accompanying low air pressures encountered in the sub-stratosphere, where aviation now would like to do its flying, render inaccurate some experimental findings obtained in previous wind tunnels at ordinary atmospheric pressure.

A 200-POUND boulder of jade has been unearthed in ruins of a Mayan pyramid near Guatemala City by an expedition of the Carnegie Institution of Washington. Dr. A. V. Kidder remarks: "We were astounded, for no piece of jade even remotely approaching this in size has ever been found in America before." The rough ball of jade bears scars where Mayan Indian workers had cut out slices of clear green stone for use in jewelry or ceremonial objects. Why the Indians then buried their treasure at the very center of a pyramid stair is a mystery. The whole boulder was of good quality and might have represented a vast value. Modern investigators have searched without success for the natural source where American Indians got their much-treasured jade in Mexico or Central America. The American jade is similar to Oriental jade in appearance, but differs in chemical structure, and in range of coloring.

AN unusually heavy yield by the grapefruit orchards of the lower Rio Grande region is the cause of the haste with which citrus growers are stripping their trees, according to the Bureau of Entomology and Plant Quarantine of the U. S. Department of Agriculture. Because of the danger of invasion by Mexican fruit fly, it is necessary to keep the trees stripped of fruit from about the end of March each year until cool weather comes in autumn. This prevents the insects from breeding, for their larvae must have juicy fruit in which to feed. The big crop this year is making the annual denudation of the orchards more difficult than usual. The Mexican fruit fly is not the same insect as the Mediterranean fruit fly, whose threatened invasion in Florida a few years ago threw the citrus industry of that state into a turmoil. It is, however, a fairly closely related species, with quite similar habits.

WILDLIFE land nearly 5,000,000 acres in extent has been acquired by the government during the past three years, according to Secretary of Agriculture Henry A. Wallace, who spoke at the North American Wildlife Conference at the St. Louis meeting. All federal wildlife sanctuaries acquired in the whole previous history of the country amounted to only about 1,800,000 acres—little more than a third of the new acquisitions. A total of $20,700,000 has been expended in the purchase and development of these wildlife lands. They are in large part lands in the "submarginal" class so far as profitable use for farming, grazing and forestry are concerned. In their new utilization they not only serve the people as recreation areas and a source of game and fish for food, but also aid materially in combating floods and the manifold evils of soil erosion.

THE terrace-building hot waters at Mammoth Hot Springs, Yellowstone National Park, are showing more activity than has been noted in recent years, according to Superintendent Edmund B. Rogers of the park. The Palette Spring is spreading over a greater area than at any time during the past three years, with the result that the terraces are building up very rapidly at the top and to the east. The coloring of the spring is the most beautiful in recent years. The temperature of the water in the Palette Spring is 143 degrees Fahrenheit. Mound Spring, with water at 149 degrees, is again playing spectacularly from numerous vents along the top of the terrace. Angel Terrace, once one of the leading sights at Mammoth Hot Springs, has exhibited renewed activity with three new vents and a resultant increase in deposition of new travertine. Cleopatra Spring, with a temperature of 158.5 degrees, shows an increased flow. The Baby Spring, which developed on Prospect Terrace three or four years ago, is a little bubbler that changes every month, sometimes almost weekly. Occasionally it ceases entirely, then shows a new burst of activity. At present its terraces and basins are an average of two feet high and 50 feet in diameter. It went entirely dry during February, then started flowing a good-sized volume of water.