SCIENCE NEWS

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ADVANCES IN SPECTRUM ANALYSIS

A NEW method of analyzing blood and other body fluids, capable of detecting elements present to the extent of only one part in a hundred thousand, was explained at the conference on spectroscopy at the Massachusetts Institute of Technology at its opening session on July 20.

The ultra-penetrating eye of science's master key of investigation, the spectroscope, forms the basis for the delicate and precise analysis. Dr. O. S. Duffendack, of the University of Michigan, who developed the new technique along with Dr. Kenneth B. Thomson and Dr. William C. Lee, also of Michigan, told the conference that only two drops of the solution being tested are needed for the investigation, a decided advantage over other methods of analysis in that large amounts of complex body fluids are often not available to investigators. Dr. Duffendack's technique also has the advantage of being considerably speedier than the usually employed chemical analysis while losing none of that method's precision.

The method was developed particularly for the analysis of urine, blood and other body fluids for sodium, potassium, calcium and magnesium. And Dr. Duffendack has found that the method also works well in ferreting out minute traces of aluminum, chromium, copper, nickel, iron, silicon and similar substances in electroplating solutions, caustic liquors and other industrial chemicals.

There are two variations of the method as developed by Dr. Duffendack, each with its own peculiar advantages. In general principle, both employ fundamental spectroscopic technique, spreading the light given off into the colors of the rainbow. Each of these lines, or colors, tells a story, enabling the scientist to see what elements are present by identifying them from their peculiar tints.

The first variation employs a 25,000-volt inductive spark, maintained between two electrodes which are in reality composed of the solution under analysis. A minimum of nine cubic centimeters, only a few tablespoonfuls, of the solution is required for the test, but the method regularly yields results with an average error of approximately three per cent.

The second method utilizes a high voltage alternating current arc between spectroscopic carbons upon which a drop of the solution under analysis has been evaporated. Thus only two drops of the solution are needed for the experiment, a valuable factor in the study of body fluids and other solutions available only in extremely small amounts. This method also has the added advantage of detecting elements present in exceptionally small amounts in solutions containing large amounts of other substances.

NEW TECHNIQUE IN SPECTROSCOPY

A NEW method of snapping science's valuable spectroscopic pictures, which adds another "dimension" to the photograph, thus enabling investigators to ferret out minute traces of elusive elements and even to determine in what compounds various metals are present, a heretofore impossible task, was reported to the conference by David Richardson, research fellow in physics. The discovery may be said to sharpen science's already keen tool, the spectroscope. Many among the 100 scientific men attending agreed that this new technique will greatly increase the value of spectroscopy.

Ordinary spectrum photographs show the chemical elements present in the substance and tell roughly in how great amounts they are found. The pictures are snapped in a manner generally resembling that used in taking ordinary snapshots.

By moving the photographic plate upward at a constant rate throughout the exposure, instead of keeping it stationary, Mr. Richardson has added another "dimension" to his picture, which makes it possible to determine what is occurring at any instant during the exposure.

The greatest advantage of the new technique is its ability to tell the investigator in what chemical compound a given metal is present, an analysis not possible with ordinary methods. The standard technique, for example, can detect sodium, iron or any other element, but does not say whether the compound in which it was present was a chloride, a nitrate, an oxide or some other compound. With Mr. Richardson's technique this is possible, for the width and brightness of the line that reveal the presence of a metal can also be made to divulge the negative radical, the element with which it is associated in the compound.

The addition of the time dimension also enables the scientist to identify minute traces of an element which would escape detection under ordinary methods, and also to determine more accurately than by other methods the amount of a substance present in the material under investigation.

TANDEM BALLOONS TO RECORD COSMIC RAYS

TANDEM stratosphere balloons—four or more gas bags launched tied together—are about to be set free at San Antonio, Texas, by Dr. Robert A. Millikan and Dr. Victor Neher, of the California Institute of Technology, in a new attempt to extend their researches upon cosmic rays. Extremely sensitive and light apparatus will be carried to heights that are unattainable with manned balloons and airships. Not until rockets are perfected is there any hope of reaching the distances above earth that the Millikan-Neher balloons promise to attain.

At extreme elevations of between 15 and 20 miles the recording instruments will be bombarded with cosmic radiations hundreds of times more intense than at sea-level. Moreover, some of the most interesting rays never get down to more accessible regions at all.

Five flights are planned. With the breaking of one of the balloons in a tandem string, the journey of the instruments back to earth will begin. Each balloon

leaves the earth inflated to a diameter of four feet and at the highest, or bursting altitude, it reaches a diameter of about fifteen feet. The fall of instruments to the ground is broken by the automatic opening of a parachute.

Each flight will take only a few hours, but high winds in the stratosphere may carry the balloons several hundred miles. Drs. Millikan and Neher hope that at least half the instruments will be found after their fall to earth and will be returned to them. In addition to receiving a small cash reward, the finders will be performing a service useful to science.

The instruments carried aloft by the balloons weigh only two pounds. Yet they contain five devices of special design and automatic operation. These are the cosmic ray electroscope designed by Dr. Neher, a camera, a clock, a thermometer and a barometer. Dr. Millikan is the pioneer in this type of cosmic ray research and the instruments used were developed at the California Institute of Technology.

Records obtained in the flights will be specially important because there is very little information about the cosmic rays in the stratosphere at such low latitudes as San Antonio. Low latitude observations are considered important because they show how much of the cosmic radiation is composed of charged particles which can not easily approach the earth in those low latitudes because of the magnetic field of the earth there.

POLIOMYELITIS IN THE SOUTH

No indications are seen by U. S. Public Health Service officials that the infantile paralysis (poliomyelitis) epidemic in Alabama and Tennessee will reach national proportions. Reports from other parts of the country show no unusual amount of the disease. Federal health authorities are also encouraged by the fact that the Alabama-Tennessee outbreak is not so severe as the North Carolina epidemic of about the same time last year. Nor does it show any great tendency to spread.

Federal "H-men" led by Dr. Charles Armstrong have gone into the affected areas in order to aid in the application of the new nose spray which it is hoped will prevent the disease. Developed by Dr. Armstrong and Dr. W. T. Harrison as the result of experimental work on monkeys, the alum-picric acid nasal spray is receiving its first large-scale application in this epidemic.

In the hope of saving some of those who might otherwise fall victims, the nasal spray is being used without any attempt at making a controlled experiment. Physicians and health officers are administering the spray, which is quite harmless, to those who desire it and who can be treated with the facilities available. Undoubtedly a study will be made later to determine whether any cases of poliomyelitis occur among those who are treated with the spray, but there is no systematic exclusion of some from the treatment in order to have a "normal" group in which the disease might have an unhampered chance to spread, as would be the case if the doctors were conducting a laboratory experiment.

U. S. Public Health Service officers are careful to state that the alum-picric acid spray method is "based entirely upon animal experimentation" and "is not at present to be regarded as of proved value in the prevention of poliomyelitis in man." Nevertheless, they are hopeful that it will prove effective in preventing the disease and that this epidemic may give some evidence to that effect.

In last year's North Carolina epidemic there was experimental use of vaccines designed to provide artificial immunity to the disease. In the time subsequent to that use medical opinion has developed which has indicated that vaccines should not be used.

TREATMENT OF VARICOSE ULCERS

A NEW method of treating varicose ulcers which appears more satisfactory than any treatment hitherto suggested is described in the *Journal* of the American Medical Association.

Twenty-six persons have been treated by the new method for this chronic condition after from one to thirty-seven years of suffering during which time all recognized forms of treatment had been tried on one or more of them. All except three were healed after treatments extending over periods of from one to twelve weeks.

Dr. Leslie Saylor, of Topeka, Kans., and Drs. Joseph Kovacs, A. Wilbur Duryee and Irving Wright, of New York City, make the report to the medical journal. Their experimental work was done at the vascular clinic of the New York Post-Graduate Medical School and Hospital of Columbia University, aided by a grant from the Josiah Macy, Jr., Foundation.

During the new treatment none of the patients was put to bed or sent to a hospital. They continued their daily occupations of washing, ironing, cooking, chopping wood and selling real estate.

In treating the varicose ulcers, the doctors saturate a reinforced asbestos paper with a 0.5 per cent. solution of acetyl-beta-methyl-choline chloride and wrap it around the patient's foot and leg as high as the knee. A metal plate is placed over the wet asbestos paper and connected to the negative pole of a galvanic machine. The current is then turned on. Half-hour treatments are given two or three times a week. The metal plates are never applied over the ulcerated area.

This form of treatment has especial value, the four physicians assert, in cases in which ulcers do not heal after the injection treatment for varicose veins or in cases in which injections are not to be recommended as, for example, with diabetes or phlebitis.

THE YELLOWSTONE ELK

YELLOWSTONE'S ten thousand elk of the Northern Herd face starvation and death during the coming winter, because of the unprecedented failure of their rangeland and of the fields where hay is normally grown for their winter use. A survey of the situation shows a falling off in density of forage vegetation of 27 per cent., as compared with the figures for last year.

Not only is the total amount of vegetation decidedly less, but what is left is qualitatively less fit for animal consumption. The palatable grasses have been largely

burned out or eaten off to the roots. Their place is taken by various kinds of undesirable weeds and unpalatable brush. This means not only bitter hard times for the elk during the coming winter, but also very slow recovery of the one-time rich game rangeland. The pasture will be years, perhaps decades, in coming back.

"Perhaps the most distinct indication of volume of forage that will be available during the coming winter is the height of forage plants," the report continues. "The average height of all plants examined in the plots is 65 per cent. less than in 1935. In several instances the quadrats examined did not contain a single grass seed stalk, while in the previous year a good seed crop was produced. Seedling crops have been totally lacking this year or have died due to weather conditions.

"Unusually high temperatures along with hot, dry winds melted the snow in early April and caused very rapid run-off. The rapid melting of snow did not permit the soil to absorb a normal, or even a slight amount of moisture. An abnormally dry period followed in May, and in the Gardiner area only .21 inches of precipitation was recorded during the month.

"June had a more normal rainfall, but this was largely offset by high temperatures and the fact that rainfall occurred in a short time with run-off high. Combined with the high temperatures were several wind and dust storms that greatly increased evaporation.

"It is obvious to the layman examining the winter game range that a critical condition exists, and that action is necessary to even maintain forage at its present status."

ITEMS

THE U. S. Biological Survey has informed Science Service that small wild animals in the drought area are suffering less than live stock. Such lesser native creatures as prairie dogs, rabbits, ground-squirrels, and the owls, hawks and snakes that prey upon them, manage to pick up a living when pasture had failed for the bigger beasts. The Biological Survey discounts stories of wholesale migrations of jackrabbits from South Dakota into Nebraska. Migrations have occurred from time to time, but they are always more or less local affairs. Jackrabbits were never mass migrants like their old-time bigger neighbors, the bison.

GRASSHOPPERS have an ally in a related insect, the Mormon cricket, in the northern Rocky Mountain area of Montana and Idaho, and also in Nevada. These crickets, big, clumsy, non-fliers with tremendous appetites, have been raising a great deal of trouble in their limited range. They do not threaten to spread eastward, for the Mormon cricket is distinctly an insect of the Far West. Appeals continue to come in to the U. S. Department of Agriculture for more poison-bran bait for the still unconquered grasshoppers throughout the West, but there is nothing more to send. The small appropriation provided by the Congress in the pre-adjournment rush is totally exhausted, and no more funds are in sight.

VIOLENT storms, such as struck Pennsylvania, New York and other parts of the country, are normally to be expected when a persistent and intense heat wave is broken up by the coming of cooler air masses. The sharp contrast between temperatures, and hence of densities, of the adjacent air masses causes rapid rising currents and overturns in the atmosphere, which often produce hailstorms and sometimes tornadoes. Although the Weather Bureau usually knows when the atmosphere is thus loaded with "air dynamite," it never issues tornado warnings, as it does warnings of hurricanes in the Gulf and South Atlantic regions. This is because it is impossible to tell whether a tornado will merely spend itself in the air, as such twisters frequently do, and also because the exact path can not be forecast even if it does swing down to the ground.

A TWO-AND-A-HALF-TON battery of three star cameras, the largest using plates two feet wide, has been placed in operation at the private observatory of Dr. Gustavus Wynne Cook, located at Wynnewood, Pa. The largest camera battery of its kind in the world, Dr. Cook will use it to make a series of photographs of the entire Milky Way. After photographing all the Milky Way area that is within reach from Wynnewood, Pa., he expects to move the equipment to South America or South Africa, so that regions of the sky which never rise in the Philadelphia area can be recorded. The three cameras take pictures on plates 20 by 24 inches, 14 by 17 inches and 8 by 10 inches. They are equipped with lenses, 6½, 5 and 4 inches in diameter, of a type invented by Dr. Frank E. Ross, of the Yerkes Observatory of the University of Chicago. There is a guiding telescope with 4-inch lens by means of which the photographer can keep the cameras accurately pointed at a selected part of the sky.

A SURGICAL operation on a Chicago medical student was interrupted recently and an x-ray picture was taken of the young man's kidney, which the surgeons had exposed. From a study of the x-ray films, Drs. Herman L. Kretschmer and Faye F. Squires, of Presbyterian Hospital, were able to make a diagnosis of tuberculosis of the kidney, thus satisfying themselves that the organ should be removed. The doctors had suspected renal tuberculosis, but when they exposed the kidney it appeared normal and they were undecided as to whether or not it should be removed. The x-ray pictures cinched the diagnosis. This rare use of the x-ray machine is reported by the two surgeons in the *Journal* of the American Medical Association.

THE new fashion of black clothing for summer wear has no support from those who understand problems of heat. It might do for evening wear, but don't don a black dress and go out in the sun if you want maximum comfort. Rough black surfaces are the best absorbers of heat known to science. Smooth, bright surfaces reflect or turn away the heat. Science, therefore, does give support to the new bright helmets the boys are wearing. Another warning about summer clothing—it is not the fabric that is loosely woven with wide air spaces between fibers that is the coolest. Air makes a good insulator for holding the heat of the body in. Wool clothing and furs are warm because the fibers are small and hold plenty of air between them. Linen is a cool fabric because the fibers are large and it has few air spaces.