SCIENCE NEWS

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POLAR YEAR STATIONS

INVESTIGATORS of thirty-three nations are taking their posts at more than 100 observing stations scattered over the earth to begin thirteen months of intensive scientific work. About half the stations are permanent and have been in operation for years; the other half are being set up for this Second International Polar Year and many of them are on sites of First Polar Year Stations operated fifty years ago.

But for the coming work, Polar Year is a misnomer. Roughly 40 of the 100 stations will be in the Arctic, above the 55th parallel, and a few will be in the Antarctic, while the rest will be scattered over the warmer parts of the earth.

Participation of the United States will be manifest in the establishment of an important observing point at the village of College, near Fairbanks, Alaska. It had been hoped that Fort Conger, on Ellesmere Island, northeast of Canada, could be occupied again through private subscription, but lack of funds prevented the carrying out of this project. Observations were made from Fort Conger by the ill-fated Greely Expedition during the First Polar Year. The station near Fairbanks, however, will be an important one at which special observations are to be made.

Among the latest expeditions to take to the field are one from France and another from Denmark, which will set up stations in Greenland. University of Michigan scientists, under Professor Ralph L. Belknap, have also left for Greenland. On this, their fifth expedition to the continent of ice, they will continue studies of air currents and ice.

A Danish investigator, who has reached Cape Town, is carrying instruments with which he will set up stations in South Africa and Madagascar, according to information received by Director J. A. Fleming, of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington. Additional observations will be made in the far south from an Argentine station in the Orkney Islands and from a post which Chile has promised to put up in the southern part of South America.

Polar Year officials hope to cooperate with the second Byrd Antarctic Expedition which, it is expected, will occupy stations in the Antarctic continent during 1933.

While the northern stations are scheduled to begin operations in August of this year, those in the far south will wait until summer comes to that part of the world, and January has been set as their opening month.

CANCER CELLS AND NORMAL CELLS

THE discovery of a positive difference between the cells that make up cancers and healthy cells that occur normally is reported from the Kracow (Poland) Institute of Pathology by Dr. Z. Zakrzewski. There is hope that the understanding of cancer will be aided by this discovery.

When the multiplication of a cancer cell is prevented, Dr. Zakrzewski finds that it fails to exhibit any differentiation in structure, while when a normal cell is treated in the same way, it changes its structure.

The cancer cell is a sick cell in the sense that some of its normal functions are altered or destroyed, and Dr. Zakrzewski thinks that it is this property or principle of differentiation that is lacking, while the property of proliferation or growth is retained. His conclusions are based upon cell-culture experiments in which bits of the cancer-tissue were allowed to grow outside the body in a suitable medium kept under proper conditions and protected from contamination and infection.

Many observers have grown cancer-cells in this way, especially in this country, and much is known about their characteristics, but so far no decisive difference has been found between them and normal cells grown under similar conditions. The differences are in degree rather than in kind, quantitative rather than qualitative. The reason for this negative result, Dr. Zakrzewski believes, lies in the fact that in the cell-culture experiments the conditions sought for and maintained are those that favor active multiplication of the cells. Growth-stimulating substances are added to the medium in the form of extracts of embryonic tissue, and when cells are multiplying rapidly they do not show differentiation in structure. There is an incompatibility between the two processes.

Dr. A. Fischer, of Berlin, has found that if heparin is added to the blood-plasma in which normal cells are being cultured their multiplication is prevented. The culture will remain for months without cell growth, although the cells are in a living condition and capable of showing differentiation in structure. If the bit of normal tissue that is being cultured was taken from an embryo it may produce cells of different kinds, such as bone, cartilage, fat and muscle.

On the contrary, if cancer cells are cultured in a heparin plasma, neither multiplication nor differentiation takes place. The fragment may lie for months without increasing in size and with no change in the structure of the cells, although it is still living and retains its malignancy. If inoculated into a living animal it grows rapidly and causes the death of the animal. It is not known what has happened to the cancer cell to cause it to lose its power of differentiation while retaining the property of unlimited multiplication, but Dr. Zakrzewski feels that he has established one definite characteristic of the cancer cell whose further study may lead to important results.

The heparin used to prevent proliferation in the cell cultures is a substance, discovered in this country by Dr. W. H. Howell, then at the Johns Hopkins University. It is obtained from the liver and it prevents the clotting of blood. Dr. Zakrzewski's report appears in the *Zeitschrift für Krebsforschung.*

DIABETIC ANIMALS MAY BURN FAT INSTEAD OF SUGAR

EXPERIMENTS showing that sufferers from diabetes probably burn fat instead of sugar when they exercise or do muscular work were reported by Dr. William H. Chambers, of Cornell University Medical College, at the recent meeting of the American Association for the Advancement of Science in Syracuse.

When the pancreas fails to produce enough insulin, diabetes follows. Investigators differ as to whether the diabetic condition is caused by an overproduction of sugar from fat or is due to a loss of the ability to burn sugar, Dr. Chambers pointed out. Recent studies of diabetics during exercise have seemed to show that they burn some sugar during exercise and that therefore the overproduction idea was correct. Dr. Chambers's studies, on the contrary, indicate that this theory is probably not correct and that even during exercise the diabetic is burning fat for fuel and not sugar.

The method of determining whether the body is burning fat or sugar consists of measuring the ratio of the carbon dioxide output to the oxygen intake. When fat is burned the quotient of carbon dioxide divided by oxygen is 0.71, and any rise in this figure shows that sugar is being burned.

The investigations show that there was a rise in this figure during exercise in diabetic animals, but Dr. Chambers also made measurements during the rest or recovery period following the exercise and studied the blood composition during this time. From these findings he concluded that the rise in the figure for the diabetic during exercise is due to change in the acid-base balance of the body and not to the burning of sugar, and that consequently the diabetic burns fat for fuel during exercise as well as when at rest.

THE USES OF TEAR GAS

SOME people decry the use of gas in warfare as wantonly destructive and unhumanitarian. But the little blue can filled with tear gas, chemists call it chlo-ra-cet-o-phe-none, did practically without injury what bayonets and bullets could have accomplished only with a heavy casualty list when the bonus marchers were driven from government property.

Chloracetophenone itself was not developed until near the close of the war, but other harmless gases similar to it were used to harass troops on the battlefront. Brombenzyl cyanide is one.

Their effects are familiar. Sharp pains stab the eyes causing them to water so that temporary blindness follows. The most menacing mob cries and flees. Fresh air is a sure remedy, but for more immediate comfort wash the eyes with boric acid solution, a publication of the U. S. Chemical Warfare Service advises.

These discomforts soon pass and the effects of the gas are over. Yet, a person could commit suicide with the gas if he would lock himself in a tight room and explode several bombs. He would die of asphyxiation, a result that could be achieved more economically with smoke. The bonus veterans reported to have been treated for gas burns must have received their injuries from hot tin as they picked up the cans to hurl them back at the police.

The chloracetophenone is in solid form in the cans, and, since it does not readily turn into gas, it is mixed with smokeless powder. There is not enough powder to tear the can to pieces, but just enough to blow out weak plugs so that the chloracetophenone can escape when it is changed into a gas by the burning of the powder. The explosion, delayed by a time fuse, is started when the ring is pulled and the missile hurled.

This is the tear gas bomb with which police of many cities have been equipped during the past few years. The Army calls its weapon a "CN" can. Such bombs can be bought from chemical manufacturers.

Though this weapon has been available since the close of the war, its extensive use by police is confined to the past six or seven years. Had tear gas been used in the Boston police strike of 1921, chemical warfare authorities believe that the trouble would have been much more quickly and amicably settled with less loss of life.

The manufacture of chloracetophenone is not an involved process. Acetic acid, familiar in vinegar, is made to react with chlorine, the first war gas, to form monochloracetic acid. Monochloracetic acid is in turn chlorinated to form chloracetyl chloride which is treated with benzene in the presence of anhydrous ammonium chloride to yield the desired tear gas solid.

BLIMPS EQUIPPED FOR GROUND COMMUNICATION TESTS

ONE of the vital subjects of airship navigation, radio communication, is being studied exhaustively at Goodyear's blimp base at Wingfoot Lake, Akron, Ohio, where a new station, designated as WAXQ, was recently established.

Five Goodyear blimps have been equipped with both sending and receiving apparatus for tests, and engineers hope to be able soon to announce dependable two-way communications between these small airships and the lake station for a distance of 250 to 300 miles at least.

Although the receiving range of the blimps' set-up is practically unlimited, their transmission reaches only about 200 miles in the day time. Their night transmission range is approximately 2,000 miles, however.

The new station is equipped with a four-panel transmitter. It is believed to embrace the only experimental station in existence having the recently developed system of modulation in which half of the current is conserved while the operator is not broadcasting.

The station's set-up embraces modulator and power units, an oscillator, and intermediate and power amplifiers. It is powered to transmit by voice and code for 1,000 miles in the day time and 5,000 miles at night.

Engineers are working on a special antenna for the dirigibles, since it was found that reception was greatly improved when the ships were turned in a certain direction. Shields are also being developed to prevent motors of the ships from interfering with communication activities.

A principal object of experiments is to enable airships

constantly to have available the latest observations of weather bureaus—to permit pilots to inquire regarding weather likely to be encountered along any given sky lane. Necessity of perfect communication between government aircraft and ground bases is likewise important. Buses in which ground crews travel about the country to land the blimps are next to be equipped with powerful but compact radio sets.

SKELETONS IN AN OHIO MOUND

ELEVEN skeletons of mound builders and numerous articles reflecting the prehistoric age are the discovery announced by Dr. Emerson F. Greenman, curator of the Ohio State Archeological and Historical Society, who directed the excavation of a large mound at Pippin Lake, near Akron. The excavation required a week.

The excavations ended when the eleventh skeleton, the first full-sized one, was found. Dr. Greenman pronounced the bones those of a woman who had probably been interred more than 600 years ago. The skeleton was intact except for the skull, for which only a layer of mica appeared. It was lying on its side with knee bones drawn up. Dr. Greenman declared it the first skeleton he had found lying in flexed position in any Ohio mound of the Hopewell type of culture, outside of those in the southern half of the state.

A grave uncovered in the digging, a pyramid built of flat stones, is to be reconstructed for display in the society's museum on the Ohio State University campus.

Dr. Greenman said that careful measurements would be taken of burial discoveries to ascertain whether a connecting link existed between the prehistoric mound-building Indians and the Western Reserve Indians.

Other discoveries at the mound included copper and shell beads, slate ornaments, arrowheads, stray teeth and portions of skulls, flint knives, and what may prove to be a petrified pipe bowl. The shell beads may have been brought from Mexico, but on the other hand could have been constructed of mussel shells of Ohio streams. The mound is about 40 feet in diameter. It overlooks what Dr. Greenman said was the ideal country always selected for mounds of the same type. The curator will announce further conclusions after intensive study of the discoveries.

ITEMS

DEPREDATIONS of bacteria which thrive at temperatures that kill most of their fellows have been reported to the American Chemical Society by William L. Owen, of Baton Rouge, Louisiana. They are the thermophile bacteria, and their spores are often found in one of the purest substances used in industry, sugar. Non-acid vegetables, particularly corn, are often spoiled by the thermophiles because they flourish between 130 and 160 degrees Fahrenheit. Below 130 degrees most of them enter the spore state and do not reproduce. Mr. Owen's studies show that sugar becomes infested with thermophile spores chiefly from starch and new towel bagging in the refinery. He said that it is possible to protect sugar thoroughly during the refining process and that some refineries are already doing this to produce for canners a more desirable product than sugar whose thermophile content is unknown.

A CURIOUS species of frog which can fly, or, to be more accurate, glide through the air by spreading their elongated hind legs, thus coming gracefully to earth from heights of as much as 90 feet, is among those found in the tropical forests of Mexico by Dr. Remington Kellogg, of the U. S. National Museum and described by him in a Smithsonian Institution report just issued. These tree frogs are difficult to find, for they keep out of the way of the human explorer and can even change the color of their bodies like chameleons to match their surroundings. Various members of the family of tree frogs show different stages of evolutionary adaptation to their home in the trees. Besides the "flying" species, there is another which is learning to climb and cling to limbs of trees through the development of adhesive disks on the ends of the fingers and toes.

FIRE-SWEPT ruins of a house containing timbers cut in the year 797 A. D. have been discovered at an Indian site near Allentown, Arizona, is the report just received at the Bureau of American Ethnology from Dr. Frank H. H. Roberts, Jr., of its staff. The house takes rank as the oldest dated ruin in the Southwest. The house was a pit house, built largely under ground, with an entrance through the roof. Such homes must have been fire-traps. The fire which destroyed the place forced the inhabitants to flee without salvaging their belongings. Dr. Roberts found everything still inside, including much pottery. Antiquity of the house was determined by means of four timbers on the floor. The dates of the tree rings were read according to the tree ring calendar worked out by Dr. A. E. Douglass, of the University of Arizona. Dates previously established as the oldest in the Southwest were 919 A. D. from a beam found at Pueblo Bonito, then 861 A. D. from a piece of timber in Una Vida, both pueblos being in New Mexico.

OVER three hundred pounds of the rare chemical element rhenium will be made available for industrial use each year by the utilization of a waste material from a Mansfeld copper ore, the German correspondent of the American Chemical Society reports. Rhenium was discovered in 1925 by Drs. Walter and Ida Noddack, husband and wife, Berlin chemists, and it is element 75 in the table of atomic numbers. The first gram (less than a thirtieth of an ounce) of the metal cost the discoverers some $12,500 to produce. Dr. Wilhelm Feit, of a chemical concern at Leopoldshall, Germany, tested the schist waste for rhenium because it contained molybdenum, an element with which Drs. Noddack found rhenium associated. Although the molybdenum-bearing waste contains only two parts rhenium in ten million, Dr. Feit has extracted the rare element from it successfully.