SCIENCE NEWS

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CRYSTALLIZED RUBBER

CRYSTALS of rubber, an important step toward the discovery of the composition of this familiar material, have been produced in the chemical laboratories of the U. S. Bureau of Standards in Washington. In achieving this result it was necessary for Dr. W. H. Smith, chemist, to make the purest rubber yet produced. A long process of purification gave a block of rubber as transparent and colorless as window glass. This material, dissolved in ether, and cooled to 80 degrees below zero Centigrade formed minute crystals of rubber, plainly visible under a magnifying glass. Dr. Smith even succeeded in photographing at this low temperature the fine crystals of rubber, and he expects in the near future to publish a scientific report on his work.

Once a small quantity of the crystals is isolated, the chemical composition can be determined by burning them and otherwise analyzing them. This should give the true formula of rubber, which the best estimates indicate may have the molecular composition of some multiple of five carbon atoms and eight hydrogen atoms. When the structure and composition of rubber is definitely known there will be much greater hope of its synthesis from common sources of carbon and hydrogen, such as coal. The researches just made at the U. S. Bureau of Standards may therefore in the distant future lead to the freedom of the United States from the dominance of foreign-grown rubber, but for the immediate future chemical methods of production are not expected to compete with the natural product.

Rubber was distilled for the first time in history when Dr. Smith took some of the pure, colorless rubber and by placing it in a vacuum at 100 degrees Centigrade temperature succeeded in making it evaporate from one side of a flask and solidify on the other side.

The researches were carried out in the division of chemistry, of which Dr. E. W. Washburn is chief, and they were announced by Dr. G. K. Burgess, director of the Bureau of Standards.

INSECT POWDER

THE poisonous principle of old-fashioned insect powder has been traced to its lair by C. B. Gnadinger and C. S. Corl, research chemists of Minneapolis, Minnesota. The powerful poison of the material has been located largely in the achenes, or fuzzy seeds of the pyrethrum plant, from which it is prepared. Pyrethrum, a variety of chrysanthemum, has been used to abate insect nuisances for generations. The flowers and even leaflets and stems of the particular species are commonly ground into a fine powder, which is extremely toxic to insects but harmless to man. Some time ago the noted Swiss chemist Staudinger solved the mystery of the chemical formula of "pyrethrin," the potent oil which gives the value to the insect powder. The oil is actually a mixture of two similar but complicated substances containing only carbon, hydrogen and oxygen, innocent elements when in simple relations. Being an oil, it may be diluted in gasoline or like solvent and used in sprays where dusting powders are undesirable.

The two Minneapolis chemists have now discovered a method of chemical analysis whereby one may quickly tell which plants, and which parts of the plants, contain the poisonous principle. Armed with the new method they have upset several long-standing beliefs in the insect-powder business. Japanese pyrethrum has been found to be just twice as potent as the classic and more expensive Dalmatian powder. Also the mature flowers are more valuable than the unopened or half-opened buds, which the trade prizes and holds at higher prices. Stems and florets have relatively little value compared to the achenes.

The extreme toxicity of pyrethrin was shown in the Minnesota experiments by a test on cockroaches. A solution of one part of the oil in 80,000 of water effected a complete slaughter of a colony of the pests submitted to the test.

The perfecting of these chemical experiments opens the door to most promising research in plant breeding. Just as the sugar content of beets was raised in cultivation, so may it be possible to increase the pyrethrin content of chrysanthemums. At present only about one half to three quarters of one per cent. of the powder is actual poison. Modern selection methods as practiced by plant breeders would probably lead to great increase in efficiency in agricultural pest control. It is also considered possible that the essential principle itself may be made synthetically if the demand should be sufficient.

VITAMIN D

A NEW use for the rickets-preventing, bone-building vitamin D is being investigated in medical fields. Shortening of the time required for blood to clot, vitally important in operations, by the feeding of vitamin D (or ergosterol irradiated with ultra-violet light), is the result which W. C. Corson, G. F. Irwin and I. A. Phillips, of the Washington University School of Medicine, recently reported as a result of tests made on white rats.

The formation of a clotted mass of blood is nature's way of stopping the flow of blood through an open wound. Without some such means, most of us would have bled to death long ago. The average normal time required for the formation of this clot is 2 minutes, 10 seconds. It is this length of time which the medical profession wish to see shortened, for to some patients, two minutes of blood flowing freely might be most disastrous.

Normal blood contains in each thimblefull about 600,000 bodies known as thrombocytes. These thrombocytes are the points or foci where coagulation of the blood begins whenever the blood leaves the small blood vessels and comes in contact with something different.

By increasing the thrombocytes, it then would be possible for the blood more quickly to form this clot which will stop bleeding. The sooner the blood issuing from the open wound thickens and stops flowing, the less blood the patient loses. These three scientists made interesting findings along this very line.

Each animal receiving vitamin D (as ergosterol irradiated with ultra-violet light) showed a marked decrease in the coagulation time which occurred simultaneously with the marked increase in the thrombocyte count. The thrombocyte count was doubled in 48 hours. The highest counts recorded, which were as high as 3,000,000 from a normal count of 600,000, were obtained on the fifth through the seventh day after the initial dosage. The lowest coagulation time (15 seconds to 30 seconds) occurred also on the fifth through the seventh day.

The fact that the results of the feeding of vitamin D do not reach their maximum until the fifth day may be of great importance to the surgical profession. "Bleeders" are people whose blood does not coagulate or clot readily. To them this new phase of the use of vitamin D may be of untold value. Again, certain diseases have such an effect upon the blood. In jaundice, for example, the effect of the disease is in some way to cut down the power of the blood to clot when bleeding occurs. The report deals as follows with this: "We hope to demonstrate by further experiments that the coagulation time which is prolonged in obstructive jaundice can be shortened sufficiently to reduce the operative risk."

CATTLE TICK

THE success of a twenty-four-year war against the cattle tick, cause of the costly animal disease known as southern Texas or tick fever, was reported by W. W. MacKellar, of the U. S. Bureau of Animal Industry, to the Inter-American Conference on Agriculture, Forestry and Animal Industry, which met in Washington this month. According to Mr. MacKellar it is possible and practicable to eradicate the cattle tick permanently from any section. This fact has been established as a result of the practical work which the U. S. Bureau of Animal Industry has been conducting since 1906.

Long before that, in 1893, Theobald Smith, veteran microbe hunter of America, reported the cause of Texas or tick fever, and explained how to wipe out this disease which was playing havoc with cattle. Dr. Smith showed that the disease is carried from one animal to another by the tick and that the germ of the disease must spend part of its life cycle in the body of the tick. When the tick is eradicated, the disease will be wiped out also.

When this eradication project was started in 1906, 983 counties with a total area of 728,565 square miles in the states of Alabama, Arkansas, California, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas and Virginia were under federal quarantine because of tick infestation. At the close of 1929 the quarantined area had been reduced to 184 counties containing 151,198 square miles in Arkansas, Florida, Louisiana, Mississippi and Texas. This means that about four fifths of the originally quarantined area has been freed from ticks, released from quarantine and made safe for the greater development of the cattle industry.

The practical work has shown the best and cheapest method of treating the infested animals is the arsenical cattle dip. The animals are treated at fourteen-day intervals from March to November. At the same time quarantine measures are enforced until the ticks are completely eradicated.

INDIANS OF TEXAS

CAVES of eastern Texas, inhabited by an ancient people, may help science to explain how the mysterious Mound Builder culture found its way to the Mississippi Valley where it flourished in prehistoric times. Matthew W. Stirling, chief of the Bureau of American Ethnology, has just returned to Washington from exploring this western region, which is still practically untouched by archeologists. He reported finding caves bearing traces of human occupation and apparently well worth investigation by Smithsonian Institution expeditions.

The Indians who built fires in the cave shelters and left their broken tools and dinner bones there to be buried in dust and débris were probably similar to the Basket Makers of the early Southwest. Greatest interest in these caves hinges on the fact that they are along the route where the Mound Builder culture presumably advanced if it spread overland from Mexico to the Mississippi Valley. Here may be preserved some evidences of those ancient happenings.

One question to be answered is whether there was an actual migration of Aztecs or some other tribe from the south, or whether the Mexican Indians merely passed along by trade contacts their ideas of building high places, and art designs, and other knowledge and customs that they shared with the Mississippi Valley Mound Builders. Mr. Stirling selected sites in northeastern Nevada which seem promising for excavation. Both eastern Texas and northeast Nevada are marginal regions where important cultures, spreading out from their centers, may have overlapped.

A SPECIAL TYPE OF BALDNESS

A DRUG is now on the market which will help a special type of baldness known medically as alopecia areata, Dr. C. N. Myers, of the H. A. Metz Company, Brooklyn, N. Y., reported to the American Chemical Society meeting at Cincinnati. Dr. Myers also reported the results of his chemical studies made on people suffering from this condition in which the hair falls out in localized areas only. This type of baldness is not the common variety for which a cure has long been vainly sought. The tiny blood vessels of the skin were either entirely invisible or showed marked constriction, microscopic examination showed. The blood contained more sugar and less chloride or salt than normal. In a large pro-

portion of the cases, arsenic and lead were found in harmful amounts in the blood and in the kidney secretion. The drug which was found helpful in treating the ailment is a sulfur compound, known commercially as sulfactol, a brand of crystalline thiosulfate.

ELECTRON STREAM MOTOR POWER

A MOTOR that runs by a stream of minute electrons is the latest modification of the vacuum tube that makes home radio sets possible. In the forthcoming issue of *Electronics,* this tube, the invention of Allen B DuMont, chief engineer of the DeForest Radio Company, is described.

In the center of the DuMont tube is the filament, immediately surrounded by a cylindrical cathode, from which the electrons emanate. Around the cathode hangs a cylindrical grid, suspended from a bearing at the top so that it is free to turn. In the grid are a series of vertical slots, with small blades projecting from one side of each of the slots. All the blades point in the same direction.

As the filament is turned on, the electrons are shot out from the cathode at a high speed, and after passing through the slots in the grid they hit the blades and bounce off to the outside. The impact of each electron is very minute, but with the great numbers that hit all the blades there is sufficient force to start the grid rotating. No practical use has yet been found for the tube, as the power developed is very small. It has been suggested that it might be used for a clock, however, or as a source of alternating current.

Some years ago the famous English physicist, Sir William Crookes, who was one of the original experimenters with cathode rays, or streams of electrons, used them to produce a rotatory movement. In one of his cathode ray tubes, the stream of rays was aimed at a small windmill-like device in the tube, and the windmill spun round very rapidly when the tube was operating. But this tube required high voltages to operate it, while the DuMont tube will work on voltages of the same order as used in radio equipment.

CHILD DELINQUENTS

DR. BRYANT E. MOULTON, of the Judge Baker Foundation of Boston, states that psychiatrists who probe into the minds and the conduct of delinquent boys and girls should not fail to look into the families in which those boys and girls live. Very frequently more psychiatric work should be done with the family than with the child to get any lasting results. Many transient cures upon which considerable time is spent would have been permanent if the family background had been altered.

One ten-year-old boy who was sent to Dr. Moulton had a persistent tendency to run away. The root of this desire was found only when home conditions were investigated, and it was shown that the child was overwhelmed by the sense of family insecurity. His father was employed very irregularly, and there was much anxiety and agitation about making ends meet, with frequent quarrels between the father and mother over the payment of bills. Such conditions alarm and depress a child by the feeling that the home is insecure, and the child's reaction may take various forms which neither he nor the parents understand.

Ignorance on the part of parents, also prudishness, fanaticism, are so common that they are frequently overlooked as contributing causes of a child's strange or unsocial behavior. Such basic causes in a child's environment are too often overlooked by specialists who attempt to set the child right with his world, but who do not try to set the world right for the child.

ITEMS

THE heating effect of electrical rotating machinery is no longer entirely a loss. Temperature increases caused by resistance, eddy currents and magnetic effects in direct current and synchronous motors and generators are now being scientifically used to warm the buildings which house the equipment. In recent installations sheet metal hoods of a new design collect the air warmed by the revolving machinery and transfer it to ducts which carry it where it can be used most effectively for heating. In the summer it is exhausted in the open to keep the buildings cool. Made to take advantage of the ventilation characteristics of the machinery, the new hoods also greatly reduce windage losses. Cool air enters near the ends of the armature shaft and is discharged along its circumference. Although the machines under the hoods act as fans and pump their air, they operate more efficiently than they would in the open or enclosed the old way.

A GOITER preventive found in certain plants was described by Drs. Emil J. Baumann and David Marine, of New York City, at the meeting of the American Chemical Society at Cincinnati. The preventive is not iodine, the investigators reported. It may be a hexuronic acid, a hitherto unknown but very active acid related to starches and sugars. This acid was recently found in cabbage, orange juice and suprarenal glands by Dr. Albert Szent-Györgyi, of the Mayo Foundation. Drs. Baumann and Marine conducted their experiments on rabbits. The animals developed simple goiter when fed on a diet of cabbage or turnips or related plants. The development of the goiter could be prevented by giving the animals certain plants or certain plant juice concentrates which apparently contained a goiter preventive.

CHILLING on ice hastens the germination of the large edible nut-pines regardless of their native habitats, according to G. R. Johnstone and Tema Shults Clare, of the department of botany of the University of Southern California. Torrey pine seeds from the Torrey Pine Preserve near La Jolla require 25 days of chilling, while the seeds of Coulter and Digger pines require 60 and 50 days, respectively, for the highest percentages of germination. Experiments dealing with the chilling of one-leaf piñon pine, another of the edible pine seeds, indicate that 30 days on ice are followed by the best germination.