SCIENCE NEWS

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SYNTHALIN AND INSULIN

A SYNTHETIC drug that acts like insulin in remedying diabetic conditions, but which can be taken by mouth instead of necessitating troublesome daily injections with a hypodermic needle, is the discovery reported by Dr. E. Frank, of the University of Breslau.

The new compound is a derivative of guanidin, a substance long well known to organic chemists, and has been named "synthalin" by its discoverer. It is not nearly so powerful as insulin in the crystalline form, first prepared by Dr. John J. Abel, of the Johns Hopkins University, but its effects are indistinguishable from those of the natural drug produced from the pancreatic gland. Injected into the blood stream of laboratory animals afflicted with diabetes, it quickly reduces their blood sugar concentration to normal, and an overdose produces the convulsions that are a symptom of excessive insulin. These convulsions can be cured by injecting sugar solution, as they are in the case of those produced by the natural insulin.

Dr. Frank states that the new chemical will be of use chiefly in the treatment of mild and moderately severe cases of diabetes, and he cautions prospective users to be exceedingly careful in regulating the size of the dose. Synthalin alone, he says, will not avail against diabetes in its more advanced stages. In these the frequent injection of insulin is still the only effective treatment. But even here, he claims, synthalin will be useful as an auxiliary medicament, for by swallowing properly adjusted doses of it the patient can cut the number of insulin injections needed daily from three down to one.

THE CAUSE OF RHEUMATISM

THE heavy economic and industrial losses resulting from acute rheumatism has led the British Medical Research Council to instigate one of the most exhaustive surveys of the prevalence of this disease among the poorer classes ever undertaken. Medical men have long recognized that the causative factor of rheumatism probably has something to do with the conditions arising from poverty, since it occurs with comparative rarity among the well to do. The investigation just completed is an attempt to ascertain means of preventing its high incidence among the children of the very poor.

A specially appointed committee investigated the families of 700 rheumatic children, charity cases in hospitals in London and Glasgow. The families of 200 children, receiving hospital treatment for non-rheumatic diseases, but of otherwise similar circumstances were observed as controls. In addition the committee went into the histories of some 2,000 children with rheumatism attending the Poor Law Schools.

The results of this detailed survey indicate that infected tonsils and damp housing conditions do not have as close a connection with the disease as many physicians have formerly believed, but the family incidence of the disease runs high. In 31 per cent. of the families of the rheumatic children relatives living in the same house were afflicted with the same malady. Over-crowded living quarters and several children sleeping in the same bed were an all-too-common circumstance featured in the report.

The committee frankly admits that the conclusions to be drawn from the investigation are mainly negative, but it points out that the prevalence of the disease in other members of the family suggests several possibilities: there may be a tendency to inherit rheumatism, it may be due to similarity of environment or it may be transmitted from person to person by contact. More research still is needed to show which line of effort should be followed to make rheumatism preventable.

OXYGEN IN SOILS

DR. LEE M. HUTCHINS, of the Department of Agriculture, Washington, D. C., has published in *Plant Physiology* a series of experiments carried out in the laboratory of plant physiology of the Johns Hopkins University under the personal direction of Professor Burton E. Livingston on the supply of oxygen present in various soils under different conditions and the effects of this varying supply of soil oxygen on the germination and growth of a number of varieties of seeds.

It was found, for example, that rice requires very little soil oyxgen, wheat considerably more and cotton a great deal. The oxygen-supplying power of different soils varies. Sandy loamy soils supply more oxygen to plant roots than heavy or clayey soils; a soil supplies less oxygen when wet than when dry; less when packed than loose, and the supply decreases with the depth from the surface.

These experiments agree with the well-known facts that rice thrives in heavy soils with plenty of water and little cultivation while cotton requires drier, lighter soil and more cultivation.

Delicate and complex apparatus for determining the oxygen-supplying power of soils was perfected by these experimenters and described in detail by Dr. Hutchins, who suggests the broad field of study just beginning to be opened up by these and other experiments in the quantitative requirements of water, oxygen, carbon-dioxide, etc., in plant growth.

BIRD MIGRATION AND GLAND ACTION

ELECTRIC lights that hoodwink deluded hens into laying financial profits into their owners' pockets in the winter time are now being utilized in much the same way to further scientific knowledge about the causes of bird migration.

Dr. William Rowan, associate professor of zoology at the University of Alberta, believes that migration may depend on the production of an internal secretion or hormone by the reproductive organs during certain stages

of regeneration. It is well known that the sex glands of birds undergo marked seasonal changes that various authorities have endeavored to link up with the phenomena of migration; and this last winter Dr. Rowan has endeavored to prove his theory with a series of ingenious experiments.

About two hundred juncos, hardy little birds common in southern Canada and the northeastern states, were trapped, divided into two groups, and placed in two unheated aviaries. In this experimental aviary the length of the birds' day was artificially increased by the lights at the same rate it would normally increase in the spring. The other birds were left to get along with mere daylight.

Laboratory investigation of a control and an experimental bird in the middle of the winter showed that the organs of the bird in the lighted aviary were in the condition normally found in birds in spring, while those of the inmates of the unlighted bird house were still in the quiescent state characteristic of the winter season. Juncos released from the unlighted aviary hung around the same locality all winter, displaying no desire to continue their wanderings, but only a few of those released from the lighted house were recovered by the experimenters. This Dr. Rowan interprets, in a report to *Nature*, as meaning that birds whose organs are in the quiescent state of minimum activity of winter have no desire to set about the strenuous business of migration.

AN ELECTRIC RELAY

MECHANICAL window displays that automatically start to operate when a person stops to watch, lights of a city that may be turned on by a single drop of rain, or costly jewels, loosely laid around and apparently unprotected, but arranged so that a bell loudly rings when a prospective crook's hand draws near, are now a possibility as the result of a new electric relay. The device, which was invented by D. D. Knowles, research engineer of the Westinghouse Electric and Manufacturing Company, was publicly demonstrated recently for the first time.

It is known as the Knowles grid-glow relay, and resembles a radio set vacuum tube in appearance. When properly connected, a billionth of a watt of electrical energy, about one fortieth the amount of energy exerted by a fly climbing an inch in a second, is sufficient to control the flow of a current a hundred million times as great, and this current, in opening or closing another relay, can control currents as high as twenty-five amperes, as much as is used to operate large motors.

Though exhausted of air, the tube contains neon, argon, or some similar gas which is chemically inert. Like a radio tube, the parts within are an anode, a cathode and a grid, but there is no filament. When the anode and cathode are connected to the two terminals of a circuit of about 440 volts no current flows, because there is an electrical charge built up on the grid which blocks it, as long as the grid is insulated. But if the grid be connected to the ground, the blockade is lifted and the current flows and operates any device connected in the circuit.

In the demonstration made showing how jewelry may be protected, a watch was laid on a plush cover under which was a piece of tinfoil connected to the grid of the relay tube. As soon as the hand was brought near the watch, and the tinfoil, the electrical charge on the grid is removed. The tiny amount of electrical energy jumps from the tinfoil to the hand. The grid being discharged, the 440-volt current flowed through the tube, and operated any device in the circuit. A drop of water falling on two fine wires, a photoelectric cell sensitive to light variations, or a flame under two parallel wires, were substituted for the hand and tinfoil arrangement. Possible applications of the device suggested by Mr. Knowles are to guard exhibits in stores and museums, turn lights on and off at nightfall and daybreak, warn of thunderstorms and give alarms when intruders enter doorways or halls.

ITEMS

WITH the collaboration of other entomologists, the U. S. Bureau of Entomology has been keeping records of insect conditions in all parts of the country and issues monthly reports of the work so that every official entomologist in the United States knows the exact condition regarding injurious insects throughout the country from month to month. In this way they get warning of the spread of imported pests often in sufficient time to help them to lay plans in advance. Through this insect pest survey it is hoped that clues may be gained to the causes of the sudden increase in numbers of certain pests.

CALIFORNIA walnut growers are much concerned over the inroads of the codling moth on walnut orchards, according to the California Experiment Station. This moth is the same that is now all too well known to apple growers. It is present in nearly all orchards of California to some degree and is very prevalent in some localities. In one particular orchard 31 per cent. of the trees were infested. It has been found that it moved freely from apples to walnuts and its behavior was practically the same on both. The insect lays eggs in the undeveloped flower which is stimulated to rapid growth. The larvae that emerge from the eggs are soon provided with abundant food in the surrounding tissue at the expense of apple or walnut host. Spraying the trees with 15 per cent. solution of basic arsenate of lead in the early weeks of June or as soon as possible after the moth eggs are hatched is the method of extermination. Dusting the trees is sometimes tried but is not as effective as spraying.

PINEAPPLES and sugar are the two principal industries of Hawaii, but a third is rapidly being established to make use of lands too wet for pineapples and too high for cane. This is starch, to be made from the edible canna. For fifty years Australia has furnished the market with arrow-root, which is starch from the root-stock of this plant. The familiar canna of our gardens has tubers rich in starch, but the edible species has a very much larger spread of underground stems filled with starch that is easily separated from the fiber for market use. Hawaii has used the plant extensively for stock feeding and there seems to be no reason why it should not be very profitable for commercial use when established.