SCIENCE NEWS

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A DISEASE SUPPOSED TO BE DUE TO GRAIN

GRAIN from certain sections of the great cereal-growing region of the Northwest seems to harbor the cause of a serious and sometimes fatal disease afflicting farm animals and possibly also human beings. Researches indicate very strongly that when several different kinds of grain raised in parts of the region are fed to laboratory animals, these suffer from a serious weakening of the bones, breakdown of the liver tissue, hemorrhage, skin disturbances and other symptoms. There are also indications that farm animals get the disease from eating hay as well as from the suspected grains. A few human cases showing somewhat comparable symptoms have been reported from hospitals.

The actual cause of the disease is still quite unknown. Conjectures have been made that it may be a fungus harbored by the grains, a bacterium or a poison drawn from the soil or formed in the grain because of peculiar soil or climatic conditions. But these are only guesses, and the real answer must await more extensive investigation. Investigators at the U. S. Department of Agriculture expect to grow grain under controlled conditions in the areas from which the disease is reported. They will feed this grain to experimental animals to obtain more definite data than are now available.

The four grains known to carry the disease are corn, wheat, barley and emmer. The latter is a relative of wheat, and seems to have been the first grain cultivated by the ancient civilizations of Babylonia and Egypt. It is less grown now, but is still valuable in many semi-dry regions.

Efforts will also be made to determine whether the malady is confined to specific soil types. If this proves to be the case, an effort will be made to find what soil elements or conditions are responsible for the trouble.

Before grains were pointed out as responsible for the disease, a very careful checking up was made. Large numbers of rats were fed on grain from the suspected area, and "controls" were fed from grain raised elsewhere. The controls remained healthy, while the others showed marked slowing down of growth, together with other abnormalities.

Trouble with poultry in the "poison area," apparently traceable to the same disease-bearing grains, manifests itself largely in the failure of eggs to hatch. The chick develops, almost reaching the point of hatching; some of them do hatch in a lame sort of way. But when the chicks, living or dead, are freed from the shells, they are seen to be cripples, with deficient leg or wing bones, sometimes with abortive beaks, and invariably clad in a thin, stringy, hair-like growth instead of the normal thick, soft down.

The experiments have been going on for more than a year until there is little doubt that the four grains named are real bearers of the disease. It is reported that local buyers have long been discriminating against grains from the affected area. If this practice should become extensive, the economic consequences are bound to be very serious. It remains to be seen whether flour and other mill products made from the grains will produce nutritional disturbances in human beings.

The condition responsible for the present investigation seems not to be strictly new. Records of similar disturbances have been found running back for many years, into early exploration days; but until the present time the malady was merely shoved aside as "alkali trouble" and was not seriously considered.

RESISTANCE TO INFANTILE PARALYSIS

ARE resistance and susceptibility to infantile paralysis inherited? This question was raised at the recent meeting of the American Medical Association in New Orleans. The dread scourge of childhood which afflicted some five thousand young persons in last year's epidemic will eventually be controlled by increasing the resistance of the individual child to the disease. This was the hope held out to the general practitioners, the family doctors of the country, by leading investigators of the disease. Efforts to control the disease by preventing the spread of the germ or by fighting the disease itself will be less successful.

Investigating why some children get the disease and others do not, Dr. W. Lloyd Aycock, of Boston, found that it tends to "run in families." He reported a number of families in which the disease occurred more than once, affecting a second child some years after the first one had recovered. He cited particularly the cases of two brothers, orphaned at an early age and reared apart, both of whom developed the disease, indicating a possible hereditary factor.

Nearly nine tenths of affected muscles in cases of infantile paralysis were restored to normal within two years by proper care and exercise. This was brought out in a discussion of the importance of early careful treatment, to prevent the weakened muscles from stretching. These muscles were in "good" condition at the start of the treatment. About two thirds of muscles classed as only "fair" were restored to normal, while more than half of those classed as "poor" became normal.

The types of braces and supports used in keeping the paralyzed muscles at rest to prevent their stretching were shown at an exhibit sponsored by the American Medical Association and the U. S. Public Health Service. Taking part were Drs. Aycock, S. D. Kramer, James L. Wilson and Arthur T. Legg, of Boston; Edward B. Shaw, of San Francisco; John E. Gordon, of Detroit, and James P. Leake, of Washington, under the direction of Dr. R. C. Williams, of the U. S. Public Health Service.

Small infantile paralysis patients, of New Orleans, helped Miss Janet B. Merrill, of Boston, a "polio-therapist," show the physicians how to give just the right amount of exercise to the weakened muscles both

in and out of water. Later in the week the disease will be the subject of a special symposium.

Poor posture as a cause of arthritis, or rheumatism, was cited in a discussion of this ancient disease, traces of which have been found in a dinosaur that lived one hundred and fifty million years ago. While there are other causes of the condition, this particular factor affects the function of the organs. Poor function of internal organs may influence the development of arthritis, according to the American Committee for the Control of Rheumatism.

PROTEIN-DIGESTING ENZYMES

PROTEOLYTIC enzymes, substances which are always found in mixtures in all animal and plant tissues, and which have the power both to break down or digest proteins and to synthesize or cause the union of different chemical substances, or to break them up into their constituent parts, were discussed by Professor Ernst Waldschmidt-Leitz, of the Institute of Chemistry, German Technical High School, Prague, who delivered the first of the 1932 Charles E. Dohme Memorial Lectures at the Johns Hopkins School of Hygiene and Public Health.

These enzymes are very complex, Professor Waldschmidt-Leitz explained. They are always found as mixtures, but he has developed methods of separating them and of proving the specific action of each separate enzyme. For example, years ago trypsin was thought to consist of a single individual ferment only. But Professor Waldschmidt-Leitz and his pupils have shown that the trypsin of an older day is not a unitary substance but consists in reality of six separate ferments, each of which plays its own individual rôle in the intestinal digestion of proteins.

The single enzymes which have been separated from the complex enzyme mixtures differ from each other in their chemical properties and each one has to be tested with special materials. Some of these enzymes or ferments split only substances with very large molecular weights, such as egg albumen, while others act only on substances of much smaller molecular weights. An example of the latter type of substance would be the amino acids or combinations of them which are found in all proteins.

The specificity of these various ferments is determined by their ability to attach themselves to certain chemical groupings of the substance upon which they act. The specific properties of the various enzymes when separated from the other admixed enzymes suggest an analogy to what is observed in toxin-antitoxin studies and call to mind the old side-chain theory of Ehrlich.

MENTAL DISEASE IN IDENTICAL TWINS

NEW light on the relative importance of heredity and environment as factors causing certain types of mental disease, and also juvenile delinquency and criminal tendencies, is gained as a result of a study of identical and non-identical twins being conducted at the University of Southern California by Dr. Aaron J. Rosanoff.

A total of one thousand pairs of twins with mental diseases is being sought by the scientist, and already records of 404 have been obtained. This is believed to be the largest collection of such records ever gathered. A preliminary report of the data now available will be published in a forthcoming issue of *Eugenical News*.

Of those twins that were of the same sex and probably with origin in a single ovum, or egg cell, and therefore with the same hereditary equipment, 116 pairs had both twins affected and only fifteen pairs with but one individual affected, it was found by Dr. Rosanoff. An entirely different picture is presented by the group containing twins of opposite sex and therefore origin in separate egg cells with different heredity. Of these 26 pairs had both twins affected and 75 pairs where only one member was involved. Of the twins of the same sex, but probably non-identical, 53 pairs had both members affected and 67 had only one with the trouble.

The "disorders" considered included mental deficiency, epilepsy, dementia praecox, manic-depressive psychoses, and also behavior problems in children, adult crime and juvenile delinquency. As a check on these results, an associate of Dr. Rosanoff, Doncaster G. Humm, has undertaken a parallel study of brothers and sisters who are not twins.

CANAL PROJECTED FOR NORTHERN FLORIDA

THE construction of a great ship canal across northern Florida to save more than 800 miles, or three days' sailing time on a round trip between North Atlantic and Gulf ports, is urged in a report made by Colonel Gilbert A. Youngberg to the Florida Engineering Society following a preliminary study.

He believes that the project is well worth a complete survey of the site by army engineers. Colonel Youngberg's study, made for the City of Jacksonville, was authorized by the 1930 River and Harbor Act. A special board of engineers is now making a study of the most practicable route.

The canal would be one of the world's largest engineering projects. It is roughly estimated that it would cost between $125,000,000 and $200,000,000. Vessels plying between Gulf ports and northern Europe would be benefited almost as much as those going to or from the Gulf and North Atlantic American ports.

During 1929, Colonel Youngberg said, 1,487 vessels made 10,341 voyages that would have profited by the canal. These ships are the larger portion of those sailing from the Gulf, since only 1,971 vessels traded between ports on the Gulf and ports elsewhere.

The immensity of possible savings in tonnage the new canal will effect was emphasized by comparison with freight now carried by well-known inland waterways. The ton-mileage savings of the projected canal will exceed 20,000,000,000 statute ton-miles.

"This is more than ten times the ton-mileage carried on that portion of the Mississippi River between St. Louis and New Orleans," Colonel Youngberg said. "It is more than 13 times that on the Ohio between its mouth and Pittsburgh, and it is about eight times the ton-mileage on the Monongahela, that paragon of inland water-way freight lines."

The canal would be of great benefit to the American merchant marine, because, out of a total of more than 10,000 voyages which would have been benefited by the canal in 1929, 7,610 were made by American vessels and only 2,731 by vessels of foreign register.

ITEMS

No new herds of infected and exposed animals have been discovered in Southern California for several days prior to May 16 by the U. S. Department of Agriculture workers, and it is hoped that the outbreak may now be considered definitely at an end. Continued vigilance will, of course, be necessary for some time, to detect and stamp out promptly any cases that may occur.

AN asteroid or minor planet was discovered on May 10 at the La Plata Observatory, Argentine, the Harvard College Observatory has been informed telegraphically by Professor J. F. Hartmann, director. The new asteroid can not be seen by American astronomers as it is in the southern skies, in the constellation of the Hydra, right ascension 14 hours and south declination 22 degrees.

A TEST for determining the success of the new vaccine against yellow fever was discussed at the meeting of the American Medical Association. Drs. T. P. Hughes and W. A. Sawyer, of the Rockefeller Foundation, New York City, who just announced that they were able to give lasting protection against yellow fever by a newly-developed method that makes use of mouse serum, described the test. In this test the germ or virus of yellow fever is mixed with the blood serum of the person being tested and injected into mice. If the person has in his blood protective substances that guard against yellow fever, they will neutralize the yellow fever virus and the mice stay well. If the mice get the disease it proves that the person's blood lacks the protective substances and hence that he is susceptible to the disease. The specific nature of this test was proved by trying it on Canadians, who have never been exposed to yellow fever. As was expected, it showed that they did not have the protective substances.

SIXTEEN persons have been successfully vaccinated against yellow fever, Drs. W. A. Sawyer, S. F. Kitchen and Wray Lloyd, of the Rockefeller Foundation, have reported to the Federation of American Societies for Experimental Biology. This is the first time a way has been found to give immunity to this disease. While the method is not yet ready to be used on large groups of people in yellow fever countries, it can be used immediately to protect investigators working on the disease. Thirty-two yellow fever investigators contracted the disease within the last four years, of whom five died. Besides the sixteen successful vaccinations in New York, three men in Africa and South America have been given protection against yellow fever.

SCIENCE has not yet solved the green leaf's secret of storing up the energy of sunlight by converting carbon dioxide into carbohydrates, it appears from research by Professor G. Mackinney, of the division of plant nutrition of the University of California. Vegetation has the ability of turning carbon dioxide, the gas exhaled by organisms and given off by fire, into carbohydrates, useful as starches, sugars and cellulose. Some six years ago Professor E. C. C. Baly, professor of chemistry at the University of Liverpool, reported the reduction of carbon dioxide to formaldehyde and carbohydrates in vitro, that is, in the test-tube. Others worked on the same important problem with varying success. Professor Mackinney has attempted to repeat the experiments, but has been forced to conclude in his report to the American Chemical Society that "no procedure has yet been published whereby conditions for obtaining formaldehyde and carbohydrates in vitro can be duplicated in other laboratories."

A QUARTER of the sufferers from the general paralysis type of insanity when treated with malaria have been practically cured and restored to former occupations, the U. S. Public Health Service announces in giving details of a new program of study of the treatment. Over ten thousand cases have been reported in the medical literature since 1917 when Professor von Jauregg, of Vienna, began to treat that advanced stage of syphilitic infection, known as paresis or general paralysis, with artificially inoculated malarial fever. A study of these reports shows that about 25 per cent. of patients have been practically cured and returned to their homes and jobs. Before the malaria treatment only one or two per cent. of the victims had complete remissions and patients died within three or four years. The U. S. Public Health Service is cooperating with the State Hospital at Columbia, S. C., in its new investigation. The development of reliable and simple methods of infecting the patients with malaria will be attempted.

PRODUCTION of vitamin A from the yellow pigment, carotene, by action of ultra-violet light is another step to understanding the essential food elements that a few years ago were totally unknown. Rapid progress has been made in the past few months in the chemistry of vitamin A. It is definitely known that carotene, such as used in the Cambridge University experiments, is the precursor of vitamin A. Other experimenters have shown that carotene is converted into the vitamin in the liver and early this year Professor J. C. Drummond, of University College, London, obtained vitamin A by splitting carotene into two products, one of which was the vitamin. Professor Paul Karrer, of the University of Zurich, Switzerland, recently derived a formula for vitamin A and showed it to be a close chemical relative to artificial violet perfume. The ultra-violet light which activated carotene into vitamin A is not contained in sunlight. Vitamin A will not be known as a "sunshine vitamin" like anti-rachitic vitamin D, which is produced by the irradiation of foods and the chemical ergosterol. Production of vitamin A on a large scale and its manufacture in foods, such as bread and cereals, in the same way that vitamin D is introduced, can be expected to result if the British experiments are confirmed.