SCIENCE NEWS

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THE ISOLATION OF AN ENZYME

THE isolation and crystallization of the first enzyme has been achieved by Dr. James B. Sumner, assistant professor of biological chemistry at the Cornell Medical College at Ithaca. Success came only after a period of research covering nearly nine years. During a part of the time Dr. Sumner was assisted by Dr. Viola A. Graham and by Dr. Charles V. Noback.

The enzyme isolated is known as urease and occurs in the jack bean, in the soy bean and in a great many kinds of bacteria. It has been found in the horseshoe crab and in the lining of the stomach. Urease is important in the cycle of nitrogen because it converts the urea that is produced by animals into ammonium carbonate, which is used by the plant, usually after conversion to nitrates by bacteria.

Chemists have been attempting to purify enzymes for nearly a century, but up to the time of Dr. Sumner's discovery no enzyme had ever been prepared in pure condition and the chemical nature of enzymes was entirely unknown. Indeed, a prominent worker in this field, Dr. Richard Willstatter, of Germany, recently stated that the enzymes belong to no known group of chemical substances.

An enzyme, the word meaning "in yeast," is a substance elaborated by plants, animals or micro-organisms that accelerates chemical reactions without itself being used up in the process. In other words an enzyme is a catalyst. But the enzyme is a catalyst of a special sort. It is extremely unstable and of colloidal nature. These are the chief reasons why the isolation of an enzyme has been considered an almost impossible task. Enzymes are sometimes called ferments because they cause fermentations. Of the great number of enzymes found in living cells a few examples are: zymase, which is present in yeast and which is responsible for the alcoholic fermentation of saccharine liquids; rennin, which is obtained from the stomachs of calves and which is used in the manufacture of cheese; pepsin, which is present in the gastric juice and which digests meat; and thrombin, which is necessary for the coagulation of blood.

Urease has been prepared by Dr. Sumner as octahedral crystals that are slightly larger in diameter than human red blood corpuscles. The crystals are protein and belong to the class known as globulins. They are able to transform their own weight of urea into ammonium carbonate every 1.4 seconds at room temperature.

The isolation of urease has opened up new fields for research and is expected to aid in the solution of many problems of the chemistry of enzymes and to lead to the isolation of still other enzymes.

THE SPECTROHELIOSCOPE

CHANGES on the sun, previously perceptible only in photographs, may now be watched visually with a new instrument called the spectrohelioscope, invented by Dr. George Ellery Hale, honorary director of the Mt. Wilson Observatory. This device is a modification of the spectroheliograph, which he invented a number of years ago for photographing the sun as a whole or individual features of it in the light of a single color or wavelength. The visual device is advantageous, however, because actual changes can be watched as they take place, even though they are invisible when the sun is viewed through the telescope in the ordinary way.

Using this instrument, Dr. Hale has been able to watch the behavior of the whirls of hydrogen around sun spots, for since these glowing gases give off light of characteristic colors, the spectrohelioscope may be set to observe one particular element, just as a radio set may be tuned in on one particular station to the exclusion of others. A very unusual phenomenon that he observed recently was the engulfment of one of the prominences or huge flames that shoot out from the sun, by one of these spot whirls.

Dr. Hale is hopeful that the spectrohelioscope may be so simplified that its cost will be low enough to have a large number of them in all parts of the world, in both professional and amateur observatories. In this way it will be possible to keep a practically continual watch on the sun.

MME. CURIE'S LABORATORY

MADAME J. S. LATTES, a worker in Madame Curie's laboratory, has described in *Annales de Physique* her studies of the filtering of radium rays. She was originally interested in finding the best method of wrapping up the applicator tubes which are brought in contact with the flesh of a patient who receives radium treatment, but her results led her into fundamental studies of the absorption of radium rays by different materials. She was able to confirm definitely, using the American radium, a law discovered last year by Georges Fournier in the same laboratory according to which there is a simple mathematical relation between the absorption coefficient of a material and its atomic number. She also attained her original object, for she learned how to avoid the destruction of the flesh, or necrosis, which occurs when a radium tube is improperly used. Essentially her method is to use first a thin sheath of a dense metal, such as platinum, around the radium, and then to wrap the tube in many layers of light material, such as gauze, to absorb the secondary rays issuing from the platinum. This method which has also been developed empirically is now for the first time clearly understood and explained.

In her latest report, published in the *Annals* of the University of Paris, Madame Curie tells of the great and growing activity of the group which she directs. No less than thirty investigators are studying different problems of radioactivity, and fifteen scientific papers were published from the laboratory between November, 1925, and May, 1926. In addition, the various technical

services of the laboratory have been kept up. Madame Curie's daughter, Dr. Irene Curie, is one of the most productive research workers at the Radium Institute, and also has charge of some of the laboratory teaching.

THE MEDICAL TREATMENT OF PARALYSIS

THE growing medical practice of treating paralysis with a counter attack of malaria or rat-bite fever may be superseded by a much simpler process of injection with protein substances.

The latter, according to a report to the American Medical Association by Drs. M. M. Kunde, George W. Hall and F. J. Gerty, of Chicago, presents the advantage of not introducing a disease-producing organism into the system of the patient and is much more conveniently managed.

Malaria treatment requires the presence of a malarial patient as a source of infection and such persons, thanks to present-day health campaigns, are not always to be found in many communities. In spite of the very beneficial results, however, that have been achieved by judicious administering of both this disease and rat-bite fever to paralytics, neither treatment is absolutely under control, a difficulty that may be offset by the new method the Chicago doctors claim.

High temperature seems to be the agent that does the trick in straightening out the paralysis, and this can be induced by protein injections more conveniently and without serious risk to the patient. The fever can be produced at will and regulated approximately by the size of the dose.

"The improvements in the clinical symptoms of the patients treated at the present time are sufficiently encouraging," states Dr. Kunde, "to warrant our making this preliminary report with the hope that it may be given proper consideration by others who are interested in the treatment of general paralysis."

IMPORTATION OF USEFUL PARASITES

EVER since Hawaii saved millions for the cane plantations by introducing parasites to prey on the sugar cane leafhopper, the importation of beneficial insects has gone on apace.

A tiny parasite sent over from Mexico, according to O. H. Swezey at the Experiment Station of the Hawaiian Sugar Planters Association, has become an efficient check on the activities of a mealy bug that prefers the plutocratic diet of avocados. An Australian parasite has been of great aid in rescuing the native ferns from extermination at the hands or rather the mandibles of a foreign weevil that had increased in the islands in great numbers. Still other parasites from various countries have helped prevent outbursts of army worms that have flared up in hordes from time to time in the past.

Introduced fig wasps, states Mr. Swezey, help fertilize wild fig trees that have been planted as part of a forestry project to improve the water-sheds in mountains where the natural forests are on the decline.

Insect power is being further harnessed for the benefit of man in an attempt to weed out a troublesome species of grass with a stem borer from the Philippines. The borer was first held under observation in its native habitat before it was allowed to be brought in, and then grown in quarantine after arrival. Since the insect developed no desire to eat valuable food plants it was turned loose, but has not yet been out long enough to prove definitely its value as a weed exterminator.

EARTHQUAKE NEAR PACIFIC STEAMER ROUTES

TWO earthquakes off the coast of British Columbia in the Pacific Ocean, one in the inland steamer route to Alaska, the other in the route from Vancouver to Japan, occurred on Saturday and Sunday, October 30 and 31, according to the report of experts of the U. S. Coast and Geodetic Survey after they had analyzed data collected by *Science Service*.

The quake on Saturday, October 30, occurred at 2:41 p. m. Eastern Standard Time, and was centered at latitude 53 degrees north and longitude 129 degrees west. This point is across from the Queen Charlotte islands, and on the inland route of steamers to Alaska, in a region of moderate seismic activity. Two hours before this was recorded, the seismograph at the meteorological observatory at Victoria, B. C., about 350 miles away, recorded what was probably a preliminary shock of the same quake.

The second quake, which may have been set off by the first one, was about 250 miles to the south, and originated about 100 miles off the coast at Vancouver, or latitude 49 degrees north and longitude 129 degrees west. It happened at 8:39 p. m. Eastern Standard Time, on Sunday, October 31. This location is in the Vancouver-Japan steamer lane.

Had these earthquakes been on land, it was stated, severe damage would probably have been done but as it was, not even a tidal wave was caused. Probably this was because the displacement of the ocean's bottom was horizontal so that the water above was not greatly disturbed. Undersea quakes in other parts of the world, off the coast of Chile, for example, are frequently vertical, and may lead to disastrous tidal waves.

The data from which these determinations were made was furnished by the seismograph stations of the U. S. Coast and Geodetic Survey at Cheltenham, Md., and Tucson, Ariz.; the United States Weather Bureau at Chicago; Regis College, Denver, Colo.; Fordham University, New York; St. Louis University, St. Louis; Georgetown University, Washington, D. C.; Gonzaga College, Spokane, Wash., and the Meteorological Observatory, Victoria, B. C.

FISHERIES SCIENCE RESEARCH

INTERNATIONAL cooperation in an exact scientific investigation of the resources of the sea, to raise the fisheries and allied industries from their present level of ill-informed and frequently destructive operation to a status comparable in efficiency with the meat packing and automobile industries, was the program advocated by Maurice Holland, director of the division of engineer-

ing and industrial research of the U. S. National Research Council. Speaking before the third Pan-Pacific Science Congress, Mr. Holland outlined the evolution of fishing from primitive days to the present time, and pointed out ways in which the industry could take advantage of knowledge made available through the researches in pure science already concluded and yet to be undertaken.

The speaker stated that although the yearly production per individual worker in the fisheries was much higher in the United States than it is in other countries the American fisheries worker shows up very poorly in comparison with American workers in other fields. This, he claimed, is due to a very considerable extent to the fact that the industries of the land have taken full advantage, through technology, of the data made available by science, and have adopted methods of mass production and intensive use of economical power, while the industries of the sea have adhered to a very large extent to more or less primitive methods.

The situation is strikingly indexed by comparing the number of men occupied in pure science with the number working in applied sciences. In the country at large, there are about 500 scientific men engaged in pure research, while about 30,000 busy themselves in finding economic applications for the abstract results of the 500. This makes the ratio of "pure" to "applied" about 1 to 60. In the fisheries the situation is quite reversed, with many men bringing out scientific facts which the industry could use if it would, but only one technologist to every sixty pure scientists. Dr. Holland pointed out that this means that there is a great mass of facts waiting for application, if only properly trained men can be found to bring their wits to bear on the problem of translating the abstract data into concrete terms that fit the working conditions. Mr. Holland concluded his address with an appeal for international action in promoting fisheries research.

ITEMS

AVIATORS preparing to fly at high altitudes may now carry their oxygen supply in liquid form in thermos bottles, and thus do away with the transportation of heavy steel cylinders containing the compressed gas. This is the invention of M. Garsaud, of the French Academy of Sciences. Not only is it easier to carry oxygen in this way, but larger quantities can be transported in a very small space. The bottles are made of enamelled metal and have two openings at the mouth, one leading the gasified oxygen into the mask worn by the aviator and the other for the passage of a wire carrying an electric current. The electric current heats a tiny quartz lamp inside of the bottle and thus vaporizes the necessary amount of oxygen. The only inconvenience of the apparatus, M. Garsaud says, is splashing of the liquid oxygen in the bottle. This could cause explosion unless corrected by filling it loosely with asbestos. Liquid air can be carried in these bottles for as long as six days at a time.

RAISING rubber trees so that they will give more of the milk that becomes the auto tire of commerce is more important than synthesizing man-made rubber in the laboratory, says Dr. L. E. Weber, rubber technologist of Boston. "Under present practice the rubber tree yields about four pounds of rubber a year," Dr. Weber explained. "In the early days of the beet sugar industry the beet could only be made to yield two per cent. of sugar. But the plant biologist got busy and cultivated it until he got a type that yielded just nine times as much. It may be fantastic to imagine that rubber trees could be bred to yield 36 pounds of rubber a year, but even if the present amount were merely doubled it would be an accomplishment unparalleled in its effect on the rubber industry of the world." While the making of synthetic rubber may be one of the most fascinating problems of the chemist it is overshadowed in technical importance by the possibility of breeding better rubber trees.

THOUSANDS of dollars may be saved to cattle breeders if experiments being carried out at the Michigan State Agricultural College prove successful. Prevention of premature calving in cattle, responsible for large losses annually, is being fought by scientists with vaccination. This condition is caused by infection from a specific bacteria, hence the possibility of combatting the disease by inoculation. Dr. I. Forest Huddleson, of the bacteriological section of the State Agricultural College, has been conducting a series of experimental inoculations of cattle to determine if this method can be successfully used as a preventive. The idea is much the same, according to Dr. Huddleson, as that of smallpox vaccination. It is necessary to evolve a strain of the causative organism so weakened that it will not cause harmful effects but will still stimulate the production of enough antitoxins to confer future immunity to the disease. He has found that the cattle he has inoculated have attained a certain degree of immunity and it is hoped that further research will develop a strain of bacteria that will confer complete immunity.

RECENT isolation of an organism in cheese which poisoned a number of persons may lead to a solution of the numerous poisonings from milk products responsible each year for the suffering of countless people. Reports to the U. S. Bureau of Chemistry which administers the Pure Food and Drug Act caused the examination of cheese eaten by the persons affected and resulted in the isolation of an organism hitherto not held responsible in food poisoning cases. Members of the paratyphoid-enteriditis group so commonly reported to be the cause of such outbreaks were not found in the cheese. The organism believed to cause the disturbance was of the streptococcus group. When milk was used as a culture medium, symptoms like those of the human beings affected were produced in cats. The symptoms manifested by those poisoned were nausea, vomiting, paroxysms of abdominal pain and diarrhea. Cheese causing three such outbreaks was found to contain this organism and to reproduce similar reactions when applied in milk cultures to cats. Residents of Maine were affected by imported Albanian cheese while residents of Missouri and New York were affected by an American-made cheese.