SCIENCE NEWS

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PAPERS BEFORE THE INTERNATIONAL CONGRESS OF MICROBIOLOGY

MAN'S chemical warfare against the germs that invade his body occupied a leading part in the opening session in New York City on September 4 of the Third International Congress for Microbiology. Especial prominence was given to the powerful new weapons, sulfanilamide and its related chemicals. Just how sulfanilamide acts against bacteria is still pretty much of a riddle, it was admitted by Drs. Eleanor A. Bliss and Perrin H. Long, of the Johns Hopkins Medical School. It has been known for some time that in the presence of small quantities of the chemical, germs of the group known as cocci are not killed outright but stunned or paralyzed, so that the body's own fighting forces can make an end of them. However, in the researches reported by Drs. Bliss and Long, it has also been shown that stronger concentrations of sulfanilamide kill the bacteria outright. Another point developed was that the effectiveness of certain compounds of sulfanilamide seems to be due to their chemical decomposition, releasing "straight" sulfanilamide in contact with the bacteria.

Experiments in which sulfanilamide and sulfapyridine were used, either alone or in combination with injections of immune sera, on mice exposed to infection with meningitis were reported by Dr. Sara E. Branham, of the U. S. Public Health Service: "In general, it may be said that, weight for weight, sulfapyridine protected mice better than sulfanilamide, and that the combination of either sulfapyridine or sulfanilamide with serum gave better protection than either the drugs or the serum did alone."

A whole family of serious diseases, including typhus fever, Rocky Mountain spotted fever and several even worse maladies from the tropics, was discussed. The diseases of this group are all caused by members of the genus Rickettsia, which are small, bacteria-like bodies of variable shape. They are usually carried about by ticks, but have also been found in the bodies of lice and other biting insects. Climate influences the virulence of three types of infection, as shown by experiments on guinea pigs and other rodents, was reported by Dr. R. E. Dyer, of the U. S. Public Health Service. Animals inoculated with the viruses of spotted fever, endemic typhus and the St. Louis strain of encephalitis showed most pronounced reactions in winter and least in summer. Some of the tests, repeated under conditions of artificially controlled air temperature, yielded confirmatory results. The Japanese representative in this family, known as tsutsugamushi disease, was the subject of a report by Professor Norio Ogata, of the Medical University of Chiba, Japan. It occurs in certain districts during the summer months, and is fatal in between 30 and 70 per cent. of all cases. Another Rickettsia-caused disease was the subject of a paper prepared by Professor Ugo Reitano, of the University of Rome. It is a form of typhus fever always present among the natives of Abyssinia, and only the most alert precautions of the Italian medical service keeps it from spreading among white troops now garrisoned there. The most effective means of combat is vaccination.

The smallest plants, no less than the largest animals, must have their vitamins, hormones and other minutely concentrated but physiologically powerful substances if they are to live and grow. Not less than a dozen such substances, according to Dr. William J. Robbins, of the New York Botanical Garden, who opened the session with a general statement. To a very large extent, microscopic plants and full-sized animals need and use the same growth-promoting substances. One such substance, only recently discovered, was given the name "coenzyme R" by Dr. Franklin E. Allison and Francis W. Minor, of the U. S. Department of Agriculture. It has been found indispensable for the growth of the nitrogen-fixing bacteria that live in the roots of clover, peas and related plants. The bacteria need very little of it; they would grow and multiply in solutions containing as weak a dilution as one part in a million. But that much at least they had to have in order to grow at all.

Other bacterial growth-promoting substances, necessary in equally minute minimal quantities, were described by Drs. P. W. Wilson and P. M. West, of the University of Wisconsin. They found the same substances present in yeast as well as bacteria. Another nitrogen-fixing bacterium, Azotobacter, that lives free in the soil instead of in plant roots, has been found to require minute traces of molybdenum, the same metal that is used in hardening modern high-grade steels, and even smaller quantities of tungsten, the metal used in electric lamp filaments. Researches establishing these facts were reported by Drs. Dean Burk and Kenneth Horner, of the U. S. Department of Agriculture.

Relationship between rheumatic fever and pneumonia has been traced by Drs. Homer F. Swift and Thomas MacPherson Brown, of the Rockefeller Institute for Medical Research, who reported on their findings. Exudates oozing from the tissues of sufferers with rheumatic fever were cultured in various ways, both in the lungs of mice and on the embryonic membranes of incubated eggs. On the membranes the cultures produced characteristic lesions and in the mice they caused pneumonia. Microscopic examination disclosed the presence of the extremely small microorganisms known as pleuropneumonia bodies, which seem to have a size between the smaller types of bacteria and the invisible filterable viruses. Indeed, under certain circumstances the pleuropneumonia bodies themselves will slip through the invisibly fine pores of porcelain filters.

Two other strains of filterable organisms of the pleuropneumonia type, found in mice, were reported on by Dr. Albert T. Sabin, also of the Rockefeller Institute. Strain

A, which thrives either in the brain or in certain other tissues of the body, produces a toxin that either kills outright or leaves the animal crippled with symptoms like those of chorea. Strain B "has an almost specific affinity for the joints, in which it gives rise to a chronic, progressive, proliferative, ankylosing arthritis which clinically and pathologically resembles rheumatoid arthritis in man."

From the Far East and the Near East came simultaneous reports of a bacteriological feat long considered impossible: the growing of the virus of rabies in glass laboratory flasks instead of in the brains of living animals. Professor K. Kanazawa, of the University of Tokyo, made the virus grow by feeding it minced brains of either rabbit or chick embryo. In experiments of Professor I. J. Kligler and Dr. H. Bernkopf, of the University of Jerusalem, it was grown on a medium consisting of coagulated human blood plasma and mouse embryo brain.

Cancer, at least of certain types, is caused by filterable viruses, and thereby joins a numerous and varied group of human ills, including smallpox, influenza and infantile paralysis. Three converging lines of evidence were presented by Drs. James B. Murphy and Albert Claude, of the Rockefeller Institute for Medical Research; by Drs. Jacob Furth and Elvin A. Kabat, of the Cornell University Medical College, and by Dr. F. Duran-Reynals, of Yale University. Fluids from malignant transplantable tumors of chickens were whirled in the ultra-centrifuge, passed through fine-pored filters, and otherwise treated after the manner of virus-containing fluids in known animal and plant diseases. Materials obtained from these cancer-fluid filtrates, injected into the tissues of healthy chickens, produced typical cancerous growths. In the researches reported by Dr. Duran-Reynals, chicks responded to doses of a tumor virus by developing fatal hemorrhages and degeneration of tissues, without the development of tumors. However, extracts obtained from such chicks produced the characteristic growths when injected into healthy adult fowls. Similar evidence for virus causation of cancers in rabbits was reported in communications by Dr. Jerome T. Syverton, of the University of Rochester, and Drs. John C. Kidd and Peyton Rous, of the Rockefeller Institute. A virus was indicated as the probable cause of kidney cancer in frogs, by Dr. Balduin Lucké, of the University of Pennsylvania.

African monkeys may become immune carriers of yellow fever without being bitten by mosquitoes, according to Drs. G. M. Findlay and F. O. MacCallum, of London. They introduced yellow fever virus artificially into the stomachs of monkeys and found that it retained its virulence. Other animals, including man, could not be thus converted into carriers. Apparently the high acidity of their gastric juices inactivated the virus. "If non-biting arthropods with a long life span carry yellow fever virus and are occasionally eaten by monkeys, a solution would be found of the continuance of yellow fever in dry seasons when mosquitoes are absent or rare. Attention is drawn to the survival of yellow fever virus in cockroaches."

PAPERS BEFORE THE AMERICAN PSYCHOLOGICAL ASSOCIATION

CHALLENGING the idea that a head wound injuring the frontal lobes of the brain could leave the victim unimpaired in intelligence, Dr. Ward C. Halstead, of the Otho S. A. Sprague Institute of the University of Chicago, stated that such an injury would cause "fundamental alteration" to the personality. The report was made to the American Psychological Association meeting at Stanford University. Scientific men have recently claimed that surgical removal of even the whole frontal lobe area left patients with normal or improved I.Q. Such conclusions, according to Dr. Halstead, are "based on inadequate methods" or standards. One type of abstract thinking, involving the storing of objects into categories on an abstract basis, is "relatively unavailable," for the person who suffers a frontal lobe injury regardless of which frontal lobe is damaged. Dr. Halstead's conclusions are based on a four-year study at the University of Chicago Clinics. He pointed out that it is only recently that such experimental studies of brain injury effects have been undertaken, although analyses were made of World War gunshot brain injury cases.

Anger and other emotions can make your finger tips cold. Close links between such body changes and mental states were described by Drs. Bela Mittelmann and Harold G. Wolff, of the New York Hospital and Cornell University Medical College. As the investigators discussed with a patient the difficult situations of his life in a psychoanalytic interview, they also made measurements of his finger temperature and the behavior of his digestive system. Anger, fear, depression and elation all were accompanied by a chilling of the finger tips. Even when the patient hid his emotion from himself, it was betrayed by the body changes and by his speech. The greatest drop in finger temperature came when the patient was in a state of tension, anxiety or conflict. The maximum drop was 13.5 degrees Centigrade or about 24 degrees Fahrenheit.

Braille, the language of the blind, can open the door of the world of printed literature to those who are blind only in their inability to "see" words, was stated by Dr. Grace M. Fernald, of the University of California. In learning Braille, she found, the word-blind slightly surpassed the "control group." In all cases, word-blind subjects could then learn to read Braille with the use of only the eyes even when they were still unable to read printed words. Emotional instability is characteristic of all the word-blind individuals studied.

Rats scurrying away on hearing a warning signal, as human beings have learned to run to shelter at an air-raid siren, demonstrated the potency of relief from anxiety as a means for "stamping in" the learning of certain lessons. Psychologists have recognized how powerful fear is for inhibiting or restraining the frightened one. Escape from fear, according to Dr. O. H. Mowrer, of the Institute of Human Relations of Yale University, is also powerful in determining the course of new behavior. When the

rats in Dr. Mowrer's experiments were given a warning of impending punishment and allowed to escape from its threat, they learned better than with the aid of the punishment itself. "Human beings can take either of two courses of action in a danger situation," said Dr. Mowrer in discussing the human implications of his research with a representative of Science Service. "They can act in such a manner as to reduce the danger, or they can act in such a way as to reduce only their perception of the danger, that is, their fear."

Noise and imprisonment, as well as the dilemma of trying to make a correct decision when there is no right way, may be contributing causes to nervous breakdowns in rats. And what is true for rats may be true for men. Dr. Norman R. F. Maier, of the University of Michigan, last winter gained recognition and a $1,000 prize for causing rats to have nervous breakdowns. An animal was forced to take some action when there was no right way to do it. The driving force used in his experiments with rats was a jet of air. Now Dr. Maier finds that the noise of the air jet is a contributing factor in the breakdown. When the rats were placed on a small table and keys were jingled, the noise produced violent activity in 85 per cent.; the sound of an air jet caused it in 64 per cent. In some cases convulsions accompanied the extreme activity. Confinement is also a factor. When the rats were placed during the experiment in a closed wooden box, they were affected more than in a transparent box. But Dr. Maier sticks to his original conclusion that only the theory that breakdown occurs when a conflict is faced from which there is no escape, but in which it is necessary to take action, is broad enough to cover all the cases.

ITEMS

A 1500-YEAR-OLD pair of small iron horseshoes which probably once shod the hooves of a Swiss Lake Dweller's horse is now on exhibition at the Field Museum of Natural History. It represents the last cultural phase of the Lake Dwellers of Lake Neuchâtel. Iron horseshoes were known by the fifth century.

THE American Museum of Natural History wants a group of rare and valuable 25,000,000-year-old bird tracks just beyond reach. The museum can not afford to build scaffolding to reach up, or block and tackle to reach down, to a deposit of tracks found exposed two thirds the way up a Slim Buttes, S. D., badlands cliff, and the tracks can not be reached in any other way. A sample of what is in store for the museum and its visitors was placed on exhibition. About 100 footprints made by wading birds on the shores of lakes that vanished ages ago are included in specimens picked up at the foot of the cliff by Henry Lee, of Rapid City, S. D. They had dropped from a stratum above. Mr. Lee saw more in the stratum. It is these the museum wants.

NATURE is slowly rebuilding the Long Island beaches struck by the memorable hurricane of September, 1938, is reported by Dr. Arthur David Howard, of New York University. Last year, in a few hours, the hurricane moved back the highwater mark at Jones Beach from 300 to 400 feet, but already natural accretion of sand is repairing the damage. Airplane photographs show this repair. Many of the inlets driven through the Fire Island sand dunes have submarine bars across them already. Dr. Howard explains in the new issue of *The Geographical Review* that during calm weather sand bars pile up offshore. During a storm this sand is washed landward. Some of it goes onto the beaches and some of it goes to enlarge the submarine bars across inlet channels. Gradually the beaches will be restored.

RIGOLLET'S comet, named after the amateur French observer who "discovered" it in the constellation Taurus (July 27), is very probably identical with one found in 1788 by Caroline Herschel, sister of the great English astronomer, Sir William Herschel, herself an astronomer. This was reported by Leland Cunningham, of the Harvard Observatory, who has found that the orbit of the "new" comet checks at virtually every point with that computed by Miss Herschel for her comet. It is possible that the two are not the same, but they are definitely of the same family and very probably identical. If it is the same one, this is the first time that it has been seen since its discovery.

USE of the spectroscope to determine the molecular patterns of simple hydrocarbons and to follow the changes occurring in their photochemical decomposition was reported at the conference on spectroscopy at the Massachusetts Institute of Technology by Professor Emma P. Carr and Hildegard Stucklen, of Mount Holyoke College. They obtained experimental results on a series of simple organic molecules which are necessary for the testing of theoretical predictions. This work promises ultimately to lead to a better understanding of the energy relationships involved in a carbon carbon double bond, a problem with significant biological implications. More than 25 hydrocarbons have been examined in this research, including some containing as many as eight carbon atoms and even two double bonds. Several previously unknown relationships governing molecular structure were found.

THE compression ignition principle of the Diesel engine was invented by Malay natives at least a thousand years before it was invented in Germany. Herbert W. Krieger, curator of ethnology at the U. S. National Museum, supports this claim by showing one of the old high-compression fire lighting gadgets of the Malay Peninsula, considered probably the most efficient fire-making idea that primitive man ever thought of. It is a tightly wrapped plunger which is forced into a wooden cylinder by a blow of the hand. At the bottom of the cylinder is a bit of tinder, which lights when the blow compresses the air in the cylinder, thereby generating heat. Crediting primitive men with other brilliant inventions, Mr. Krieger says that the textile industry was saved millions of dollars of royalties when an invention for winding cord so that it could be unwound with even tension turned out to be similar to an old Fiji idea. A Fiji twine ball, in the National Museum, prevented patenting of the device.