SCIENCE NEWS

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THE BACTERIOPHAGE

THE controversy over the existence of living organisms so small that they can not be seen in the most powerful microscope was renewed at the Washington meeting by the statement of Dr. Lloyd Arnold, Chicago, to the Society of American Bacteriologists that the active principle which causes the breakdown of the bodies of bacteria is not a living thing. Ever since the first claim by the French-Canadian bacteriologist, Dr. F. d'Herelle, to the effect that he had demonstrated the existence of organisms of approximately the size of some of the large molecules with which chemists are acquainted, scientists have been divided on the question. With the first announcement, d'Herelle claimed the new form of life preyed on bacteria, and that the taking into the body of an active culture of the invisible germ would convey immunity to many diseases.

In 1923, some seven years after the first discovery, opponents of the living organism theory admitted that d'Herelle's technic had value in the treatment of dysentery, and positive evidence was obtained that the immunizers prepared according to his direction materially assisted in the cure of this disease. Those working on the subject at the time maintained, however, that an enzyme, or ferment, was responsible.

Subsequently bacteriologists were forced to the conclusion that the "bacteriophage," to use the name given to the minute bacteria-eaters, was not confined in its appetite to organisms harmful to man, but that it also attacked certain bacteria of the soil which play a vital part in maintaining its reserve of nitrogen. This was countered by the discoverer of bacteriophage with the statement that he had actually measured the size of the organisms.

That d'Herelle's doctrine is still disputed is proven by the report of Dr. Arnold, however, who flatly denies the existence of such a small "germ." His experiments have shown that bacteriophage really behaves according to the important laws of chemistry; that the question of proportion enters, and that the usual response of the substances recognized by classical chemistry to changes in temperature, and rate of combination or neutralization, is also made by bacteriophage. In other words, the pseudo-organism obeys the laws relating to known toxins and antitoxins.

Summarizing d'Herelle's work, which implies a parasite invisible to the most powerful microscope, and capable of passing through some solid materials, Dr. Arnold said: "We can not substantiate this. We have shown that the agent which causes the dissolution of the bacteria is a toxin or ferment-like substance, and not a living, ultramicroscopic parasite." Dr. Arnold would put the bacteriophage in the same class, chemically, as snake venom. He does not deny that the strange serum possesses peculiar properties, however, such as the power to reproduce itself, when a small portion is placed in a nutrient solution.

CAUSES OF TOOTH DECAY

A SPECIAL germ, deficient diet and predisposing conditions in the mouth combine to foster decay of teeth, according to Drs. F. E. Rodriguez and R. A. Kelser, of the Army Medical School, Washington. Dr. Rodriguez has found that an individual germ of the lactic acid family is the one responsible for the piercing of the hard enamel of the teeth and exposing the soft dentine inside to many different types of bacteria. It thrives in an acid medium, and itself produces an acid condition.

The germs are now being used on rats in order to see whether it is not possible to produce diseased teeth artificially in the living animal, since experiments on isolated teeth have been successful. "I hope that within five or six months, we will be able to duplicate in rats the changes which take place in the teeth of human beings," Dr. Rodriguez stated.

These investigations do not prove that the mere presence of the causal organism is the only requirement for the appearance of dental decay, it is pointed out. Conditions of diet must prevail which foster the growth of bacteria, and further, it must be easy for them to lodge in the mouth so that the etching process can go on. "I believe that the two factors are of equal importance," Dr. Rodriguez said. "The environment in the mouth must be favorable to the organisms."

This is why three sets of rats are being used in the experiments designed to produce artificial decay. One group gets a perfect diet; a second group receives an unusually high percentage of sugar, and a third set receives food which is deficient in calcium and in fat-soluble vitamin A. Dr. Rodriguez then watches the development teeth of the rats, and follows the changes which result when the mouths of the rodents are infected with the lactic organisms. The high-sugar diet is used to provide the offending organisms with plenty of material for the manufacture of acid, and the deficient rations are employed to study the function of calcium salts and the fat-soluble vitamin in the formation of teeth, as some investigators claim that sound teeth can not develop unless there are adequate supplies of each of these two substances.

PREPARATIONS FOR PHOTOGRAPHING THE ECLIPSE FROM THE "LOS ANGELES"

THE advance party of the world's most unique eclipse expedition is installing upon the U. S. Navy dirigible "Los Angeles," in her hangar, cameras and other apparatus that will photograph and record for science the total eclipse of the sun on January 24. Professor F. B.

Littell, captain, U. S. Navy, and Professor George H. Peters, both of the U. S. Naval Observatory, Washington, are in charge of the battery of cameras, telescope lenses and spectroscope that will temporarily turn the cabin of the "Los Angeles" into an astronomical observatory.

The equatorial telescope camera will be used to photograph the mysterious corona of the sun, a pearly halo that can be seen only during the few brief minutes of total solar eclipse. This instrument is being adjusted to the limited space of the air liner's cabin and the exact routine of the aerial eclipse expedition is being outlined with the cooperation of the officers of the "Los Angeles," Commander J. H. Klein commanding.

Every second of the time will count, for even at the favorable position selected for the dirigible, 100 miles off the Atlantic coast on the central line of the eclipse, the length of time that the sun will be completely covered by the moon will be only two minutes and seven seconds. By reaching an altitude of 4,000 to 6,000 feet above the ocean the astronomers hope to avoid clouds and haze that may obstruct the view of the solar phenomena from observers on land.

Tentative plans for the expedition call for a 3:00 A. M. departure from Lakehurst on the morning of the eclipse which will occur at 9:15 A.M. at the position selected for the dirigible. The astronomical party will be in charge of Captain E. T. Pollock, superintendent of the U. S. Naval Observatory. Arrangements are being made to keep the public in touch with the progress of the expedition by radio.

PHOTOGRAPHY OF INFRA-RED RAYS

USE of the large 36-inch reflecting telescope at the Steward Observatory of the University of Arizona to photograph a house six miles away was described at the Washington meeting of the American Association for the Advancement of Science by Dr. A. E. Douglass, director of the observatory. These experiments were made to test a new photographic plate sensitive only to infra-red rays invisible to the human eye. Comparisons were made of the results obtained with the usual types of photographic plate, and it was demonstrated that while the latter exaggerated all the haze of the atmosphere, those taken by infra-red light produced a result as distinct as that taken a short distance away.

These plates were also used by Dr. Douglass to photograph Mars during the time of its close approach last summer and it was found that they showed the markings on the planet far more distinctly than those of the usual kind. In view of these results, the opinion has been expressed by Dr. D. H. Menzel, of the University of Iowa, that it seems evident that Mars itself has an atmosphere, which, like that of the earth, cuts out most of the blue light which affects the ordinary plate and transmits the red and infra-red radiations.

Dr. E. C. Slipher, astronomer at the Lowell Observatory at Flagstaff, Arizona, and a leading authority on Mars, told of somewhat similar experiments. In an effort to test the accuracy of drawings of Mars made with the aid of their large telescope, an enlarged photographic copy of a drawing was taken to a point a mile and a half from the observatory and photographed with the telescope in the same way as the planet itself. The result, as it appears on photographs shown by Dr. Slipher, shows the straight lines of the drawing representing canals as indistinct patches, on account of the distance of the drawing. Most striking, however, is the similarity of these photographs to ones made at the same time of the planet itself and which show similar markings. This, in the opinion of Dr. Slipher, is convincing proof of the presence of the canals, the very existence of which have been doubted by some astronomers.

THE MEXICAN BEAN BEETLE

WITHIN the next two or three years, bean growers of eastern Michigan and western New York will probably suffer heavy losses from the ravages of the Mexican bean beetle, was the prediction made at the meeting of the American Association of Economic Entomologists by Neale F. Howard, associate in truck crop insect investigations of the U. S. Bureau of Entomology.

This insect pest is now within 150 miles of these two greatest bean-growing districts of the east. Since its discovery in Alabama in 1920, Mr. Howard said, the Mexican bean beetle has spread rapidly and steadily at the rate of about 150 miles per year to the north and almost half as far per year to the east, until it is now present in 12 states and may possibly be present in three others.

Neither the destructive capabilities of this species nor the actual damage is as great as in the case of many other insects, and it can be successfully controlled by the use of magnesium arsenate, he said.

J. E. Graf, entomologist in charge of truck crop insect investigations of the U. S. Bureau of Entomology, pointed out that temperature and humidity are not important factors in limiting the distribution of the Mexican bean beetle as it has become a pest in three separate areas in North America—one arid, one humid, and a third with dry winters and heavy rainfall during the summer.

The habit of cleaning itself makes the Mexican bean beetle easy to control and may be the means of preventing further serious ravages by this damaging crop pest, Professor S. Marcovitch, of the Tennessee Agriculture Experiment Station, told the entomologists. When the plants are dusted with sodium fluosilicate or mustard gas on charcoal, all that is required is for the beetle to walk over the dusted plants. When he does this, the dry powder sticks to his legs and body. These materials cause irritation, so that the beetle starts washing his feet. The material thus enters the mouth and death takes places in a few hours.

MODERN SCIENCE IN THE FOURTEENTH AND FIFTEENTH CENTURIES

PLASTIC surgery, the wonder of the world war, was practiced in Italy as early as 1456 and not only were mutilated noses repaired, but lips and ears as well.

Professor Lynn Thorndike, of Columbia University,

who has been conducting investigations in the fourteenth and fifteenth centuries, reported to the Washington meeting of the History of Science Society in a symposium on medieval science that other remarkable advances in science had been made during this comparatively unknown time.

The hospitals were kept scrupulously clean. Bed linen was changed often, and stoves were wheeled to the bedsides of patients during the winter. The systematic practice of dissecting the human body was generally practiced. At this time leprosy almost disappeared from Europe, and other contagious diseases were isolated. Mercury salve was used in the treatment of syphilis early in the fifteenth century about the time it was supposed to have made its first appearance. The study of natural sciences, however, declined, due not to religious opposition but because of the failure of the universities themselves to promote interest in the study.

Dr. George Sarton, of Harvard University, also stressed the progress during the so-called dark ages. Dr. Louis J. Paetow, of the University of California, said that although there was a keen interest in Aristotle and his works during the early part of the century it gave way to other subjects. "It became the fixed idea during the middle ages that the mystery of existence could be solved by logic, philosophy and revelation," he commented. "Gradually all interest centered on these branches and the university thought became stereotyped expressions of it."

SPREAD OF THE CHESTNUT BLIGHT

THE chestnut blight, which has till now been supposed to have reached as far as central Virginia, has taken a tremendous stride and appeared in southwestern North Carolina, according to G. F. Gravatt, of the office of forest pathology, United States Department of Agriculture. On a recent reconnaissance trip in the south Mr. Gravatt discovered a considerable area in the famous Saluda district of the Blue Ridge Mountains which showed signs of severe blighting. He estimates that the original infection dated back about ten years; the disease is now well under way in Henderson County.

Before this giant leap of the chestnut blight it had been thought feasible to check the disease by cutting down all the chestnuts in a wide swathe around the main area of infection and so "firing back" in the way that prairie fires are stopped. The outbreak of the disease in the Saluda district removes all hope of this.

The big chestnut tan bark companies in North Carolina, where the finest stands of chestnut in this country are located, are undecided whether it will be best to lumber over all the available chestnut at once and so drug the market or to cut slowly and run the risk that the blight will get there before the sawmill. Blight-killed trees are useless for the tanning industry.

Chinese and Japanese chestnuts, with which the Department of Agriculture hopes to replace the native species, are reported to be very successful in all trials thus far. The Chinese chestnut promises to fulfill the three requirements of a perfect chestnut: it will develop blight-resistant strains, furnish a bark useful in tanning and produce good nuts for eating.

PRESENT EXISTENCE OF PRIMITIVE MAN

THAT fragments of the primitive, apelike Neanderthal race of men, commonly regarded as long since extinct, may still be alive in some unexplored corner of Africa or Australia is the view advanced by a noted French anthropologist, Professor R. Verneau. A study of several of the lowest known savage races has led him to this conclusion.

Anthropologists at present regard the human genus as having once existed in two distinct species, Neanderthal Man and Modern Man. The theory holds that Modern Man drove out and exterminated the Neanderthal species. There seems to be little doubt that this was what happened in Europe, for skulls and other remains of the extinct race have been found, but no people exist there with Neanderthaloid skull measurements or other physical characters. But in certain primitive tribes in Africa, Australia and the East Indies, Professor Verneau has found men with strong resemblances to the supposedly extinct race, and he is of the opinion that in the unexplored interior fastnesses there may be others who are still more like their "missing link" ancestor of fifty or a hundred thousand years ago.

Professor Verneau was recently awarded the Huxley Medal, the highest honor that the Royal Anthropological Institute of Great Britain and Ireland can bestow.

ITEMS

FRESH lubricating oil and refined kerosene may be salvaged from the used oil in crank cases. By agitating the used oil with a solution of sodium silicate and then distilling with steam an oil may be recovered which compares favorably with new lubricant, according to F. H. Rhodes and H. J. Haon, Jr., of Cornell University. Because the salvaged oil has been heated to such a high temperature it is even better for use than fresh oil for automobiles as it is not so easily cracked. The residue could then be blended with naphtha or casinghead gasoline and be used either as a motor fuel or as kerosene.

PROFESSIONAL astronomers do not realize the importance of observations of meteors and they should make an effort to learn more about them, is the opinion of Professor C. P. Olivier, of the Leander McCormick Observatory. He urges that two special observatories be established in different parts of the country, to photograph meteors simultaneously. By comparison of the plates, many facts could be learned about their height and motion, he said. Credit was given to the members of the American Meteor Society, a group of amateur astronomers who have made many meteoric observations and have helped greatly in augmenting our knowledge of these fiery visitors.