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MALARIA IN CEYLON

MALARIA, which has swept disastrously across Ceylon, is still a mystery disease to the U. S. Public Health Service. The emphasis on the green color of the causal parasitic cells appears to be the distinguishing characteristic that would set it up as a quite new malarial species.

The three well-recognized species of malaria germs already known also have pigments; but two of them are described as dark brown to black, and the third as light brown. The darkest of them, the species causing the quartan or "four-day" type of malarial fever, is described by some observers as "greenish." Dr. L. R. Williams, of the U. S. Public Health Service, states that if the British medical men on the island, who are exceedingly competent in the malarial field, describe the present form as green, it is not likely that they are confusing it with any of the already known species.

All forms of malaria are caused by one-celled animal parasites, of the genus known to scientists as Plasmodium. There are three well-recognized species, and a number of varieties of less certain distinctness. Of the three known species, one causes quartan fever, one tertian fever, and one a most virulent type of tertian or three-day fever which, because of its seasonal nature, is called aestivo-autumnal, or summer-and-fall fever. The parasites causing all malarias pass through a most complicated life cycle, partly in the body of the human victim, partly in that of the carrier mosquito. In the human blood they attack the corpuscles, breaking them down as they themselves multiply. Because of this peculiarity, the most marked of the many disagreeable effects of malaria are seen in the blood itself and in the organs where blood plays an important rôle, especially the spleen, the liver and the red marrow in the spongy parts of the bones. In the especially vicious attacks of pernicious malaria that end in death, it is often found that so many of the red blood corpuscles are broken down that the tiny capillaries are choked with their debris. In other cases, death seems to result from simple massive poisoning from a toxin secreted by the parasites.

The present terrific epidemic in Ceylon is not without precedent in that part of the world. In the Punjab, in northern India, more or less localized epidemics break out at intervals of a few years, seldom occurring twice in the same region. In these epidemics it is not uncommon for sixty-five per cent. of the population in the affected area to be attacked; and of the sick, sometimes a third or more will die. This is much more severe, though less extensive, than the present Ceylon epidemic where, according to cabled press reports, about a sixth of the total population are sick, with a death list representing only one in a hundred of those actually sick.

GIANT MOLECULES

EGG-SHAPED molecules so large that they may be seen with a microscope, the first time any molecule has been seen with such apparatus, have been discovered at Urbana, Illinois, in the x-ray laboratory of the University of Illinois.

A molecule is the smallest subdivision of a chemical compound as it is known to man, in which its chemical properties are maintained.

Scientists are hailing the new find as the foundation for a really successful synthetic rubber. It is believed present-day synthetic rubber-like products have been made erroneously on the basis that rubber molecules each weighed 68,000 times as much as a hydrogen atom.

The new super-giants of the molecular world weigh 500,000 times as much as hydrogen atoms; over seven times as large as previous estimates of rubber molecules.

Yet the new giants are just at the limits of the microscope. They are but six one-hundred-thousandths of an inch long.

Professor George L. Clark, of the chemistry staff and pioneer in industrial x-ray work, made the discovery of the giant molecules. Their presence had been indicated by observing the fashion in which they bent, or diffracted, x-rays but only now have they been isolated for microscopic observation.

Botanists have known for years that the basic structure of cellulose and plant products consisted of little crystalline particles linked endwise. These structures could be seen in a microscope and were made up of the giant molecules.

The reason for failure of science to see the actual molecules before was that they were embedded in a jelly-like substance which had not previously yielded to any breaking-down process.

The value of the new discovery for rubber-making in laboratories lies in the fact that no substance can be man-made until its exact molecular weight is known and used in the manufacture.

From the discoveries of Professor Clark it appears, therefore, that rubber chemists need to make a rubber molecule nearly eight times as large as those with which they have been working.

Man-made molecules of such enormous size have not yet been produced in the laboratories. Few people even suspected that such large molecules could exist. Professor Clark's work shows that in plants these giants are possible. Research is expected to complete the final laboratory step to make them artificially.

CAUSES OF DEAFNESS

LONG exposure to loud noise, such as boilermakers experience in the course of their work, causes deafness by damaging part of the hearing apparatus, known as the organ of Corti. Strangely, however, the part of the organ most damaged by loud high-pitched tones is not the part which picks up faint sounds of that pitch, a group of investigators at Harvard University and Clark University have found.

The investigation which gives new knowledge both of a cause of deafness and of the little understood mechanics

of hearing was made by Dr. Hallowell Davis, Dr. Moses H. Lurie, Dr. Morgan Upton and Dr. Arthur J. Derbyshire, of Harvard, and Dr. Edward H. Kemp, of Clark University.

The intensity of the sounds necessary to damage is sufficient to cause definite discomfort in the ears of a human listener and to cause his ears to ring afterwards. It might be compared to that of a steam whistle or riveter at a distance of a few feet. The power of such tones in physical terms is some 10,000,000,000 times that of the faintest corresponding tones which the human ear can hear.

Because cats and guinea-pigs could not tell the scientists just when they stopped hearing tones, the electrical currents generated in their hearing apparatus were tapped something as a telephone conversation is tapped by a lineman splicing a wire from the phone line to his earpiece. In the case of the cats and guinea-pigs, the organ of hearing was connected to an apparatus which amplified the currents originating in it and carried these to a cathode ray oscillograph which wrote in light on a fluorescent screen a wavy line corresponding to the fluctuations in the current from the ear.

The sensitivity to sound intensity of normal cats and guinea-pigs as determined in this way corresponds quite closely to the normal human audibility curve, the investigators found.

The cats and guinea-pigs were exposed to sound of varying degrees of loudness for varying lengths of time. With the electrical set-up, the point at which they lost sensitivity to the sound and could not hear the tones was determined in each case. As a check, the tissues of their hearing apparatus were then examined under the microscope for signs of damage.

The results indicate that frequency of a tone as well as its intensity may be an important factor in determining whether or not it will damage the inner ear, it was reported, the tone of 2,500 cycles per second (about an octave above high C) being more effective than 600 cycles per second (a tone and a half above middle C).

Considerable individual differences in susceptibility were also indicated. Intense exposure may sometimes cause extensive damage to the inner ear and correspondingly great loss of hearing, it appeared. Some of the cases in which the damage was moderate and localized gave information suggesting that a certain part of the hearing apparatus picks up tones of a certain range in pitch, thus shedding light on a highly complex problem which has not yet been satisfactorily settled.

CARRIERS OF MENINGITIS

WHILE epidemic meningitis is a relatively rare disease, it has been fairly prevalent all over the United States during the past few years. It is known to public health authorities as one of the seasonal diseases, which means that it is more prevalent at some times of the year than at others. In the temperate zone, in which we live, it is most prevalent during winter and spring, reaching a high point in March.

Meningitis is an inflammation of the membranes covering the brain and spinal cord. This inflammation may be caused by various types of infection, such as tuberculosis, pneumonia, streptococcus, etc. The type known as epidemic meningitis is caused by an organism called the meningococcus.

Epidemic meningitis is spread chiefly by healthy carriers who carry the meningococci in their throats and noses. Theoretically, the way to check meningitis would be by isolating all the carriers. This was found to be impossible during the World War, when the disease broke out among the soldiers, because the germ may be carried by one person to-day and by another to-morrow.

For example, if a thousand people are examined, probably about 5 to 20 per cent. of them will be found to be meningitis carriers. Examination of the same thousand people on the next day will disclose that five per cent. are still carriers, but the group of carriers may be composed of entirely different individuals. And the same will be true the next day, which illustrates the futility of trying to identify and isolate the carriers.

Sometimes a patient suffering from the disease gives it to others. This must be guarded against by isolating the patient and disinfecting all discharges from the nose and mouth, and the bedding, linen, etc.

Crowded living conditions, such as exist in tenements, in barracks during war time, or sometimes in the steerage of ships, are particularly favorable to the development of epidemics of meningitis.

A serum has been developed for treating meningitis which has been partially successful. This has been on the market for some fifteen years, but because of the irregular results obtained with it, the U. S. National Institute of Health is now engaged in investigations which it is hoped will lead to a more satisfactory product.

The meningitis serum is made from the blood of horses which have been inoculated with the meningococcus. The U. S. National Institute of Health has been collecting different strains of the germ from all over this country and from Europe. At present the Institute laboratory has over 300 living cultures. Most benefit is obtained when the serum is used early. For this reason prompt recognition of the disease is important.

Examination of the fluid within the spinal cord for the presence of the germ is the only way of making an absolute diagnosis of epidemic meningitis. For this purpose the fluid is drawn through a needle. The operation is not dangerous and does not cause much pain. The serum is later injected into the spinal cord, so that it will quickly reach the affected tissues.

ELECTRICAL SOUND RECORDING

A SYSTEM of electrical sound recording has been devised by Professor Vladimir Karapetoff, of the department of electrical engineering of Cornell University. His device makes it possible for a single performer to produce the effects generally achieved by a number of players. Each instrumental part is recorded electrically on a separate record. These records are then synchronized into one composite recording. The final record produces the effect of a complete orchestral group. Or one part may be cut out which the operator can play himself.

The idea was conceived of using the electric phono-

graph as a "partner and adjunct" in actual performance by instrumentalists and vocalists, rather than as a substitute for home singing and playing.

To put this idea in actual operation, he has assembled in his residence in Ithaca an elaborate outfit for making high-grade phonograph records on cellulose acetate and has added attachments to an electric phonograph for reproducing these records in connection with playing a musical instrument.

The records of accompaniments were made by Professor Karapetoff himself, with the correct tempi, retards and accelerations, but without gradations of the volume of sound. This latter is controlled by a resistance operated by the performer's foot, or by a second person familiar with the piece. In this way dynamic accents are introduced at will and the accompaniment is made to sound differently, depending upon the soloist, his mood, and the acoustic conditions of the room. Such accompaniment can be made for any musical instrument, using the piano or any other desired instruments as the background.

BUFFALO GRASS

IN keeping with the national reform program is the endeavor to reestablish buffalo grass on the now unprofitable plowlands of the Great Plains region. It has been found that a cycle of drought will easily wipe out all the agricultural gains made by years of "boom" wheat farming, and that winds often double the ruin and make it permanent by whirling away the soil itself, after drought and the locust have eaten every green thing.

The old native vegetation of the short-grass country was dominated by buffalo grass, because of its importance in the diet of the great herds of bison that once covered the plains. Buffalo grass is highly resistant to drought, will stand all but the most extreme cold, and with its everlasting habit of sending out "runners" like those of a strawberry plant it keeps an uninterrupted year-after-year hold on the soil.

It is as good food for cattle as it once was for the native bison, and it can be made into handsome lawns and well-kept golf courses.

It does, however, need encouragement to reestablish itself where it has been plowed out. It was thought at first that if an abandoned field were just left alone the buffalo grass would reclaim it. But experience has shown that this will not take place fully in less than 20 or 30 years. Fortunately, its growth habits make it fairly easy to propagate. It will grow from seed and it will take hold as solid sheets of transplanted sod.

ITEMS

AN aluminum and sand filter that removes fluorine from water has been devised by Dr. S. P. Kramer, of Fort Thomas, Ky. Fluorine in drinking water is the cause of a dental disease known as mottled enamel. The condition has become so serious in the Southwest, where fluorine is frequently found in the water, that at least one town has changed its water supply and now obtains its drinking water from another source in order to protect the teeth of its inhabitants. At one time it was feared that the water impounded by Boulder Dam would prove useless because of reports of the high fluorine content of the Colorado River tributaries. Dr. Kramer made a contact filter of river sand to which he added 2 per cent. by weight of powdered aluminum. He reported in a previous issue of the journal, SCIENCE, that this filter removes fluoride from a solution containing 30 parts per million of sodium fluoride.

A NEW aid for diagnosing cancer and other diseased conditions of the breast is a powerful "cold light" which enables physicians to see through the tissues and observe directly the tumors or other abnormalities. Clinical trial of the lamp has been made at the tumor clinic of the Michael Reese Hospital in Chicago under the direction of Dr. Max Cutler, who terms it "a simple, safe and valuable aid." Transillumination, seeing through body tissues with the aid of a strong light, is not a new procedure in itself, but this new lamp, powered by a 750-watt bulb, is said to provide much more intense light than other lamps hitherto used. A wall of circulating water cools it so that it can be applied directly to the skin with safety and comfort for the patient.

ELECTROCUTION is the latest method of controlling orchard insect pests at Massachusetts State College. Professor A. I. Bourne, Stewart D. Edmond and Professor C. I. Gunness are studying the effectiveness of five electric insect traps in a local apple orchard to determine the practicability of the method on a wide scale. Each trap consists of a double wire screen enclosing a 75-watt frosted bulb. The light attracts insects at night but as they fly toward it they come in contact with the electrified screen wire. Current at 110 volts cremates them. Some are only killed, however, and fall to a tray beneath the trap. The present installation of five traps is already known to have killed 1,300 insects in a single night, not counting those so completely destroyed that identification is impossible.

GLIDING swiftly down the canyons of New York and Brooklyn, new articulated streamlined trains of light weight will replace on the elevated track the rickety wooden "El" cars which for many years have crashed noisily up and down town, making the light trestles waver every time they come to a halt or started again. Two articulated units designed to fit the needs of the "El" by B. M. T. engineers have been built by the Pullman Company in Chicago, according to *The Engineering News Record*. It is expected that they will make possible a modernization of elevated lines to the point where service and safety standards will equal those of the subways. Built in the days before present engineering standards, most of New York's elevated tracks were not designed to support the heavy coaches and cars which now are the accepted rule for safety and comfort. Consequently "El" coaches have been flimsy; not strong enough to have the good qualities of heavy cars, and not built with the advantages of present-day design in light aluminum-alloy construction.