SCIENCE NEWS

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RELAPSING FEVER

THREE brave men have again offered their lives to help science fight disease. Fortunately they escaped death, modern methods of treatment having cured the disease which they voluntarily contracted for the sake of their fellow men.

They made their heroic contribution to the advancement of science at the Panama laboratory of the Gorgas Memorial Institute. The disease they acquired was relapsing fever, in itself no trifling ailment. But when the three men submitted to the experiment, they had no certain knowledge that the disease they were risking was one known to science and for which science had found fairly effective methods of treatment. The problem which the three volunteers helped to solve was one of those scientific mysteries the account of which, even in the technical report of the institute, reads like a good detective story.

The wild monkeys of Panama have been the subject of study at the laboratory for some time. In the blood of one of these animals, a juvenile squirrel monkey commonly known as a marmoset, a new disease germ was found. This germ belonged to the spirochete family. Members of this family cause various forms of relapsing fever, syphilis and other diseases.

This particular animal had spent three nights on its way into the laboratory in native villages that are endemic centers for relapsing fever, a spirochetal disease. They first concluded that the monkey had accidentally acquired human relapsing fever. Because this would mean that this type of monkey could be a reservoir for the disease, from which humans might acquire it, it was decided to investigate.

A jungle expedition in an area out of contact with human beings yielded two animals that had been infected naturally in the jungle. Back in the laboratory, the disease transferred easily to practically all laboratory animals and monkeys. Most of them recovered quickly from it, but the infant and juvenile squirrel monkeys showed a high death rate.

"We considered this of such importance that another call for human volunteers was made," Dr. Herbert C. Clark, director of the laboratory, reported. Fear of the virulence of the organism limited the human experiment to one man at first. Proof that the disease was transferred to him from the monkey was made by finding the spirochete in his blood. After he had responded well to treatment for relapsing fever, the other volunteers were used.

Human ticks native to the locality were next fed on monkeys acutely ill with the disease. They later fed on the second human volunteer to whom they transferred the disease. The progeny from the eggs of these ticks were then fed on the third volunteer, but without success in the transference of the disease.

Further links in the chain of evidence needed to prove the identity of the mysterious monkey disease are now being taken. However, the investigators feel they have progressed far enough to say that the disease is either identical to or very closely related to human relapsing fever. Meanwhile, the three volunteers have recovered. To avoid publicity, their names are withheld and they themselves are once more engaged at their regular occupations.

LABORATORY GROWN ERGOT

ERGOT, one of the most important drugs used by physicians, may in future be raised artificially in the laboratories of pharmaceutical factories, instead of being harvested in the natural state as at present. Preliminary experiments pointing to this possibility have been carried out by Miss Adelia McCrea in the botanical laboratories of the University of Michigan.

The quality of ergot was the subject of a Senate Committee hearing last June, as a result of charges that the federal food and drugs administration was allowing importation of impure and adulterated ergot. Miss McCrea's research raises the question of whether the growth of laboratory-raised ergot may not be so controlled as to insure a supply of the drug having a high degree of potency. It is too early, however, to consider practical applications of Miss McCrea's work, which is still in the realm of pure science.

Miss McCrea grew cultures of the fungus from which the drug is derived on a variety of media, including mashes and jellies made from various kinds of grain, and simpler jellies containing different sugars. She found malt sugar to be the best food for the fungus. To get ergot to grow in a flask or test-tube at all is regarded as a considerable triumph, because under natural conditions it is a parasite, preying only on living plants. She found it to be fairly modest in its food requirements, doing quite as well on a two or three per cent. concentration of malt sugar as it did on six or eight per cent., and failing to thrive at all at higher concentrations.

It was greedy for oxygen, however, growing much faster when a stream of pure oxygen was passed through its tube than when it was given only air. But on a mixture of half oxygen and half carbon dioxide its growth was considerably retarded. It grew best at temperatures between 68 and 77 degrees Fahrenheit. Light had a powerful effect on it. Without the shorter-wave visible rays—the blue end of the spectrum—it did not develop the purple color that is its most marked characteristic. Ultra-violet light, however, had no stimulating effect, and in repeated doses even retarded development.

Miss McCrea made physiological tests of the ergot growths she raised, and found that they produce most of the effects characteristic of natural ergot, though somewhat less powerfully. The reactions averaged from 40 to 75 per cent. of those obtained with the same concentrations of natural ergot. In making these tests, however, she had to use the whole vegetative growth of her

cultures, for they did not produce the full-grown fruiting bodies which are the only source of commercial ergot at present.

Miss McCrea also made two attempts to infect growing grain with ergot, with the idea that its field cultivation might be undertaken. At present, commercial ergot is obtained solely by hand-gathering of wild growths on grain, especially rye, and wild grasses. Because of the great amount of hand work involved and the high cost of labor in this country, American production of ergot is unprofitable. However, the field experiments did not yield particularly encouraging results, and Miss McCrea concludes that if it ever becomes desirable or necessary to raise ergot in this country the laboratory method is the more promising. A full technical account of Miss McCrea's work is contained in the current issue of *The American Journal of Botany.*

CHEMICAL MOLECULES

CHEMICAL molecules can be handled very roughly without breaking them into fragments, experiments by Professor F. O. Rice and Dr. Harold T. Byck at the Johns Hopkins University demonstrate.

Professor Rice's work gives one answer to a fundamental problem that has occupied the attention of physical chemists for twenty years: how is heat transferred from the walls of a container to the gas inside—which is continuously in motion?

Acetone molecules which ordinarily decompose at a temperature of 1,000 degrees Fahrenheit into the gas methane and other products, were bounced from a white hot platinum surface at 2,900 degrees Fahrenheit without change, in Professor Rice's experiments. Previously it had been assumed that a certain fraction of the molecules sit down on the surface for a while, then get up and leave. When things get this hot it seems they can not be persuaded to stay.

Many chemical substances decompose when heated, as the amateur housewife knows from her cooking. Professor Rice has been attempting to decide whether this decomposition is due to the heat rays from the walls of the vessel enclosing the substance or to the fact that at higher temperatures the gas molecules collide more violently with each other.

In earlier experiments with Professor H. C. Urey and Dr. R. N. Washbourne, molecules were heated but collisions between molecules were prevented by having all the molecules of gas moving in a procession through a very hot furnace. These experiments showed the heat radiation alone was unable to cause chemical change. And apparently there are also some kinds of collisions of molecules that are equally ineffective in producing chemical changes.

A NEW TYPE ELECTRIC ILLUMINATING UNIT

THE development of a new type of electric illuminating unit which, it is said, uses only half the power required by present incandescent filament bulbs and gives a softer and more uniform light has been announced by Claude Neon Lights, Inc.

The new lighting unit is the result of refinement of the red, tube-like electric signs which have come into wide use during the past few years and brings to more complete development inventions of Georges Claude, the French engineer and scientist who last year conducted notable experiments at Matanzas, Cuba, to get power from temperature differences of sea water.

A very high voltage is needed to operate the red signs, but the new lighting units radiating either incandescent white light or a light containing approximately the same wave-lengths as that from the sun can be used with ordinary house wiring of either 110 or 220 volts, alternating current.

It is stated that these new low voltage units are ready for application in the industrial and commercial field and that lamps for general household use will be manufactured soon.

Glass tubes which can be made in any length from several inches to several feet and containing the rare gases of the atmosphere—helium, neon, argon, krypton and xenon—are the most conspicuous elements of the new unit.

The initial cost of the new lights will probably be higher than that of types now in use, but when the saving in power consumption is considered the cost over a considerable period of time is expected to be less than that of present electric illumination.

The new tubes distribute light evenly and have a soft, non-glaring quality. It is possible to look directly into the exposed tubes for several minutes and turn immediately to read fine print, without undue eyestrain. They do not require heavy diffusing glass which would greatly cut down their efficiency, and they give off much less heat than incandescent lamps.

Four years of laboratory research work and tests have yielded four new developments which make the new units possible. First, the correct mixtures of the rare gases of the atmosphere have been found. These gases glowing under the action of the current passing through them, and not a metal heated to a white glow, produce the light.

An automatic starting apparatus has been developed which will light the tube seven seconds after the switch is turned. This necessitated the perfection of a heating unit that automatically turns off after the tube is lighted. Electrodes for the conduction of low current and a ballast coil which largely determines the power consumption and illuminating strength of the units were designed. The starting apparatus and ballast coil are required with each fixture, but they are small and inconspicuous.

AUTOMOBILE FATALITIES

MORE lives were lost in the United States during the last year and a half as a result of automobile accidents than in the A. E. F. during a year and a half of the World War, a survey by statisticians of the Travelers Insurance Company shows.

During 18 months of the World War 50,510 members of the A. E. F. were killed in action or died of wounds.

During the last 18 months 50,900 persons were killed in automobile accidents in this country.

The 1930 total of deaths from automobile accidents was 32,500, the statisticians determined from reports of 40 states. This represents an increase of more than 1,200 over the 1929 total, although gasoline consumption dropped more than one billion gallons in 1930, with consequent reduction of mileage traveled by automobiles.

"Men were behind the wheel in 93 out of every 100 cars in accidents causing deaths and non-fatal injuries in 1930, with women being the drivers in the remaining seven," the records showed. "Whether the better record of women drivers as to fatalities is due to better driving, or not being behind the wheel for as many miles as men on the average, is not indicated."

In over half the fatal accidents, the drivers were between the ages of 25 and 54. In nearly a third more, the drivers were between 18 and 24 years. One half the automobile fatalities occurred in collisions with pedestrians, one fifth in collisions with other automobiles and about one tenth in collisions with fixed objects. Over half the non-fatal injuries were from collisions with other automobiles and one third of such injuries occurred in collisions with pedestrians.

The large number of motor vehicle fatalities can not be charged up to the automobile itself. About nine tenths of the killed and injured were victims of automobiles in good mechanical condition at the time of the accident. Most of the automobiles involved in these accidents were private passenger cars, though this class also represents most of the total motor vehicle registration in the country.

"Three specific driving violations by operators of automobiles were responsible, in whole or in part, for 68 per cent. of the 1930 accidents due to improper driving. They were exceeding the speed limit, driving on the wrong side of the road, and failing to grant right-of-way," the report stated. Violations of driving regulations by motorists played a part in over two thirds of all the automobile accidents.

ITEMS

SCIENTISTS are now searching for a new basic unit weight of matter. Chemists have in the past used the atom of oxygen as the unit of atomic weight, calling it 16. Dr. F. W. Aston, of Trinity College, Cambridge, in a communication to scientists printed in *Nature*, has raised the point that since there are now three known varieties of oxygen atoms, known as isotopes 16, 17 and 18, the actual weight of the average atomic weight of the element oxygen is about 1.25 parts in 10,000 greater than the customary 16 assumed in chemical books. While chemists might get along with the present standard, Dr. Aston intimates, physicists who compare the weights of individual atoms by means of the mass-spectrograph with an accuracy of 1 in 10,000 need a new and more definite unit. Among the possible units suggested are: the proton or positive nucleus of the hydrogen atom, the neutral hydrogen atom, one quarter of the neutral helium atom, one sixteenth of neutral oxygen atom 16. But none of these proposed units is entirely free from objection.

FROM the astronomical observatory to the movie lot a new triple-fast photographic emulsion has come to make motion-picture production cheaper and more flexible. The motion-picture film introduced by the Eastman Kodak Company is described as "the greatest advance in motion-picture materials since the introduction of panchromatic film eighteen years ago." Its sensitive emulsion is very closely related to one prepared for astronomical photography which has been used to reduce the time required for making exposures through large telescopes. An improvement in the photographic plates used is just as effective in this case as though the telescope itself were increased in size. The super-speed panchromatic plates produced for newspaper photographers are also very similar to the new movie emulsion. When the movies went talkie it was necessary to banish the familiar arc lamps on account of their noise. Large incandescent lamps are used.

SAFFLOWER, which in its photographs looks to the layman something like a thistle without prickles, is one of the new plants being developed experimentally by the U. S. Department of Agriculture, for its oil-bearing seeds. The seeds contain a drying oil valuable in the production of paints and varnishes and allied products. The oil cake is useful as a stock feed. The plant is not really new, excepting in this country. For years it has been cultivated in India and Egypt as an oil-seed crop. Frank Rabak, of the Bureau of Plant Industry of the U. S. Department of Agriculture, under whose supervision experimental plantings of safflower have been grown, states that the crop is especially well adapted to the northern Great Plains region.

A SPONGE rubber pillow that sings and talks to an ear placed upon it is the latest product of a radio company here. It is intended for use in hospitals. A radio unit within the pillow is connected to a central radio receiver. So quiet is this type of installation that only the patient with his head on the pillow can hear the radio program.

A LONG-DISTANCE telephone call can now be made in less than half the time it took only five years ago. More specifically, the average time between the placing of a long-distance call and the commencing of conversation was seven and a half minutes in 1926; now it is two and a half minutes. This fact was brought out in a report presented by W. G. Harrison, of the American Telephone and Telegraph Company, and A. E. Silver, of the Electric Bond and Share Company, before the American Institute of Electrical Engineers meeting in New York. The two engineers also gave interesting statistics on increases in the use of both telephones and power. During the past decade while population has increased only 16 per cent. the number of telephone calls made each year has increased 96 per cent. and the annual kilowatt hour consumption of power, 107 per cent. In this period the mileage of telephone toll lines has increased 250 per cent. and of power transmission lines, more than 100 per cent.