SCIENCE NEWS

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TWO FORMS OF YELLOW FEVER

NOT for months and perhaps years will the medical world be able to estimate the importance and value of the varied researches undertaken by Dr. Hideyo Noguchi, internationally known bacteriologist and latest addition to yellow fever's long list of scientific martyrs.

From the germ cultures he has left, perhaps from samples of his own blood that he insisted be taken from his body for inoculation of monkeys, it may be found whether or not there are two forms of the disease, one American and one African. It may be that when his assistants who are at work on his material have their results ready to give the world, the ancient controversy will be settled and it will be established whether the dread "yellow jack" was one of the New World's questionable gifts to humanity or whether it was brought over from Africa with the importation of slaves.

During work on yellow fever in South America, in 1918, Dr. Noguchi isolated a germ believed to be the cause of yellow fever. From it he developed a preventive vaccine and a causative serum that proved fairly efficacious if used within two or three days after the onset of the disease. Campaigns against the deadly stegomyia mosquito, carrier of the disease, practically stamped out the infection in the Western Hemisphere. Nevertheless, it continued to be a serious menace in West Africa.

Epidemiologists stress the importance of suppressing yellow fever in the west of Africa before a transcontinental railway is opened up to carry the disease to the East. The stegomyia flourishes in the warmer countries of the Orient, and once these mosquitoes became infected the havoc that a disease like yellow fever would wreak amid the unsanitary conditions of India and southern China would be appalling and should be prevented at any cost.

Anxious to smother the disease before it could spread afresh from its last stronghold, the international health division of the Rockefeller Foundation established a laboratory at Lagos, Nigeria, where a trained staff has been at work on the problem for many years. In South America, Dr. Noguchi was able to transfer the disease to monkeys and even guinea-pigs, but workers in Africa found it impossible to inoculate any animals for a long time, a condition that argues in favor of two distinct entities for the disease in the two countries. In all outward aspects, however, they are much alike. Finally Dr. Adrian Stokes, a British investigator at the laboratory at Lagos, succeeded, along with a group of colleagues, in infecting monkeys of the variety known as *Macacus rhesus* with typical African yellow fever. Dr. Stokes also succumbed to the disease. But his work constituted an important step, since it did away with the necessity in studying the African form for volunteer human victims, such as were called for by the U. S. Army Commission in Havana years ago. At the same time the workers were unable to find the causative Leptospira in the patient's blood. It almost seemed as if the two diseases had different origins.

Since Dr. Noguchi was generally conceded to know more about this particular group of germs than any other living person, he undertook the African trip last fall to see if he could personally sort out the two diseases. Perhaps his skilful crippled hands, famous throughout the realm of bacteriology for their technique with test-tube and microscope, could demonstrate *Leptospira icteroides* where others had failed, or even show an entirely different cause. While at work he contracted the disease and died. Whether or not he found what he sought, authorities at the Rockefeller Foundation refuse to affirm or deny. Only after his coworkers and assistants have some concrete results to show from his research will the world know. In the meantime the work at Lagos goes on.

HIGH-FREQUENCY X-RAYS

EXTREME high-frequency X-rays, generated in a million-volt tube, are the next item of promise on the program at the California Institute of Technology. Allied to the investigation of the cosmic rays, which has recently yielded such interesting results, is the attempt, long under way at the institute, at the artificial production of very short waves, and therefore very penetrating radiation. In the hands of C. C. Lauritsen and R. D. Bennett this work has already yielded some promising results.

As yet no apparatus can be devised for handling the terrific electric potential required for the artificial production of cosmic rays. For intermediate rays of about one-twenty-billionth of an inch wave-length, however, there seem to be experimental possibilities. Such rays are much shorter than the surgeon's X-rays and much more difficult to produce.

The X-ray "tube" used in the new work is several yards long, made in sections similar to the glass cylinders used in gasoline dispensing apparatus. Before operation all but one billionth part of its air content is pumped out. A water-cooled anode raised to a potential of a million volts pulls electrons bodily and violently out of the nearby cathode by the application of the principle of "field currents" studied intensively for some years past at the Norman Bridge laboratory by Millikan, Eyring and Lauritsen. Under this terrific force the electrons attain a speed very near to 186,000 miles per second, the velocity of light. Striking the anode at this enormous speed the electrons generate X-rays like the gamma rays naturally emitted by radium.

In preliminary trials now being run in the high tension laboratory of the institute, where a million-volts to ground at a thousand kilowatts is available to the experimenters, Lauritsen and Bennett have succeeded in obtaining continuous operation of their new tube at voltages that have approached the million mark. The high-frequency rays produced were observable through the steel doors of the laboratory more than 100 feet away.

The physicists of the institute make no pretense of any immediate project beyond an extension of spectrographic studies, long a part of Millikan's program. It is suspected, however, that these new and very difficult experiments are a preliminary skirmish in a further campaign on the nucleus of the atom. It is well-known that the gamma rays of radium are intimately connected with nuclear disintegration and transmutation of elements. The structure of the nucleus is a profound mystery, but there is plausible evidence of enormous forces connected therewith. Electrically the problem is one where voltage is counted in seven and eight figures. Economically the problem suggests fabulous power values as yet wholly within the domain of fancy.

THE EMERGENCY ASSOCIATION OF GERMAN SCIENCE

A GERMAN scientific association, originally organized in the post-war and post-revolutionary emergency to help out hard-pressed scientists and impoverished laboratories, has developed into one of the most active agencies for the promotion of science to be found in Europe.

It still keeps the now somewhat inappropriate name, "Notgemeinschaft der deutschen Wissenschaft," that is, "Emergency Association of German Science." But its present functions, now that times have become a little less stringent, have expanded far beyond its original work of rescue in distress. It is backing half-a-dozen promising ventures in science, in widely varying fields.

Of greatest interest to Americans, perhaps, is the plan now under discussion for the creation of a school for research into the physiological improvement of human beings by means of sports and games. Germans have always been much interested in physical culture, and since the war have taken increasingly to track and field athletics on the American plan. It is the ambition of German athletes to offer a really serious challenge to America for first place in this year's Olympics.

In the realm of industrial science the Notgemeinschaft is supporting research in metals and their properties, under Professor Schenk, of Muenster, Westphalia. He is engaged in examining the plasticity and other properties of metals which offer possibilities of development for science and for the metallurgical industries.

Another field is the investigation of the nutritive physiology of plants, especially questions of manures and fertilizers, and the growth and cultivation of grains and other economic plants.

Exploratory expeditions of purely scientific character are also under way. One goes to Transbaikalia in cooperation with Russian scientific institutions, under Professor Wilmans, of Heidelberg. Another expedition, in association with the Russian Academy of Sciences, is to be sent to the Altai regions on the borders of Siberia and Tibet.

The Notgemeinschaft has interested itself in archeological finds at the ancient town of Trier or Treves, which was once a Roman garrison city. During the construction of a new high school there the foundations of a large Roman building were unearthed, which were shown to constitute a temple area and a praetorium. It is hoped to gather new light here concerning Roman culture in Western Germany.

Similar problems engage attention in the East, where prehistoric earthworks and fortifications have been excavated. Professor Unverzagt, of the Ethnological Museum, Berlin, well known for his excavations at Lossow, near Frankfurt on the Oder, has been working in this field.

STUDY OF THE HARESKIN INDIANS

THE prospect of studying a primitive culture, which has been maintained for thousands of years untouched by outside contacts, is taking Cornelius Osgood, graduate student of ethnology at the University of Chicago, on a 15 months' expedition to the Canadian Barren Grounds, the region around Great Bear Lake. He is *en route* to Waterways, where he leaves the railroad. The 1,000-mile trip from Waterways will be made by canoe and dog team. He expects to reach Ft. Norman, the last outpost of civilization in that region, sometime in August.

Almost nothing is known of the Hareskin Indians, which he will study, except that they are sullen and inhospitable. Two white missionaries who tried to convert them were murdered. Mr. Osgood hopes, if it is possible, to live with them during the long winter season, getting first-hand observations of their manners and customs. The difficult language of the Hareskin tribe presents a problem, but Mr. Osgood expects, if he receives a friendly reception, to make himself understood by using Athabascan word stems. The Hareskin tribe is a member of that linguistic group.

Professor Edward Sapir, University of Chicago anthropologist, believes that this expedition presents "an almost unparalleled opportunity of studying a primitive people who have been uninfluenced by outside cultures." It is hoped that a complete knowledge of this tribe will shed light on the development of other Athabascan tribes, particularly the Navajos, in Arizona and Mexico.

The Barren Grounds lie almost wholly within the Arctic Circle, more than 300 miles from Ft. Norman. The hardships of a winter in this region induced Mr. Osgood to make a 1,300-mile preliminary trip on the rivers north of Edmonton last summer, in order to learn what he may expect. The expedition is being financed by the National Museum of Canada.

THE ROCKET AUTOMOBILE

WITH fire-spurting rockets instead of engine-furnishing power, the Opel rocket car made trial runs on the Avus race course in Berlin, on May 23, reaching speeds of 90 to 120 miles an hour. The small, slightly-built automobile was piloted by Fritz V. Opel. To stabilize it during its speedy travel it has a plane or fin on each side.

A battery of slow-burning rockets, filled with powder, by discharging into the air at the rear of the car, furnished the impulse that drove the car forward. The driver controlled the burning of the rockets and therefore the speed of the car by an ignition foot lever.

Each rocket was about a yard long and three inches in diameter and metal cases were used as containers. The curves of the two-mile track were taken without difficulty or danger. Tests of this new sort of automobile are understood to be preliminary to the trials of a rocket airplane designed to reach high altitudes where an ordinary air propeller airplane could not obtain traction. The rocket, operating upon the same principle as the kick of a rifle, does not need the air in order to produce its effect. The rocket principle is, therefore, the method of power that could be used in airless outer space that must be traversed on a journey, a la Jules Verne, to the moon or the planets.

Although interested in the Opel rocket auto tested in Berlin, scientists in Washington point out that for land or air transportation the rocket car will not prove economical when compared with the usual internal combustion engine autos and airplanes. The rocket applies effectively only a small percentage of the fuel's energy, about five per cent., as compared with four to six times that percentage for ordinary automobiles operated on gasoline. For use where there is no air the rocket provides propulsion where other methods can not apply. The idea of applying rocket power to automobiles is not new, for in the past extensive tests have not been made.

THE SEVENTEEN-YEAR "LOCUSTS"

THE seventeen-year cicada, often called the seventeen-year locust, is booked to appear during late May and early June through a wide stretch of territory east of the Alleghenies, from North Carolina up to the Hudson Valley and the Long Island Sound region. In a few spots in the middle west, in southern Indiana and southern Michigan, it is also expected to emerge.

These remarkable insects, which are the longest-lived of all the six-legged hordes that crawl the earth, spend over sixteen years under ground, clinging to plant roots from which they suck their nourishment. Then, in the spring of the seventeenth year, they emerge from their burrows, shed their pupa cases, and spend a few weeks as fully developed adults, mating and depositing eggs to provide for the next generation.

During the four or five weeks of their above-ground existence the seventeen-year cicadas make their presence known by the incessant shrill song of the males. The chorus of millions of tiny saw-like voices is very disagreeable to many persons. The Pilgrim Fathers didn't like it. Governor Bradford spoke of it as "a constante yelling noyes, as made all ye woods ring of them and ready to deafe ye hearers."

The immense number of these rather large insects sometimes causes alarm, but they are really comparatively harmless. They feed very seldom or not at all, depending on the reserves accumulated during their long underground life. The principal mischief is caused when the females lay their eggs, which they deposit in furrows cut into the green bark of young twigs. This causes a temporary defoliation of many trees, but no permanent harm in the forests. It may be very damaging at times, however, in orchards and nurseries.

There are 17 "broods" of the seventeen-year cicada, distributed in various parts of the country. One brood comes out each year. The one emerging this year is designated as Brood II. Brood III, which is due in 1929, has its headquarters in the prairie states, especially Iowa, In addition to the seventeen-year species there is an allied thirteen-year form which ranges principally in the lower Mississippi region. This is divided into 13 broods, so that an outbreak of this insect also is to be expected somewhere in the South every year.

ITEMS

ACCORDING to Dr. M. Blaschke, a German ceramic chemist, glass windows were in use in ancient Rome. Most of the panes did not exceed 12 by 16 inches in size, though a few larger ones have been found. Glass-making, known for many centuries in Egypt, came to Rome relatively late. During the time of Cicero, who died in 43 B. C., glass objects of any kind were rarities, and glass windows were unknown. A hundred years later most households owned some, and by the time the Empire was well established glass was fairly common. The famous mosaics of the later Empire, notably at Ravenna and Constantinople, were made largely out of bits of glass.

A 120,000-pound master truck scale of the plate-fulcrum type, used for weighing railroad trucks, was this month installed and housed on the Chicago Belt line in Chicago by the United States Bureau of Standards. Since the scale has a sensitivity to one tenth of a pound and so is accurate to the millionth point under full load, the bureau believes that it will do much for standardization in heavy weighing. The scale is so sensitive that the atmospheric barometric pressure causes different registrations of weight for one object. It is the purpose of the bureau to have different railroads bring their different type cars to this scale, have them weighed, and then send these cars back to the scales of the railroad for a checkup of differences. In this way, a standard weight can be established and maintained from coast to coast for the first time.

APPARENT "earthquakes" accompanying a great meteor, such as that which flashed over Georgia and South Carolina recently, are really due to air waves from the speeding celestial projectile. This is the opinion of Professor Charles P. Oliver, of the University of Virginia and recognized authority on meteoric astronomy. It is not possible for such a meteor to cause an actual tremor of the earth, he stated. However, as it passes through the earth's atmosphere, it causes air waves, similar to those caused by a projectile from a large gun. The meteor may travel as fast as 25 miles a second, or around fifty times the speed of the shell from the gun, and so the air waves are much stronger. As they strike houses and buildings, they cause them to vibrate, even breaking window panes and cracking plaster walls. To a person within such a building, the effects are practically indistinguishable from those of an earthquake.