

Mosquitoes—Continued

flowers during the critical period of malaria, from the beginning of summer to the end of autumn. He states that the highly scented blossoms are frequented by the malaria mosquitoes, which feed on the nectar. This nectar contains coumarin, a sugar syrup. The contention is that coumarin plays a role in the mosquitoes comparable to that which quinine plays in man, and that in the insects it stops the development of the malarial plasmodium which the mosquito, therefore, can not transmit to man.

Sir William states that the regions in Egypt where there is abundant cultivation of clover are immune from malaria, and is an enthusiastic supporter of Dr. d'Herelle's "clover-quinine" theory. American students of the malaria-mosquito problem are still slightly skeptical about it. However, like good Missourians, they are willing to be shown; and should the theory be conclusively proven it would give additional good reason for the cultivation of clover crops in malaria-ridden regions.

In addition to the plants that destroy or discourage mosquitoes while they are alive, there are others that do good service in the hands of the human mosquito-fighting forces after they are dead. Pyrethrum powder, one of the commonest of commercial insect powders, consists of the dried flowerheads of a white, daisy-like chrysanthemum; it is much used in clearing houses and other buildings of the winged pests.

A more recent addition to the vegetable weapons in our anti-mosquito armory is the tropical plant Derris, which comes from the Philippines. The dried roots of this plant are powdered and dissolved in water where the mosquito larvæ swarm. Three parts of the powder weight to a thousand of water proved effective in clearing out the hated wigglers. Derris may come to be a useful addition to the oils and arsenical chemicals now used in clearing up infested ponds, swamps and reservoirs.

The files in Dr. Howard's office contain curious bits of mosquito information from all over the world. Some of the oddest bits are about animal enemies of these insect pests. In addition to our valiant little ally *Gambusia*, which has now been carried from its home in America to such distant lands as Italy, India, and Samoa there are listed a number of other top-feeding minnows, as well as certain kinds (*Turn to next page*)

Million-Volt "Cosmic" Rays

Physics

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-lengths,

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 Bridge Laboratory by Millikan, Eyring, and Lauritsen. Under this terrific (*Turn to next page*)

Seventeen-Year "Locusts" Appear

Entomology

The seventeen-year cicada, often called the seventeen-year locust, is booked to appear during 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 seven-

teenth 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" (*Turn to next page*)

Red Light Shines Through Fog

Physics

A brilliant red arc light that makes use of the rare atmospheric gas neon, and which can shine through thick fog, has been developed at the Research Laboratory of the General Electric Company. The new lamp is the result of the work of Dr. Clifton G. Found, in collaboration with J. D. Forney, of the Cooper-Hewitt Electric Company, and has just been demonstrated by them to engineers.

Airplane landing fields will probably be among the first to make use of the lamp, for by outlining the fields with them aviators flying above through fog will be enabled to make a safe landing. Such an occurrence as that of Commander

Byrd on his flight to Paris, when he actually flew over Le Bourget, but could not see to land, would probably be prevented.

Docks in harbors may also be marked with the lamp. According to Dr. Found, the light has been tested for this use when one was recently placed on a pier in the Hudson River. "Observations from boats during fog," he says, "have shown that it was possible to pick up the red neon light before any of the other lights in the same vicinity were observed."

Earlier forms of neon tubes, which give the characteristic red neon light that is now so common in advertising signs, suffer (*Turn to next page*)

Man-Made Cosmic Rays—*Continued*

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 much 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, Messrs. 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 Dr. 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, to be sure, 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.

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Seventeen-Year Locusts—*Continued*

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.

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Red Neon Arc—*Continued*

from what is called the "cathode drop." This is the great difference in voltage between the electrode through which the electric current enters the tube, and the nearby gas. On account of it, also, tubes must be operated with a high voltage, and must be made quite long in order to be efficient. Another disagreeable effect is that the gas is made to gradually disappear.

The new tube of Dr. Found and Forney heats the cathode, or the electrode through which the current enters the tube, by means of an additional electric circuit. This causes it to give off the electrons which cause the neon gas to glow, but without the high voltages that are needed in the older tubes. By such

means an extremely efficient source of brilliant red light can be obtained. Light of this color is best for penetrating fog.

Another possible use of the lamp is in photography, especially in colors. The mercury vapor lamp, which gives a characteristically violet colored light, has often been used for ordinary photography, but the unnatural pallor which it causes is a disadvantage, especially where colors are concerned. By combining the neon light with the mercury vapor lamp, the former supplies the red rays which are lacking in the latter, and the result, said Dr. Found, is a good approximation to white light.

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Mosquitoes—*Continued*

of tadpoles and newts. Russia reports that one species of leech gobbles up mosquito larvæ most greedily. Many insects, including water bugs, beetles and certain kinds of flies, assist in the massacre. There are two or three genera of beneficial mosquitoes recorded, whose carnivorous larvæ make cannibal feasts out of the larvæ of other species of mosquitoes. Two new tropical forms of these have been reported within the past year. From Russia again comes the astonishing statement that mosquitoes have been seen feeding on lice and bedbugs, thus getting their ration of human blood at second hand, but incidentally also killing other insect foes of man!

Yet, in spite of all the help we get from our plant and animal allies, and of all our efforts on our own behalf with oil and arsenicals and other poisons, the war with the mosquito hosts is by no means near a victorious end. Years of battle with the buzzing, biting, disease-bearing pests are still ahead.

"I understand," says Dr. Howard gravely, "that before he lost his money, the great philanthropist, Andrew Gump, offered a reward of fifty million dollars for the last mosquito. In spite, however, of the wonderful anti-mosquito work that is going on, I have an idea that any one of us, however modest his financial condition, would be fairly safe in adding a hundred millions more to this apparently generous sum offered by Mr. Gump."

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Howling monkeys have such extraordinary vocal abilities that many zoos refuse to keep them because they disturb the other animals.

The grocery bill for the London Zoo last year included seven tons of apples, two tons of grapes, 175,000 bananas and 32 tons of potatoes.

Bulgarian rose growers who sowed their fields with tobacco after the World War are returning to the production of rose oil for the perfume trade.

Although the number of apple trees in this country is declining, the output per tree is increasing sufficiently so that the apple crop is larger than ever.

About 95 per cent. of the whale oil used in this country goes into soap.