SCIENCE NEWS

Science Service, Washington, D. C.

MOSQUITOES IN THE TENNESSEE VALLEY

EIGHT new lakes, formed by the eight great dams of the Tennessee Valley system, have become health and pleasure resorts as well as sources of wealth and power for the nation because the malaria-carrying mosquitoes are not permitted to breed in the shallow waters along their shores. Workers in shallow-draft boats, in low-flying airplanes, trudging along on foot, patrol every spot where the malevolent insects might lay their eggs and prevent their coming with clouds of poison dust.

When the new lakes are all filled to normal height they lap shorelines amounting to some 5,000 miles, or twenty-five times the shoreline length of the Panama Canal. Not a mile can be neglected, either, for the lakes lie in seven states that have in past times been known as the heart of the malaria belt.

Control of mosquitoes (and hence of malaria) in the valley is the fruit of painstaking preliminary research, participated in by the U. S. Public Health Service, the Bureau of Entomology and Plant Quarantine of the Department of Agriculture, and the Rockefeller Foundation. Several steps in control were found necessary and all have been most thoroughly carried out.

First came a complete clearing away of all bushes and other growths along the zone over which the water level fluctuates, as the dams are first closed for filling, then opened to maintain navigation heights in the streams and to develop power. Malaria mosquitoes love to lurk and breed in such sheltered places, and that part of the shoreline had to be shaved clean. It cost money at first, but saved heavily on poison dust expenditures later.

A second element in the new technique was a radical departure in the schedule of pool level fluctuation. The purposes of flood control, power and navigation would not always permit fluctuation of the pools at the times when the variation was most needed for mosquito control. Early in the construction program the Health and Safety Department succeeded in obtaining the addition of one foot (called the "malaria control surcharge") to the heights of the dams.

Starting at the beginning of the mosquito-breeding season, the pool level is varied once every week or ten days —first to the maximum and then down to the minimum, each succeeding time falling slightly short of the preceding maximum. In this way the pool level is kept always a little ahead of the encroaching vegetation.

Finally comes dusting of mosquito-breeding waters with Paris green, diluted with soapstone, so that only half a pound of the poisonous green powder is spread per acre of water treated. Airplanes are much used: in 1939, pilots flew more than 300 hours to spread more than 100 tons of dust over 82,000 acres of lake shore. Boats with oil sprays are also in use, and men on foot to get at the less accessible places. Lately, copper arsenite has been found quite as effective as Paris green and only about half as expensive.

Public health officers keep close track of the incidence of malaria in the valley. Every year they make approximately 20,000 blood examinations, from samplings of the population. In the area as a whole the number of malaria cases has already been reduced.—FRANK THONE.

FOOD HABITS OF EUROPEANS

HUNGER for some of Europe's millions will be lessened in days ahead, provided they can do a difficult thing—change their food habits. So it appears from latest reports from the European war food front, studied by agricultural economists in the United States.

The continent's short crops of rye and wheat, for example, can be balanced against a good corn crop in southern Europe and against a good potato crop, and somewhat reassuring totals on "food" can be obtained. But can peasants in countries unaccustomed to corn make good use of it? There's a catch in the arithmetic. Yet, from German sources has come the grim warning that conquered areas must exert themselves to the utmost to feed themselves.

"By tightening their belts and making some changes in their food consumption habits, they should be able in most sections to get through the winter," is the way the situation looks to the U. S. Bureau of Agricultural Economics. It foresees likelihood, however, of a serious situation in some regions, and among some consumer groups, because of difficulties in adjusting the food available to the requirements of the people.

Americans will recall that teaching hungry French and Belgians to eat American corn-meal, instead of wheat flour, during World War days proved so Herculean a task that the United States settled down to using the corn and sending more wheat to Europe. Nutritionists explain that this was not sheer contrariness on the part of hungry peasants. The French are more used to buying bread than baking it. Their farmhouse ovens are very different from quick American stoves. Corn-meal was thus a double problem—unfamiliar to taste and a major problem to handle. As for rice, some Belgians found it too strange for eating. Paradoxically, in rice-eating areas in India efforts to break rice famines with other foods have met with difficulty. It had to be rice. In our own country, the southern share-cropper clings to a pellagra-causing diet of monotonous cornbread, fat-back and molasses. It is a major victory when nutritionists can win over these, or other Americans, to unfamiliar foods needed to round out a diet.

Europe's worst food debits are in the rye and wheat crops, as the situation appears now. The fruit crop is also figured as smaller than last year's large crop. Supplies of fats and oils are probably 25 per cent. less than normal. The continent depends on outside sources for about half of the fats and oils it uses, and what its hoarded reserves now amount to is not known. On the credit side of the food ledger, however, are the large corn

and potato crops; a large vegetable crop; adequate supplies of sugar, doled out by rationing; considerable supplies of meat for the present, due to slaughter of more animals than usual. Balancing conditions on the egg situation, it is thought that, while many of northwest Europe's hens will be killed and commercial egg production reduced, the loss of the British market for eggs "may leave almost normal supplies of eggs available for continental consumption."

Disposal of these uneven supplies is another problem, hinging on transportation uncertainties and other fortunes of war. Eating whatever comes their way is the prospect for Europeans caught in these war tangles, and faced with what the most conservative observers term an "uncomfortable" winter.—EMILY C. DAVIS.

FARMERS OF FUTURE MAY NOT NEED FENCES; PSYCHOLOGISTS CAN "CONDITION" COWS TO STAY INSIDE A STRING ENCLOSURE, IT IS PREDICTED

A SINGLE string hung between slender posts may be enough to keep the cow of the future in her pasture if cows are psychologically conditioned was suggested by Dr. Arthur I. Gates, of Teachers College, Columbia University, at the meeting of the American Association of Applied Psychology at State College, Pa.

The conditioning would only mean the use of a mild electric shock every time a cow approached the string. Even a cow soon learns to stay away from all strings after that.

Psychology could thus save the farmer the enormous costs of iron fences and electric devices now used. He stated that: "Although a farmer neighbor of mine declared that this was a daffy idea, it is good psychology." Aid to the farmer was but one of a wide variety of new jobs proposed for psychologists by Dr. Gates. They had been suggested to him, he said, in a poll of his colleagues.

Prevention of "flops" on the stage and among would-be literary best sellers is another job awaiting the shrewd psychologist, according to Dr. Gates. Publishers, he said, are already beginning to provide places for persons trained in this field. Children's magazines are employing psychologists in increasing numbers. Large stores will have their own psychologists in the future, he predicted. They will not only aid in selecting and training of clerks, but improve relationships between salesmen and customers.

Dr. Gates quoted Dr. H. A. Toops, of the Ohio State University as making another suggestion (it was Dr. Toops who proposed to him "conditioning" the cows). He pointed out that personality experts who will sell a whole ensemble, determined experimentally, to match the buyer's personality or purpose are needed. In his opinion psychologists will also find great opportunities in hospitals quite apart from the treatment of mental disorder. The use of the radio, music, conversation, rest, quiet games and various activities to aid the patient demands psychological insight. He believes that we need more of the spirit of adventure in educational psychology. There never has been and probably never will be enough first-class educational psychologists to do the work which able persons, trained in this field, are best qualified to do.—MARJORIE VAN DE WATER.

FREQUENCY BANDS FOR DIATHERMY APPARATUS

DIATHERMY apparatus used by physicians to give heat treatments by means of short-wave radio emanations will have their own frequency bands to prevent interference with other radio services, if plans outlined by E. K. Jett, chief engineer of the Federal Communications Commission, to the American Congress of Physical Therapy meeting at Cleveland are carried out.

Transmissions from electro-medical apparatus have actually been received across the continent and even across oceans, Mr. Jett reported in explaining the interference difficulties caused by diathermy machines. When diathermy interference first began to be serious a number of years ago, the disturbances were first attributed to stations operated by persons under the jurisdiction of foreign governments. The signals were traced to diathermy machines operated in medical centers and offices of private physicians. One machine was hitched to a telegraph key and signals tapped out in International Morse Code were easily read in Washington, D. C., and Great Lakes, Ill. From 10 per cent. to 82 per cent. of the channels in use for long-distance communication were interfered with at times.

Diathermy apparatus affects radio reception because the machines are essentially radio transmitters, Mr. Jett explained. The radiation that causes interference is not essential for therapeutic purposes and steps are being taken to prevent such radiation. Mr. Jett emphasized that the Federal Communications Commission recognizes the importance of electro-medical apparatus to the medical profession and he assured those present that the government will cooperate fully so that both services may continue without mutual annoyance.

At Inter-American Radio Conferences it was agreed that the various American nations should consider limiting diathermy apparatus to two frequencies in harmonic relation above 12 megacycles which will not interfere with existing radio assignments. A conference to bring together all the interested parties will be called in the near future.

INFANTILE PARALYSIS

WHEN dread infantile paralysis invades a human body, success or failure of the virus blitzkrieg hangs on all-important "ifs." A view of how the disease conquers, gained by anatomical study, was reported at Cleveland, to the American Congress of Physical Therapy, by Dr. John A. Toomey, of Cleveland City Hospital.

To produce the disease, the virus must contact gray fibered nerves which have naked axis cylinders, into which the virus can be absorbed and thus find transportation to its goal—the central nervous system. Gray fibers which the virus can reach for entry would include nerves in the nasal passages and about tastebuds of the tongue and networks of nerves in the stomach tract. The disease will strike with more force if the absorption of the virus is

rapid, if transmission through the body is quick and easy, if the strain of the virus is virulent, if the nerves are not in healthy condition, or if other factors favor the invading virus. If the distance between the virus' point of attack and the central nervous system is too great, the virus may fail, because it may be absorbed, excreted, or destroyed long before reaching the spinal cord.

Dr. Toomey, who has long held that infantile paralysis virus enters the body *via* the gateway of the gastrointestinal tract—that is, by being swallowed—declared that some years ago few research workers could be found to agree with him. "To-day the situation is changed," he said, "and nearly every one working in this field is willing to admit that the gastrointestinal tract may be at least one of the portals of entry."

THE PROBLEM OF THE INTERNE

WHILE serving a year as an interne in a hospital is an important part of American medical training, only 17 per cent. of the medical schools of the country now require it before the M.D. degree is awarded, according to figures issued by the American Medical Association.

Editorially the *Journal* of the American Medical Association takes the stand that "medical schools should not make the interneship a part of their requirement for a degree." The difficulty is that the tendency is to make the school or dean responsible for placing its graduates as internes, and having recommended a student for interneship in the fall of his final year, the faculty would scarcely refuse its approval in June.

A change of scene for medical students is recommended by Dr. William Dock, of San Francisco, in discussing the problem of internes. They should not interne in hospitals in which they took undergraduate training. Medical schools that control hospitals should not select, in his opinion, internes for those hospitals almost wholly from its own graduates, as is often the custom.

Dr. Dock considers that the problem of the fifth year of medical training might be left to state licensing boards, of which 44 per cent. now require the interne year before a student can practice as a physician.

Compilations of the American Medical Association show that there are 76 medical schools in the United States and Canada. In the past year 5,703 received the M.D. degree. Students enrolled numbered 24,194, not including internes. One out of twenty of the graduates were women.

ITEMS

SEX reversal in fish, changing females into males, has been accomplished by injecting synthetic male sex hormone, in experiments performed by Drs. F. M. Baldwin and H. S. Goldin, of the University of Southern California. The fish used were young female swordtails. The males of this species have a long point spine projecting backwards from the tail, which gives the fish its name. The female normally lacks this spine, but injection of the male hormone caused the ones under experiment to grow it, as well as to develop internal changes in the reproductive glands characteristic of the male.

DEADLY hydrocyanic acid, in concentrations sufficient to be dangerous to livestock, has been found in several species of plants by Dr. E. A. Moran, R. R. Briese and J. F. Couch, of the Bureau of Animal Industry of the U. S. Department of Agriculture, and has been reported to the Washington Academy of Sciences. The plants include the wild California almond, two western species of wild flax, a southwestern star thistle, the eastern manna grass and a widely distributed marsh plant known as arrow grass.

COPPERHEAD snakes are less deadly than rattlesnakes, water moccasins and coral snakes. The bite of the coral snake is very dangerous because the venom of this reptile attacks the nerve centers. The venom of rattlesnakes, moccasins and copperheads, on the other hand, destroys red blood cells and breaks down the walls of the blood vessels. Serious as this condition is, it takes a little longer period before it becomes fatal, giving a chance for the victim's recuperative powers and medical aid to overcome the effect of the snake venom. Copperheads are dangerous and there are records of deaths from the bite of this snake, but such deaths are not common. The reasons why the copperhead is less dangerous than the rattler are that the copperhead has shorter fangs, less virulent venom, and, because of its smaller size, injects a smaller amount of poison into a bite.

STIMULATION of diesel airplane engines with oxygen just at take-off may make possible wide-spread future use of much safer and more economical engines, according to Professor Paul H. Schweitzer, of the Pennsylvania State College. Feeding oxygen into the intake air of a diesel engine increases its power output by 55 per cent. for a few minutes without undue strain. Airplanes usually require about a third more power for take-off than for ordinary flight. Professor Schweitzer suggested that oxygen boosting for take-off might overcome the diesel's handicap of somewhat greater weight per horse power when compared with gasoline engines. Diesels with lower fuel consumption and less fire danger have been used in many German and some American planes. A 3,000 horse-power transport plane would need about 160 pounds of liquid oxygen, costing less than $50, to supply an additional 1,000 horse power for two minutes required for take-off.

PARADICHLORBENZENE, a chemical now widely used in combating insect pests, has been found effective in preventing downy mildew, one of the worst diseases of tobacco, in a cooperative research project conducted at Chatham, Va., by the Virginia Agricultural Experiment Station and Duke University. PDB, as the compound is called for short, is introduced as a vapor over the seedbeds, which are covered with cotton sheets to keep the vapor down during the period of fumigation. The odorous gas penetrates into the leaf tissues and kills the deadly fungus threads that are attacking them. In the concentrations used, the chemical is harmless to growing tobacco plants. Associated in the research were Dr. A. Pinckard, Ruth McLean, F. R. Darkis, P. M. Gross and F. A. Wolf. Results are published in full in *Phytopathology*.