ENTOMOLOGY

Grasshopper War Due to Break Along Wide Front in West

Scientists Now Marshalling Defense Forces Armed With Millions of Pounds of Poison Ammunition

WAR on a wide front will break out in the American West this spring. From below the Mexican border to beyond the Canadian line, hordes of enemies menace our Prairie and Plains regions. Already, from headquarters, the officers of our defense have moved into the field, to recruit their forces, and Congress has appropriated a war fund for the procurement of munitions.

The enemy are grasshoppers, now about to arise in billions from the soil, to advance on fields and pastures, devouring as they go. Defense will be maintained by scientists of the U. S. Department of Agriculture and the various states, and by thousands of farmers, foresters, and other units of Western manpower.

Greater than ever before in the memory of living men is the menace of grasshopper hordes, in this spring of 1938. But the defense forces are not dismayed. By the time the enemy swarms appear they will be in position and ready to meet them, with adequate weapons of chemical warfare, well distributed.

THE ENEMY RESTS

Having stripped the grassblades to their midribs and denuded the bushes of their leaves, the swarming insects roost on the naked stems to bask in the sun.

The situation is different from what it has been in recent grasshopper years, when for one cause or another the anti-hopper campaign has been delayed, and had to be carried out on an emergency basis after the best time for stopping the insects had passed.

This time the hopper-fighters are getting the drop on their enemies. They are in the field before the grasshoppers emerge, and to the money left over from last year's emergency fund there has recently been added a new Congressional appropriation of $2,000,000.

The one time grasshoppers can be fought with real effect is in the spring. In winter they are safe, as eggs in the soil. Winter cold and ice do them little damage, and even deep fall plowing will not make any decisive cut in their numbers.

Later, when spring passes into early summer, the young grasshoppers get their wings, and so are able to make long leaps, clear over man's defenses. That is why the scientists have been eager to be up and at 'em during the coming few weeks.

Crawling Infancy

When the grasshoppers hatch from the masses of over-wintering eggs just beneath the surface of the soil, they are wingless and quite small—no bigger than ants. They crawl over the ground in enormous mobs, feeding as they go. They grow rapidly, and change their skins several times. After the last change they are winged, full-grown insects, ready for making real trouble.

During this wingless, crawling juvenile stage they are most vulnerable, both to the elements and to the attack of man. Cold, beating rains are always hoped for about mid-spring during grasshopper years. Such weather hammers them into the earth and drowns them, and it also weakens them to the attacks of natural enemies, such as predatory insects and fungi that cause fatal sickness in their ranks.

But mankind, with farms and ranches to defend, cannot depend on so capricious an ally as the weather. The critical weeks may be warm and sunny instead —paradise-weather for young grasshoppers. So the defense forces seek out the masses of crawling grasshopper "infantry" and spread before them tempting Borgia-banquets of bran flavored with arsenic. The hungry little hoppers feast —and die.

Of course, the younger the grasshoppers are when they find these lethal rations, the less it takes to kill them. Economy of government funds is one of the motives that impels the defensive forces of science to get into the field good and early.

Another economy has been achieved within the last couple of years. Hitherto the formula called for a 100 per cent. bran base for the poison bait. But it has been discovered that a mixture of one-quarter bran and three-quarters sawdust will be eaten by the grasshoppers just as readily. Sawdust, of course, is vastly cheaper than bran.

Mountains of Bait

The quantity of poison bait needed is staggering, at first glance. Last year the hopper-fighters spread 80,000 tons of it—the weight of two super-battleships. This year there are so many grasshopper eggs in the soil ready to hatch that the estimate calls for just double that quantity.

This seems like a terrific mountain of bran-sawdust-arsenic, and indeed it is; but when it is noted that it must be spread in effective spots all the way from Michigan to western Washington, and on south to southern California and central Texas, it doesn't loom quite so mountainous after all.

The worst infestations are all over the state of Iowa, the eastern half or two-thirds of the Dakotas with parts of Wyoming, Colorado and Wisconsin. Minnesota got into the fight earlier and harder than other states, or the plague might be more severe than it is in its southern half. Minneapolis has been chosen as national field headquarters for the grasshopper war.

Our grasshoppers are zoological cousins of the locusts that were one of the worst of Egypt's classic plagues. The troublemakers are not all of one kind. Four species of the long-legged insects do most of the damage in the great farm areas. The situation among the grasses

and herbs of the Western range lands is much more complex; some 25 or 30 distinct species of grasshoppers feed upon them, robbing cattle and sheep. Each of these species has its own habits and food preferences, so that the grasshopper-entomologist's life is not an easy one.

The grasshopper's history goes a long way back of Moses. The group of insects to which it belongs is reckoned as one of the more primitive ones, and includes other similar insects such as katydids and crickets. Wings and parts of bodies of the grasshopper cousinship have been found in geological deposits dating back scores of millions of years. Dinosaur and saber-tooth tiger have come and gone, but the grasshoppers we have always with us.

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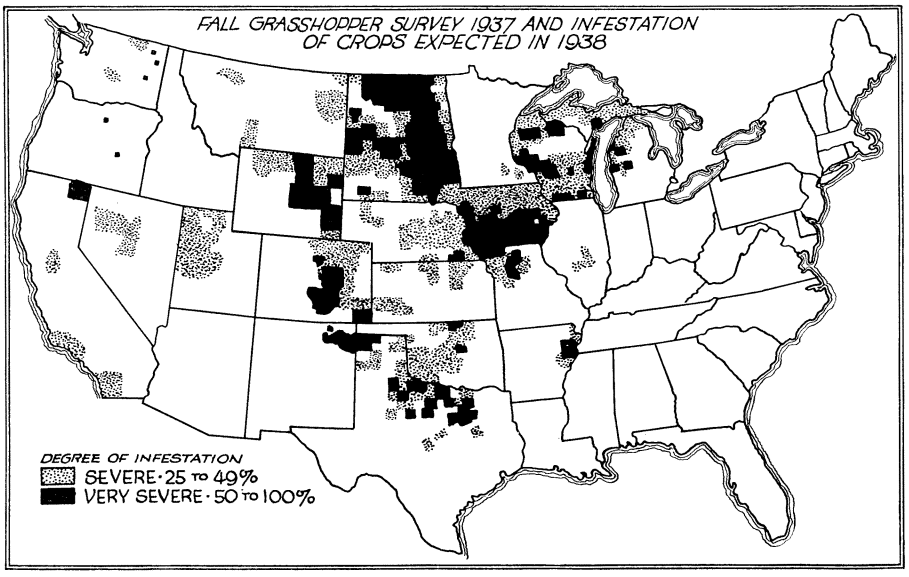

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afflicted with arthritis include cat, cow, deer, bear, hyena, baboons and anthropoid apes. It was not found among certain carnivora, notably the dog group; rodents and bats seem likewise to be immune.

"The ease of discovery of the disease in hyenas and gorillas should be emphasized," Prof. Fox remarked. "There is a strongly suggested similarity between the arthritis of the lower animals and that of the deforming and rheumatoid arthritis in man."

Lindbergh's "Heart" Ready

Col. Charles Lindbergh's invention, the "glass heart", has been used in over 900 experiments, totalling about 100,000 hours, to keep alive a large variety of organs from human beings and lower animals, Dr. Alexis Carrel of the Rockefeller Institute announced. He added:

"The method has reached the stage where it can be profitably applied to many problems in the fields of anatomy, physiology, biological chemistry, and pathology."

Among organs kept alive and working, for periods varying from two to thirty days, were hearts, lungs, livers, kidneys, spleens and other glands, arteries, veins, nerves, muscles, joints, and reproductive organs including pregnant uteri. The hearts kept on beating, the glands continued to secrete, and other organs continued their functions in the circulating medium. (*See* SNL, June 29, 1935.)

By modifying the chemical composition of the fluid, especially by the addition of insulin, adrenalin, and other glandular extracts, it became "possible to study how the morphological and physical activities of an organ are related to physicochemical conditions of its medium," Dr. Carrell stated.

ON A LOST BATTLEFIELD

Too late to do anything for what was once a prosperous cornfield, scientists and farmers survey the damage and plan reprisals for next season.

Brain Waves Vary

Different parts of the head give rise to different kinds of brain waves, it was reported by Prof. E. Newton Harvey of Princeton University and Dr. Alfred L. Loomis and Garret Hobart of the Loomis Laboratory, Tuxedo Park, N. Y.

Brain waves are detected by setting light metal disks against various parts of the skull and amplifying a million times the slight fluctuations of potential they set up. These waves have been used in the study of widely diverse phenomena such as sleep, hypnotism, epilepsy, etc.

The shapes and amplitudes of the brain-wave traces from the ear region are quite different from those obtained by placing the electrodes on top of the skull or at its sides. Patterns from corresponding positions on right and left sides of the center line usually correspond with each other, but at times a dis-