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THE INTERNATIONAL CONGRESS OF ENTOMOLOGY

Press dispatches by Dr. Frank Thone, staff writer

WAR between humanity and the Hexapods was pictured in unfamiliar colors before the opening session, at Ithaca, of the fourth International Congress of Entomology on August 13. The president of the congress, Dr. L. O. Howard, of the U. S. Bureau of Entomology, in his address printed in SCIENCE, on August 17, pointed out that the prevalent conception of an Age of Man finding its supremacy threatened by a looming Age of Insects is not accurate. The world is still in the Age of Insects, he said, and the Age of Man is not yet established. Taking into account the facts now known about evolutionary history, we must look upon the insect world as the old established order, an animal hierarchy of such exceedingly ancient lineage that it can count even the dinosaurs as a race of upstarts that had their day and ceased to be. It is the race of men, and not only they but all of their warm-blooded relatives, who must be looked upon as the invaders, as the attackers, as those who seek a place in the sun at the expense of the present landlords.

An intimate knowledge of a group of insects which are only too intimate companions of man and his warm-blooded kindred was demonstrated by Dr. Karl Jordan, of the Zoological Museum of Tring, England. Dr. Jordan has made a special study of the often despised, often joked-about, but never-to-be-ignored flea. Fleas display much the same evolutionary variations as do the bigger creatures which unwillingly yield them a living, and they frequently constitute a major problem either because of their too great numbers or because of the disease germs they carry.

Less immediately noticeable, but in the end no less influential in the life of man, are the activities of the vast burrowing underground population of insects and their allies. Their work in the soil of the forest was the subject of Professor I. Tragardh, of Stockholm. All dead things in the forest, wood, leaves, the bodies of birds and animals, receive the attention of innumerable tiny jaws, which share with fungi, bacteria, worms and protozoa the task of reducing them to the dust whence they came and thereby making them the foundation for a new generation of life.

Warfare against insects whose bites or stings plant deadly germs in the human system occupied much of the attention of the members. Dr. R. R. Parker, of the U. S. Public Health Service, outlined the results of researches on Rocky Mountain spotted fever which he and his colleague, Dr. R. R. Spencer, have been carrying on in Montana.

This dangerous disease is curiously uneven in its behavior. In parts of Montana ninety per cent. of all persons who take it die, while in another region, in the neighboring state of Idaho, only five per cent. of the cases terminate fatally. There is no effective treatment once the disease has been contracted, and no control measures have been devised against the ticks whose bites initiate the attack. During the past few months, however, the effectiveness of a preventive serum has been conclusively demonstrated. It prevents mild forms of the disease altogether, and usually checks the course of the severer attacks. It also cuts the death rate very materially. Among the twelve cases contracted in a group of 5,000 serum-treated persons only one death occurred, while among eighteen cases contracted by non-treated persons during the same time fifteen deaths occurred.

Dr. Erich Martini, of Hamburg, Germany, called attention to the need for a better understanding of climatic factors as they affect insect-borne diseases. Sometimes the problem is relatively simple: frosty weather kills flies, and so abates fly-borne plagues, such as some types of dysentery and some epidemics of typhoid fever. But sometimes the operation of climatic factors is not so easily understood. The peak of the annual spread of tertian malaria, for example, comes before the warm weather that is most favorable for mosquitoes. This, upon investigation, seems to be because the malaria germ itself is better able to carry on its mischief-making better in moderately warm than in very warm weather.

Professor W. J. Baerg, of the University of Arkansas, noted among entomologists as the man who has the nerve to let tarantulas, scorpions and centipedes bite and sting him, detailed the results of his first-hand experiences with arthropod poisons. Most of the poisons of spiders and their ugly-looking relatives, he said, are greatly overrated. A centipede bite, even from a big specimen, is about as painful as a bee sting, but no more harmful. The same is true of most tarantulas—and it is usually hard to get a tarantula to bite at all. The much smaller black widow spider of the South is equally reluctant to bite, but its venom is much more wicked in its effects. A black widow bite once put Professor Baerg to bed for three days of rather pronounced illness. But, he added philosophically, it gave him and his attendant physicians a good chance to get an authentic record of the symptoms.

Meet *Trichogramma minutum*. This little insect is a great friend of the human family. Most of us do not know it, because she is too small to be seen, as she goes about the world, doing good to us and ill to our enemies. Trichogramma is one of those interesting though tiny insects that lays her eggs in the eggs of other and larger insects that eat man's crops and orchards. The grubs that hatch out of such parasitic eggs prey upon the larger eggs in which they are laid, and so destroy them. This insect has been known to parasitize the 40 per cent. of all corn borer moths, or 90 per cent. of all cotton caterpillars, in a given area.

To date she has had to take her own chance in the wild state, so that in an unfavorable season there were

not enough of her sisterhood to take care of the eggs of the teeming pests. Now, however, she has been taken in hand by Stanley E. Flanders, of Saticoy, Calif., and brought up in huge numbers in captivity. His method is simple. He first breeds a lot of pests—grain moths—in 40 or 50 bushels of wheat. Then he lets the Trichogramma mothers loose at their masses of eggs. Presently he has perfect clouds of Trichogramma insects, which he then carries out into the California walnut orchards, to mop up the codling moths. Since Trichogramma has uncritical taste in victims, many other insect pests will doubtless be attacked with her aid in time.

A new technique in the handling of another insect friend of man, which has been reared much longer in captivity, was demonstrated by Dr. Lloyd R. Watson, of Alfred, N. Y. He has worked out a method of artificially fertilized queen bees, which will make it possible to breed bees as accurately and scientifically as we now breed cattle. Hitherto the fertilization of the queen has been a matter of chance. By Dr. Watson's method, which involves the use of microscopic glass tubes of unimaginable fineness, the process is made largely mechanical, and the drone that is to be the father of the bee colony can be selected just as accurately as can the queen that is to be the mother.

Locusts, the most ancient of man's insect enemies and one of the worst, are still being fought as they were in the days of Pharaoh. It is in Russia that the campaign is most highly organized and is being fought along most nearly military lines, including the use of chemical warfare methods and combat planes. In Russia and Siberia there are six principal locust species. They breed in waste places and creep about wingless in great mobs while they are young, and it is then they are attacked; for once allowed to grow wings and get into the air they would be beyond all hope of control.

Anti-locust forces sent out by the central government spot these breeding-places, often using scouting planes for the purpose. Once located, they cover with arsenical poison dust the wild grasses on which the young locusts feed, or set sweetened baits of poisoned bran and sawdust. Part of this work is done by ground machines, which might be considered a tank corps; where the ground is difficult, as in marshes, the dusting is done from airplanes.

Locusts were not the only troubles that Pharaoh's farmers had to contend with. Dr. Hassan C. Efflatoun Bey presented results of his researches into the papyri of his ancient fatherland for entomological references. In a complaining letter from the steward of an estate, about 1400 B. C., he found this:

"The worm ate half the crop and the hippopotami ate the other half. The fields were full of rats, a swarm of locusts settled down and fed, the sheep also ate and the birds stole."

Egyptian entomologists, said Dr. Efflatoun, do not now need to go out and catch hippopotami, but they still have plenty of enemies to fight. The "worm" of which the steward complained is still there; it is the common cutworm. And farmers still have to be exhorted to fight it as the farmers of 3,500 years ago were bidden in a royal decree.

An exchange of diplomatic views among allied generals opposing the insect armies was represented by the discussion of Dr. C. L. Marlatt, chief of the bureau of entomology, U. S. Department of Agriculture. Dr. Marlatt spoke on the plant immigration restrictions recently imposed by the United States. These regulations, designed to keep out new insect pests, he said, came very late, long after most other countries had adopted similar measures. Even while they were being debated, between 1909 and 1912, several bad pests and diseases got in, including European corn borer, Japanese beetle, citrus canker and Oriental fruit moth. Since their imposition, however, only two pests have succeeded in breaking through. These were the Mexican fruit fly and the pink bollworm, both of which crossed the southern frontier, admittedly much harder to guard than the seaports.

The marches of the early armies of insects, in the days when there was no human race to oppose their progress, poison and traps and other paraphernalia of war, are the subject of much discussion at the meetings of the congress. Their fossil chronicles in rocks a hundred million years or more in age have been read by careful human historians who are reporting their findings.

Northern Russia and Siberia had an insect fauna much like that of Kansas away back in the Permian Age, before even the dinosaurs had established their sway on the earth. Dr. Andreas B. Martynov, of Leningrad, reported new discoveries in the rocks of Russia that thus link up the ancient history of the two hemispheres.

From the opposite end of the earth, F. W. Edwards, of the British Museum, brought a story of modern evidence on ancient migrations. Mr. Edwards has spent two years in the far south of Chile, in the southernmost forest of the world. There, under trees much like our northern beeches, he found insects belonging to the same genera as those of Australia, Tasmania and New Zealand. Most of this area had been unvisited since Darwin as a young man had tramped over it nearly three quarters of a century ago. Mr. Edwards failed to find evidence there of a former land bridge connecting South America with Australia, but found some support for the so-called Wegener theory, that all the continents of the earth were once one solid land mass, and that the two Americas have drifted westward, floating on a semi-liquid layer of rock beneath.

Further support of Mr. Edwards's findings was supplied by Dr. E. C. Van Dyke, of the University of California, who told of the migrations of North American insects, by Dr. W. M. Wheeler, of the Bussey Institution, Cambridge, Mass., from his studies on the ants of South America and Australia, and by Professor E. L. Bouvier, of the Museum of Natural History, Paris, who has been working with the most primitive of all the creatures that walk the earth on jointed legs.

The myriads of tiny creeping things that live in the upper layers of the soil under the trees of the forest have changed but little in their preferences through almost uncounted ages, according to a note contributed by Dr. R. J. Tillyard, chief entomologist of the Australian Government. He stated that he saw in England fossil plants from the Devonian Age, a period so remote that geologists hesitate to estimate its age in years.

The plants then were utterly unlike the plants of to-day; yet the tiny life that crept among their tangled stems when they died rather closely resembled the life of the same habitat to-day not only in the families represented, but in the relative numbers of individuals.

A paradox of pests, wherein man encourages insects to prey on plants, prevails in the Antipodes. The secret of it is that the plants are weeds and in devouring them the erstwhile pests are unwittingly serving their cleverer opponent. This biological control of troublesome weeds is developing into a distinct branch of entomological science, which was discussed at the closing sessions of the congress.

The discussion also served to illustrate the fact that Britain's far-flung battle-line exists in other fields besides the military. The three men who, with their assistants, are cooperating to fight the weeds of Australia and New Zealand are Dr. R. J. Tillyard, of Australia; Dr. Ernest Marsden, of New Zealand, and Dr. A. D. Imms, of England. Australia's most terrible weed is the common prickly pear cactus, introduced from America. To prevent it from completely overrunning warmer parts of the island, the cactus regions of the United States were combed for insects that would eat cactus and nothing else. The search has been very successful, and the Australian cactus pest is now well under control. The many-legged allies of man in this fight against a vegetable include the cochineal bug, cultivated in Mexico for red dye, several other true bugs, the caterpillars of three moth species, and a variety of the almost microscopic red spider.

In New Zealand there are three introduced weeds that are very troublesome, the common blackberry, the European gorse, and the ragwort, a plant allied to the dandelion and quite poisonous to livestock. A moth species has been found whose caterpillars will take care of the ragwort situation, and a feeder on the gorse also gives promise. A third caterpillar has been tried out for the blackberry pest, and a beetle whose grubs bore into the stems may also be useful.

This introduction of destructive insects to prey on weeds is admittedly a ticklish job, for if one of them should turn on an economic plant instead of the weed for which it is intended, the remedy might itself become a disease. However, the insects are all kept most carefully caged until they are tried out on all possible diets in addition to the one for which they were imported, and if they show a taste for a valuable plant they are at once destroyed. This period of quarantine also serves to clear the insects of their natural parasitic enemies before they are released. As an insurance measure, however, a stock of parasites of each species is kept available, so that if one of the devourers should go wrong it could have a counter-attack launched against it.

For the warfare on the home front, here in the United States, chemists are seeking new weapons. The arsenates of lead and of copper, or Paris Green, which are the staples of present-day Borgian banquets for bugs, may soon be varied with arsenates of other metals, such as aluminum, iron, magnesium, barium and zinc, with additions of such things as thallium, sulphate, copper cyanide and various fluorides and fluosilicates. In addition, stated Dr. R. C. Roark, of the bureau of chemistry and soils of the U. S. Department of Agriculture, some 400 patented moth-proofing compounds are being investigated for their possible usefulness in man's chemical warfare against the insects.

The present congress is hailed as the most successful meeting of its kind ever held. Over 600 persons attended, including 100 foreign delegates representing some 35 countries. The halls were a friendly Babel of languages. Frenchmen spoke German to Germans, and Germans replied in French to Frenchmen. Belgians, Czechs and Russians spoke both languages to each other. There was very evidently no question of frontier or race in this meeting of the Scientific General Staff.

The next Congress of Entomology is to be held in Paris in 1932.

ITEMS

TUNGSTEN, a few years ago so rare that it was a curiosity even to chemists, is now a household necessity and a household word. Its near relatives, tantalum, molybdenum and columbium, while not so universally familiar, are now produced quite as readily, and are finding an increasing use in industry, Dr. C. W. Blake, of Highland Park, Ill., told members of the institute. The handling of these metals on an industrial scale presents its difficulties. The melting points are among the highest known for metals, and in order to prevent oxidation during melting, the process has to be conducted in a vacuum or under an inert gas such as neon or nitrogen. At the same session Francis M. Foley, of Pennsylvania, discussed the handling of various types of alloy steels. Some of the metals he described, designed especially for resisting corrosion, contain more nickel, chromium and tungsten than they do iron.

THE familiar "drops" which the doctor puts in the eyes before examining them do not have the same effect of enlarging the pupils in eyes of other races, members of the American Pharmaceutical Association, K. K. Chen and Edgar J. Poth, of the Johns Hopkins Medical School, reported at the recent annual meeting. Chinese, for instance, and Negroes are not so affected. The reason for this peculiarity of Chinese and Negro eyes is not known. In the study a very delicate instrument called a filar micrometer, which measures to one-hundredth of a millimeter, was attached to a telescope and used to measure very accurately the dilation of the pupils under controlled illumination. Five kinds of "drops" were studied: synthetic, natural and pseudo-ephedrine, and cocaine and euphthalmine. The last two are in more general use. For the examination of Chinese and Negro eyes there remain two solutions, homatropin and atropine, which do dilate the pupils. However, these two are dangerous for persons who have an eye disease called glaucoma.