Entomological Study Considered Fun

Biology

But Scientists' Pleasure Has Economic Value

WHY do we study insects? Dr. E. P. Felt, of Stamford, Conn., asked this question at one of the meetings of the American Association for the Advancement of Science and then answered it himself. Entomologists keep on studying insects mainly for the fun of it, he declared.

It is true, Dr. Felt admitted, that economic entomology figures enormously, when we spend ten millions in one season's war against the European corn borer, and calmly contemplate spending fifteen millions on the Mediterranean fruit fly campaign. Yet even the economic entomologists are in the game largely for the fun of it, he thinks.

Prof. C. T. Brues of the Bussey Institution, Harvard University, reviewed the varied table manners of different kinds of insects and discussed the effects of these preferences on man's affairs.

For insects have choices as to what they will eat and what they will reject, no less than humans or horses. Some of them will eat almost anything they can fasten their jaws on, while others will reject all but a single item on the whole wide world's bill of fare.

The cockroach, one of the most ancient and primitive of all insects, is also one of the least "choosy", Prof. Brues said. It will eat almost anything, either vegetable or animal, but other insects equally ancient, like the dragonflies, already show special preferences, sticking strictly to a diet of freshly captured insects. Some of the later-developed insect groups show a graduation in choice within a single family or genus. Some species of wasps, for example, are willing to use a variety of spiders and insects in provisioning their nests, while others depend on a single species to supply them with meat.

The same is even more strikingly the case among plant-eating insects. Everybody knows how thoroughly grasshoppers strip vegetation, and in the East the Japanese beetle is establishing a record almost as bad. Others again will feed on a number of different plants, as the gipsy moth caterpillar feeds on several kinds of shade trees; but these have a more limited number of host plants.

Among the worst of the pests man has to deal with are insects so highly specialized that they cannot or at least will not feed on anything but one kind of plant. The potato beetle and the cotton boll weevil are high on this "bad eminence". It is largely against them that quarantine barriers are erected, and for their undoing that entomologists comb the world seeking other insects that will kill or weaken them or prey upon their eggs and young.

BREEDING corn with as much attention to the pedigree of the individual plant as is now bestowed on the pedigree of the individual animal in horse or hog breeding will result in a great increase in midwestern farm productivity within the next ten years.

This in effect is the prophecy made by Henry Wallace, editor of *Wallace's Farmer* and practical scientific corn breeder. He told of the methods of modern corn breeding, by which one can select qualities desired and put them into the new strain as a cook stirs ingredients for a cake together in a bowl, producing what might almost be called a synthetic corn plant.

The work is done by inbreeding numerous strains of corn and segregating their offspring, until the tangle of their hybrid origin is unsnarled and the desired qualities remain as pure "unit characters". These inbred strains are used as the pollen-producers, or fathers of the new crop. They are planted among the rows of "mother" stalks, which are deprived of their tassels so that they cannot produce any pollen of their own to contaminate the seed corn.

A paradox in the production of high-yield inbred corn was pointed out by Dr. R. A. Brink of the University of Wisconsin. In working out the undesirable qualities of the ancestral corn during the first period of inbreeding, the strain undergoes an apparent retrogression, often becoming more and more stunted and yielding less and less seed. Yet two of these "runt" parents can be crossed to produce a giant offspring with a yield greater than that of any strain figuring in its pedigree.

Dr. Brink told of the various methods by which these highly purified "aristocratic" corn ancestors are mated to produce the desired new combination in their descendants. Sometimes two of them will be crossed, and the resultant hybrid crossed again with a third. Sometimes two pairs will be crossed to produce hybrids, and these two hybrid strains re-hybridized with each other. The method he proposed is to take the first pair of hybrids and keep each of the two going separately for several generations until they come to equilibrium, and then to make the second cross.

Dr. H. K. Hayes of the University of Minnesota told of results obtained in his state with the introduction of the new type corn.

"The double crosses matured somewhat earlier than the normal varieties," he said. "A greater percentage of the ears were mature at time of husking than in the normal varieties. This is a very valuable characteristic in Minnesota. An increased yield together with earlier maturity means much more than a greater increase in yielding ability without an increase in earliness of maturity."

THE wild grass of the western prairies and the plains country, free as air when the long-horned cattle succeeded the bison as kings of the range, is now an important factor in the meat and wool economics of this country, and anything that cuts down its yield is a matter of concern to the biologists who study it and the range managers who administer it. At the Iowa State College, a group of botanists and zoologists who have expert knowledge of range grass problems pooled the results of their studies in a symposium, under the auspices of the Ecological Society of America.

One of the most striking phases of the range problem is the expense of maintaining wild rodents. This was discussed by Dr. Walter P. Taylor of the U. S. Biological Survey. Wild rats and mice, rabbits, ground squirrels and gophers, prairie dogs, marmots and other swarming small animals that gnaw for a living, all levy toll on the valuable wild grass crop of the West. Their depredations sometimes add up to a total of $150,000,000 a year, Dr. Taylor stated. It is obviously of importance to get some estimate of their numbers and rate of increase if means are to be devised to keep them in check.

Prof. A. E. (*Turn to page* 14)

Artificial Atmosphere Is Better

Physiology

Helium, the gas that makes the American non-inflammable airships possible, may prove of value in helping submarine crews to work more efficiently, if a suggestion made by Dr. J. Willard Hershey, of McPherson College, is adopted. Speaking before the chemists attending the meeting of the American Association for the Advancement of Science, he told of his study of artificial atmospheres. Some mixtures of gases, quite different from the mixture that forms the air we breathe, supported life of mice and guinea pigs even better than ordinary air, he discovered.

Natural air contains 21 per cent. oxygen, 78 per cent. nitrogen and 1 per cent. of a mixture of gases, including carbon dioxide, helium, argon, krypton, neon and xenon. One series of experiments on white mice showed that a mixture of nitrogen and oxygen, in the same proportion as in air but without the other gases, only supported life for a few days. This demonstrated that the rare gases are necessary for life, said Dr. Hershey.

In pure oxygen, the animals lived only two to five days, while a similar group of animals, also kept in a large bottle with normal food supply, but supplied with ordinary air, suffered no ill effects whatever. With a mixture of 60 per cent. oxygen and 40 per cent. nitrogen, however, the animalse lived as well as normally, if not better.

A mixture of 79 per cent. helium and 21 per cent. oxygen, practically ordinary air with the nitrogen replaced by helium, supported the life of mice in a normal manner. Using argon instead of helium and in the same proportion, the mice did not survive. Dr. Hershey pointed out that the argon mixture does not diffuse through the living cells as rapidly as natural air, while helium diffuses more rapidly. As the helium-oxygen atmosphere is considerably lighter than air, it would doubtless be possible for a person to live inside the gas bag of an airship containing it.

However, Dr. Hershey found that a mixture of 25 per cent. oxygen and 75 per cent. argon supported the life of mice, and that at the end of ten days in it they appeared better than at the start.

"In the field of practical application of prepared atmospheres there is a wide range of commercial uses and values," said Dr. Hershey. "Medical men have a fair knowledge of the action of oxygen in the air, but nothing is understood by them concerning the other gases. It is quite possible that a knowledge of atmospheres may aid in the control of diseases.

"In deep-sea diving, mines, and in submarines, foul air is encountered and is not sufficient in amount to sustain life. A prepared atmosphere for such activities would broaden their respective range of usefulness. An artificial atmosphere in a submarine that sustained life even more effectually than the normal air would bring about a safer and more efficient submarine. A prepared atmosphere would be of great advantage to the high-altitude flyer."

Dr. Hershey believes that the widest field of prepared atmospheres will be in the treatment of disease.

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Good Radio—*Continued*

the year 1930 should show a general decrease in sun spot numbers as the year waxes, with a corresponding increase in radio signal strength in the broadcast zone. By the very end of 1930 and the beginning of 1931, the general rise of a secondary sun spot maximum should be evident. By 1931, however, it is believed that we shall be so far from the maximum of the 11-year period that the secondary maximum will have no effect upon radio reception and allied electro-magnetic phenomena as have the sun spot maxima of 1928-29. The general lifting of the ionization level in the earth's atmosphere should continue, with the fluctuations noted, through the next six years, but in 1934 solar activity should be as quiescent as at the last minimum of 1923."

Dr. Stetson believes that these radio changes are produced by variations in the height of this ionized layer of the atmosphere, known as the Kennelly-Heaviside layer. Long waves of 18 kilocycles show an opposite effect. Their reception is best when sun spots are most numerous.

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Entomology—*Continued*

Aldous of Kansas State Agricultural College talked on the effect of different frequencies and heights of cutting on the yield and vigor of prairie grass vegetation. In general, his experiments showed that too frequent cropping off at the tops of the plants discouraged them from coming back with new herbage.

Dr. J. E. Weaver of the University of Nebraska discussed the effects of grazing on roots and other underground parts of plants. To obtain his data it was necessary for Dr. Weaver and his associates to become scholarly ditch-diggers, for the roots of prairie plants are frequently several times as long as their tops, and deep trenches have to be driven for considerable distances to get an idea of the form and distribution of roots.

Weather of course has as much effect on prairie vegetation as it has on plant life everywhere. Dr. W. G. McGinnies of the University of Arizona discussed the value of measuring the physical factors of weather and soil condition, such as evaporation rates, available soil moisture, intensity of sunshine and so on.

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