thickness of the litter layer and in moisture content, and are evidence of very sensitive discrimination.

In mixed plantations, again, distinct populations were found in relation to spruce (*Picca* sp.), Scots pine (*Pinus sylvestris* L.), larch (*Larix* sp.) and silver fir (*Abies alba* Mill.). The numbers under spruce were generally lowest, and a few species showed definite preferences for larch or silver fir.

Hayes described some work on feeding behaviour of Oribatid mites using mainly *Hoploderma magnum*. Colonies were kept at constant temperature maintained at three different humidities and fed on weighed quantities of needles from three species of conifer. These needles were graded into three categories of age and condition. After 72 hr. the remains were re-weighed and the number of fæcal pellets counted. Measurements were made on eight replicates of fifty individuals for each treatment. Production of fæcal pellets for all three species appeared to be greatest for fallen but still entire needles and least for fresh green needles. Analysis of variance showed, however, that few of the differences between humidities, tree species or conditions of needles were significant. Preliminary results indicated that there was no correlation between loss in dry weight and the number of fæcal pellets produced, and loss in dry weight of needles did not appear to give a satisfactory index of feeding.

As part of the concerted work on woodland soils by the Nature Conservancy at Merlewood Research Station, K. L. Bocock described some work concerned specifically with the comparative rates of disappearance of oak (*Quercus petraea* Liebl.) and ash (*Fraxinus excelsior* L.) leaves on contrasting sites. Weighed quantities of leaves were placed on the ground in nylon hair-nets and sampled periodically over 14 months. As a result of earthworm activity ash leaves on a mull soil disappeared most rapidly, with loss in nitrogen following closely the trends of loss in dry weight. On a moder soil the loss of nitrogen was relatively less rapid. Oak leaves on mull showed an actual increase in nitrogen content; possible explanations were the presence of nitrogen-fixing micro-organisms, absorption of nitrogen compounds from the rain or contamination with slime and droppings from soil animals.

Feeding experiments with *Glomeris* (Diplopoda) on hazel leaves (*Corylus avellana* L.) showed that the amount of water-soluble nitrogen was larger in the fæces than in the food, largely due to an increased ammonia content.

The symposium ended with a synoptic point of view of invertebrate metabolism and its effect on soil fertility. With the aid of diagrams, A. Macfadyen depicted the main paths of energy-flow in a typical grassland soil as a result of the direct metabolic effects of the fauna. Calories entering the system from sunlight pass through various levels (corresponding to successive links in food chains) at each of which some energy is dissipated in respiration. The proportions received and passed on by different groups of organisms and, in the case of agricultural exploitation of the grassland, the amount finally available to man were calculated.

Indirectly the fauna has catalytic effects on other organisms which are probably much more important: the feeding of animals on fungi eliminates senescent growths, effects the dispersal of spores and overcomes 'stasis', and their fæces provide food sources for other organisms. All such activities increase the rate of energy-flow which ultimately determines the soil fertility.

B. N. K. Davis

AGRICULTURAL HISTORY

THE joint winter conference of the Agricultural History Society and the Association of Agriculture was held on December 3, at the Institute of Education, University of London, under the chairmanship of Sir Keith Murray. Before lunch, Mr. Michael Havinden, research assistant, Museum of English Rural Life, read a paper on "Agricultural Progress in Open Field Oxfordshire". Modern research has suggested that the open field system was more flexible than was formerly believed. Mr. Havinden's researches among college documents and seventeenth-century Oxfordshire farmers' inventories has confirmed this still further. He is convinced that the introduction of improved rotations by agreement among the tenants or imposed by manorial lords was a major factor in delaying enclosure in Oxfordshire and possibly elsewhere. The improvement was mainly towards the introduction of fodder crops, the growing of more peas and beans and vetches, and the new legumes clover, sainfoin and lucern as well as some rye grass. In places a group of strips was enclosed by agreement and these crops were grown. He described the mechanism of this process very definitely. In other places fodder was grown and consumed by hitching the grazing animal on the strip. It has, of course, for long been known that sainfoin was grown on the chalk escarpment in the seventeenth century, but only vaguely. Mr. Havinden's researches have revealed places where this and other fodder crops were actually grown in the open fields, and he has thus made specific what was formerly only a general impression derived from remarks in the didactic treatises and propagandist literature of the time.

In the afternoon Mr. John Saville, senior lecturer in economic history, University of Hull, discussed "Public Opinion and Agricultural Depression, 1880–1900". He showed how the current difficulties of the landed interest had led reformers to demand the restoration of a peasant proprietary without any very clear perception of the methods by which the plan could be put into effect. Despite some ameliorative legislation, giving the farm worker the vote, the setting up of parish councils, some small-holding acts, etc., the ideas were in the main quite ineffective. These measures had been supported by liberal reformers in the first place, but afterwards received the backing of the great landlords, Henry Chaplin for example. In spite of that, somewhat less than 1,000 acres of small holdings were created before 1914.

The programme was closed by the showing of a film made by Imperial Chemical Industries in 1942, "The Harvest Shall Come", which is a moving history of the wretched conditions of employment in agriculture before 1914, the comparative prosperity of the workers during the two Wars, and their submersion in poverty in the interval between them, conditions that will never again be imposed.