18° C. Though oyster farmers place millions of limed tiles and thousands of cubic metres of mussel-shells at the most favourable time in the water of the Oosterschelde, only about 1 per cent of the 'mature' larvæ succeeds in finding a collector and in accomplishing fixation; the other 99 per cent perishes. Many of the newly settled spat perish in the first weeks of sedentary life, and in spite of all the care of the oyster-farmers, it is considered normal if 10 per cent of the spat survives until October, not to mention the losses by severe frost in the following winter, and those by shifting sand or silt or by predators and diseases before the age is reached at which they participate in reproduction. It may be concluded that the 'useful effect' is not very great in the propagation of *Ostrea edulis*, even when the oyster farmer intervenes, the most perilous period being that during which it is urgent to find a collector.

How are 'mature' oyster larvæ to find any cultch on the natural oyster beds if it is not provided by the oyster farmer? Practically the only hard and clean objects available there are the new shell-edges of the growing oysters themselves[4]. This is the reason why oysters are so often found in clusters on the natural beds instead of singly. When the beds had a rich population, many larvæ were produced and the oysters themselves provided the cultch in the form of their clean new shell-edges. Natural banks could thrive even on less-favourable spots thanks to the great number of oysters present in the community. Then man interfered. He overfished the beds and the phenomenon described above contributed to a rapid decline, for large oysters were fished away, diminishing both the number of mother oysters and the quantity of natural cultch; and at the same time innumerable young oysters, attached to the shells of the larger ones, were destroyed. This depletion process is accelerated as soon as oysters become so scarce on the natural banks that fertilization possibilities diminish and only part of the maternal eggs are in a position to produce larvæ. That means the end of a natural oyster bed.

What can we do to stop the decline? When the population is poor, and no cultch is planted, spatfall prospects are negligible. The provision of cultch is only profitable if enough spat is collected to pay the charges, and that will not be the case when too few larvæ reach the mature stage. In the favourable conditions of the Oosterschelde, we need at least 10,000,000 mother-oysters if enough spat is to be produced in an average summer. It will be clear from the foregoing why I do not believe the British and German plans to restore the natural oyster beds can be successful, as both want to start with a very limited number of mother-oysters and say nothing about the planting of cultch material.

Is there no hope for revival of once prosperous oyster beds? There is a possibility, but only if one is prepared to invest a lot of money in it, and to work on a large scale. In the first place a suitable area should be selected, ensuring a restricted dispersal of the larvæ and a suitable temperature for larval development. A wide area of bottom surface should be cleaned thoroughly with oyster dredges. Several millions of mother-oysters should be planted there, more according as hydrographical conditions are less ideal. I believe it is not very important from which country the mother-oysters come. Cultch should be planted on a large scale and in due time; in deciding the right moment, scientific investigations can help a great deal.

It may be objected that my suggestions do not aim at a revival of natural oyster beds, but at the foundation of oyster culture. Indeed, that is true. Oyster culture may be possible in several suitable places on the coast of Europe, but natural oyster beds, once severely overfished, are doomed.

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Occurrence of Foot Louse of Sheep in the British Isles

WE wish to record the first known occurrence in the British Isles of *Linognathus pedalis* (Osborn), the foot louse of sheep. In June 1946 a heavy infestation of this parasite was reported by Mr. C. T. Murphy on the legs of a flock of a hundred cross-bred Suffolk sheep, near Colchester, Essex. The lice were identified in this laboratory as *L. pedalis*, and a part of the material has been placed in the collections at the British Museum (Natural History).

Linognathus pedalis is a sucking louse which previously had only been recorded from sheep in the United States, South America, New Zealand, Australia and South Africa. Heavy infestations of this louse cause considerable irritation and loss of condition of the host, and its introduction into Great Britain is to be regretted. Control of this parasite, with modern insecticides, should not, however, be difficult.

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Control of Wireworm

Thomas and Jameson[1] state that as a result of the application of 'Gammexane' in field trials reductions in wireworm populations of up to 65 per cent have been obtained. Numerous similar trials were laid down by the Cambridge Advisory Centre in the spring of 1946, in conjunction with Imperial Chemical Industries, Ltd. 'Gammexane' was applied in powder form at various strengths, to test its efficiency in the control of wireworms on arable crops. In the majority of these trials, which included wheat, oats, barley, sugar beet and reseeded grassland, the plant establishment in treated plots was satisfactory or normal compared with plots receiving no treatment, where it was poor or failed entirely.

Five centres, where the crop differences were very striking, were selected for intensive sampling and investigation, to find if 'Gammexane' treatment caused any marked reductions in the wireworm population. Each centre consisted of five 'Gammexane' treatments and a control untreated in twelve replicated plots. Twenty standard 4-in. diameter cores were taken from each plot, in the growing crop in May and June, in all 240 samples per centre. Each core was split in two, the top three inches being bulked separately from the bottom three inches. This was to find if there was any downward migration of wireworms as a result of the treatment. The samples were examined by the wet or flotation extraction method[2].

At four of the five centres examined, the populations were found to be similar to the initial populations, as first estimated before treatment. Only at one centre was there an apparent reduction in population. The results were examined statistically, and only at one centre was the difference between treatments and controls significant. No downward migration of wireworms was demonstrated.

As these findings did not offer any explanation of the striking crop differences obtained, a simple test was devised to discover if 'Gammexane' had any inactivating effect on the wireworms. R. C. Amsden had previously demonstrated that wireworms could be extracted by placing soil in trays in a water bath, until the surface temperature of the soil reached 40° C. This treatment by heat causes large numbers of active wireworms to come to the surface, from which they can be picked off. Twenty cores were again taken from each plot at three of the above-mentioned centres, and treated by this method. The soil was afterwards examined by the wet method to recover the wireworms still remaining in the soil. At two of the centres a higher proportion of wireworms came to the surface in the samples from untreated plots than from treated plots. A statistical analysis of these results showed that the difference was highly significant. The figures at the third centre, however, showed no difference between treated and untreated plots.

All centres are being sampled again on the completion of harvesting. The results so far show that the wireworm populations in the untreated plots are only slightly lower than the first estimation, whereas the populations in the treated plots are now considerably reduced, in some cases to the extent of 60–70 per cent.

These findings seem to suggest that the application of 'Gammexane' quickly renders the wireworm incapable of attacking the crop, but any killing action appears to be considerably delayed.

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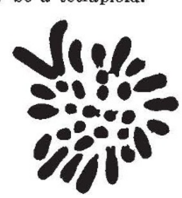
Polyploidy and Parthenogenesis in the Genus *Saga*

THE large wingless Tettigoniid grasshopper *Saga pedo* (*serrata*) is an inhabitant of southern Europe, its distribution ranging from Spain to the Ural Mountains. Among the northern outposts of its range are some localities in the Moravian mountains and Voronij, Saratov and Ufa in Russia. It is remarkable that this species, which occurs farther north than any other representative of the genus, appears to reproduce normally by parthenogenesis. The biology and cytology of *Saga pedo* was studied by Matthey[1] in material from the Swiss canton Valais. He found that the chromosome number of the parthenogenetic females generally amounted to 68, made up of six pairs of metacentric and twenty-eight pairs of acrocentric elements. This high number is unique among the Tettigoniidæ, the idiograms of which range from 22 to 36 in all other species investigated. Matthey suggested, therefore, that *S. pedo* must in reality be a tetraploid.



SPERMATOGONIAL PLATE OF *S. ephippigera*: BOUIN, SECTION 14 μ THICK, GENTIAN VIOLET. × 1850

Saga ephippigera and *Saga gracilipes* had originally been chosen as objects of a cytological study because they represent an instance of two species inhabiting the same area. They are sporadically distributed almost throughout Palestine, both species frequently occurring in closely neighbouring localities. *S. ephippigera* is noteworthy for its giant size (total length of larger females including ovipositor, 125–135 mm.), which is nearly equalled by the largest specimens of *S. gracilipes* (total length of larger females including ovipositor, 107–120 mm.). Both species are bisexual. The examination of their idiograms has furnished a full confirmation of Matthey's assumption.

In a number of males of each of these species, the diploid chromosome number in the spermatogonia was found to be 31. There is a certain discrepancy between this number ($2n = 30 + X$) and that of the female *S. pedo* ($4n = 64 + 4X$). However, one male of *S. ephippigera* possessed a supernumerary pair of chromosomes, thus showing 33 elements in the spermatogonia, and sixteen tetrads and one dyad in all first spermatocytes throughout the testis. This exceptional number ($n = 16 + X$) makes a perfect fit with the tetraploid number of *S. pedo*. It seems plausible that the establishment of a super-