

## PARASITIC FUNGUS.

*Isaria farinosa* (Dicks) Fr.

(Plate I, Fig. 4; Plate II, Fig. 22.)

Shortly after beginning my investigations on *N. erichsonii* it was found that the hibernating caterpillars were attacked by a parasitic fungus belonging to the *Cordyceps* group. This fungus appeared in the form of white patches on the cocoons and also as elongated stalks of sporophores of the conidial form. As it was believed that the larvæ on entering the soil in hibernation and to spin their cocoons would become infected if the spores of this fungus were in the soil, experiments were carried out in 1909 with a view to testing the validity of this belief. A piece of ground which continued use had shown to be uninfected with spores of this fungus was chosen in a region where the sawfly does not occur and young larch trees were planted. A large number of larvæ were placed on these larches and the ground round the bases of the young trees was infected by distributing specially infected soil and litter containing the spores. Unfortunately an accident to the small group of larches and my removal to Canada prevented a satisfactory conclusion to this experiment.

When cocoons of *N. erichsonii* were received from England in 1910, a certain proportion was infested with the fungus and accordingly I handed some of them to Mr. Güssow, Dominion Botanist, in order that he might study the problem of infection. The results of these studies have since been published.<sup>1</sup> Mr. Güssow identified the fungus, after having cultivated it, as *Isaria farinosa* and the same fungus was found on cocoons which were collected by me near Ottawa. The question which it was necessary to decide was whether this fungus was growing saprophytically on the sawfly cocoons, that is, growing on the sawfly larvæ which had died from other causes, or whether it was a parasite and capable of attacking and infecting healthy larvæ. Mr. Güssow's experiments and conclusions were as follows:

"These cocoons" (referring to the *Isaria* covered cocoons which had been provided for the purposes of these experiments) "were placed together with the moss in which they were imported from England into a flat glass dish. The moss was moistened and a well-fitting lid preserved the moisture satisfactorily. The cage was kept in the dark under ordinary laboratory temperature. In about 22 days a considerable quantity of sporophores of the *Isaria* were produced. Originally 23 cocoons showing the white patches of the fungus were placed in the cage. No adult insect emerged from these cocoons. Some of the cocoons were dissected at intervals and were found to contain a blackened or dirty yellowish adult. The dissected cocoons were replaced and the *Isaria* developed further. I then obtained a handful of cocoons which were carefully examined and which showed no signs of an infection whatever. They were divided in equal numbers, 30 cocoons serving in each of the following experiments:

"*Experiment A.*—These sound living cocoons were introduced into a breeding chamber and were carefully kept free from external infection from *Isaria* spores. It was sought to ascertain how many of the cocoons would produce living adults and those emerging were carefully recorded. Ten adult larch sawflies emerged in the course of ten days. Eleven parasitic insects were also found to emerge from the cocoons; the remainder of the cocoons did not 'hatch' at all. Some of these were found, on dissection, empty. Some showed remains of a dead adult. Only one cocoon showed signs of *Isaria*.

"*Experiment B.*—The same number of cocoons were used. These were placed together with infected moss and cocoons bearing *Isaria* spores into a

<sup>1</sup>Güssow, H. T. "Observations on the Parasitism of *Isaria farinosa* (Dicks) Fr. with special reference to the Larch Sawfly (*Nematus erichsonii* Hartig). Trans. Roy. Soc. Canada, 3rd series, Vol. 4, pp. 95-99, 1911,