

Larva. When full grown 9 mm. long; yellowish; pupal respiratory histoblasts black and peculiar character of these organs plainly visible; triple anal gills simple without any small lateral "buds"; head capsule yellowish anteriorly but shading to brown posteriorly, markings brown as follow: central broad diffused stripe with pair of lateral spots each side of this; apical antennal segment thin, dark brown, basal segments broader and pale yellow.

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EPIDAPUS SCABIES. Hopk. AS A GREENHOUSE PEST IN VANCOUVER

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One morning during the first week in October, 1931, a commercial greenhouse grower from North Vancouver brought over for identification and suggestions of control, a quart milk bottle of rich greenhouse soil in which were enormous numbers of minute white worms. They resembled soil nematodes but were too big for these, being about 2 mm. long: microscopic examination showed them to be Dipterous larvae. They swarmed all through the soil but were distinctly gregarious, collecting together in white masses which showed as large as 50 cent pieces through the sides of the bottle. Slowly these masses moved from place to place while all larvae seemed restless, travelling incessantly.

Since the problem of control was immediate, the earth was transferred to a large stender, some being treated immediately with a cold saturated solution of sodium silico fluoride and some set aside for dessication at normal warm laboratory temperature. In two hours the larvae treated with fluoride solution were unharmed while those in the drying soil sample had left the surface of the soil and had collected on the bottom of the receptacle where the soil was still damp. Within six hours most of those in the drying soil were dead, so the owner was immediately advised by telephone to allow the affected soil to dry out as fast as possible, if necessary by turning on extra heat and by deeply raking over the soil at intervals to accelerate the drying out process without adopting any further treatment. He did this and rid his house of the pest within a few days. Up to the time of writing, March, 1932, he has had no further trouble with them.

History of the Outbreak

From this man and from other sources, I find that this type of infestation has appeared within the last six years, at least twice in North Vancouver and once in Vancouver itself. In all three cases the

outbreaks occurred in greenhouses. Growers maintain that the larvae appear in autumn and become a pest, completely destroying all crops planted in the soil, the crops being chiefly mushrooms.

Searching available records for identification, I find that these maggots are the larvae of a Fungus Gnat which, as nearly as I can determine, is probably **Epidapus scabies** Hopkins, or a closely allied species. The only description I can find is in Sanderson's manual of economic insects in which are reproduced Hopkins figures illustrating the life history of the pest. It was originally described by Hopkins in 1895 at West Virginia Agricultural Station; was mentioned again by Chittenden in 1907 and again by Gossard in 1911, and apparently not since then. It does not seem to have been recorded in Canada until now. In North Vancouver it appeared in 1928 and about the same time in the old Royal Nurseries in Vancouver; it was reported again in North Vancouver in 1931.

I bred out some individuals and the larvae, pupae and adults agree very closely with Hopkins' descriptions. The female is a wingless midge with a relatively very large abdomen while the male is winged and very much smaller. The female moves fairly deliberately over the surface of the soil while the male tears around at a great pace, seldom taking flight. Mating occurs very soon after the females emerge from pupal cases in the soil. Both sexes run to cover on the least atmospheric disturbance and are consequently best observed under a glass plate. At first sight, without magnification, they are not unlike certain Collembola.

Notwithstanding the greatest care I failed to rear any further generations and all died out. It may be that there is only one brood a year, in which case the minute larvae of the second generation are growing in the soil, which is being maintained in the laboratory for that purpose, suitably dampened and covered.

They are reported in literature as causing a scab-like blemish on potatoes, but injured and perfect, potatoes and carrots which I put into the stender, have so far not been attacked by the larvae.

As far as control is concerned, the drying out which I recommend almost at once, seems very effective against the myriads of larvae, provided that the process can be continued fast enough and deep enough to catch the downward-migrating larvae. One of the growers reported having used naphthalene flakes over the surface of his soil, covered with canvas to keep in the fumes, and declared that he secured perfect control. Since this man uses naphthalene as a panacea against a wide range of insect pests, I have either to change my views of naphthalene or to proffer this as a second means of control in addition to the drying out process.

Acknowledgments.

I am deeply indebted to Dr. O. A. Johannsen for having confirmed my identification of these insects.

In a letter just received (31 May, 1932) he informs me that at Ithaca, N.Y., he finds them both in greenhouses and in fields, doing damage to potatoes.