

up and spread out so that they were on the surface they burrowed back into it. About 50 of these were put into the exhibition cage, where they immediately went into the rubble. The ants did not harm them.

While searching in the neighbourhood of a certain mound for *F. rufa* a rather peculiar situation was met with, at the beginning of September. On lifting up a piece of a stick close to a mound there were found beneath it some of the mound ants, one or two crickets and about a dozen small white leaf-hoppers. Three were taken. Unfortunately, there was little time to spare on these observations so that no more cases of this fraternizing were seen, but it does seem possible that this was connected with the honey-dew collecting habits of the mound-ant.

Injury to Primulas from Vine Weevil

By W. B. ANDERSON, *Victoria.*



THE paper I have prepared for this meeting may seem, perhaps, to be one better suited to a gardeners' meeting than to one of entomologists, but if, as it appears to me, that entomology is to be of assistance to the horticulturist, then I hope that these remarks on my practical experience of combatting a serious pest will be of some use to plant growers. Although the European Vine Weevil, *Brachyrhinus sulcatus* (Fabricius), has long been known as an enemy of the strawberry grower in this province, not many complaints have yet been made by gardeners of its attacking other plants at all seriously.

The genus *Primula* is one most seriously affected by this pest in some places on the coast, and the probable reason for its not having been more complained of is, I think, due in most cases to the presence of the pest being unsuspected. The fact of some plants in a *Primula* bed dying off at about the flowering season, is mostly attributed to a rotting of the roots during the wet weather, if the weevil is not known as an enemy by the gardener, and, in consequence, its presence is unsuspected.

My attention was first called to the insect's depredations among *Primulas* some years ago by a *Victoria* gardener's complaint to me that something was rotting off his bed of fine English *Primula* hybrids. He had noted some larvae in the soil under the plants affected, but could not quite satisfy himself as to this being the cause of mortality. Upon examining the bed, many larvae were found, in various stages of devel-

opment. Some of these were bred out, the results sent to the Entomological Branch at Ottawa, and there pronounced to be the Vine Weevil. The injury manifests itself more fully about the blooming season. Plants well loaded with blossom will suddenly droop, the flowers soon dying, and the leaves taking on a soft, leathery wilt. At this stage, a slight lateral pressure will topple the plant out of its bed, when it will be seen that the roots are all, or nearly all gone. Without a close examination, a stranger to the work of the insect will be inclined to pronounce the injury due to the fleshy roots having been rotted off by winter wet, as in all cases the thick cormous crown will be quite uninjured, and may, if planted in clean ground, and well watered, soon put out new roots and eventually recover; of course, with the loss of the year's bloom.

By digging well under the injured plants, abundant evidence will be found. Larvae, from soft white fellows to ones in the last stage, will be found down to a depth of six inches. The hatching seems to take place sometime in late summer and early autumn, the newly emerged larvae at once beginning to feed on the tender rootlets of the (preferably) young *Primulas*, and apparently feeding until sometime in the winter, when a hybernation takes place; the awakening from which, and the resumption of feeding taking place in early spring, so that the deadly work is completed by flowering time.

There are some members of the *Primula* family which seem to be immune from the attack. These are ones with hard, wiry roots, like "*Sikkimensis*," "*Juliae*," "*Cortusoides*," and others with their allies. All those with fleshy roots, however, are viciously attacked, hence most of the Alpine and Himalayan species, many of the Chinese, as well as the common English primrose, polyanthi, cowslips, etc., must be watched most carefully if the weevil is in the neighbourhood. As stated, most of the injured plants may be saved, if desired, by replanting the fleshy crowns and keeping well watered in dry weather. Indeed, moisture and weevils do not seem to get along well together, a superfluity of moisture seeming to act as a deterrent. In re-planting, care must, of course, be taken to free the soil of other weevils by means which I will now set forth.

I have found that when weevils are suspected—or as a matter of precaution whether they are suspected or not—it is well to dig up all *Primulas* in September, throwing the plants as dug into a tub of water. Then carefully dig the bed well over, finally turning over with the hands to a depth of at least six inches, destroying all larvae which may be discovered thereby. Then sow the ground well with crude flake naphthaline, perhaps 1 lb. to 20 sq. feet of land, well mixing with the soil. Now go over your plants, well washing the roots clean of all soil and

replant. The water from the washing tub should, of course, be dealt with so that any chance larvae can be destroyed.

I am not prepared, at this stage, to say whether the naphthaline acts as a deterrent, or as an insecticide, but am inclined to think that it kills the larva by acting on its tender skin. That it is effective, I can vouch for, from my own experiments.

Last summer I had a patch of a special variety of strawberry, the soil of which had been well treated with naphthaline. The plants were quite untouched, while just alongside a patch of Alpine Primulas were badly damaged before I, upon returning from one of my trips, discovered the injury and at once took steps to recover my plants by the means just given, which was so sure that in a month's time they were all well established and now promise well for spring blooming.

A Remarkable Simuliid Pupa

Notes on *Simulium Virgatum* in British Columbia

By ERIC HEARLE,

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Introduction

IN THE spring of 1928 a study of British Columbian black flies was commenced in connection with one of the minor projects of the Kamloops laboratory. Among the first specimens encountered during preliminary collecting of immature stages was a pupa with breathing organs of such an unusual character that we consider it to be the most remarkable form of simuliid in this stage yet recorded. We waited for the emergence of adults from the rearing cages with the keenest interest, and had high expectations that we would be rewarded with a representative of a new genus; but instead the adults proved to be ***Simulium virgatum*** Coquillett. This species has previously been recorded only from Mexico, New Mexico, California, S. Dakota and Texas (1, 2, 3, 4, and 5.) The larva and pupa have hitherto been unknown. Coquillett originally described the species in 1903 from material from New Mexico. Dyar and Shannon (2) have placed Malloch's ***hippovorom*** (5) and Knab's ***rubicundulum*** (4) as synonyms of it. It is known to attack horses, as Malloch's single specimen of ***hippovorom*** was obtained from the ear of a horse in Mexico at 7300 feet elevation. The distribution of this species must be remarkably wide, since, in addition to our Kamloops material, there is a specimen in the Canadian