TWO SMALL-FRUIT PESTS.

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†Connected with Second Judicial Department Branch Station.
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RASPBERRY SAW-FLY.

The goddess Hera, realizing the possibilities of future ill to herself that lay undeveloped in the infant Hercules, sent two serpents to strangle him in his cradle. The attempt failed; but her guiding principle: "Nip the evil in the bud," is of great importance to fruit growers in these days of increasing insect pests and plant diseases.

In the case of the raspberry saw-fly the possibility of early discovery and effective subsequent treatment makes it a very easy enemy to combat; but, if neglected, few insects can do so much damage to raspberry and blackberry plantations in a single season as this little relative of the bees. The grower of these fruits should examine the leaves of his bushes carefully in mid-May and later; and if he finds their upper surfaces marked by small, light-colored spots scattered along the midribs and larger veins, he should at once prepare to combat the larvæ of the raspberry saw-fly (Monophadnus rubi). The adult female has already used her saw-like ovipositor and the eggs have been placed just beneath the thin, whitish skin of the leaf’s under surface, where they are increasing in size from the moisture absorbed.

*This is a brief review of Bulletin No. 150 of this Station, on The Raspberry Saw-Fly and The Grape-Vine Flea-Beetle, by V. H. Lowe. Any one specially interested in the detailed account of the investigations will be furnished, on application, with a copy of the complete bulletin; and the names of those who so request will be placed on the Station mailing list to receive future bulletins, popular or complete as desired.
from the leaf tissue, thus producing the light spots which show upon the upper surface. The appearance of the leaf is shown at Plate I, fig. 4; and of the eggs in position, natural size and enlarged, in the same plate at Figs. 2 and 3.

Should inspection have been delayed until late Course May or early June, the eggs will have hatched and the little, pale yellowish-green larvæ will be at work on the under sides of the leaves, well out of sight and almost indistinguishable, both then and later, from their close resemblance in color to the surface upon which they feed. They soon eat holes through the leaves

MALE AND FEMALE SAW-FLIES.
(as shown on the cover) and by the latter part of June, unless checked, will have completely riddled the leaves so that nothing
remains but skeletons, may have injured the buds' and blossoms (Plate I, fig. 1) and even attacked the young shoots and tender bark.

Later stages.

The larvae have now become from one-half to three-fourths of an inch in length, are dark green in color, and are ornamented with a profusion of spines as shown in the upper figures of Plate II. They now leave the canes and enter the ground within two or three feet from the rows. Here they form cocoons from a few threads of silk and a dark-brown, mucilaginous secretion mixed with particles of soil; so that the little pellets are hardly distinguishable from the earth about them. In these small, almost cylindrical cocoons, about one-fourth of an inch long (Plate II, figs. 4 and 5), the larvae pass the winter, gradually changing to pupae; and in early May the perfect insects emerge. These are shown on page 2, the male at Fig. 1 and the female, with her saw-like ovipositor, at Fig. 2.

When the larvae have been present in any season and have not been destroyed before going into cocoons, the ground between the rows of bushes should be thoroughly cultivated late in the fall to bring the cocoons to the surface where the snow and frosts of winter will kill the dormant larvae. As the mature insects are so small and inconspicuous, little dependence can be placed on seeing them in the spring; but careful examination of the young leaves will reveal the light spots above and the eggs beneath; or, later, the tiny larvae and the holes produced by their feeding. The period of activity being so short—only about three weeks—prompt measures must be taken. If the infested patch is a small one or if cheap boy and girl labor is plentiful, the little feeders can be quickly and easily jarred off by giving the canes light blows with a heavy, leafy switch, a light pine branch with a bunch of needles at the end or any convenient instrument. The larvae are so small that they find it very difficult to return to the bushes, especially if the ground between the rows be kept well cultivated and crumbly and if the jarring be done in the heat of the day.

Ordinarily, however, it will be found cheapest and best to spray the canes, either with some arsenical poison, as arsenite of
lime (1 pt. of stock solution to 45 gals. of lime water) or hellebore (1 oz. to 1 gal.) The latter is preferable because of the prejudice against the use of any form of arsenic on rapidly developing fruit and because hellebore does not disfigure either leaves or fruit. Hellebore may also be mixed with twice its weight of plaster or cheap flour and dusted on the leaves early in the morning, but it is difficult to get it upon the under surfaces of the leaves, where the larvae first feed, and to make it adhere. In experiments with the arsenite of lime and with hellebore applied with a sprayer so that both surfaces of all the leaves were thoroughly drenched, one application gave complete control of the pest; while an adjoining unsprayed plat was stripped of its leaves and developed little good fruit.

**GRAPE-VINE FLEA-BEETLE.**

The grape-vine flea-bettle (*Haltica chalybea*), which appeared in large numbers in many vineyards last year, is a very serious pest. Unlike the saw-fly, which is injurious only in the larval stage, both larvae and mature grape-vine flea-beetles feed upon the grape buds and foliage. It is estimated that 10 per ct. of the entire Keuka Lake crop was destroyed by them last season, while near Bluff Point some vineyards were entirely stripped of foliage, no grapes were produced and the vines were much weakened.

**Life history.**

The mature beetles, shown on page 5, much enlarged at *a* and natural size at *c*, are steel blue in color, and are active jumpers, as may be judged by the leg development as shown at the right of *a*. They winter in rubbish about the fields or under loose bark on the vines, becoming active in April and feeding voraciously on the buds. Egg laying begins in late April or early May and by the middle of May the dark brown larvae (enlarged at *b*) are at work (*c*) and continue for about four weeks. A beetle feeding upon a bud is shown at *d*, and others destroyed by a fungous disease at *e*. When full grown the larvae pupate under ground and in late June or early July emerge as mature beetles to continue their destructive feeding all summer.
Prompt and thorough measures are necessary, as much damage is done by the early work of the beetles on the buds and the feeding of larvæ or beetles continues all summer. Spraying with Paris green (1 lb. to 50 gals. of lime water), just before the buds swell or as soon as the beetles are noticed on the vines and again with a weaker mixture (1 lb. Paris green to 150 gals.) when the larvæ appear, will be effectual. Probably arsenite of lime would be equally good and cheaper; but experiments with it have not yet been made. Other remedies used with more or less success are: Scattering air-slaked lime or unleached ashes about the base of the vine to kill the larvæ as they attempt to enter the ground; jarring the beetles onto sheets of cloth saturated with kerosene; and spraying with kerosene emulsion.

Whatever measures are taken, it is essential that the repression be made general throughout a neighborhood; for beetles migrate readily and a single neglected vineyard will soon restock a large district.