NOTES FROM OTTAWA.

Mr. H. F. Hudson, Field Officer of the Entomological Branch, in charge of the Entomological Laboratory at Strathroy, Ont., has given up his Entomological work and has joined the First Battery of the Canadian Field Artillery of the Second Contingent which is expected to leave for England for service abroad early in 1915. He is now in training with his company at London, Ont. The good wishes of his many Entomological friends will go with him.

Mr. J. B. Gareau has been appointed a Field Officer and Inspector of the Entomological Branch and commences his duties on January 1st. Mr. Gareau is a graduate of the Quebec Forestry School and during the last two years has been an officer of the Forest Service of British Columbia. He has also studied under Prof. Kellogg at Stanford University, California from which institution he was appointed. Mr. Gareau will continue the work formerly carried on by Mr. Hudson.

POPULAR AND ECONOMIC ENTOMOLOGY.

DEFORMED APPLES AND THE CAUSES.

BY L. CAESAR, GUELPH, ONT.

It is a very common occurrence in almost every district to find apples that are so deformed that they have to be rejected as culls. Neglected orchards have usually, as one would expect, the greater proportion of such fruit; there are, however, exceptions where the best cared-for orchards suffer severely. Although most of the causes of these deformities have now been discovered there are still some cases that have not yet been solved.

Insect Injuries as a Cause.

The chief insects to which malformed apples may be attributed are Plum Curculio, Apple Curculio, Leaf-bugs or Capsids, Aphids, Apple Maggot or Railroad Worm, Leaf-rollers and Green Fruit-worms. Each of these will now be discussed in turn.

Plum Curculio. Many apples and pears are deformed as a result of the egg-laying and early feeding habits of this small snout-beetle. The injury in such cases is done while the fruit is still small. The eggs in these apples or pears either fail to hatch

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or the young larvæ die very early, because if they live, the fruit almost always falls prematurely. The malformation is due to the tissues immediately around the injured area not growing or growing very slowly while the rest of the apple grows at the normal rate; therefore a depression is produced at the affected part. There are often several such depressions in a fruit. There is usually a scar at the point of injury. Uncultivated and neglected orchards and those bordering on woods or thickets or waste places are regularly much worse attacked than well cultivated and sprayed ones.

Apple Curculio. This is also a snout-beetle. It is smaller than the Plum Curculio, and has a longer and more slender snout.

Fig. 1.—The work of the Apple Curculio. Notice the little holes at the bottom of the punctures and the uniform inverted cone type of the depression.

With this it eats deep holes into the fruit for feeding and egg-laying purposes. As in the case of the Plum Curculio, apples usually drop early if the larvæ from the eggs hatch and live; otherwise they remain on the tree, but are deformed in the manner shown in the photograph. Note the regular inverted, cone-shaped outline of the depression with the little hole at the apex. This helps in the identification of the injury. Apple Curculios are not very common in

most parts of Canada, but there are a few counties in which they do much damage.

Leaf-Bugs or Capsids. These insects have in recent years been found to be the cause of a large number of deformed apples in the Northern United States and in parts of Canada. At least five species are now known to cause malformed apples, viz., *Hetero-*

cordylus malinus, *Lygidea mendax*, *Neurocolpus nubilus*, *Paracalcoris colon* and *Lygus invitus*. The injuries in each case are made while the fruit is still small and are caused by the nymphs or young bugs making deep punctures into it with their needle-like mouth

Fig. 2.—Work of Capsids or Leaf-bugs on apples. This is done when the apples are very small.

parts. The juice is sucked out through these punctures. Very severely injured apples usually drop off. The remainder hang on but are often much distorted in consequence of the punctures received. The nymphs of the first two species are red and easily seen; those of the others are usually greenish or brownish green colour, and are more likely to escape observation. The addition of a tobacco extract, such as Black-leaf 40, to the regular Codling Moth spray will do much to destroy these insects.

Aphids. Most fruit growers are familiar with the clusters of small woody, more or less deformed apples caused by these sucking insects. Wherever the aphids feed upon a young apple, they leave little depressions or dimples. In many cases these depressions disappear with the growth of the apple. The peculiar tenacity with which a badly infested cluster of fruit hangs on the

Fig. 3.—Cluster of small, woody, deformed apples, caused by the feeding of Aphids on twigs, leaves and fruit.

tree seems to be the result of the small amount of food and sap that the fruit and fruit stems receive in consequence of the feeding of the insects on the leaves and new growth of the branch that bears the cluster. Such partial starvation produces tough tissues in stems and fruit.

Apple Maggot or Railroad Worm.—If the fruit is only slightly infested with this insect it seldom produces any noticeable deformity except the very small depressions where the eggs are laid, but if the infestation is severe almost every apple on the tree may be rendered unsightly by ridges and bulges on the surface. These are partly the result of numerous egg punctures and partly of the death and therefore failure to grow of tissues here and there just beneath the skin wherever the larvæ happened to tunnel when feeding.

Leaf-Rollers and Green Fruit Worms.—These are greenish caterpillars that attack the apples soon after they are formed and frequently eat deep holes in them. As the apples grow these injuries callous over but are often so deep that the fruit is distorted and cannot be marketed. Any other biting insect that eats out similar areas may also cause a deformed fruit.

Other Causes of Deformities.

Although most of the deformities of apples are caused by insects, a number is due to some of the following factors: Frost injury, fungus diseases, imperfect fertilization, Bitter Pit disease or spray injury.

Frost Injury.—Fruit recently set may become partly frozen with the result that the injured area will fail to develop normally and a malformed apple will be produced. It is claimed that frost injury to blossom buds may also cause deformed fruits.

Fungous Diseases. Any fungus disease, such as Apple Scab, which attacks one side of the apple much worse than the other, will by interfering with the growth of that side cause a deformity.

Bitter Pit Disease.—This is a disease of apples due neither to a fungus nor a bacterium, but so far as known to weather conditions. Good growing weather in spring, or early summer

followed by drought, seems in Ontario to be the chief cause. Soil conditions and the individuality of the tree are apparently contributing factors. The disease takes various forms; sometimes the apples look quite sound but, when cut open, are found to have dry dead areas here and there through them; at other times, especially in the case of Baldwins, the surface is pitted with

Fig. 4.—Duchess Apple deformed by a very severe attack of Bitter Pit Disease.

small depressed areas that are at first somewhat darker in colour than the rest of the epidermis and later turn brown; in still other cases the injury inside the fruit is so severe that the whole apple becomes much distorted and unfit for use. This last kind of injury is not nearly so common as either of the others.

Imperfect Fertilization.—If during the blossom period one or more of the pistils of the fruit fails to be fertilized the result is often a lop-sided or malformed fruit.

Spray Injury.—Sometimes spray mixtures, especially Bordeaux, injures a portion of the epidermis of a young fruit and, if the injury is sufficiently deep, will cause an interruption in the growth of that side and consequently a deformity. The failure of the surface over these injuries to keep pace with the growth of the tissues beneath often leads to its becoming cracked.

A NEW SPECIES OF THE GENUS NEPHROCERUS.

BY CHARLES W. JOHNSON, BOSTON, MASS.

The determination of the two American species of this genus has presented some difficulties owing to the dearth of material and to their close resemblance to some of the European species. Through the kindness of Mr. Frederick Knab, I have been able to study both sexes of *N. daeckei* and the specimen of the undescribed species collected by Mrs. A. T. Slosson, on Mt. Washington, N. H., in 1897. During the past two seasons six specimens of the latter have been collected, thus giving ample material to define more clearly our two species.

The following table, including the three European species will show some of the structural characters separating them from the American species:—

TABLE OF SPECIES.

1. Last tarsal joints of all the legs without conspicuously long, bristly hairs, arista entirely black.....	<i>lapponica</i> Zett.
Last tarsal joints of all the legs with 4-7 long, bristly hairs.....	2
2. Hind tibiae rather twisted, widened at the end, and with a circle of bristles at the tip.....	<i>flavicornis</i> Zett.

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