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Entomology.

Injurious Insects—No. 1.

BY JAMES FLETCHER, F. L. S., F, R. S. C., DOMINION ENTOMOLOGIST, OTTAWA, ONT.

FIG. 1.

In response to an invitation from the editor, I have promised to prepare a series of illustrated articles for publication in the FARMER'S ADVOCATE upon injurious insects, and the best remedies for their attacks. In these articles, the most injurious insects which attack the crops in Canada will be treated of as nearly as possible a little before the season of the year when it is most advantageous to apply the best known remedy. It will be impossible always to carry out this plan closely, but I hope to warn farmers who read the ADVOCATE, before the injuries occur, so that they may be on their guard to protect their crops on the first appearance of the enemy.

The study of the habits, classification and structure of insects, is known by the name of entomology, which is a compound word derived from the Greek, and means *a discourse on insects*. Economic entomology deals particularly with injurious insects, and its object is the discovery of remedies for their attacks, or of means to protect our crops or other property against their depredations.

To the question, What is an insect? many people would probably answer, "Oh! an insect is a bug." Speaking accurately, this is not the case, although, on the other hand, it is true that a bug is an insect. The name *bug* properly belongs only to the members of the small order Hemiptera, which are known by the nature of their wing, by their mouth parts being always in the shape of a hollow tube, and by their generally having the power to emit an unpleasant odor. Examples of true bugs are shown enlarged at fig. 2. and 3. The first of these, the Tarnished Plant-bug, is an exceedingly injurious pest, attacking almost all kinds of vegetation, and the latter has the delectable habit of feeding upon its relative, the common bed bug. Most people know in a general sort of way that a certain object, as a locust (fig. 1), a bug (fig. 2), a fly (fig. 3), or a beetle (fig. 4 *d*), is an insect, but it may not be amiss to give a proper definition of the word. An insect is a small animal having its body divided (*insected*, —whence the name insect) into rings, with an external skeleton, and breathing not through its mouth like other animals, but by means of air tubes running through its whole body, and which generally have external openings along the sides. An insect passes through four distinct stages of development, in all of which it may present very different aspects. In the perfect state it has the body divided into three main divisions, viz., (i) the head, bearing the mouth parts, the eyes and the sensitive organs called the feelers; (ii) the thorax, which bears the organs of locomotion—the wings (generally two pairs) and feet (three pairs); and (iii) the abdomen, the seat of the organs of digestion and reproduction.

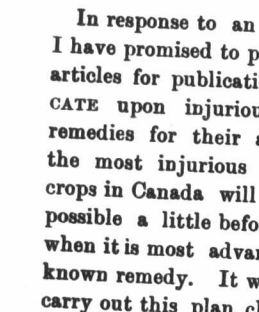

FIG. 2.

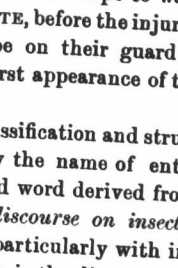

FIG. 3.

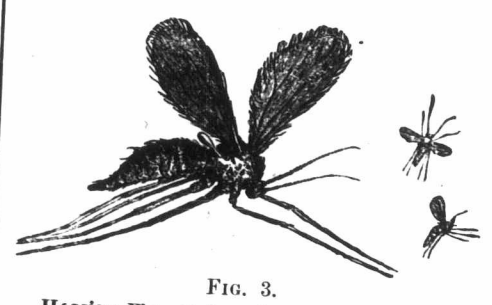

FIG. 3.

Hessian Fly.—Enlarged and Natural Size.

Insects are never, as some people think, generated spontaneously from decaying animal or vegetable matter; but all are produced from eggs (fig. 6 *a*, *c*, *d*,) laid by a mother insect, to which when they are mature they will be exactly similar. From the egg hatches the *larva* or second stage of an insect's life. The word larva means a mask, and signifies that the true form of the perfect insect is hidden from view in this stage of its growth. It is in this second stage that most of our insect enemies commit their depredations. The larvæ of the different orders of insects vary very much. The larvæ of moths and butterflies are caterpillars (fig. 5); of flies, maggots; of beetles (fig. 4 *a*) and wasps, grubs; the word worm should never be applied to insects.

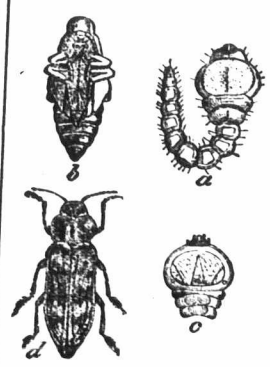

FIG. 4.

FIG. 5.

The third stage of an insect's life is called the chrysalis or *pupa*. The first of these names means golden, and was given because some butterflies in this stage are frequently ornamented with golden marks. The word *pupa* signifies a mummy or a baby trussed in bandages, as was formerly the custom amongst the Romans, and is to-day still practised by some Indians. It is appropriately applied to this stage, as may be seen at fig. 4 *b*, where all the parts of the future beetle are recognizable; but as yet they are soft and weak. From the pupa in due time the perfect insect emerges. At fig. 4 the grub, pupa, and perfect insect of the Flatheaded Apple-tree Borer are shown, and at fig. 6 *a* is a cluster of the eggs of the Forest Tent Caterpillar. At *c* and *d* enlarged views of the eggs are given. Fig. 5 shows the caterpillar, fig. 6 *b* the perfect moth.

Few farmers recognize the true extent even of their own losses from the attacks of injurious insects; but they see enough to convince them that of all the enemies against which they have to contend, there are none which demand such constant attention as these apparently insignificant foes. The study of insects has assumed an importance second to no other department of natural history, on account of its direct bearing upon agriculture, horticulture and forestry. The amount of damage done to crops every year is so vast, that the figures excite incredulity from those who do not study crop statistics. The following figures will illustrate this: In 1864 the loss from the attacks of the Chinch bug on cereals in the one state of Illinois was $73,000,000. In Missouri in 1874 it was $19,000,000, and in 1887 in Iowa $25,000,000, and lastly, in nine states which were infested by this insect in 1887 no less than $60,000,000 worth of grain was destroyed. This is only one example of what serious injury a single kind of insect can do when it is allowed to increase in undue numbers. It has been stated that there is probably no crop grown which is not reduced every year one-tenth by its insect depredators, and that each plant supports an average of 4 or 5 different kinds of insects. Many forest and fruit trees are particularly liable to attack by insects. Dr. A. S. Packard says that the oak harbors between five and six hundred species; the hickory, 140; the birch, over 100; the maple, 85; the poplar, 72; and the pine over 100, while the apple tree affords maintenance to over 200 different kinds.

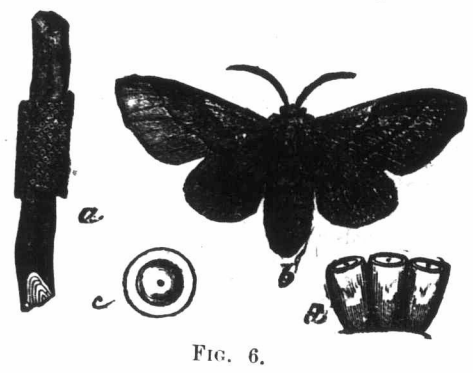

FIG. 6.

Now, this loss is going on around us every year, and comparatively little is being done to prevent it. For most of the troublesome injurious insects remedies have already been discovered, and this great loss is, therefore, unnecessary. It is my wish to make known as soon as possible any remedies which may save the farmer from loss. I shall, therefore, be pleased to answer, through the columns of the ADVOCATE, any questions about injurious insects and their treatment which may be sent in either through the editor or to me direct to Ottawa.