

species. Many complete their growth within a week, while others continue from one to several years. The average larval life among herbivorous insects is about four weeks. When the limit of growth is reached the larva ceases to feed and prepares for its first transformation. Some creep into crevices of stones or bark, or hide among crumpled leaves. A large proportion burrow into the earth, some spin for their protection silken or parchment-like cocoons, while others require nothing more than a retired nook in which to suspend themselves by slender but strong cables of silk. This is the pupa or resting state in which most insects pass the winter. After a certain time varying with the nature of the insect and the season of the year the second transformation takes place and the insect issues from the pupa-case in its mature or perfect form. And it certainly does appear wonderful that from the crawling maggot should come the active fly, from the soft grub the hard-shelled beetle, or from the repulsive caterpillar the beautiful moth or butterfly. But in addition to being a matter of interest a knowledge of the life history of insects is of no small importance. For at one or another of its stages of development, in the life history of nearly every insect, there is a time when its increase in numbers can be best checked. For example the *bot-fly of the horse* may be most easily destroyed by scraping the eggs from the horse's legs before they are licked off and taken into the animal's stomach. Most of the foliage-eating insects may be most easily killed by poisoning the voracious larva. Large numbers of the *Hessian fly* may be destroyed by burning the flax-seed like pupae in the fine screenings from the threshing machine and fanning mill. While in the perfect or imago state the *plum curculio* is most readily captured in sheets when shaken from the trees.

Successful warfare may however be waged against many insects in more than one stage of their development, and the man best acquainted with the different guises of his insect enemies, will be most able to direct his attack to the weakest point in different quarters.

Another item of great importance to the agriculturist, is a knowledge of the manner in which the different injurious insects feed, for upon this will depend the method of applying insecticides. All insects may in a general way, be divided into two classes: Those having well developed jaws and that chew their food, such as cut-worms, tomato worms, potato

beetles, etc., and those obtaining their nourishment like a mosquito, by inserting a sharp proboscis through which they suck the juice of the plant or animal upon which they feed. To this class belong the squash bugs, leafhoppers and all the many forms of plant lice, as well as bed bugs and animal lice.

As insects differ in their nature and manner of taking food, it is evident that the agriculturist must vary his methods of prevention and remedy according to the insects against which he may be fighting. As already intimated the attacks of some insects may be prevented, and as prevention is better than cure, such means should be devised whenever possible. These may be often found out through a knowledge of the life history of the insect under consideration. For instance, turnip flea-beetles make their appearance early in spring, live on whatever cruciferous plants they may find, lay eggs for a second brood and soon die. If turnips are sown so as to be well into the second leaf before the second brood of beetles appears, the crop may escape injury altogether. This period, usually sometime in June, varies with different localities and must be discovered by the farmer for his own neighborhood. The sheep tick being a wingless fly and passing its whole life on the sheep, when entirely exterminated may be got rid of for all time if the sheep are carefully prevented from re-infection from new animals added to the flock.

Climbing cut-worms, often so injurious to the leaves and buds of fruit trees, remain concealed during the day, just beneath the surface of the ground, and ascend the trees and commit their depredations in the night; such may be prevented by putting tar bands about the trunk of the trees.

In many ways preventive remedies may be of great value, but along with these more deadly remedies must often be resorted to. The best remedies known for many injurious insects are far from satisfactory. But the farmer should as far as possible, keep up with the times in the use of insect remedies. All should read the best agricultural and horticultural journals, and all who can should obtain and read carefully the annual report of the Ontario Entomological Society. He should know at least the standard remedies, and be able to prepare and apply them in proportions that will destroy the insects without injuring the foliage.