

**THE UNIVERSITY OF KANSAS,  
LAWRENCE. DEPARTMENT  
OF ENTOMOLOGY; COMMON  
INJURIOUS INSECTS OF KANSAS**

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LAWRENCE.

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DEPARTMENT OF ENTOMOLOGY.

F. H. SNOW, Ph. D.  
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COMMON INJURIOUS INSECTS  
OF KANSAS.

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BY  
*S. J. S. S. S.*  
VERNON L. KELLOGG.

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THE UNIVERSITY:

1892.

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## PREFATORY NOTE.

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The fact that Kansas is annually sustaining a large financial loss because of the attacks of injurious insects on its cereal, garden and fruit crops, a considerable part of which loss is needlessly suffered, is excuse for this pamphlet. Only the commoner, or more important, insect pests working within the State are considered. Nor are all the important pests included; though, of cereal pests, I believe most, if not all, are included.

In compiling the information presented herewith, the writings of reputable economic entomologists, generally, have been consulted and relied on. Bruner of Nebraska, Comstock of New York, Forbes of Illinois, Lintner of New York, Osborn of Iowa, Riley of the United States Agricultural Department, Saunders of Canada, Smith of New Jersey, Weed of New Hampshire, and others, are such entomologists. The Kansas notes have been derived from the reports of the State Board of Agriculture and the State Horticultural Society; from the published notes of Prof. F. H. Snow, of the University of Kansas, Prof. E. A. Popenoe, of the State Agricultural College, and Mr. G. C. Brackett, secretary of the State Horticultural Society; and from the unpublished notes of the Department of Entomology in the University. For valuable suggestions constantly offered during the course of compilation, I am indebted to Chancellor F. H. Snow and Dr. S. W. Williston, of the University.

VERNON L. KELLOGG.

UNIVERSITY OF KANSAS, November 14, 1892.

## ACKNOWLEDGMENTS.

My thanks are due Mr. G. C. Brackett, secretary of the Kansas State Horticultural Society, who most kindly put at my disposal electrotypes of figures 4, 87, 88, 39, 40, 41, 42, 43, 44, 46 (4), 48, 49, 50, 52, 54. All of these figures are original with Dr. C. V. Riley.

The electrotyle of figure 45 was loaned by Prof. E. A. Popenoe, of the State Agricultural College, Manhattan.

The plate so fully illustrating the life-history of the Hessian Fly, figure 16, the various parts original with Riley, Burgess, and Packard, was loaned by Hon. M. Mohler, secretary of the State Board of Agriculture.

The plates for all the other figures (excepting figures 1 and 13, both after Riley) were made expressly for this volume by A. Zeese & Co., of Chicago, from original drawings, and from reduced, rearranged or otherwise altered copies of existing plates, as follows: Figures 2, 3, 5, 7, *e* of 12, *a* of 14, *a*, *c* of 17, *a* of 19, 20, 21, 22, 23, *b*, *d*, *e*, *f*, *g*, *h* of 24, *a* of 25, *c*, *d*, *e* of 27, 28 (2), *b*, *d* of 29, *a* of 30, *a* of 31, *a* of 32, *a* of 33, *c*, *d* of 34, 35 (3), 53, *a* of 56, 56 (5), *b*, *c* of 57, 59, *a* of 60, and *a*, *b*, *c* of 61, are from original drawings made by Miss Mary Wellman, under direction. Figure 6 is a copy of figures selected from plate 1 (J. H. Emerton), First Annual Report of the U. S. Entomological Commission, 1878; figure 8 is a copy of figures from plate 7, Thirteenth Report of the Illinois State Entomologist (Prof. S. A. Forbes); figure 9 is after H. A. Garman; figures 10 and 11 are copies (reduced and rearranged) in outline of the colored figures of plates A and B, Seventeenth Report of the State Entomologist of Illinois (Prof. S. A. Forbes); *a*, *b*, *c*, *d* of figure 12 are figure 6; *b* and *c* of figure 14, *e* and *f* of 16, figure 18, and *b* of 19, are after Riley; *c* and *d* of figure 15 are after Glover; *b* and *d* of figure 17 are after Forbes; *a* and *c* of figure 24 are after H. E. Weed; *b* and *c* of figure 25 are after Curtis; figure 26 is after a cut in the *American Naturalist* (*Tyroglyphus sacchari*); *a* and *b* of figure 27, *c* of figure 29, *b* of figure 31, *b* of figure 32, *b* of figure 33, are after Riley; *b* of figure 30 is after Scudder; *a* and *b* of figure 34 are after Popenoe; *a* of figure 36 is after Riley, and *b* is after Weed; figure 47 is a rearranged copy of portions of a figure original with Riley; figure 51 is after Packard and Saunders; *b* of figure 55 is after Popenoe; *a* of figure 57 is after Riley; figure 58 is after Claparède; *b* and *c* of figure 60 are after Riley.

## INTRODUCTION.

The knowledge of entomology desired by farmers is, as a rule, limited by the actual demands of profitable farming. A knowledge of the life-histories of the Chinch-bug and Hessian Fly is certainly a necessary requisite of the most profitable farming in Kansas; one might even say of any profitable farming. The fruit-grower should know something about borers and Codlin Moths as well as about grafting. But more than this necessary entomological knowledge—and this knowledge is all gathered about the practical application of it, the how and why of remedies—is not being loudly called for by the grain- and vegetable- and fruit-growers. Hence entomological text-books are not crowding everything else off the parlor tables in the farm homes; and a bug is a bug and not much else, to the worker in the fields. It is a fact, however, that the men who do pay some attention to the bugs are helping themselves. For the intelligent application of insecticides (insect-killing substances), some little should be known of the general economy of insect life, and that little may be briefly told.

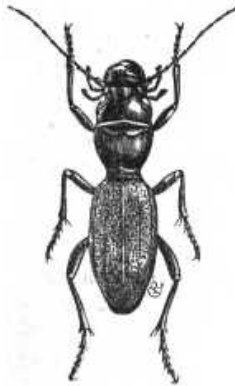


FIG. 1. A BEETLE, with biting mouth-parts.

Broadly speaking, insects may be divided into two great groups, namely, biting insects and sucking insects. The biting insects have jaws, or mandibles, moving laterally, instead of vertically as with us, and fitted for tearing off and masticating foliage, fruits, bark, and even hard wood. They take into their mouths and swallow the succulent tissues of the plant leaf or the dry, tough fibers of woody tissue. They take "solid food." The beetles and the grasshoppers are insects possessing typical biting mouth-parts. The sucking insects, on the



other hand, have the mouth-parts more or less completely combined into a hollow, pointed beak, which may be thrust through protecting outer envelopes to get at the juices of plants and even animals. The sucking insects live on liquid food. The true bugs, including such well-known forms as the Chinch-bug, Squash-bug, and the plant-lice, are insects possessing typical sucking beaks.

This broad distinction between biting and sucking insects is an attractive one, but, unfortunately for its immediate use as a basis for generalizations concerning practical work, complications arise because of the wonderful character of the growth of certain insects. While the young of the Chinch-bug much resemble the parent, having a true sucking beak, and lacking only the wings which are present in the adult, the young of the butterfly or of the moth do not at all resemble the parent forms, and, correlated with the difference in resemblance, have wholly different habits. The adult Tomato-worm Moth, for example, has a

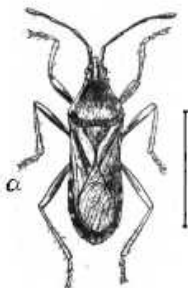


FIG. 2. SQUASH-BUG, with sucking mouth-parts.

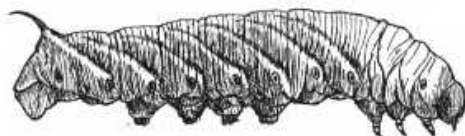


FIG. 3. TOMATO WORM.

long, slender tube, which serves for sucking up honey from the deep nectaries of flowers; the young of this moth is the great disgusting, green "worm," or, more properly, caterpillar, which is furnished with a pair of strong, biting jaws. Thus we have an insect which, in one stage of its life, is a biting insect, and, in another stage, is a sucking insect.

This difference between the different stages of insect life tends to make the study of insects, as taken up by the economic entomologist, more difficult than at first sight it might appear to be. When we speak of biting insects, we must include in our minds not only those insects which, as adults, are biting, but we must

have in mind, also, the young form of certain orders of insects which, as adults, are really sucking insects.

When we come to consider remedies, it is evident at once that remedies whose effectiveness consists in the fact that the foliage which is eaten by the insects is poisoned by being covered with a coating of some arsenical mixture cannot be used against sucking insects who get their food from the inside of the leaves. And it is evident that barriers around tree trunks, or around plats of ground, which might surely prevent the progress of the wingless caterpillars and worms, would not at all prevent the winged adult forms (the moths, etc.) of the insects — which adult forms lay the eggs from which the caterpillars are hatched — from getting into the tree tops, or into the plats of ground.

It is important to discover at what time in an insect's life remedies may be best applied; different remedies will be demanded by the different life-stages of the same insect. The life-stages of insects should be pretty fairly understood by anyone who hopes to carry on an intelligently-directed warfare with the insect pests of his farm or garden. First, there is the egg — deposited usually on the food-plant of the insect, so that the newly-hatched larvæ or caterpillars may run no risk of starving while hunting for their proper food. Often the insect may be veritably nipped in the bud, if we may become acquainted with its favorite place of oviposition, and destroy the eggs. Or, by protecting the plant, we may prevent the laying of eggs on it. (See recommendations for Spring Canker-worm.)

The second stage is, in insects which undergo a complete metamorphosis, the worm-like, caterpillar, grub or maggot stage, the young of various insects being thus variously termed. By entomologists this is called the larval stage, and the young, whether grub or maggot or caterpillar, is called the *larva*. This term will be used frequently in the succeeding pages, and its meaning should be remembered. In this stage most insect injury is done. The larvæ of moths and butterflies are the voracious caterpillars, as those of the Codlin Moth, the Tomato-worm, the Wheat-head Army-worm, the Garden Web-worm, the Fall Army-worm, the Spring Canker-worm, the Fall Web-worm, the Bag-worm, the Maple-worm, the Walnut-moth Worm, the Tussock-moth Worm, and the Clothes-moth Worm. The adult or moth forms of these insects are absolutely innocuous so far as devouring plant tissue

goes, but from them come the eggs from which the ravaging larvæ issue.

The next stage is the pupal or chrysalid stage, in which the insect lies inactive within a hard protecting shell or case. This

stage is passed either in the ground or in some place of shelter beneath stones, or boards, in crevices of bark, or even buried in seeds (as with the Pea- and Bean-weevils), or in the trunks of trees (as with the Apple-tree Borer). The changing from the larval stage to this quiescent or pupal stage is called *pupation*,

or, the larva is said to *pupate*. These terms are frequently used hereafter. During this stage the insect takes no food, but is undergoing within its protecting bodily structure which result in the issuance of the beautiful white- and rose-tinted moth, with its four wings and delicate sucking tube, from a chrysalis which was formed by the pupation of the crawling, biting, sluggish, green Maple-worm.

The fourth stage is that of the adult insect; the one real mission of which is the perpetuation of the species. As before said, no injury is done by the adult moths and butterflies, nor by the four-winged hymenopterous insects, (the Raspberry- and Rose-slug Saw-flies,) but many beetles are seriously injurious in the adult stage, as the Cucumber Beetle and others.

All insects, however, do not undergo such a complete metamorphosis, and four distinct stages cannot be made out in the lives

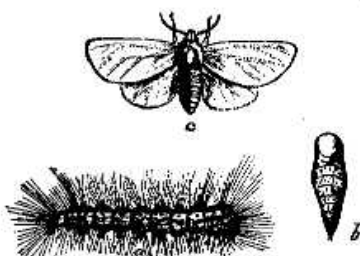


FIG. 4. FALL WEB-WORM MOTH, an insect which undergoes "complete metamorphosis;" a, larval form; b, pupal form; c, adult or moth form.

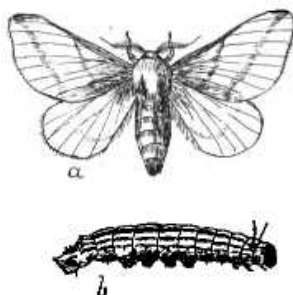


FIG. 5. MAPLE WORM; a, adult or moth; b, larva or "worm."