

ADDITIONAL NOTES ON THE ARMY WORM (*Leucania unipuncta*).
By C. V. RILEY, of Washington, D. C.

[ABSTRACT.]

It was my privilege to lay before you in a paper published in our Proceedings for 1876 (Sec. B, p. 279) certain facts regarding the Army Worm up to that time unrecorded. The widespread appearance of the worm the present year has enabled me to revise some of the views then entertained and derived from the facts then at hand.

Number of annual Generations.—Experiments at St. Louis showed conclusively that there were always two and sometimes three generations in that latitude. Subsequent experience leads me to believe that there may be one more there and that farther south there is a succession of generations with scarcely any intermission during mild winters. The prevailing impression has been that there is but one annual brood in the more northern States. This impression has resulted, doubtless, from the worms appearing in vast numbers once a year or about the time that wheat is ripening. The truth, however, seems to be that even in New England there is at least one other generation of worms, usually unnoticed and more slowly developing and existing during the autumn, winter and early spring months.

Hibernation.—In my previous paper proof was given of hibernation in the moth or imago state, and the possibility of the species hibernating in any of the three states of egg, larva and chrysalis was admitted. During the past year accumulative evidence of the hibernation of the moth, especially towards the South, has been obtained, it being one of the commonest hibernating moths which I have found in the Southern States. The fact of hibernation in the larva state has also now been established, both by the occurrence of a partly grown larva in the stomach of a Blue-bird taken at Normal, Ill., by Prof. S. A. Forbes as early as March 19, or before vegetation could have fairly started,¹ and from its having been received at the Department of Agriculture from South Carolina and Tennessee during the months of December, January and February of the past mild winter, with accounts

¹This larva was identified by myself and there can be no question as to its proper determination.

of injury done by it. That larval hibernation is far more general than has hitherto been supposed, even in the more northern States, is rendered probable by the lateness of the season at which the worms have been found. It is now, therefore, an established fact that the species does hibernate both as larva and as moth, with strong circumstantial evidence that it also hibernates, particularly northward, as a chrysalis; but we have no evidence that it can hibernate in the egg. The fact of larval hibernation at once explains why the burning over of meadows in winter time is beneficial as a preventive, and it was upon the result of such burning that we heretofore depended for the theory of hibernation in the egg state.

All the facts at command seem to indicate that the hibernating individuals, whether worms or moths, are never numerous enough to attract especial attention, and that it is the brood generated from moths that have either themselves hibernated or are developed from worms that have, which is destructive.

Immigration versus local Increase.—It is evident also from what has preceded that we may have excessive injury either as the resultant of natural local increase, or of the sudden appearance of the moths flying in great numbers from other localities and concentrating in particular fields. This will account for the variation in the time when the injury is done, as it is well known that the worms appeared at "Deer Range farm," at Islip, L. I., the latter part of May of this year, or three weeks earlier than in other parts of the island, that farm being on a neck of land extending into Great South Bay to which the moths could have flown from farther south on the New Jersey or Delaware coast where the worms were known to have been destructive.

Why wet wild Grasses seem to harbor the Worms.—That low, swampy, wild grass lands are the favorite resort of this insect, as Dr. Fitch assumed, is now rendered very doubtful. Old neglected fields, whatever their elevation or location, have proved to be natural breeding places, and if the worms more often appear in low lands or the neighborhood of such, the fact doubtless finds, as I have elsewhere stated, more correct explanation, first, in the highly probable fact that the parent moth gets more appropriate food at such places, either in saccharine exudations, the "sweat" of the plants, or the moisture of the ground; secondly, in the well observed fact that such lands afford the greatest extent of

neglected meadows where the insect has opportunity to multiply unnoticed by man and undisturbed by cattle.

Connection of wet and dry Seasons with Army Worm Increase.—The past history of Army Worm years shows conclusively that dry seasons are favorable to the multiplication of the insect. Fitch's theory that such excessive multiplication occurred only during a wet season following the dry ones, required that the Spring of the present year should be a wet one, whereas, throughout the Atlantic States where the worm has been destructive, the exceptional drought has been proverbial. We must, therefore, believe that the Army Worm is most likely to appear in destructive numbers after dry seasons, regardless of the wetness of the season in which it does so appear; though moist cloudy weather, rather than hot dry weather, is without doubt favorable to the development of the species.

SOME RECENT PRACTICAL RESULTS OF THE COTTON WORM INQUIRY BY THE U. S. ENTOMOLOGICAL COMMISSION. By C. V. RILEY, of Washington, D. C.

THE Cotton Worm (*Aletia argillacea* Hübn.¹) has already formed the subject of two papers read at recent meetings of the Association. A year ago I presented some of the facts and conclusions regarding the habits and natural history of the insect, that had up to that time grown out of the investigation begun by me three years ago under the Department of Agriculture and continued under the auspices of the U. S. Entomological Commission. It is my purpose in the present short paper to present a few of the more practical results obtained up to the present time.

PRINCIPLES ESTABLISHED.

While experience and methods must vary, there are certain underlying facts and principles which we have fully established, and which should everywhere guide, since they obtain all over the cotton belt. Among the more important of these that have a practical bearing are the following:

¹ *Anomis xyliana*, Say.