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Note on Probable Life History of *Crepidodera* (*Epitrix*) *cucumeris*, Ham.

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it be? These are questions harder to answer. The first, however, is really not hard to answer. Financial support is a necessity first and other things follow. Much valuable work may be done without very expensive apparatus, but all apparatus costs something. Perhaps there is no method but that of appealing to the state to lay the foundation by an appropriation, then perhaps some of the superstructure could be erected from fees. As an answer to the second question, regarding the control of the station, one that offers itself is that the State Academy of Sciences should have control by whatever means seemed most desirable.

NOTE ON PROBABLE LIFE HISTORY OF CREPIDODERA (EPITRIX) CUCUMERIS, HAM.

BY F. A. SIRRINE.

During the winter of 1894 and 1895 a trouble known as "Pimply potatoes," among potato growers, was brought to our attention. As the trouble appeared to be some skin disease, it was turned over to M. F. C. Stewart, the mycologist. At the time he came to no definite conclusion as to what the trouble might be. Early in the fall of 1895 Mr. Stewart obtained a quantity of "Pimply potatoes" for microscopic examination. It was found that the pimples covered what appeared to be a brown "sliver" in the flesh of the potato. This "sliver" proved to be a tube lined with broken starchless cells, the starch grains usually occurring free within the tube. Our natural conclusion was that the trouble was caused by the puncture of some insect and that the pimple resulted as an effort of the growing potato to heal the puncture. No trace of castings could be found within the tube, hence it appeared that the tube was not the result of larval mining, nor could it have been made for the deposition of an egg, for in such a case the tube would have shown larval castings. Thus it appeared as if the puncture must be the work of some "snout beetle," or of some hemipterous insect.

A close watch for the depredator was maintained during the past summer. I had my eye on the adult of a new seed stalk weevil *Centorhynchus seriesetosus* Dietz, of kale, turnip and cabbage.

On July 7th Mr. Stewart found a small thread-like white worm, about one-sixth of an inch long, burrowing into potatoes. He also found small white bodies in the soil around the potatoes. The white bodies were found to be pupæ of some of the flea beetles. They were bred, issuing in about eight days as adult *Crepidodera cucumeris*. About two weeks after the grubs were found mining the potatoes they issued as adult beetles and proved to be *Crepidodera cucumeris*.

There is a leaning to the theory that the potato flea-beetle is double brooded in this section, Long Island. I think that this is based on the fact that the beetles appear quite numerous in April and early in May on plantain and various other weeds. I have seen no evidence of their pairing at this season—in fact they were not observed pairing until June. Furthermore they were very destructive to potato and tomato vines the past season from the time the plants came up until the middle of June, at which time the beetles commenced to diminish in numbers. From the middle of July until August they appeared again in such numbers that they soon made the potato fields appear as if a hot wind had struck them.

A close watch was kept for signs of another brood after the July brood. No signs of pairing were noticed. The adult beetles appeared to gradually disappear, until late in October scarcely a single beetle could be found.

As the facts stand there is probably but one brood of the potato flea-beetle a year. The eggs are probably dropped during the month of June to the ground from whatever plant the adults are feeding upon. The larva hatch and work their way to the roots and tubers of the plants upon which they feed. The pupa stage is passed in a naked state in the surrounding soil. The adults issue in July and August, feeding awhile, then scatter to hibernate. They come out early the following spring, feed on various plants until the latter part of May, or until June, at which time they begin to pair and deposit their eggs.

The larvæ are only about one-sixth of an inch long. They are provided with three pairs of true legs and a single anal leg. They have a peculiar habit of resting at nearly right angles to the object on which they are feeding. They will remain in this position even after the root or tuber upon which they are feeding has been removed from the ground. They rarely mine more than the length of the body into the root or tuber. These

mines are barely large enough to more than admit of the larva getting into them—in fact it requires considerable effort on the part of the larva to back out of one of these mines, when disturbed.

It was found that some varieties of potatoes contained more pimples than other varieties. It was also found that varieties which did not contain many “pimples” often contained as many “slivers” or tubes as the more “pimplly” varieties. At the same time potatoes in all varieties could be found with “slivers” where no pimples had been formed. Whether “pimples” are formed only at certain stages of growth of the potato, or whether some varieties form “pimples” while others do not, is still a question.

CONTRIBUTIONS TO THE HEMIPTEROUS FAUNA OF IOWA.

BY HERBERT OSBORN AND E. D. BALL.

I. ON THE LIFE-HISTORY OF JASSIDÆ.

(With descriptions of new species and a review of the genus *Deltoccephalus*.)

In various papers published during the past five years the senior author has called attention to the injuries caused in grass lands and pastures by the numerous species of Jassidæ, which swarm, often by millions to the acre, upon various species of grasses.

In these papers it has been shown that the loss, though seldom noticed, must be really enormous, and that by the use of the tar pan or “hopper-dozer” the insects may be to a great extent destroyed. Further than this, however, our knowledge has been too meager to furnish a certain basis for remedial measures. It is true studies were made of a few species and some facts learned as to their life-history which warranted the belief that burning, mowing, etc., might be of service, but still so much remained unknown regarding even the most common species, that there seemed a necessity for a more exhaustive study. At the beginning of the present season (1896) a study was planned, the essential features of which were: First, a determination of the life histories of as many as possible of the species known to feed upon grasses. Second, the determination of the range of