

As the larva approaches maturity and is about to change to a chrysalis, the colour of the body gradually grows darker until it becomes dark reddish brown, the sides nearly black. The minute whitish granulations and the blue dots become much more distinctly visible, giving the larva a very different appearance. It then selects some suitable spot in which to pass the chrysalis state, where it spins a web of silk in which its hind feet are entangled, and having prepared and stretched across a silken band to sustain its body in the middle, it casts its larva skin and remains a dull brownish chrysalis until the following spring.

This insect is widely distributed, being found throughout the greater portion of the United States and Canada. The larva feeds on a number of different trees, but chiefly affects with us the apple, cherry, thorn and basswood.

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### THE USE OF APHIS-EXCRETION AND BENEFIT DERIVED THEREFROM.

BY THOMAS G. GENTRY, GERMANTOWN, PA.

It is well known to the popular as well as scientific world that the *Aphides* secrete or rather excrete a peculiarly viscid and honey-like fluid which forms one of the chief delicacies of Ants. That it was originally designed to form an article of food for the latter is a supposition that cannot be entertained for a single moment; but that it is in some way connected with the preservation of the soft and tender beings by which it is manufactured, there can be no reasonable doubt. Various opinions have been hazarded, and not a few theories devised to account for its probable origin and use and the material benefit which it secures to the authors thereof, but these have been of such an unsatisfactory character as not to merit the approval of the learned.

While some writers have surmised its application to be connected in some way with the wants of the newly-born *Aphis*, still the lack of evidence confirmatory of any such surmise has caused it to fall into neglect and disuse.

That this fluid has both a primary and a secondary purpose to subserve in the economy of the plant louse is a fact the truth of which stands off as gross as black from white. Recently, while engaged in the study of the

*Aphis* which particularly infests the blossoms of *Cucurbita ovifera*, I had the happy satisfaction of being a witness of a phenomenon which promised to solve the knotty problem. After a few moments of calm and deliberate reflection upon what I observed, the entire theory, the details of which I am about to delineate, became almost intuitively outlined upon my mind.

Feeding upon the flowers of this plant were hundreds of lice, the groupings of which not even a careless and hasty observer could fail to detect. There, like the patriarchal tribes we read about, were observable group after group, each composed of a head and a family of children of diverse ages and sizes. In the arrangement the young and newly-born, as if requiring the first care and earliest attention of the mother, were closely in her rear, the proximity to her presence in the case of the residue being apparently determined by their age.

While intently scrutinizing the actions of the various groups, one little fellow was observed to caress its parent by means of its antennæ, as if soliciting the bestowal of a favor. After the lapse of some few seconds the mother, acting in obedience to the child's wishes as thus expressed, slowly elevated the posterior part of her abdomen and ejected a honey drop upon the head of the latter, apparently to its infinite delight and satisfaction. It is my honest opinion, evidenced by repeated observations, that it is only during the first two days of the life of the offspring that this process of feeding is necessary, the digestive organs at this period being too feeble and delicate to partake of the strong juice of the flower without the entailment of injury. But after undergoing remarkable changes in the alimentary laboratory it becomes deprived of its injurious properties and rendered fit for the sustenance of life.

In conjunction with the previous discovery I remarked that the older and stronger seldom, if ever, deviated from the path over which their maternal head had passed, but seemed to find their chief good attained by following closely therein. It seems just to conclude that this would not be if they were amply qualified to look after their own temporal welfare ; but on the ground that parental provision and attention are still indispensable, the reason is obvious.

Plant lice being vigorous feeders, the manufacture and excretion of this fluid would necessarily be very great and profuse, and as nature does not work in vain, it might be argued that it is a sort of compensation which the insect lavishes upon the plant for the losses which it

momentarily sustains. But to this opinion I cannot assent, as experience teaches me that the plant does not receive the least benefit therefrom. Even if it possessed any healing virtues, these could not manifest any marked effects, owing to the very rapid multiplication of the lice, which are constantly probing the wounds by means of their puctorial apparatus and thus serving to heighten instead of lightening the evil. Viewing the subject in this light, nature would seem to be defeating her own ends.

It is true that these highly mischievous creatures are slightly held in check by a few species of the Ichneumonidæ, Syrphidæ and Coccinellidæ, but their rate of increase is so enormously out of proportion to the number of their enemies that very little good results to plants.

From the preceding remarks it is evident to the mind of every candid reasoner that plants receive no material advantage from this excretion. It now remains to indicate its use. That it is of great service to the newly born *Aphis*, totally unfitted as it is both by nature and by structure to imbibe the strong, yet sometimes acrid and bitter fluids of plants, there can be no doubt. But as the supply is clearly above the requirements of such, why the excess? Most assuredly to serve as *pabulum* for their stronger companions. How? By uniting with the plant's forced excretion, thus diluting and rendering it a suitable material for imbibition and digestion. That its primary use is to serve as food for the lice during their early existence I think from the argument adduced must be obvious to all.

That a secondary purpose also is subserved thereby, to wit, the preservation of the species, there are just grounds for belief. It is well known to naturalists that ants do not merely possess a fondness for sugar, gums and saccharine solutions, but that they also manifest a decided penchant for the rich juices and tender tissues of animals; the liquids and solids of humbler forms of insect life being sought after and devoured with avidity, save when the animals possess some peculiar properties that recommend them to the mercy of their enemies.

There is no doubt that the soft and juicy *Aphis*, which is esteemed such a rich morsel of food by the *Coccinella*, was primitively as delicious to the *Formica*, and that it shared equally with other feeble creatures of its class the murderous assaults of the latter. This condition of things doubtless continued for ages, until there appeared on the scene an ant possessed of more sagacity than any of its fellows.

This ant having discovered the hidden virtues of the *Aphis* excretion there would dawn a new era in the history of the two species. The news of this discovery would doubtless become diffused not only through the colony of which this ant formed a part, but through the entire species and kindred species, for the *Formicidae*, as is well known, exhibit in a remarkable manner the power of communicating their thoughts, wishes, &c., to each other.

As ants are endowed with a high degree of intelligence, considering the place which they occupy in the scale of created existence, they would not be slow to perceive that their chief good would be best attained by taking under protection the little creatures which are the authors of this luxury. From this time the ants would gradually abandon their sanguinary propensities, and little by little manifest their solicitude and regard for the latter by gentle strokes and caresses. The lice in turn perceiving the latter's disposition to friendliness, would cease by degrees to regard them as enemies, and would learn to cater to their physical wants. Thus would be developed these amicable relations which are known to exist between them, and which so admirably tend to their mutual good.

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#### MICRO - LEPIDOPTERA.

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BY V. T. CHAMBERS, COVINGTON, KENTUCKY.

Continued from Page 232, vol. v.

#### BUTALIS.

*B. fuscicomella*, Clem.

*B. flavifrontella*, Clem.

Both of these species occur abundantly in this locality; but the latter (my specimens can be nothing else) has the apical vein furcate before the apex, whilst Dr. Clemens says that it is simple. Mr. Stainton says it may be *B. basilaris*, Zeller.

*B. matutella*? Clem.

I am not altogether certain that my specimens belong to this species which I know only by Dr. Clemen's description. The neuration of the wings in my specimens is the same with that of Dr. Clemen's species as