

the body, their outline being indicated by the prominence due to their beaded structure. Spiracles dark, with no trace of light annuli. Observed during the middle of October, in the vicinity of Bristol, Penn., feeding upon the frost-bitten leaves of *Nicotiana tabacum*.

#### CONCLUSIONS.

That the abnormal forms described above should present such curious deviations from the ordinary normal type, is to me a rather interesting occurrence. That they are to be considered as the effects of a legitimate cause is a settled conviction in my mind. What the cause is it will be my aim to show. Happening at a period when the leaves of plants show a diminished state of vitality, and are assuming the characteristic hues of the season in consequence of the introduction of chemical changes into their parenchymatous material, it seems that the variations are in some way connected with *defective nutrition*. The unusually small sizes of the larvae, when compared with the normal forms, add great weight to such an opinion.

It will be seen that the colors of the caterpillars rival those of the changing leaves. In few cases all the transitional color stages from the natural one of the larva to that which is last assumed, were distinctly observed by the writer, thus clearly proving the two facts to be connected with each other in the relation of effect and cause.

If the beautiful and varied shades of green which many caterpillars present can be attributed to the green and granular chlorophyl of the leaves upon which they subsist, the conclusion must be irresistible that when chemical or other changes are inaugurated in the parenchyma of the leaf, thereby inducing color changes, the introduction of such food into the insect's economy must give rise to changes therein which will have a tendency to vary its external coloration and markings.

'Tis true that the variable colors of animals in many cases are brought about through the influence of the *will*. The changeableness of our ordinary *Hyla versicolor*, Lec., might be cited as an example, and the number of such might be prolonged to considerable length, but the cases are so numerous and so well known that it would not be advisable to give them notice in a paper like the present. In the above example the color variableness serves to conceal the animal from its enemies by adapting it to the colors of objects upon which it chances to place itself.