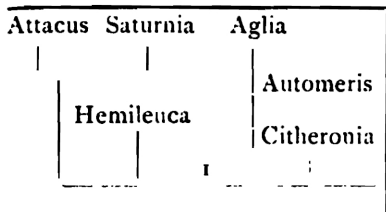


## NOTES ON THE PHYLOGENY OF THE SATURNIANS.

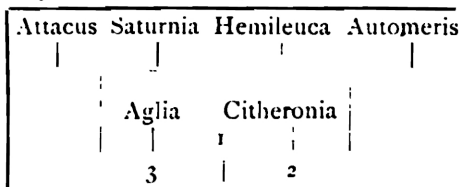
BY HARRISON G. DYAR, PH. D., NEW YORK.

Mr. Grote's remark (CAN. ENT., XXVIII., p. 294) that the stinging spines of *Hemileuca* and *Automeris* may have been separately evolved is not in accordance with my views, and I wish to compare his genealogical tree of the Saturnians with the larval characters more at length than was possible in the review of his paper, "Die Saturniiden." I reproduce first his tree: At 1 there is a dichotomous division, the genera on the right having vein  $IV_2$  in the middle of the cell or but slightly moved (generalized);



those on the left with vein  $IV_2$  considerably moved toward  $IV_1$ . It is not proved that this movement of  $IV_2$  took place only once in the Saturnians, but it is so assumed, and the construction of the tree depends upon the assumption.

Next I present a tree founded on larval characters, using the same generic types. At 1 is a dichotomous division, the larvæ on the right retaining the unpaired tubercle on joint 13 and losing those on the anal plate; on the left losing the unpaired tubercle and retaining the pair on the anal plate. At 2 is another division, the two genera above acquiring stinging spines, while *Citheronia* remains without them. At 3 the stem of *Attacus-Saturnia* acquires many haired, reduced tubercles, while *Aglia* retains the single haired primitive condition and degenerates.



A comparison shows that these two trees are contradictory, the position assigned to *Aglia* and *Hemileuca* being almost exactly transposed. Yet, if rightly interpreted, there should be no contradiction between larval and imaginal characters.

If Mr. Grote's tree is correct, *Aglia* must have reacquired tubercles on the anal plate, because it is derived from the stem of *Citheronia* after *Automeris* was thrown off, and neither of these genera possess these tubercles. Likewise, *Hemileuca* has independently lost these tubercles, unless we suppose that originally they were not present, but were acquired separately by *Attacus-Saturnia* and *Aglia*. This can not be, however, as

the tubercles are primary, not recently developed structures. *Automeris* and *Hemileuca* must have separately acquired stinging spines and not from "an initiatory existence in a common ancestor," as Mr. Grote puts it, because there is no such condition in *Aglia* or *Citheronia*, which are placed between them, nor any evidence that these genera are derived from wart-bearing ancestors, a condition necessary for the multiple spine formation. I regard these conditions as very improbable.

If my larval tree is correct, *Aglia* has remained more nearly in the primitive condition in regard to vein  $IV_2$  in that this vein is only slightly moved toward  $IV_1$ . Yet, it is somewhat moved, which weakens Mr. Grote's point (see the fig. *Die Sat.*, p. 19, fig. 8). *Hemileuca* has followed out the same process separately; derived from a common stem with *Automeris*, vein  $IV_2$  has moved close to  $IV_1$  separately from the *Attacus* branch. *Hemileuca* is separately specialized in this respect.

Some collateral evidence may help to a conclusion. If these moths be separated on the position of the wings in rest, the wings folded over the back in the shape of a roof or with the upper faces together (as in butterflies) a tree results like the larval one. In the hind wings there are two anal veins in *Hemileuca* and *Citheronia*, the rest have one. A tree constructed on these characters (which I believe to be as good as the one selected by Mr. Grote) would be different from either. To reconcile it with my tree, it must be supposed that the left-hand branch had lost one anal vein, while *Automeris* on the right branch also lost it, but separately. To reconcile it with Mr. Grote's tree, three separate losses of anal vein must be supposed, viz., in *Automeris*, *Aglia*, and *Attacus-Saturnia*. My view is here the simpler.

As to the pectinations of the antennæ in the male, those of *Hemileuca* only have simple branches; in the female only *Attacus-Saturnia* have them double. Mr. Grote may suppose that the original ancestor had single pectinations in both sexes, retained in *Hemileuca*; the right branch acquired double pectinations in the male, while *Attacus-Saturnia* separately acquired them in both sexes, which seems improbable.

In my larval tree the ancestor must have already possessed double pectinations in the male, which became transferred to the female also in *Attacus-Saturnia*, but were lost by degeneration in the male of *Hemileuca*. It is true that this supposition can also be applied to Mr. Grote's tree, so that we are not greatly benefited by the consideration. Other characters will have to be compared; but this I will leave to Mr. Grote, with the

hope that he will examine the matter thoroughly. I believe he will find that the true natural classification is not far from that which I have indicated on larval characters.

Finally, this is perhaps as good a place as any in which to protest against Dr. Skinner's remarks in a recent number of the *Journ. N. Y. Ent. Soc.* Dr. Skinner says: "I may say right here that I believe the imago the culmination of nature's efforts, and that while studies of transformations are most valuable, they will not solve the problem of specific difference or identity." This is not the view of a careful student of the subject, but reads like an excuse for neglecting studies of the early stages. As if the *larva* were not often the "culmination of nature's effort," as in *Apatela* or the *Limacodidæ*, or as if the forces determining the struggle for existence must always impinge most strongly on the same stage in all species.

#### DESCRIPTION OF TWO REMARKABLE ABERRATIONS OF *COLIAS PHILODICE*.

BY DWIGHT BRAINERD, MONTREAL.

We were fortunate in taking a very peculiar pair of *Colias philodice* this summer. They were captured at Edgartown, Mass., in a little salt marsh, August 10th and 14th respectively, and, though hatched during the hot wave, we believe are blood relations — part of a sport brood.

Many specimens were examined at the time, but no other departures from the type found.

Number one is a male very similar to the melanic variety figured by Mr. W. H. Edwards on Plate III. of *Colias* in *Butt. N. A.*, second series. The colouring on trunk and appendages is normal, except that pile on dorsum is mouse-gray, the collar a more decided brick-red than usual, and the yellows, where present, match the deep chrome on wings.

When caught, the whole upper surface (with exception of a dusting of yellow on costal margin of the primaries and a pallid green-white strip on the secondaries from costal margin to and following the radius for three-quarters of its length, gradually becoming obsolete) was a deep bottle-green. On drying, the marginal bands, both wings, appeared as a slight, but uniform, reddish-purple stain, the indentations regularly lunulate, and the nervules came prominently out in dull black lines.

The spot on discal vein of fore wings is present and distinct, but a dark blotch replaces the usual orange patch on secondaries. The rosy marginal line is as in type.