

Camponotus herculeanus Latr. var. *pictus*
For.

Formica fusca L. *subpolita* Mayr.

Lasius nigra. L.

The collection consisted of 22 species,

of one of which there was not sufficient material for determination, but apparently it is distinct from any species hitherto found in New England.

THE SO-CALLED MANDIBLES OF SPIDERS.

BY WILLIAM A. RILEY, ITHACA, N. Y.

Regarding the homologies of the first pair of appendages of the arachnids there has always been a question. According to the prevailing view they correspond to the mandibles of insects and are therefore generally referred to as mandibles. The evidence indicates that this application of the term is incorrect.

In 1816 Savigny expressed himself against any attempt to homologize the head appendages of the arachnids with those of insects. He believed that in arachnids the first pair of appendages, commonly known as mandibles, in reality represented a modified pair of legs.

A little later Latreille, '29, advanced the view that the so-called mandibles are, in fact, the homologues of the second antennae of Crustacea. He stated that this is evident from a comparison with the second antennae of Crustacea and especially with those of the order Poecilopodes (*Limulus*.) As indicative of this homology he introduced the term *chelicerae*, (Gr. *chēlē*, claw + *keras*, horn), or *antennes-pinces*.

Following Latreille a number of prominent zoologists have referred to the chelicerae as homologous with the antennae of crustaceans and insects. Thus, Siebold, '48, says "This view of Latreille is the correct one, since the nerves of those organs do not arise from the abdominal ganglia, but directly from the brain, as those of the antennae of Crustacea and Insecta." Ed. Burnett, '54, p. 374. Blackwell, '52, while admitting, as highly probable, this homology, proposes as more non-committal the term *falces* instead of Latreille's term *chelicerae*.

While drawing most of their evidence from the Crustacea these authors have uniformly spoken of the appendages in question as corresponding to the antennae of insects. Thus, Simon, '92, p. 29, states that the first antennae of Crustacea are not represented in the arachnids and insects but that the second antennae find their homologues in the antennae of insects and the chelicerae of arachnids.

Those who hold to the view expressed by Simon have fallen into the error of assuming the homology of the antennae of Crustacea and of Hexapoda. But,

as Viallanes and others have shown, the evidence of both comparative anatomy and embryology, clearly indicates that the antennae of the Hexapoda are the homologues, not of the *second*, but of the *first* antennae or *antennules* of the Crustacea. This is evidenced by the fact that the antennae of insects and the first antennae of Crustacea are innervated by the deutocerebral ganglia while the second antennae of Crustacea are innervated by the tritocerebral ganglia. The question then is as to whether Latreille was correct in regarding the chelicerae as homologous with the second antennae of Crustacea.

The evidence at hand leaves little doubt as to the correctness of this view. It is supported not only by comparative morphology but by physiological and embryological data.

Although physiological evidence may be of doubtful value as a criterion for determining homology it is interesting to note that, as pointed out by St. Remy, the first antennae are primarily olfactory organs while the chelicerae, like the second antennae, are primarily tactile organs.

From the embryological side the most striking evidence has been the discovery, by several investigators, of evanescent appendages lying in front of the rudiments of the chelicerae. The most definite account of these vestigial antennae is that of Jaworowski, '91, who discovered them in the embryos of *Trochosa singoriensis*.

Latreille's theory has been assailed by

Balfour, '80, and others on the ground that the ganglia of the chelicerae are primitively suboesophageal, like those of the mandibles of insects and that they only secondarily pass forward to unite with the supraoesophageal ganglia. This argument loses weight when we consider the fact that the ganglia of both pairs of *antennae* were primitively postoral in position. Indeed, Pelseneer, '85, has shown that even in the *adult* of *Apus*, a phyllopod, the second antennae are innervated by suboesophageal ganglia. Moreover, the studies of Balfour antedate the establishment of the existence, in insects, of a premandibular segment corresponding to the second antennae and having its ganglia at first postoral.

A more serious objection has been urged by Viallanes, '93, who believes that the chelicerae are the homologues of the first antennae. He states that in the adult arachnids the cerebral segment innervating the chelicerae has its commissure entirely preoesophageal and that therefore it cannot be homologous with the tritocerebral or second antennal. As bearing on this argument it is interesting to note that Janet, 99, regards the postoesophageal commissure as a compound of fibers from the three primitive commissures of the proto-, deuto-, and tritocerebral ganglia. The argument of Viallanes can also be met by the evidence that both pairs of antennae were primitively postoral in position. If in the crustaceans and insects the deutocerebrum has become entirely

preoesophageal, why may we not have in arachnids a condition in which even the tritocerebrum has assumed this position? Indeed, the acceptance of Jaworowski's work as demonstrating the presence of vestiges of true first antennae leaves us no other alternative.

The evidence therefore goes to show that while in the insects the first pair of antennae is retained throughout life, in the arachnids it is the second pair which is represented by the chelicerae. In both groups the missing pair may be present in the form of embryonic vestiges.

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GROUP CHARACTERISTICS OF SOME NORTH AMERICAN BUTTERFLIES — I.

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Some years since I announced as in preparation a Student's Manual of North American Butterflies, north of Mexico, and a fragment of the same was published in 1892 (Proc. Amer. Acad. Arts Sci., XXVII) under the title, The tropical faunal element of our southern Nymphalinae systematically treated. Owing

to other demands upon my time progress upon this Manual has been very slow, and I am now compelled to abandon the project. Such few portions as are in any way complete, mostly written ten years or more ago, I bring together in the following series of papers, in the hope that their publication may be of some



Riley, William A. 1902. "The So-Called Mandibles of Spiders." *Psyche* 9, 368–370. <https://doi.org/10.1155/1902/71080>.

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