XII. *Notes on the genus* Prosopistoma *of Latreille.* By J. O. Westwood, M.A., F.L.S., Pres. Ent. Soc., &c.

[Read 4th April, 1877.]

Geoffroy, the historian of the insects of the environs of Paris (v. 2, 17, p. 660, pl. 21, fig. 3), first made us acquainted with a small aquatic insect, under the name of "Le Binocle à queue en plumet," which he placed amongst the Apterous genera, and which subsequently received the names of *Binoculus pennigerus*, Latreille, and *Binocle pisciforme*, Dumeril. The insect must evidently be of great rarity, as no Entomologist appears, until recently, to have met with it except its original describer, and its minute organization was not sufficiently described to allow of all its relations being discovered. In the same genus *Binocle*, Geoffroy introduced also the *Apus caneriformis* and the *Argulus foliaceus*.

In 1833 Latreille, however, recalled attention to this almost unknown animal in a memoir which he published in the "Nouvelles Annales du Muséum d'Histoire Naturelle," t. ii. p. 23, entitled "Description d'un nouveau genre de Crustacés," established on an insect which he had found in a box of Madagascar *Coleoptera*, having much the appearance of a *Gyrinus*, and which he did not hesitate to regard as congeneric with Geoffroy's *Binoculus*. The Madagascar specimens were unfortunately in a more or less mutilated condition; and after a comparison of their structure (with such details as had been given by Geoffroy), and that of such genera as *Apus*, *Limulus*, &c., Latreille came to the conclusion that the insects in question could not be arranged with any known Entomostracous or Branchiopodous group, and that, "de tous les Entomostracés ou Branchiopodes, la coupe qui doit les comprendre est, par la composition de la tête, offrant deux antennes, deux yeux à réseau, quatre appendices maxillaires, représentant les mandibules et les mâchoires et une lame mentonnière, ainsi que par le nombre et la forme des pattes, la plus rapprochée des insectes proprement dits." Although the Madagascar specimens exhibited no terminal

filaments, Latreille added in his characters of the genus (to which he gave the name of *Prosopistoma*): "Abdomen en forme de petite queue, composé de quatre segments, dont le dernier applati, presque semi-circulaire, portant des *filets barbus branchiaux et rétractiles*," on the authority of Geoffroy's original description, and which, his young friend Audouin had affirmed, existed in the Madagascar insect, "retirés" within the terminal segment of the body. "Il est probable," adds Latreille, "que ces organes servent à la natation et à la respiration et font l'office des branchies; car Geoffroy a observé que l'espèce, par lui décrite, agite précipitamment la queue: ces Crustacés n'ont d'ailleurs aucun autre appendice que l'on puisse regarder comme propre à cette dernière fonction."

Latreille terminates his observations on his new genus with the remark, "Ce genre semble devoir former à lui seul une famille particulière, terminant la division des Crustacés dentés ou munis de mâchoires. Cependant, jusqu'à ce que de nouvelles recherches nous aient parfaitement dévoilé l'organisation buccale, et que nous soyons assurés qu'il n'existe point de siphon, nous suspendrons notre jugement." Lastly, Latreille gave the specific name of *Pr. variegatum* to the Madagascar insect, and that of *Pr. punctifrons* to Geoffroy's French species.

In 1872, appeared in the Annales des Sciences Naturelles, 5 Ser., Zool., t. xvi. Art. 7, a memoir by Messrs. N. & E. Joly, entitled, "Etudes sur le prétendu Crustacé, au sujet duquel Latreille a crée le genre Prosopistoma, et qui n'est autre chose qu'un véritable insecte hexapode;" "un véritable insecte, encore incomplètement développé, encore dans cet état que les naturalistes Anglais designent sous la denomination heureuse, mais un peu élastique, de 'an immature condition,' une larve aquatique d'Ephémérine."

This unexpected conclusion was arrived at by these authors in consequence of one of them having rediscovered it in September, 1868, in the basin of the Garonne, near the Island of Grands Ramiers, and thus being able to make a complete examination of the more important internal organs of the creature than could be obtained from dried individuals or from the incomplete description of Geoffroy.

The most important of the structures observed by these authors is the discovery of a tracheal system of respiration, announced as follows: "S'il pouvait rester encore quelques doutes sur la vraie nature du prétendu Crustacé de Geoffroy, de Dumeril, et de Latreille, tous ces doutes seraient dissipés à la fois par la seule présence des trachées qu'on observe chez lui. Or, des dissections minutieuses et que nous croyons exemptes d'erreur, nous ont appris qu'il existe sous la carapace, à la partie latérale des cinq premiers segments abdominaux de notre animal, cinq paires de fausses branchies très-analogues à celles de plusieurs larves d'Ephémérines, et notamment du genre Cænis." An elaborate plate of details accompanies this memoir, from which the figures in Plate V. are copied, and which are here introduced in order to allow comparison with them of the various details observed by myself in examining Latreille's existing types of his Madagascar species, which I had the pleasure to find and obtain, in one of my visits to Paris, in the wreck of his collection of the minute Crustacea and other Linnean apterous insects.

M. E. Joly has published several other papers on the insect of Geoffroy, in the Mémoires de la Société des Sciences Naturelles de Cherbourg, 1871, t. xvi.; also, "Nouvelles recherches tendant à établir que le prétendu Crustacé, décrit par Latreille sous le nom de Prosopistoma, est un véritable insecte de la tribu des Ephémérines," published in the Revue des Sciences Naturelles (of Montpellier), tome iv. Juin, 1875;* also an article "Sur le Prosopistoma," in the Feuille des Jeunes Naturalistes, 1er Mars, 1876, Sixième Année, No. 65; and "Notes sur les caractères d'un larve d'insectes de la famille des Ephémérines" (Rev. Soc. Sav. (2) iii.). This larva, found near Toulouse, possesses respiratory organs protected by two trapezoidal lamellæ, and is doubtingly referred to the genus *Cænis*.

The figures of *Prosopistoma punctifrons* and its details, which M. E. Joly has given in the Annales des Sciences Naturelles (5 Ser. Zool., tom. xvi. pl. 13), disagree in many important particulars from the examination which I have been able to make of a specimen of that species sent by M. Joly himself to Mr. MacLachlan, and which I find

* In this memoir, Messrs. Joly have endeavoured to prove the correctness of their opinion as to the Ephemerideous nature of these creatures, by the discovery of the singular New Zealand Ephemerideous *Oniscigaster Wakefieldi* of MacLachlan (Il. Linn. Soc. xii. p. 145), and the pupa of *Baetisca obesa* of Say, figured and described by Walsh.

to agree almost entirely with the Madagascar specimens of Latreille.

The semicircular head in the animal itself exhibits in front of its upper surface a distinct transverse upper lip, and on its under surface a decidedly marked triangular space, the former corresponding in position with the upper lip, and the latter evidently representing an under lip or mentum—of neither of these parts is there any trace in M. Joly's figure.* The antennæ are extremely small and scarcely extend beyond the impressed spaces in which they are inserted. With the exception of the triangular space above noticed the under surface of the head is flat and entire, exhibiting no trace (in all the specimens of both species) of any of the mouth organs or mask spoken of by Latreille and Joly, the latter of whom represents the trophi as, apparently, partially visible through the flat under-covering of the head. The ocelli represented by M. Joly appear to me to be very questionable. Between the antennal impressions are two minute punctures placed transversely, and behind them a small central tubercle. In *P. variegatum* there is a very slender, waved, raised line in front of the eyes, like a pair of tubercles, within which this line is directed nearer to the hind margin of the head, having between it and the margin two small dark dots, which have been regarded as the posterior ocelli by M. Joly. The large entire carapace, convex and longitudinally ridged above and flat beneath, entirely recalls to mind the shell of a tortoise. The sternum is clearly divisible by slight impressions into three parts,† the anterior (prosternum) being more distinct than the others and considerably longer and more distinct than is represented by M. Joly. The mesosternum terminates between the base of the middle legs, and the metasternum seems formed of four pieces, the first terminating transversely between the third pair of legs, whilst the other three divisions form the triangular space extending to a point as far back as the extremity of the posterior femora. Here there is a distinct transverse articulation forming a joint, considerably narrower than the hind part of the carapace, obliquely truncate on each side. This articulation is the part represented in M. Joly's figure 3, as C 5, but which

* Both these structures are, however, indicated in M. Joly's more recent figures.

† None of these divisions are indicated in M. Joly's recent figures.

he has misdrawn by making its posterior lateral angles extend outwards. The preceding space on each side of the pointed metasternum is regarded by M. Joly in all his articles as abdominal, and is actually lettered C 1, C 2, C 3, and C 4, as so many abdominal segments, respecting which I can only observe that in both species I have failed to see any trace of articulation except that between C 4 and C 5, as above mentioned. M. Joly further represents, in the middle of the hind margin of his C 5, a small tongue-like piece, which he describes as "les deux valves à travers l'orifice desquelles s'échappe l'eau qui a baigné les fausses branchies." I have seen nothing of these valves. The terminal part of the body in all the specimens before me consists of three segments, the first and second of which are very short, with the lateral posterior angles produced to a point, and the third is large, with the anterior and lateral margins raised with a sharp edge, giving the appearance of a basal division, which M. Joly has enlarged into a distinct segment, making the merely rounded and slightly concave portion of the segment quite distinct from the other part, with its posterior edge scalloped,* and with a circular opening in the centre, which he terms the "ouverture anal." In all my specimens the hinder margin is entire and sharp, and the upper surface without any aperture.

In none of my specimens is there to be seen any trace of the three anal filaments which M. Joly represents as nearly the third of the length of the entire body.

The want of sufficient materials has prevented me from instituting an examination of the structure of the mouth organs or of the respiratory apparatus as figured by M. E. Joly.

He represents the labrum as transverse and ciliated, with the anterior lateral angles rounded off, and the middle of the fore margin slightly produced (his fig. 5); the mandibles (fig. 7) and maxillæ (fig. 8) as elongated, terminating in several sharp teeth (the maxillæ having an extra and stronger bifid tooth), below which are a few strong curved bristles, and the lower lip (fig. 6) as emarginated at the sides, and rounded in front with two small palpi, having

* In his more recent figures, M. Joly has represented the extremity of his 4th abdominal segment as truncate, with three ridges produced by the bases of the three anal filaments.

a very short basal and a longer elongate-ovate terminal joint. The antennæ are represented (his fig. 14) as 4-jointed and cylindrical, the joints gradually shortening to the tips.

My object in the preceding observations has been to describe the precise structure of the singular creatures under examination. I by no means wish to disparage, in the slightest degree, the value of the admirable deduction which Messrs. Joly have arrived at as to the insect-nature of *Prosopistoma*, founded on the examination of recent specimens. Further, with the example of my *Branchiotoma Spongillæ* (now ascertained to be the larva of one of the *Hemerobiidæ*) before us, we need scarcely be surprised if *Prosopistoma* should prove to be the larva of an Ephemerideous fly. Its whole character is, however, so anomalous and unlike that of any other Ephemerideous larva, that direct observation alone of its transformations will be required to confirm the opinions of Messrs. Joly.

DESCRIPTION OF THE FIGURES.

PLATE IV. (Division B.)

Fig. 1. *Prosopistoma variegatum*, magnified; seen from above.
Fig. 2. The same, ventral surface.
Fig. 3. One of the six legs of ditto.
Fig. 4. One of the maxillæ terminating in a group of four strong curved bristles, with a single one detached. The long basal piece on the right side of the figure may possibly be extraneous.
Fig. 5. Extremity of the body of *P. punctifrons*. (From M. Joly.)

PLATE V.

(*Copied from the figures published by Messrs. Joly.*)

Fig. 1. *Prosopistoma punctifrons*, magnified. From "Annales des Sci. Nat. Zool.," Ser. V., Zool., vol. xvi., pl. 13, shewing, *a*, the trophi, *m*, the 'lèvre inférieure' or 'espèce de masque,' and 1, 2, 3, 4, 5, the first five segments of the abdomen.
Fig. 2. Underside of the head.
Fig. 3. The labrum.
Fig. 4. One of the mandibles.
Fig. 5. One of the maxillæ.
Fig. 6. The labium with its palpi.
Fig. 7. One of the antennæ.
Fig. 8. Portion of the tracheo-branchial apparatus.
Fig. 9. The two valves of the posterior margin of the carapace, shewing the minute carmine molecules which escaped with the water used in respiration.
Fig. 10. The corrected figure of the same animal (from the "Feuille des Jeunes Naturalistes," 1st March, 1876); seen from above.
Fig. 11. The same (from ditto); seen from below.
Fig. 12. The terminal segments of the body; seen from above. (From the "Annales des Sci. Nat.")

XIII. *On the Adult Larvæ of the* Stylopidæ *and their Puparia.* By Sir Sidney Smith Saunders, C.M.G. With Remarks and Figures, by Professor Westwood, M.A., &c., Pres. Ent. Soc.

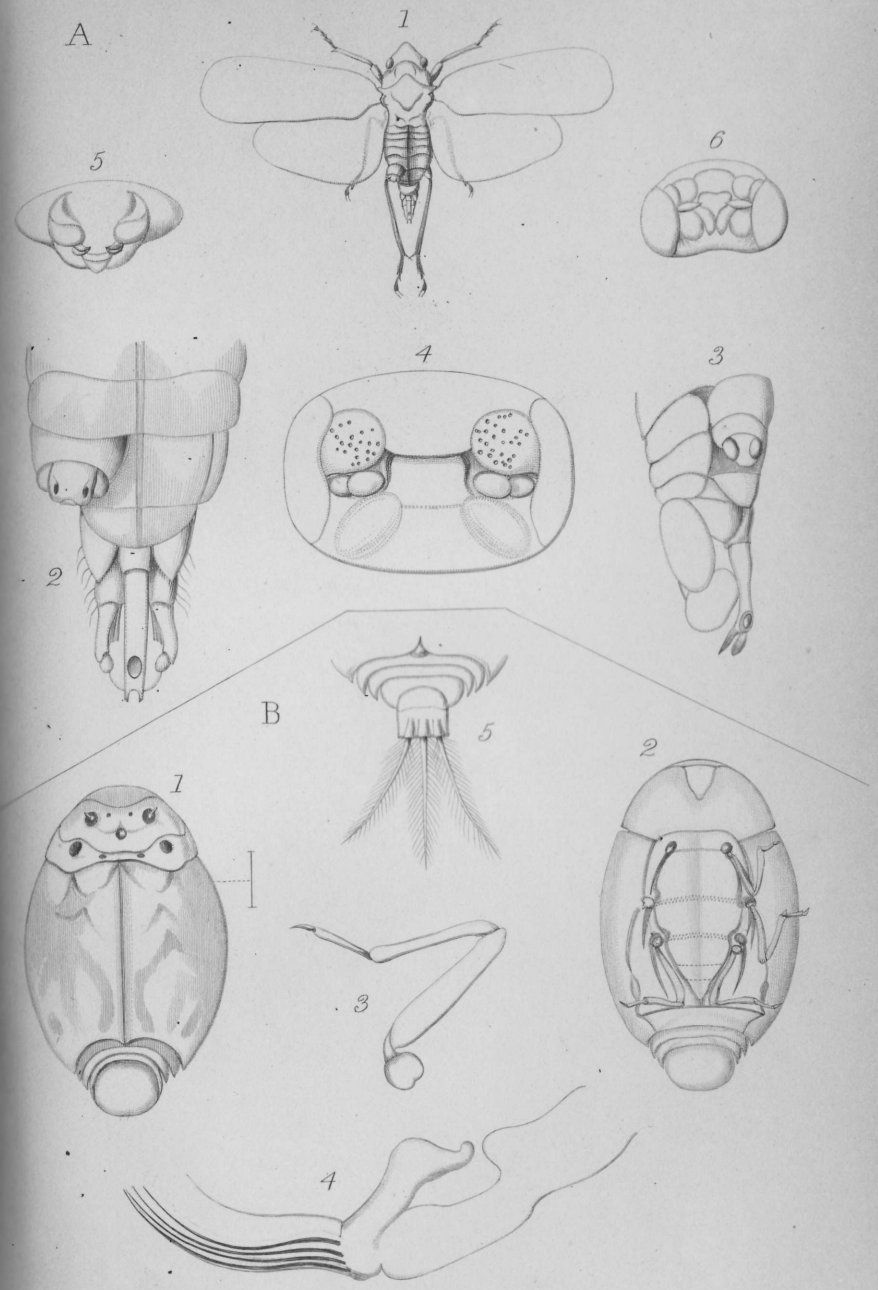
[Read 2nd May, 1877.]

The President having called attention to the position of the adult larvæ of *Stylopidæ*, preparatory to their ultimate metamorphoses, as indicated by the head-caps of their puparia, in connexion with the remarkable Homopterous parasite of this family, described in his memoir read at our last meeting, I have brought for inspection two puparia of *Stylops* (from Hampstead), with their head-caps re-attached in situ, and several other head-caps of like origin, some having the anterior segments of the puparia still connected therewith; shewing that, contrary to the position in which the imago *Stylops* emerges, the adult larvæ, like those of *Xenos* and its allies, are accustomed to penetrate between the abdominal segments in a *reversed* position, with the *ventral region uppermost*.

It is well known that all the *females* of this family occupy the same relative position *inter se*, when protruded from the abdominal segments of the Hymenopterous insects upon which they have subsisted; the *convex* region of the cephalothorax, outwardly exhibited, being regarded by Siebold as the *ventral*, and the *concave* as the *dorsal* region;* whereas in some genera the *males* are accustomed to emerge in the imago-form with their feet directed towards the abdomen of their foster-parents, and in others reversed, as figured by Professor Westwood in our Transactions (Vol. 2, N. S., pl. 16, figs. 1, 2).

But although the true *Stylops*, and others reared within the soft-bodied Mellifera, effect their exit from the puparium in what we may term a natural position, with their feet towards the abdomen of the bee, yet, by a careful examination of these puparia it will be observed that traces of the leg-sockets of the primal larva-form are perceptible

* Wiegmann's "Archiv. für Naturgeschichte," 1843, pp. 149, 150.



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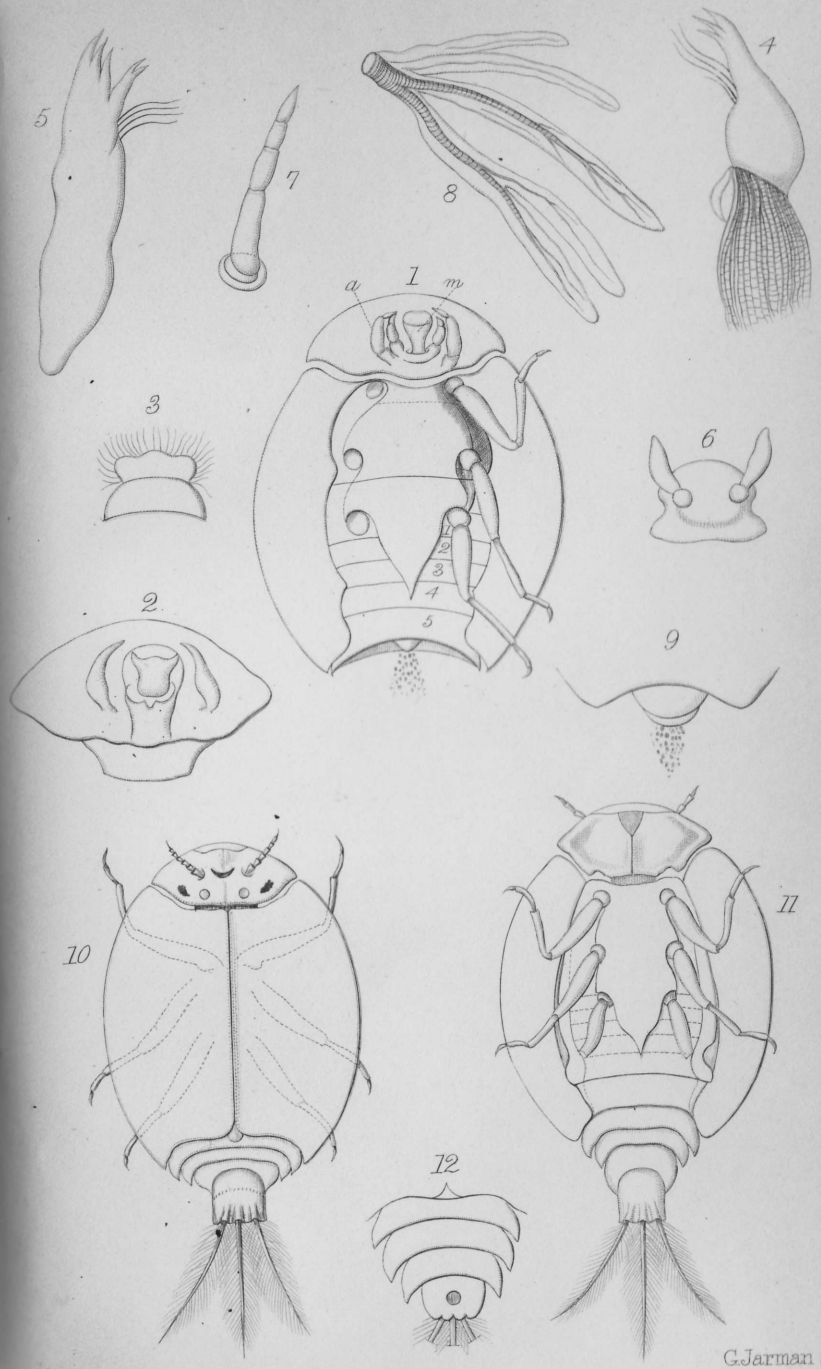

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