XXXV. *Observations upon the Strepsiptera.*

By J. O. WESTWOOD, F.L.S., &c.

[Read January 5, 1835.]

THE opportunity kindly afforded me by Mr. Pickering of examining a recently killed stylopized bee and its parasites has enabled me to add a few particulars, in addition to those given by that gentleman, and which relate, first, to the preparatory states of the *Stylops*, and second, to its structure in the imago state.

The bee was a female of *Andrena tibialis*, and had nourished three of these parasites: one of these Mr. Pickering had extracted in the perfect state, having scaled off the head-case; another, apparently in the state of a larva, he had extracted; and the third, together with the exuviae of the last-mentioned individual, still remained within the abdomen of the bee, all having appeared between the dorsal articulations. For the purpose therefore of ascertaining the structure of the parasite still remaining within the bee's abdomen, and in the hope that it might possibly be in the pupa state, or perhaps ready to burst forth like the one first above mentioned, I carefully removed the scales from the under surface of the abdomen, when a quantity of thick white fluid first presented itself. On removing this the air-vessels and viscera were observed occupying the centre of the abdomen, on one side of which was an elongated fleshy white mass extended to the base of the abdomen, which proved to be the body of the remaining parasite, and which (from its vermiform appearance and the complete want of that solid appearance which the bodies of the dipterous larvæ assume when they have passed into the coarctatespecies of metamorphosis, and inclose the true pupa,) I should not hesitate to regard still as the larva of the *Stylops* although the head was protruded. On the other side the exuviae of the first individual were observed.

Upon comparing the volume of the internal air-vessels and viscera when extracted with those of a perfect female bee discovered at the same time, it was at once evident that they were very considerably reduced in size, and although the ovaries were perfectly distinct in the latter insect, I was unable to perceive them in the former; indeed, as they are of considerable size, and are not conducive to the life of the bee, I should consider that Mr. Kirby's supposition that their presence renders the insects attacked abortive is well founded.

I next endeavoured to remove the remaining parasite, the body of which was internal, and its head exerted. The hind part of the body was perfectly free and yielded to the action of a pencil ; but although I widened the space where the head protruded I found it impossible to detach the parasite, the neck being apparently in some manner attached to the interior surface of the bee's abdomen. After considerable difficulty I ascertained that the attachment was caused by a fine thread extending from one side of the neck and firmly attached to the abdomen of the bee. Mr. Pickering, who was present at the time, observed this curious circumstance as well as myself, and we preserved the parasite attached to a portion of the abdomen by means of this thread, in the bottle of spirits now exhibited, so that any person now present may himself perceive the connexion. Whether this thread was tubular or not I cannot state, but the circumstance, combined with the want of manducatory organs in the head of the *Stylops* larva as noticed by Jurine, seems to favour the idea originally entertained by Mr. Kirby, that the *Stylops* in its larva state feeds by absorption. I would however by no means wish it to be considered that this view of the subject is satisfactorily established, even although it appears to be confirmed by the examination of the exuviae of the *Stylops* which Mr. Pickering had extracted. This, on removal, was found to consist of a thin and transparent pellicle, being of a long cylindric and narrow form, having the dorsal portion more darkly shaded, and presenting the appearance of indistinct articulations. This therefore appears to have been the larva skin of the insect ; the neck exhibited the thickened appearance visible in the neck of the larva, and, precisely in the same situation that the thread above noticed was attached in the larva, I observed an apparent spiracle or circular aperture connected with an incrassated and apparently tubular process of the neck : within the pellicle I likewise observed a long thread which appeared to arise from the same aperture, but this might possibly be accidental as it was removed without any difficulty or rupture.

Within this pellicle at its posterior extremity was observed another crumpled-up mass of pellicle of a dark opaque colour, perfectly distinct from the pellicle of the larva above mentioned, and which evidently had formed the covering of the inclosed pupa, and had been shed by it previous to the time when Mr. Pickering extracted the imago. Hence, as well as from the account given by Jurine, it is evident that the pupa of the *Stylops* is inclosed in a distinct skin, and is also in that state enveloped by the skin of the larva, contrary to the suggestion of Mr. Kirby ; and hence the accounts and figures given by most authors of the pupa of these insects are in fact merely

representations of the larva in an altered form, but totally different from that of the real pupa, which no one except Jurine appears ever to have seen.

No insects have so much perplexed entomologists with respect to their structural peculiarities as the present. Hence it is not perhaps surprising that we should find an author at one period regarding them as belonging to the *Hymenoptera**, at another to the *Diptera*†, and at a third period as belonging to none of the established orders, but wandering comet-like amongst the entomological circles‡. In the second of these instances Mr. Newman has published a series of observations upon the structure of the thorax and its appendages, and the oral organs, which, it is probable, if left uncorrected might lead to erroneous impressions as to the true structure and consequent affinities of the *Strepsiptera*. If indeed Mr. Newman had dissected the specimen of *Stylops* which he examined, or if he had carefully examined Mr. Curtis's beautiful figures of the dissections of this genus, or even those published from my figures, in Griffith's Animal Kingdom, he would surely have hesitated before he had made the observations alluded to. He would in fact thence have seen that the prothorax is clearly proved to be a very slender and short yet distinct segment, not lost in the mesothorax; that the mesothorax instead of being a large and conspicuous segment is scarcely larger than the prothorax, indeed Mr. Newman appears entirely to have overlooked it; that the part termed the scutellum of the mesothorax is the postscutellum of the metathorax; that the pseudelytra are attached to the collar-like mesothorax and not to the anterior part of the same segment which bears the miscalled scutellum; that these pseudelytra instead of representing the patagia or tip-pets are in fact the real analogues of the anterior wings of the *Lepidoptera*; that the large spreading wings of the *Stylops*, instead of representing the anterior wings, are the analogues of the posterior; that the supposed metathorax is only the produced lateral lobes of the metasternum; and that the pair of "crumpled opaque whitish hind wings" stated to have been observed by Mr. Walker, and to be attached to this supposed metathorax, are either entirely extraneous bodies connected accidentally with the insect, or are torn portions of the real wings. I have not the slightest doubt with respect to this last assertion, having examined several specimens of *Stylops*, both in a living and dead state, without having been able to discover the least trace of such a pair of organs as those mentioned above,

* Newman, in Mag. Nat. Hist., No. 23.

† See Entomol. Mag., vol. ii. p. 326.

‡ See *Sphinx vespiiformis*, an Essay, &c.

and which, had they existed, would surely not have escaped the notice of such observers as Jurine, Kirby, Latreille, Passerini, and Curtis.

With respect to Mr. Newman's identification of the structure of the mouth of these insects with that of the *Diptera*, this gentleman admits that he did not dissect it. I will therefore only observe that I cannot find the least analogy between the oral organization such as it is in *Stylops*, and the tubularly developed elbowed mouth of the *Diptera*, the labium of which is greatly elongated; whereas, on the contrary, there seems to me much greater resemblance in this respect between the *Strepsiptera* and *Lepidoptera*, the labium in both being soldered flatly to the head, the acute mandibles, as they have been termed in *Stylops*, representing the maxillary tongue of the butterfly, and the large palpi being much more analogous to the labial palpi of the *Lepidoptera* than to the maxillary palpi of the *Diptera*.

The rare opportunity of examining a living *Stylops* induced me to make a series of figures, from which those in the accompanying plate have been selected, and of which the following is the description.

PLATE XVII.

- Fig. 1. *Stylops Spencii*, Pickering, magnified.
 2. Ditto, with the wings closed.
 3. Ditto, ditto, seen laterally.
 4. Head of ditto, seen from beneath.
 5. Ditto, ditto, seen in profile.
 6. Metathorax and abdomen seen laterally, the wings and legs truncated.
 7. Metathorax seen from beneath.
 8. Tarsus.
 9. Larva greatly magnified, seen from above.
 10. Ditto, seen from beneath.
 11. Ditto, seen laterally.
 12. Anterior portion of ditto, showing the cord (*a*) by which it is attached to the abdomen of the bee (*b*).
 13. Exuviae of larva remaining in the body of the bee. (*a*.) Exuviae of pupa remaining within the exuviae of the larva.
 14. A cord observed near the neck of the exuviae of the larva.