

Note on the sexual apertures of the Lepidopteran chrysalis.

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The number of this Journal for Dec. 2. 1889 contains on p. 622, a paper by myself, »Studies in the Morphology of the Lepidoptera, I«, which relates to two subjects — to the sexual apertures of the chrysalis, and the mode in which the azygos oviduct with its accessory organs developes in *Vanessa Io*. It has come to my knowledge since that paper was written, that two authorities, J. T. Chr. Ratzeburg and O. Wilde, have already partially described the sexual apertures of the Lepidopteran pupa.

For the reference to Ratzeburg's work, »Die Forst-Insecten«, Th. II, Berlin, 1840, I am indebted to the courtesy of Dr. Erich Haase of Königsberg i. Pr. On p. 6, Ratzeburg compares the somites of the chrysalis with the somites of the caterpillar. He assigns to the abdomen of the latter nine somites only, as is clear also from p. 4. Speaking of the three terminal abdominal somites, he says, »Letztere scheinen in der Puppe zwar vier zu sein (also der ganze Hinterleib zehnringelig), allein das kommt nur daher, daß der After sich besonders abschnürte. Dicht vor der Afterspalte liegt die Geschlechtsspalte. Bei der männlichen Puppe setzt sie sich aber in den vorletzten Ring fort, während sie bei der weiblichen auf den letzten beschränkt ist (z. B. T. XII Fig. 3, 4 p). So kann man, meiner Beobachtung zufolge, männliche und weibliche überall in der Puppe unterscheiden (s. die zahlreichen Abbildungen)«. In commenting on this passage, it may be pointed out, first that the abdomen of the caterpillar and chrysalis is composed of 10 somites as is proved conclusively by anatomical considerations, and secondly that Ratzeburg's description would be more correct in reality if what he says of the male were said of the female. The particular figures to which he refers are unfortunately small, but they appear to bear out his words. Others, however, of his figures, e. g. Taf. XIV figs. 4 p ♂ and 4 p ♀, Taf. XVI figs. 1 p, 2 p, 3 p, show with greater exactitude, the male aperture in the ninth somite i. e. the one in front of the anal somite, and the female aperture in the eighth somite i. e. in the second somite in front of the anal. Ratzeburg figures in his first plate the female pupa of *Vanessa poly-chloros*: all his other examples are taken from *Heterocera* with the two female apertures confluent, and he has failed to notice the peculiar

forward extension of the ninth abdominal sternum into the eighth sternal region which is so characteristic of *Heterocera* in general.

O. Wilde's account is given in his »Systematische Beschreibung der Raupen unter Angabe ihrer Lebensweise und Entwicklungszeiten«, Th. II, Berlin, 1861. This work was put into my hands by my friend Mr. Heron of the Insect Department, Natural History Museum (British Museum). In turning over the plates illustrative of the second part, which represent chrysalids only, I noticed that Wilde attaches to many of the figures the signs used to indicate sex. The figures themselves show that a difference exists in some instances between the cremaster of the two sexes, but on p. 4 of the »Introduction« Wilde mentions that the male pupa may be identified by the antennae when the latter are pectinated — a well-known fact —, and then continues to say that the male also has »in der Mitte der Bauchfläche des letzten Ringes, zwei kleinere, durch eine Längsfurche getrennte Höckerchen, während die Stelle bei der weiblichen Puppe geglättet, dagegen aber hinter dem Einschnitt, zwischen dem siebenten und achten Ringe, über der Mitte der letzteren, eine seichte, mehr oder weniger deutliche, kurze Längsfurche wahrnehmbar ist. Die Unterschiede entsprechen der verschiedenen Lage der Fortpflanzungsorgane bei den beiden Geschlechtern«. It is sufficient to say that Wilde like Ratzeburg did not recognise the proper number of abdominal somites, and the position of the male aperture in the penultimate somite; and judging from his words alone, he appears to have known and that not in its full detail, only the *Heteroceran* type in which the two female apertures are usually confluent.

I may be permitted, perhaps, to make a slight correction in the account given in my previous paper, of the azygos oviduct so far as relates to one particular point. A renewed examination of the specimens has convinced me that the second pair of larval vesicles, the pair that is to say, which developes in the ninth somite, has a twofold fate. The dorsal portion of the vesicles is converted into the sebaceous apparatus, the ventral portion constitutes the posterior extremity of the azygos oviduct itself, and where the ventral portion closes by the fusion of the opposing lips of the aperture, the future oviducal aperture is left at a spot which corresponds to the anterior extremity of the second pair of vesicles, where they pass over into the primitive oviducal furrow.

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