

PSYCHE.

FRAGMENTS OF THE COARSER ANATOMY OF DIURNAL LEPIDOPTERA.

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(Concluded from p. 309.).

10. THE LARVA OF *EUPHOEADES TROILUS*, OF NORTH AMERICA.

Muscular system. The longitudinal system of muscles, which we have usually found to be made up on the dorsal and ventral surfaces of each half of the body of double or treble bands, is here composed both above and below of one broad ribbon on each side. Each of the lower ones is made up of about fifteen, of the upper of about twenty-five, closely contiguous but independent cords similar to one another in every respect.

The investing muscular walls of the stomach are thicker than usual and almost entirely composed of transverse, parallel, muscular fibres, with a few hardly noticeable longitudinal threads, and a dorsal ribbon of a dozen or more parallel threads besides a similar ventral band.

Digestive system. The stomach is 6.5 mm. in diameter; at its extremity an investing band of strong muscles enwraps the canal, contracting its diameter to 1.75 mm., while the intestine is 3 mm. broad; the intestine and colon are very short (together 7.5 mm. long) compared with the stomach, and so also is the oesophagus.

The malpighian vessels originate in a very slender thread, 1.1 mm. long, which

then expands into a vermiform, subfusiform, swollen gland, 1.45 mm. long and 0.45 mm. broad, contracted slightly before the bluntly rounded apex; the lower branch is thrown off from its tip, and immediately afterward the other two; they are very slight and very short as compared with *Danaïs* or *Eurymus*; the upper branch extends as far as the posterior margin of the fourth abdominal segment.

Nervous system. The nervous cords are closely united, but can be seen to be distinct throughout their whole length. The distance between the first and second body-ganglia is 2.5 mm.; between the second and third 3.25 mm. The cords at each side of the third are parallel for a very short distance and then diverge. The fourth ganglion is 1.75 mm. distant from the third, and is situated near the middle of its segment, while the others, as a general thing, are near the anterior edge of the segments. The tenth and eleventh ganglia are completely united; together they are no broader than, but twice as long as, the ninth ganglion; from the posterior border, four long, equal and equally divergent nerves are thrown off, two on one side and two

on the other, and these seem to be the only nerves emitted.

There are two sets of lateral nerves to each ganglion; the posterior originates at the posterior outer side and is directed outward and somewhat backward; it forks very shortly beyond its origin, sometimes, in the anterior part of the body, at the very origin; the anterior set consists of two parallel nerves, which start, the anterior from the anterior outer side, the posterior from near the middle of the outer margin, and extend outward at right angles to the cord; the anterior of these parallel nerves is sometimes connected, just beyond its base, with the cord just in advance of the ganglia; at least it is so in the seventh abdominal segment where the nerves are somewhat modified; this anterior nerve may be the same as that which originates

in other species from the cord itself just in advance of the ganglia.

Glandular system. The initial duct of the silk vessels runs to the middle of the first abdominal segment, beyond which it expands to a vessel 0.65 mm. broad, which runs straight along the ventral surface to the front part of the third abdominal segment, turns abruptly back to the origin of the thicker portion, then bends at right angles and runs in a vermiform course upward along the first and second abdominal segments and terminates upon the back. The whole of the thicker part of the vessel is 21 mm. long.

Male generative organs. The testes are situated at the posterior part of the dorsum of the fifth abdominal segment, are plump, obovate, well rounded, 1.1 mm. long and 0.85 mm. broad.

11. THE LARVA OF *EPARGYREUS TITYRUS*, OF NORTH AMERICA.

Digestive system. As in *Euphœades troilus* the stomach is very large as compared with the rest of the alimentary canal; it measures 19.5 mm. in length, while the crop measures 3.5 and the intestine and colon together 5 mm.; the oesophagus proper is exceedingly short.

The salivary glands are slender, crinkled ribbons of uniform diameter (0.14 mm.) and 5 mm. long, reaching to the front of the stomach, where the extremity is attached by a very slender, pellucid, suspensory thread to tissue connected with the dorsal vessel.

The malpighian vessels originate in a slender, thread-like tube, smaller than

the duct of the silk vessels, from the constriction at the extremity of the stomach; it extends forward along the hinder extremity of the stomach for 1.6 mm. and then sends off the inferior branch, which passes along the stomach nearly to the middle of the third abdominal segment and there turns upon its course. The main stem continues for 1.25 mm. further before dividing, a feature in which this insect is entirely different from all the others described, and its two forks pass forward as usual along the sides of the stomach, the upper to the middle or slightly in advance of the middle, the lower (or middle of the three branches)

to the front of the third abdominal segment, and then abruptly retrace their course. They are exceedingly delicate, being only 0.045 mm. in width, and are ribbons rather than cords; in their delicacy and slight development, but not at all in the characteristics of their origin, they agree with *Euphocades troilus*.

Nervous system. The first body-ganglion is separated from the suboesophageal ganglion by a narrow space, not more than one-third the length of the former, which is somewhat longer than broad. The fourth body, or the first abdominal ganglion is separated from the one in front by less than the diameter of the latter, and is situated wholly within, but at the hinder border of, the third thoracic segment; the other ganglia, even the third thoracic, are situated in the middle of their respective segments; the last two ganglia are completely amalgamated, forming a single, subfusiform, oval mass more than twice as long as broad, slightly broader than and nearly twice as long as the ninth ganglion. The cords between the ganglia are quite distinct from each other in front of each ganglion for one-third or one-fourth the distance to the ganglion next in advance; in front of this they are attingent and apparently consolidated, although it can be seen that the ribbon is composed of two elements. The lateral nerves consist of a single thread issuing from the anterior outer angle of the ganglion, directed laterally and a little forward; and a pair, issuing separately, but in close proximity, from the posterior outer angle, and directed laterally and somewhat posteriorly; these last are also very slightly divergent.

Silk vessels. These consist, first, of a long thread-like tube or duct, 0.9 mm. in diameter, having a slightly tortuous course through the thoracic segments; and second, of a larger vessel, a mere enlargement of the tube, which commences to expand as it enters the abdominal region, and continues of the same diameter, 0.5 mm., as far as the beginning of the fifth abdominal segment, then turns abruptly back upon itself, outside its former course, as far as the front of the second abdominal segment; again turns back with equal abruptness, outside or above its previous course, and, diminished to nearly one-half its former diameter, extends nearly to the middle of the third abdominal segment; it then turns upward at right angles along the walls of the stomach to the middle of the sides of the same, or a little higher, and again resumes its general backward direction; on this it extends, with a slightly wavy course, as far as the end of the stomach, when it turns downward and inward again and soon terminates in a blunt tip, its extremity scarcely slenderer than its width when it is freed from the coils on the sides of the stomach. The coiled or reversed portion covers a distance of 5.75 mm. The initial duct is 9.5 mm. long, the stouter part of the vessel 12 mm. long, and the slender terminal portion 11.5 mm. long.

Male reproductive organs. The testes consist of a pair of quadrilobed, elongated, subreniform organs, terminating anteriorly in a little thread less than half as long as themselves; and are situated scarcely behind the middle of the fifth abdominal segment.

[End.]



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