

ART. VIII. *Further Notices of the British parasitic Hymenopterous Insects ; together with the " Transactions of a Fly with a long Tail," observed by Mr. E. W. LEWIS ; and additional Observations.* By J. O. WESTWOOD, Esq. F.L.S. &c.

(Continued from p. 123.)

Sir,

"CHALK and cheese;" you know the rest. If you *will* have *popular* bits of natural history, you *shall* have *technical* descriptions, at least, of remarkable insects. Mr. E. W. Lewis, of Chelsea, whose communication, in the fourth number of the *Entomological Magazine*, p. 422., entitles him to the rank of a very ingenious observer of nature, has transmitted to me the result of a series of observations upon the natural history of an ichneumon, which appears to me to be not inapplicable as a prelude to a continuation [from p. 123.] of my descriptions of some interesting forms among the minute parasitic Hymenoptera. Mr. Lewis's communication is as follows: — "On the 28th of September, 1832, I observed an ichneumon flying about a lilac tree in our garden, great numbers of the leaves of which were rolled up by the larvæ of a leaf-rolling moth. After it had alighted, I observed that it thrust its long ovipositor into a rolled leaf, drawing it up and down, and working it about in all directions; evidently, as it seemed to me, with some other intention than that of laying its eggs in the enclosed caterpillar, which was not larger than itself; and, in a few moments, it succeeded in driving it out. This extraordinary behaviour attracted my attention; since, if its sole object had been to lay eggs in it, it would not have acted thus. I therefore caught the ichneumon, and placed it under a tumbler, together with a caterpillar, almost dead, which happened to be in the leaf I put in with it. A short time afterwards, the ichneumon began eating the caterpillar; and soon ate nearly half of it, at the same time moving about its head and palpi very quickly. The next morning, I furnished it with several caterpillars, closely rolled up in a leaf; when it immediately began walking over the leaf, with its antennæ bent and intensely vibrating, apparently with the intention of finding some place through which it might easily introduce its ovipositor. Having found a place which had been half eaten through, it directly introduced its ovipositor, moving it about as before; and, having found out where the larva was, it withdrew it; and, taking its station upon the edge of the leaf, with its antennæ arched, the tips between the folds of the leaf, plunged the ovipositor in again, and succeeded in driving out a caterpillar, which was immediately pounced

upon and seized with its mandibles; but, the caterpillar twisting about, it thrust its ovipositor into it, at the same time held it with its legs, and then commenced eating it. It soon left this caterpillar, and drove out another, proceeding in the same manner until it had destroyed all. At one time, after having thrust its ovipositor several times through a spot in the leaf, which had been half eaten, and was very thin, without the caterpillar coming out, it began gnawing the leaf; and I afterwards found a caterpillar there, which had been unable to move. I supplied this ichneumon with caterpillars every day for a week; and it destroyed every one, partly eating them. It then died; and, from the lateness of the season, I was unable to follow up this interesting subject.

"When boring, it generally proceeded in the following manner: — It elevated the abdomen, and placed the whole of the ovipositor perpendicularly on the leaf, keeping it in that position until it had fixed the point; it then withdrew the outer cases about the eighth of an inch, but still directing the dart of the ovipositor with them, until it was firmly driven in; when it took them away entirely, and, all the while, moved its ovipositor half round and back again (like as one would use a brad-awl), the muscles in the last segment of the abdomen being actively employed. This may easily be seen with a glass of an inch and a half focus, for the ichneumon is not very easily disturbed. Sometimes it places its ovipositor under its body, steadying it with its hinder coxæ [hips].

"It seemed unable to capture the caterpillars when not rolled in a leaf, as, whenever it approached them, they dropped down. I have several times put them under a glass together, with a leaf, and it never touched them until they had rolled themselves up. While they were doing so, whenever it approached them they immediately retired into or under the leaf; and, when they had finished, it drove them out, and murdered them: for murder it certainly was, since it killed sufficient to feast a hundred ichneumons.

"This ichneumon also laid several eggs in the rolled part of the leaf while in confinement; and I also found several eggs in the leaves upon the tree: but the larvæ, when hatched from these eggs, would not be able to find subsistence, as the leaf-rollers began to go into the ground on the 24th of September. The eggs were little more than half a line long, and about the same in circumference in the middle, and were narrowed to a point at each end; the external part transparent, the inner opaque. The ichneumon laid one on the side of the glass after I had driven it from the leaf; the external part was then very soft."

During the months of May and June in the present year (1833), Mr. Lewis resumed his observations, having succeeded in rearing some *para* ichneumons at the commencement of the former month. He accordingly "placed a male under a glass, with some flowers of *Alyssum*: the insect, after perambulating the flowers for some time, went into the corolla as far as he could, did not seem able to reach the honey. I then exposed a tectary; immediately on finding it, he began eating, and continued until he had finished it. I afterwards gave him some more, of which he was extremely fond; but he died in four days.

"On May 13. I bred a male and female, both of which ate sugar; but, in the eve, the female began to attack the rolled-up caterpillars. On May 14. she killed a caterpillar, but could not get it to come fully out of the leaf; she, therefore, gnawed a hole through the leaf, keeping her ovipositor in the caterpillar, and going round it as a guide. She then withdrew her ovipositor and began eating the caterpillar: when she had eaten such as was under the hole, she used her tail as a fork to bring her dinner within reach. One thrust of the ovipositor the head of a larva generally deprives that part of motion. Caterpillars above half an inch in length require more time: the ichneumons, however, killed some an inch long.

"In one instance I noted an ichneumon drive out a caterpillar from the folds of a leaf; when another ichneumon thrust at it, and drove it to the edge of the glass, where, after a stab or two, it became motionless. She then began eating it; but the former, thinking she deserved part, wanted also to eat: this, however, the latter would not allow, and drove her away. Nothing daunted she returned to the charge, and, unsheathing her ovipositor, seemed determined to maintain her rights; whereupon the other, recollecting, perhaps, the fable of the bear and the lion, or convinced by the more powerful argument *behind*, yielded her to have a share. They ate together amicably," (?) until the caterpillar was too small for two; when they fought, one of them seizing it in her mouth, whilst the other went in search of more: but, finding none, she jumped suddenly on her companion; and, upsetting her, seized the tail of the caterpillar, now not worth contending for. They are very pugnacious, fighting with their wings and legs and frequently lose a dinner, which makes the best of it off. They, however, spent a considerable time every day at the sugar.

"Towards the end of May the females commenced laying their eggs, which hatched in three or four days.

"I could not ascertain whether they stung the larvæ or not. Some caterpillars required more stabbing than others. One which received three stabs died in a few hours; another, half an inch long, died in about ten minutes; while one which I stabbed with a pin was as merry as ever four days afterwards."

So far Mr. Lewis, whose facts offer another striking peculiarity in the extraordinary economy of the parasitic Hymenoptera. Hitherto it has been considered that the little nutriment taken by ichneumons in the perfect state consisted merely of the nectar of flowers: hence it is that so many are observed upon the blossoms of plants, especially upon those of umbelliferous plants; and, indeed, from Mr. Lewis's statement, it appears that his ichneumon would occasionally resort to nectar and sugar. With the exception of the wasp, which may often be observed feeding upon the meat hanging in butchers' shops, and the ants, which will skeletonise a small animal in a very short time, no hymenopterous insect, to the best of my recollection, has hitherto been observed to be carnivorous.

The power of stinging has been denied to the ichneumons and other hymenopterous insects of the section Terebrantia of Latreille. They appear to me, however, to possess this power to a certain degree; since, although they do not sting so painfully as the bees and wasps, yet the general construction of the ovipositor being perfectly similar to that of the sting of the aculeate tribes, enables them to inflict a wound; and, from experience, I can state that irritation has followed the puncture.* It may, indeed, be said that this irritation was merely produced by the wound, and was not the effect of the poison; but Mr. Lewis's statement proves that, in the instance of the larvæ of the leaf-rollers, poison must have been injected.

Respecting the manner in which the egg is excluded in hymenopterous insects, on which subject no decided observations have been recorded, Mr. Lewis informs me that the egg passes down the central dart of the ovipositor, which is gradually dilated as the egg passes, the two external sheaths being detached; that its passage is caused by the alternate motion of the two internal spicula, which are enclosed in the

* I may add, that a few days ago, while collecting in Richmond Park, a small-sized ichneumon fell upon my face, close to the corner of my eye, from a branch of an oak tree which I was beating. The lids instinctively closed in an instant, catching the intruder by his leg, which so annoyed him that, for self-defence, he stung me in the eyelid, and I felt the effects for an hour afterwards; sufficiently long to show, regard being had to his size, that the wound was irritated by poison.

channeled dart, and which are constantly drawn up and down; and that the egg, which must be very elastic, is protruded out of the ovipositor at a short distance before its extremity. At times, however, the ichneumon made use of its ovipositor, neither as an instrument of oviposition, nor as a sting, but merely as a means of retaining the larva upon which it was feeding in a convenient position.

But, one of the most extraordinary facts which Mr. Lewis has communicated to me on the history of this ichneumon is, that the species of larva which is devoured by the perfect ichneumon is also that in which the females deposit their eggs for the support of their future young, Mr. Lewis having observed many of the larvæ of the ichneumons feeding externally upon the leaf-roller caterpillar in the roll of the leaf, where also he found the ichneumon pupæ, which subsequently produced perfect insects, as stated by him. Now, from Mr. Lewis's account, the ichneumons appear in the perfect state as early as the beginning of May; and they were also observed in September: at both which seasons (and, probably, during all the intermediate time) there is a supply of leaf-rolling caterpillars for their support. Hence it is most probable that the larvæ of the ichneumons destined to prey upon the leaf-rollers are the offspring of some of the earlier bred ichneumons, it being absolutely necessary that there should be a supply of the leaf-rolling larvæ for the support of the ichneumon's larvæ; as these feed only upon the leaf-rolling larvæ, which latter go into the earth towards the end of September.

The history of the moth which produces these leaf-rollers is not less interesting than that of its parasite: this Mr. Lewis reserves till another occasion.

The perfect insect, Mr. Lewis tells me, does not confine itself to the leaf-roller; but will devour other caterpillars, he having given it the larva of a *Lozotænia*, that of the little ermine moth (*Yponomeuta padella*), and of two other species.

It only remains for me to add, that the leaf-roller is an undetermined species of *Gracillaria*; and that the ichneumon agrees with the *Pimpla stercorator* of Fabricius and Gravenhorst, except that the ovipositor is rather shorter than the abdomen.

In conclusion, I add short descriptions of six curious minute parasites belonging to the families Chalcididæ and Proctotrupidæ:—

EPICOPTERUS * *Westw.*, *Pterómalo* affinis. Corpus brevissimum,

* *Epikopeis*, cut, and *pteron*, wing; from the notch in the front of the wing.

latum; antennæ 12-articulatæ subclavatæ (*fig. 55. b*); alarum portio inter marginem anticum et nervum subcostalem anticè (et præsertim ad nervi conjunctionem cum margine) dilatata, et ibi obliquè truncata (*a*).

Body very short, convex, and contracted; antennæ short, subclavate, 12-jointed, the 3d and 4th joints annular; wings with the humeral portion anteriorly dilated and obliquely truncate at the union of the subcostal nerve with the front margin of the wings; abdomen sessile.

Spec. 1. *Epic. choreitiformis Westw.* Nigro-æneus hand nitidus; facie viridi; antennis piceis articulo basali rufo; abdomine nitido cyaneo-nigro; lateribus cupreo-nitentibus; pedibus testaceis; alis basi obscurioribus.

Longitudo corporis, lineæ dimidium. Expansio alarum, lineæ $\frac{1}{2}$. In musæo nostro. Habitat in gramineis prope Cantabrigiam, Julio, 1833.

Brassy black, not shining; face greenish; antennæ pitchy, with the basal joint reddish; abdomen shining cyaneous black, with the sides coppery; legs reddish; wings darkish towards the base.

I found several specimens of this curious little insect at Gog Magog Hills, near Cambridge, during the late meeting of the British Association [June 24—28. 1833], in company with *Choreia nigro-ænea W.* [described p. 122. 279. 380.]; which it so much resembles, that, until I had carefully examined it, I thought it was its male. I have seen no other insect in this very extensive family with wings similarly formed.

SMARAGDITES * *Westw.* ab Eulophinis omnibus differt antennis longis. Corpus nitidissimum; antennæ ♂, ut mihi videtur, 9-articulatæ, corporis longitudine, articulo primo dilatato, secundo brevi, tertio minutissimo, reliquis elongatis filiformibus longe pilosis; abdomen thorace paullo longius, at illo duplo angustius.

Body very shining; antennæ apparently 9-jointed, as long as the whole body, with the basal joint dilated, the 2d short, the 3d very small, the remaining long filiform, with long hairs; head rather broader than the thorax, the latter ovate, with the front margin rounded; the abdomen rather longer but much narrower than the thorax, elongate ovate, concave above; tarsi 4-jointed.

Spec. 1. *Smar. admirabilis Westw.* Caput lætè viride, posticè auratum; thorax et abdominis basis lætè aurata, hujus parte postica cyanea, maculâ pallidâ ante medium; antennæ pallidè fuscæ, articulo primo viridi nitido, basi apiceque albis; pedes albi; alæ immaculatæ.

Long. corp. $\frac{3}{4}$ lin. Expans. alar. $1\frac{1}{2}$ lin. In mus. nostr. Habitat in Sylva Coombe, Maio, 1831.

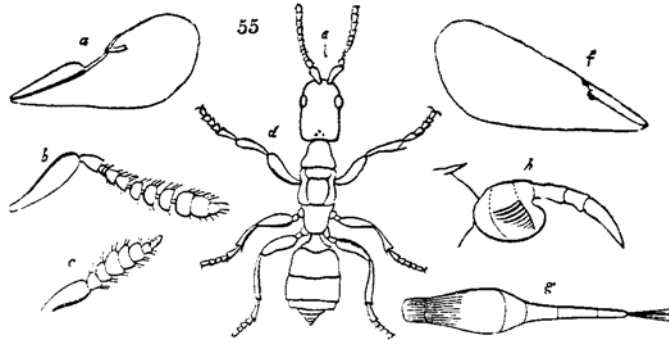
Head splendid green, behind golden; thorax and base of the abdomen beautiful golden coloured, the hind part of the latter cyaneous with a pale spot before the middle; antennæ pale brown, the basal joint splendid green, with the base and tip white; legs white; wings spotless.

At Coombe, in May, 1831; beaten from the oak?

CLOSTERO'CERUS † *Westw.*, Eulopho affinis. Antennæ 8-articulatæ, articulo primo apicem versus dilatato, articulis reliquis clavam depressam fusiformem formantibus, articulo ultimo minutissimo (*fig. 55. c*); thorax

* *Smaragdites*, the emerald stone; in allusion to the splendour of the insect.

† *Klōstēr*, a spindle, and *keras*, a horn; from the fusiform [spindle-shaped] antennæ.



ovatus; abdomen subsessile thoracis magnitudine, ovato-depressum, posticè subconicum.

Antennæ 8-jointed, the 1st joint dilated near the tip, the remaining joints forming a flattened fusiform club, the 4th joint rather larger than the 3d and 5th, the 7th joint minute subquadrate, the terminal one very minute subulate; thorax ovate; abdomen nearly sessile ovate depressed, as large as the thorax, somewhat conical at the apex; wings large; tarsi short tetramerous.

Spec. 1. *Clost. trifasciatus* Westw. Niger, thorace cæruleo-viridi; abdomine chalybeo-nigro; oculis fuscis; alis fasciis duabus arcuatis, apiceque fuscis; tarsis basi pallidis. Variat fascia antica fere oblitterata.

Long. corp. $\frac{2}{3}$ lin.; expans. alar. $1\frac{1}{2}$ lin. In mus. nostr. Habitat apud Ensham, prope Oxoniam; Augusto, 1826.

Black, with the thorax greenish blue; the abdomen chalybeate black; eyes brown; wings with two arched fasciæ, and the apex brown; the tarsi pale at the base.

At Ensham, near Oxford, in August, 1826. Oaks, Richmond Park, August, 1833.*

CEPHALONOMIA † Westw., Telædi affinis. Caput ♂ mediocre fere rotundatum, ♀ magnum oblongo-quadratum planum; antennæ in utroque sexu 10-articulatæ, articulo secundo tertio multo majori, ♂ filiformes longitudine fere thoracis, ♀ capite non longiores fere moniliformes, haud apicem versus incrassatæ; collare triangulare, anticè rotundatum; alæ nervo subcostale brevi (tertiam partem longitudinis alarum non attingenti), callositate parva ad costam terminata, alteraque subapicali discum versus posita; nervo stigmatali nullo (fig. 55. f.); ♀ interdum aptera.

Antennæ 10-jointed in both sexes, with the 2d joint larger than the 3d; in the male filiform, and nearly as long as the thorax; in the female, submoniliform, and not longer than the head, which is oblong, quadrate, and flattened; thorax elongate-ovate; collar large and triangular, rounded in front; wings with a very short subcostal nerve, terminated by two minute callous spots; ♀ sometimes apterous (d).

* Speciem alteram (*Closterócerus formosus* Westw.) cepi e quercu, in "Richmond Park," Aug. 16. 1833. Cæruleo-viridis, abdomine cyaneo fasciato, antennis nigris, pedibus nigro alboque variis, alis fascia substigmatali nigra. Magn. *Clost. trifasciati*.

† *Kephale*, the head, and *anomoiot*, unlike; from the dissimilarity of the form of the head in the sexes.

Spec. 1. *Ceph. formiciformis* Westw. Nigra, nitida; pedibus antennisque piceis; his in ♀ articulis secundo et tertio pallidis; variat ♀ corpore piceo, pedibus, præsertim tibiis et tarsis, pallidioribus.

Long. corp. $\frac{3}{4}$ — $\frac{2}{3}$ lin.; expans. alar. 1 lin. In mus. nostr. Habitat in fungis [pileatis] prope Londinum.

Black shining; legs and antennæ pitchy, the 2d and 3d joints of the latter, in the female, pale; the female varies in having the body pitchy and the legs paler. In [mushroom-like] fungi near London. (*d*, The insect much magnified; *e* shows the natural length of the insect.)

EPIMECÆS * Westw., a *Platygastro* disjunctus. Abdomen in utroque sexu thorace triplo longius, segmentis tribus posticis valde elongatis et attenuatis; alæ aveniæ; antennæ in utroque sexu 10 articulatae, articulo tertio secundo minori; in ♂ subfiliformes articulis 4—10 æqualibus; in ♀ articulis 4 ultimis clavam magnam formantibus; scutellum ♂ inerme, ♀ mucronatum.

Abdomen in both sexes three times as long as the thorax, with the last three segments very long and slender; wings nerveless; antennæ in both sexes 10-jointed, with the 3d joint smaller than the second; in the male they are subfiliform, with the 4th to the 10th joints equal-sized; in the female the last four joints form a large club; scutellum in the male unarmed, in the female mucronate.†

Spec. 1. *Epim. ensifer* Westw. Niger, subnitidus; femoribus piceis apice pallidis; tibiis fuscis, basi et apice tarsisque pallidis; abdomine nitido, basi longitudinaliter striato (*g*).

Long. corp. $1\frac{1}{2}$ lin.; expans. alar. $1\frac{1}{2}$ lin. In mus. nostr. Habitat in Sylva Coombe, fine Maii.

Black, somewhat shining; the thighs pitchy, with the tips pale; tibiæ brown with the base and tips, and also the tarsi, pale; abdomen shining, longitudinally striated at the base.

At Coombe.

Spec. 2. *Epim. ventralis* Westw. Niger, subnitidus; abdomine segmentis tribus basalibus subtus rotundato-compressis (abdomen *Cynipis* referentibus), segmentis tribus apicalibus valde arcuatis; e parte suprema articuli præcedentis exeuntibus (*h*); pedibus nigris; tibiis basi tarsisque rufescentibus.

Long. corp. $\frac{3}{4}$ lin.; expans. alar. $1\frac{1}{4}$ lin. In mus. nostr. Habitat prope Cantabrigiam, Julio, 1833.

Black, somewhat shining; abdomen with the three basal segments compressed and rounded beneath (resembling the abdomen of a *Cynipis*), the last three segments much curved and arising from the upper part of the preceding segment; legs black; tibiæ at the base and the tarsi reddish.

I possess other species of this subgenus.

Messrs. Haliday and Curtis do not appear to be acquainted with the type of the genus *Platygaster* (*Pl. ruficornis* Latr.), since it is erroneously located in their tables (vid. *Gen. Crust.*, vol. iv. p. 31. last line): the description there given, I can affirm from an examination of Latreille's specimens, is perfectly correct.

I am, Sir, yours, &c.

The Grove, Hammersmith,
July 29. 1833.

J. O. WESTWOOD.

* *Epimæcæ*, long; from the elongation of the abdomen.

† The sexual differences of *Platygaster*, and its subdivisions, have not been previously correctly ascertained, sexual characters having been regarded as sectional.