

thus solved, the spines are thus evidently intended to enable the insect to convey the materials with which she closes her burrow, which a smooth surface could not accomplish. The apex of the intermediate and anterior tibiæ on one side have also some portion of this substance, the greater part of which may perhaps have been rubbed off in its capture, or I took her before she had quite completed her task. It is but in very few of these insects that the anterior tibiæ are spinose and restricted to such as are absolutely fossorial in the strictest application of the term, and not extended to the non-parasites which burrow in wood. That the anterior and intermediate tibiæ, as well as the plantæ of the latter, are occasionally employed to convey building materials, I have a very strong proof in a specimen of *Bombus terrestris* in my possession, which has all these limbs thickly covered with clay, and the posterior corbiculæ loaded to a degree which must have been a great encumbrance even to so robust an insect; and which I think tends to prove that it went some distance to fetch it, or that its use was very urgent, otherwise, with its well known rapidity on the wing, it would have accomplished several journeys in nearly the same space of time as from the impediment offered to its flight by being so loaded it executed this single one. I have also this year taken a female *Psithyrus* which has some clay on the superior surface of the apex of the posterior tibiæ and plantæ, which perhaps indicates that although supposed to be strictly parasitic, it yet takes some share in the domestic œconomy of the nest, and which supposition is strengthened by the circumstance that it is most certainly not an accidental adhesion, nor is it so in either of the cases cited above. We thus see that Nature never works without a purpose,—she is too strict an œconomist of time and material,—and we may therefore rationally infer that where an organ exists, a function necessarily coexists, although too recalcitrant for our ready apprehension, and which analogy or chance may ultimately discover.

XIII. *On the Habits of some Indian Insects.* By W. W. SAUNDERS, Esq., F.L.S., &c.

[Read April 7, 1834.]

IN the hope that the following remarks on the habits of a few Indian insects may not be thought uninteresting to entomologists, I am induced to submit this communication to the Entomological Society. The facts are chiefly taken from a note-book in which I recorded the observations as they occurred.

I captured many specimens of the *Lamia Rubus*, Fab., in the neighbourhood of Calcutta on the Pipal tree (*Ficus religiosa*) during the months of May and June. These insects cling very tightly to the branches, so much so that it is difficult to detach them, except by violent shaking. When on the wing, they fly well in a direct line, and their great size gives them somewhat the appearance of small birds. Their food consists of the round buds of the Pipal, and not the leaves

as might be supposed by those who had not paid attention to the subject. I ascertained this fact by carefully watching the insect several times whilst feeding, and I invariably observed it eating the buds, whilst the leaves around were untouched. This species of *Lamia* may at times be detected in the tree by a grating noise, caused by rubbing the back part of the head against the anterior margin of the thorax. When handled, this noise seems to be produced louder and more rapidly than on the tree, so much so that at twenty paces distant it may be heard. The mandibles of the insect possess great strength, a fact I am particularly aware of from having once been bitten by one on my little finger, when it made its jaws meet in the flesh, paining me exceedingly, and causing a wound which, from not healing well, I shall long bear the mark of. While the operation of feeding is going on, the antennæ of the insect are motionless, but upon touching them on the body ever so slightly, a quick horizontal motion of these organs (probably the result of fear,) immediately commences, and is continued for some time. I have only observed this insect upon the Pipal tree, where however it may be taken abundantly. I was not able to obtain any information respecting the immature states of this species.

If diligent search be made under the bark of the Mango (*Mangifera indica*) and Lichi (*Dimocarpus Litchi*), the *Cossyphus planus*, Fab., (*depressus*, Lat.) will be found. The remarkable flatness of this insect allows it to creep into very narrow cracks and crevices of the bark, so that in searching for it every interstice ought to be well examined. When the bark is removed, the insect is found adhering to the tree; and as it remains motionless in that position, it may easily escape notice, the colour of the bark being very similar to that of the insect. I have taken several of these insects near Calcutta, in Garden Reach, but never in any abundance; generally singly.

The *Cicindela sexpunctata*, Fab., is frequently taken during the evening in the apartments at Calcutta. They are attracted by the light of the lamps, and to an accustomed eye may easily be distinguished by the rapidity with which they dart round the light, and almost immediately settle on something near. It is somewhat difficult to catch them in their night excursions, they are so very quick, and fly off the moment an attempt is made to capture them. Although frequent in the rooms during the evening, I have never seen the insect but once during the day; a circumstance arising, I should think, from my not knowing where to find it at that time.

Another species of *Cicindela*, which I propose calling *limosa*, and which is probably undescribed, was captured by me one evening in abundance, and only on that one evening, whilst in a boat at anchor

off a mud bank near Diamond Harbour in the river Hooghly. It was in the beginning of June, and the tide failing us, we were obliged to anchor close to the bank. Whilst thus situated we observed many of this species of *Cicindela* fly into the cabin, and dart towards a light which was in a lantern, striking so violently against the glass that they immediately fell upon a bench on which the lantern stood, so that I was able to take specimens of them. Unless where given by myself, I have not met with them in the cabinets of entomologists.

A third species of *Cicindela* is found on pathways at Ackra in the neighbourhood of Calcutta. It is a most active insect, flying rapidly and running very fast. Being of a dark brown colour, it is very difficult to be seen when on the path, a difficulty which is increased by its small size, so that I took but very few specimens of it. A description of this species, which appears to be unknown, will also be found at the end of this paper; it is named *Prinsepii* after James Prinsep, Esq., F.R.S., of Calcutta, a zealous promoter of science in all its branches, and whose labours are not sufficiently known in this country.

Euchlora viridis, MacLeay, is frequently attracted into the rooms at night by the light of the lamps, and the large *Copris Molossus* is an occasional night visitor.

On the banks of the Hooghly, a few miles below Calcutta, two new species of Mr. Hope's subgenus *Anthelephila* were captured in the month of April, running about the roots of grass among sand in abundance. Some British species of *Anthicus*, a genus from which *Anthelephila* has been separated, are found also at the roots of grass among sand, a fact indicating that *Anthelephila* and *Anthicus* are nearly allied in habits as well as form. These two species are described under the names of *ruficollis* and *mutillaria*; the latter, from the insect resembling a small *Mutilla*, as suggested to me by Mr. Westwood.

At Saugor Island, in the mouth of the Hooghly, I have frequently noticed the cells, which are built of mud, by a species of *Eumenes*. The cells are generally placed under some projection, or in an angle, where they are very firmly fixed. They are of an oval shape, sometimes two or three together, placed side by side. Each cell is somewhat smaller than a pigeon's egg, and before being closed up, is well stored with green caterpillars, which I have often amused myself by watching the *Eumenes* carry into the cells. When the cells are sufficiently stored, they are filled up so very neatly with mud that it is difficult to discover the entrance. One of these nests was found in a keyhole, closing the aperture; another, in a bungalow at Ganga Saugor, was beautifully constructed

inside an old flute, the insect having chosen one of the note-holes for the entrance to the nest. At Mud Point, Saugor, I observed several of these nests already built and sealed up; others the *Eumenes* were storing with caterpillars, while some were in progress of completion. I took down one of the sealed nests and broke it open to examine the interior, and was surprised to see a species of *Pelopæus* come out lively and strong, an insect not known to subsist on the stores of others, as this fact seems to prove. This *Pelopæus* was a male, with a black body, excepting the peduncle, which was yellow; two spots behind the head, and a third a little behind the junction of the wings with the trunk, are of the same colour. The antennæ are black. Legs black and yellow. Wings of a brownish yellow cast, with the tips gradually growing dusky. Length half an inch. A female of the same species in my possession is seven tenths of an inch long. The species of *Eumenes* whose œconomy is detailed above is about an inch long. Body chestnut brown, with an undefined black band across the first joint of the abdomen beyond the peduncle. Antennæ and legs of a chestnut brown, but rather lighter than the body. Wings yellowish brown, with the tips dusky.

Pelopæus has never been considered a parasite, but as building nests resembling those of *Eumenes*. My observations go far to prove that they are parasitic, and I presume that in former descriptions the *Pelopæus* has been described as the architect of the nest, instead of *Eumenes*, the real constructor: this error might easily occur to those who had not witnessed the *Eumenes* at work.

Having frequently noticed cases of an oblong oval shape attached to the walls of rooms in the houses at Calcutta, and supposing them to be the abode of the larva of some insect, I opened some of them and inclosed others in a bottle. In some of the specimens examined a chrysalis was found, in others a larva, and in others merely exuviae of a chrysalis. From those in the bottle there proceeded in time some small moths. The cases are generally attached to walls or partitions by silken threads of considerable tenacity, and are to be seen sometimes pendent from a beam or the ceiling. They are half an inch long by one fifth of an inch broad in the widest part, nearly flat, the longitudinal and transverse sections being lens-shaped, and margined along the sides. They are open at both ends, although attached to the walls at one end, the attachment being so managed as not to stop the entrance. The inside is lined with a silky substance, the outside covered with small grains, resembling sand. The larva when full grown is about three tenths of an inch long, with the head and first three segments of the body

dark brown, the remainder white. It has six legs placed on the first three segments of the body, two on each segment. The chrysalis is of a pale yellow brown, and about a quarter of an inch in length. The moths were lost by an accident, and therefore cannot be minutely described. They approached in size the cloth-moth, and the upper surface of the wings were of a silvery brown. The larva has the power of turning within its abode, and if watched when fixed to a wall may often be seen protruding its head and legs, sometimes at one end, sometimes at the other, as if in search of food. I have always found the cases tightly fixed, yet the larvæ have the power of locomotion. One of the larvæ with its envelope, which I detached from a wall and placed upon a table, was very active in moving it about, by protruding the head and legs and then laying hold of the table, when by a contraction of the body the case was moved forward, and as these jerks were rapidly repeated, the larva and its abode made considerable progress. When the progress of the larva was obstructed, it immediately withdrew into its home, and turning itself, began to retreat at the other end. Whilst on the table, it fixed its house several times, an operation so quickly performed as scarcely to be perceptible. I always found the cases nearly of the same size, whence we might be induced to suppose that at first the larvæ had the instinct to make an abode sufficiently large to suit themselves when fully grown. I could never determine the food of the larva, nor the manner in which it constructs its interesting habitation, particulars which I hope some other observer will supply. In so vast a field as India, where there are so many Europeans who have leisure, it is much to be regretted that there are so few observers of the insect creation. Valuable discoveries might doubtless be made, and many new facts brought to light, which would be highly interesting to the naturalist and particularly to the entomologist.

Descriptions of the New Species of Coleoptera referred to in the preceding Observations.

CICINDELA of Authors.

CICINDELA LIMOSA, Saunders. Plate VII. fig. 6.

Olivaceo-viridis, subcupreo-nitens, elytris margine tenui ochraceo cinctis.

Long. corp. $\frac{7}{8}$ unc.

Habitat Diamond Harbour, flumine Hooghly, Indiæ Orientalis.

Description.—Olive-green, with coppery shades. *Head* rather broader than the thorax, with two punctate impressions between the eyes. *Mandibles* and *palpi* ochraceous, tipped with black. *Labrum* ochraceous. *Thorax* cylindric, ovate, truncated before and behind, with a transverse, punctate impression towards the head and another towards the scutellum, with a faint impression joining the two, down the centre. *Elytra* minutely punctured, with a narrow, ochraceous margin, extending from the base to the apex. *Legs* very long, pubescent. *Femora* shining green; the knees red. *Tibiæ* red, with the apex green. The *female* has two polished, green, round, discoidal spots, one on each elytron.

Found at Diamond Harbour, River Hooghly.

CICINDELA PRINSEPII, *Saunders*. Plate VII. fig. 7.

Obscure nigro-fuscescens, elytrorum singulo maculis tribus parvis ochraccis, pone medium, notato.

Long. corp. $\frac{7}{8}$ unc.

Habitat in semitis apud Ackra prope Calcuttam.

Description.—Black-brown. *Head* with the eyes very prominent. *Thorax* narrower than the head, long, and nearly cylindric. *Elytra* rather broader than the head, very convex; each elytron marked with three small ochraceous spots, a little below the middle, placed in a triangle; two on the margin, linear, and at right angles to it; the third discoidal, round. *Body* beneath shining purple. *Legs* with shades of brassy green, particularly beneath.

Inhabits pathways at Ackra, near Calcutta.

ANTHELEPHILA, *Hope*.

ANTHELEPHILA RUFICOLLIS, *Saunders*. Plate VII. fig. 8.

Nigra, nitida, pubescens, thorace femorumque basi rufescentibus.

Long. corp. $\frac{1}{8}$ unc.

Habitat in sabuletis, ad ripas fluminis Hooghly.

Description.—Glossy black, except the thorax and base of the thighs, which are reddish brown. The *head* is slightly punctured, and the whole insect covered with very short pubescence.

Inhabits sandy places on the banks of the Hooghly.

ANTHELEPHILA MUTILLARIA, *Saunders*. Plate VII. fig. 9.

Rufescens, albo longe pilosa, capite fasciâque transversâ elytrorum nigris.

Long. corp. $\frac{3}{8}$ unc.

Habitat cum præcedenti.

Description.—*Head* black, deeply punctured; some long hairs proceeding from just behind the eyes. *Antennæ* black, with the three basal joints reddish brown. *Thorax* reddish brown, deeply punctured, pubescent. *Elytra* reddish brown, with a broad black band across, a little beyond the middle, clothed with long white hairs, particularly from the posterior margin of the band to the apex. *Legs* hairy, dull black, with the base of the thighs reddish brown. The *thorax* in this species is not so long and attenuated as in *A. ruficollis*, and the coleoptra are less oval.

Hab. the same as the last.