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XXIV.—*Notes on some Species of the Orthopterous Genus Cloëon, Leach (as limited by M. Pictet). By A. E. EATON, of Trin. Coll. Camb.*

ALTHOUGH but little attention is paid by the generality of entomologists to the Ephemeriidæ, the following notes may prove not altogether uninteresting. From reading Dr. Hagen's introductory remarks to his synopsis of the British species of this family (Ent. Ann. 1863) one might be led to imagine that in their early stages of development they are strictly carnivorous. The existence of such a propensity is clearly seen by merely placing a number of pupæ in a small vessel, when the stronger will speedily devour such as they are able to master. But that their diet is partly vegetable also is apparent on an examination of the contents of their alimentary canal; for, in many instances, along with a large proportion of mud, half-digested Diatoms and pieces of Confervæ can be detected. These the animals obtain by nibbling over the surface of water-plants and stones—an occupation to which they are much given. For this work their jaws are admirably suited. In the front are four or five strong sharp teeth, arranged in two rows, whilst behind these is a very singular structure—a flattened transversely striated protuberance, somewhat resembling an elephant's tooth in miniature*. Their subulate antennæ and their unconcentrated abdomen are not the only points in which they resemble Libellulidæ, as, besides the branchial plates of the pupa, the rectum is subservient to purposes of respiration. They seem to be furnished with a muscular cloaca, which is shut off from the extremity of the alimentary canal by a voluntary sphincter muscle. Its external aperture is the anus, through which water is admitted when the insect wishes to inspire. The cloaca being filled, this is then closed, the rectum opens, the cloaca contracts and forces the

* Jaw of the pupa of *Ephemera vulgata*, L.

contained fluid into the intestine, over which ramify branches of the tracheal trunks. The distribution of these tracheæ varies, possibly according to the age of the insect; yet the branches (in a *Cloëon*) which are given off from the trunks in the seventh and eighth segments (Dr. Schaumi's method of reckoning) are larger than those in the other segments, especially in young pupæ.

The genus *Cloëon*, as limited by M. Pictet, whom Dr. Hagen follows, may be at once divided into two groups, which in reality are genera, although not recognized as such hitherto. As it is therefore necessary to propose a name for one of them, I will suggest that *Cloëopsis* be given to *C. diptera*, L., on account of a variety of the male resembling in colour *Cloë* or *Cloëon Rhodani*, Pict.

CLOËOPSIS, nov. gen.

Comprises one widely distributed species, *C. diptera*, L.

GEN. CHAR.—Pupa with six pairs of double branchial plates and one pair of single ones. Imago dipterous, with two anal setæ, the third abortive.

In this species the larger division of the double branchial plates of the pupa is nearly circular; the smaller is indicated by the dotted line in the figure. The single plates are also circular. It may perhaps be unnecessary to mention that, although Dr. Hagen has included it in his diagnosis of the pupa, the possession of black wing-cases is indicative of state, and is not a special character; in *Cloëon Rhodani*, and some other species also, these organs become black shortly before the final change of the pupa. Dr. Hagen, too, attaches great importance to the markings or absence of colour in the setæ of the imago, as well as to the colour of the turban of the male. But there is scarcely any colour-character which, when fully tested, is not found to vary more or less in the species of this family. Specimens of this insect from Cambridge and Huntingdon often have the turban dull greenish yellow (like the legs of *C. Rhodani* subim.), instead of reddish brown (eyes of house-fly); and in the same localities the female generally has colourless wings, like the male. The setæ are frequently not annulated.



Outline of a double branchial plate.

CLOËON (as restricted).

GEN. CHAR.—Pupa with seven pairs of single branchial plates. Imago with four wings and two anal setæ; third seta abortive.



Fifth branchial plate of pupa (sp. 7.).

In this genus the form of the rudimentary hind wings is very useful in determining the species, as it does not vary to any

great extent among individuals of the same kind, whether subimagos or imagos, and it is not much affected by drying. The interneural veinlets on the apical margin of the fore wings are disposed in pairs in the species with round-tipped hind wings, but singly in that with sharp-tipped wings.

C. Rhodani, Pictet.

In the ♂ the turban varies precisely as does that of *C. diptera*. The lines on the thorax also are similar to those in that insect in highly coloured specimens. The anal setæ are sometimes entirely white, generally white, with fuscous rings at the joinings and the middle of the joints, seldom fuscous throughout, and become transparent, through tenuity, towards their tips. The imago appears, in favourable weather, throughout the year. A branchial plate of the pupa is figured, I believe, in M. Pictet's work on the Epheméridæ.



Hind wing, magnified.

C. pumilum, Burmeister.

Subimago. ♂. Turban yellow. Spots and lines of imago all indicated. Legs yellowish white; tarsi, tibiæ, and tips of femora tinged with fuscous. Thorax yellowish fawn-colour. Abdomen pale yellowish grey. Wings and setæ unicolorous, fuscous. Penis black.

Imago. Turban of male yellow, changing to red when dry. Thorax shiny yellowish brown. Legs yellowish, pale; knees and tarsi darker in the female, but paler in the male. Abdomen in the male whitish yellow, the four apical segments brown: in the female dull yellow brown, with the tips of the dorsal arches darker. Setæ in both sexes white, either annulated with fuscous or not. The hind margins are more delicate, much smaller and narrower than those of *C. Rhodani*, as will be seen on referring to the figures.



Hind wing, magnified.

C. bioculatum, L.

Turban of male cornelian-red, seldom yellow. The imago varies but little in colour. It appears from April to November, if not throughout the year. The figure of the hind wing of *C. bioculatum*, Pict. (Hist. Nat. des Névropt.), differs entirely from the above. His is more like that of Stephens's *bioculatum* (i.e. *C. pumilum*, Burmeister), to which insect *C. bioculatum*, L., when dry, is very similar, size excepted.



Hind wing, magnified.

The above notes were taken from living specimens.

It would be interesting to know more than is known at present about the distribution of the British Ephemeridæ. In Dorset and on Dartmoor *Potamanthus erythrophthalmus* is the commonest of the genus, whilst *P. marginatus* is the most frequent in the Cambridge district. On the Dart *Baëtis montana* predominates, but *B. lutea* at Little Bridy, Dorset. At this last place, too, *Cloëon Rhodani* outnumbers *C. bioculatum*; but at Blandford, in the same county, and at Cambridge the converse obtains. From this it would appear that *P. erythrophthalmus* and *C. Rhodani* are better fitted to inhabit swift streams than *P. marginatus* and *C. bioculatum*.

XXV.—On the Dentition of *Thylacoleo carnifex* (Ow.).

By GERARD KREFFT.

[Plate XI.]

To the Editors of the *Annals and Magazine of Natural History*.

GENTLEMEN,

In the December Number of your Journal you figure a tooth which is supposed by Prof. M'Coy to be the hitherto unknown canine of *Thylacoleo carnifex*, because it was discovered "with part of the lower jaw and teeth of *Nototherium Mitchellii*, on which it had probably been feeding." I do not think the finding of such a tooth in proximity with a *Nototherium's* teeth is sufficient proof that it belonged to a *Thylacoleo*, the more so as the huge canine of that animal had never been known before—and never will be known, because the *Thylacoleo carnifex* was not furnished with canine teeth, and the dental series (in the lower jaw at least) ended in a pair of incisors, from which fact I venture to conclude (guided by the analogy furnished by the dentition of our living Marsupials with two lower incisors, the wombat excepted) that the upper jaw contained the usual six incisor teeth, and that if it ever possessed a canine it must have been a very small one, corresponding to the diminished tooth found in *Hypsiprymnus* and *Phalangista*.

The tooth described by Prof. M'Coy is not referable to *Thylacoleo*; and the shape of its crown proves it at once to be an incisor, not a canine, and most likely the (incisor) tooth of the animal with the remains of which it was discovered. Prof. Owen (who long ago expressed his opinion to the effect that the dental series of the lower jaw of *Thylacoleo* would probably end in a pair of incisors) has given us a full description of the teeth of this animal, to which I have nothing to add, except that, with the scanty material at my disposal, I have ventured to recon-