

## The Mouth-parts of Dragonflies.

-1-

As a necessary complement to the predaceous and carnivorous habit of life of both nymphal and adult dragon-flies, we find these insects furnished with mouth-parts of the most approved flesh-eating type, which is the perfection of their adaptation to the purposes for which they are designed, compare favorably with the teeth and claws of vertebrate carnivora. In an earlier portion of this book, the method of hunting of the nymphal dragonfly, and his manner of devouring his prey has been fully discussed. The mouth parts consist of an upper lip or labrum, a pair of strongly chitinated mandibles, a pair of maxillae, and the large and characteristic labium. (Fig. —). Between the maxillae and the hyo-pharynx is the mouth, but it as well as the maxillae and the mandibles are concealed by the labium.

The labium has developed from the fusion of the second maxillae, the lateral lobe of the labium representing the palpus of the typical maxilla, while the ligula represents the consolidated labial and galeae. The typical labium (Fig.) consists of a sub-mentum, a mentum, a ligula, the shape of which varies greatly in the different families, and two lateral lobes, each bearing a movable hook and terminating in an end hook. These various parts are hinged together at four points, the movable hooks are hinged to the lateral lobes, which, in turn, are joined to the mentum by the apical hinges, the middle hinge marks the juncture of the mentum and sub-mentum, and the basal hinge the point of attachment of the sub-mentum to the head. (Fig. —).

The arrangement of muscles which produces the accurate



and effective movements of which the labium is capable, -2-  
is very simple. The movable hook is without muscles, and  
all the necessary movements are provided for by four pairs  
of powerful muscles, operating the apical, middle and  
~~basal~~ rings. These consist of a pair of abductors (Fig—)  
a pair of adductors, a pair of extensors and a pair of flexors.  
The abductors which are fastened to the external tendinous  
prolongation of the lateral lobe at its insertion into the  
submentum, and which originate in the floor of the sub-  
mentum, proximal to the middle ring, serve to thrust  
out the lateral lobe when the labium is extended.  
The adductors, which are inserted at the internal tendinous  
prolongation of the lateral lobe, and which also originate  
in the floor of the submentum, at a point a little distal to  
the origin of the abductors, serve to draw the lateral lobes  
down against the ligula. The extensors have their origin  
upon the backward prolongation of the hypos-pharynx,  
and passing over the flexors and above the adductors  
near their origin, are inserted upon the third ventral  
margin of the labium below the ring. These extensors,  
by pulling over the basal ring and the middle  
ring, obtain the leverage necessary to thrust the  
labium out to its full length. The flexors, originating  
upon the tentorium somewhat above the origin of the  
extensors, and inserting into the supero-lateral margin  
of the mentum distal to the ring by means of a  
tendon, fold the labium down into a position of rest.

Thus by the combined action of the ~~abductor~~ muscles  
and the extensors, the labium is thrust out, the lateral  
lobes opened and the movable hook mechanically (or  
automatically) extended; when the victim is within touch,



with a movement equally rapid and concerted, the adductors working with the flexors, the lateral lobes are drawn down, the labium closes, and the prey is held in the position in which it can most easily be devoured.

The labium of the nymph is a much more highly specialized organ than that of the adult. This is readily comprehensible when one recalls that in the nymph the labium is used not only in devouring the prey, but is also the sole instrument used to effect its capture; in the adult, on the contrary, the leg basket plays a large part in capturing the prey and the labium is merely accessory. In adults of those species which have the habit of vigorously hunting their prey and capturing it on the wing, the labium is more highly specialized than in the smaller less active forms.

The maxillae differ little from the ordinary type of those appendages; the palpus has only one joint and the lacinia and galea are not separated, but there are the principal differences. The maxillae serve a double purpose they help the mandibles to shred the food and reduce it to suitable fineness and they serve to retain it in the mouth after it has been thus shredded. The mandibles are the true jaws and are adapted for cutting and tearing the food, they are powerful, strongly chitinized appendages and the sharptips cross one another like the blades of a pair of shears. They shred and cut the captured insect while it is held firmly in place by the labium. Within the mouth is a large, free, semi-membranous lingua or tongue, the delicate lower lamina of which is connected with the mentum. The mouth is closed above by the upper lip

-4-  
or labrum which is pendulous, and very freely movable.  
The size and shape of the dragonfly's mouth can thus be  
altered considerably and with great rapidity, so as to adapt  
it to the capturing and devouring of creatures of the  
most various size.