

ON REARING DRAGONFLIES.

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Field work in Entomology is full of delightful opportunities, and none, just at present, is more inviting, none more certain to repay well even a little effort, none more sure to yield discoveries of scientific value, than work upon the life-histories of Dragonflies.

Of the species occurring throughout the central tier of States, a majority perhaps has now been bred; but of the Canadian, far western and southern species the known nymphs are few and far between.

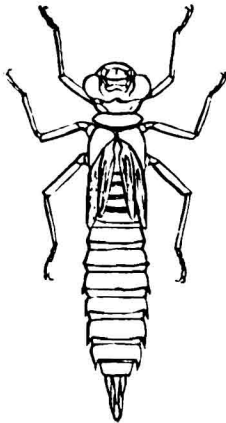


FIG. 15.—AESCHNID NYMPH.

The nymphs (fig. 15), which are all aquatic, have an interesting distribution in depth. Those of *Agrionidae* and of most *Aeschninae* cling to floating or submerged vegetation. These at least every aquatic collector has seen. Those of *Libellulidae* sprawl upon the bottom amid fallen trash. Those of *Gomphinae* burrow shallowly along beneath the film of sediment that lies on the bottom, with the end of the abdomen turned up for respiration.

It is very easy to collect them, especially in spring. A garden rake with which to draw ashore the stuff to which they cling and a pail of water in which to carry them home is all the apparatus desirable at that season. Later, when a new growth of weeds is rooted fast to the bottom, the rake will have to be exchanged for a water-net. Withdrawn from the water, the nymphs render themselves evident by their active efforts to get back, and need only to be picked up. The number of species one will find will generally depend on the variety of aquatic situations from which he collects. The places apt to yield the best collecting are small permanent pools, shallow inlets in the shores of lakes, and the places where the trash falls in the eddies of streams.

They are quite as easily reared. I have found common wooden kits and pails half filled with water, with screen or netting covers, entirely satisfactory. A number of nymphs, if near one size, may safely be kept together (excepting only a few notoriously cannibalistic *Aeschninas*: e. g., *Anax junius*), and if not grown may be fed upon such small insects as a net will gather in any pond. A good square meal once a week will keep

them thriving. The water should be reasonably clean. Three things should be carefully observed. (1) There must be a surface up which they can climb to transform: if the sides of the kit are too smooth put in some sticks; (2) there must be room enough between the netting cover and the water for complete expansion of their wings; (3) they must remain out of doors where the sunshine will reach them. This last point especially is essential to success. But there is still an easier way to do it, and one which, when a species is very common, will prove entirely satisfactory. The several nymphal stages (excepting the youngest, not likely to be collected) are very much alike. I am in the habit of preserving the younger nymphs and putting into my kits only those well grown, as shown by the length of the wing-cases, which should reach the middle of the abdomen. But if, when a species is becoming common, one will go to the edge of the water it frequents, at the time of its emergence, one may find nymphs crawling from the water, others transforming, imagoes drying their wings, and others ready to fly, and may thus obtain in a few minutes the material necessary for determining nymph and imago. The time of emergence may be determined by noticing at what time pale young imagoes are seen taking their first flight, and then going out a little earlier. The unfortunate thing about it is that many of the larger species transform very early in the morning, and to take such advantage of them one must be on the ground between daybreak and sunrise.

Several imagoes should be kept alive until they have assumed their mature colours. It is most important that each imago and its cast skin should be kept together.

Eggs, also, are easily obtained. Every collector has seen the female of the species figured on the front of this magazine, or of related species, dipping the tip of her abdomen into the surface of the water, depositing eggs. If the ovipositing female be captured, held by the fore wings, leaving the hind wings free, and "dipped" by hand to the surface of clean water in a vial or a tumbler, an abundance of eggs will usually be liberated. Eggs of those species which possess an ovipositor and which place them within the tissues of plants may be obtained by collecting the stems in which they have been inserted.

Eggs and nymphs should be dropped in boiling water for a minute and then preserved in alcohol. Imagoes, if mounted, should have a wire or bristle inserted into the body its entire length to prevent otherwise

certain breakage, or if placed unmounted in envelopes, these should be of soft paper, loosely packed, so that the eyes will not be crushed.

In my own field work upon Dragonflies I try to cover for each species the points of the following outline :

I. Imago.

- (1) Name ; locality ; date ; occurrence ; etc.
- (2) Haunts : places frequented ; places avoided ; the reasons, if discoverable.
- (3) Flight : its hours ; its duration ; its directness ; average altitude ; places of rest : altitudes.
- (4) Food : its kind ; how obtained ; where eaten.
- (5) Enemies : what are they, and how do they destroy Dragonflies ?
- (6) Oviposition : does the ♀ oviposit alone or attended by the ♂.
- (7) The eggs : where placed ; number in a place ; incubation period.

II. The Nymph.

Points 1, 2, 4 and 5 of above, and Imagination : hours ; places ; distance from water ; etc.

I shall have to admit at once that it is very difficult to determine all these points for a single species, but the effort will lead on into delightful intimacy with these beautiful insects.

At the kind invitation of the editors, I venture to say to the readers of this magazine that I am now engaged upon a semi-popular monograph of N. American Dragonflies, which, in so far as it includes accounts of habits and life-histories of the species, must of necessity be a co-operative work. And I have written this to invite co-operation. The foregoing simple methods are the very best. I will furnish (if desired) half a dozen named nymphs of typical genera to any one who will undertake to collect and rear others. I shall be very willing to determine nymphs or imagoes for any one, and to point out for description such as are new. But I especially desire that accurate field observations and notes be made on many of our species of which we now know only the names, and to such observers I will give all possible aid.

THE ANNUAL REPORT of the Entomological Society of Ontario for 1896 is now in type and will soon be ready for distribution.

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