

# Entomology for Fly Fisherman

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*Seth Green Chapter of Trout Unlimited*

About one half of insect life feed, breathe and sport in the water. In the grace of their movements, in the quick adaptation to circumstances, they show a joyful feeling of pleasure in their existence. Some live an aquatic life in all its three phases, others in two, and some in but one. It is a strange instance in the economy of nature that although insects use the six feet in walking, yet for swimming the latter two pairs are only employed. The forelegs when not adapted for prehension are partially aborted. All aquatic insects that I have been able thus far to rear feed on vegetable matter on exclusion from the egg. After the second and third molts their appetite varies. A large proportion are nocturnal, both larvae and imagines.

Springs, rivers, ponds and pools have their own peculiar insect fauna. In some there is an excess, in others a marked scarcity. The essential elements of a rich fauna are sunlight, healthy vegetation, and uniform temperature. These Caledonia Creek possesses in a wonderful degree. There is also equilibrium of the forces of nature that preserves each species in the same proportion for successive years. Carnivorous devour gregarious, multitudes remain; some denizens devour all species, multitudes of all species remain.

The larvae of all the insects are fish food, and in this connection there is this query--Do trout burrow in pursuit of food? I have found the larvae of insects in their stomachs that feed and transform buried in the soft mud eight, ten and twelve inches below the water. Although there are so many and various forms of life, yet the imitation of a comparatively few can be used by the fly-fisher. It is only those insects that in leaving the water rise from the current of the stream and those that in returning to the water, to perpetuate their race, hover over the current. The reason of this is apparent to those who know the habits of trout. Whether insects feel the vibrations of sound with their antennae or have auricular orifices is a disputed question. They certainly hear some way. It is the music of the riffle that glides them back, sometimes a mile or more, and they will always be found where there is a dam or break in the current, causing the flow of water to be heard at a greater distance.

The trout understand this and congregate in such places to feed; for trout, although gorged to repletion, will rise to their favorite food--the fly, that comes to them like manna from above.

The largest of articulate life is a crawfish, *Cambarus acutus*. The young are found in April and May

among the leaves of water plants, feeding on Entomostacea, water fleas and small Ephemera; later in the season and when fully grown, they burrow under gravel and stones. There is but one other Crustacea in the stream; it belongs to the family Gammaridae. It is these as a food that give the *Salmo fontinalis* of this stream their peculiar color, flavor and numbers. In life the color of the Gammarus is a uniform dark green. In death they turn a bright salmon. An infusion of them dried, with the addition of a mordant, colors a permanent rosy salmon. Twenty-five or thirty of these small pigments form but an ordinary meal for a trout. The Gammarus are single brooded--dying in April and May. The young resemble the parents. Their food is decaying vegetation and vegetable mold.

The Ephemera differ in many respects from the type. They are of small size, triple brooded, or with a succession of broods; the second pair of wings rudimentary. They live twenty-four, thirty-six, and sometimes forty-eight hours after leaving the water before casting the last parchment-like covering. After this they live about the same number of hours before they perish. The germ cells, from thirty to forty in number, are inclosed in a globulous gelatinous membrane that expands in con-

tact with the water, and adheres to any object it meets. The food of larvae and pupa is decaying vegetation and vegetable mold. Their anatomical structure is grace and symmetry combined, and actively swimming up, down and round through the water their tactics are continually of the defensive. When placed in a position of danger, or if taken from the water, they throw the setae up at right angles with the body, and present such a formidable appearance that if one were not certain of their harmlessness they would prefer to handle them with gloves.

The Ephemera leave the water mornings and evenings, the greater number in the evenings, and if the sun is obscured they will rise all day. When ready to leave, they swim to the surface and lie in the current. The case splits open on the thorax, a pair of wings unfold and are held upright, the head and feet are drawn out; it rests on the old hull an instant while the abdomen is being freed, and flies away to cast the last covering. It is then brighter colored and more transparent, so that the imago and sub-imago are known by different names by the angler.

*Potomanthus rufescens*, "blue dun" and "jenny spinner" leaves the water, if the weather is favorable, in the middle of March.

*Baetis longicanda*, "great dun" and "red spinner" the first of May.

The "dark fox" and its imago, the "silver fox", the last of April.

The "bright fox" and its imago, the "little egg", the first of May. This is the most abundant fly on the stream.

The "brown coffin" and its imago, the "gray coffin", the first of August.

The Phyganina, "Case worms", "Caddis bait", are the best known of water insects. There are in this stream twelve distinct species, nearly all vegetarians, and partially nocturnal in their habits. The pupae are quiescent, and when ready to transform rise to the current, leaving the water just before twilight. The larvae weave coverings of fine silk, some employing extraneous matter for the dress, others using it only as ballast, but each species clinging to its own style of garment through all time.

One species selects three small branches, varying from one to three inches in length, places them longitudinally and at equal distances around the body; inside of this there is another covering of fine texture. This is the "pale stone fly". It begins to leave the water in November, on warm days through the winter, and in March and April.

Another larvae, that feeds on the leaves of the water cress, employs small portions of the stem of the water-cress, building laterally and forms a rhomboid case, using only what silk is necessary to bind the pieces together. This is the "stone fly"; it leaves the water and is found hovering over it in July, August and September.

One species weaves together small snail shells, first eating the toothsome mollusk. Its costume is thus a series of spiral folds. This resembles in color the preceding.

Two use sand and gravel, add-

ing on as they increase in size. One is the "poor man's fly". It leaves the water in April. The other is the "wren hackle". It is seen the most in July.

Two use silk only. One of these is shaped like a horn. It is the raven of the stream, and comes off in June and July. The other resembles a cucumber seed, and is the "black hackle" for June, known in Pennsylvania as the "June Spinner".

The sub-family Ryacophila, of which there are three species in the stream, weave tents of silk with two entrances. This is a place of rest and refuge, leaving it to seek their food. They are all solitary in their habits--a quiescent pupa and single brooded.

There are two species of dragon flies, Odonata, single brooded, hibernating in the larvae form. Their food varies in different stages. I have noticed this in all the Odonata I have reared in aquaria--twenty varieties. Up to the time of the third molt, their food is vegetable matter. After this they live on small Ephemera and other small insects until fully grown and ready to leave the water. They are rapid swimmers, using the feet as oars and moving with an undulating motion. They are fond of coming to the surface, and if disturbed, by a sudden contraction of the tracheae they will spurt a spray of water eight or ten inches; the same movement propels them suddenly away. There is the same contraction when they dart for their prey; throwing out the long under lip, they grasp and swallow instantly. Authors have often referred to this contraction, and considered it their only method

of propelling themselves through the water.

The Diptera are all small-sized species, and belong to the families Chironomidae, Tipulidae, Simuliidae.

Chironomous larvae are slender, worm-like, distinct head, one pair of prolegs and retractable anal hooks. Their food is decaying vegetation. Pupae are in a thin, rude case, formed of debris: transform in two weeks to a graceful fly with large feathered antennae, transparent wings shorter than the abdomen; hibernate in the larvae form, double brooded. There are five species. The first brood appears in March and April; the second in August and September. They leave the water almost invariably in the morning.

They are named, piscatorially, "black gnat", "dark claret gnat", "bright claret gnat", "gray gnat", and "olive gnat".

Tipulidae larvae are a dirty green color, scaly head, almost entirely drawn within first thoracic segment, without feet, live on vegetable mold and confervae. They are single brooded and hibernate in the pupa form.

Simulium larvae are maggot like, without feet or distinct head, transparent, varying in color according to the vegetation they feed on;

spin a slipper shaped pouch for the pupa; transform in three weeks; are triple brooded.

The Coleoptera are all nocturnal. In the winged form they breathe by coming to the surface. They take occasional flights, flying with a heavy whirring sound. They are strong, rapid swimmers, using their feet as oars. When seized they emit a milky, fetid liquid.

*Hydrophilus piceus* is olive black, an inch and a quarter long. Its armor is a sharp spine on its breast. The larva is a soft fleshy grub with well-developed mouthparts, when grown, three inches in length. If touched they emit a black liquid; it discolors the water and enables them to escape. They are herbivorous. In the late fall they leave the creek and seek neighboring pools, where they live in torpor until the following April.

The Dytiscidae have earned their reputation as water tigers. Besides insect larvae they attack tadpoles, mollusks and young fish, and if hungry they will not spare their own species. They are dark brown, with stripes of paler brown on the exterior edge of the elytra; are large, burly beetles, and when flying, have an alar expanse of over three inches.

The Gyrinidae, or whirligigs, are all small sized beetles, oval, some bluish black, others brown. They will be seen in numbers, swimming in circles near the surface. They rise from the water and fly when pursued by fish, and dive to escape the water scorpions. They are remarkable for the arrangement of their eyes, which are apparently double. The lower eyes look into the water, the upper eyes into the air above. I have traced five species of this family through the different stages, and there are at least five more in the stream.

Of all the insects that creep, fly, or swim, the water scorpions [*Hydrocorisae*] are the most destructive. They seem to kill and destroy to satisfy a feeling of wanton cruelty, and nothing but a living, breathing meal will satisfy their appetite. Clumsy swimmers, they lie in wait and dart on their prey like a cat. Of the genus *Nepa*, there are two species, oval, very flat, and of an ashy gray color. One species is two and one half inches long. The body is terminated with two grooved threads, through which the adult insect breathes. *Ranatra fusca* has a long linear body, its respiratory tube consisting of three grooved threads an inch in length. ■