

NEW OR HITHERTO UNKNOWN EPHEMERID  
NYMPHS OF THE EASTERN UNITED  
STATES.

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THE nymphs of these, our most primitive Neuroptera, are especially interesting because of their varied and great specialization, each species having solved the problem of existence in a somewhat different manner. The described nymphs are few. That of *Bætisca obesa* Say has been known and figured for some years. Needham,<sup>1</sup> in 1901, describes the nymphs of seven species, representing as many genera, from the Adirondack region; and a number of undetermined American nymphs are described and figured in Eaton's monograph. It is singular that these most interesting aquatic larvæ are so little known. They are very easy to rear and form a delightful addition to any aquarium. Almost any pond or stream, of whatever size, will furnish its quota of forms, and there is a constant succession of species throughout the year. Thus I found *Blasturus cupidus* extremely common during the latter part of March and the first part of April, while diligent search on May 17 failed to disclose any specimens. *Habrophlebia americana* was abundant during the last week in May, while on June 14 I could not find any trace of it.

In these brief notes special attention is directed to the structure of the gills, because they afford a convenient and admirable criterion of the relations of the various species, both to one another and to their environment, and will prove exceedingly useful as a basis for phylogenetical hypotheses when more extended observations have been accumulated.

I am greatly indebted to Nathan Banks of the Department of Agriculture for authoritative determinations of the imagos.

<sup>1</sup> *N. Y. State Museum, Bull. No. 47.*

All the specimens are from Boynton's Pond, a shallow sheet of water about one hundred feet in diameter on the outskirts of Passaic, N.J.

**Habrophlebia americana** Banks mss.

This fine little species was common among the floating masses of *Spirogyra* which skirt the edges of the pond; rather sedentary in habit, but very active swimmers when disturbed. They swim by rapid vertical movements of the abdomen, meanwhile holding it considerably elevated. The chief organs of locomotion are the flattened abdomen with the expanded lateral margins of its segments. The caudal setæ are weak and but thinly clothed with hairs, and can be of but little assistance in

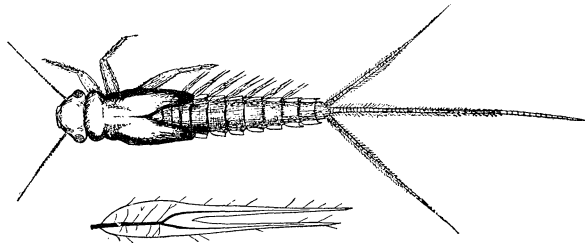


FIG. 1. — *Habrophlebia americana* Banks mss.

swimming. The abdomen is not held in a raised position when the nymphs are resting, as it is in *Callibaëtis*, for instance.

Antennæ slender, about 2 mm. long, sparsely and minutely hairy at the joints toward the base. Head wider than long, with the eyes on the posterior lateral angles. Color dark brown; margins of the abdominal segments and their lateral extensions, together with the terminal third of the caudal setæ, yellowish. Abdomen flattened; segments 3 to 6 about the same width and becoming slightly longer; segments 7, 8, and 9 rapidly narrowing, the ninth being about half the width of the third; posterior margins of segments 6 to 10 minutely toothed; lateral margins of all the segments produced more or less beneath the gills, thus protecting them when swimming. This lateral expansion increases posteriorly, and the posterior lateral angles of segments 8 and 9 are produced into a sharp spur.

Gills single, lanceolate, bilobed, similar in outline to the first stunted pair in *Blasturus cupidus*; directed laterally, borne on segments 1 to 7, and all alike except for the third, fourth, and fifth pairs being slightly larger; margins of all somewhat clothed with scattered hairs.

Caudal setæ all hairy on both sides, — sparsely so, however, and then only at the joints; angle of separation considerable; terminal third naked and lighter colored than the basal two-thirds. Middle seta longest, length 5–6 mm.

Legs rather small and weak, the third pair the longest; coxa with a row of eight tiny spines; femur abundantly spined; tibia and tarsus spined at angles and hairy, the hairs longest on the tibia. This species seems to walk backward or forward with equal facility.

Total length 6–7 mm. (figure enlarged  $\times 6$ ); greatest width 1.1 to 1.5 mm.

These were taken the afternoon of May 24 and were fully grown, but owing to the cool weather none emerged until May 29, when one emerged; the next day (May 30) two others emerged, and the first specimen molted his subimago accoutrements and became a full-fledged ephemerid.

This is the only known species from the United States, and the only recorded locality as far as I know, although Eaton in his revision states that he has seen a specimen belonging to this genus from New Hampshire.

#### ***Blasturus cupidus* Say.**

This is one of the commonest spring May flies of the eastern states. Imagos have been recorded from the following New Jersey localities: Fort Lee, Staten Island, Caldwell, Westville, and Jamesburg. The full-grown nymphs were common beneath the floating debris around the pond margins during the last week in March and the first week in April. On May 17 none were to be found.

Nymphs stout, widest across mesothorax (about 3 mm.), total length 12 to 13 mm., color dark; antennæ about half as long as body (or 6 mm.); legs comparatively strong, minutely spined throughout. Comparatively slow swimmers, but active

walkers and climbers, walking with facility either forward or backward. Lateral margins of posterior abdominal segments produced into a point.

Outer caudal setæ fringed on both sides, habitually held at an angle of  $60^{\circ}$  to  $70^{\circ}$  (Fig. 2, *e*); length about 12 mm.; joints

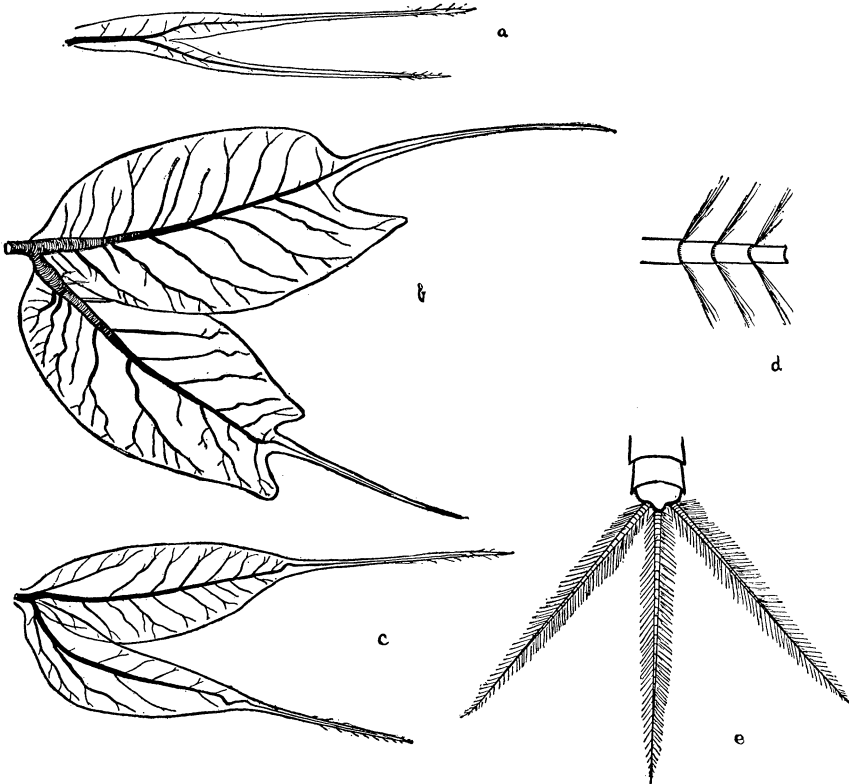


FIG. 2.—*Blasturus cupidus* Say.

over seventy, short at the base, becoming elongated toward the tip; margins of joints finely spined, hairy only at the nodes (Fig. 2, *d*).

Gills exposed, leaf-like, held laterally, on segments 1 to 7, their movement comparatively slow (about 130 per minute); on the first segment they are simple lanceolate rudiments, forked for over two-thirds their length into two slender sparsely hairy branches (Fig. 2, *a*); they are double on segments 2 to 7, ovate

in outline, their mid-veins extended into slender filaments, which are nearly as long as the gill leaf proper (Fig. 2, *b*); the gills gradually become smaller and more slender posteriorly, until on segment 7 they are lanceolate (Fig. 2, *c*). Veins reddish, thick, passing abruptly into very fine branches.

*Callibaëtis ferruginea* Walsh.

Imagos of this species have been taken from Canada to the southern states; none are recorded from New Jersey localities, however. The nymphs are very common beneath the floating

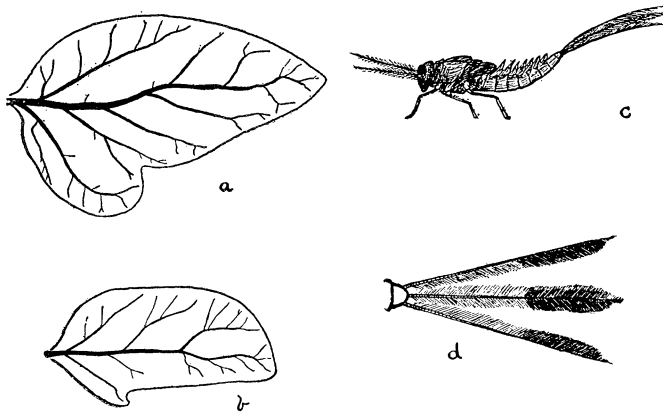


FIG. 3.—*Callibaëtis ferruginea* Walsh (spring form).

debris and *Spirogyra* masses, and appears to be the most common species in the vicinity of Passaic except for an undetermined species of *Heptagenia* from the brooks of this vicinity. I have taken them at intervals from the first week in April through July; they were more abundant, however, during the springtime.

General color light brown, sometimes greenish; eyes lateral; body widest across the mesothorax; legs about equidistant at base, weak, light colored, darker at the tips of the joints.

Gills exposed, on segments 1 to 7, simple, somewhat two-lobed, broadly oval in outline, held vertically when at rest; vibration intermittent but rapid (about 200 per minute). They

decrease regularly in size posteriorly. Fig. 3, *a* represents one of the first pair and Fig. 3, *b* one of the last pair.

Total length about 9 mm.; antennæ 5–6 mm.; caudal setæ 7 mm.

Caudal setæ abundantly fringed, the lateral ones on the inner side only; fringe three or four times as long as setæ is wide, regularly abundant, not confined to nodes except towards tip, where it is short and sparse and almost imperceptible; fringe widest on the middle third, which is strikingly dark colored (Fig. 3, *d*); lateral setæ slightly longer than terminal,

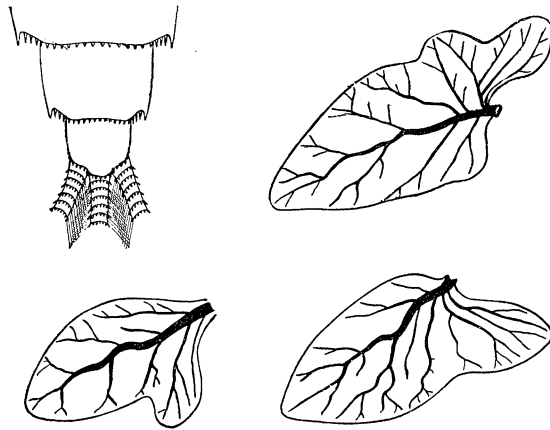


FIG. 4. — *Callibaëtis ferruginea* Walsh (summer form).

bringing their tips in a line; angle between outer setæ habitually about  $30^{\circ}$ ; active darting swimmers, as might be imagined from the oarlike caudal setæ, and correspondingly poor walkers and climbers. When at rest the abdomen is held much elevated, as in Fig. 3, *c*.

The specimens taken on June 14 (Fig. 4) differ somewhat from the preceding, and I imagine the former might have been females. One of the latter which I bred was a male, but I cannot be sure that it is the individual from which I wrote the description.

Total length 10 mm.; antennæ 5.25 mm.; setæ 7 mm.; greatest width 2.25 mm. The habitual angle at which the outer caudal setæ was held was slightly greater than in the

former case; the margins of the joints more conspicuously spined, particularly those of the abdomen, which increase in size laterally, the last one forming a decided spur at the posterior-lateral angle of the segment; gill veins somewhat stouter, and gills with a much more decided basal lobe. Collected on the afternoon of June 14. During the night four subimagos emerged, and the next afternoon the only living one molted to the imago stage.

PASSAIC, NEW JERSEY.