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NEW RECORD OF *BRACHYCERCUS MACULATUS* BERNER (EPHEMEROPTERA: CAENIDAE) FROM NEW YORK AND A KEY TO LARVAE OF NORTHEASTERN SPECIES

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ABSTRACT

Brachycercus maculatus, a member of a rare group of mayflies, is now recorded for the first time from New York State in the upper Hudson River. An illustrated key to the *Brachycercus* larvae of northeastern North America is provided to spur further study of the genus in the region.

Species of the genus *Brachycercus* Curtis include some of the most enigmatic mayflies. Larvae are small with ocellar tubercles and occur among fine detritus and shifting sediments of lentic and slow-flowing lotic habitats. Although current distribution records indicate that the genus is broadly distributed, larvae are rarely collected. Adults are small, short-lived, and encountered even less frequently than larvae. Virtually nothing is known about the swarming behavior or biology of most North American species. Taxonomic studies of *Brachycercus* (Berner 1950, Soldan 1986, Berner and Pescador 1988), which contain little information on biology, constitute most of what is known about North American species.

Brachycercus maculatus Berner is a species that was believed to have been restricted to north-central Florida, but recently it was confirmed from North Carolina (M. Pescador, pers. comm.). The purpose of this paper is to report the discovery of *B. maculatus* from the upper Hudson River in New York. We also present, a regional key to the larvae of the four species of *Brachycercus* now known to occur in New York, New England, and southern Quebec.

Brachycercus maculatus Berner 1946, **NEW RECORD–NEW YORK**: (11 Larvae) **Warren Co.**, Hudson River, Corinth, milepoint 214 [43° 14′ 55″N/073° 49′ 57″W], 7 July 1994, R.W.Bode; (4 Larvae); **Saratoga Co.**, Hudson River, Waterford, milepoint 157 [42° 47′19″N/073° 40′ 38″W], 7 July 1994, R.W.Bode.

Brachycercus maculatus larvae were collected in Petite Ponar grab samples (APHA, 1985) taken during ambient water quality monitoring at the village of Corinth and at Waterford on the upper Hudson River. Physical and chemical water quality parameters for both collection sites are presented in Table 1. Corinth samples containing *Brachycercus* larvae were obtained 20 m upstream of a hydroelectric dam and 5 m from the northeastern shore. Waterford samples were taken 20 m from the eastern shore. The substrate in Ponar grab samples at both sites consisted of sand, silt, and organic material

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Table 1. Physical and chemical parameters of *Brachycercus* sites on the Hudson River. Chemical habitat parameters recorded at the time of collection are listed with annual ranges. Annual ranges of chemical parameters were obtained from Firda et al. (1993,1994, and in press).

Site	Vel.[a] (m/s)	Width (m)	Depth[a] (m)	Flow (m^3/s)	Temp. (°C)	Spec. Cond.[d]	D.O. (ppm)	pH
Corinth	1.0	110	2.0	158.6[b]	23.0	45	8.7	6.9
	—	—	—	—	(0.1–24.6)	(33–57)	(8.2–15.3)	(6.6–7.3)
Waterford	0.5	300	4.0	230.4[c]	26.4	133	8.1	7.8
	—	—	—	—	(0.2–30.0)	(98–177)	(3.3–14.0)	(7.0–7.8)

[a]Taken at mid-channel.
[b]Measured at USGS gage at Lake Luzerne 8.0 km upstream of site.
[c]Measured at USGS gage 5.3 km upstream of site.
[d](mhos/cm @ 25°C)

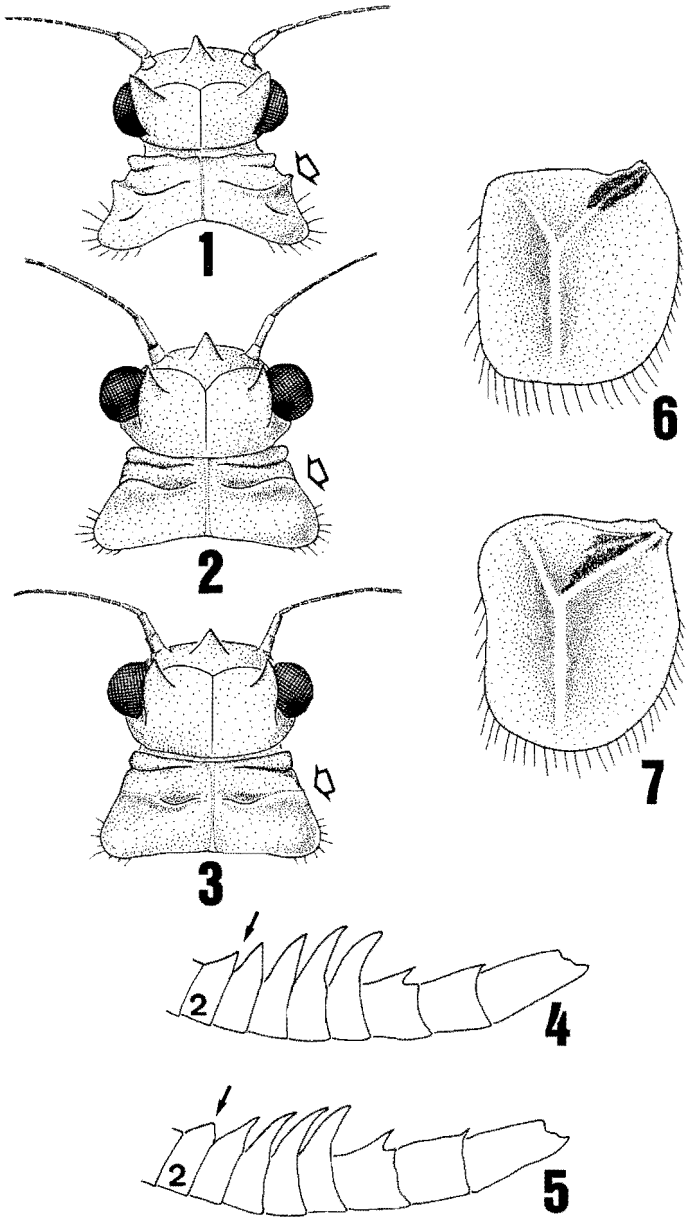
(mostly leaves). Specimens of *B. maculatus* were only found in samples that contained fine sediments with few leaves or macrophyte stems. Samples with a large amount of plant matter contained no *Brachycercus*.

Larvae taken at both sites ranged in length from 2.66 to 5.75 mm, with a mean of 4.43 mm. Several had black wing pads indicating that emergence was imminent at the time of collection. Among these specimens body lengths ranged from 4.58 to 5.75 mm, with a mean of 5.23 mm. Previously, adult emergence has only been reported for *B. lacustris* (Lyman 1955) and *B. flavus* (Harper and Harper 1976). Both of these species have emergences that occur in late July and continue into August, whereas *B. maculatus* seems to be emerging in early July. Lyman (1955) showed that *B. lacustris* had a prolonged emergence that peaked in early August. Harper and Harper (1976) reported a similar peak emergence for *B. flavus* in early August. Unfortunately, because no other specimens of *B. maculatus* were obtained it was not possible to determine the duration or the peak of its emergence at the Hudson River sites. In Florida adults of *B. maculatus* have been reported in February, April, and July (Berner and Pescador 1988).

Four species of *Brachycercus* (*B. flavus* Traver, *B. lacustris* (Needham), *B. nitidus* (Traver), and *B. maculatus*) are now known from New York, New England, and southern Quebec. Among the these species *B. nitidus* is most distinctive and easily identified. However, the remaining species are very similar. Differences among diagnostic characters described by Traver (1935), Berner (1946, 1950), Burks (1953), Soldan (1986), and Berner and Pescador (1988) are subtle and may eventually be shown to be within the range of variation a single widely distributed species. But any decision on this matter will require a thorough revision of the genus. Until that occurs the following key, based on our studies and the decriptive works listed above, will aid in indentifying the larvae of these taxa as they are now defined. We hope that this will spur interest and futher study of *Brachycercus* in this region.

Key to Larvae of *Brachycercus* of Northeastern North America

1. Pronotum with a pair of well developed lateral spines (Fig.1); body length 7.0–9.0 mm ..... *B. nitidus*



Figures 1–7. 1–3: Head and pronotum, arrows indicate pronotal spines or ridges; 1, *B. nitidus*; 2, *B. maculatus*; 3, *B. lacustris*; 4–5: Left lateral view of abdomen showing posterolateral projections, segment 2 is labeled; 4, *B. flavus*;5, *B. lacustris*; 6–7: Dorsal view of right gill covers; 6, *B. flavus*; 7, *B. lacustris*.

1'. Pronotum without lateral spines, but may have a pair of transverse ridges (Fig. 2); body length less than 7.0 mm 2
2. Pronotum with well developed transverse ridges that are distinct from the lateral margins to the midline (Fig. 2) ..... *B. maculatus*
2'. Pronotum smooth with weakly developed transverse ridges that may appear not to meet the lateral margins (Fig. 3) 3
3. Posterolateral spines on abdominal segment 2 sharp and greater than half the length of spines on segment 3 (Fig. 4); gill covers with distinct dark spots near basal articulation, spots do not extend to the intersection of ridges on gill covers (Fig. 6) ..... *B. flavus*
3'. Posterolateral spines on abdominal segment 2 blunt and only about half the length of those on segments 3 (Fig. 5), bases of spines on segment 2 wider than those on segments 3–6; gill covers without distinct spots, but may have dark shading that extends to the intersection of ridges on gill covers (Fig. 7) ..... *B. lacustris*

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