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NOTE

Description of the Adults of *Maccaffertium lenati* (Ephemeroptera: Heptageniidae), Notes on its Ecology and Distribution, and a New North Carolina Record for *Isonychia arida* (Ephemeroptera: Isonychiidae)

McCafferty (1990) described *Maccaffertium lenati* from larvae collected from several North Carolina inner coastal plain streams. The adults have remained undescribed. Recently, we successfully reared a male and a female from the Cape Fear River, Harnett Co., North Carolina. In this paper we describe the male and female of *M. lenati* following terminology in Bednarik and McCafferty (1979). All species of *Maccaffertium* are now described in the larval and adult stages.

Male imago.—Length 10.5 mm. Head pale. Ocellar rings black. Compound eyes separated dorsally by distance slightly greater than width of lateral ocellus. *Thorax:* Pale; sutures tinged with brown. Forefemur with middorsal reddish-brown band, tibiae white with apices dark; foretarsal ratio 2.4. Forewing hyaline, longitudinal veins pale, crossveins brown; milky tinge in stigmatic area; 2 crossveins in each of first 3 bulla interspaces, not crowded; 11 crossveins in first interspace distal to bulla region. Hindwing not darkened on outer margins. *Abdomen:* Segments 1–7 hyaline white; 8–10 shaded with brown (Fig. 1). Terga 2–7 with narrow black transverse bands at posterior margins interrupted medially (Fig. 2); spiracular markings absent. Caudal filaments white; segment joints narrowly brown. Penes as in Fig. 3.

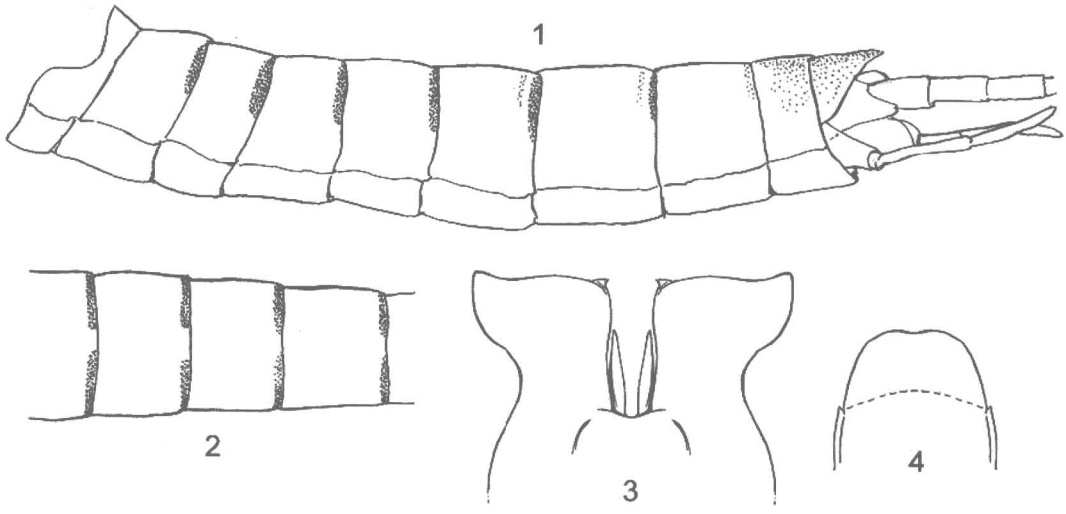
Female imago.—Posterior margin of subanal plate as in Fig. 4.

Material examined.—North Carolina: Harnett Co., Cape Fear River, Hwy 217 SW of Erwin, N 35.31219 W 75.69094, 18 May 2004, B. C. Kondratieff, R. F. Kirchner, R. E. Zuellig, and D. R. Lenat, 1 ♂, 1 ♀ reared (C. P. Gillette Museum of Arthropod Diversity, Colorado State University).

Diagnosis.—The male imago of *M. lenati* will key to couplet 16, *M. terminatum* (Walsh) in Bednarik and McCafferty (1979). The markings of the adult abdomen of *M. lenati* (Fig. 2) are similar to certain *M. terminatum* variants that have dashes expanded to form narrow posteriomedially interrupted transverse bands (see Bednarik and McCafferty 1979: fig. 91). The upcurved shape of the penial lobes (Fig. 3) of the male of *M. lenati* easily separates it from *M. terminatum* (see Bednarik and McCafferty 1979: figs. 46–47). Additionally, *M. lenati* lacks the faint reddish stain in the stigmatic area of the forewing, and males of *M. terminatum* are apparently smaller, ranging in body length from 6–9 mm, whereas the single reared male of *M. lenati* is 10.5 mm. Apparently, *M. terminatum* does not occur sympatrically with *M. lenati* in North Carolina (see below).

Remarks.—McCafferty (1990) speculated that *M. lenati* is a member of Cluster IIIB as defined by Bednarik and McCafferty (1979), which includes *M. modestum* (Banks), *M. smithae* (Traver), and *M. mexicanum* (Ulmer). However, adult characteristics seem to indicate that *M. lenati* is a member of Cluster IIIA, which includes *M. pulchellum* (Walsh), *M. terminatum*, *M. exiguum* (Traver), and *M. meririvulanum* (Carle and Lewis).

The larvae of *M. lenati* are usually not found in high-current riffle areas, and may be missed by surveys that target riffle habitat. This species is most often found on large rocks in slower water, either at



Figs 1–4. *Maccaffertium lenati*. 1, Adult abdomen, lateral. 2, Adult abdomen, dorsal. 3, penial lobes. 4, Adult female subanal plate.

the head of a riffle or near the banks. North Carolina Division of Water Quality (NCDWQ) biologists collect benthic macroinvertebrates from all major streams and rivers in the state in a five-year rotation. The NCDWQ data set (unpublished) is used here to determine the distribution and preferred habitat for *M. lenati*. There are 92 North Carolina records of *M. lenati* larvae, including data from 40 sites in 16 different rivers (Fig. 5). Streams at collection localities have a mean width of 32 m. *Maccaffertium lenati* may have a preference for higher water quality as 72% of the records are from sites rated as Excellent or Good by the NCDWQ. Larvae of this species have been collected during all seasons of the year. *Maccaffertium lenati* seems to favor transition areas between ecoregions, with one cluster of records between the mountains and piedmont (especially in the "Inner Northern Piedmont") and a second cluster along the fall line between the

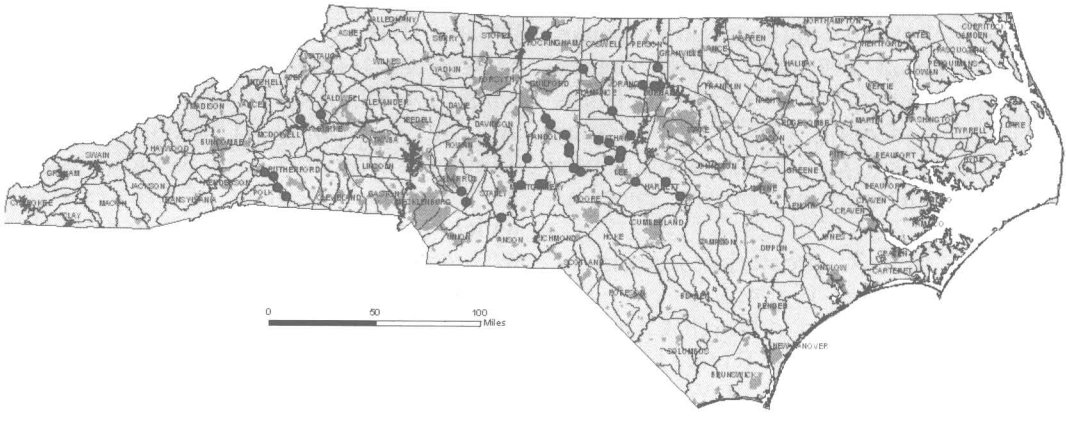


Fig. 5. Distribution of *Maccaffertium lenati* in North Carolina.

piedmont and coastal plain. The first cluster includes the Broad, Green, Linville, Johns, Dan, and Mayo rivers. The second cluster includes the Cape Fear, Deep, Haw, Eno, and Flat rivers (Fig. 5). Other heptageniids which frequently co-occur with *M. lenati* include *M. modestum*, *M. exiguum*, *Stenacron pallidum* (Traver), *S. interpunctatum* (Say), *Heptagenia marginalis* Banks, and *Leucrocuta aphrodite* (McDunnough). It had been reported as co-occurring with *M. terminatum* (McCafferty 1990), but these records resulted from incorrect identification of early instars of *M. exiguum* larvae by NCDWQ personnel. Additionally, at the Cape Fear site, *Isonychia arida* (Say) was reared, representing a new state record for North Carolina (Pescador et al. 1999).

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