

NOTES ON THE GENUS *PERLINELLA* AND A GENERIC  
SYNONYMY IN NORTH AMERICAN PERLIDAE  
(PLECOPTERA).

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ABSTRACT

The generic concept of *Perlinella* Banks is revised and *Atoperla* Banks is placed as a synonym. The 3 species included, *P. drymo* (Newman), *P. fumipennis* (Walsh), and *P. ephyre* (Newman) are redescribed, and their distinctive characters are illustrated. *P. fumipennis* is removed from the synonymy of *P. ephyre* and revalidated.

Through the courtesy of Dr. William L. Peters I recently received a number of stoneflies collected by him and some of his colleagues near Tallahassee, mainly in the Blackwater River (Okaloosa Co., Florida). Besides the 3 species discussed in detail below, there are numerous *Perlesta placida* (Hagen), adults as well as nymphs. The samples also contain some *Attaneuria ruralis* (Hagen) and *Acroneuria arenosa* (Pictet), a few *Neoperla clymene* (Newman), 2 presently unidentified species of *Isoperla* and a minute nymph of some *Pteronarcys* species.

The *Perlesta* specimens are aberrant in that the males have no small tooth near the tips of the paraprocts (which normal *P. placida* should have according to Needham & Claassen 1925, who studied the type specimen) and in that the penis appears more definitely sclerotized and is slightly different in proportions when compared to the genitalia of specimens with paraproctal teeth (from Sharon Woods, Ohio). However, differences are minor and presently I have no possibility to study the variations of the above mentioned characters. Specimens apparently similar to the ones from the Blackwater River have recently been described in great detail (Stewart, Atmar & Solon 1969) and have also been identified as *Perlesta placida* in the sense of Hagen; unfortunately the authors do not indicate where their specimens were taken, but presumably they were collected near Denton, in northern Texas.

The observations I made when studying some *Perlinella drymo* (Newman) (new for Florida) and *Atoperla ephyre* (Newman) are of greater importance. Both species resemble one another very closely in all structural details, except that *Atoperla* normally lacks the anterior ocellus. The coloration of the prothorax distinguishes the 2 and they differ in the presence (*Perlinella*) or absence (*Atoperla*) of anal gills in the nymphs according to Claassen (1931); this, however, was doubted by Frison (1935), who observed anal gills in *Atoperla*-nymphs.

For generic distinction, the differences mentioned seemed rather poor and so I looked for other characters and studied the male copulatory organs. The penial sclerites of *Perlinella drymo* have been drawn by Needham & Claassen (1925) and the organ is distinctive and of unusual structure. There is no description of the penis of *Atoperla*, but preparations surprisingly showed no basic differences between the 2. They further-

more revealed that a surprisingly sharp break between a majority of dull luteous specimens of *Atoperla* and a minority of very dark specimens (the species is said to have a wide range in coloration, Needham & Claassen 1925, Frison 1935) is in fact the gap between 2 species. The dark specimens, which could not be distinguished from *A. ephyre* except for the coloration, have a penis very similar to that of *P. drymo*. They belong to *Perla fumipennis* Walsh (treated as a synonym of *A. ephyre* since Needham & Claassen's monograph and revalidated below) and, they combine the exterior characters of *Atoperla* with the interior ones of *Perlinella*. The distinction of the 2 genera is apparently impossible, necessitating a revised generic concept (i.e. there is only one genus and *Perlinella* is the older, valid name).

*Perlinella* Banks

- 1900 *Perlinella* Banks, Trans. Amer. Entomol. Soc. 26:242. Monotypic; type-species: *Perla elongata* Walsh=*Perlinella drymo* (Newman).  
 1905 *Atoperla* Banks, Psyche 12:56.—Monotypic; type-species: *Perla producta* Walsh=*Atoperla ephyre* (Newman). NEW SYNONYMY.

Small to medium-sized Perlidae (9 to 19mm long) of the subfamily Acroneuriinae. They are easily recognized because their wings have only 1 to 4 crossveins beyond the end of Sc and none or 1 before it. The head is rather elongate, slightly wider than the pronotum and bears 3 ocelli in the type species, 2 of them in the other species (sometimes the third is faintly indicated in *P. ephyre* specimens).

Subgenital plate of the female very short, with a central more or less quadrangular notch flanked by 2 lateral lobes. Though this is rather diagnostic for the genus, individual variation seems to be important and no reliable specific characters have been found.

Males with slender, upcurved paraprocots, tips pointed. The subgenital plate bears a rather large transversely oval whitish hammer in subterminal position. The penis is highly diagnostic. It consists of a muscular bulb around the terminal section of the 2 seminal vesicles and laterally bears 2 sclerites. Their bases serve as an attachment to muscle fibers, partly of the retractor muscles, partly of muscles which apparently can spread the sclerites so that their tips diverge and a median membranous sac normally folded and concealed between the sclerites can expand. Situated on this membranous sac, which is ornated with numerous small spicules, is the genital pore (or pores, because many stoneflies have 2 of them; but no direct observation was possible here). The distal sections of the sclerites possibly act as claspers, holding the female organs with their serrated margins.

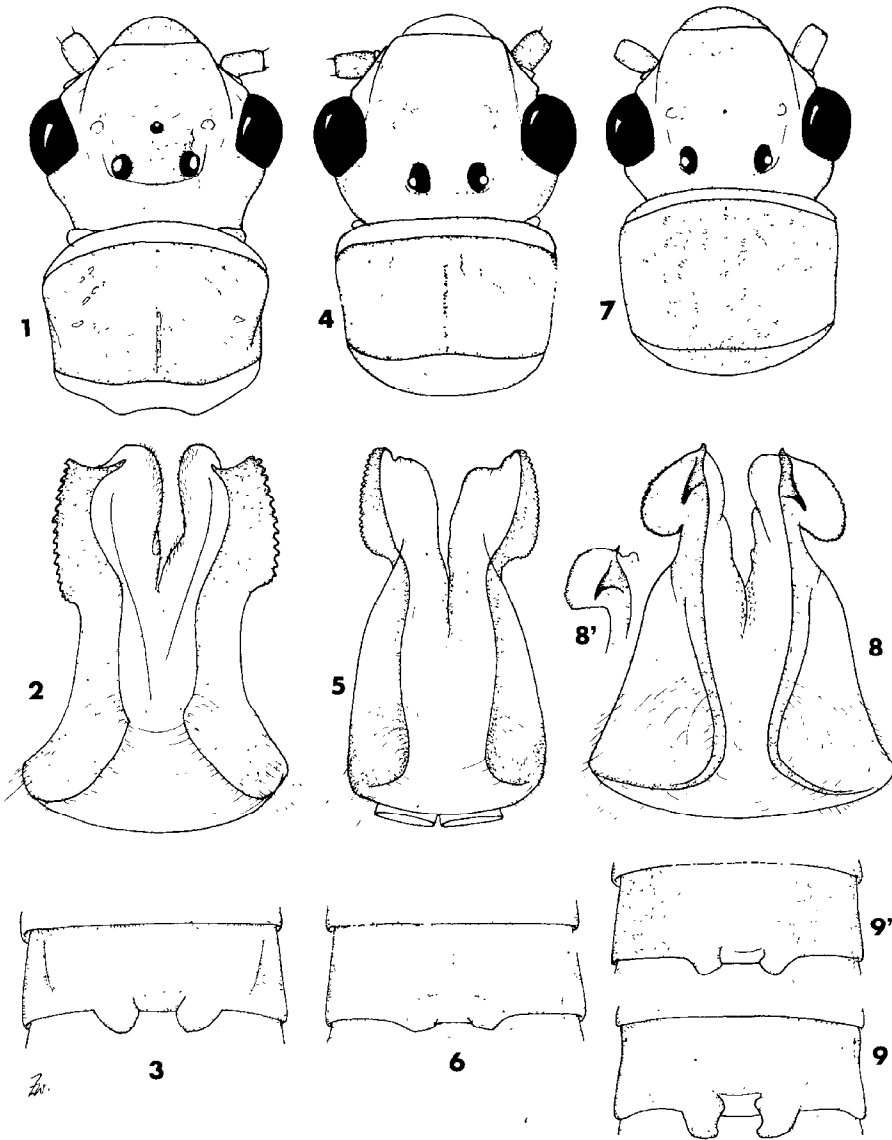
Nymphs characterized by very long heads and small eyes in anterior position. Thoracic gills copious, prothorax with small anterior and posterior supracoxal gills, mesothorax with first substigmatal and posterior supracoxal gills, metathorax with second substigmatal and big posterior supracoxal gills; the so-called third substigmatal gill (the gill of the reduced first abdominal sternite) is absent. Anal gills small or absent.

The genus comprises 3 North American species, all found in the eastern Nearctic region. Wu (1938) and Banks (1939) place 3 Chinese species into *Atoperla* because they lack an anterior ocellus. The diagnostic value of

this character has been highly over-estimated and, no other data, indicating a close relationship to the Nearctic species, are known (Illies 1966); these species are therefore not considered here.

*Perlinella drymo* (Newman)

1839 *Isogenus drymo* Newman, Mag. Nat. Hist. 3:86; Type locality: Georgia. For synonyms and detailed bibliography see Illies (1966).



Head and prothorax (above), ventral view of penis in resting position (center) and female subgenital plates (below) of *Perlinella drymo* (Newman) (Fig. 1-3), *P. fumipennis* (Walsh) (Fig. 4-6) and *P. ephyre* (Newman). Figures 8' and 9' show specimens from Ohio, all others represent specimens from the Blackwater River, Florida.

Easily recognized by the contrast between light and dark areas of the pronotum, which give it a somewhat striped appearance (Fig. 1). There are always 3 ocelli. Penis (Fig. 2) with strong sclerites, their bases enlarged, the coarsely serrated distal section long, almost half as long as the entire organ. Inner membranous sac with numerous small spicules. Figure 2 differs from that given by Needham & Claassen (1925) in that the inner distal tips of the sclerites are not bent but pointed. This seems to differ from specimen to specimen and simply seems to depend on the degree of retraction or devagination of the folded membranous parts.

Females are best recognized by their coloration. The shape of the subgenital plate seems to be fairly constant, the notch is less deep than in the other species (Fig. 3).

Nymphs, according to Claassen 1931, with small anal gills; for detailed data see Claassen or Frison 1935.

Material studied: 12 males, 1 female from several stations on the Blackwater River, Florida; they were compared to specimens from the Indian Creek, Hwy. 128, Ohio.

*Perlinella fumipennis* (Walsh), new combination

1862 *Perla fumipennis* Walsh, Proc. Acad. Nat. Sci. Philadelphia 13:366.  
Type locality: vicinity of Rock Island, Illinois.

A small Perlid, only 9 to 12mm long, of very dark appearance. The head is yellowish, with a black central patch around the 2 ocelli (Walsh, 1863, stressed that ". . . in *Perlina* the number of ocelli, which elsewhere is of high systematic value becomes scarcely of subgeneric value.") and less distinct dark patches behind the eyes. In contrast to *P. drymo* and *P. ephyre* the forehead is entirely yellow (Fig. 4). The antennae have a luteous basal third, but with a darker first joint; distal ends dark brown. The prothorax is entirely dark brown as is the rest of the body, except lighter patches in front and along the attachment of the wings. Wings dark brown with only minute basal stretch of Sc yellowish and a pale indistinct line in front of basal section of M and another behind Cu<sub>2</sub>. Legs dark, with basal portions of all femora yellow. In the fore leg the light section is restricted to very base of femur, but occupying about half the femur length in other legs. Cerci entirely dark, while Walsh calls them lighter in basal forth, but I believe this is an insignificant difference.

Penis similar to that of *P. drymo*, but sclerites more slender, basally less enlarged, serrated section relatively shorter (about one third entire length), serration finer (Fig. 5). Inner membranous sac with fine spicules.

In the only female known, the notch of the subgenital plate is distinct but relatively small, the lateral lobes are minute (Fig. 6).

Nymph not known.

Material studied: 2 males, Blackwater River at Kennedy Bridge, 6 miles w Blackman, 1-V-70; 1 male, 1 female, Blackwater River at Bryant Bridge, 2,5 miles w Holt, 9-V-70.

The species was originally described on a single male; a more complete, revised description was given by Walsh in 1863 after 2 additional males had been taken at the type locality. According to Frison (1935) the type

material no longer exists. The species has later been mistaken for *P. ephyre* and may be widely distributed.

*Perlinella ephyre* (Newman), new combination

1839 *Chloroperla ephyre* Newman, Mag. Nat. Hist. 3:87. Type locality: Georgia.

For synonyms (delete *P. fumipennis* Walsh !) and detailed bibliography see Illies (1966).

Species of medium size, 9 to 16mm long, with 2 ocelli (sometimes the anterior, third ocellus is faintly indicated) and a unicolorous pronotum. The female type (recently studied by Kimmins, 1970) is light in color as are all the specimens I have seen. If there are darker specimens, as earlier authors indicate, they could be distinguished from *P. fumipennis* by the presence of dark patches on the forehead (Fig. 7).

Males are easily separated by study of the penial sclerites (Fig. 8): they are very wide, almost triangular, with short finely serrated lobes near the tip. The inner distal angles are bent up and recurved as strong dark hooks. There is some variation in the shape of the serrated lobe and its angle against the longitudinal axis of the sclerite (Fig. 8,8'). Membranous sac covered with minute blunt warts.

The female subgenital plate seems to be quite variable, both shape and coloration are affected; specimens are therefore probably best identified by the coloration of head and pronotum.

Nymphs are generally similar to those of *P. drymo*; the specimens from the Blackwater River have no anal gills as indicated by Claassen (1931) but doubted by Frison (1935). The possibility of intraspecific variation cannot be excluded, but the nymphs Frison studied could have been those of another species, possibly *P. fumipennis*.

Material studied: 29 males, 9 females, 3 nymphs from various stations on the Blackwater River; a number of males and females from the 7-Mile-Creek, Hwy. 127, Collinsville, Ohio.

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