

## The larva of *Plectrocnemia laetabilis* McLachlan, 1880 (Trichoptera ; Polycentropodidae ; Polycentropodinae)

R. Vieira-Lanero\*, M.A. González, F. Cobo

Departamento de Biología Animal, Facultad de Biología, Universidad de Santiago de Compostela, E-15782 Santiago de Compostela (A Coruña), Spain

The fifth instar larva of *Plectrocnemia laetabilis* McLachlan, 1880 is described for the first time, and the main taxonomic characters are figured. The larvae of *P. laetabilis* are very similar to those of *P. conspersa* (Curtis, 1834), but they are easily distinguishable by some characters of the frontoclypeal apotome, labrum and abdominal segment IX. Additionally, some notes on distribution and ecological preferences are included.

Keywords : Trichoptera, Polycentropodidae, Polycentropodinae, *Plectrocnemia*, larva, Iberian Peninsula.

### Introduction

The Polycentropodidae are represented in the Iberian Peninsula (González et al. 1992, Terra 1994) by four genera : *Cyrnus* Stephens, 1836 ; *Plectrocnemia* Stephens, 1836 ; *Polycentropus* Curtis, 1835 and *Pseudoneureclipsis* Ulmer, 1913. Nevertheless, it should be noted that, in a recent paper, Tachet et al. (2001) noted difficulties placing *Pseudoneureclipsis* in Polycentropodidae and, subsequently, Li et al. (2001) concluded that *Pseudoneureclipsis* should be removed from Polycentropodidae and placed in Dipseudopsidae.

The prothoracic tarsi and anal claws are used by Edington (1964) to separate the last instar larvae of *Plectrocnemia* from those of other British Polycentropodidae. *Cyrnus* larvae have always four blunt teeth on the inside margin of the anal claw, which are absent in *Plectrocnemia* larvae. Moreover, prothoracic tarsi are less than half length of the tibiae in the last instar larvae of *Polycentropus*, while it is about same length as the tibiae in *Plectrocnemia* larvae.

According to González et al. (1992) and Terra (1994), there are five *Plectrocnemia* species in the Iberian Peninsula, *P. geniculata* McLachlan, 1871, *P. conspersa* (Curtis, 1834), *P. inflata* McLachlan, 1884, *P. laetabilis* McLachlan, 1880 and *P. scruposa* McLachlan, 1880. Of these, only the larvae of *P. conspersa* and *P. geniculata* have been described. The main larval diagnostic characters of *P. conspersa* were presented (among other authors) by Ulmer (1903), Nielsen (1942), Edington (1964), Lepneva (1964), Hickin (1967), Moretti (1983), Wallace & Wallace (1983), Edington & Hildrew (1995) and Waringer & Graf (1997). Larval descriptions of *P. geniculata* are available in the papers of Hickin (1967), Wallace & Wallace (1983), Edington & Hildrew (1995) and Waringer & Graf (1997). Therefore, the immature stages of the remaining three species are unknown.

### Material and methods

Material examined : 247 larvae and 80 pupae from several Galician localities (NW Spain). Association between larval and adult stage was ensured by laboratory rearing of some larvae and by using the metamorphotype method.

\* corresponding author : E-mail: barufo@usc.es

Specific identification of *Plectrocnemia* larvae may cause some difficulties and, occasionally, morphometric measures of several structures are needed to ensure the identification. Nevertheless, these measures can vary with the larval stage and, therefore, it is essential to ensure that we are identifying a last instar larva. The diagnostic characters commonly used to separate *Plectrocnemia* species (cf. Wallace & Wallace 1983) are :

a.- Frontoclypeal apotome :

- frontoclypeal apotome ratio (a/b in Fig. 1B) : calculated from the positions of the apex of the apotome and the posterior muscle attachment spots relative to the posterior setal alveoli (seta 6). The measurement b must be made from the edge of the muscle attachment spot, not from the limit of the associated shading, and it is essential that the apotome lies horizontally for measurement. A microscope with a micrometer eyepiece will be required for making the necessary measurements to calculate the ratios.

- minimum width at median narrowing and maximum width in the area posterior to it (d, c in Fig. 1B).

b.- *Labrum mark*. The attachment region of the dorsal labral retractor muscles on the labrum is marked, in some species of the genus (see Wallace & Wallace 1983), by slight irregular thickening of the margin usually accompanied by dark pigmentation, while some other lack thickening. To examine this feature it is usually necessary to draw out the labrum from the plate (the anteclypeus) overlaying it.

c.- Abdominal segment IX : number and length of both dorsal and ventral setae.

d.- Cephalic capsule: width and pigmentation.

We have adopted in this paper the terminology of the larval characters used by Wallace & Wallace (1983) and Edington & Hildrew (1995).

## Description of the last instar larva

The last instar larvae of *P. laetabilis* show all the features common to the genus.

Larval length up to 24 mm (N = 10).

*Cephalic capsule* : slightly squarish, maximum width at posterior third (mean 2.62 mm, N = 19) ; mean length 3.2 mm (N = 19). Dorsal side of brown colour, darker along frontoclypeal and coronal sutures; lateral areas around the eyes of light colour (Fig. 1A). Postero-lateral area of genae of light colour in ventral view ; ventral apotome, submental sclerite, margins of ventral suture and adjacent area, brown. Dorsal and ventro-posterior muscle attachment spots dark brown and

conspicuous. Frontoclypeal apotome typical of the genus, with a shallow arc of 6 dark muscle attachment spots, always located clearly from behind of the insertion point of the seta 6. Frontoclypeal apotome ratio a/b 2.35 - 3.40 (mean 3.07, N = 32). Left mandible with three well developed teeth along mesal margins of both dorsal and ventral blades, and a sharp apical tooth. Central concavity of the left mandible with a brush of 3 - 4 indented setae. Right mandible similar to the left, but it lacks the group of setae of the concavity. Labrum broad (Figs. 1A, E), with dark postero-lateral areas and a dark line, uniform in width, along the posterior margin.

*Thorax* : Pronotum slightly lighter than head, with dark spots and a well developed black posterior margin. Thoracic legs concolorous with the head.

*Abdomen* : Ventral surface of the ninth abdominal segment (Fig. 1C) with four long, dark primary setae (p and ip in Fig. 1C) and 7 - 24 smaller secondary setae on either side of the mid-line (22 - 48 setae in all). The majority of these secondary setae are, at least, half the length of the inner primaries (ip). Dorsal side of the last abdominal segment with a group of three setae on either side of the mid-line: a pair of secondary setae (minute and which need to be looked for carefully) situated lateral to the large primary seta (Fig. 1D). The outer seta in this pair of secondary setae is about three times the length of the inner one.

The anal claws are curved in obtuse angle.

## Discussion

*P. conspersa*, *P. geniculata* and, now, *P. laetabilis*, are the only Iberian species of the genus with known larvae.

As there is considerable variation in some of the characters used below to differentiate the species, a tabular arrangement (Table I) has been adopted to allow the various characters to be considered simultaneously.

The cephalic capsule of *P. laetabilis* is slightly wider (mean 2.62 mm) than that of *P. conspersa* and *P. geniculata* (mean 2.31 mm and 2.25 mm, respectively, according to Wallace & Wallace 1983). The head of both *P. laetabilis* and *P. conspersa* is brown but it is uniformly darker in the former ; by contrast, the head and pronotum of *P. geniculata* are very pale (Edington 1964). However, this character is difficult to quantify and large variations may occur in a given population or from one population to another (Edington 1964, Edington & Hildrew 1995) therefore, it seems to be an invalid diagnostic character.

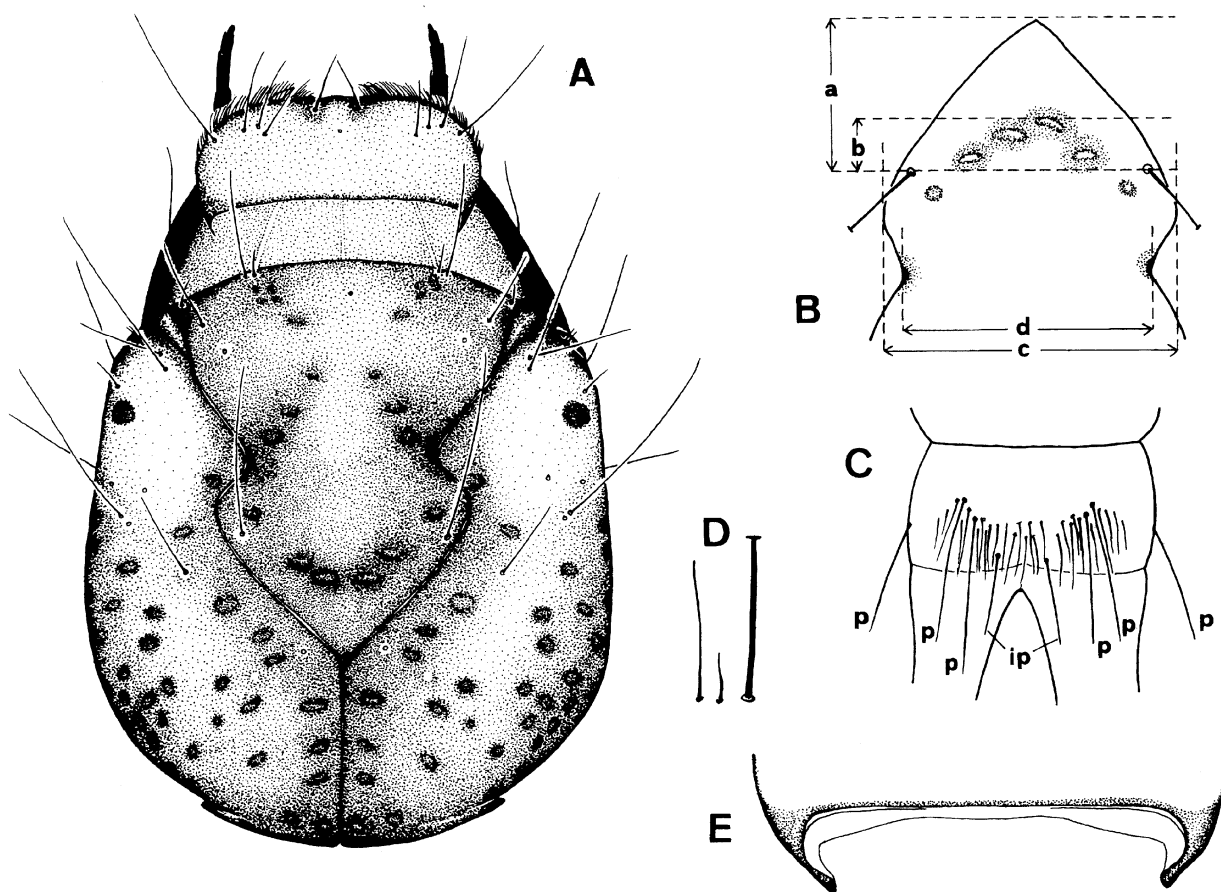


Fig. 1. *Plectrocnemia laetabilis*, last instar larva. A - head, dorsal view ; B - frontoclypeal apotome, posterior region, diagram of used landmarks (see text) ; C - last abdominal sternum, setal arrangement ; D - last abdominal dorsum, setal group of the left side (see text) ; E - labrum, posterior margin.

Values for the ratio  $a/b$  are always bigger than 3.1 in *P. conspersa* (3.2 - 14.8, see Wallace & Wallace, 1983) but very similar in *P. laetabilis* (2.3 - 3.4) and *P. geniculata* (2.2 - 3.4, see Wallace & Wallace 1983).

The labrum of *P. conspersa* shows an elongated, brown pigment patch in the median position of the posterior margin, while it is absent in *P. laetabilis* and *P. geniculata* (cf. Edington 1964, Hickin 1967, Wallace & Wallace 1983, Edington & Hildrew 1995, Waringer & Graf 1997).

In all three *Plectrocnemia* species the ventral surface of the last abdominal segment (segment IX) bears eight (4 pairs) long primary setae and some smaller secondary setae. In both *P. conspersa* and *P. laetabilis* these secondary setae are numerous [30 - 65 setae (according to Wallace & Wallace 1983) in *P. conspersa*, and 22 - 48 in *P. laetabilis*] and mostly long. By contrast, in *P. geniculata* those setae are sparse and

short [9 - 14 according to Edington & Hildrew (1995), 12 - 22 according to Wallace & Wallace (1983)].

The secondary setae on the dorsal side of the last abdominal segment are similar in both *P. laetabilis* and *P. conspersa* (the outermost seta is, at least, twice the length of the inner one, and even three times in *P. laetabilis*) ; by contrast, these secondary setae are of approximately equal length in *P. geniculata*.

In summary, the main diagnostic character to difference the larvae of *P. laetabilis* from those of *P. conspersa* is the absence of brown pigment patch in the posterior margin of the labrum of the former species. In addition, the larvae of *P. laetabilis* and *P. geniculata* can be distinguished by the length of the ninth dorsal secondary setae (the outermost seta the longer in the former, but both similar in size in the latter) and ventral secondary setae (numerous and long in the former species, but sparse and short in the latter one).

Table I. Frontoclypeal apotome ratio (see Fig. 1B), width of head capsule, measurements of the frontoclypeal apotome at two points, and main diagnostic characters of the species compared in the text. For *P. conspersa* and *P. geniculata*, data from Wallace & Wallace (1983), except \* = data from Edington & Hildrew (1995).

Species	<i>P. conspersa</i>	<i>P. geniculata</i>	<i>P. laetabilis</i>
Frontoclypeal apotome ratio (a/b)	3.2-14.8	2.2-3.4	2.35-3.40
Width of head capsule [range and (mean), in mm].	1.93-2.60 (2.31)	1.91-2.48 (2.25)	2.45-2.75 (2.62)
<i>c</i> (see Fig. 1B)	0.78-1.21 (1.06)	0.95-1.19 (1.08)	0.76-1.27 (1.07)
<i>d</i> (see Fig. 1B)	0.70-0.97 (0.84)	0.75-0.95 (0.85)	0.62-0.97 (0.84)
Posterior mark of labrum	distinct	absent	absent
Ventral secondary setae on abdominal segment IX	numerous and long. 30-65 or 9-57*.	sparse and short. 12-22 or 4-14*.	numerous and long. 22-48.
Dorsal secondary setae on abdominal segment IX	outer longer than inner	outer and inner of similar length	outer longer than inner

## Notes on biology, ecology and distribution

The distribution area of *P. laetabilis* includes the Iberian Peninsula and Pyrenees, also reaching the north of Africa (González et al. 1992). Most of the Iberian citations belong to the northern regions, but the species has been recently cited from Cadiz (South Spain, see Ruiz et al. 2001).

In Galicia, this species shows a wide altitudinal distribution (González 1988, Pardo 1992), ranging from 160 to 1650 m a. s. l. Larvae were found in small mountain streams and, preferably, in springs with sandy bottom and, generally, moderate flow rate. Some other authors (Décamps 1968, Lavandier 1979, Terra & Molles 1987) associate also the species with this habitat, until 2200 m a. s. l. According to Décamps (1967a, b) the species lives in cold springs (3 - 5 °C) and high-altitude shallow streams with gravel bottom, where waters are clear, oxygen saturated, with neuter or slightly basic pH and low mineralization.

The life cycle of this species is developed in one year (Lavandier & Dumas 1971), and its flight period extends from May to October (Décamps 1967a, González 1988).

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