

**Taxonomic Characters for Species Identification in the Genus  
*Electrogena* Zurwerra and Tomka, with a Description of  
*Electrogena hyblaea* sp. n. from Sicily  
(Ephemeroptera, Heptageniidae)**

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C. BELFIORE: Taxonomic Characters for Species Identification in the Genus *Electrogena* Zurwerra and Tomka, with a Description of *Electrogena hyblaea* sp. n. from Sicily (Ephemeroptera, Heptageniidae).

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16 diagnostic characters of larvae for a taxonomy of *Electrogena* species are listed, briefly described and coded for future reference. Male and female imagines, eggs and larvae of a new species of this genus, *E. hyblaea* sp. n., are described, with a list and commentary of the diagnostic character states of larvae. The new species is distributed only in Southeastern Sicily, and flies from May to November.

Key words: Ephemeroptera, Heptageniidae, taxonomy, new species, Italy.

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### INTRODUCTION

The taxonomy of the genus *Electrogena* Zurwerra and Tomka, 1985 is poorly defined, notwithstanding recent descriptions and redescriptions of species (Zurwerra and Tomka, 1986; Gaino and Belfiore, 1987; Landolt et al., 1991). The diagnostic characters considered differ from author to author and from paper to paper, and often do not allow species to be discriminated clearly. Having conducted a wide study on several populations of Italian *Electrogena* (Belfiore, manuscript), I selected a number of larval characters which, in their various combinations, are diagnostic of the species. In what follows I list 16 of the characters and the relative codes for synthetic reference (the first code letter refers to character type: N=meristic, R=ratio, S=description of shape or multistate characters).

- 1) R\_LBR - labrum: total length/length of lateral projection (Fig 1a);
- 2) N\_PLP - maxilla: number of setae on fore margin and ventral surface of the first segment of maxillar palpus (Fig. 1h);
- 3) N\_OUT - maxilla: number of long bristles on outer margin of galea-lacinia (Fig. 1h);
- 4) N\_CBS - maxilla: number of comb-shaped bristles of galea-lacinia;

- 5) N\_TCB - maxilla: number of pointed teeth on the 5th (starting from inner side) comb-shaped bristle of galea-lacinia (Fig. 1b);
- 6) S\_HLB - hypopharynx: extension of pilosity on lateral lobes (Fig. 1c);
- 7) R\_GLA - labium: distance between outer margins of glossae/distance between inner margins of glossae (Fig. 1d);
- 8) R\_GLB - labium: distance between outer margins of glossae/width of glossa (Fig. 1d);
- 9) S\_PGL - labium: shape of paraglossae;
- 10) S\_PNT - pronotum shape;
- 11) S\_BFE - legs: shape of distal bristles on upper surface of femora (Fig. 1e);
- 12) N\_BVF - legs: number of bristles on ventral surface of femora, near the hind edge;
- 13) S\_TAR - legs: marking on tarsus;
- 14) N\_CLW - legs: number of teeth on tarsal claw;
- 15) R\_1GI - gills: 1st gill length/width (Fig. 1f);
- 16) R\_7GI - gills: 7th gill length/width (Fig. 1g).

The known Italian species of the genus *Electrogena* are: *E. fallax* (Hagen, 1864), Sardinia; *E. grandiae* (Belfiore, 1981), Central Apennines; *E. gridellii* (Grandi, 1953), Northern Italy; *E. lateralis* (Curtis, 1834), all regions of Italy, except Sardinia; *E. zebrata* (Hagen, 1864), Sardinia. I do not agree with Hefti and Tomka (1989), who refer the latter species to the genus *Afronurus* Lestage, 1924. I examined larvae and adults of *Afronurus*, collected by Dr. J. M. Elouard from Central Africa, and I found that *E. zebrata*, and the allied *E. kugleri* (Demoulin, 1973), are much closer to European *Electrogena* than African *Afronurus*. The notch on the labrum which Hefti and Tomka (1989) claimed as peculiar of *Afronurus* can be observed, for instance, in some populations of *Electrogena lateralis* from the central Apennine, and also in other genera of Heptageniidae. As far as the diagnosis of male is concerned, the resemblance between *Afronurus* and *E. zebrata* is only superficial; one of the most clearcut differences is the lack of titillators in all the true *Afronurus*. Kluge (1988), in a comprehensive revision of the Heptageniidae, synonymized a lot of genera (the "triangular gills" group: *Thalerosphyrus*, *Afronurus*, *Electrogena*, etc.) with *Ecdyonurus*, mainly on the basis of adult characters; I think that his statement must be rejected, because the larval differences were underestimated. Only after a further revision of the *Thalerosphyrus*-like genera, based on a thorough comparison of larvae, can we decide whether *E. zebrata* belongs to *Electrogena* or to an undescribed genus. For the moment I keep the name *Electrogena zebrata*, for the great larval similarity between this and the other species of the genus.

In a recent work on the mayflies of Sicily, Belfiore et al. (1992) referred some populations from south-eastern Sicily to *Electrogena* cfr. *grandiae*, pointing out some differences with *E. grandiae* from other parts of Italy. A further examination of that material, and collections of fresh material and rearing of larvae, led me to identify a new species of the genus *Electrogena*, which I name after the

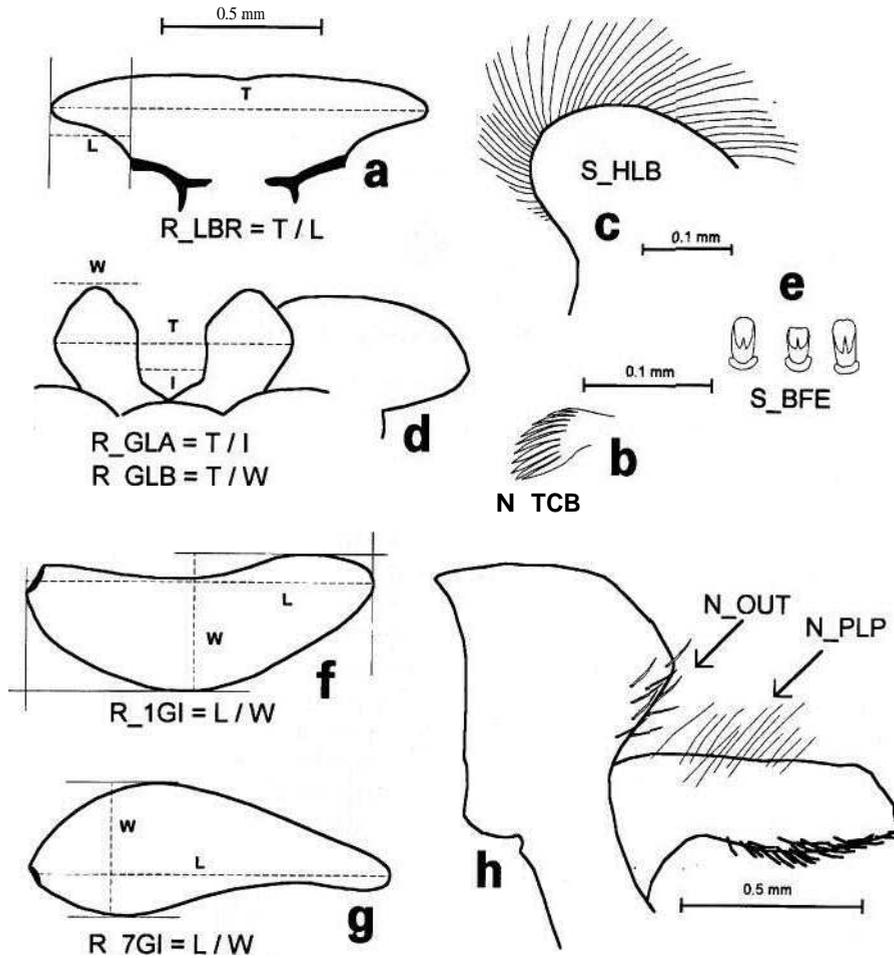


Fig. 1. Diagnostic characters of larvae of *E. hyblaea*: a) labrum; b) 5th comb-shaped bristle of maxilla; c) lateral lobe of hypopharynx; d) glossae and left paraglossa; e) distal bristles on upper surface of fore femur; f) first gill; g) seventh gill; h) galea-lacinia and first maxillar palpus of *E. gridellii*, from ventral view.

south-eastern hills of Sicily (Monti Iblei). I also compared several specimens (larvae and a male imago) of *E. malickyi* (Braasch, 1983) from Crete (material listed in Belfiore, 1990) with the new species.

***Electrogena hyblaea* sp. n.**

*Electrogena* cfr. *grandiae*: Belfiore et al., 1992

**Diagnosis.** Larvae: N\_CLW=2, N\_PLP=10-30, N\_OUT=0-1. Adults with wide reddish triangular marking on tergites, dark and thick wing veins.

**Material.** ITALY, SICILY - Canicattini Bagni (Siracusa), River Manghisi, National Road 287, 390 m, WA0392: 1 male imago holotype with his larval exuviae, reared, collected 20.05.1993, emerged 27.05.1993; 2 male imagines, 2 female imagines, 10 larvae paratypes. Other material: 45 larvae from the same locality as type material; Canicattini Bagni (Siracusa), River Manghisi, WA0598, 450 m, 31.05.1988: 15 larvae, 19.05.1993: 85 larvae; Vizzini (Catania), River Vizzini, 350 m, VB7317, 31.05.1988: 15 larvae; 19.05.1993: 10 larvae; Giarratana (Ragusa), River Irminio, 600 m, VB8302, 14.04.1986: 1 larva (R. Gerecke leg.), 19.05.1993: 30 larvae; Case Nobile (Siracusa), Tellesimo Stream, VA9286, 190 m, 29.09.1985: 3 larvae (R. Gerecke leg.); Chiusa Grande Hill (Siracusa), Vallone Casazze, VB8605, 690 m, 25.11.1985: 1 larva (R. Gerecke leg.); Sortino (Siracusa), Cava Grande, VB9510, 450 m, 22.11.1985: 3 larvae (R. Gerecke leg.). All material is preserved in the Author's collection.

**Description of holotype (male imago).** Body length: 10 mm; cerci: 27 mm. Colour (living specimen): eyes blackish brown; thorax dorsally and ventrally blackish brown, laterally with brown sclerites and pale yellow areas; fore legs dark brown, mid and hind legs yellowish brown, darkening toward apex of tarsi, with dim brownish spots on femora and at the joint between femur and tibia; wings diaphanous, veins thick, dark brownish violet; tergites yellowish with reddish brown markings: four spots at the corners of tergites, a stripe on the hind margin and a large median triangular spot, with apex directed backward (Fig. 2a). Sternites brownish, with two paired pale spots and well marked, dark nervous ganglia. Genitalia (Figs. 2b-c): penis lobes are somewhat squared, diverging, with rounded outer margin. Penis stem is slender.

**Female imago.** General colour more reddish than male. Costal area of fore wings is opaque, the rest of the wing is transparent with very thick and dark veins. The pattern on tergites is like the male, sternites have a large reddish spot with two submedian pale stripes; the violet nervous ganglia are hardly visible. Genitalia figured in Fig. 2d.

**Egg** (from female imago). Length = 0.20 mm, width = 0.15 mm. Chorion is quite smooth, without tubercles and knob-terminated coiled threads, resembling that of *E. fallax* and *E. gridellii* (Gaino et al., 1987). A matrix of very small granules envelopes the chorion.

**Description of larva.** General aspect and colour: Body length of mature larva up to 10 mm. Dorsal side from greenish grey to greenish brown. Head without pale spots; paired pale spots are on the first six tergites, other tergites with various marking. Ventral side pale; a dim greyish spot is on ventral side of femora, brown nervous ganglia are visible on sternites. Pronotum rounded, wider in the fore half.

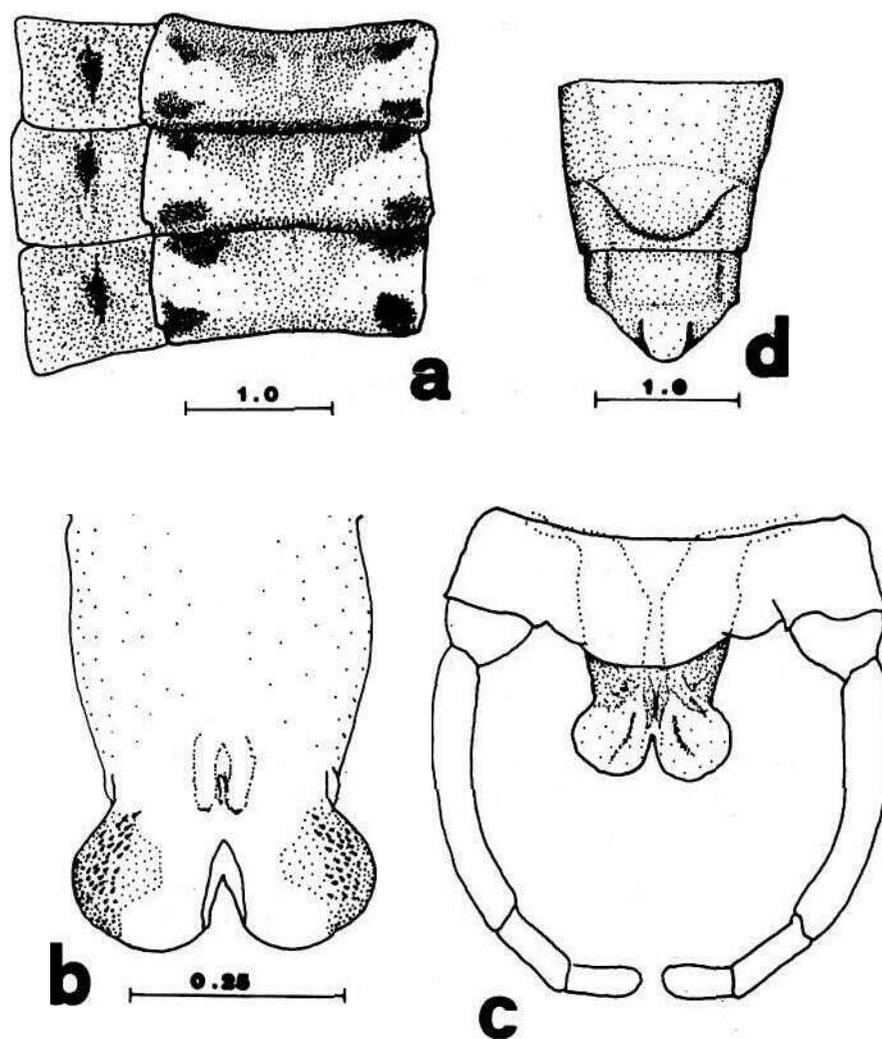


Fig. 2. Imagines of *E. hyblaea*: a) III, IV and V tergites and sternites of male imago (from a slide mount); b) penis in dorsal view; c) genitalia of male imago in ventral view; d) genitalia of female imago in ventral view.

*Diagnostic character states:*

- R\_LBR - (Fig. 1a) min = 4.15, max = 4.87, mean = 4.50, std dev. = 0.21; labrum shape is very constant; labrum is "slender", unlike *E. grandiae* and *E. lateralis*. The closest species, by this character, is *E. fallax* (mean = 4.51).
- N\_PLP - min = 10, max = 27, mean = 16.5, std dev. = 3.8; the great number of setae is a major diagnostic character; the only species with a mean number close to *E. hyblaea* is *E. gridellii* (mean = 16.4), which, unlike *E. hyblaea*, has several bristles on outer margin of galea-lacinia (next character) (Fig. 1h).
- N\_OUT - min = 0, max = 1, mean = 0.11, std dev. = 0.28; generally no bristles on outer margin of galea-lacinia, like *E. grandiae*, *E. zebrata* and *E. malickyi*.
- N\_CBS - min = 16, max = 19, mean = 17.6, std dev. = 0.9; the nearest relatives are *E. lateralis* (mean = 17.4) and *E. grandiae* (mean = 18.4).
- N\_TCB - (Fig. 1b) min = 8, max = 14, mean = 11.4, std dev. = 1.4; the number of teeth on the 5th comb is intermediate between two groups: *E. lateralis*, *E. grandiae*, *E. gridellii* (respective means = 8.1, 8.4, 9.7) and *E. fallax*, *E. zebrata*, *E. malickyi* (means = 13.0, 13.0, 14.5).
- S\_HLB - (Fig. 1c) long hairs extend over the apex of lobes; this character state is shared by all species but *E. lateralis*.
- R\_GLA - (Fig. 1d) min = 2.75, max = 3.80, mean = 3.23, std dev. = 0.24; glossae are close together.
- R-GLB - (Fig. 1d) min = 2.57, max = 3.00, mean = 2.73, std dev. = 0.11; this character is a measure of the width of a glossa; glossae of *E. hyblaea* are of intermediate width among Italian species.
- S\_PGL - (Fig. 1d) paraglossae are bluntly pointed, asymmetrical, the fore margin curves steeply to apex.
- S\_PNT - with rounded sides, wider at fore 1/4, steeply narrowing backwards.
- S\_BFE - (Fig. 1e) moderately long, with parallel or divergent sides. Like *E. grandiae*, but a little longer.
- N\_BVF - all examined femora have only one pointed ventral bristle.
- S\_TAR - tarsi are darkened at apex only.
- N\_CLW - majority of claws of each individual with 2 teeth, like all other species considered but *E. lateralis* (= 1) and *E. zebrata* (= 3).
- R\_1GI - (Fig. 1f) min = 2.25, max = 3.18, mean = 2.70, std dev. = 0.26; first gill of the type "slender", like *E. fallax* (mean = 2.77) and *E. grandiae* (mean = 2.86).
- R\_7GI - (Fig. 1g) min = 2.21, max = 3.08, mean = 2.65, std dev. = 0.25; seventh gill also slender, like *E. grandiae* (mean = 2.68). Only in *E. fallax* is this gill even more slender (mean = 3.53).

## DISTRIBUTION AND ECOLOGY

*E. hyblaea* is distributed only in rivers of the Monti Iblei (Southeastern Sicily). The habitat is the same as of most species of the genus: small clean rivers with stony substratum, in places where the water is still or slow flowing. The flight period extends from May to November, possibly with several generations.

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