

## Description of *Electrogena calabra* n. sp., a new species from southern Italy (Ephemeroptera, Heptageniidae)

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Keywords : Ephemeroptera, Heptageniidae, *Electrogena*, New species, southern Italy.

Imagines, larvae and eggs of *Electrogena calabra* n. sp. are described from Calabria and Campania, southern Italy. Larvae are described using a set of measurement characters, recently proposed and coded for a standard taxonomy of the genus *Electrogena*. The new species is close to *E. malickyi* (Crete), *E. fallax* (Sardinia) and *E. gridellii* (Northern Italy).

Description de *Electrogena calabra* n. sp., une espèce nouvelle de l'Italie du sud (Ephemeroptera, Heptageniidae)

Mots clés : Ephemeroptera, Heptageniidae, *Electrogena*, espèce nouvelle, Italie du Sud.

Les imagos, les larves et les œufs de *Electrogena calabra* n. sp. de Calabre et de Campanie, Italie du Sud, sont décrits. Les larves sont décrites en utilisant une série de caractères biométriques, récemment proposés et codés pour une taxonomie standardisée du genre *Electrogena*. L'espèce nouvelle est proche de *E. malickyi* (Crète), *E. fallax* (Sardaigne) et *E. gridellii* (Italie du nord).

### 1. Introduction

The species of the genus *Electrogena* are often poorly defined, notwithstanding the high number of characters which can be checked in the larval stage. Traditionally, the taxonomy of the genus *Electrogena* was based primarily on adult stages (e.g. : Zurverra & Tomka 1986). When the descriptions of larvae are available, most characters are represented with some subjectivity, and every description refers to a different set of diagnostic features (e.g. Sowa 1974, Belfiore 1982, Landa & Soldan 1982, Landolt et al. 1991). Furthermore, in most of old and recent descriptions the variability, both between and within populations, is overlooked. Belfiore (1994), describing a new species of *Electrogena* from Sicily, lists 16 larval characters useful for standard diagnosis, and set up a new quantitative approach to species characterization. The use of numerical taxonomy proved to be very useful to identify and discriminate species within the

genus *Electrogena* (Belfiore, manuscript). Once the status of species is cleared up, doubtful identifications can be reconsidered and contingent new species can be properly recognized. This is the case of the species described in the present paper, previously referred to *E. grandiae* Belfiore 1981 (Belfiore et al. 1992) and here named *E. calabra* n. sp.

### 2. Definition of characters

The standard diagnostic characters here used for the description of larvae are the following (see also Belfiore 1994) :

- 1) R-LBR - labrum : total length/length of lateral projection (Fig. 2 A) ;
- 2) N-PLP - maxilla : number of setae on fore margin and ventral surface of the first segment of maxillary palpus (Fig. 2D) ;
- 3) N-OUT - maxilla : number of long bristles on outer margin of galea-lacinia (Fig. 2D) ;
- 4) N-CBS - maxilla : number of comb-shaped bristles of galea-lacinia ;

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- 5) N-TCB - maxilla : number of pointed teeth on the 5th (starting from inner side) comb-shaped bristle of galea-lacinia (Fig. 2F) ;
- 6) S-HLB - hypopharynx : extension of pilosity on lateral lobes ;
- 7) R-GLA - labium : distance between outer margins of glossae/distance between inner margins of glossae (Belfiore 1994 : Fig. 1d) ;
- 8) R-GLB - labium : distance between outer margins of glossae/width of glossa (Belfiore 1994 : 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. 2E) ;
- 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. 2B) ;
- 16) R-7GI - gills : 7th gill length/width (Fig. 2C) ;

### 3. Description of *Electrogena calabra* n. sp.

• *Diagnosis* : Larvae (mean, minimum and maximum values ; n = 54) : N-PLP = 9.97 (6-14), N-OUT = 8.21 (3-16), N-BVF = 1.12 (1-3), N-CLW = 2.02 (2-3), R-7GI = 2.78 (2.16-3.69). Adults with four dark reddish spots on tergites, the fore ones wide and rounded.

• *Material* : Italy, Calabria : Mesoraca, National Road 109 (Catanzaro), right tributary of Fiumara di Mesoraca, 550 m, UTM : XD5324, 1 male imago with its nymphal skin (holotype), 68 larvae, 17/V/1993 ; Aiello Calabro (Cosenza), River Oliva, 300 m, UTM : XD0031, 17 larvae, 17/V/1993. Campania : Morigerati (Salerno), right tributary of River Bussento, 300 m, UTM : WE4744, 1 larva, 09/VII/1987 ; 1 male imago and 2 female imagines with their nymphal skins (paratypes), 25 larvae, 16/V/1993 ; Road from Sicili to Morigerati (Salerno), River Bussento, 250 m, UTM : WE4643, 2 larvae, 19/VII/1988 ; 6 larvae, 16/V/1993.

All material collected by C. Belfiore and preserved in his collection.

• *Description of holotype* (male imago) : Body length : 9.5 mm ; cerci : 24 mm. Colour (specimen in alcohol) : eyes pinkish grey ; thorax dorsally and ventrally brown, laterally with brown sclerites and pale yellow and brown areas ; fore legs brown, mid and hind legs pale yellowish brown ; joints, tarsi and narrow spots on femora darker ; wings diaphanous, veins light brown ; abdomen (Fig. 1A) : tergites brown, with pale spots near lateral borders : there are two wide round reddish brown spots near the fore corners and a reddish brown stripe with two lateral squared spots on the hind margin ; sternites brownish with paler spots ; nervous ganglia hardly visible ; cerci brown.

Genitalia (Fig. 1C-D) : penis stem long, with two lateral small projections at basis of penis lobes ; penis lobes with rounded outer margin.

• *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. 1B.

• *Egg* (from female imago) : length = 0.17 mm, width = 0.13 mm. Chorion without tubercles and knob-terminated coiled threads and with a matrix of very small granules enveloping the chorion. The eggs of *E. calabra* resemble that of *E. fallax*, *E. gridelli* (Gaino et al., 1987) and *E. hyblaea* (Belfiore 1994).

• *Larva* : Body length of mature larva up to 10.5 mm.

Diagnostic character states (statistics were computed on 18 larvae from each population : total n = 54) :

R-LBR (Fig. 2A) - min = 3.88, max = 4.89, mean = 4.54, std dev. = 0.22 ; labrum slender, unlike *E. grandiae* (see Belfiore, 1982 : Fig. 6). The closest species, by this character, is *E. hyblaea* (mean = 4.50 : Belfiore 1994).

N-PLP (Fig. 2D) - min = 6, max = 14, mean = 9.97, std dev. = 1.94 ; number of setae on maxillary palpus is close to *E. malickyi* (mean = 7.14) and intermediate between *E. grandiae* and *E. fallax* (means = 5.74 and 5.32) and other Italian species (e.g. : *E. lateralis*, mean = 13.29) (Belfiore, manuscript).

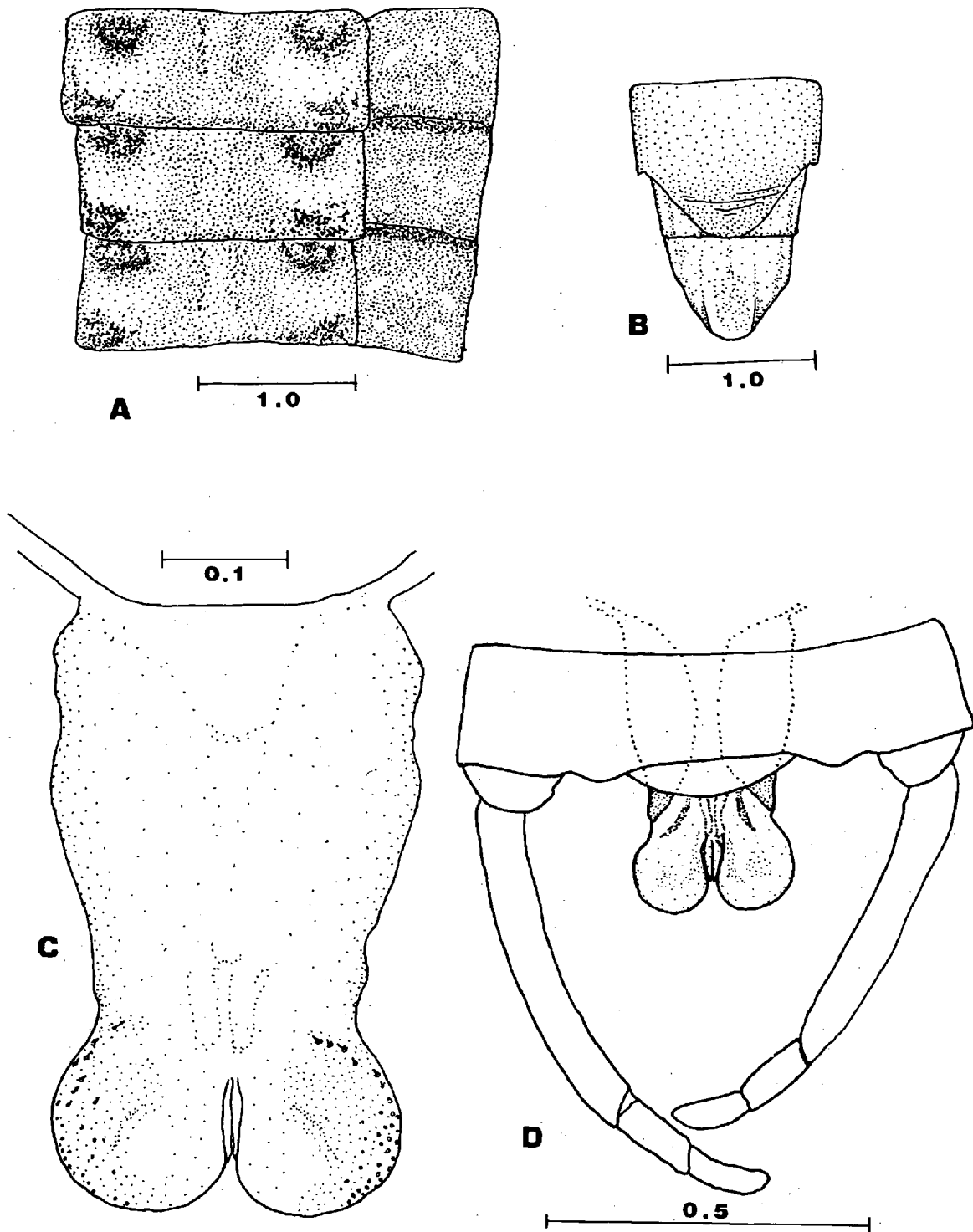


Fig. 1. *E. calabra* n. sp. : pattern of tergites and sternites III-V of male imago (A), sternites VIII-X of female imago (B). Penis from dorsal view (C), genitalia of male imago from ventral view (D) (scale in mm).

Fig. 1. *E. calabra* n. sp. : Disposition des taches des tergites et des sternites III-V de l'imago mâle (A), des sternites VIII-X de l'imago femelle (B). Pénis en vue dorsale (C), genitalia de l'imago mâle en vue ventrale (D) (échelle en mm).

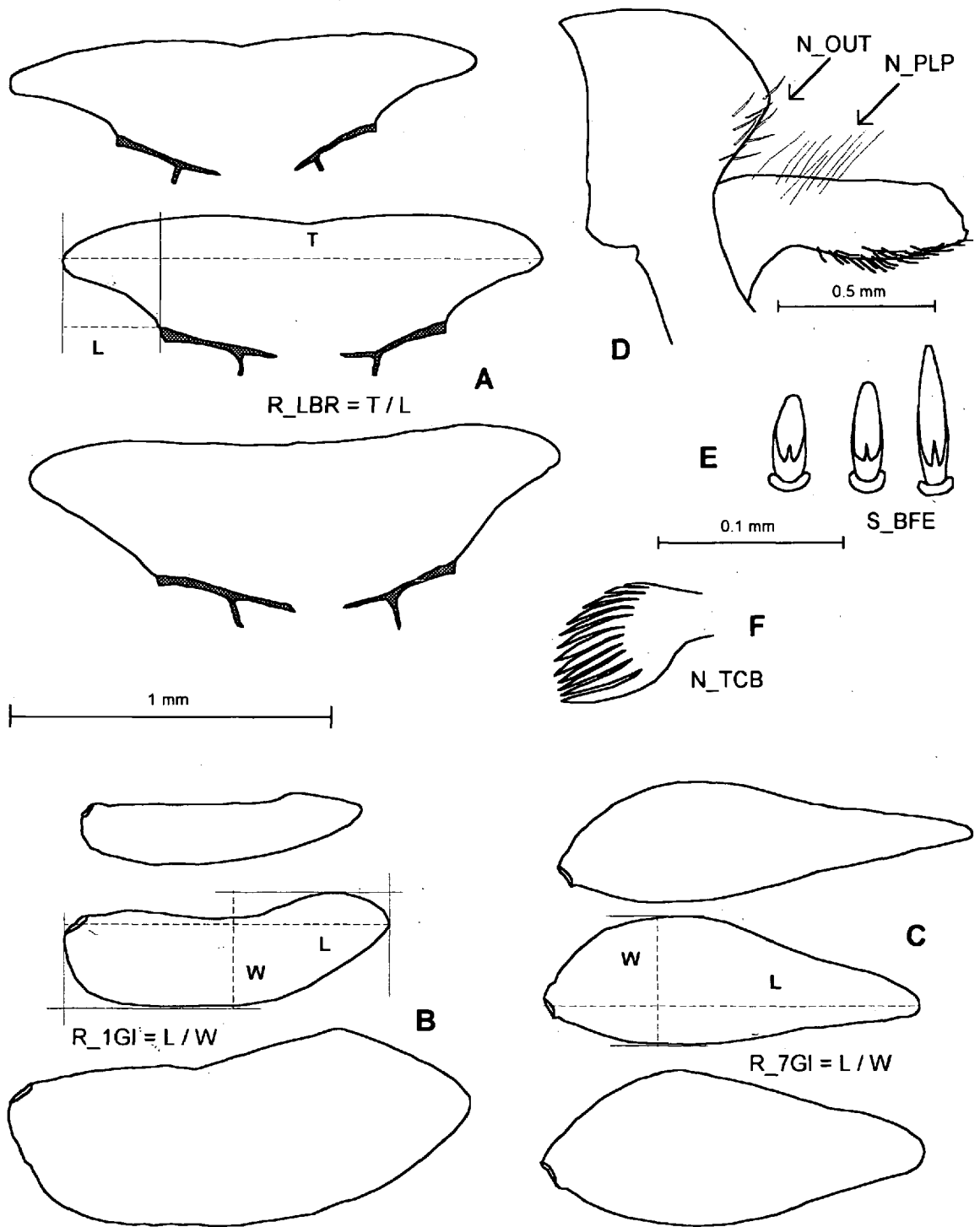


Fig. 2. Larva of *E. calabra* n. sp.: variability of labrum (A), variability of I gill (B), variability of VII gill (C), galea lacinia and I segment of maxillary palpus (D), bristles on upper surface of fore femur (E), V comb-shaped bristle of maxilla (F).

Fig. 2. Larve de *E. calabra* n. sp.: variabilité du labre (A), de la première branchie (B), de la septième branchie (C), de la galae lacinia et du premier segment du palpe maxillaire (D), des écailles de la surface dorsale du premier fémur (E), 5<sup>e</sup> peigne de la branchie (F).

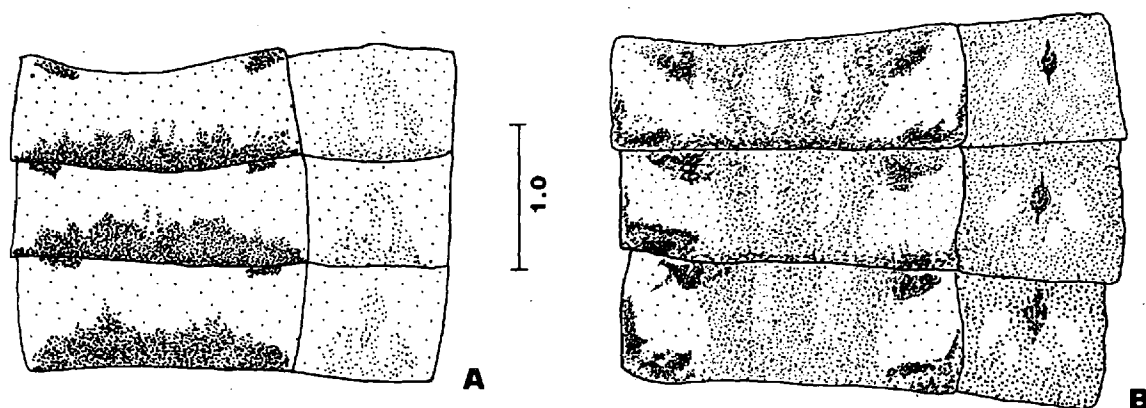


Fig. 3. Pattern of tergites and sternites III-V of male imago : *E. fallax* (Sardinia, Mount Limbara, 6/V/1993) (B), *E. malickyi* (Crete, Nomos Rethymnon, R. Petres, 17/IV/1989) (A).

Fig. 3. Disposition des taches des tergites et des sternites III-V de l'imago mâle chez *E. fallax* (Sardaigne, Mont Limbara, 6/V/1993) (B), et chez *E. malickyi* (Crête, Nomos Rethymnon, R. Petres, 17/IV/1989i) (A).

N-OUT (Fig. 2D) - min = 3, max = 16, mean = 8.21, std dev. = 2.85 ; *E. calabra* belongs to the group of species with several bristles on outer margin of maxilla, like *E. gridellii* (mean = 13.08) and *E. fallax* (mean = 8.79) (Belfiore, manuscript).

N-CBS - min = 17, max = 23, mean = 19.12, std dev. = 1.29 ; the closest relative, by this character, is *E. gridellii* (mean = 19.30) ; comb-shaped bristles are more numerous in *E. fallax* (mean = 22.29) (Belfiore, manuscript).

N-TCB (Fig. 2F) - min = 10, max = 15, mean = 12.19, std dev. = 1.15 ; *E. zebrata* (mean = 13.00 : Belfiore, manuscript) and *E. hyblaea* (mean = 11.37 : Belfiore 1994) are the closest relatives, by number of pointed teeth on the 5th comb-shaped bristle.

S-HLB - long hairs extend over the apex of lobes (Belfiore 1994 : Fig. 2e), like all other species but *E. lateralis* (Belfiore 1982).

R-GLA - min = 2.88, max = 3.54, mean = 3.12, std dev. = 0.14 ; glossae close together, like *E. malickyi* (mean = 3.07), *E. lateralis* (mean = 3.06) (Belfiore, manuscript) and *E. hyblaea* (mean = 3.23 : Belfiore 1994).

R-GLB - min = 2.23, max = 2.97, mean = 2.64, std dev. = 0.14 ; glossae wide, like *E. gridellii* and *E. malickyi* (means = 2.65 and 2.67 : Belfiore, manuscript).

S-PGL - shape of outer margin of paraglossae variable, generally symmetrically rounded.

S-PNT - Pronotum is wide, sometimes rectangular with evident hind corners (like *E. fallax*), but generally more similar to other species.

S-BFE - bristles on upper surface of fore femora long and pointed, distal ones with a blunt tip (Fig. 2E).

N-BVF - generally one (sometimes two or three) pointed bristle on ventral surface of femora, near hind margin.

S-TAR - tarsi darkened only at apex.

N-CLW - majority of claws of each individual with two teeth.

R-IGI Fig. 2B) - min = 2.28, max = 3.87, mean = 2.81, std dev. = 0.32 ; first gill slender, like *E. grandiae* (mean = 2.86), *E. fallax* (mean = 2.83) (Belfiore, manuscript), and *E. hyblaea* (mean = 2.70 : Belfiore 1994).

R-7GI (Fig. 2C) - min = 2.16, max = 3.69, mean = 2.78, std dev. = 0.28 ; seventh gill very slender ; the only Italian species with a more slender seventh gill is *E. fallax* (mean = 3.43 : Belfiore, manuscript).

Géographic variability. The means (and standard deviations) of measurement characters states in the three examined populations (Rivers Mesoraca (1), Oliva (2) and Bussento (3)) are :

R-LBR	1) 4.68 (0.15)	2) 4.53 (0.28)	3) 4.43 (0.14)
N-PLP	1) 10.43 (2.17)	2) 10.39 (1.55)	3) 9.13 (1.89)
N-OUT	1) 7.18 (2.59)	2) 9.36 (3.45)	3) 8.10 (2.18)
N-CBS	1) 18.79 (1.03)	2) 19.54 (1.74)	3) 19.03 (0.95)
N-TCB	1) 12.75 (0.94)	2) 12.71 (1.07)	3) 11.17 (0.65)
R-GLA	1) 3.07 (0.10)	2) 3.17 (0.17)	3) 3.11 (0.18)
R-GLB	1) 2.57 (0.14)	2) 2.61 (0.11)	3) 2.74 (0.10)
N-CLW	1) 2.00 (0.00)	2) 2.07 (0.27)	3) 2.00 (0.00)
R-1GI	1) 2.89 (0.34)	2) 2.81 (0.26)	3) 2.72 (0.34)
R-7GI	1) 2.77 (0.20)	2) 2.59 (0.28)	3) 2.97 (0.25)

#### 4. Distribution and ecology

*E. calabra* is distributed on both Tyrrhenian and Ionic sides of middle Calabria, and in a single locality of Cilento (Campania).

The habitat is typical of *Electrogena* : little rivers with clear water and stony bottom, mostly where the current is slow flowing (borders, pools, etc.). The life cycle seems like most of *Electrogena* species : several generations from April to November.

#### 5. Affinities

The closest relatives of *E. calabra* are *E. malickyi*, *E. fallax* and *E. gridelli*. The imagines of *E. calabra* differ from the latter three species in the abdominal colour pattern : *E. gridellii* and *E. malickyi* have a dark, somewhat triangular marking in the medial part of tergites with two elongate pale spots at sides of median line (Fig. 3B) ; tergites of *E. fallax* are uniformly yellowish, with an irregular bright reddish

stripe near hind margin and two small reddish spots on fore corners (Fig. 3B). Larvae differ in the hairs on the outer margin of maxilla (absent in *E. malickyi*) comb-shaped bristles on the galea-lacinia (more numerous in *E. fallax*) and shape of 7th gill (stouter in *E. gridellii*). *E. malickyi* is endemic to Crete, *E. fallax* is endemic to Sardinia and Corsica, *E. gridellii* is distributed within northern Italy.

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