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TWO NEW ALPINE *LEUCTRA* IN THE *L. BRAUERI* SPECIES GROUP (PLECOPTERA, LEUCTRIDAE)

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ABSTRACT

Two new species of the genus *Leuctra* that were previously confused with *L. braueri* Kempny, 1898 are described from the eastern Alps: *L. muranyii* sp. n. and *L. juliettae* sp. n. A comparative description of *L. braueri* is given. The composition and characters of the *L. braueri* species group are discussed.

Keywords: Plecoptera, Leuctridae, *Leuctra, braueri* group, new species, endemics, Italy, Switzerland, Austria

INTRODUCTION

For more than ten years, with the aim of improving the knowledge of Italian stoneflies, faunistic studies have been undertaken in the Italian Alps, mainly in the western part of the Alps at the beginning, and more recently in the central and eastern Alps. As a result, several new taxa have been discovered in the last two years and are at present being described. In this contribution, we describe two *Leuctra* species strongly related with *L. braueri*, requiring the revision of several collections of European entomologists (Aubert, Consiglio, Delmastro, Fochetti, Ravizza, Sivec). Complementary investigations, undertaken in the Italian, Swiss and Austrian Alps, show that the two new taxa occupy distinct geographical areas (Fig. 1) but are sympatric in part of the Lessini Mountains (*L. muranyii* sp. n. and *L. juliettae* sp. n.) and the Dolomites (*L. muranyii* sp. n. and *L. braueri*) without intermediate forms, thus justifying their species rank.

After the description of the two new species and the re-description of *L. braueri*, we comment on the history and the composition of the *L. braueri* species group.

MATERIAL AND METHODS

The material is preserved in alcohol. Type specimens are deposited in the Zoological Museum of Lausanne, Switzerland. Other specimens are held by G. Vinçon, Grenoble, France, and W. Graf, Vienna, Austria. An important part of the Swiss material was studied by J.L. Gattolliat, Lausanne, Switzerland.

Abbreviations: b.= brook, R.= River, spr.= spring, tor.= torrent, trib.= tributary, →= in direction, Aub.= Aubert coll., Con.= Consiglio coll. (Fochetti leg.), Del.= Delmastro coll., Gra.= Graf collection, Rav.= Ravizza coll., Siv.= Sivec coll., Vin.= Vinçon coll.

RESULTS AND DISCUSSION

Leuctra muranyii Vinçon & Graf sp. n.

(Figs. 2-4)

Material examined. Holotype ♂. **ITALY**: **W. Lombard Prealps**: N. Erba, San Primo Mount, > Magreglio, 1400m, 26.10.08 (Vin.). **Other material**. Paratypes: same date and locality: 11♂, 7♀; **ITALY**: **Orobie Alps**: N. Lecco, between Ballabio and

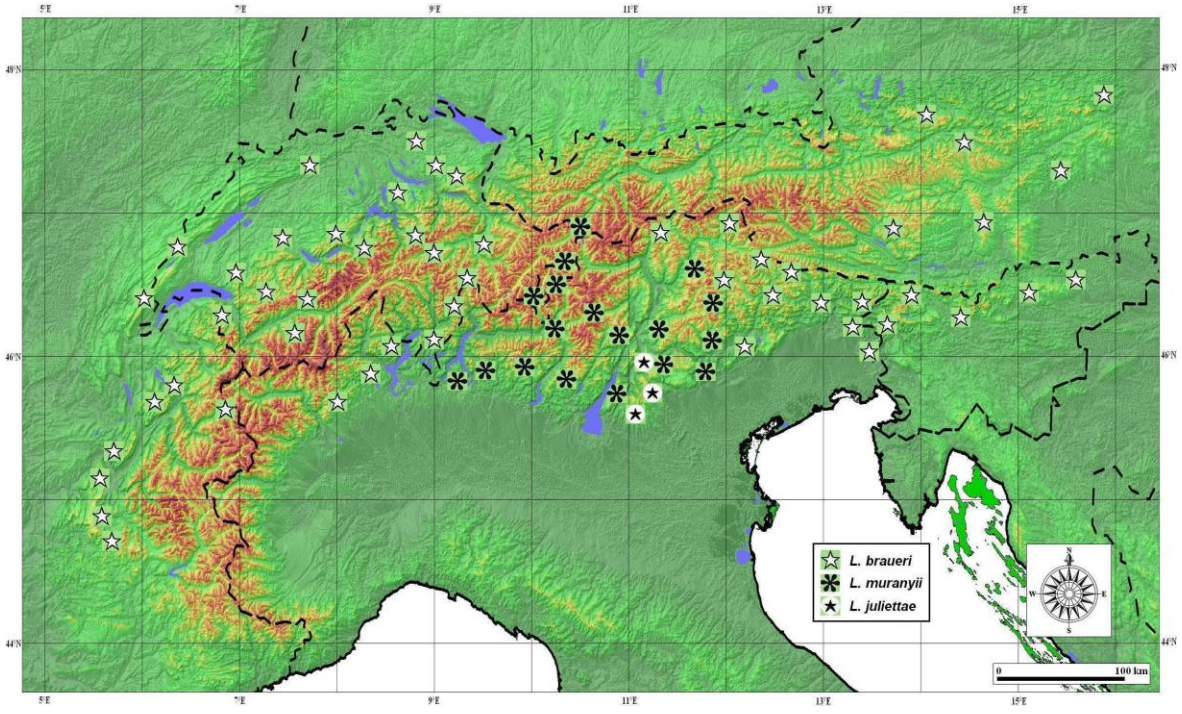


Fig. 1. Distribution areas of *Leuctra braueri* Kempny, *L. juliettae* sp. n. and *L. muranyii* sp. n. within the Alps.

Maggio, Service station, b., 29.11.98, 3♂, 12♀, 10.10.99, 3♂, 11♀ (Vin.); Val Brembana, Zambla b., 1050m, 30.10.72, 1♂, 2♀; 15.10.73, 1♂, 1♀; Val Brembana, Camerata Cornello, Brembo R., 450m, 2♂, 3♀; Val Gerola (Valtellina) Pedesina R. 1000m, 23.09.76, 3♀ (Rav.); **E. Lombard Prealps**: N. Brescia, Val Trompia, Collio b., 600 m, 20.08.75, 1♂ (Rav.); N.E. Brescia, > Vestone, > Forno d'Ono, Degnone tor., 29.11.98, 2♂, 11♀; NW. Riva di Garda, Concei Valley, 10.09.99, 9♀ (Vin.). Vezza d'Oglio, Val Grande, 46°10.16.2'N, 10°23'51,9''E, 6.10.09, 900m 3♂, 5♀, leg. P. Neu; 46°14'59.0''N, 10°23'45.1''1390m, 6.10.09, 1♀, leg. P. Neu. **Rhaetian Alps**: W. Bormio, road to Livigno, < San Carlo, b., 1450m, 27.10.08, 39♂, 26♀, > San Carlo, 1650m, spr., 26.10.08, 14♂, 13♀; S. Bormio, Grosio → Monno, Foppa Pass N. slope, 1450m, 26.10.08, 9♂, 16♀, S. slope, 1750m, spr, 26.10.08, 5♂, 5♀ (Vin.); Tonale pass, b., 1900m, 04.09.80, 6♂, 6♀ (Rav.), 10.10.99, 1♂, 2♀ (Vin.); Tonale Pass, W. slope, b. > Ponte di Legno, 26.10.08, 28♂, 15♀; b., Tresenda → Aprica, 10.10.99, 1♂, 22♀; Tonale Pass., E. slope, spr.,1900m, 10.09.99, 1♂, 2♀; 1800m, 10.09.99, 7♂, 10♀, 26.10.08, 5♀; S. Madonna di Campiglio, Nambrone Valley → Nambino lake, 1700m, 10.09.99, 2♀ (Vin.). **Venetian Prealps**: SW. Trento, Cornetto Mount, Cei Valley, > Aldeno, 28.11.98, 9♂, 16♀ (Vin.). Baldo Mount: > Avio, Aviana tor. < dam, 1012m, 11.09.08, 1♂, > St Valerio, small cascade, 11.09.08, 16♂, 2♀, < Bocca di Navene, 1400m, spr., 11.09.08, 4♂, 3♀ (Vin.). SE. Trento: > Vattaro, La Fricca Pass, 1000m, 10.10.08, 13♂, 18♀; > Carbonare → Lavarone, 1100m, 10.10.08, 1♂, 7♀; S. Levico Terme, Vezzena Pass, 1400m, spring, 28.11.98, 1♂, 14♀; 27.10.08, 5♀; < Folgaria, Molini, 700m, 18.09.09, 4♂, 11♀ (Vin.). Grappa Mount: > Seren del Grappa, Avien Pian de Giacon, 426m, Stizzone tor., 10.10.08, 1♀; spring, 500m, 10.10.08, 9♂, 19♀; spring, 750m, 10.10.08, 1♂, 1♀ (Vin.). **Dolomites:** > Ortisei, Passo di Pinei, spr., 1400m, 18.09.09, 14♂, 15♀; NE. Bolzano, Fie Sciliar → Presule, 18.09.09, 9♂, 9♀ (Vin.). S. Bolzano, Lavazze pass: < Rauth Novale, 1200m, 27.10.08, 4♂, 12♀, Stava, 1224m, 27.10.08, 1♀ (Vin.).

E. Predazzo, Val di Viezena, 1200m, 27.10.08, 10♂, 16♀; < San Martino di Castrozza, 1350m, spr., 27.10.08, 3♂, 6♀, 1400m, tor., 27.10.08, 2♂, 2♀ (Vin.). **S. Dolomites**: E. Trento, > Pergine Valsugana, Frassilongo, 850m, 28.11.98, 1♂, 3♀; NW. Feltre, Croce d'Aune Pass, 800m, 28.11.98, 3♂, 5♀ (Vin.). Manghen Pass: spr., > Telve, 950m, 10.10.08, 15♂, 23♀, spr., 1400m, 10.10.08, 25♂, 30♀, crossroad to Valtrighetta, 1425m, brooklet, 10.10.08, 16♂, 14♀ (Vin.). **SWITZERLAND: Grisons: Rhaetian Alps:** Bernina Pass, > Miralago, tor., 950m, 26.10.08, 1♂, 9♀; > St Carlo, 26.10.08, 26♂, 33♀; Val Müstair: road to the Fuorn Pass, Tschierv, Rom trib., Adige trib., 1700m, 3♂, 5♀, 11.10.99; 1♂, 1♀, 29.06.09 (Vin.); Rom trib., Sta Maria im Müstair, 1340m, 17.09.50, 18♂, 17♀ (Aub.); idem, 3.09.93, 4♂, 6♀ (Lubini leg., Aub.). Tschierv, Tschierv-Orasom Riv., 1646m, 13.07.2004, 1♀, 2 larvae (Vicentini coll.); Ofenpass, Buffalora Riv., 2120m, 8.09.2004, 1♂, 2♀ (Lubini coll.). **AUSTRIA: Rhaetian Alps:** > Martina (Martinsbruck) → Nauders, Inn trib., spr., 1400m, 18.09.09, 4♂, 20♀; Reschenpass (Passo di Resia), Inn trib., 1520m, 18.09.09, 4♂, 10♀ (Vin.).

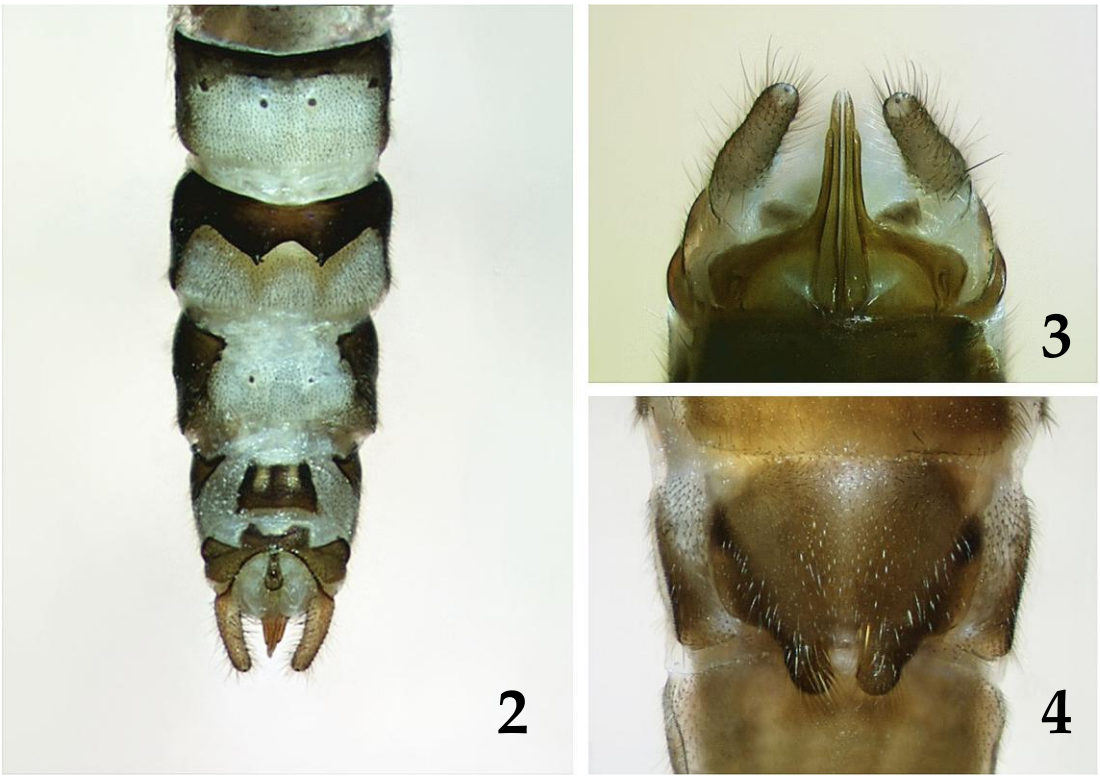
Description. Medium sized species: body length: male 7.0-7.4 mm, female 9.2-9.7 mm. Macropterous, wing length: male 5.5-6.5 mm, female 7.8-8.1 mm. General colour brown. Head brown with dark granulation on the occiput. Antennae dark brown with a crown of long bristles at the tip of each antennal segment; bristles are almost as long as an antennal segment. Pronotum brown with dark marks; long bristles are present on its anterior margin near the corners. Legs brown, covered with long erect setae; darker longitudinal bands are present on the femora. Long erect setae are also present on the base of the main wing veins.

Male (Figs. 2-3). Terga I-V normal; posterior part weakly sclerotized. Tergite VI: antecosta strong, not divided; median membranous field wide and bell-shaped. Tergite VII similar, carrying two strong triangular teeth projecting upward and rearward from the antecosta; the teeth are separated by a triangular notch about as wide as the width of one of them. Tergite VIII: antecosta interrupted for about half the segment's width; the median membranous field is bell-shaped. Tergite IX: antecosta widely open; the median membranous field carries a trapezoidal pigmented sclerite with two less pigmented anterior spots. Tergite X: anterior margin bilobed as usual in the genus, posterior margin with wide rounded median notch. Epiproct slim, racket-shaped; the stalk is about as wide as the rounded apex. Cerci long and slim, with vestigial second segment. Sternite IX: vesicle short and rounded, without stalk. Specilla nearly straight, strong at their base and getting thinner toward their apex. Paraprocts: styles thin, slightly shorter than their base, ending in an acute tip widely separated from the tip of the specilla (Fig. 3). The paraproct's base is not flanked by a distinct lateral lobe, it carries a posterior sclerotized expansion that extends between the style and the cercus base. The base of the paraprocts is split in two parts separated by a membranous field, the anterior part is connected to the base of the specillum and the posterior part is prolonged rearward by the styles, but it might be hardly visible if the paraproct base is hidden under the previous segment, as in Fig. 3.

Female (Fig. 4). Subgenital plate wide, rounded, less pigmented medially that on its edges, and covered with long hairs. The two lobes are globular, extending backward, and separated by a rounded notch about as wide as the width of one lobe; their apices are separated by a more or less wide space. Spermatheca globular and without visible armature.

Affinities. This species is closely related to *L. braueri* and *L. juliettae* sp. n. The male differs mainly in the shorter styles of the paraprocts and by the epiproct having a slim apex. The female lobes of the subgenital plate are narrower and longer than in *L. juliettae* sp. n. (Fig. 7) and they are less widely separated at their base than in *L. braueri* (Fig. 10).

Distribution and ecology. *L. muranyii* sp. n. occurs in the south eastern Alps (Fig. 1). Its western limit is the high range of mountains that extends along the Italian and Swiss (Ticino) border from the lake Lugano up to the Spluga Pass (Splügenpass, 2113m). Its eastern limit is the wide Piave River, in the surroundings of Belluno. Northwards it is mainly reported from the southern slope of the Alps (Po drainage basin). It occurs in Italy and Switzerland (Val Bernina and Val Müstair) but it also crosses the Austrian border and enters the Inn valley, a main Danube tributary. In the northern part of the Lessini Mountains, it is sympatric with its sister species, *L. juliettae* sp. n. It is a crenophilic species occurring in



Figs. 2-4. *Leuctra muranyii* sp. n.: male abdominal tip in dorsal view (2), male genitalia in ventral view (3), female subgenital plate in ventral view (4).

mountain springs and brooklets (400-1900 m). The flight period is in autumn (VIII-XI) but a few adults were also collected the 29.06.2009 (CH: Müstair valley).

Etymology. This species is dedicated to the Hungarian entomologist Dávid Murányi for his major contribution to our knowledge of Central and Eastern European stoneflies.

Leuctra juliettae Vinçon & Graf sp. n.

(Figs. 5-7)

Material examined. Holotype ♂. **ITALY: Lessini Mountains:** > Raossi, Speccheri, 650, small river and brook, 11.09.08. **Other material**. Paratypes: same date and locality: 82♂, 52♀; Venetian Prealps: SE. Trento: S. Folgaria, > Zoreri → Borcola Pass, spr., 900m, 27.10.08, 8♂, 13♀ (Vin.). Lessini Mountains: Fugazze Pass, > Camposilvano, 1170m, 11.09.08, 9♂, 29♀; 15.10.06, 3♂, 4♀ (Graf); W. Fugazze Pass: < Campogrosso Pass, N. slope, 1394m, 11.09.08, 19♂, 13♀; < Campogrosso Pass, S. slope, 800m, 11.09.08, 3♂, 4♀, 1300m, 11.09.08, 10♂, 20♀; > Bellori, Val Pantena trib., 500m, 10.10.08, 1♀ (Vin.).

Description. Medium sized species: body length: male 7.5-8.0 mm, female 7.9-9.5 mm. Macropterous, wing length: male 7.5-8.0 mm, female 8.0-9.0 mm. General colour brown. Head brown with dark lateral marks on the occiput. Antennae brown with a crown of long bristles at the tip of each antennal segment; bristles about as long as an antennal segment. Pronotum brown with dark marks and long bristles on its anterior margin near the corners. Legs brown with darker longitudinal bands, and covered with long erect setae. Base of the main wing veins carrying long erect setae.

Male (Figs. 5-6). Terga I-V normal; posterior part weakly sclerotized. Tergite VI with strong, not

Figs. 5-7. *Leuctra juliettae* sp. n.: male abdominal tip in dorsal view (5), male genitalia in ventral view (6), female subgenital plate in ventral view (7).

divided antecosta and median bell-shaped membranous field. Tergite VII with two strong triangular teeth separated by a notch wider than the width of one of them; they project up and rearward from the antecosta. Tergite VIII: antecosta interrupted for more than half the segment's width; the median membranous field is bell-shaped. Tergite IX similar, with two connected dark triangular spots, in postero-median position. Tergite X: anterior margin bilobed, posterior margin with wide rounded median notch. Epiproct strong, mushroom-shaped, with wide stalk. Cerci long and slim, with a vestigial second segment. Sternite IX: vesicle strongly reduced, without stalk. Specilla long, nearly straight, getting thinner toward their apex. Paraprocts: styles long almost reaching the specilla tips, thin and ending in an acute tip (Fig. 6); the base of the paraprocts is split in two parts that are separated by a membranous field, the anterior part is connected to the base of the specillum and the posterior part is prolonged rearward by the styles; it is hardly visible on specimens where the paraproct base is partly hidden under the previous segment (Fig. 6).

Female (Fig. 7). Subgenital plate wide, rounded, less pigmented medially that on its edges, covered with long hairs. The two lobes are wide and short, separated by a small rounded notch. Spermatheca globular and without visible armature.

Affinities. This species is closely related to *L. braueri* and *L. muranyii* sp. n. (see previous description of *L. muranyii*). The male differs by the more widely separated teeth on tergite VII, the shape of the median spot on tergite IX, the strong stalk of the epiproct. It also differs from *L. muranyii* in the style of the paraprocts that are much longer in *L. juliettae* sp. n. The two female lobes of the subgenital plate are

broad and reduced in length compared with the other species of the group.

Distribution and ecology. It is strictly limited to the Lessini Mountains were it cohabits with *L. muranyii* sp. n. in the surroundings of Folgaria. It occurs in mountain watercourses of different size (springs, brooks and torrents), between 500 and 1400m. The flight period is in autumn (IX-X).

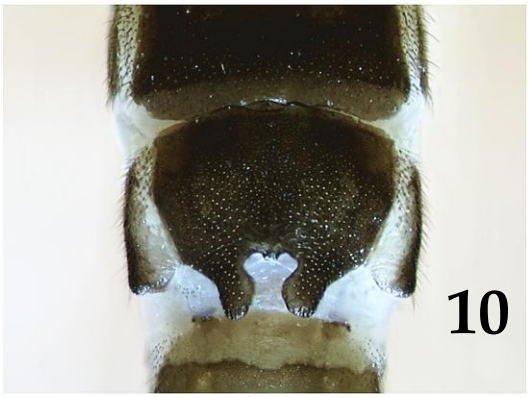
Etymology. *L. juliettae* occurs in the close surroundings of Verona and therefore we dedicate it to the emblematic Verona lovers, Romeo and Juliette.

L. braueri Kempny 1898

(Figs. 8-10)

Material examined. FRANCE: Hautes-Alpes: Devoluy Massif, Lus-la-Croix-Haute, Rioufroid brook, 1500m, 19.09.87, 2♀, 29.08.88, 1♀ (Vin.). **Isère:** Croix-Haute Pass, Alpes du Jocou, 1350m, 16.09.90, 4♂, 5♀, 13.10.91, 1♀, Ebron trib, 1000m, 33♂, 23♀ (Vin.). Vercors Massif: St Michel-les-Portes, Pellas spr., < Aupet Pass, 1400m, 16.09.90, 5♂, 2♀, 13.10.91, 2♂, 11♀, 17.09.99, 5♀; > St Ange, Pissarde spr., 950m, 11.09.94, 1♀; > Lans-en-Vercors, Furon spr., 1250m, 8.09.91, 12♂, 12♀; 6.10.91, 1♂; St Gervais, Drevenne tor. > Cascade, 880m, 6.10.91, 1♂, 1♀; Drevenne < Romayère Pass, 1000m, 8.09.91, 24♂, 22♀; 6.10.91, 4♀ (Vin.). Chartreuse Massif: Charmette Pass, N. slope, Ivernon brook, 1200m, 9.09.89, 2♀, S. slope, Vence trib., 9.09.89, 1♀ (Vin.). **Savoie:** Ste Foy Tarentaise, Le Miroir, Isère trib., brook, 1300m, 22.09.91, 1♂; Bauges Massif: spring Cherel trib., 1200m, 22.09.91, 14♂, 13♀ (Vin.). **Haute-Savoie:** Tamié Pass, close to the Tamié Abbaye, Chaise trib., 900m, 14.10.90, 1♀ (Vin.). Tournette Massif, Montaubert, Chaise trib., 1000m, 8.09.93, 1♂ (Vin.). Cornette de bise Mount, > Vouvry, Le Fosseau, 1000-1400m, 16.08.89, 1♂ (Vin.). **Jura Massif, Doubs**: Jougne, Entre-les-Fourgs, La Jougnena trib., brooklet, 1000m, 21.08.95, 6♂, 6.09.95, 5♂, 8♀ (Vin.); **Jura Massif, Ain**: > Gex, road to Faucille Pass, Oudar tor., 850m, 20.08.89, 4♂, 2. Vattay Ski Station, Faucille Pass, Valserine spring, 1300m, 21.08.95, 7♂, 3♀, 5.09.95, 5♀, 23.10.95, 1♀ (Vin.). **SWITZERLAND: Vaud:** Ollon; Vallée Gryonne, 1460m, 5.08.81, 3♂; Froideville, Jorat, rte de Froideville Riv, 890m., 23.09.78, 6♂ (Aub., Gattolliat det). **Fribourg:** Chatel-St-Denis, s. Les Paccots, 1130m, 11.09.78, 1♂; Chatel-St-Denis, Creux de l'Ours Riv., 1300m, 13.10.78, 2♂; Semsales, Le Cheval Brulé Riv., 1310m, 29.08.79, 1♀ (Aub., Gattolliat det.). **Berne**, Rueschegg, Schalenberg Riv., 1450m., 2♀, 22.08.01, 1♀, 2.10.01 (Aub., Stucki leg., Gattolliat det.). **Lucerne**, Hergiswil-Willisau, Napf, Wiggerenhütten Riv., 900m, 14.09.82, 1♀ (Aub., Gattolliat det.);Wald Emme, Fluehli sur Sörenberg, 1250m, 26.08.1980, 16♂, 2♀ (Aub.). **Obwald**: Giswil, Kleinteil, Mülbach, 560m, 26.08.1980, 2♂, 1♀; Sarnen, Schwendi-Kaltbad, 1450m, 27.08.1980, 9♂,1♀ (Aub.). **Uri**: Spiringen, Schächental Riv., 1050m, 4.10.1957, 1♂, 4♀ (Aub.). **Saint-Gall**: Wildhaus, Schwendi brook, 1250m, 5.10.1957, 4♂, 6♀; St Gallenkappel, Ranzachtobel spring, 550m, 22.08.2002, 1♂; 7.09.2002, 10♂, 4♀ (Lubini coll.); Sädelrain, Winterthur, Tuffquelle, 630m, 26.09.2001, 5♀ (Lubini coll.). **Ticino**: Ghirone, Val Blenio Riv., 1250m, 17.09.90, 1♀; Lopagno, Val Colla, 730m, 15.09.1985, 1♂, 2♀; Val Colla, Cassarate tor., > Sonvico, 640m, 15.09.85, 3♂; 11.04.86, 1 la; Val Colla, between Bidogno and Albuno, 900m, 15.09.85, 2♂, 1♀; Bach Aquino (684), 585m, 20.09.96, 9♂, 4♀; spr. (Ravizza leg., Aub.); Indemini, Valle di Vira, 16.09.1985, 1♀, Ravizza coll.; Valle di Vira, 16.09.85, 4♀; 13.09.88, 2♂, 6♀; 15.09.90, 3♂, 8♀; 17.09.88, 1♂; Bedretto, Bedretto Riv., 1600m, 16.09.1985, 1♂, 3♀, Ravizza coll.; Val Bedretto, 1.10.44, 4♂, 5♀. **Valais**: Montana, Montana Riv, 1600m, 10.08.58, 7♂; Saxon, Saxon brook, 607m, 18.10.06, 1♀ (Aub.). **Grisons**: Passo del San Bernardino, > Mesocco, < tunnel, 17.09.09, 12♂, 15♀; near the rest area, 17.09.09, 11♂, 21♀ (Vin.); San Bernardino , Mesocco Riv., 1610m. 9.09.1950, 9♂, 9♀; Grono, Mesocco Riv., 16.09.1990, 1♀ (Ravizza coll.); > Splügen, Spluga Pass, 17.07.09, 1♂, 3♀ (Vin.); Alp Nadels, Trun, Dadens Riv., 1940m, 28.08.2001, 2♀ (Lubini coll.). **ITALY: Cottian Alps**: NW. Perosa Argentina, > Meano, > Borgata Selvagio, spr. Chisone trib., 1200m, 29.09.02, 6♂, 29♀; W. Giaveno, Alpe Colombina, Aquila ski station, 1200m, 9.10.99, 2♂, 2♀ (Vin.); Coazze, tor. Sangonetto, loc. Prietto, 900 m, 26.10.02, 2♂ (Del.). **Graian Alps**: S. Viu, Lis Pass, spr., Stura di Viu trib., 1000m, 23.10.00, 2♂, 3♀; 27.08.05, 1♂; NE. Lanzo Torinese, > Corio, Pian d'Audi, Malone trib., 865m, 26.12.94, 1♀, 23.10.00, 1♀ (Vin.); NW Cuorgne, Alpette, Nero brook, 920m, 9.09.08, 2♂ (Del.); > Quincinetto, Renanchio b., Dora Baltea trib., 1100m, 9.10.99, 1♂, 5♀; 17.09.09, 13♂, 25♀ (Vin.). **Pennine Alps**: E. St-Vincent, Joux Pass, >

Grand Rhun, 1400m, 27.10.04, 4♂, 8♀; E. Pont St Martin, > Carema, brook, Dora Baltea trib., 500m, 2.11.90, 13♀; SE. Pont St Martin, > Settimo Vittone, > Trovinasse, spr., 1600m, 26.10.04, 23♂, 47♀; 13.08.05, 1♂; < Trovinasse, 1000m, 26.10.04, 7♂, 11♀ (Vin.); NW Biella, Piedicavallo, Cervo trib., 10.09.55, 2♂, 1♀ (Aub.); Val Sesia, Alagna, Sesia trib., 1300 m, 14.09.78, 1♂, 4♀ (Rav.); E. Quittengo, Panoramica Zegna, Sessera trib., 1300m, 4.11.90, 1♂, 8♀; N. Varallo, Sabbiola trib., < Erbareti, 8.10.90, 1♂, 3♀; 3.11.90, 6♂, 14♀; E. Varallo, Civiasco, spr., Sesia trib., 700m, 8.10.90, 1♂, 2♀; Val Strona, < Rosarolo, > Massiola, 600m, 10.10.99, 2♀ (Vin.); NE. Orta San Giulio, Armeno, Agogna tor., Sovazza loc., 550 m, 21.09.04, 1♂, 1♀ (Del.). **Lepontine Alps:** Aurano, ruisseau, E. slope of Zeda-Laurasca Mounts, 1000 m, 21.10.91 (Rav.). **Atesine Alps**: SW. Vipiteno, Monte Giovo Pass, N. slope, 1200m, 11.10.99, 2♂, 1♀ (Vin.); Alto Adige, NE. Brunico, Val de Tures, Riva di Tures, tor. Riva, 1300m, 10.06.80, 1♀ (Rav.). **Dolomites**: Falzarego pass., Gaderbach, brooklet NW slope of the pass, 2100m, 11.10.99, 7♂, 15♀ (Vin.); S. Cortina d'Ampezzo, Lago d'Ajal, 1472m, 18.08.53, 1♀ (Con.); **Carnic Alps**: Croce di Comelico Pass, r. 1600m, 31.09.80, 4♂, 4♀ ; Forni Avoltri, brook, 800m, 21.09.80, 1♂, 4♀ (Rav.). **Carnic Prealps**: S. Belluno, < Tassei, 400m, 12.10.08, 2♂, 4♀; NE. Belluno, S. Passo di Mauria, < Gias Refuge, spr. 1100m, 11.10.08, 1♀; tor., 1200m, 11.10.08, 1♂, 1♀; SE. Ampezzo, Sella Chiampon, W. slope of Verzégnis Mount, big spr., 800m, 11.10.08, 1♂, 9♀; **Julian Prealps:** E. Cividale, road to Stegna, spr. < Zamir, 200m, 29.12.95, 3♀; 11.10.09, 3♀; crossroad Stregna - Podgora, spr., 280m, 11.10.08, 3♂, 10♀. NE. Cividale, Montemaggiore → Cepletischis, Losaz, 900m, 1♀; spr. > Cepletischis, close to the Slovenian border, 600m, 11.10.08, 1♂, 2♀; N. Cividale, W. Breginj, Prossenico, spr., 11.10.08, 4♀ (Vin.). **AUSTRIA:** Several records from the North east Austrian Alps: Upper Austria: National Park Kalkalpen and Styria: Nationalpark Gesäuse; Pernegg, Bärenschützklamm, 21.00.06, 1♂, 2♀, Lower Austria: Prein a.d. Rax, 11.09.99, 7♂, 12♀; Urgerstal, 10.10.98, 4♀; as well as the East Austrian Alps (Carinthia: Nockberge, St. Oswald; Saualpe, Ladinger Hütte, 23.09.00, 1♂, 2♀). **SLOVENIA: Julian Prealps and Karawanken Mountains:** SW Kobarid, < Livek, 400m, tor., 11.10.08, 1♀; spr., 11.10.08, 4♂, 10♀; W. Kobarid, Breginj, R., 11.10.08, 4♀; spr. Stanovišče → Breginj, 11.10.08, 13♂, 13♀ (Vin.). Dolenja Trebuša, 420m, 29.08.92, 3♂, 1♀; Gorenja Trebuša Zrčin, reka Trebuščica, 290m, 29.08.92, 14♂, 1♀; Kozina Artviže povirje, Brsnica b., 700m, 16.11.90, 3♂, 6♀; Idrija, Vrh Zale, Zala R., 400m, 29.08.92, 41♂, 20♀; Vrzdenec Kisovnik, Kisovnik b., 360m, 31.08.91, 22♂, 2♀; Velike Lašče, Četež pri Turjaku, Granjevica b., 12.09.99, 2♂, 3♀; Čabar, pri izviru Čabranke, Čabranka b., 550m, 11.10.91, 3♂, 1♀; Ortnek, Zlati rep., Zastava b., 560m, 25.08.89, 13♂, 7♀; 5.10.89, 3♂, 4♀; Velike Lašče, Luknja, Zastava b., 550m, 9.09.89, 4♂, 1♀; Ljubljana, Javor, Panska R., 380m, 20.10.85, 4♂; Višnja gora, Dedni dol, Višnjica b., 380m, 15.09.99, 65♂, 27♀; Litija, Cerovica, Pustov Mlin, Stamarica b., 380m, 17.10.85, 1♂, 1♀; Tolmin, Rodne, Tolminka R., 170m, 24.08.89, 5♂, 1♀; Kranjska Gora, Pišnica, Velika Pišnica b., 850m, 2.10.89, 1♂, 2♀; Mojstrana, Vrata, Bistrica R. pod Kočo pri Peričniku, 700m, 28.08.84, 74♂, 11♀; Gozd Martuljek, Planina Martuljek, Martuljek b., 930m, 27.09.84, 11♂, 4♀; Kranjska Gora, Srednji vrh., Hladnik b., 920m, 27.09.84, 5♂, 12♀; 13.10.99, 10♂, 17♀; Idrija, Otalež, pritok Idrijce, 330m, 29.08.92, 151♂, 3♀, Jesenice, Planina pod Golico, Savske jame, 1150m, 19.09.92, 1♀; Jesenice, Javorniški rovt, Planinski dom Pristava, 975m, 21.09.84, 5♀; Mojstrana, Mlinca, Sava R., 640m, 14.09.89, 19♂, 8♀; 2.10.89, 19♂, 34♀; Mojstrana, Srednja Radovna, Klemen, Radovna R., 690m, 21.09.84, 1♂, 7♀; Bled, Spodnja Radovna, Radovna R., 730m, 9.11.89, 5♀; Jesenice, Koroška Bela, Bela b., 1100m, 24.08.85, 17♂, 9♀; Žirovnica, Karavanke, pod Valvazorjevim donom povirje Rečice, 1000m, 24.08.85, 12♂, 9♀; Žirovnica, Završnica, Završnica b., 1000m, 24.08.85, 22♂, 4♀; Polhov Gradec, Setnik, Jernejčkov graben, 470m, 31.08.91, 5♂; 21.10.91, 6♂, 10♀; Ljubelj, Korošica, Mošenik b., 950m, 24.08.93, 3♂, 5♀; Tržič, Podljubelj, Tominčev slap, 750m, 21.08.92, 13♂, 4♀; Tržič, Jelendol, Dolžanka b., 1050m, 21.08.92, 6♂, 5♀; Tržič, Grahovše, Lomščica b., 860m, 19.11.89; Tržič, Črna peč, Medvodje, Tržiška Bistrica R., 1200m, 4.08.92, 5♂; 17.09.92, 5♂, 7♀; Tržič, Košutnik, Medvodje, Košutnik b., 1150m, 24.08.93, 5♂, 11♀; Kamniška Bistrica, Kamniška Bistrica b., 600m, 29.09.86, 2♂, 6♀; Solčava, Logarska dolina pod slapom Rinka, 1000m, 19.09.92, 1♂, 17♀; Zgornje Jezersko, Roblek, Jezernica b., 970m, 29.08.90, 5♂, 18♀; Kamnik, Kališe, povirje, Volovljek b., 960m, 5.09.89, 8♂, 5♀; Kamnik, Krivčevo, Črna b., 640m,



Figs. 8-10. *Leuctra braueri* kempny: male abdominal tip in dorsal view (8), male genitalia in ventral view (9), female subgenital plate in ventral view (10).

11.09.92; Litija Volčja Jama, 16.10.85, 3♀; Gornji grad, Dol, Ragačnica b., 490m, 11.09.92, 3♂, 3♀; Črna na Koroškem, Kozar, reka Meža, 630m, 28.08.91, 9♂, 21♀; Podpeca, Mitnik, Helenski b., 900m, 28.08.91, 1♂, 3♀; 23.10.91, 2♀; Vransko, Motnik, Motnjiščica b., 400m, 7.09.99, 4♂, 4♀; Črna na Koroškem, Javorje, Javorski b., 730m, 20.09.91, 1♂, 3♀; Dravograd, Libeliče, Ridlov graben b., 420m, 11.09.84, 3♂, 10♀; Ravne na Koroškem Strojna Zelenbreški b., 550m, 28.01.91, 2♂, 2♀; Mirna, Cirnik, Mirna R., 280m, 30.08.91, 22♂; Trebnje, Roženberk, Kostanjščica b., 15.09.99, 31♂, 37♀; Gorjanci, Dolž, Klamfer b., 660m, 25.10.90, 12♂, 10♀; Gorjanci, Cerov log, Pendirjevka b., 500m, 28.09.90, 10♂, 10♀; Kostanjevica na Krki, Črneča vas, Sušica b., 340m, 10.10.84, 8♂, 19♀; Sava, Polšnik, Sopota b., 680m, 24.09.91, 4♀; Dravograd, Kozji vrh, Velka b., 550m, 20.09.91, 4♀; Vuzenica, Sveti Primož na Pohorju, Plavžnica b., 480m, 11.09.84, 2♂, 9♀; Rimske Toplice, Jurklošter, Lahomščica b., 360m, 14.09.84, 1♂, 2♀ (Siv.); **Pohorje Mountains**, Koča na Pesku, povirje reke Oplotnice, 1360m, 15.10.94, 1♂, 8♀; Pohorje, Pesek, povirje nad Ribnikom, 1360m, 15.9.99, 5♀; Pohorje, Koča na Pesku, povirje reke Radoljne, 1300m, 28.10.89, 1♂, 4♀; Sevnica, Planina pri Sevnici, desni pritok Sevnične, 500m, 14.09.84, 6♂, 7♀; Slovenske Konjice, Preloge pri Konjicah, Polenščica b., 360m, 4.11.84, 3♂, 7♀; Pohorje Osankarica, pri Domu na Osankarici, 18.09.99, 4♂, 3♀; Kazjansko, Kozje, Bistri graben b., 290 m, 6.09.85, 4♂, 12♀; Poljčane, Lovnik, Bela b., 18.09.99, 6♂, 9♀; Slovenska Bistrica, Zgornja Bistrica, Bistrica b., 6.10.89, 1♂, 2♀; 18.09.99, 12♂; Kozjak, Zgornji Slemen Bresterniški b., 550m, 7.09.95, 2♂, 6♀; Jurski, vrh, Gaj nad Mariborom, Radečki b., 400m, 12.09.84, 1♂, 3♀; 7.09.95, 10♂, 14♀; Dobovec pri Rogatcu, Ferčec, Sotla R., 280m, 4.09.90, 4♂ (Siv.).

Complementary Description. Wings of normal length, except brachypterous specimens occurring in the Slovenian Pohorje mountains.

Male (Figs 8-9). Terga I-V normal; posterior part weakly sclerotized. Tergite VI with strong, not divided antecosta and median bell-shaped membranous field. Tergite VII with two strong triangular teeth separated by a notch as wide as the width of one of them and projecting up and rearward from the antecosta. Tergite VIII: antecosta interrupted for more than half the segment's width; its free ends are sharp; the median membranous field is bell-shaped. Tergite IX similar, the median membranous field carries a trapezoidal pigmented sclerite with two less pigmented spots medially, though in some strongly sclerotized specimens the lighter spots are hardly visible. Tergite X: anterior margin bilobed, posterior margin with wide rounded median notch. Epiproct strong, mushroom-shaped, with short stalk. Cerci long and slim, with vestigial second segment. Sternite IX: vesicle small, without stalk. Specilla nearly straight, getting thinner toward the apex. Paraprocts: styles long, nearly reaching the specilla tips, and ending in an acute tip (Fig. 9). Paraproct base without lateral lobe, and carrying a posterior sclerotized expansion between the style and the cercus base; the base of the paraprocts is split in two parts that are separated by a membranous field, the anterior part is connected to the base of the specillum and the posterior part is prolonged rearward by the styles (Fig. 9).

Female (Fig. 10). Subgenital plate wide, rounded, most frequently less pigmented medially that on its edges, covered with long hairs. The two lobes are rather long, finger shaped, and separated by a wide sub-triangular notch.

Affinities. This species is closely related to *L. juliettae* sp. n. and *L. muranyii* sp. n. (see previous descriptions of *L. muranyii* and *L. juliettae*).

Distribution. In the Italian Alps, its southern limit seems to be the Chisone valley, and on the French slope, the Vercors and Dévoluy massifs. In Italy it extends northwards and eastwards in the Graian Alps, Dora Baltea valley, Pennine Alps (Biellais mountains), up to the Swiss Ticino, in the eastern part of the Italian Alps it occurs in the Dolomites. In Austria it covers the whole alpine area (Vorarlberg, Tyrol, Salzburg, Carinthia, Upper and Lower Austria) as well as the central midlands between 300m and 1800m. Beside the Alps, *L. braueri* was reported from the whole Hercynian ranges (Soldán et al 1998), the West, North and N.E. Carpathians (Czech Republic, Slovakia, Poland, Ukraine - Soldán et al 1998, Krno 2003, Fialkowski & Kittel 2002, Zhiltzova 2003) and also in the E. foothills of the Alps (Andrikovics & Murányi 2001).

HISTORY OF THE *BRAUERI* SPECIES GROUP

In 1946, Aubert has proposed a first separation of the European species of the genus *Leuctra* in seven groups: *geniculata*, *braueri*, *cylindrica*, *schmidi*, *nigra*, *hippopus* and *inermis*. In 1952, with the description of *L. hispanica*, he united the two monotypic groups *geniculata* and *braueri*; therefore the *geniculata* group was then comprising three species, *L. geniculata, L. braueri* and *L. hispanica*, both characterized by the presence of a crown of long bristles at the tip of each antennal segment. Then, in 1954, he proposed a re-classification following six main groups: *geniculata, schmidi, nigra, fusca, hippopus*, *inermis,* and a seventh group comprising a few species with uncertain affinities. This grouping was followed by Aubert (1959), in his Swiss Fauna, and recognised by Raušer (1962), in its study of the *Protonemura* and *Leuctra* species groups, but Raušer was ambiguous since he used the united *geniculata* group in the text while he separated the two groups in his Fig. 7.

In 1966, *L. geniculata* was separated from the *Leuctra* genus and placed in a new genus *Euleuctra* by Illies (1966), but a few years later it was put back again in the *Leuctra* genus by Consiglio (1975). Afterwards the two groups, *braueri* and *geniculata*, remained separated.

Nevertheless, a few years later, the composition of the *braueri* group became completely obsolete when a new species, *L. iliberis* Sánchez-Ortega & Alba-Tercedor, 1988 was described from southern Spain. It was closely related to *L. braueri* but had normal short pilosity and no crown of erect bristles on the antennae. In that paper, the *braueri* group was considered as it should be monotypic before, and *L. iliberis* should be the second described species that belongs to this group.

However, one year later, Membiela (1989) added a new species, *L. auriensis,* in the *braueri* group comprising four species. This grouping was only

justified by the antennal pilosity and not by the position of the tergal ornamentations, tough this last feature was yet considered as a main distinctive character by Sánchez-Ortega & Alba-Tercedor (1988).

CHARACTERISATION OF THE *BRAUERI* SPECIES GROUP

To define the *braueri* group, the criterion of the antennal pilosity is of no use since it is not constant throughout the group.

The best distinctive character is the lack of sclerotized armature in the female spermatheca. This feature is exceptional in the *Leuctra* genus where all species have a visible sclerite that characterizes their species group (Aubert 1957, Figs 4-6). However, few *Leuctra* species have their spermathecal sclerite hardly visible or reduced to a simple ring, also indicating a primitive origin; it is the case for *L. aptera* Kaćanski & Zwick, 1970, *L. berthelemyi* Zwick & Vinçon, 1993, *L. brachyptera* Kazanci, 1985 and *L. geniculata*. The lack of a spermathecal sclerite is also observed in the two other European Leuctridae genera: *Pachyleuctra* (see Zwick 1973, Fig. 58g) and *Tyrrhenoleuctra*, both considered as more primitive than the *Leuctra* genus (Berthélemy 1968).

In the males, the best distinctive character is the presence of two strong triangular teeth on the seventh tergite, but this feature is also present in another species group in the *Leuctra* genus, the *L. sipahilerae* group endemic of the eastern Pontic chain in Anatolia and comprising four species (Vinçon & Sivec 2001); it is very probably a convergence since the *sipahilerae* group is clearly different from the *braueri* group (in the males, the two teeth of tergite VII are closely connected, forming a median process, in the females, the spermathecal sclerite is well visible).

Moreover, the *braueri* group looks like the North American *tenuis* group (Harper & Harper 1997), also having one sclerite on tergite VII, the paraprocts of *L. tenuis* have thin, blade-like expansions similar to those of *L. braueri* but the specillum of *L. tenuis* is much stronger (Harper & Harper. 1997, Figs. 5, 7, 8). To better compare the *tenuis* and *braueri* groups it should be usefull to study the female spermathecal ring in the *tenuis* group.

COMPOSITION OF THE *BRAUERI* SPECIES GROUP

L. hispanica and *L. auriensis* are removed herein from the *L. braueri* group, and placed in the *hippopus* group since the males have two teeth on the eighth tergite and since the female spermathecal sclerite corresponds to that of the *hippopus* group *prima* subgroup, looking like that of *L. clerguae* Vinçon & Pardo, 1994 and *L. joani* Vinçon & Pardo, 1994, two Pyrenean endemic species. Thus, the *L. braueri* group comprises four species that we separate into two subgroups.

The *braueri* subgroup comprises three species, *L. braueri, L. muranyii* and *L. juliettae*.

It is characterized in the males, by the specialized paraprocts: - a posterior rounded sclerite extends between the style and the cercus; - the base of the paraprocts is split into two parts separated by a triangular membranous field, the anterior part is connected to the base of the specillum and the posterior part is prolonged rearward by the styles (Fig. 9). Sometimes, the anterior part is hardly visible since it is partly covered by the sternite IX posterior margin (Fig. 3, 6).

The adults have an exceptionally long pilosity, especially on the legs, and a crown of long bristles at the tip of the antennal segments, as it is also the case in some species belonging to other *Leuctra* groups: *L. geniculata*, *L. hispanica*, *L. auriensis*, *L. occitana* Despax, 1930, *L. khroumiriensis* Vinçon & Pardo, 1998 and *L. sartorii* Vinçon & Pardo, 1998. This character is of poor taxonomical interest since it varies within some species groups (*hippopus* and *braueri*). Moreover, the two characters (long pilosity on the body and on the antennal segments) can also occur separately, indeed *L. nigra* has long body pilosity but no long antennal hairs, while *L. bronislawi* has short body pilosity and long antennal hairs (Murányi in litt.)

The *iliberis* subgroup. The remaining species in the *braueri* group, *L. iliberis* appears rather isolated since its pilosity is not exceptionally developed; the antennae have no long bristles at the tip of each article, the male paraprocts have no posterior expansion, and their base is not split in two parts. *L. iliberis* is also geographically isolated from the rest of the group since no members of the *braueri* subgroup occur in the French Massif-Central, Pyrenees and in the northern and central Iberian Peninsula.

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