Description of the larva of *Oulimnius echinatus* Berthélemy (Coleoptera: Elmidae: Elminae)

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The mature larva of *Oulimnius echinatus* Berthélemy is described for the first time, based on material from Mallorca (Spain). Morphologically the larva of *O. echinatus* resembles those of *O. jaechi* Hernando, Ribera & Aguilera and *O. fuscipes* (Reiche, 1879), from which it differs in the distinctly denser dorsal granulation, the less prominent setiferous tubercle on posterior angles of tergites and the absence of mesal setiferous tubercle on tergites and ventrites. We used for the first time scanning electron microscopy to describe the morphology of an *Oulimnius* larva.

The genus *Oulimnius* Gozis occurs in Europe, North Africa and North America (Kodada & Jäch 2005; Jäch et al. 2006). To date, 16 species and subspecies have been described, although the systematic position of the two American species within the genus is open to question.

The morphology and diagnostic features of adults have been described in all species, but the knowledge of the larva is still incomplete (Hernando et al. 1998). Until now, only the larva of five species have been described: *O. tuberculatus* (Müller), *O. trogloides* (Gyllenhal), *O. rivularis* (Rosenhauer), *O. latiusculus* (LeConte) and *O. jaechi*.

*Oulimnius echinatus* was described from eastern Mallorca (Berthélemy 1979). It is the only Elmidae species known from the Balearic Islands, occurring only in Mallorca and Menorca (Rico 1996; Rico & García-Avilés 1998). According to Sánchez-Fernández et al. (2008), this species is highly vulnerable, and so any information about its adult or larval stages can contribute to conservation efforts.

This paper provides a detailed description of mature larva of *O. echinatus* and its comparison with known larva. SEM was used to provide detailed information on the larval morphology, and to allow the comparison of the larva of *Oulimnius* with that of other elmid genera.

For the description, two mature larva were available, collected in the western part of Mallorca (Banyalbufar, tν. s’Alga C710, km90, 146m a.s.l., N39º40’29.5" E2º29’52.4”). The larva were cleaned of dirt, dissected and examined with a Nikon SMZ-1B stereo-microscope under diffuse lighting at magnifications up to 140×. For scanning electron microscopy, larva were dehydrated in a graded ethanol series, air-dried from absolute ethanol, mounted on stubs using double-faced tape, sputter-coated with gold and viewed in a Hitachi S800 at 15 kV. Metric characters were measured to the nearest 0.05 mm using a Nikon stereo-microscope with an ocular scale. Larval morphological nomenclature follows Lawrence (1991). Material examined is deposited in the CCB–Collection (F. Čiampor), Bratislava, Slovakia.

**Oulimnius echinatus** Berthélemy

(Figs 1–11)

**Description of the larva.** Habitus (Fig. 1). Length 2.80–2.90 mm, greatest width 0.70 mm. Dorsal side dark gray, ventral side paler; areas around eyes, antennae and legs except coxae pale yellow, mouth parts and apex of ninth abdominal segment darkened to brown. Body elongate, tapering posteriorly; moderately convex dorsally, almost flat ventrally, subtriangular in cross-section. Biforous spiracles present laterally on mesothorax and abdominal segments 2–8. Integument with dense setose granules and sparse longer pale hairs (Figs 8, 14).

Head (Fig. 2) dorsoventrally flattened, sides subparallel in posterior portion, prognathous, partially retracted into prothorax; frontoclypeal plate without granules, epicranial plates and genae granulated, granules with small scales.
FIGURES 1–11. *Oulimnius echinatus* larva, 1) habitus; 2) head, dorsal view; 3) antenna, dorsal view; 4) labium and maxillae, ventral view; 5) labrum, dorsal view; 6) right maxilla, ventral view; 7) right maxilla, dorsal view; 8) protergum; 9) left fore-leg, dorsal view; 10) right mid-leg, ventral view; 11) right hind-leg, ventral view; 12) ventral side of thorax (legs removed); 13) detail of lateral margin of prosternum; 14) detail of abdominal tergites; 15) detail of abdominal sternites and pleura; 16) abdominal segment 9, dorsal view; 17) apex of abdominal segment 9 with operculum, ventral view.
Epicranial and frontoclypeal sutures present. Stemmata small, clustered laterally, exposed cuticular capsula. Gula short. Antenna three-segmented (Fig. 3); scape widest, subapically with short tufted setae; pedicel slender, elongate, about three times as long as scape, with sparse elongate scales and apical setae; flagellum setiform, apex with central elongate sensillum surrounded by short scale-like sensilla; sensorium subacute, almost three times as long as flagellum. Labrum about 1.6 times wider than long, glabrous, with longer sensory hairs and tufted scales (Fig. 5); anterior margin shallowly emarginate in the middle. Clypeus wide. Mandible (Figs 6, 7) subtriangular, palmate, with apex tridentate; incisor area with long straight articulated setose process; mola absent; penicillus well developed; outer margin smooth, with two moderately long setae; ventral condyle rounded. Maxilla (Fig. 4) slender; cardo small subtriangular, with moderately long branched seta; stipes elongate, smooth, slightly narrowed anteriad, with one long sublateral seta and few short, forked scales; galea shorter than lacinia, both lobes apically with acuminate setae; palpifer oblique, maxillary palpus shorter than galea. Labium elongate (Fig. 4). Prementum narrow, short, subtriangular between palpi; ligula setose. Postmentum undivided, glabrous, with few scales and two pairs of sublateral sensilla, apical angles slightly excavate with elongate pegs; labial palpi short, last segment globular. Apex excavated with sensory field.

Thorax. Protergum (Fig. 8) ca 1.5 times wider than long, widest before base; depressed mediolaterally, mesal longitudinal carina tuberculate; disc with dense setiferous tubercles and few long hairs; anterior margin feebly convex; posterior margin almost straight, rimmed with elongate, apically excavated setiferous tubercles; sides convex with setiferous tubercles. Meso- and metatergum about 3 times as wide as long, about half as long as protergum. Venter of thoracic segments (Fig. 12, 13) with: basisternum and sternellum subtriangular; episternum and epimeron moderately wide; pleural suture well impressed; laterotergites narrow. Legs well developed, with serrate setae and several long sensory hairs. Fore-legs shortest and robust (Fig. 9), mid- and hind-legs slender, similar in shape (Figs 10, 11). Coxae large, partly microgranulate. Trochanter (shortest segment) subtriangular. Femur elongate, slightly widened distad. Tibia slightly longer than femur, feebly narrowed distad. Tarsungulus long, slender, acuminated, about half as long as tibia, moderately curved, with long, baso-ventral seta.

Abdomen with nine segments; tergites microgranulate on anterior portion (Fig. 14), sternites scaled on anterior portion (Fig. 15); exposed portion of tergites 1–8 with dense setiferous granules, pairs of which form distinct longitudinal mesal carina, posterior margin rimmed by elongated apically excised tubercles with tufted setae (Fig. 14); lateral margins slightly convex, with setiferous granules; segments 1–8 simple, wide and short in dorsal view, similar in shape, subequal in length; segments 1–7 with distinct pleura (Fig. 15) and subquadrate sternum; segments 8–9 with sclerites fused. Segment 9 trapezoidal, elongate, about 1.9 times as long as wide; apex feebly emarginate, with numerous robust hairs (Fig. 16). Ventral operculum subpentagonal, almost 1.5 times as long as wide, tapering in posterior third, depressed along midline, sides rimmed by setae, anterior margin rounded; apical opercular claws well developed, long and slender (Fig. 17).

Differential diagnosis. The most important diagnostic feature of *O. echinatus* is its geographical distribution, as it is endemic to the Balearic Islands. Morphologically it resembles more *O. jaechi* and *O. fuscipes* than *O. tuberculatus* or *O. troglodytes*. From *O. jaechi* and *O. fuscipes* it differs in the denser dorsal granulation, the less prominent setiferous tubercle on the posterior angles of tergites, and the absence of mesal setiferous tubercle on tergites and/or ventrites.

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References


