

# Larvae of the *Gonioctena* subgenus *Spartoxena*: description of mature larvae of *G. leprieuri* and *G. aegrota* (Coleoptera: Chrysomelidae: Chrysomelinae)

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**Abstract**—Mature larvae of *Gonioctena leprieuri* (Pic) and *Gonioctena aegrota* (Fabricius) are described and illustrated for the first time, based on specimens collected on *Genista* spp. (Fabaceae) in Spain. A key to known larvae of subgenus *Spartoxena* Motschulsky is provided. Diagnostic characters for the identification of species within this subgenus are shape of labrum, arrangement of microtrichia of epipharynx, shape of tarsal claws, and numbers of tubercles on abdominal segments. Notes on distributions and host plants are provided.

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**Résumé**—On trouvera ici la description, pour la première fois, des larves à maturité de *Gonioctena leprieuri* (Pic) et *Gonioctena aegrota* (Fabricius) à partir de spécimens récoltés sur *Genista* spp. (Fabaceae) en Espagne. Une clé permettra l'identification des larves connues du sous-genre *Spartoxena* Motschulsky. Les caractères diagnostiques qui permettent la séparation des espèces appartenant à ce sous-genre sont la forme du labre, la disposition des microtriches de l'épipharynx, la forme de l'ongle tarsal et le nombre de plaques sclérifiées aux segments abdominaux. Des renseignements sur les distributions et les plantes-hôte sont donnés.

## Introduction

The genus *Gonioctena* Redtenbacher (Coleoptera: Chrysomelidae: Chrysomelinae) is widely distributed in the Holarctic region and contains more than 70 species classified into nine monophyletic subgenera (Mardulyn *et al.* 1997). The subgenus *Spartoxena* Motschulsky comprises eight species recently reviewed by Kippenberg (2001) that are restricted to southwestern Europe and North Africa. Despite this advanced state of knowledge about adults of *Gonioctena* spp., larval stages are still poorly known in the West Palaearctic region (Steinhausen 1996): larvae of only about 22% of taxa within Chrysomelidae and 37% of taxa within Chrysomelinae have been described. Within *Gonioctena*, larvae of only 15 West Palaearctic taxa have been described, and for *Spartoxena*, only a single species is known in the larval stage (Steinhausen 1994). The aims of this paper are (i) to describe the mature larvae of two species belonging to *Spartoxena*, *Gonioctena leprieuri* (Pic) and *Gonioctena aegrota* (Fabricius), and (ii) to provide diagnostic characters allowing identification of the known larvae within this subgenus.

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## Materials and methods

Mature larvae described in this paper were collected along with adults by sweeping and beating their host plants. Larvae were attributed to genus *Gonioctena* and subgenus *Spartoxena* following Steinhausen (1994). The specific identities of larvae were established after determination of adults collected from the same plants because only a single species of the subgenus occurs in each sampled locality. All specimens were collected by A. Baselga and deposited in the collection of the Departamento de Biología Animal, Universidad de Santiago de Compostela, Spain. Larvae were preserved in 70% ethanol. Some specimens were cleared in warm 10% KOH, and teguments, including dissected cephalic and thoracic appendages, were mounted on microscope slides. Slide mounts were prepared using dimethyl hydantoin formaldehyde resin. Drawings were traced from images captured with an Olympus DP11 digital camera attached to an Olympus SZH10 stereoscopic microscope and an Olympus BX41 compound microscope.

The localities listed in the Material examined sections were georeferenced to the Universal Transverse Mercator grid, providing UTM coordinates with a precision of 1 km. A detailed description is provided for *G. leprieuri*, but description of *G. aegrota* consists only of character states that are different from those described for *G. leprieuri*. Morphological terminology was taken from Kimoto (1962) and Cox (1982), and the classification follows that of Kippenberg (2001).

### *Gonioctena (Spartoxena) leprieuri* (Pic), mature larva (Figs. 1–6, 10)

#### Material examined

**SPAIN. León:** Puerto de Ancares-Sierra de Ancares (UTM 29TPH7848), 1700 m, 25.vi.1998, 6 mature larvae. **Lugo:** Tres Bispos-Sierra de Ancares (UTM 29TPH7442), 1500 m, 8.viii.1998, 2 mature larvae. **Ourense:** Cabeza de Manzanca-Pobra de Trives (UTM 29TPG4079), 1600 m, 18.vi.2003, 3 mature larvae; Penapetada-Pobra de Trives (UTM 29TPG3986), 1050 m, 18.vi.2000, 8 mature larvae.

#### Description

Habitus as in Figure 1. Length: 8.9–11.5 mm. Body eruciform, moderately convex, and slightly arched in preserved specimens. Intertubercular plates pale yellow-brown, tubercles pale brown in ventral and dorsal region, dark brown in dorsolateral region, as well as sides of head and pronotum, so that larva appears to have lateral dark stripes in dorsal view. **Head.** Hypognathous, well sclerotized. Light yellow-brown, with large dark brown spot on side of vertex and another on side of frons, sometimes fused, and some small brown dots near center of vertex. Epicranial suture well developed and long, frontal arms distinct, V-shaped, and almost straight. Endocarina present, extending to clypeus. Vertex bearing 5 large primary setae along with many shorter setae on each side. Frons with 5 primary setae and 8–11 slightly shorter setae on each side. Antennae very short and well sclerotized (Fig. 2), 3-segmented: first antennomere highly transverse; second antennomere almost as long as wide, bearing a conical membranous sensillum, 3 minute setae, and 1 placoid sensillum; distal antennomere narrow, subconical, with membranous apex bearing 5 highly minute setae and 1 placoid sensillum. Stemmata arranged in 2 groups, 1 pair located below base of antenna and 2 pairs behind antenna. Clypeus with 3 pairs of setae. **Mouthparts.** Labrum (Fig. 3) bearing 2 pairs of setae on upper surface and 1 pair of placoid sensilla, anterior border with narrow U-shaped notch and 5–7 stout setae on each side. Epipharynx with 2 bands

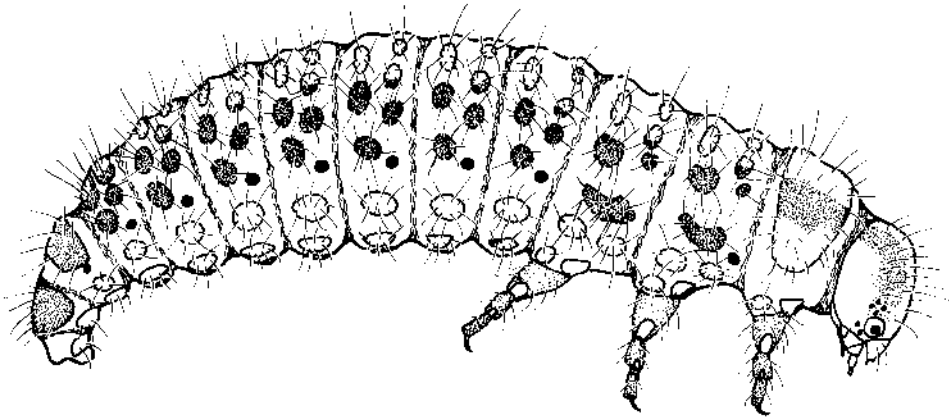


FIGURE 1. Habitus of *Gonioctena leprieuri*, mature larva from Penapetada, Spain. Length = 11.1 mm.

of microtrichia situated laterally to anterior notch (Fig. 4), microtrichia fused together to form ridges of 3–5 denticles. Mandibles symmetrical, 5-toothed, bearing 2 setae on external face and 1 placoid sensillum on dorsal side. Maxillae (Fig. 5): cardo transverse, with 1 seta in external border; stipes elongate, with 2 large setae near base of maxillary palp; mala bearing 15–16 setae on internal margin and apex, basal setae longer than apical setae, microtrichia present between setae; maxillary palpi 4-segmented, first palpomere almost as long as wide, bearing 2 long setae basally and another minute seta apically on external margin, second palpomere transverse with 2 setae on internal face and 1 seta on external side, third palpomere longer than wide, and fourth palpomere conical with 1 minute seta on internal face and membranous apex bearing 10–11 highly minute setae. Labium (Fig. 5) with postmentum membranous, bearing 3 pairs of setae, anterolateral pair very short; prementum with 4 pairs of minute setae, 1 pair posterior and 3 pairs anterior to labial palpi along with 1 pair of placoid sensilla; palpi 2-segmented, first palpomere transverse, distal palpomere conical with membranous apex bearing 10–11 highly minute setae. **Thorax.** All tubercles multisetose (Fig. 10). Prothorax with tubercles D (dorsal), DL (dorsolateral), and EP (epipleural) fused together in a pronotal sclerite, pronotum (D–DL–EP) bearing 10 pairs of primary setae along with many other slightly shorter setae; tubercle P (pleural) with 6–7 setae; ventral region with very slightly sclerotized tubercles, tubercle SS (sternellar) reduced to 2–3 sclerotized spots bearing 1 seta, midventral tubercle ES (eusternal) bearing 6 setae. Meso- and metathorax each with 6 tubercles on each side of dorsal region: Dai (dorsal anterior interior, 5–8 setae), Dae (dorsal anterior exterior, 6–7 setae), Dpi–Dpe (fused dorsal posterior interior and dorsal posterior exterior, 9–13 setae), DLai (dorsolateral anterior interior, 2–5 setae), DLpi (dorsolateral posterior interior, 11–16 setae), and DLae–DLpe (fused dorsolateral anterior exterior and dorsolateral posterior exterior, 12–18 setae); epipleural region with 2 tubercles: EPa (epipleural anterior, 9–13 setae) and EPP (epipleural posterior, 5–7 setae); mesothoracic spiracle isolated from tubercle EPa, located in front of tubercle DLae–DLpe; tubercle P bearing 4–6 setae; tubercles SS and ES reduced to numerous sclerotized dots bearing isolated setae. **Legs.** All pairs similar in size; trochantin located in front of tubercle P, bearing 2–4 minute setae in anterior half; prothoracic trochantin also with a larger seta in posteroventral angle; coxa almost twice as long as wide in lateral view, with 10–13 large setae on dorsal face and 3–4 shorter setae in lateral declivities; trochanter triangular, with 4 setae on ventral side; femur wider apically than basally in lateral view, with 2 setae dorsally, 4–5 setae on ventral face, and 1 placoid sensillum on each lateral side; tibiotarsus twice as long as wide,

bearing 4–5 setae dorsally and 3 ventrally; unguis wide basally, curved apically, with marked tooth and seta on lower side (Fig. 6). **Abdomen.** All tubercles multisetose (Fig. 10). Segments 1–6 each with 6 tubercles on each side of dorsal region: Dai (5–8 setae), Dae (6–11 setae), Dpi (7–11 setae), Dpe (6–10 setae), DLai–DLae (fused dorsolateral anterior interior and dorsolateral anterior exterior, 5–9 setae), and DLpi–DLpe (fused dorsolateral posterior interior and dorsolateral posterior exterior, 7–12 setae); epipleural region with tubercle EP bearing 10–13 setae; spiracle isolated from tubercle EP, located in front of tubercle DLpi–DLpe; tubercle P with 7–10 setae; sternal region presents the following tubercles: PS (parasternal, 5–8 setae, but extremely reduced in segment 1, with only 1–2 setae), SS (4–8 setae), ES (6–10 setae); tubercles SS and ES weakly sclerotized and poorly delimited. Segment 7 with tubercles Dai and Dae fused, and tubercles Dpi and Dpe fused; segments 8 and 9 with all dorsal and dorsolateral tubercles fused, ventral tubercles also fused in segment 9; segment 10 forming anal pseudopod, without dorsal tubercles, ventral tubercles fused.

### Distribution and ecology

*Gonioctena lepriuri* is a montane species restricted to the northwestern regions of the Iberian Peninsula, reaching Sierra de Gredos (central Spain) to the south (García-Ocejo *et al.* 1993). The recorded host plants are *Genista cinerea* (Vill.) D.C. (Fabaceae) (Bechyné 1957 after J Daniel *in litt.*), though this citation seems to be erroneous because this plant does not occur in the northwestern part of the Iberian Peninsula (Talavera 1999). *Genista cinerascens* Langc (García-Ocejo *et al.* 1993), as well as *Genista florida* L. and *Genista obtusiramea* Gay ex Spach (Baselga and Novoa 2000), appear to be the true host plants for this species because the larvae described in this paper were collected on these two latter plants.

### *Gonioctena (Spartoxena) aegrota* (Fabricius), mature larva

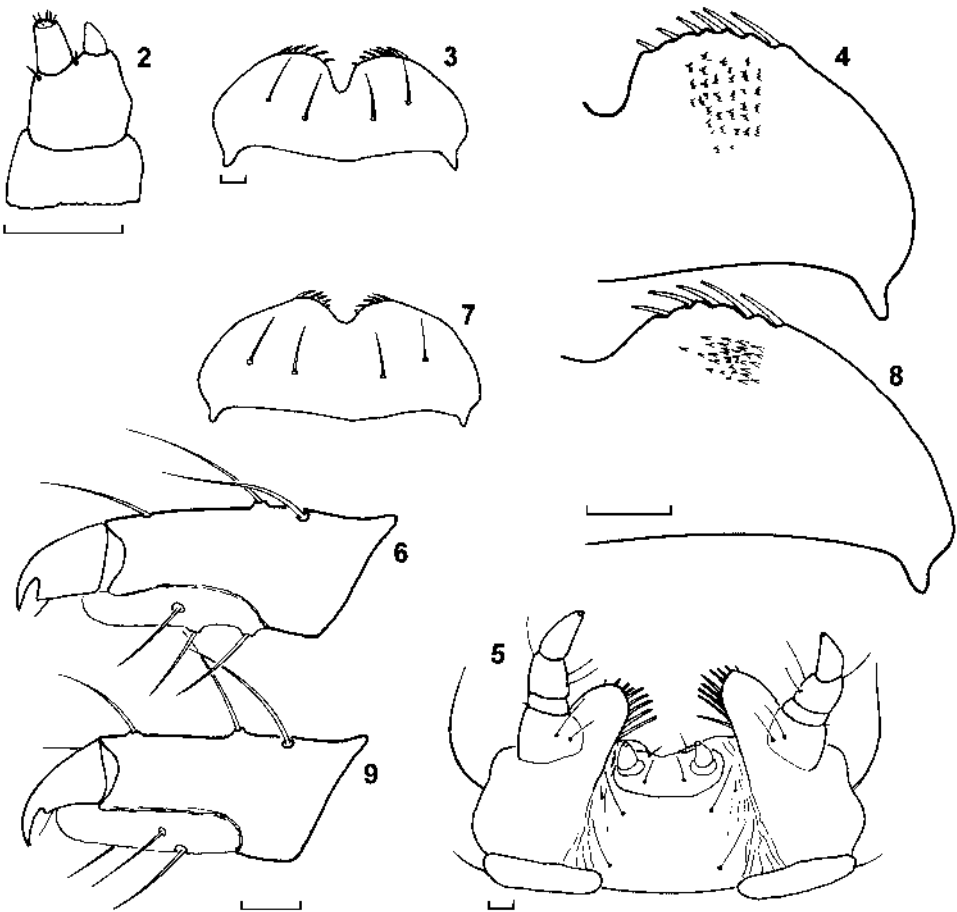
(Figs. 7–9, 11)

### Material examined

**SPAIN. Ourense:** Mendoza-Pobra de Trives (UTM 29TPG4787), 300 m, 18.iv.2003, 2 mature larvae. **Zamora:** Pinilla de Fermoselle (UTM 29TQF1984), 600 m, 3.v.2001, 4 mature larvae; 8.v.2003, 2 mature larvae.

### Description

Length: 9.5–12.4 mm. **Head.** Hypognathous, well sclerotized. Frons with 5 primary setae and 10 shorter setae on each side. **Mouthparts.** Labrum (Fig. 7) bearing 2 pairs of setae on upper surface and 1 pair of placoid sensilla, anterior border with wide V-shaped notch and 5–6 stout setae on each side. Epipharynx with 2 bands of microtrichia situated laterally to anterior notch (Fig. 8), microtrichia mostly isolated (but sometimes paired). **Thorax.** All tubercles multisetose (Fig. 11). Prothorax with tubercle P bearing 5 setae. Meso- and metathorax each with 6 tubercles on each side of dorsal region: Dai (5–6 setae), Dae (5 setae), Dpi–Dpe (8–12 setae), DLai (2–4 setae), DLpi (12–15 setae), and DLae–DLpe (13–16 setae); epipleural region with 2 tubercles: EPa (11 setae) and EPP (5–6 setae); mesothoracic spiracle isolated from tubercle EPa, located in front of tubercle DLae–DLpe; tubercle P bearing 3–5 setae; tubercles SS and ES reduced to numerous sclerotized dots bearing isolated setae. **Legs.** All pairs similar in size; trochantin bearing 1–2 minute setae in anterior half; prothoracic trochantin also with a larger seta in posteroventral angle; coxa with 9–11 large setae on dorsal face and 3–4 shorter setae in lateral declivities; unguis wide basally, slightly curved apically,



FIGURES 2-9. 2-6, *Gonioctena leprieuri*, mature larva from Puerto de Ancares, Spain; 2, antenna; 3, labrum; 4, epipharynx, left side; 5, maxillae and labium; 6, tibiotarsus and unguis, lateral view. 7-9, *Gonioctena aegrota*, mature larva from Pinilla de Fermoselle, Spain; 7, labrum; 8, epipharynx, left side; 9, tibiotarsus and unguis, lateral view. Scale bars = 0.1 mm.

with weak tooth and seta on lower side (Fig. 9). **Abdomen.** All tubercles multisetose (Fig. 11). Segments 1-6 each with 6 tubercles on each side of dorsal region: Dai (4-5 setae), Dac (5-7 setae), Dpi (7-9 setae), Dpe (6-8 setae), DLai-DLac (5-7 setae), and DLpi-DLpe (7-9 setae); epipleural region with tubercle EP bearing 8-11 setae; tubercle P with 6-9 setae; sternal region presents the following tubercles: PS (4-5 setae, but extremely reduced in segment 1, with only 1 seta), SS (5-6 setae), ES (4-8 setae), and a secondary tubercle as1 bearing 1 minute seta in front of tubercle SS; tubercle ES fragmented in 2-5 sclerotized spots.

### Distribution and ecology

*Gonioctena aegrota* is distributed in the Iberian Peninsula and the Rif mountains in northern Morocco (Bourdonné and Doguet 1979). The Iberian range reaches central and northeastern Spain (Kippenberg 2001) to the north. Present records extend the distribution to the northwestern part of the Iberian Peninsula, reaching the warm localities of Sil Valley in Galicia. The recorded host plants are several species of Fabaceae

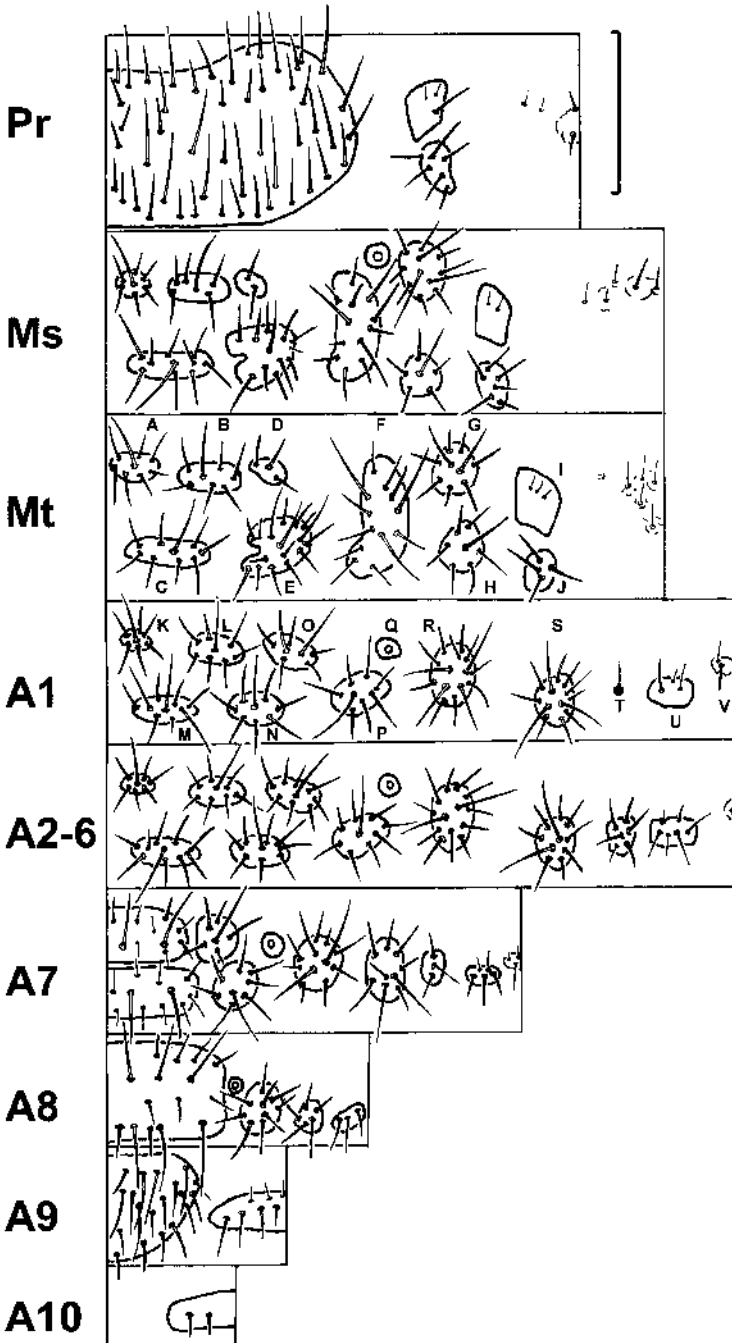


FIGURE 10. *Goniectena leprieuri*, mature larva from Puerto de Ancares, Spain: location of tubercles and body chaetotaxy, right side. Pr, prothorax; Ms, mesothorax; Mt, metathorax; A1–A10, abdominal segments 1–10. Thoracic tubercles: A, Dai; B, Dae; C, Dpi–Dpe; D, DLai; E, DLpi; F, DLae–DLpe; G, EPa; H, Epp; I, trochantin; J, pleural. Abdominal tubercles: K, Dai; L, Dae; M, Dpi; N, Dpe; O, DLai–DLae; P, DLpi–DLpe; Q, spiracle; R, EP; S, pleural; T, PS; U, SS; V, ES. See text for definition of terms. Scale bar = 1.0 mm.

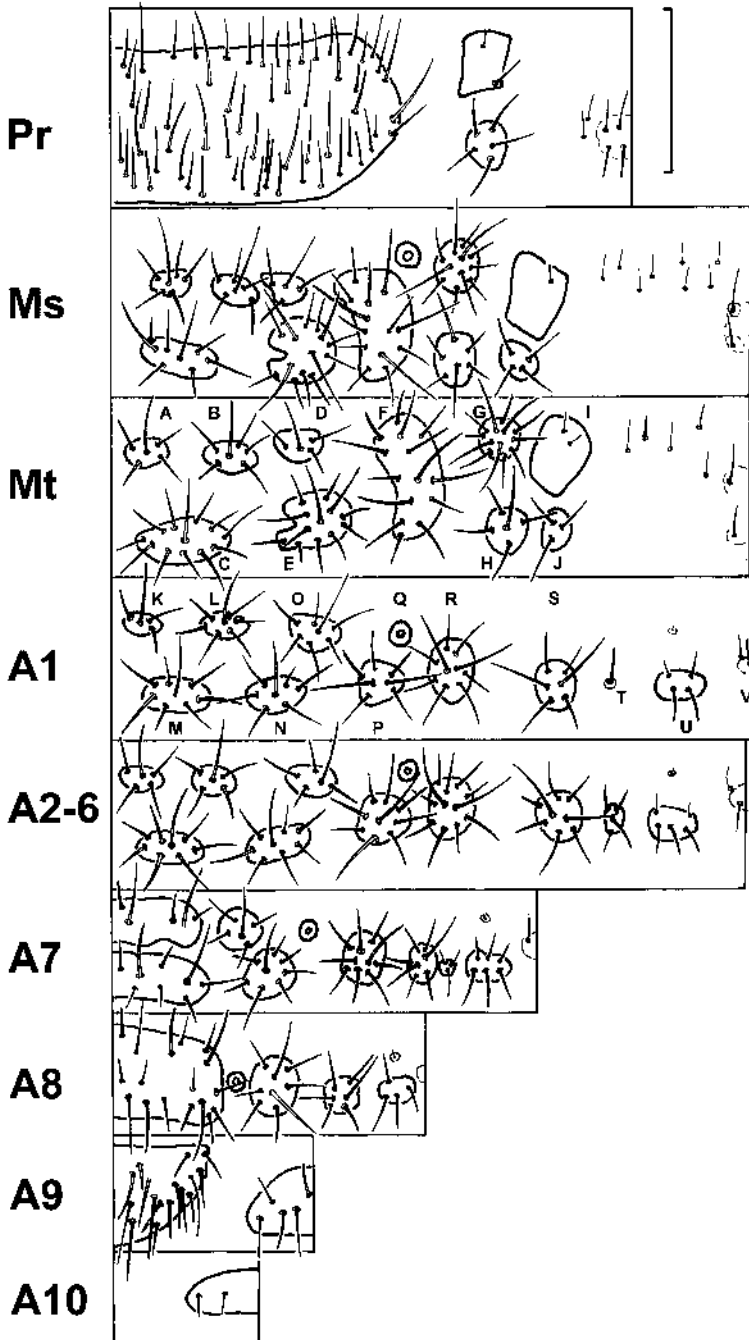


FIGURE 11. *Gonioctena aegrota*, mature larva from Pinilla de Fermoselle, Spain: location of tubercles and body chaetotaxy, right side. See Figure 10 for further explanation. Scale bar = 1.0 mm.

belonging to the genera *Cytisus* Desf. (= *Sarothamnus* Wimm.), *Genista* L., *Retama* Raf. (= *Lygos* Adans.), and *Ulex* L. (Bourdonné and Doguet 1979; Kippenberg 2001). The larvae described in this paper were collected on *Genista hystrix* Lange.

## Discussion

Mature larvae of *G. leprieuri* and *G. aegrota* fit the definition of the genus given by Cox (1982) and Steinhausen (1994) by the following combination of characters: body dorsally not strongly convex; labrum with 2 pairs of setae; pronotum bearing a high number of setae on disc; dorsolateral tubercles of mesothorax, metathorax, and abdomen without eversible glands; and tarsal claws toothed on lower side. In the West Palaearctic region, the larval stages of 15 species of *Gonioctena* are known (Steinhausen 1996), but among them only *G. gobanzi* (Reitter) belongs to subgenus *Spartoxena*. No description of the larva of *G. gobanzi* is available, but the species is included in Steinhausen's (1994) key for Central European leaf beetles. *Gonioctena leprieuri* and *G. aegrota* key out with *G. gobanzi* because the three species share the following features, which may be considered diagnostic for subgenus *Spartoxena*: frons with 2 dark spots and 5 primary setae along with more than 8 slightly shorter setae on each side, abdomen with dorsal tubercles not fused, the interior tubercles not pigmented.

For identification of the three known larvae belonging to subgenus *Spartoxena*, only Figure 216 of Steinhausen (1994) can be used to distinguish *G. gobanzi* from the other two species. In the cited illustration, a tubercle is figured behind the spiracle. The position of this sclerite is not clear in the figure, and Steinhausen does not provide any additional information, but it is probably tubercle DL<sub>pe</sub>, isolated from tubercle DL<sub>pi</sub> in *G. gobanzi* instead of fused with tubercle DL<sub>pi</sub> as in *G. leprieuri* and *G. aegrota*. Though the identity of the tubercle cannot be confirmed, three dorsolateral tubercles are present in *G. gobanzi*, according to Steinhausen (1994, p 276, Fig. 216), whereas only two are present in *G. leprieuri* (Fig. 10) and *G. aegrota* (Fig. 11). These latter two taxa can be easily distinguished by the shape of the tarsal claw and the shape of the labrum. The tarsal claw has a marked tooth in *G. leprieuri* (Fig. 6) but a poorly developed tooth in *G. aegrota* (Fig. 9): the labrum has a narrow U-shaped notch in *G. leprieuri* (Fig. 3) but a wide V-shaped notch in *G. aegrota* (Fig. 7). The fields of microtrichia situated laterally to the anterior notch of the epipharynx are another good diagnostic character, though observation of this feature requires dissection and slide mounting. In *G. leprieuri*, microtrichia are arranged in ridges of 3–5 denticles (Fig. 4), whereas they are mostly isolated or sometimes paired in *G. aegrota* (Fig. 8).

## Key to larvae of subgenus *Spartoxena*

1. Abdominal segments 1–6 with three dorsolateral tubercles on each side (Steinhausen 1994: 276, Fig. 216). Southern Alps . . . . . *G. gobanzi*
- Abdominal segments 1–6 with two dorsolateral tubercles on each side (Figs. 10, 11) . . . . . 2
2. Tarsal claws with a distinct tooth in ventral side (Fig. 6). Labrum with a narrow U-shaped notch (Fig. 3). Microtrichia of epipharynx fused together to form ridges of 3–5 denticles (Fig. 4). Northwest of Iberian Peninsula . . . . . *G. leprieuri*
- Tarsal claws with a poorly developed tooth in ventral side (Fig. 9). Labrum with a wide V-shaped notch (Fig. 7). Microtrichia of epipharynx mostly isolated or sometimes paired (Fig. 8). Iberian Peninsula and northern Morocco . . . . . *G. aegrota*



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