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DESCRIPTION OF THE LARVA OF *AGRILUS ANTIQUUS CROATICUS* (COLEOPTERA, BUPRESTIDAE)

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Description of the Larva of *Agrilus antiquus croaticus* (Coleoptera, Buprestidae). Prokhorov, A. V., Vasilyeva, Ju. S. — The mature larva of *Agrilus antiquus croaticus* Abeille de Perrin, 1897 from the stalks of *Cytisus ruthenicus* and *Genista* sp. (Leguminosae) in Kyiv and Kherson Regions (Ukraine) is described. According to the structure of labrum and location of microspinulae on inner side of maxillae, larva is attributed to *Agrilus ater* species-assemblage.

Key words: Coleoptera, Buprestidae, *Agrilus antiquus croaticus*, larva.

Introduction

The larvae of the buprestid beetles of the genus *Agrilus* (Coleoptera, Buprestidae) are still poorly studied in the world, but in Europe, larvae of most species are known. Of the 41 species occurring in Ukraine, the larvae remained unknown or undescribed for 8 species. The mature larva of *Agrilus antiquus croaticus* Abeille de Perrin, 1897 found in the stalks of *Cytisus ruthenicus* Fisch. ex Wolf., 1824 and *Genista* sp. (Leguminosae) remained by far undescribed, though it has been known to feed in lignified stalks and roots of the leguminous plants, *Cytisophyllum*, *Cytisus*, *Genista* and *Lembotropis* (Jendek & Poláková, 2014).

Material and methods

All the studied specimens are deposited in I. I. Schmalhausen Institute of Zoology, National Academy of Sciences of Ukraine, Kyiv.

Terminology used in this work generally follows that by Alexeev (1960, 1981), Volkovitsh (1979), Volkovitsh, Hawkeswood (1990), and Chamorro et al. (2012).

Study of the morphological structures of the larva was carried out using microscopes MBI-3 and MBS-9. All photos were made by A. V. Prokhorov using Canon PowerShot A640 camera mounted on the microscope Zeiss Stemi 2000-C, as well as the Olympus C-4040ZOOM camera with software Olympus DP-Soft (Version 3.2) mounted on the Olympus CX-41 microscope.

Agrilus antiquus croaticus Abeille de Perrin, 1897

Material studied. Ukraine: Kyiv Region, Makariv District, 7 km NW Kodra, 50°37' N 29°28' E, 4.04.2010, in stalk of *Cytisus ruthenicus*, 1 larva; same locality, 17.04.2011, in stalk of *Cytisus ruthenicus*, 1 prepupa; same locality, 24.04.2011, in stalk of *Cytisus ruthenicus*, 1 larva; Kherson Region, Hola Prystan District, Black Sea Biosphere Reserve, "Solonoozerny", 46°27' N 31°58' E, in stalk of *Genista* sp., 4 larvae and 3 prepupa (A. Prokhorov).

Measurements. Length 13 and 20 mm; width of prothorax of the biggest larva 2.35 mm (larvae from *Cytisus*); length 5.7–15 mm, width of prothorax 0.9–2.0 mm (larvae from *Genista*).

Larva of instar IV. Body of usual agrilinoïd type (fig. 1) with slightly enlarged thoracic segments, whitish flattened body with yellowish protoracic plates, weakly sclerotized pronotal and prosternal grooves, spiracles and heavily sclerotized terminal

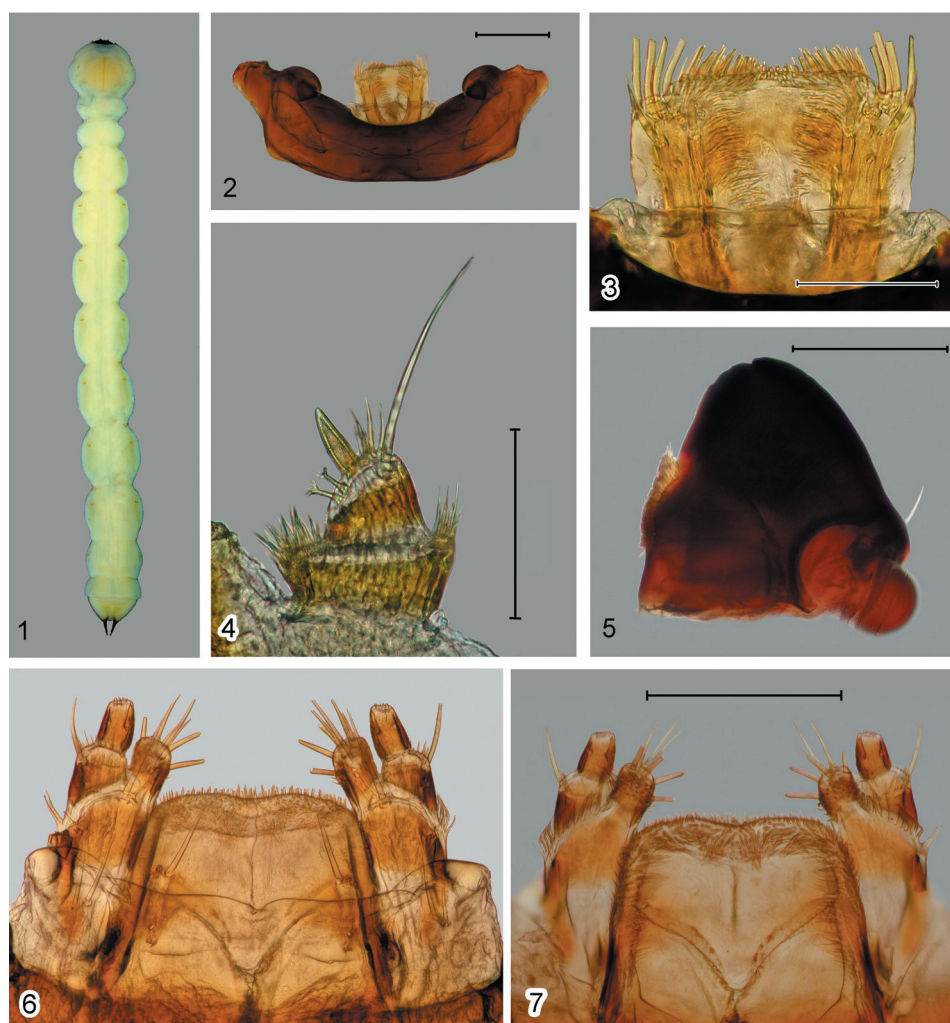


Fig. 1–7. *Agrilus antiquus croaticus* mature larva: 1 — habitus, dorsal view; 2 — epistome, dorsal view; 3 — labrum, dorsal view; 4 — right antenna; 5 — right mandible; 6 — labio-maxillary complex, external surface; 7 — prementum, internal surface. Scale bars: 2, 5, 7 — 0.2 mm; 3, 4 — 0.1 mm.

processes. Each segment of the body with sparse short pale setae (their average length is not less than the diameter of abdominal spiracles).

Head and mouthparts. Epistome (fig. 2) strongly transverse, with emarginate anterior and arcuately projecting posterior margin, 4.5–4.6 times as wide as long; latero-basal angles obtuse. Two pair of epistomal sensilla located medially forming a trapezoid: each pair consists of a single anterior sensillum and two sunken posterior basiconic sensilla in a simple pit. Anteclypeus membranous and glabrous, with anterior margin almost straight.

Labrum (fig. 3) rectangular, about 2 times as wide as long, with straight anterior margin, emarginated anterolateral corners and nearly straight, subparallel lateral sides; anterior margin bears numerous short truncate bristles (which are shorter in central part); median sensilla of palatine sclerites of labrum consist of a long subapical seta and two subbasal campaniform sensilla; anterolateral sensilla of palatine sclerites of labrum with long dorsal anterior and very short dorsal posterior setae, 4 flattened blunt anterior ventral setae arranged linearly (basal part of the 1st ventral seta distinctly curved, stronger than the rest). Epipharynx densely covered with short blunt bristles arranged along median branches of palatine sclerites.

Antennae (fig. 4) two-segmented, 1st segment subcylindrical, at least 2 times as wide as long, with sclerotized sides, fringe of microspinulae around apex (anterior margin) and campaniform sensillum at lower half of internal margin; the second segment subcylindrical, about as long as wide at base, with very long trichosensillum (its length exceeds both antennal segments length), prominent and pointed sensory appendage (its length is almost the same as the length of the second segment), 2 palmate sensilla, 2 basiconic sensilla at base of sensory appendage and tuft of microspinulae apically.

Mandibles (fig. 5) triangular, heavily sclerotized, with two blunt apical teeth almost serrated, internal margin with penicillum, consisting of numerous microtrichia, external margin with seta located above dorsal articulation.

Labio-maxillary complex (figs 6, 7). Maxillae with membranous cardo bearing latero-basal sclerite and 2 rather long setae; stipes moderately sclerotized with long seta at base of mala and campaniform sensillum just below seta and short seta laterally, with sparse cilia along anterior margin. First segment of maxillary palpi slightly longer than wide with long seta near anterolateral margin and campaniform sensillum below long seta (approximately at the middle of the lateral margin of segment). Second segment 1.5–1.6 times as long as wide, quite heavily sclerotized with campaniform sensillum along lateral margin, curved sensillum along internal margin, apically with sensory cones. Sclerotized mala about 1.6–1.7 times as long as wide with basiconic sensillum medially, 3 long setae externally, 4 short thick blunt setae internally and 2 very short setae (or large basiconic sensilla) between them. Internal surface of mala under thick blunt setae with curved cilia. Labium: prementum (figs 6, 7) almost square, anterior margin with a small notch in the middle and rounded lateral corners. Externally (ventrally) with dense and short microsetae forming microsetal area along anterior margin, posterior border of this area slightly convex, extending about 1/3 distance from anterior margin to base of apical seta of corner sclerites of prementum. Each corner sclerite bearing 2 basal sensilla (basiconic and campaniform), 4 apical cam-

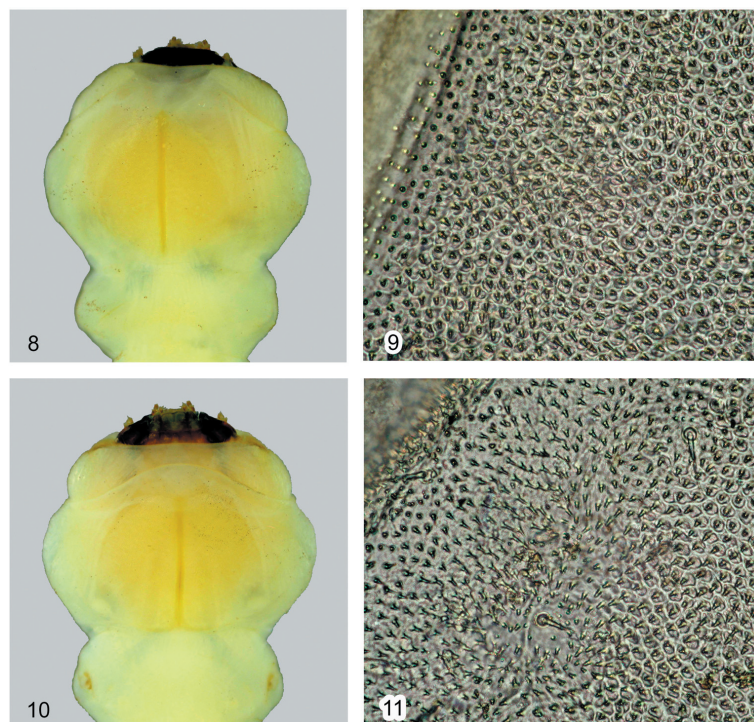


Fig. 8–11. *Agrilus antiquus croaticus* mature larva: 8 — pronotal plate of thorax; 9 — microdenticles of pronotal plate; 10 — prosternal plate of thorax; 11 — microdenticles and microspinulae of prosternal plate.

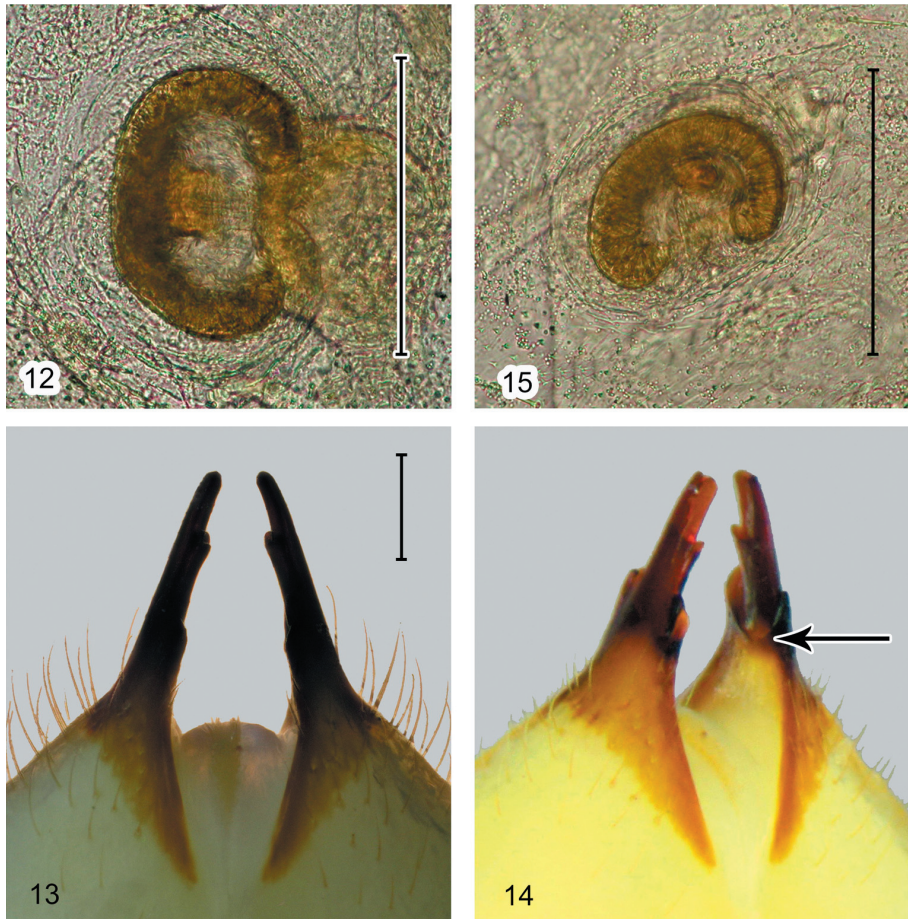


Fig. 12–15. *Agrilus antiquus croaticus* mature larva: 12 — mesothoracic spiracle; 13 — terminal processes of anal segment, ventral view; 14 — terminal processes, ventro-lateral view (arrow shows emargination of basal part); 15 — abdominal spiracle (segment 2). Scale bar 0.2 mm.

paniform sensilla and apical seta extending anterior margin of prementum. Hypopharynx with microsetae along antero-lateral corners. Postmentum glabrous.

Thorax. Prothorax feebly expanded, 1.3 times as wide as long, 1.2 times wider than abdominal segments and 1.3 times wider than meso- and metathorax; length of prothorax is equal to length of subsequent segments altogether. Meso- and metathorax of the same length. Pronotal plate (fig. 8) rounded with very weak pigmentation, completely covered with heavily sclerotized microdenticles (fig. 9) situated on small rounded tubercles; straight pronotal groove yellowish, weakly uniformly sclerotized, barely widened anteriorly. Prosternal plate (fig. 10) more rounded with pigmentation slightly better expressed, prosternal groove in the middle part more extensive yellowish brown. Prosternal plate covered with stronger developed microdenticles and microspinulae with sparse setae among them (fig. 11). Mesothoracic spiracles (fig. 12) of the agriloid circular type, heavily sclerotized, 1.5 times as long as wide, located on the ventro-lateral side of mesothorax.

Abdomen. Segments 1–7 almost equal in length and width (segment 1 slightly shorter than others), nearly as long as wide. Segment 8 shorter than previous segments, 1.6 times as wide as long. Segments 1–8 dorsally and ventrally bearing shallow lateral longitudinal depressions. Segment 9 shorter than previous segment, 3 times as wide as long, its lateral sides with quite long setae. Segment 10 (anal segment,) deltoid, bearing long setae laterally, zones of microspinulae around anal opening, apically with heavily sclerotized paired termi-

nal processes (fig. 13). Some of long setae reaching the middle part of terminal processes. Basal part of terminal processes 1.9 times wider than middle part; inner edge of basal part distinctly emarginate (fig. 14). Middle part distinctly narrowing to the apex, 1.5 times as long as wide, 1.5 times as wide at base as at apex. The apical part 1.7 times as long as wide. Width of basal part of terminal processes 1.4 times exceeding the length of its apical part. Abdominal spiracles (fig. 15) located on segments 1–8 dorso-laterally, similar to mesothoracic spiracles in shape but have a smaller size and number of trabeculae, pigmentation less expressed.

D i a g n o s i s. According to recent studies (Volkovitsh, Hawkeswood, 1990; Chamorro et al., 2012) the larva corresponds to *Agrilus ater* assemblage (labrum with dense bristles along anterior margin, and internal surface of the maxillae densely covered with cilia). But *A. ater* larva has a bifurcated pronotal groove posteriorly and strongly expanded prosternal groove anteriorly. This confirms the subgeneric separation of the genus and shows that *A. antiquus croaticus* belongs to the subgenus *Spiragrilus* Alexeev, 1998. The larvae are known for *A. (S.) constantini* Obenberger, 1927, *A. (S.) hyperici* (Creutzer, 1799) and *A. (S.) macroderus* Abeille de Perrin, 1897 (Alexeev, 1981). *A. antiquus croaticus* differs from the larvae of those species by the following characters:

1) posterior border of microsetal area along anterior margin of prementum extending about 1/3 distance from anterior margin to base of apical seta of corner sclerites of prementum (2/3 in *A. constantini*, 3/4 in *A. macroderus*);

2) middle part of terminal processes 1.5 times as long as wide (1.3 times as wide as long in *A. constantini*, about same length and width in *A. macroderus*);

3) middle part of terminal processes 1.5 times as wide as apical part (about 2 times in *A. constantini*, 1.4 times in *A. macroderus*);

4) apical part of terminal processes 1.7 times as long as wide (1.8 times in *A. constantini*, 1.6 times in *A. macroderus*);

5) some setae on anal segment reaching the middle part of terminal processes (in *A. constantini* reaching the half of the middle part, in *A. macroderus* not reaching the middle part).

In this species group, *A. antiquus croaticus* larva is most similar to that of *A. hyperici* in the structure of parts of terminal processes. In the key to *Agrilus* larvae, these two species can be given as follows:

1. Basal part of terminal processes at least 1.9 times as wide as its middle part, which is almost merging with base of apical part; apical part 1.2–1.7 times as long as wide. 2
- Basal part of terminal processes at most 1.5 times as wide as its middle part, which is noticeably wider than apical part; apical part 1.8–2 times as long as wide. other species
2. Basal part of terminal processes 1.9 times as wide as middle part; middle part distinctly narrowing to the apex, 1.5 times as long as wide, its width at the base 1.5 times the width of apical part. Apical part 1.7 times as long as wide, its width at the base is 1.4 times the length of apical part. Pronotal groove barely widened anteriorly, uniformly weakly sclerotized. Prosternal groove not widened, in the middle part more extensive yellowish brown. Some of long setae on anal segment of abdomen reaching the middle part of terminal processes. 20 mm. On *Cytisus* spp., *Genista* spp. *A. antiquus croaticus*
- Basal part of terminal processes more than 2 times wider than middle part, which is almost parallel sides. Apical part 1.2–1.3 times as long as wide, its width at the base is 2–2.1 times the length of apical part. Pronotal groove widened anteriorly, distinctly sclerotized only in anterior half, yellowish white in posterior half. Prosternal groove brightly colored only in roundly widened apical part. Long setae on anal segment of abdomen do not reaching the middle part of terminal processes. 9–12 mm. On *Hypericum* spp. *A. hyperici*

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