

# ON THE LARVAL MORPHOLOGY OF *APHODIUS BOREALIS* GYLLENHAL AND *A. CORVINUS* ERICHSON (COLEOPTERA: SCARABAEIDAE)

A. V. FROLOV<sup>1</sup> and A.V. IVANOV<sup>2</sup>

<sup>1</sup>Zoological Institute, Russian Academy of Sciences, Universitetskaya nab. 1, St.Petersburg 199034, Russia. E-mail: avfrolov@mail.ru

<sup>2</sup>Institute of Plant and Animal Ecology, Uralsk Branch of Russian Academy of Sciences, ul. 8-Marta, 202, 620044 Ekaterinburg, Russia. E-mail: alexander.ivanov@usu.ru

**Abstract.**— Larvae of two *Aphodius* Illiger species, *A. borealis* Gyllenhal and *A. corvinus* Erichson, which feed on deer and elk dung in European forests, are described and illustrated.



**Key words.**— Scarabaeidae, dung beetles, *Aphodius*, larvae, Europe.

Larvae were reared in the laboratory from eggs laid by the identified adults collected in vicinity of Kamenyuki village in “Belovezhskaya puscha” National Park in April, 1998. Methods of preparation and examination of larvae follows Frolov (2000).

*Aphodius (Planolinus) borealis* Gyllenhal, 1827  
(Figs 1, 3–7)

**Description.** Third-instar larva. Head width 1.20–1.29 mm, length (without clypeus and labrum) 0.93–1.70 mm. Head strongly shining, smooth. Coloration of head yellowish-brown with darker area on epicranial sclerites and frons near basal membrane of antennae (Fig. 1). Apex of frons lighter. Epicranial sclerites with distinct pattern of small light maculae and with narrow dark strip along epicranial suture. Frontal sutures appear as light lines. Epicranial suture darkened. Each epicranial sclerite with 8 relatively long setae with definite position: 3 near epicranial suture of which one is longer than others, 4 in genal area, and 1 in the center. Short setae in temporal area without definite position. Frons with 5 pairs of setae: 2 pairs of short setae in center, 1 short setae near each frontal suture, and 2 pairs of long setae anteriorly. Center of frons with 2 parallel rows of fossae, 4 fossae in each row; in most individuals, margins of fossae indistinct. Clypeus trapezoidal, without swelling in central part, light-brown, lighter distally, with 2 pairs of short setae and a pair of long setae situated in a transverse row. Clypeus width 0.56–0.61 mm, length 0.17–0.20 mm.

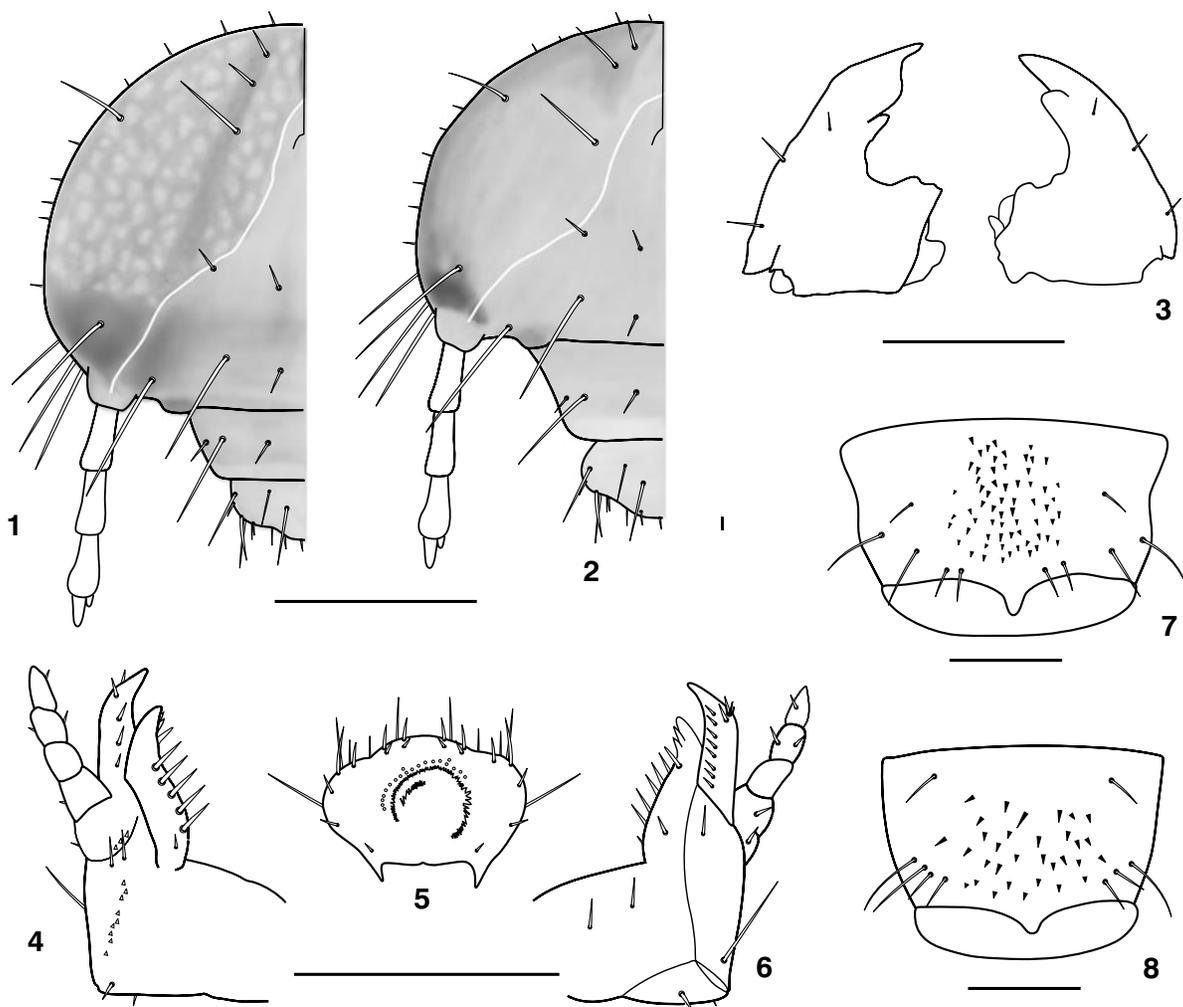
Antennae pale yellowish-brown, semitransparent. Antennal segments 1–3 of equal length, segment 4 short, conical. Labrum (Fig. 5) indistinctly three-lobed, yellowish-brown, with 28 setae: 2 long and 16 short setae on

anterior margin, 2 long setae dorso-laterally, 4 short setae ventro-laterally, 4 long setae dorsally. Labrum width 0.34–0.37 mm. Mandibles pale brown, strongly sclerotized apically and nearly black, with 3 short setae laterally (Fig. 3). Left mandible slightly longer than right. Maxillae (Figs 4, 6) symmetrical, yellowish. The number of setae and stridulatory teeth varies slightly in different specimens, and often on left and right maxillae in single specimens. Cardo with 4 short setae: 2 on ventral side and 2 on lateral side near base of stipes. Ventral side of stipes with long setae proximally and relatively short setae distally. Dorsal side of stipes with 7–9 stridulatory teeth and 2 short setae near base of palpifer; palpifer with 3 stridulatory teeth. Maxillary palpi with 4 segments, 1 seta on segments 1 and 4, 2 setae on segment 3. Galea with a row of 8–10 short setae on ventral side and 5–6 longer setae on dorsal side and apex; 1 short seta present on dorsal side proximally. Dorsal surface of lacinia with 5 long, thick setae along medial margin; ventral side with relatively long seta apically. Base of lacinia with 1 short seta dorsally and 1 seta ventrally. Apex of lacinia tridentate.

All legs nearly the same in length and chaetotaxy; fore legs slightly shorter than others. Each leg with 37 setae: coxa with 3 setae, trochanter with 7 setae of which one is very long, femur with 11 setae, tibia with 14 setae and tarsus with 2 setae.

Lateral bulges of the abdomen with 2 setae. Anal sternite with 53–75 equal spines (Fig. 7); spines flat and acute towards apex. Lower anal lobe sinuate in the middle and rounded at sides.

Younger instar larvae differ from the third-instar larva in lighter head coloration, lesser pronounced head pattern, and lesser size.



Figures 1–8. Larvae. 1, 3–7 *A. borealis*; 2, 8 *A. corvinus*. (1, 2) Head; (3) left and right mandibles in dorsal view; (4, 6) maxillae (4 - dorsal view, 6 - ventral view); (5) labrum in ventral view; (7, 8) anal sternite. Scale 0.5 mm.

Second-instar. Head width 0.77–0.81 mm, length 0.60–0.61 mm; clypeus width 0.40–0.47 mm, length 0.10–0.16 mm; labrum width 0.19–0.24 mm.

First-instar. Head width 0.61–0.66 mm, length 0.44–0.47 mm; clypeus width 0.29–0.31 mm, length 0.07–0.08 mm; labrum width 0.16–0.17 mm.

**Material examined.** Third-instar – 8 exx., second-instar – 3 exx., first-instar – 3 exx.

***Aphodius (Parammoecius corvinus)* Erichson, 1848**  
(Figs 2, 8)

**Description.** Third-instar larva. Head width 1.19–1.24 mm, length (without clypeus and labrum) 0.85–1.86 mm. Head shining, smooth, weakly-sculptured. Coloration of head yellowish-brown with darker macula on each epicranial sclerite near basal membrane of antenna and indistinct darker area near epicranial suture (Fig. 2). Frontal sutures appear as thin light lines. Epicranial

suture darkened. Each epicranial sclerite with 8 relatively long setae with definite position: 3 near epicranial suture of which one is shorter than the others, 4 in genal area, and 1 in the center. Short setae in temporal area without definite position. Frons with 5 pairs of setae: 2 pairs of short setae in the center, 1 short setae near each frontal suture, and 2 pairs of long setae anteriorly. Center of frons with 2 parallel rows of fossae, with 4 fossae in each row; in most individuals margins of fossae indistinct. Clypeus trapezoidal, without swelling in central part, light-brown, lighter distally, with 2 pairs of short setae and a pair of long setae situated in a transverse row. Clypeus width 0.61–0.64 mm, length 0.17–0.20 mm.

Antennae pale yellowish-brown, semitransparent. Antennal segments 1–3 of equal length, segment 4 short, conical. Labrum indistinctly three-lobed, yellowish-brown, with 28 setae: 2 long and 16 short setae on anterior margin, 2 long setae dorso-laterally, 4 short setae ventro-laterally, 4 long setae dorsally. Labrum width

0.37–0.39 mm. Mandibles pale brown, strongly sclerotized apically and nearly black, with 3 short setae laterally. Left mandible slightly longer than right. Maxillae symmetrical, yellowish. Cardo with 4 short setae: 2 on ventral side and 2 on lateral side near base of stipes. Ventral side of stipes with long setae proximally and relatively short setae distally. Dorsal side of stipes with 7–9 stridulatory teeth and 2 short setae near base of palpifer; palpifer with 1–2 stridulatory teeth. Maxillary palpi with 4 segments, 1 seta on segments 1 and 4, 2 setae on segment 3. Galea with a row of 11–13 short setae ventrally, 5 longer setae on dorsal surface and apex and 1 short seta on dorsal side proximally. Dorsal surface of lacinia with 5 long, thick setae along medial margin; ventral surface with relatively long seta apically. Base of lacinia with 1 seta dorsally and 1 seta ventrally. Apex of lacinia tridentate.

All legs nearly the same in length and chaetotaxy; fore legs slightly shorter than others. Each leg with 37 setae: coxa with 3 setae, trochanter with 7 setae of which one is very long, femur with 11 setae, tibia with 14 setae and tarsus with 2 setae.

Lateral bulges of the abdomen with 2 setae. Anal sternite with 30–40 equal spines (Fig. 8); spines flat and acute towards apex. Lower anal lobe sinuate in the middle and rounded at sides.

Younger instar larvae differ from the third-instar larva in lighter head coloration, lesser pronounced head pattern, and lesser size.

Second-instar. Head width 0.79–0.87 mm, length 0.53–0.63 mm; clypeus width 0.42–0.46 mm, length 0.13–0.16 mm; labrum width 0.24–0.26 mm.

First-instar. Head width 0.56–0.57 mm, length 0.36–0.40 mm; clypeus width 0.29–0.30 mm, length 0.07–0.09 mm; labrum width 0.16–0.19 mm.

**Material examined.** Third-instar – 6 exx., second-instar – 4 exx., first-instar – 3 exx.

**Notes.** Larvae of the two species are similar in size, body shape, head and mouthparts proportions and chaetotaxy, but they can be separated from each other by the coloration and pattern of the head capsule, by the number of setae on ventral side of galea, and by the number of spines on anal sternite.

## ACKNOWLEDGEMENTS

The authors are very indebted to Dr. Jan Vitner (Praha) and Dr. Frank-Thorsten Krell (London) for valuable suggestions on the early version of the manuscript and to Dr. Paul Lago (University of Mississippi) for linguistic review of the text.

## REFERENCE

- Frolov, A.V. 2000. [Descriptions of the *Aphodius sticticus* Panzer and *A. punctatosulcatus* Sturm larvae (Coleoptera, Scarabaeidae)]. Entomologicheskoe obozrenie. 79, 3: 619–624 (in Russian).

Received: April 20, 2001  
Accepted: August 8, 2001