On the Larval Morphology of Two Species of *Aphodius* (Coleoptera, Scarabaeidae)*

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**Abstract.** The principal morphological features of the third instar of *Aphodius rectus* Motschulsky and *A. erraticus* Linnaeus are described. These features are the structure and chaetome of the epicranium, structure of mouthparts, and setation of the anal sternite.

**Key words:** Coleoptera; Scarabaeidae; *Aphodius*; morphology.

The diagnostic characters of the larvae of *A. rectus* are the reticulum of pale polygonal pleural sclerites, and two pairs of lateral setae of the clypeus of different length. Diagnostic characters of larva of *A. erraticus* are the complex relief of the clypeus, elongate shape of frontal pits of the 1st pair, groove between lateral pits, and situation of pits of the 2nd-4th pairs in the form of a V.

The morphology of preimaginal stages is known in no more than 15% of species of Scarabaeidae. Larvae of the agricultural pests are better known, whereas small coprophagous species of the subfamily Aphodiinae are poorly investigated. Thus, larvae of the large genus *Aphodius* III. have been described for more than 25-30 species (about 2.5% of the world fauna). Because of systematics of the subfamily in general and of the genus *Aphodius* III. in particular are not completely worked out and is understood by different researchers differently, the investigation and use for taxonomic purposes of new characters, particularly morphological characters of larvae are very important. The purpose of this work is to fill some gaps in this area.

In the designation of groups of epicranial setae and naming central frontal pits I used the work of Medvedev (1952)1.

*Aphodius rectus* Motsch.

Nine larvae not distinguishable from each other by morphological characters were collected in September 1992, in the vicinity of Korfovskiy, Khabarovsk Terr. Under laboratory conditions beetles were reared out of 3 of them. They were determined as *Aphodius rectus* Motsch. The other 6 larvae were used as material for this paper. The general body shape is typical of larvae of the genus *Aphodius* III., the body is C-shaped, and slightly flattened on posterior end.

Head (Fig. 1, 1) brown and pale-colored. Surface of head capsule shiny, punctate, pleural sclerites with distinct pattern of pale polygons forming a reticulum. Width of head capsule 1.87 ± 0.11, length (projected and without labrum) 1.62 ± 0.10 mm.

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Fig. 1. *Aphodius rectus* Motsch: 1) head, general view; 2, 3) left and right mandibles in dorsal view; 4, 5) right and left mandibles in ventral view; 6, 7) left maxilla in ventral and dorsal views; 8) epipharynx; 9) anal sternite. Scale (mm): 1, 9) 1; 2-8) 0.5.
Anteriorly, pleural sclerites, between apex of frontal triangle and 4th pair of frontal pits with 1 long seta on each sclerite, and laterally with 1 small seta on each sclerite. Each pleural sclerite, near basal membrane of antennae, with 4 long genal setae. Approximately in center of each pleural sclerite with 1 relatively long seta. Other setae of pleural sclerites short, but without any certain number or position.
Height of frontal triangle considerably (twice) as long as epicranial suture. Apex of frontal triangle rounded. Frons with 4 pairs of central frontal pits. Pits of 1st pair (forming anterior margin of frons) and 4th pair rather large, distinct, and slightly flattened in center. Pits of 2nd and 3rd pairs small, in common depression and often not distinctly separated from each other. All 4 pits on each side in common irregularly shaped depression extending longitudinally. Presence of central frontal pits may be considered a specific character of *Aphodius* and close genera, and their actual number and shape are used for diagnostics of many species. However, the degree of their development often strongly varies. Frontal pits of *A. rectus* in clearest most simplified form are shown in Fig. 1, 1.

Frons with 10 setae; 2 long setae in lateral pits; pits of 1st and 4th pairs bearing single short seta each. Each anterior corner of epistome, near basal membrane of antennae (anterolateral frontal) with 1 long seta. Small depressions near frontal sutures at projection across 4th pair of frontal pits (sutural frontal) with 1 short seta in each.

Clypeus trapezoid, with slightly darkened anterior and lateral margins and distinct depressions in middle of lateral margins. Chaetome of clypeus consisting of 3 pairs of setae, 1 pair of central setae and 2 pairs of lateral setae; lateral setae in depressions, including 2 long setae and 2 very small setae. Labrum not clearly tri-lobate, more sclerotized on margins, and without distinct depressions.

Mandibles (Figs. 1, 2-5) relatively strongly sclerotized, darker than general background of head, and in apical part almost black. Left mandible slightly more powerful and longer than right mandible, on apical part of inner margin bearing 3 teeth, 1 of which closer to base and strongly rounded. In recently molted larva, apical teeth sharp and relatively long. In feeding they wear out and become rounded.

Antennae 4-segmented, on basal membrane; 1st segment with somewhat indistinct constriction approximately in middle; 2nd segment slightly smaller than 1st segment; 3rd segment slightly smaller than 2nd segment; 4th segment very small, somewhat shorter and slenderer than other segments. Apical surface of labrum with 2 pairs of central setae and numerous marginal setae. Anterior surface of mandibles with 3 setae on each, among them seta closer to apical end considerably shorter than 2 other setae. Maxillae symmetrical; left maxilla as in Figs. 1, 6, 7). Epipharynx as in Fig. 1, 8).

Anal sternite with 40 spines in indistinctly separated groups (Fig. 1, 9); narrow, bare space
Fig. 2. Aphodius erraticus L.: 1) head in general view; 2, 3) left and right mandibles in dorsal view; 4, 5) right and left mandibles in ventral view; 6, 7) left maxilla in dorsal and ventral views; 8) epipharynx; 9) anal sternite. Scale (mm): 1, 9) 1; 2-8) 0.5.

between them variable in size and sometimes indistinct and therefore nonusable as reliable diagnostic character.

**Distribution:** E Siberia, Far East, N and C China, Japan, Taiwan, and Mongolia. This is a common and locally abundant species.
Seven larvae of *Aphodius erraticus* L., indistinguishable from each other, were collected in May 1993 in the vicinity of Khvoyensk, Belarus, Pripyat Reserve. To serve as controls, imagines were reared from 2 of them, and their exuviae and 5 remaining larvae were used for morphological study.

Head pale brown, with weak reddish shade. Length of head capsule (without labrum) $2.32 \pm 0.15$ mm, and width $2.35 \pm 0.15$ mm. General view of head as in Fig. 2, 1.

Pleural sclerites with smooth surface, without distinct pattern; their Chaetome consisting of 4
pairs of long genal setae, 1 pair of postvertical, and 2 pairs of anterovertical setae, among which setae of 1 pair small and at projection of 4th pair of frontal pits, and another pair relatively long. A few other setae mostly asymmetrical, and inconsistent in number and arrangement.

Apex of frontal triangle relatively broadly rounded. Frontal sutures distinct. Frontal pits of 1st pair on extreme anterior margin of frontal triangle, and slightly extended longitudinally. Pits of 2nd and 3rd pairs distinct; pits of 4th pair relatively larger and distinct; rows of frontal pits of 2nd-4th pairs at an angle to each other in form of V; between lateral frontal pits somewhat developed, but always with distinct groove present. Chaetome of frontal triangle completely agreeing with that of preceding species.

Clypeus of complex structure; proximal part strongly sclerotized and with complex relief consisting of various tubercles and carinate structures; central tubercle most distinct, with weak medial pit. Distal part of clypeus smooth, without developed relief, weakly sclerotized and relatively transparent. Chaetome of clypus consisting of pair of central and pair of lateral setae of approximately same length.

Because the morphology of other larvae of the group of *Colobopterus* (sensu Mulsant) is not
known, it is not clear whether such a complex structure of the clypeus is a species-specific character, or whether it occurs in related species.

Labrum relatively small, distinctly trilobate, and with smooth surface; chaetome consisting of pair of postmedial, pair of anteromedial, pair of lateral, and numerous marginal setae.

Maxillae symmetrical; left maxilla as in Fig. 2, 6, 7; epipharynx as in Fig. 2, 8; and mandibles as in Fig. 2, 2-5.

Anal sternite with about 50 spines. Separated into two groups by small, bare intervals (Fig. 2, 9).

**Distribution:** Europe, N and C Asia, N Africa, and N America. This is a common species.