DYTISCIDAE: VII. Description of the larva of *Colymbetes minimus* ZAITZEV

(Coleoptera)

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Abstract

The third instar of *Colymbetes minimus* ZAITZEV (Colcoptera: Dytiscidae) is described and illustrated. It differs from the known *Colymbetes* larvae by its smaller size and monotonous yellow coloration.

Key words: Coleoptera, Dytiscidae, Colymbetinae, Colymbetes, larva, third instar, description.

Introduction

The Holarctic genus *Colymbetes* CLAIRVILLE includes 21 species (NILSSON 2001). Larval characters of *Colymbetes* were used in several works (ALARIE 1995, ALARIE 1998, NILSSON 1987, 1988, NILSSON & HILSENHOFF 1991) although only larvae of a few species were described. Descriptions as well as a key to all three instars of four European species: *Colymbetes dolabratus* (PAYKULL), *C. fuscus* (L.), *C. paykulli* ERICHSON, and *C. striatus* (L.) have been provided by GALEWSKI (1964, 1968). The larval instars of the Nearctic *C. sculptilis* HARRIS have been described by JAMES (1970) and WATTS (1970). However, these descriptions are not detailed enough to be used in updating phylogenetic comparisons and contain transitional characters and mistakes. NILSSON & CUPPEN (1988) presented a useful key to larvae of three instars of the above mentioned European species, unfortunately, without providing descriptions. Thus, all species of *Colymbetes* are in need of detailed study of their larval morphology, and the purpose of the present work is to initiate such a study by describing the third instar of *C. minimus* ZAITZEV. Because the adult morphology of this species is considered to be similar to that of the genus *Rhantus* DEJEAN (ZAITZEV 1953, ZIMMERMAN 1981) the knowledge of its larval morphology is particularly important.

Material and methods

One larva of third instar was studied: "Tibet, 25 km W Amdo, brook at Couna Lake, 4400 m a.s.l., 14.XIII.1998, leg. X. Guo" (Naturhistorisches Museum Wien). Notes: the larva was collected together with adults of *C. minimus*; it is lacking the left antennomeres 3 and 4, the right maxillary palpomere 3 and galea, the right prothoracic leg, the femur, tibia, and tarsus of the right metathoracic leg, the left metathoracic leg, and the apex of the right urogomphus. A second larva, which also is deposited in the Naturhistorisches Museum Wien (NMW), unfortunately could not be studied, because it has been on loan since August 2000 and the borrower refused to return it despite several requests.

The larva was disarticulated and studied in lactic acid. Some body parts were mounted on glass slides with DMHF (temporary preparations). All measurements were made with a Wild M10

stereoscopic microscope equipped with a micrometer eyepiece. Setae were studied and drawings were made with an Olympus BH2 microscope equipped with a drawing tube.

The characters and terms used in the morphometric analysis are mainly those used in papers dealing with larval morphology of Colymbetinae (ALARIE et al. 1998, ALARIE & LARSON 1998, ALARIE & BALKE 1999, ALARIE et al. 2001). Some of the terms used in the present paper are from SHAVERDO (1999, 2000). The morphometrical characters from some papers on *Colymbetes* (GALEWSKI 1968, 1973, NILSSON & CUPPEN 1988) were used and coded. To ensure correct interpretation of some terms the following explanations are provided:

FCLam	length of anterior margin of frontoclypeus between protruding anterolateral angles
StpL	length of maxillary stipes measured along inner margin
MndL	length of mandible measured along outer margin
PronW, PronL	width (in transverse position) and length (in vertical position) of pronotum
MesonW, MesonL	width and length of mesonotum
MetanW, MetanL	width and length of metanotum
Abs1W, Abs1L	width and length of tergum of first abdominal segment

The primary setae and pores were coded according to ALARIE (1995, 1998). The secondary setae of legs were coded as in ALARIE & BALKE (1999), ALARIE et al. (2001). Since no first instar was available for the study the additional primary setae were included in series of the AV secondary setae on femur.

Colymbetes minimus ZAITZEV, 1908

Diagnosis: The larva of *Colymbetes minimus* may be separated from other described *Colymbetes* larvae by the distinctly smaller size and paler (yellow) monotonous coloration.

Color. Head capsule dorsally predominantly yellow, with paler (whitish yellow) frontoclypeus, area near stemmata, and partly parietal area; posterior half of head capsule (area of junction of ecdysial and epicranial (coronal) sutures and vertex) darker with small inconspicuous pale yellow maculae; ecdysial and epicranial sutures whitish, inconspicuous, anterior, lateral, and posterior margins of head and occipital suture brownish due to more strong sclerotization; head capsule ventrally unicolored yellow. Head appendages pale yellow, with darker apical segment of antenna, maxillary, and labial palpi; inner margin and apical half of mandible brownish. Thoracic and abdominal segments, legs, and urogomphi unicolored yellow; margins of terga and spiracles brownish due to more strong sclerotization.

Head. Head capsule more or less rounded, with lateral margins subparallel, tempora not protruding, occipital foramen distinct (Fig. 1); HL = 2.5 mm; HW = 2.4 mm; HL/HW = 1.04; OcW = 1.63 mm; HW/OcW = 1.47; ecdysial sutures well-developed; epicranial (coronal) suture = 0.57 times HL; occipital suture present; ocularium present; frontoclypeus (FCL = 1.04 mm) with anterior margin convex and short between protruding anterolateral angles, FCLam = 1.03 mm; FCLam/A2 = 2.1; anterior margin of frontoclypeus with lamelliform setae (club-shaped) in two irregular rows (more visible in ventral aspect): upper with approximately 20 smaller setae and lower with approximately 30 larger setae; parietal area with 8 - 9 temporal spines laterally, spines shorter than secondary D setae of protibia and protarsus; clypeolabral margin (0.04 mm) in ventral aspect narrower than PALlb1 (0.06 mm); gular suture not visible; occipital foramen indented ventrally; tentorial pits visible ventrally on each side of middle at about midlength; stemmata visible ventrally; primary setae PA7 and PA18 and pores PAp and PA1 present.

Antenna. Four-segmented, shorter than HW, AL = 1.85 mm (n = 1); AL/HW = 0.77; A1 (0.37 mm) < A2 (0.49 mm) < A3 (0.56 mm) > A4 (0.43 mm); A2/A3 = 0.87; antennomere 3 with lateral elongation pore-like, with ventroapical spinula (very short, spine-like), and two ventroapical pores; antennomere 4 with pore ANg medially.



Figs. 1 - 4: *Colymbetes minimus*, third instar; 1) head capsule, dorsal aspect; 2) mesothoracic leg, anterior aspect; 3) same, posterior aspect; 4) last abdominal segment and urogomphi, dorsal aspect.

Mandible. Falciform, MndL/MndW = 2.63 - 2.84 (x = 2.74, n = 2); MndL/HL = 0.53; inner margin of mandible with mandibular channel, without median tooth, with evident pubescence.

Maxilla. Stipes subrectangular, relatively short, StpL = 0.49 mm (n = 1); StpL/PALmx = 0.41; cardo and galea present; lacinia lacking; galea short, GalL = 0.19 mm; GalL/PALmx1 = 0.54, subequal to palpifer, PALf = 0.18 mm; palpus 3-segmented, shorter than antenna, PALmx = 1.2 mm (n = 1); AL/PALmx = 1.54; PALmx1 (0.35 mm) = PALmx3 (0.35 mm) \approx PALmx2 (0.33 mm); PALmx3/PALmx2 = 1.06; palpomere 3 with primary seta MX14; stipes with 7 - 10 small secondary setae.

Labium. Prementum subrectangular, slightly broader than long, not sinuate medially; palpus 2-segmented, PALlb = 0.93 mm (n = 2); shorter than maxillary palpus, PALmx/PALlb = 1.29; PALlb1 (0.53 mm) > PALlb2 (0.4 mm); PALlb2/PALlb1 = 0.76; prementum with primary setae LA3, LA4, LA5, LA8 short, primary seta LA2 longer; palpomere 2 with pore LAc.

Thorax. Pronotum subrectangular, with posterotransverse carina; both meso- and metanota with anterotransverse and posterotransverse carina; PronW = 3.38 mm; PronL = 1.88 mm; MesonW = 3.25 mm; MesonL = 1.16 mm; MetanW = 3.19 mm; MetanL = 1.09 mm; thoracic venter membranous; mesothorax anteroventrally with pair of spiracles; weak long secondary setae (visible at high magnification) on each notum.

Legs. 5-segmented (Figs. 2, 3); metathoracic legs longest, MtCO = 1.8 mm; MtCO/ProCO = 1.15; MtCO/HW = 0.75; coxa > femur > tibia > tarsus > trochanter; pro- and mesotibia not chelate; tarsus with two claws, posterior claw shorter than anterior claw on pro- and mesothoracic legs; claws, tarsus, tibia, and femur with spinulae (spine-like) on ventral margin; procoxa with primary setae CO6 and CO7 distally; trochanter with primary seta TR3 present and TR2 in anterodorsodistal position; femur with primary seta FE1 proximately, with FE5 spine-like, and probably with 2 - 3 additional setae ventrally (since only the third instar is available it is impossible to know the exact number of primary additional setae); tibia with primary seta TI1 distally, protibia with primary setae TI6; pro- and mesotibia with primary seta TI2; tarsus with primary seta as shown in Table 1.

Abdomen. 8-segmented; terga shorter and narrower than thoracic terga, Abs1W = 2.94 mm; Abs1L = 0.94 mm; segments 1 – 6 sclerotized dorsally, membranous ventrally; segments 7 and 8 completely sclerotized; all terga with anterodorsal transverse carina; terga 1 – 7 laterally with pair of spiracles; last segment subcylindrical, narrowed posteriorly toward insertion of urogomphi (Fig. 4); LLAS = 1.85 mm; LLAS/HW = 0.77; siphon slightly indented medially, short; SL = 0.35 mm; segments 1 – 6 with weak long secondary setae and spine-like setae (visible at high magnification), segments 7 – 8 with much stronger secondary spine-like setae and less numerous long setae.

Urogomphus. One-segmented, with subbasal suture very inconspicuous; UR = 2.78 mm; UR/LLAS = 1.5; UR/HW = 1.16; outer margin of urogomphus with 19 setae and 15 -17 spine-like setae (some of them in dorsal position), inner margin with 39 setae.

Discussion. The larva studied matches all characters of *Colymbetes* larvae except for its small size: HW = 2.4 mm (HW $\ge 2.7 - 2.8$ mm for *Colymbetes* and HW ≤ 2.6 mm for *Rhantus* in NILSSON 2000, LARSON et al. 2000, SHAVERDO & KIREJTSHUK 2001) and OcW = 1.63 mm (OcW ≥ 1.9 mm for *Colymbetes* and OcW ≤ 1.5 mm for *Rhantus* in NILSSON 1987) and relatively short maxillary stipes: StpL/PALmx = 0.41 (StpL/PALmx ≈ 0.5 for *Colymbetes*, StpL/PALmx ≈ 0.3 for *Rhantus* in GALEWSKI 1973, SHAVERDO & KIREJTSHUK 2001). However, the latter character is in need of additional study among larvae of *Colymbetes* since no measurements were provided in the previous works.

Sensillar series	Prothoracic	Mesothoracic	Metathoracic
CO			
D	11	10-12	8
Λ	4	8 - 9	9
V	11	7 - 10	7
Total	26	25-31	24
TR			
Pr	2	2	2
Di	-	-	
Total	2	2	
FE			
AD	10	12-19	
AV	15	15 - 17	
PD (NS)	39	44 - 49	
PV	8	9	
Total	72	85 - 89	
ТІ			
AD	3	5-8	
AV	7	10-11	
PD (NS)	36	56 - 58	
PV	4	5	
Total	50	77-81	
ТА			
AD	3	3	
AV	7	9-10	
PD (NS)	28	39 - 40	
PV	4	5	
Total	42	57	

Table 1. Number of secondary setae on legs of third instar of Colymbetes minimus.

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