

Description of larvae of *Aepopsis robini* (Coleoptera: Carabidae: Trechini)

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Abstract. First and third instar larvae of *Aepopsis robini* (Laboulbène, 1849) are studied, redescribed, and illustrated. The larvae are characterised by three unique and likely autapomorphic character states within known members of the supertribe Trechitae: (1) apex of antennomere 4 has only one conical sensillum; (2) setae FR₁₀ and FR₁₁ on frontale are removed basally on dorsal surface from the apical margin; (3) terga of meso- and metathorax lack pore ME_a, and abdominal terga 1–8 lack pore TE_a.

INTRODUCTION

The subtribe Aepina (the tribe Aepini sensu Casale & Laneyrie, 1982) consists of five genera: *Kenodactylus* Broun, 1909 (*K. audouini* Guerin, 1830 from Falkland and Campbell Islands), *Aepopsis* Jeannel, 1922 [*A. robini* (Laboulbène, 1849) from Atlantic coast from Morocco to United Kingdom], *Temnostega* Enderlein, 1905 (*T. antarctica* Enderlein, 1905 and *T. rangitotoensis* Brookes, 1932 from Crozet Island and New Zealand respectively), *Thalassobius* Solier, 1849 (*T. testaceus* Solier, 1849 from Chile), and *Aepus* Samouelle, 1819 (*A. marinus* Ström, 1788, *A. gallaecus* Jeannel, 1926 and *A. gracilicornis* Wollaston, 1860 from Atlantic coast of western Europe).

Little is known about the larvae of the subtribe Aepina. *Aepopsis robini* was the first species described in the larval stage by Coquerel in 1850 (as *Aepus robinii*). The latest descriptive notes about the immature stages of this species have been published by Luff (1985, 1993). Larvae of two other species of the subtribe Aepina have been reported in the literature: *Temnostega antarctica* and *Kenodactylus audouini* (see Enderlein, 1909 and Johns, 1974, respectively). *T. antarctica* was very briefly described based on a single cephalic capsule and the description of *K. audouini* contains only macromorphological characters. Therefore, virtually nothing is known about the particularities of the larval chaetotaxy of the members of the tribe Aepini, which is currently the most important source of morphological information for immature stages of ground beetles (Bousquet & Goulet, 1984).

In the present paper, we report the results of a re-examination of the first and third instar larvae of *Aepopsis robini*, using the method of homologisation of sensilla (Bousquet & Goulet, 1984), which has never been used for this genus. This provides a number of new

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larval characters some of which are unique and, presumably, autapomorphic within the supertribe Trechitae (sensu Kryzhanovskij, 1976).

MATERIAL AND METHODS

This study is based on a single first instar and 10 third instar larvae of *Aepopsis robini* from the United Kingdom. All were collected by M.L. Luff: first instar in July (under stones on beach, Tynningham, East Lothian), third instar in April (in sand-filled rock crevices, Anglesey). All were identified by association with adults.

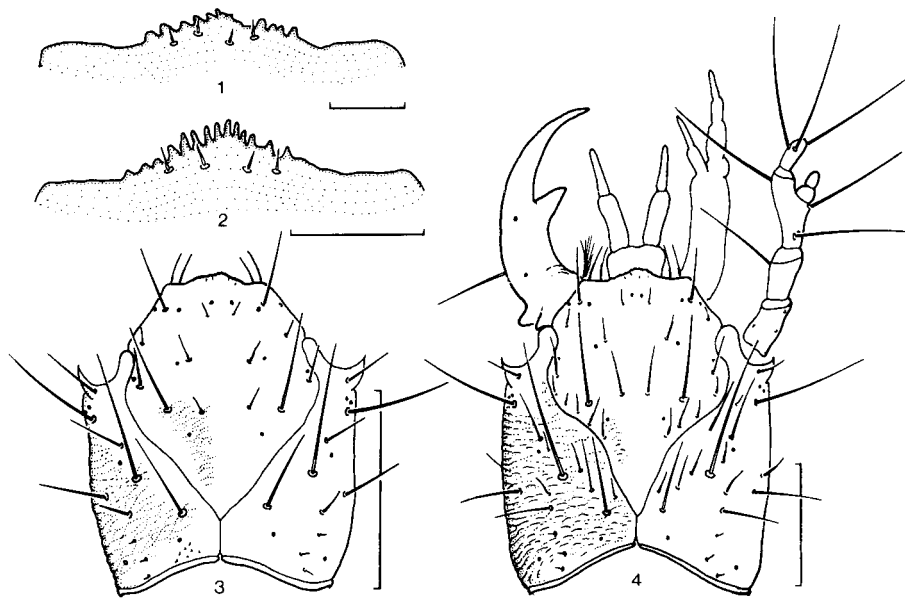
Three larvae (one first and two third instar) were mounted on a permanent microscope slide with Hoyer's medium and studied under a light microscope at 200–900 \times . Notation of the primary setae and pores follows Bousquet & Goulet (1984), that of secondary setae follows Bousquet (1985). Designation of sensilla on antennomere 4 follows Makarov (1996). The studied material is housed in the authors' collections.

For comparison, larvae of 5 tribes and 24 genera of the supertribe Trechitae were studied: the tribe Trechini (genera *Perileptus* Schaum, 1860, *Thalassophilus* Wollaston, 1854, *Amblystogenium* Enderlein, 1905, *Trechus* Clairville, 1806, *Epaphius* Stephens, 1827, and *Trechimorphus* Jeannel, 1927); the tribe Bembidiini (genera *Bembidion* Latreille, 1802, *Asaphidion* Des Gozis, 1886, *Ocys* Stephens, 1829, and *Phrypeus* Casey, 1924); the tribe Tachyini (genera *Tachys* Dejean, 1821, *Paratachys* Casey, 1918, *Sphaerotachys* G. Muller, 1926, *Elaphropus* Motschulsky, 1839, *Porotachys* Netolitzky, 1914, *Tachyta* Kirby, 1837, *Mioptachys* Bates, 1882, and *Polyderis* Motschulsky, 1862); the tribe Pogonini (genera *Pogonus* Nicolai, 1822, *Pogonistes* Chaudoir, 1870, *Cardiaderus* Dejean, 1829, and *Thalassotrechus* Van Dyke, 1918); the tribe Zolini (genera *Oopterus* Guérin-Méneville, 1841, and *Idacarabus* Lea, 1910). Larvae of the trechine genus *Kenodactylus* described by Johns (1974) have not been made available for study.

DESCRIPTION OF LARVAE OF *AEOPSIS ROBINI*

First instar larva (Figs 2, 3)

With typical habitus for Trechini larvae; slightly sclerotized; with primary set and location of sensilla, except as noted below. Cephalic capsule (Fig. 3) 0.27 mm wide ($n = 1$); parallel-sided anteriorly and slightly convergent posteriorly; stemmata absent; dorsal surface of parietale without groove near seta PA_a , and cervical groove; egg-bursters absent; nasale with single row of teeth (Fig. 2). Some microspines present on base of parietale near coronal suture; meshed microsculpture present on base of frontale and on sides of cranium. Pores PA_d and PA_e drawn together; distance between setae FR_3 – FR_4 subequal to that between FR_4 – FR_5 ; seta FR_6 2.5 \times closer to lateral side of frontale than to seta FR_7 ; setae FR_{10} and FR_{11} removed basally from anterior margin of nasale on its dorsal surface (Figs 1, 2); hypopharynx with 2 short setae at anterior angles on both sides. Antennomere 3 with sclerotised lateral surface between sensorium and base of antennomere 4 (Fig. 7); antennomere 4 with one bacilliform and only one conical sensilla apically (Fig. 7). Mandible and retinaculum slightly curved and relatively straight; terebra without teeth; dorsal surface of mandible near pore MN_b smooth, without pointed microsculpture; dorsal keel on terebra absent; penicillum present, its apex not extending beyond apex of retinaculum. Stipes 2.7 \times longer than wide; group gMX with 6 setae; first and second galeomeres subequal in length; seta MX_5 twice as long as MX_6 ; sclerotized part of palpomere 4 subdivided into 2 pseudosegments. Labium with short and not sclerotized ligula; setae LA_5 and LA_6 trichoid, not flat; sclerotized part of palpomere 2 partly subdivided into pseudosegments (Fig. 6). Terga of thorax without pores PR_c , PR_e , PR_f , PR_j , ME_d , ME_d , ME_e ; metathorax

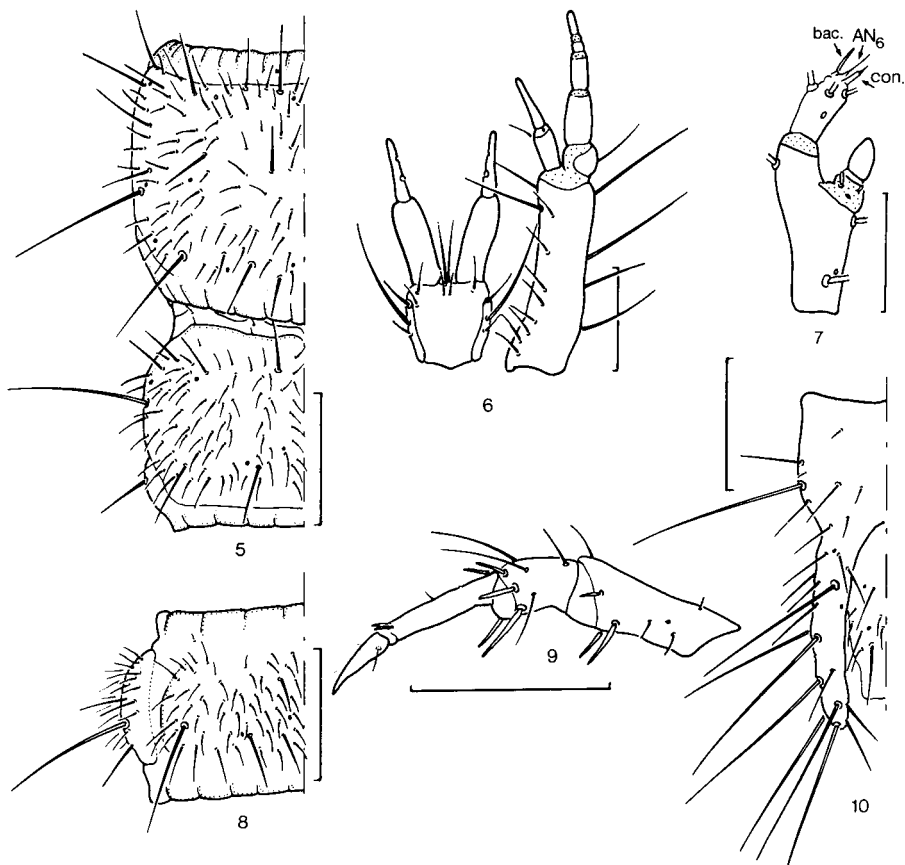


Figs 1–4: Larvae of *Aepopsis robini*, dorsal view. 2, 3 – first instar; 1, 4 – third instar. 1, 2 – nasale; 3, 4 – cephalic capsule (Fig. 4: with right antenna, left mandible, right maxilla, and labium). Scale bars: 1, 2 – 0.025 mm; 3–4 – 0.2 mm.

without seta ES_1 ; transverse microsculpture present but faint on preterga of meso- and metathorax. Legs with single claw and with one short seta at its base; setae TA_3 , TA_4 , TA_5 , and TA_6 absent; seta TA_1 at middle of dorsal surface of tarsus; setae TI_1 and TI_7 on tibia relatively thin and long. Abdomen without sensilla TE_4 and TE_6 on terga 1–8; all terga with faint pointed microsculpture; seta EP_1 on ninth abdominal segment absent; urogomphi as long as pygidium; seta UR_3 located near UR_2 .

Third instar larvae (Figs 1, 4–10)

Cephalic capsule (Fig. 4) 0.43 mm wide ($n = 1$); with numerous secondary setae; frontal suture more sinuated than in first instar; microspines absent; meshed microsculpture markedly developed, covering all surface of parietale and base of frontale. Antennomere 2 with single secondary seta apically. Mandible without secondary setae. Maxilla (Fig. 6) with group gMX consisting of 8 setae; lateral side of stipes with 2 secondary setae. Labium (Fig. 6) with 3–4 secondary setae on each side. Thorax (Fig. 5) with numerous secondary setae on terga; pleura of meso- and metathorax with two setae. Legs (Fig. 9) with some secondary setae on tibia and femur; those on tibia relatively long. Abdomen (Fig. 8) with high number of secondary setae on all sclerites, particularly on terga; seta UR alpha on urogomphi present (Fig. 10); lateral margins of ninth tergum with relatively long secondary seta; urogomphi with 7 long setae.



Figs 5–10: Larvae of *Aepopsis robini*, third instar. 5–8, 10 dorsal view, 9 – anterior view. 5 – prothorax and mesothorax, left side; 6 – right maxilla and labium; 7 – right antennomeres 3 and 4; 8 – fourth abdominal segment, left side; 9 – claw, tarsus, tibia, and femur; 10 – urogomphi and pygidium, left side. Scale bars: 5, 8–10 – 0.2 mm; 6, 7 – 0.1 mm. Abbreviations: bac. – bacilliform sensillum; con. – conical sensillum; AN₆ – number of seta according to Bousquet & Goulet (1984) designation.

DISCUSSION

Larvae of many Trechini taxa remain unknown, and it is not possible to compare our data with Aepini larvae described before (see Introduction) because of inadequate morphological descriptions. Due to these circumstances, we shall mention the important characters of the larvae of *Aepopsis robini*:

1. As members of the supertribe Trechitae (including Trechini, Bembidiini, Tachyini, Pogonini, and Zolini), *Aepopsis* larvae share some presumably synapomorphic characters: absence of lacinia, pores PR_c, PR_c, PR₁, PR₂, ME_d, ME_c on thoracic terga, pore TE_b on abdominal terga 1–8, and setae TA₃, TA₄, TA₅, and TA₆ on tarsus.

2. As members of the tribe Trechini [subfamilies Trechodinae and Trechinae sensu Casale & Laneyrie (1982), except the genera *Perileptus*, *Thalassophilus*, and

Amblystogenium with very unusual larval characters (unpublished data)], larvae of *Aepopsis* share the following presumably synapomorphic characters: hypopharynx with two short setae at anterior angles on both sides instead one seta and antennomere 2 in older instar larvae with relatively long secondary seta apically.

3. Larvae of *Aepopsis* have three presumably autapomorphic characters within the supertribe Trechitae: (1) the apex of antennomere 4 has only one conical sensillum (Fig. 7), instead of two; (2) setae FR₁₀ and FR₁₁ are removed basally on dorsal surface from the apical margin of nasale (Figs 1, 2); (3) Terga of meso- and metathorax lack pore ME_a, and abdominal terga 1–8 lack pore TE_a (Figs 5, 8).

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