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DESCRIPTION OF THE MATURE LARVA OF *WAITATIA MAORIANA* BORDONI, 2005 (COLEOPTERA STAPHYLINIDAE STAPHYLININAE XANTHOLININI) FROM NEW ZEALAND (*)

^a Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola" - Via Romana 17, I-50125 Firenze, Italy.^b 37 Glendevon Place, Vauxhall, Dunedin, New Zealand; e-mail mecodema@gmail.com(*) 279th Contribution to the knowledge of the Staphylinidae.Corresponding Author: Arnaldo Bordoni; arnaldo.bordoni@fastwebnet.itBordoni A., Nunn J. – Description of the mature larva of *Waitatia maoriana* Bordoni, 2005 (Coleoptera Staphylinidae Staphylininae Xantholinini) from New Zealand.The larva of *Waitatia maoriana* Bordoni, 2005 from New Zealand is described and figured for the first time.

KEY WORDS: Rove-beetles, staphylinid, larval morphology, immature, preimaginal, stages, external structure.

INTRODUCTION

The genus *Waitatia* was described (BORDONI, 2005) for two species from New Zealand (*W. bellicosa* Bordoni, 2005 and *W. maoriana* Bordoni, 2005) with distribution in both the North and the South Islands (Fig. I, 1-2). *Waitatia* is a very distinctive genus in the following characters: massive aspect and length of the body (10-14 mm long), robust cylindrical head, with a wide neck, maxillary and labial palpi, labrum only emarginated in the middle, tarsi anteriorly dilated, upper epipleural line of the pronotum not joining with the lower line, and genitalia of male and female. In its original description *Waitatia* has been compared with *Zeteotomus* Jaquelin du Val, 1857 but, in fact, it is morphologically unique among known Xantholinini.

Published descriptions of larvae of Xantholinini by REY (1887) and PAULIAN (1941) are not detailed and some of doubtful identity. Later, POTOTZKAYA (1967) and KASULE (1970) contributed more detailed descriptions and TOPP (1978) proposed a key for the determination of Staphylinidae laevae.

In particular PAULIAN (1941) schematically described *Leptacinus batychrus* (Gyllenhal, 1827), *Xanthophilus serpentarius* Motschulsky, 1859 from North India (sub *Leptacinus*; wrong citation because the species is known only from Ceylon), *Metolinus leucocnemis* (Kraatz, 1859) (wrong citation because this larva is listed as collected in Bengal but *M. leucocnemis* occurs only in Ceylon), *Nudobius lentus* (Gravenhorst, 1806) from Europe and *N. cephalus* (Say, 1834) (sub *cephalotes*) from Arizona, *N. cavicola* (Cameron, 1938) (sub *Xantholinus*), *N. jeanneli* (Bernhauer, 1939) (sub *Xantholinus*) from Africa, *Thyrecephalus anachoreta* (Erichson, 1839) from North India (probably *T. jocheni* Bordoni, 2002, because the type of *T. anachoreta* was not found and the specimens related to this name was attributed to five species [BORDONI, 2002]), *Xantholinus elegans* (Olivier, 1795) (sub *meridionalis*) from France.

In the seventies of the last century POTOTZKAYA (1967) described larvae of the following species: *Leptacinus batychrus* (Gyllenhal, 1827), *Xantholinus maykopensis*

Coiffait, 1966, *X. tricolor* (Fabricius, 1787), *X. laevigatus* Jacobson, 1849, *X. longiventris* Heer, 1839, *Gyrophypnus ochripennis* (Eppelsheim, 1892), *G. angustatus* Stephens, 1833, *G. punctulatus* (Paykul, 1789), and *Nudobius lentus* (Gravenhorst, 1806).

KASULE (1970) studied larvae of the following species: *Xantholinus glabratus* (Gravenhorst, 1802), *X. linearis* (Olivier, 1795) (sub Gravenhorst!), *Leptacinus formicetorum* Märkel, 1841 (not described and figured), *Nudobius lentus* (Gravenhorst, 1806).

The only recent descriptions are related to *Phacophallus pallidipennis* (Motschulsky, 1858) from Philippines (BORDONI, 2002) and some larvae from New Zealand [*Whangareiella fulvipes* (Broun, 1880), *Neoxantholinus brouni* (Sharp, 1876), *N. pseudorufulus* Bordoni, 2005, *Pseudocorynus mediocris* (Broun, 1880), *P. nelsonianus* Bordoni, 2005, *P. cultus* (Broun, 1880), and *Linusomus socius* (Fauvel, 1877)] (BORDONI, 2005). Recently PIETRYKOWSKA-TUDRUJ & STANIEC (2006) published the morphology of the developmental stages of *Hypnogyra angularis* (Ganglbauer, 1895) (see all species details in Table 1).

MATERIAL AND METHODS

The examined larva was obtained *ex societate imaginis* (2 females in the authors collections) by splitting the bole of a dead *Pseudopanax* tree from Leith Saddle, near Dunedin, Otago (J. Nunn 19.III.2015). The larvae was preserved in a solution of glycerine and alcohol. For microscopic, permanent slides the larvae were rinsed in distilled water and cleared in KOH 10%. The drawings of parts of the body were made using light microscopy (Optika B-290) and the habitus illustrations were prepared from photograph taken with Canon EOS 700 camera.

BIONOMICS

The *Pseudopanax* tree bole was riddled with the tunnels of wood-boring cryptorhynchine weevils and contained adults

Fig. I – Habitus of *Waitatia maoriana* Bordoni, 2005 (1) (total length: 10.5 mm) and *Waitatia bellicosa* Bordoni, 2005 (2) (total length: 14 mm).

and larvae of *Psepholax* and *Mesoreda* species (cfr BROWN, 1893), plus adults and possibly larvae of *Mecistostylus douei* Lacordaire, 1866. It seems likely that the larvae of *Waitatia* prey on the larvae of these wood-boring weevils. Adults of *W. maoriana* have been found by J. N. close the same locality under bark of a dead *Pseudopanax* tree and freely on a low forest vegetation. It is worthwhile to record that a series of adults of *Pseudoxantholinus sharpi* (Broun, 1880) were found by J. N. in a tree stump on Tinakori Hill (Wellington), which was also affected by beetles that made

tunnels of larger diameter in the wood. These observations allow assume that species of both of these genera live in the tunnels of dead plants hunting for other larvae.

Pseudopanax is a small genus of 12-20 species of evergreen plants, the majority of which are endemic to New Zealand, although they also occur in Tasmania (Australia) and some plants from South America have at times been included in this genus. *Pseudopanax arboreus* (common name “five-finger”) is a very common small tree in New Zealand native forests.

Table 1 – Larval descriptions of species of Xantholinini.

Species	References	Notes
<i>Phacophallus parumpunctatus</i> (Gyllenhal, 1827)	REY (1887)	Uncertain identification
<i>Leptacinus batychrus</i> (Gyllenhal, 1827)	PAULIAN (1941)	Schematic description, uncertain identification
<i>Xanthophius serpentarius</i> Motschulsky, 1859 (sub <i>Leptacinus</i>)	PAULIAN (1941)	Schematic description, uncertain identification, incorrect locality
<i>Metolinus leucocnemis</i> (Kraatz, 1859)	PAULIAN (1941)	Schematic description, uncertain identification, incorrect locality
<i>Nudobius lentus</i> (Gravenhorst, 1806)	PAULIAN (1941)	Schematic description, from Europe
<i>Nudobius cephalus</i> (Say, 1834) (sub <i>cephalotes</i>)	PAULIAN (1941)	Schematic description, from Arizona, U.S.A.
<i>Nudobius (Xantholinus) cavicola</i> (Cameron, 1938) (sub <i>Xantholinus</i>)	PAULIAN (1941)	Schematic description, from Africa
<i>Nudobius (Xantholinus) jeanneli</i> (Bernhauer, 1939) (sub <i>Xantholinus</i>)	PAULIAN (1941)	Schematic description, from Africa
<i>Thyreocephalus anachoreta</i> (Erichson, 1839)	PAULIAN (1941), BORDONI (2002)	From North India, but probably <i>Thyreocephalus jocheni</i> Bordon, 2002
<i>Xantholinus elegans</i> (Olivier, 1795) (sub <i>meridionalis</i>)	PAULIAN (1941)	Schematic description, from France
<i>Leptacinus batychrus</i> (Gyllenhal, 1827)	POTOTZKAYA (1967)	Description lacks many details
<i>Xantholinus maykopensis</i> Coiffait, 1966	POTOTZKAYA (1967)	Description lacks many details
<i>Xantholinus tricolor</i> (Fabricius, 1787)	POTOTZKAYA (1967)	Description lacks many details
<i>Xantholinus laevigatus</i> Jacobson, 1849	POTOTZKAYA (1967)	Description lacks many details
<i>Xantholinus longiventris</i> Heer, 1839	POTOTZKAYA (1967)	Description lacks many details
<i>Gyrophypnus ochripennis</i> (Eppelsheim, 1892)	POTOTZKAYA (1967)	Description lacks many details
<i>Gyrophypnus angustatus</i> Stephens, 1833	POTOTZKAYA (1967)	Description lacks many details
<i>Gyrophypnus punctulatus</i> (Paykul, 1789)	POTOTZKAYA (1967)	Description lacks many details
<i>Nudobius lentus</i> (Gravenhorst, 1806)	POTOTZKAYA (1967), KASULE (1970)	Descriptions lack many details From UK (almost alone head)
<i>Xantholinus glabratus</i> (Gravenhorst, 1802) (now <i>Megalinus</i>)	KASULE (1970)	Uncertain identification (almost alone head)
<i>Xantholinus linearis</i> (Olivier, 1795) (sub Gravenhorst)	KASULE (1970)	Misidentification (almost alone head)
<i>Leptacinus formicetorum</i> Märkel, 1841	KASULE (1970)	Cited, but not described or figured
<i>Phacophallus pallidipennis</i> (Motschulsky, 1858)	BORDONI (2002)	From Philippines
<i>Pachycorynus minimus</i> (Bernhauer, 1920)	BORDONI (2005)	From Australia, schematic description
<i>Australinus cyaneipennis</i> (McLeay, 1873)	BORDONI (2005)	From Australia, schematic description
<i>Thyreocephalus margaretae</i> Bordon, 2005	BORDONI (2005)	From Australia, schematic description
<i>Grevillia subtropicalis</i> Bordon, 2005	BORDONI (2005)	From Australia, schematic description
<i>Whangareiella fulvipes</i> (Broun, 1880)	BORDONI (2005)	From New Zealand
<i>Neoxantholinus brouni</i> (Sharp, 1876)	BORDONI (2005)	From New Zealand
<i>Neoxantholinus pseudorufus</i> Bordon, 2005	BORDONI (2005)	From New Zealand
<i>Pseudocorynus mediocris</i> (Broun, 1880)	BORDONI (2005)	From New Zealand
<i>Pseudocorynus nelsonianus</i> Bordon, 2005	BORDONI (2005)	From New Zealand
<i>Pseudocorynus cultus</i> (Broun, 1880)	BORDONI (2005)	From New Zealand
<i>Linosomus socius</i> (Fauvel, 1877)	BORDONI (2005)	From New Zealand
<i>Hypnogyra angularis</i> (Ganglbauer, 1895)	PIETRYKOWSKA-TUDRUJ & STANIEC (2006)	From Poland
<i>Neoxantholinus koghianus</i> Bordon & Staniec, 2018	BORDONI & STANIEC, 2018	From New Caledonia

DESCRIPTION

MATURE LARVA. Body length (from anterior margin of nasale to the end of pygopod): 12 mm; head length: 1.48 mm; head width, oculi level: 1.11 mm; pronotum length: 1 mm; pronotum width, anterior angles level: 1.11 mm. Body cylindrical (Fig. II, 1-2). Head and pronotum sclerotized (Fig. III, 1-4), brown, abdominal sclerites feebly yellowish; legs light yellow, mandibles dark brown; setae light brown. Body elongated, prothorax as wide as head; pro- meso- and metathorax gradually wider; abdomen with widened segments IV-V and the others slightly narrowed. Setae of head and thorax, most of setae of abdominal sternite I, longest setae of abdominal tergite II-IV, some microsetae on other tergites and urogenophi are simple. Remaining macro

and micro setae of abdominal segments I-X are rod-shaped and frayed.

Head (Fig. II, 2) longer than wider with sides almost rectilinear, slightly narrower forward. Surface almost shiny and without micro-sculpture. Epicranial suture very evident, bifurcate long before the anterior glands. Chetotaxy of dorsal side of head with 20 setae and 6 microsetae; posterior part with 4 microsetae on the two ends. Ventral surface of head with the sculpture as in Fig. III, 2, with only 10 setae and 2 tentorial pits (tp). Apotome (Fig. III, 2) with 4 short setae. Nasale (Fig. III, 1) with 6 setae, 2 gland pits (gp) and 2 olfactory organs (og). Anterior margin of nasale with 9 teeth divided by a median tooth in 2 distinct cluster of 4 teeth. The paramedian teeth about twice as long as median tooth; the teeth of the external cluster less developed, apart

Fig. II – Larva of *Waitatia maoriana* Bordoni (1), with particular of head and pronotum (2).

Fig. III – *Waitatia maoriana*, larva: head in dorsal view (1) (na- nasale, e- epicranial part, gp- glandular pit, g- gland, p- posterior part, head in ventral view (2) (a- apotome, tp- tentorial pit), pronotum in dorsal view (3), prothorax in ventral view (4) (cr- cervicosternum, sn- sternite, cc- coxal cavity).

Fig. IV – *Waitatia maoriana*, larva: mesothorax in dorsal and ventral view (1-2) (sp- spiracle, cc- coxal cavity), metathorax in dorsal and ventral view (3-4), VII abdominal segment in dorsal and ventral view (5-6).

from the penultimate that is prominent. Epipharynx in the shape of half moon.

Antennae broken, with only the first three segments visible (Fig. V, 5). Mandible symmetrical (Fig. V, 4) slender, 0.55 mm long, with 2 setae on outer margin. Maxilla (Fig. V, 6) partially damaged and partly rebuilt, 0.37 mm long, with cardo (cd) shorter than stipes (st), about 1.3 times as long as wide; stipes gradually narrowed to apical portion, about 2.2 times as long as wide, with 5 setae. Mala short, with 2 apical setae; palpifer (pf) very short; maxillary palp 4-segmented gradually shorter, with few setae. Labium (Fig. V, 7) slightly dilated forwards; 0.18 mm long; prementum (pmn) with two rounded lines and 2 anterior setae. Ligula conical (lg), with 2 short setae. Labial palp 3-segmented, the second article longer than the first, the last short.

Forelegs on ventral view (Fig. VI, 1): coxa (cx) 0.59 mm long, with 6 setae, 4 microsetae and few pores; trochanter (tr) 0.33 mm long, with only 4 setae and 2 microsetae; femur (fe) 0.51 mm long, with 8 spine-shaped setae of different length and 4 microsetae; tibia (tb) 0.38 mm long, with 13 spine-shaped setae of different length and 3 microsetae and with 3 micro cuticular process at the apex; tarsungulus (tu) 0.26 mm long, with 3 short spine-shaped setae. (Fig. VI, 1-2)

Median and posterior legs in ventral view (Fig. VI, 3): coxa 0.59 mm long, with only 4 setae; trochanter 0.27 mm long, with 3 setae and 1 spine; femur 0.48 mm long, with 4

short and 1 more long spine-shaped setae; tibia 0.36 mm long, with short spine-shaped setae; anterior margin of the apex with 10 micro cuticular processes (Fig. VI, 4); tarsungulus very short, 0.11 mm long, with 3 setae.

Prothorax in dorsal view subrectangular (Fig. III, 4), 1 mm long and 1.11 mm wide, with 10 setae and 2 pores; the same in ventral view with only 2 setae near the sternites (Fig. III, 4); cervicosternum (cr) sub-triangular, largely rounded posteriad, with median incision; surface with 16 microsetae; prosternal area with 2 triangular sternites (sn); coxal cavity (cc) sub-rounded. The anterior edge surface of prothorax and surface between cervicosternum and prosternal area covered respectively by very short, micro-process and extremely fine and very dense, very tiny spinulae.

Pro- meso- and metanotum of thorax with mid-longitudinal ecdysial line.

Mesothorax in dorsal view (Fig. IV, 1) 0.81 mm long and 1.22 mm wide, with 14 setae and 20 microsetae; the same in ventral view (Fig. IV, 2) with coxal cavities (cc), 10 setae and 2 spiracles (sp).

Metathorax (Fig. IV, 3-4) in dorsal view 0.92 mm long and 1.48 mm wide, with 8 setae; in ventral view it presents 4 setae and coxal cavities.

Abdominal segments I-VIII each with tergite, sternite, a pair of paratergites and a pair of parasternites laterally; tergites and sternites I-VIII divided by membranous area

Fig. V – *Waitatia maoriana*, larva: IX-X segments (1) (ug- urogomphi, I-II- first and second segments), nasale in dorsal view (2) (og- olfactory organ, gp- glandular pit), apotome (3), right mandible (4), antenna (5), right maxilla (6) (cd- cardo, st- stipes, pf- palpifer, ma- mala), labium in ventral view (7) (pmn- prementum, lg- ligula).

Fig. VI – *Waitatia maoriana*, larva: anterior leg in ventral view (1) (cx- coxa, tr- trochanter, fe- femur, tb- tibia, tu- tarsungulus) (2), median and posterior legs in ventral view (2) (cx- coxa, tr- trochanter, fe- femur, tb- tibia, tu- tarsungulus) micro cuticular process (4).

mid-longitudinally, each with a pair of elliptical spiracles between tergites and sternites. Abdominal segment VII 0.81 mm long and 0.80 mm wide, with 28 setae in dorsal view (Fig. IV, 5-6) and with 6 setae and 16 microsetae in ventral view.

Segment IX in dorsal side (Fig. V, 1) 0.66 mm long and 0.74 mm wide, with 18 setae; X segment (pygopod) 0.55 mm long and 0.37 mm wide, with 8 setae and some frayed, shorter setae on the surface. Tergite IX with pair of two-segmented, slender urogomphi; segment I 0.33 mm long, with 2 long setae and 2 shorter setae; segment II 0.18 mm long, with 1 lateral seta and 2 apical, long setae.

TAXONOMIC REMARKS

To make a comparison with the larvae of *Waitatia maoriana* and related species of the tribe Xantholinini is problematic, not only because of the peculiarity of the New Zealand species, but also due to the difficulty of identifying correctly the species of the larvae described in the past (c. g. PAULIAN, 1941, KASULE, 1970). KASULE (1970) nominally described *Xantholinus glabratus* and *X. linearis*, but *X. glabratus* belongs to the genus *Megalinus* Mulsant & Rey, 1877. Another fact that rises serious doubts about the species identities of the larvae described by KASULE (1970) is that he claimed the specimens of *X. linearis* that he were collected from Uganda and Tanzania, but the genus *Xantholinus* does not occur in Africa South of the Sahara.

It should also be mentioned that the larval descriptions of POTOTZKAYA (1967) are rather cursory and lacking in many details.

In view of the fact that our knowledge of the Xantholinini of New Zealand is incomplete and that the known species, even their larvae, have few features in common with those from the Palaearctic which larvae have been studied, we refrain from further considerations. We only mention that the chaetotaxy of the body of *Waitatia maoriana* larvae appears less extensive than that of larvae of Palaearctic Xantholinini.

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