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## A new species of mycophagous *Rentonium* (Coleoptera: Cleroidea: Trogossitidae) based on larvae and adults, and a catalogue of Rentoniinae

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Adults and associated larvae of *Rentonium bicolor* sp. nov. are described from New Zealand (North Island) and represent the first associated larvae of the Rentoniinae. Larvae and adults were found among the fruiting bodies of *Hypocrea rufa* (Pers.) Fr. (Ascomycota: Hypocreaceae). The larvae are morphologically similar to a previously described and undetermined larva but differ from it by the unpaired, hook-like urogomphus, four stemmata, and the apical antennal seta subequal in length to the antenna. Potential implications for phylogeny of Cleroidea are discussed. A catalogue of the genera and species of Rentoniinae is provided, along with comments about the status of *Rentonellum loebli* Kolibáč.

<http://www.zoobank.org/urn:lsid:zoobank.org:pub:936541AB-1802-4C09-9032-7EF1FAAC912E>

**Keywords:** New Zealand; fungivory; *Hypocrea*; Peltidae; Rentoniini

### Introduction

The Rentoniinae are a controversial and poorly studied cleroid group, first recognized and described by Crowson (1966). Adults possess a morphology atypical of Cleroidea, and of remaining Trogossitidae, by having a small body (about 1–2.5 mm), a strongly declined head and a highly convex and rounded body shape. Before Crowson's recognition of the group, known members were confused with Clambidae (e.g. Broun 1883) or Leiodidae (e.g. Endrödy-Younga 1960). While subfamily status has been maintained by Lawrence and Newton (1995) and Lawrence et al. (1999a, 1999b, 2011), Kolibáč (2006) synonymized Rentoniinae with Peltinae (Thymalini) based on a phylogenetic analysis, and did not formally recognize the former group. These convex beetles were referred to as the *Rentonium*-group by Kolibáč and Leschen (2010), but because of their distinctive adult and larval morphology, we treat these as Rentoniinae. Including the new species described herein, six genera and eleven species have been described (one species is excluded from Rentoniinae below), and the group is restricted to the southern hemisphere (Kolibáč and Leschen 2010), with described members occurring in Australia, New Zealand, Brazil and Chile (see catalogue below).

Crowson (1966) described a presumed larva of Rentoniinae from New Zealand based on a single specimen collected from *Nothofagus* litter from Northwest Nelson on the Dun Mountain Track outside of the city of Nelson. This larva was determined

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as Rentoniinae based on a process of elimination – no other known New Zealand microcleroids had undescribed larvae, *Protopeltis* Crowson having been described previously (Crowson 1964). This larva was not collected with adults and Crowson did not speculate on the generic identity of the larva. In this study we describe a larva based on several specimens reared to late instar from an unusual host fungus, which harboured adults of an undescribed species of rentoniine. We relate our findings to present knowledge of the systematics and natural history of Rentoniinae.

### Material and methods

This study is based on 33 larval specimens and 77 adult specimens deposited in the following collections:

- AMNZ Auckland Institute and Museum, Auckland, New Zealand
- ANIC Australian National Insect Collection, CSIRO, Canberra, Australia
- BMNH The Natural History Museum, London, UK
- FMNH Field Museum of Natural History, Chicago, Illinois, USA
- MHNG Muséum d'Histoire Naturelle, Geneva, Switzerland
- MZSP Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil
- NZAC New Zealand Arthropod Collection, Auckland, New Zealand
- SEMC Snow Entomological Museum, Lawrence, Kansas, USA

Larvae and one adult were cleared in cold 10% KOH until satisfactorily macerated, then stored in 95% ethanol. Habitus photographs were taken using a Canon EOS 70D digital camera with an Infinity K-2 long-distance microscope lens, and images were assembled using COMBINEZP. Final image processing was performed using ADOBE PHOTOSHOP CS4. Biogeographic codes follow Crosby et al. (1998).

### Descriptions

***Rentonium bicolor* sp. nov.**  
(Figures 1–7)

#### *Diagnosis*

Adults may be distinguished from the other two described species of *Rentonium* by the shorter clypeus and undulate dorsal setal pattern. Additionally, it may be separated from *Rentonium daldinia* Crowson by the colouration (elytron dark brown with at least three nebulous yellow spots in *R. daldinia*, light reddish-brown with infuscated lateral margins in *R. bicolor*), and by the pronotal vestiture (directed more or less posteriorly in *R. daldinia*, radiating outward from a medial point in *R. bicolor*). It may also be separated from *Rentonium chilense* by the colouration (unicoloured dark brown in *R. chilense*).

*Rentonium bicolor* keys to the genus *Australiodes* Endrödy-Younga in Crowson (1966) based on the partly fused maxillae, but also to *Rentonium* based on the short vestiture. It also partly keys to *Rentonellum* Crowson in Crowson (1970) based on aptery, though *R. bicolor* is brachypterous and not entirely glabrous. *Rentonellum* is a

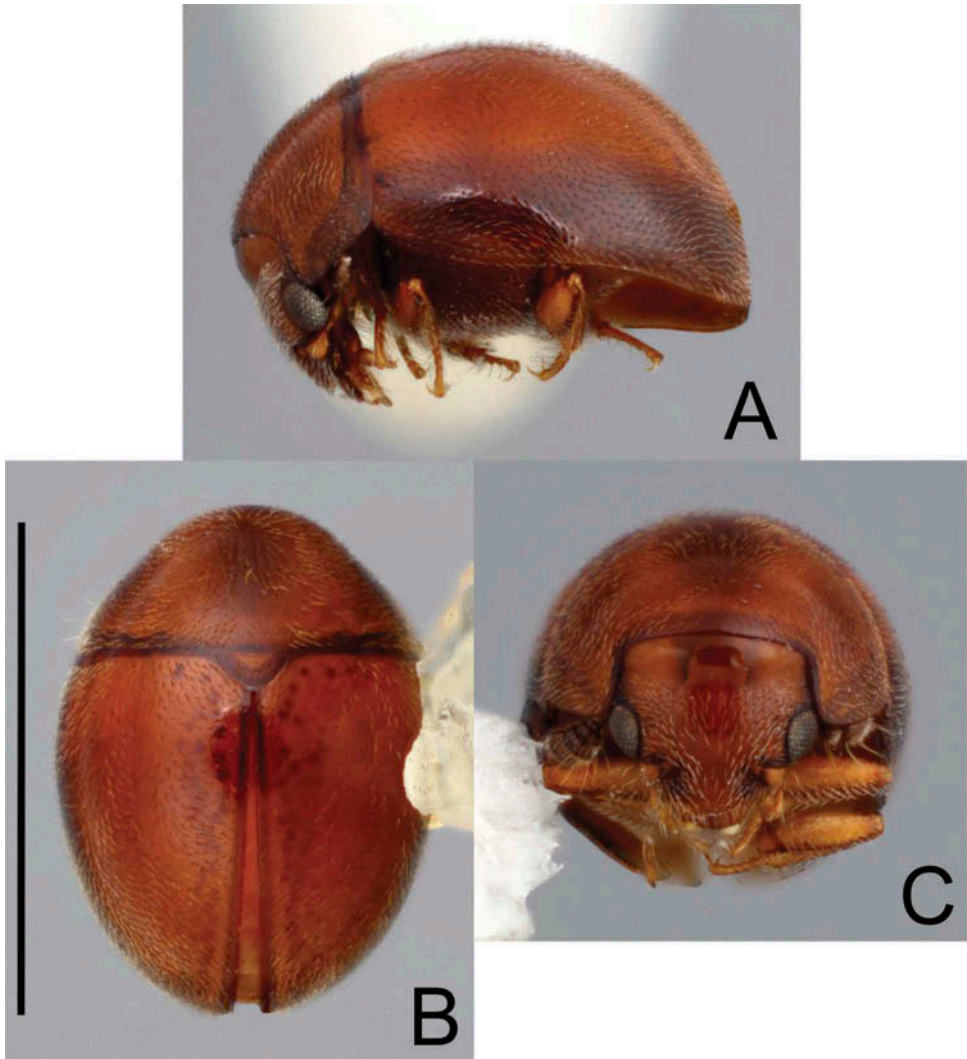


Figure 1. *Rentonium bicolor* sp. nov., adult. (A) Lateral habitus, (B) dorsal habitus, (C) frontal habitus. Scale bar = 1.0 mm.

very diverse genus with many undescribed species in New Zealand. Though many species are dorsally glabrous, some have weak vestiture, but not as obvious as that in *R. bicolor*. *Rentonium bicolor*, *Australiodes vestitus* (Endrödy-Younga) and many *Rentonellum* also have well-developed punctures in a transverse row on the abdominal ventrites. The abdominal punctures are smaller in *R. bicolor* than in *A. vestitus*. *Rentonium bicolor* also differs from the described species and one similar-looking undescribed species from New Caledonia by the lack of dorsal spots, absence of long erect to suberect setae, and the lack of fully developed hind wings.

*Rentonium bicolor* larvae can be distinguished from the undetermined larva described by Crowson (1966) by having a more grub-like body, a single hooked

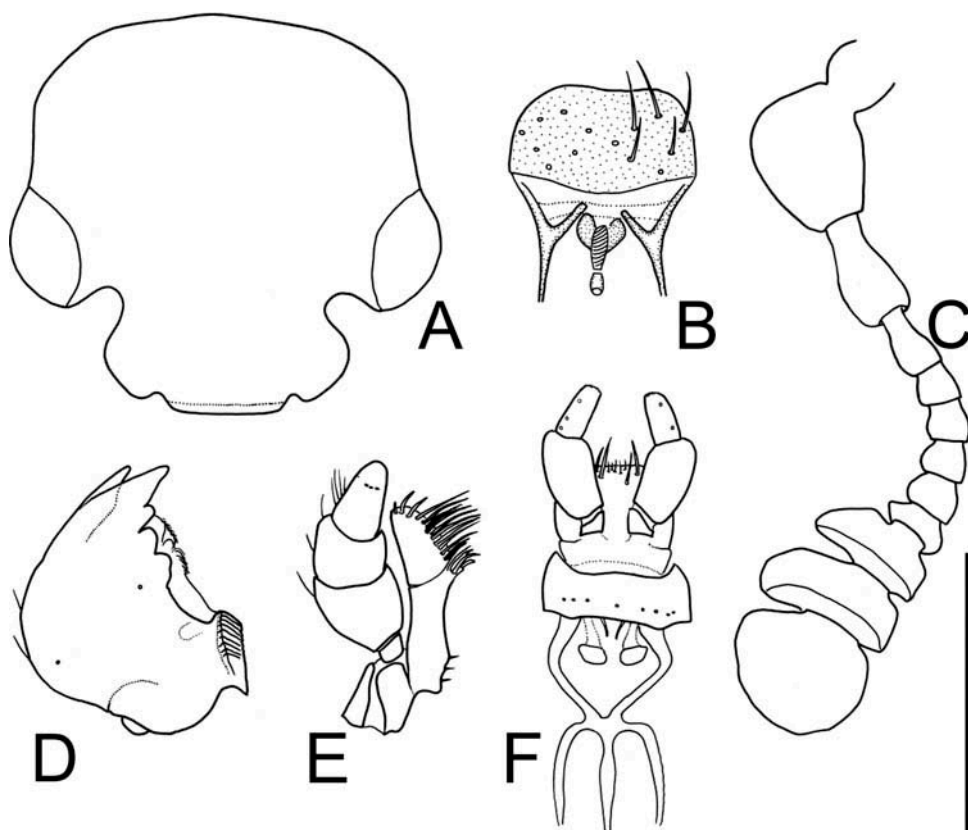


Figure 2. *Rentonium bicolor* sp. nov., adult, characters of the head. (A) Dorsal view of head capsule, (B) dorsal view of labrum with tormae, (C) antenna, (D) dorsal view of mandible, (E) ventral view of maxilla, (F) ventral view of labrum. Scale bar = 0.3 mm.

urogomphus, four stemmata, and the apical seta of the antenna subequal in length to the antenna.

#### *Adult description*

Length 0.9–1.1 mm (measured mid-dorsally from anterior edge of pronotum to tip of elytra). Body form (Figure 1A–C) highly globose, no more than 1.3 times longer than wide when viewed dorsally (head excluded); evenly arcuate laterally, without constriction between pronotum and elytra; colour predominantly pale reddish-brown, with legs and palpi slightly paler; antennal club, temples and about lateral one-quarter of elytron infuscated, sometimes with pronotum medially and sub-laterally, and elytron near scutellum infuscated.

Head capsule widest at eyes, without temples or postocular constriction (Figure 2A); epistomal region relatively short, clypeus hardly projecting anteriorly, truncate at apex (Figure 2A); frons punctate, each puncture bearing a recumbent, anteriorly directed seta; punctation fine, punctures separated by slightly more than their

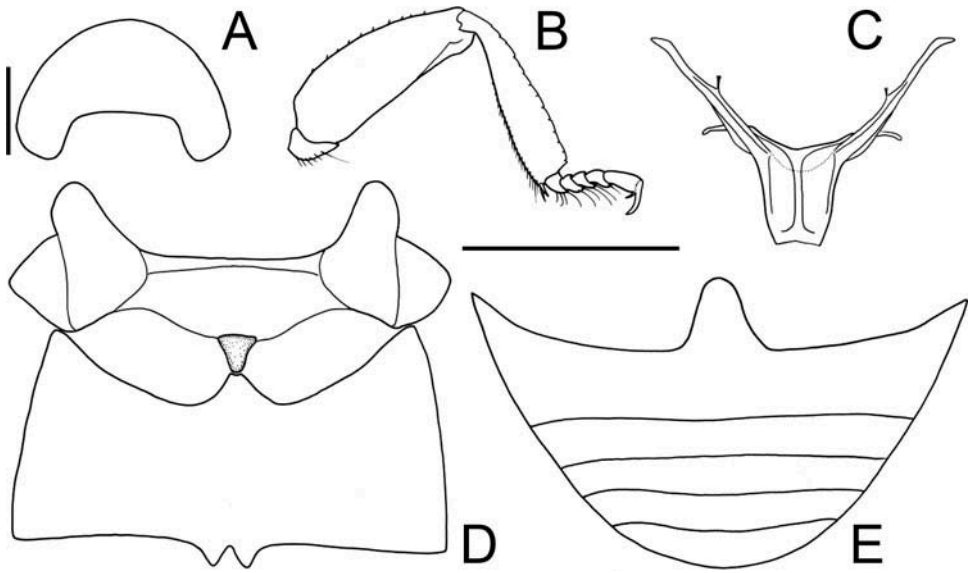


Figure 3. *Rentonium bicolor* sp. nov., adult. (A) Frontal view of pronotum, (B) dorsal view of left proleg, (C) dorsal view of metendosternite, (D) ventral view of meso- and metaventrites, (E) ventral view of abdominal ventrites. Scale bars = 0.3 mm.

diameters medially on frons, becoming more dense laterally, where separated by less than their diameters. Eyes prominent, separated by about 3.9 times their diameter when viewed dorsally (Figure 2A). Labrum (Figure 2B) about twice as wide as long, truncate to slightly emarginate, with scattered long setae dorsally; tormal processes Y-shaped. Antenna (Figure 2C) 11-segmented, scape about twice as wide as pedicel; antennomere VIII slightly asymmetrical, wider than VII; antennomeres IX–XI abruptly widened, forming compact club; antennomere XI slightly wider than long, with smoothly rounded apex. Mandible (Figure 2D) bidentate at apex, with three blunt retinacular teeth; prosthema not prominent, with a few inconspicuous setae. Maxilla (Figure 2E) bearing a short apically articulated galea and lacinia fused with stipes, together nearly as long as palp; galea with dense brush of long setae; lacinia with uncus and with a few setae at apex; maxillary palp four-segmented; palpomeres II and III similar in size and shape, about as wide as long; palpomere IV narrower than III, conical, rounded at apex. Labium (Figure 2F) with mentum transverse, broadly emarginate, with transverse row of pores near base; ligula truncate, with scattered long and short setae; labial palps three-segmented, palpomere III parallel-sided, much narrower and slightly shorter than palpomere II. Gena with short but distinct antennal groove, not extending posteriorly beyond posterior margin of eye; gular sutures widely separated, more or less parallel, disappearing anteriorly.

Pronotum evenly convex, anterior emargination deep (Figure 3A); punctuation very fine to nearly absent on central part of disc, posteriorly and laterally becoming about as coarse as that of head, but nowhere as dense; vestiture of recumbent setae radiating outward from a point about one-third distance from anteromedial margin of pronotum. Prothorax without disc, with only a short, even, keel-like elevation between procoxal cavities. Scutellar shield broader than long, triangular, narrowly

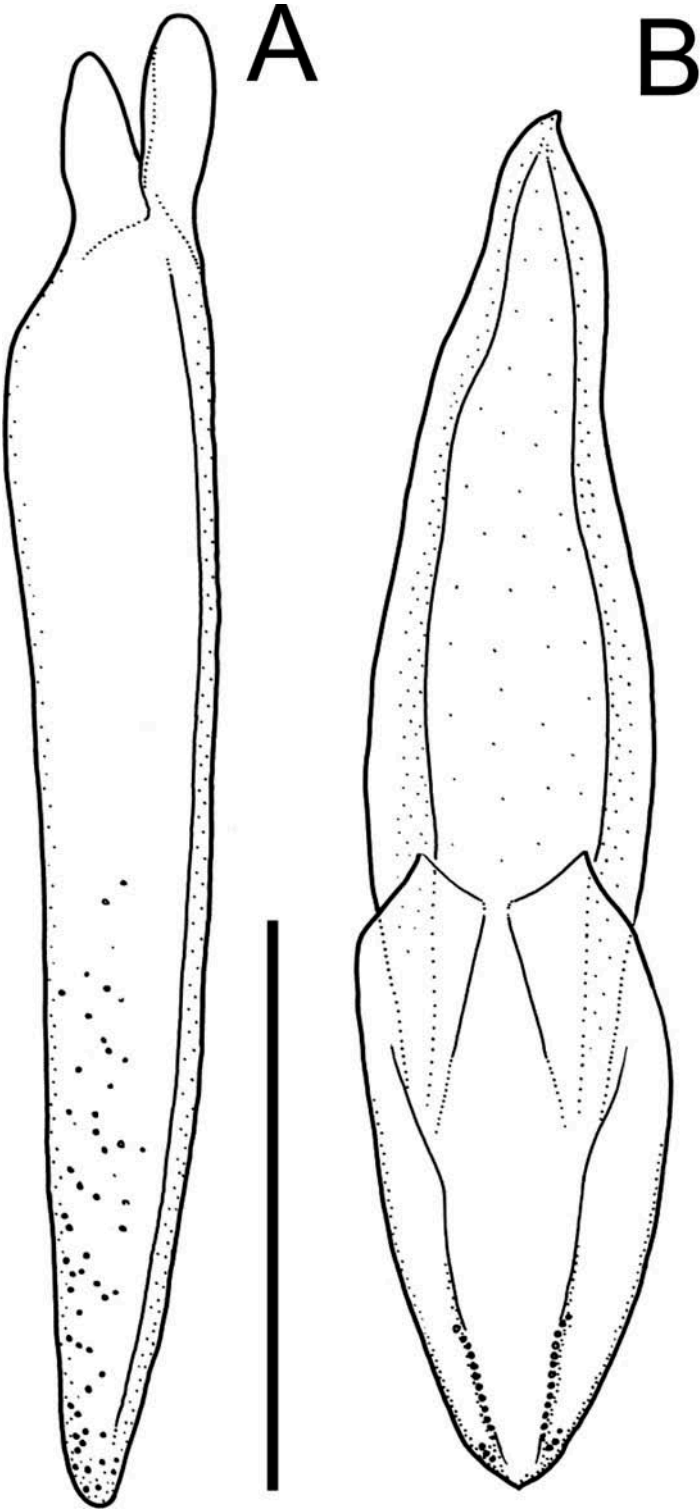


Figure 4. *Rentonium bicolor* sp. nov., adult male aedeagus. (A) Ventral view of penis, (B) ventral view of tegmen. Scale bar = 0.3 m.

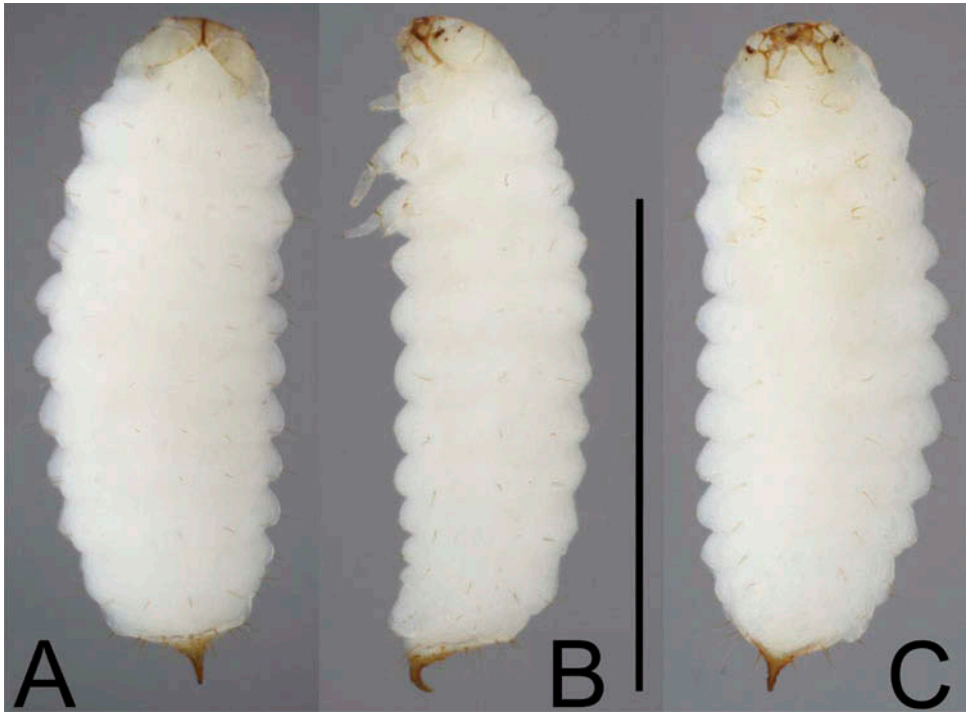


Figure 5. *Rentonium bicolor* sp. nov., late-instar larva. (A) Dorsal habitus, (B) lateral habitus, (C) ventral habitus. Scale bar = 1.0 mm.

rounded at apex. Elytron about 1.4 times longer than wide, punctation fine and confused with dorsal setae forming undulating pattern; widened portion of epipleuron short, gradually tapered posteriorly, disappeared about one-third to one-half distance from humerus, at no point wider than metepisternum. Mesoventrite (Figure 3D) with anterior portion deeply sunken dorsally, without distinct procoxal rests, posterior portion forming a narrow, flat, triangular tablet between the nearly contiguous mesocoxal cavities. Hind wing greatly reduced, strap-like, length less than width of pronotum. Metaventrite (Figure 3D) densely, uniformly punctate, punctures separated by about their diameters or less; discrimen absent; metanepisternum long-triangular, gradually narrowing anteriorly to posteriorly. Metendosternite (Figure 3C) with moderately wide base and long, slender lateral arms; laminae moderately developed, widely separated. Metacoxae separated by about width of metatibia. Protibia (Figure 3B) slightly more expanded than mesotibia and metatibia, with about 15 wide, flat serrations on outer edge; metafemur distinctly shorter than profemur and mesofemur; tibial spur formula 2-2-2, inner (ventral) spur shorter than outer; tarsal formula 5-5-5, tarsomeres each about as long as wide, except tarsomere V which is about twice as long as wide.

Abdominal ventrites densely punctate, punctures on ventrite I especially coarse (coarser than those of metaventrite) and with a single transverse row of large punctures on ventrites II–V (largest on III–V); ventrites lacking rows of stout setae; ventrite I measured behind coxa about as long as ventrites II and III combined



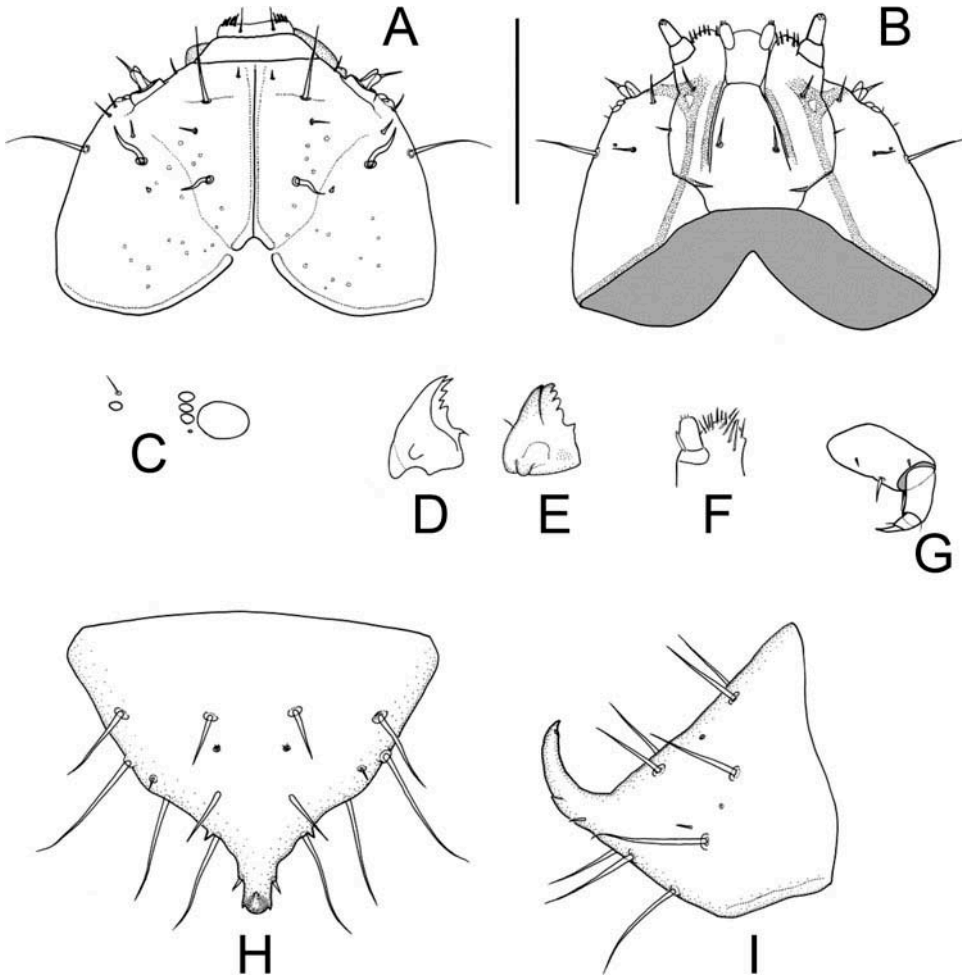


Figure 6. *Rentonium bicolor* sp. nov., late-instar larval characters. (A) Dorsal view of head capsule, (B) ventral view of head capsule with mouthparts attached, (C) lateral view of right stemmata (large circular structure is antennal socket), (D) ventral view of right mandible of freshly moulted specimen, (E) same but older specimen, (F) ventral view of right mala and maxillary palp, (G) dorsal view of right proleg, (H) dorsal view of tergite IX, (I) lateral view of tergite IX. Scale bar = 0.1 mm.

(Figure 3E). Aedeagus with penis (Figure 4A) long and slender, tapered gradually from base to apex, with narrowly rounded apex and two rounded, dorsoventrally flattened basal struts; tegmen as in Figure 4B.

*Late-instar larval description*

Length early instar (0.55–0.75 mm,  $n = 2$ ); late instar 0.7–1.5 mm, mean = 1.2 mm,  $n = 16$ ). Body (Figure 5A–C) stout and grub-like, head hypognathous.



Figure 7. (A) Microhabitat of *Rentonium bicolor* sp. nov. in Whareorino Forest, Waikato, New Zealand. Yellow globules are fruiting bodies of a species of *Hypocrea*, which housed the beetle larvae. (B) Known distribution of *Rentonium bicolor* sp. nov. in North Island, New Zealand.

Head capsule about 1.3–1.4 times wider than long (measured dorsally, including clypeus); frontoclypeal suture present; median endocarina long, extending to about level of frontoclypeal suture; frontal arms widely separated at base, not joined with endocarina, represented by broad depigmented regions in head capsule, sclerotized hind margin of head capsule broadly interrupted at intersections with frontal arms (Figures 5A, 6A); hypostomal rods heavily sclerotized (Figures 5C, 6B), complete to posterior margin of head capsule; dorsal chaetotaxy as in Figure 6A, ventral chaetotaxy as in Figure 6B, clypeus devoid of setae. Antenna (Figure 6A) two-segmented; antennomere I about 0.2 times as long as broad, antennomere II 2.5–3.0 times as long as broad; sensorium arising from antennomere I, ventral to antennomere II, similar in shape and size to antennomere II; antennomere II with terminal seta about as long as antennomere II. Stemmata four (Figure 6C), three in a vertical row just posterior to antennal insertion, with a smaller “ventral pigment spot” just ventral to this row, a fourth stemma more distal. Labrum (Figure 6A) broad, slightly emarginate, with close-set row of four stout, medially curved setae on each side occupying lateral quarter of labrum; a pair of longer setae present, arising just medial and proximal to the close-set rows. Mandible (Figure 6D) stout, bifid at apex; dorsal cutting edge with three sharp subapical teeth (blunt in older late instar larvae and prepupae, Figure 6E), a sharp subapical retinaculum present, which is more acute and tapered on the right mandible. Ventral mouthparts retracted. Maxilla (Figure 6F) with palp two-segmented, segment I slightly transverse with a well-developed apical sensorium, segment II about twice as long as wide with cluster of short peg-like setae at apex; mala with uncus consisting of a single spine, four elongate spine-like setae on the mesal surface, three stout setae and three fine setae subapically; maxillary articulating area absent; cardo fused to stipes. Labium (Figure 6B) with palp one-segmented, about twice as long as wide, palps separated by about their individual length; terminal palpomere with cluster of peg-like setae at apex; ligula broadly rounded, devoid of setae; mentum posterior to palps about as long as wide, devoid of setae; submentum long, tapering anteriorly, with pair of setae.

Thoracic segments devoid of sclerotized areas (Figure 5A), tergite I reduced dorsally; legs (Figures 5B, 6G) short, coxae widely separated; tarsungulus devoid of setae. Abdominal segments about equal in size to thoracic segments II–III; abdominal segments I–VIII devoid of sclerotized areas (Figure 5A), approximately equal in width except segment VIII narrower. Abdominal spiracles annular-biforous, lacking accessory chambers. Abdominal segment IX roughly conical, tergite IX (Figure 6H,I) sclerotized, nearly vertical (facing posteriorly) and bearing a single, median, strongly upturned and well-sclerotized urogomphus; urogomphus about 0.5 times as long as sclerotized plate of tergite IX, with paired short lateral spines about half distance to apex; tergite IX plate with six pairs of long setae and two pairs of short setae, and a pair of short spines just lateral to base of urogomphus; with pair of small tubular openings located posterior to anteromedial pair of setae.

#### *Type material*

*Holotype*. “NEW ZEALAND: WO:\Whareorino Forest, Mangatoa Tk.\38°24.985'S 174°43.312'E\ex yellow *Hypocrea stromata*\04Mar2012 coll. M.L. Gimmel\R.A.B. Leschen RL1668” (NZAC). *Paratypes* (71 adults, 33 larvae; all material adults except where specified). **NEW ZEALAND: AK:** North Auckland, Waiwera, litter, 07

December 1961, G. Kuschel, 61/11 (2, NZAC); Lynfield, Wattle Bay, ex pile of dead tree fern fronds in bush at night, 25 August 2002, S.E. Thorpe (1, AMNZ); Mataitai Forest S.A., pitfall, January 2002, A. Warren (1, AMNZ); same except March 2002 (1, AMNZ); Atuanui, Mount Auckland, pitfall, January 2002, A. Warren (1, AMNZ); **BP**: Waenga Bush, Lottin Point Road, pit traps, 20 October–24 November 1992, G. Hall (1, NZAC); **CL**: Tapu Road Summit, decayed wood, 25 March 1977, G. Kuschel (1, NZAC); Coroglen-Tapu Summit, 36°59'S, 175°35' E, litter, 03 November 2005, R. Leschen, S. Nomura, RL985 (1, NZAC); Kauaeranga National Park, Kauaeranga Kauri Track, 37°04.170' S, 175°39.952' E, 154 m, ex sifted leaf litter and wood, 15 January 2009, K. Marske, R. Leschen, K. Puliafico, T. Thery, KM303 (2, NZAC); Little Barrier Island, Te Waikohare Stream, flood debris, 28 November 2006, R. Leschen, T. Buckley, K. Marske, D. Seldon, RL1136(22) (8, NZAC); Great Barrier Island, pitfall, March 2002, A. Warren (1, AMNZ); same except April 2002 (1, AMNZ); Great Barrier Island, Mount Hobson, leaf litter, 17 December 2003, R. Leschen, RL805 (1, AMNZ); **GB**: Te Urewera National Park, Maori Track, 38°44' S, 177°09' E, ex *Trametes versicolor*, 17 November 2004, R. Leschen, RL879 (1, NZAC); **ND**: Waipoua Forest, SH12, rotten stumps/trees, 20 September 1977, D.W. Helmore, 77/102 (1, NZAC); same except mosses and liverworts, L.L. Deitz, 77/103 (1, NZAC); Waipoua Forest, sifted litter, 25 November 1980, G. Kuschel, 80/121 (1, NZAC); Waipoua Forest, Yakas Track, 35°37' S, 173°32' E, flight intercept trap, 29 March–5 May 1999, R. Leschen, R. Hoare, FIT A 409 (1, NZAC); Waipoua Forest, Yakas Track, 35.61717 S, 173.52986 E, sifting leaf litter and rotten wood, 5 April 2010, C. Carlton, R. Leschen, RL1502 (1, NZAC); Waipoua State Forest, Waipoua Summit, 387 m, berlese from leaf litter in podocarp-mixed broadleaf forest, 11–14 April 1980, A. Newton, M. Thayer (1, ANIC); Waipoua Forest, Tanemahuta, sifted litter, 29 October 1985, R.C. Craw, C. Lyal, 85/48 (1, NZAC); Waipoua Forest, SH 12, rotten stumps and trees, 20 September 1977, D.W. Helmore, 77/102 (1, NZAC); Waima Forest, Wekaweka Track, 35°34' S, 173°36' E, leaf litter, 13 June 2000, R. Leschen, G. Hall, RL583 (1, NZAC); Omahuta Forest, Kauri Sanctuary, litter, 16 July 1974, G. Kuschel, 74/40 (1, NZAC); Opuia Forest, Paihia, litter, 23 January 1981, G. Kuschel (1, NZAC); Waitangi Forest, litter and decayed wood, 2 November 1981, G. Kuschel, 81/116 (3, NZAC); same except 81/117 (1, NZAC); Mount Manaia, 150–300 m, litter and decayed wood, G. Kuschel (1, NZAC); Parahaki Park, litter and decayed wood, 5 November 1981, G. Kuschel, 81/127 (5, NZAC); Te Paki Trig, sifted litter and decayed wood, 23 November 1982, G. Kuschel, 82/116 (2, NZAC); Radar Bush, Te Paki, 34°28.382' S, 172°45.947' E, sifting leaf litter/dead wood, 4 November 2008, R. Leschen, T. Buckley, RL1357 (3, NZAC); Puketi Forest Headquarters, 35°13' S, 173°47' E, sifted leaf litter, 31 March 1999, R. Leschen, R. Hoare, RL376 (1, NZAC); Tangihua Ranges, near lodge, 35°54' S, 174°08' E, leaf litter, moss, rotting log, 13 February 2000, R. Leschen, G. Hall, R. Hoare, RL530 (1, NZAC); Kaiwhetu, north of Hihi, “Krause Property,” 34°57'S, 173°32'E, leaf litter, 15 February 2000, R. Leschen, G. Hall, R. Hoare, RL533 (2, NZAC); Mangamuka Gorge S.R., 6.6 km northwest of Mangamuka, 35°12' S, 173°29' E, 70 m, hardwood-podocarp forest, 25 November 1984, A. Newton, M. Thayer, #682 (3, FMNH); Mangamuka Track, 35°11' S, 173°28' E, FIT, 28 July–1 August 1998, R. Leschen, R. Hoare (1, NZAC); same except 30 March–5 May 1999, R. Leschen, R. Hoare, G. Hall, RL366 (3, SEMC); same except 12 June 1999, R. Leschen, E. Hilario, RL422 (1, NZAC);

Trounson Kauri Park, 35°44' S, 173°39' E, under rotten branches, 27 January 1998, R. Leschen, A. Davelos, 166 (1, NZAC); **TO**: Hauhungaroa Range, east side, 2250', litter, 20 November 1965, J.I. Townsend, 65/610 (1, NZAC); Mount Pureora, 1160 m, sifted litter, 14 October 1982, G. Kuschel, 82/93 (1, NZAC); **WO**: same data as holotype (10, NZAC).

*Questionable record (excluded from type series):*

**MC**: Banks Peninsula, Peraki Saddle Scenic Reserve, 500 m, log and leaf litter, hardwood podocarp elfin forest, 11 December 1984, A. Newton, M. Thayer, #701 (2, FMNH). **Note**: This record may be the result of mislabelling, as these are the only South Island specimens so far known.

*Larval material*

**NEW ZEALAND: WO**: same data as holotype (30 late-instar [5 slide-mounted], four early instar, NZAC).

*Distribution*

This species is known only from Northland south to central North Island (Figure 7B).

*Etymology*

The epithet *bicolor* refers to the (usually) distinctly two-toned habitus of the adult. This epithet is a noun in the nominative singular, standing in apposition.

## Discussion

### *Phylogenetic and taxonomic implications*

Crowson (1966) described the subfamily Rentoniinae, which then included the New Zealand genus *Protopeltis* Crowson, based on the following adult and larval characters: adult size smaller than 5 mm, gular sutures nearly parallel, lacinia with an uncus present or not, medio-cubital loop of wing nearly rectangular, hind tibia without denticles on outer edge, larva with median endocarina single and complete, frontoclypeal suture indistinct, abdominal tergite IX with tubular glandular openings. Kolibáč (2006) placed Rentoniinae in Thymalini (Peltinae) based on a phylogenetic study of 55 adult, 32 larval and one biological characters [the larval characters were derived from Crowson (1966) paper and coded as *Rentonium*]. Crowson (1970) argued for a direct relationship between rentoniines and *Protopeltis*, originally placed in its own tribe or subfamily, based on wing characters, but he was not explicit on exact character states. *Protopeltis* does have the “double tegmen” of some basal clerooids (see Crowson 1964) and cucujoids (Byturidae + Biphyllidae; Leschen et al. 2005), but based on limited dissections we have not observed this character in rentoniines. The larvae of *Protopeltis* and Rentoniinae are also very different, with *Protopeltis* lacking the tubular glands on abdominal tergite IX and having widely separate urogomphi. Moreover, the unusual urogomphus of Rentoniinae, with a pair of medially adjacent processes or consisting of a single unpaired hook, exists nowhere else in Cleroidea that we are aware. Although the arrangement of Cleroidea, and the

rest of Cucujiformia, is far from resolved, the phylogenetic placement of Rentoniinae with respect to cleroids and the remaining Trogossitidae is also in doubt. Evidence that they may be unrelated is based on Lawrence et al. (2011), who placed rentoniines among the various cucujoids (mainly members of the cerylonid series) and as sister taxon to the “nitiduloid” family Smicripidae. In this same study, Lophocaterinae, Peltinae and Trogossitinae (the currently recognized subfamilies of Trogossitidae) were placed as separate taxa. A more restricted analysis of the cleroid terminals from Lawrence et al. (2011) rooted with *Palophagoides*, *Eustrophopsis* and four cucujoid taxa confirmed the paraphyletic arrangement of Trogossitidae (RABL, personal observation), and the reality of trogossitid paraphyly seems likely.

While exact phylogenetic placement of Rentoniinae remains open, more than half of the diversity of this group remains undocumented with many species waiting to be described from New Zealand, Australia, South America, New Caledonia and South Africa; among these are at least five undescribed genera. Moreover, the generic concepts will have to be reassessed as new species are described (see also Lawrence and Slipinski, 2013). Referring to the comments in the above Diagnosis, the generic definitions and key characters did not allow us to place *R. bicolor* easily. It could be argued that the placement of *R. bicolor* in *Australiodes* is justified based on the partly fused adult maxillae, but a more detailed study of Rentoniinae is required to assess all character systems and determine the monophyly of the genera.

### *Natural history*

Trogossitidae consists of predatory and fungus-feeding species, with some species that may be both predatory and mycophagous (Kolibáč and Leschen 2010), but their biology is poorly known, rentoniines included. Most of these species seem to be more common in litter habitats (*Rentonellum* and *Globorentonium*) but others are commonly collected in flight intercept traps (*Parentonium*) or by beating suspended dry leaves (*Rentonidium*). Despite the apparent abundance of the adults of some rentoniines, details of their natural history are elusive. More dissections are needed to examine gut contents across the group. *Rentonium* species may specialize in particular fungi (Xylariaceae for *Rentonium daldinia*; Hypocreaceae for *R. bicolor*). One of us (RABL) has routinely collected from fungi in New Zealand since 1997, and it is possible that exact host associations require diligent collecting from inconspicuous fungi during particular times of the year.

Before our collection of *R. bicolor*, one specimen was collected from the polypore *Trametes versicolor* (L.) Lloyd, otherwise the species had been collected mainly by mass trapping methods, including sifting leaf litter. Our collection of larvae and adults of *R. bicolor* was fortuitous. While hand collecting in Whareorino Forest dominated by podocarp/broadleaf trees we were examining the undersides of rotting logs and encountered adults on fresh yellow stromata of *Hypocrea rufa* (Pers.) Fr. growing on the hymenium of *Schizopora paradoxa* (Schrad.) Donk. *Hypocrea rufa* is the teleomorph of various soil-dwelling *Trichoderma* species; our specimens were identified as *Trichoderma viride* Pers. *Hypocrea rufa*/*Trichoderma viride* is widespread throughout the world with the teleomorph growing on dead wood of various species (Jaklitsch et al. 2006). Larvae of *R. bicolor* were seen within the stromata and the entire log (about 12 cm in diameter, tree species not identified) was inspected for specimens. Fungus-infected bark was removed and taken back to the laboratory and

observed daily under a dissecting microscope where the fat larvae were observed to feed singly within each *Hypocrea* stroma. Larvae were unsuccessfully reared to pupal stage, and after 21 days, several mature larvae died and all remaining specimens were harvested.

Based on data so far, it is likely that most, if not all, adult rentoniines graze externally on fungi, whether filiplane fungi on dried leaves, or saproxylic fungi on moist logs. Regarding the adult maxilla (Figure 2E) of *R. bicolor* and *Australiodes*, it is difficult to determine if having a rather short and fixed lacinia with an apical (possibly articulated) galea could exhibit a performance advantage for feeding on fungi. Several larval structures may be associated with feeding within a small, nodular fungal stroma, including the body form (Figure 5A–C) and unique urogomphus (Figure 6H, I). The rather grub-like larva of *R. bicolor* has a body form that is similar to many larvae that are concealed feeders on both fungi and wood; among trogossitids, larvae of *R. bicolor* are similar to the larvae of the saproxylic genus *Peltis* O. F. Müller and mycophagous genus *Thymalus* Latreille. These genera, considered peltines by Kolibáč (2006) along with rentoniines, contain large-bodied species and differ from rentoniines by many features, most strikingly by the absence of a long median endocarina in the head capsule, which is present in other trogossitids like the predatory genus *Tenebroides*. Meanwhile, the rentoniine urogomphus, reduced to a single unpaired hook in *R. bicolor*, or consisting of two medially adjacent processes in Crowson's (1966) mystery larva, are similar in form to internally feeding larvae of the families Mordellidae and Ciidae, respectively. However, the larval foods in these groups differ; mordellids and ciids tend to feed on harder substrates of wood and woody fungi, whereas the fruiting bodies of *Hypocrea* are quite soft by comparison.

### World catalogue of Rentoniinae

Following is a catalogue of all described taxa currently placed in the subfamily Rentoniinae. Only taxonomically significant references are included (i.e. those that affect the nomenclature or provide illustrations or descriptions). We hope that this catalogue will help stimulate further interest in this poorly known group of beetles.

Based on examination of the type series of *Rentonellum loebli* Kolibáč, 2005: 80–81, this species does not belong to Rentoniinae nor to Trogossitidae. Moreover, the illustrations contained in Kolibáč (2005) do not match other described trogossitids and the species probably belongs to a group of previously known but undescribed globular Ciidae (J. F. Lawrence and C. Lopes-Andrade, personal communication). Material examined in the FMNH and MHNG bearing the exact label data of the type series includes at least two species of the globular ciid genus and *Globorentonium*.

#### Subfamily RENTONIINAE Crowson, 1966

Rentoniinae Crowson 1966: 120. [as subfamily of Peltidae]

Rentoniinae: Slipinski 1992: 460. [as subfamily of Trogossitidae]

Rentoniinae: Kolibáč 2006: 126. [as junior synonym of Thymalini]

DIVERSITY: 6 described genera (~5 undescribed), 11 described species (>10 undescribed).

Genus *Australiodes* Endrödy-Younga, 1960

*Australiodes* Endrödy-Younga 1960: 239. [as member of Leiodidae]

*Australiodes*: Crowson 1966: 123 (transferral to Rentoniinae).

*Australiodes*: Kolibáč 2005: 47.

Type species: *Clambus vestitus* Broun, by monotypy.

*Australiodes vestitus* (Broun, 1883)

*Clambus vestitus* Broun 1883: 291.

*Australiodes vestitus*: Endrödy-Younga 1960: 239–240 (transferral to *Australiodes* Endrödy-Younga).

[*Australiodes*] *vestitus*: Crowson 1966: 123.

*Australiodes vestitus*: Endrödy-Younga 1974: 9.

Type locality: Wellington Harbour [“Port Nicholson”], North Island, New Zealand.

Deposition: BMNH (lectotype, ♂).

Distribution: New Zealand.

Genus *Globorentonium* Lawrence and Slipinski, 2013

*Globorentonium* Lawrence and Slipinski 2013: 258–259.

Type species: *Globorentonium globulum* Lawrence and Slipinski, by original designation.

*Globorentonium globulum* Lawrence and Slipinski, 2013

*Globorentonium globulum* Lawrence and Slipinski 2013: 260–264.

Type locality: Big Sassy Creek (42.42S, 146.52E), 400 m, Tasmania, Australia.

Deposition: ANIC (holotype, ♂).

Distribution: Australia (ACT, New South Wales, Tasmania, Victoria).

*Globorentonium lescheni* Lawrence and Slipinski, 2013

*Globorentonium lescheni* Lawrence and Slipinski 2013: 264–265.

Type locality: Barrengarry Mtn., 10.5 km west of Kangaroo Valley, New South Wales, Australia. Deposition: ANIC (holotype, ♂).

Distribution: Australia (New South Wales).

*Globorentonium plaumanni* Lawrence and Slipinski, 2013

*Globorentonium plaumanni* Lawrence and Slipinski 2013: 268–269.

Type locality: Nova Teutonia (27° 11'S, 52° 23'W), Santa Catarina, Brazil.

Deposition: MZSP (holotype, sex unknown).

Distribution: Brazil (Santa Catarina).



Genus *Parentonium* Crowson, 1970

*Parentonium* Crowson 1970: 5–6.

*Parentonium*: Kolibáč 2005: 76.

Type species: *Rentonium magnum* Crowson, by original designation.

*Parentonium australicum* Crowson, 1970

*Parentonium australicum* Crowson 1970: 6.

Type locality: Mt. Wanungra, 4000 feet (1220 m), Lamington National Park, Queensland, Australia. Deposition: BMNH (holotype, ♂, slide mounted).

Distribution: Australia (Queensland).

*Parentonium magnum* (Crowson, 1966)

*Rentonium magnum* Crowson 1966: 121.

*Parentonium magnum*: Crowson 1970: 6 (transferral to *Parentonium* Crowson).

Type locality: c. 500 feet (150 m), hill southwest of Nelson, South Island, New Zealand. Deposition: BMNH (holotype, ♀).

Distribution: New Zealand.

Genus *Rentonellum* Crowson, 1966

*Rentonellum* Crowson 1966: 120.

*Rentonellum*: Kolibáč 2005: 80.

Type species: *Rentonellum apterum* Crowson, by original designation and monotypy.

*Rentonellum apterum* Crowson, 1966

*Rentonellum apterum* Crowson 1966: 120–121.

Type locality: Top of Takaka Hill, 3000 feet (915 m), Riwaka, Nelson, South Island, New Zealand. Deposition: BMNH (holotype, ♀).

Distribution: New Zealand.

Genus *Rentonidium* Crowson, 1966

*Rentonidium* Crowson 1966: 120.

*Rentoniidum*: Crowson 1966: 123 [lapsus calami].

*Rentonidium*: Kolibáč 2005: 81.

Type species: *Rentonidium costiventris* Crowson, by original designation and monotypy.

*Rentonidium costiventris* Crowson, 1966

*Rentonidium costiventris* Crowson 1966: 123.

Type locality: Waipoua State Forest, Northland, North Island, New Zealand.

Deposition: BMNH (holotype, ♂).

Distribution: New Zealand.

Genus *Rentonium* Crowson, 1966

*Rentonium* Crowson 1966: 120–121.

*Rentonium*: Kolibáč 2005: 81–82.

Type species: *Rentonium daldinia* Crowson, by original designation.

*Rentonium bicolor* Gimmel and Leschen, sp. nov.

Type locality: Whareorino Forest, Mangatoa Track, 38°24.985' S, 174°43.312' E, WO, North Island, New Zealand. Deposition: NZAC (holotype).

Distribution: New Zealand.

*Rentonium chilense* Crowson, 1970

*Rentonium chilense* Crowson 1970: 6–7.

Type locality: Isla Bertrand at 200 feet (60 m), Magallanes, Chile. Deposition: BMNH (holotype, ♂).

Distribution: Chile.

*Rentonium daldinia* Crowson, 1966

*Rentonium daldinia* Crowson 1966: 121.

Type locality: Hook Bush, Waimate, s. Canterbury, South Island, New Zealand.

Deposition: BMNH (holotype, ♀).

Distribution: New Zealand.

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