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## Two new high altitude genera of Camiarini (Coleoptera: Leiodidae: Camiarinae) from Australia and New Zealand

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### Abstract

Two new leiodid genera and species, *Camisolus ptinoides* gen. nov., sp. nov. and *Camiarodes nunni* gen. nov., sp. nov. are described from southeastern Australia and New Zealand, respectively. Each new species is placed within its own genus on the basis of morphological uniqueness within Camiarini (Camiarinae) based on the presence of an enlarged maxillary palpomere 4 and metanepisternum with a lateral, tongue-like process that overlaps the elytron in repose. A key to the described genera is provided for world Camiarini. The tribe, new to Australia, is otherwise known only from New Zealand (six genera including one new) and southern South America (one genus). Both new genera are found exclusively in high altitude areas.

**Key words:** Staphylinoidea, Leiodidae, Camiarinae, Camiarini, Australia, New Zealand

### Introduction

The leiodid tribe Camiarini Jeannel (*sensu* Newton 1998) includes those genera placed in Jeannel's (1958) family Camiaridae; the only characters shared by all members of this tribe are the presence of broadly expanded apical maxillary palpomeres and a metanepisternal "clamp" which overlaps the elytral margin in repose. Species of Camiarini have hitherto only been described from New Zealand (*Baeosilpha* Broun, *Camiarites* Jeannel, *Camiarus* Sharp, *Inocatops* Broun, *Zenocolon* Broun) and Chile (*Neocamiarus* Jeannel). These genera can be roughly divided into two groups, defined as follows by Newton (1985): the *Inocatops* group (*Inocatops*; *Neocamiarus*), with a transverse mesepimeron, oblique metaventral-pleural suture, a functional 8<sup>th</sup> abdominal spiracle, and a bisetose empodium, and the *Camiarus* group (all remaining genera), with thoracic ventrites not as above, an atrophied 8<sup>th</sup> (or lost) spiracle, and a unisetose empodium. Both groups include genera with a long-legged, scydmaenid-like habitus (*Camiarus*, *Camiarites*, *Inocatops*) as well as genera with a smaller, compact, ovoid to subquadrate habitus (*Neocamiarus*, *Baeosilpha*, *Zenocolon*). Members of the *Camiarus* group may be pubescent (*Camiarus*, *Inocatops*) or glabrous (*Camiarites*), with the scutellary shield firmly attached or fused (*Camiarus*, *Inocatops*) or not fused (*Camiarites*) to the elytra. As such, Camiarini encompasses greater morphological diversity than any other tribe of leiodids. This morphological disparity also makes it difficult not only to infer relationships between camiarine genera, but also to place Camiarini within the evolutionary context of the family Leiodidae. The austral disjunct distribution of this tribe mirrors that of Agyrtodini and Neopelatopini, the other two tribes currently placed in Camiarinae, though neopelatopines and camiarines are absent from South Africa.

The presence of undescribed New Zealand species of Camiarini was noted by Newton (1985), and one of these has subsequently been included in the New Zealand Threatened List (Leschen *et al.* 2012) and requires description. Newton (1998) later noted the discovery of an undescribed Australian species which represents a dramatic expansion of the known distribution of Camiarini, being the only member of the tribe found outside New Zealand or Chile and southern Argentina. Here we formally describe these two taxa as new genera and species, provide a

key to the known genera of the tribe, and note the biogeographic and ecological significance of the new taxa and discuss their placement within Camiarini.

## Material and methods

Specimens were cleared for dissection using heated KOH solution or a Qiagen DNA extraction kit. Cleared specimens were then rinsed with water and slide-mounted in glycerine. Dissections were examined with a Leica MZ6 dissecting scope, using a Leica DM LS2 compound microscope for higher magnification.

Body size measurements (given to nearest 0.1 mm) were made using a calibrated ocular micrometer. Specimens were measured in dorsal view, with total body length (TBL) assessed from frons to elytral apices, pronotal width (PNW) measured across widest span of pronotum, elytral width (EW) measured at widest point of closed elytra, and head width (HW) measured across widest span of eyes.

Terminology follows Newton (1998), Wheeler and Miller (2005), and Lawrence *et al.* (2010). Locality data is given verbatim, with any information added by us in square brackets [ ], including coordinates for some localities taken from Google Earth® maps. Type specimens designated here are marked with a red label bearing the word “HOLOTYPE”, or yellow labels bearing the word “PARATYPE”, plus the name. Type material is deposited in the Australian National Insect Collection (CSIRO, Canberra; ANIC), the John Nunn Insect Collection (Dunedin, New Zealand; JNIC), the New Zealand Arthropod Collection (Landcare Research, Auckland; NZAC), and the Field Museum of Natural History (Chicago; FMNH).

## Key to genera of Camiarini

**Diagnosis.** Maxillary palpomere 4 enlarged, at least 1.5x as wide as 3; metanepisternum with lateral, tongue-like process which overlaps elytron in repose (Fig. 7).

1. Body form compact and subquadrate; procoxal cavities open behind (Chile, Argentina) . . . . . *Neocamiarus*
- Body form not as above; procoxal cavities closed behind (Australia, New Zealand) . . . . . 2
2. Body form biconvex, lateral margins of pronotum and elytra not continuous in dorsal view . . . . . 4
- Body form ovoid, lateral margins of pronotum and elytra continuous in dorsal view (New Zealand) . . . . . 3
3. Epipleuron setose and lacking a distinct fovea; wings absent . . . . . *Zenocolon*
- Epipleuron glabrous and with a distinct fovea; wings present . . . . . *Baeosilpha*
4. Elytral striae conspicuous, with large, deeply impressed punctures . . . . . 5
- Elytra smooth, without deeply impressed striae or punctures (except near base in some species) (New Zealand) . . . . . 7
5. Pronotum with deeply impressed longitudinal median indentation (New Zealand) . . . . . 6
- Disc of pronotum smooth, without median indentation (Australia) . . . . . *Camisolus* **gen. nov.**
6. Hind angles of pronotum produced laterally; epistomal suture absent . . . . . *Camiarus*
- Pronotum constricted posteriorly, hind angles not produced; epistomal suture present . . . . . *Camiarodes* **gen. nov.**
7. Pronotum at widest point <1/2 as wide as elytra; hind angles of pronotum not produced . . . . . *Camiarites*
- Pronotum at widest point >2/3 as wide as elytra; hind angles of pronotum produced . . . . . *Inocatops*

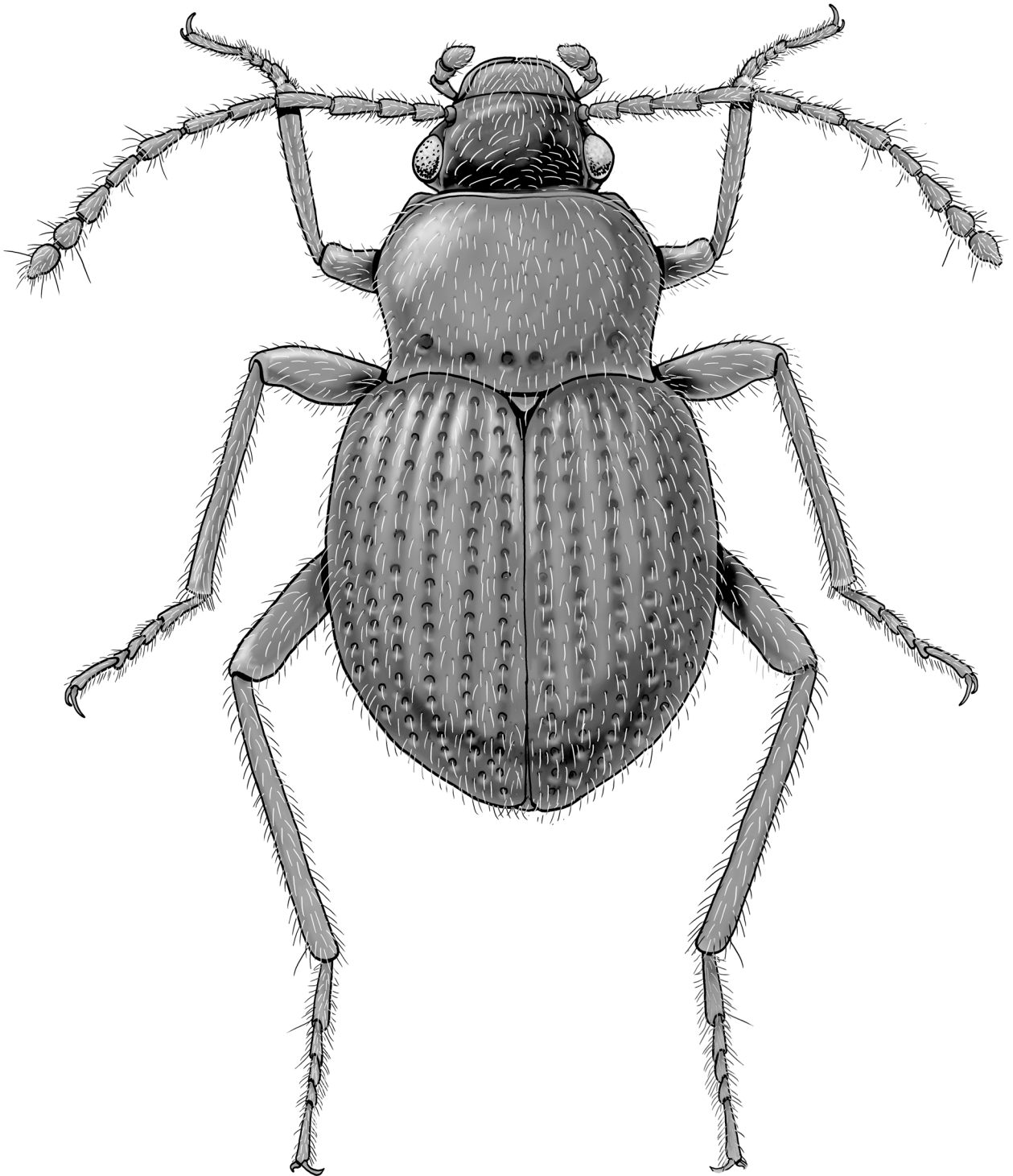
### *Camisolus* gen. nov.

(Figs. 1–6)

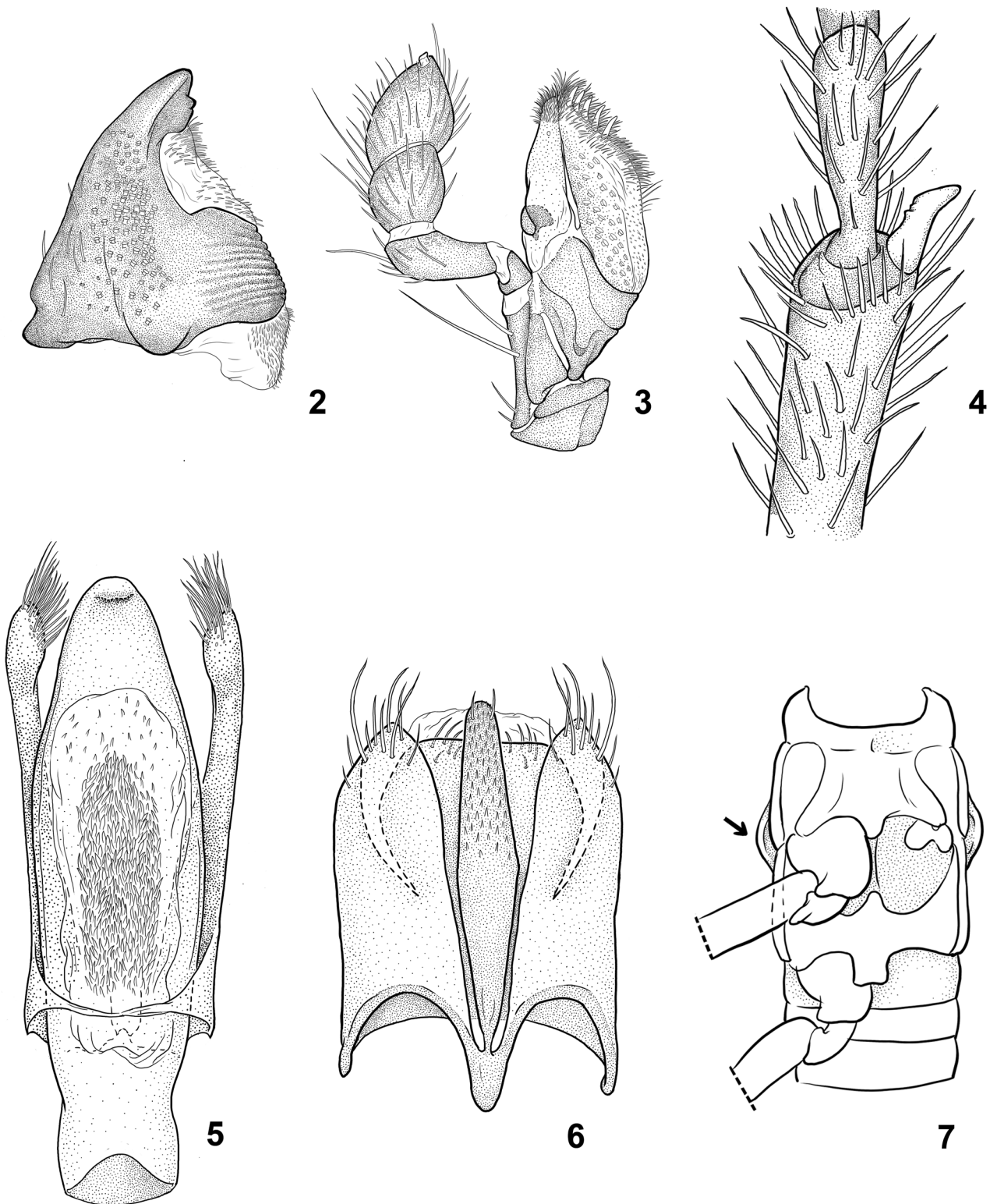
Type species: *Camisolus ptinoides* sp. nov.

**Diagnosis.** Body shape (Fig. 1) long-legged, biconvex, similar to that of the New Zealand camiarine genera *Camiarus* and *Camiarites*; dorsum clothed with long, semierect setae. Head without ocelli; epistomal suture present, without stem. Antennae elongate, with slender, interrupted five-segmented club bearing nearly enclosed periarticular gutters on segments 7, 9 and 10. Pronotum anteriorly rounded, with sides sinuately narrowed toward hind margin; hind angles and midline of hind margin produced; disc without impressions except six across base. Elytra complete (no abdominal terga exposed), without transverse strigae, and with deep strial impressions marked by large complete punctures. Scutellary shield transverse, reduced and completely fused to elytral bases; scutellary shield partially concealed by pronotum in dorsal view. Legs elongate and robust; tarsi 5-5-5 in both sexes.

**Description.** *Head.* Head slightly elongate, weakly constricted behind eyes; eyes round and protuberant, coarsely faceted, 8 facets across at greatest length. Head without conspicuous microsculpture. Epistomal suture present, without median stem. Antennae (Fig. 1) elongate and slender; antennomeres 7 and 9–11 weakly expanded, antennomere 8 cylindrical, scarcely reduced,  $\sim 0.9x$  as long as preceding segment. Antennal insertions immediately posterior to epistomal suture, partially concealed in dorsal view by shallow ridge connecting anterior margin of eye to posterolateral corner of clypeus. Gular sutures present, well separated. Tentorium with well developed anterior and posterior arms and broad tentorial bridge, dorsal arms present, extending approximately halfway to vertex of head and not associated with tentorial pits.



**FIGURE 1.** *Camisolus ptinoides*, male: dorsal habitus (length of beetle = 3.7 mm).



**FIGURES 2–7.** *Camisolus ptinoides*, male: (2) left mandible; (3) maxilla; (4) apex of mesofemur, dorsal view, with blunt spine; (5) aedeagus, ventral view; (6) male genital segment, ventral view; (7) ventral view of meso- and metathorax, arrow shows location of metanepisternal clamp. Not to scale.

*Prothorax.* Pronotum rounded in dorsal view, subquadrate, clothed with sparse vestiture of stiff, recumbent setae, lightly punctate at setal insertions but otherwise without microsculpture. Pronotum laterally explanate only in posterior half, widest in anterior third, with hind angles flattened and acutely produced posteriad. Hind margin of

pronotum with six large, conspicuous, complete punctures. Pronotum with lateral carinae complete, exposing anterior part of hypomerion to dorsal view, with loose fringe of minute setae dorsally and ventrally; hypomerion glabrous. Notosternal sutures distinct, connecting ventrolateral edge of broad cervical opening with lateral articulations of trochantins. Prosternum short, broad, with transverse carina delimiting procoxal cavities anteriorly and with prosternal process produced posteriorly and expanded to form part of procoxal closure. Coxal cavities internally separated by prosternal process, not externally separated; incompletely closed behind by conjunction of prosternal process and blunt, tapering postcoxal process arising from hypomerion. Procoxae globular, coxal cavities triangular, weakly transverse. Trochantins exposed.

*Mesothorax.* Scutellary shield reduced, transverse, triangular, fused to elytral bases; tergites of pterothorax reduced to slender, transverse sclerite with median longitudinal process. Mesocoxae globular, narrowly separated by processes of meso- and metaventrites; mesocoxal cavities open, bounded laterally by mesanepisternal bases, delimited anteriorly and posteriorly by prominent carinae of the meso- and metaventrites. Mesoventrite subquadrate, weakly transverse, laterally fused to mesanepisterna. Mesepimera complete, elongate, extending posteriorly to mesocoxal cavity and anteriorly to form lateral regions of prepectus. Mesotrochantins bluntly triangular, not concealed.

*Metathorax.* Metaventrite transverse, not carinate, with short remnant of metathoracic discrimen bisecting metathoracic process. Metacoxae globular, subconical, extending to lateral margins of metaventrite. Metacoxal cavities shallow, narrowly separated, with separation formed anteriorly by metathoracic process, posteriorly by intercoxal process of abdominal sternum 3. Metepisternal-elytral clamp (metepisternal process; Fig. 7) present.

*Elytra.* Elytra completely fused, highly convex and tapering to a blunt point posteriorly, extending to abdominal apex, epipleura convex and enclosing lateral margins of abdomen and sternum; each elytron with nine deeply impressed striae (2<sup>nd</sup>, 3<sup>rd</sup>, 8<sup>th</sup> and 9<sup>th</sup> striae from suture incomplete in apical third) bearing large, complete, windowlike punctures; epipleuron not reaching elytral apex, delimited by low carina, with scattered deep punctures, visible in lateral view. Wings absent.

*Legs.* Legs long, slender, similar to those of other Camiariini. Femorae loosely covered with sparse coat of minute hairs; femoral apices with paired flanges enclosing the tibial base. Tibiae clothed with long, erect setae and armed apically with short, blunt spines. Claws simple, lightly curved, each with low basal tooth. Empodium bisetose. Tarsi 5-5-5 in both sexes.

*Abdomen.* Greatest width of abdominal ventrites less than half as wide as the greatest width of elytra, bordered laterally by infolded epipleura. All abdominal tergites unsclerotized, transparent. Ventrite 1 longer than remaining ventrites, with raised median simple intercoxal process, bounded by paired, shallow metacoxal rests. Ventrites 1–5 heavily sclerotized, partially fused, with thick reinforced transverse strip at base of each ventrite. Spiracle 8 apparently atrophied, non-functional.

### ***Camisolus ptinoides* sp. nov.**

Length 3.5–3.8 mm (n=2). Pronotal width 0.9–1.0 mm; elytral length 2.1 mm, elytral width 1.5 mm at broadest point, 1.1 mm at elytral bases. Color uniformly dark brunneous. Dorsum of head with dense, minute punctures bearing slender setae. Antennal segments 1–9 elongate, 10–11 as long as wide. First two antennal segments subequal in length, slightly wider than segments 4–6. Segments 3–6 extremely slender, elongate (> 4x as long as wide). Segment 7 elongate, broader than preceding three segments, approximately equal in length to segment 2; segment 8 elongate, slender, cylindrical, narrower than segments 7 and 9. Segments 9–10 subconical, wider than all segments excluding segment 7; segment 11 ovate, as long as 10, with apex weakly produced. Clypeus broad, transverse but slightly narrowed anteriorly; labrum subquadrate, ~2x as long as clypeus, anteriorly rounded, with dense array of minute, trumpet-shaped sensillae on dorsal face. Mandibles (Fig. 2) heavily sclerotized, roughly triangular in dorsal view, tapering in distal half; mandibular apex narrow and weakly bilobed; mesal lobe of mandible membranous, bearing distal cluster of minute setae or slender spines; mola robust, ~0.45 as long as total length of mandible (measured along inner face), transversely ridged, with interior-facing membranous lobe coated with small spines. Maxilla (Fig. 3) with large, robust lacinia (~2x as wide as galea); lacinial apex armed with five large, blunt spines distally, comb of smaller spines proximally; interior/dorsal face of lacinia bearing dense array of short trumpet-shaped sensillae. Galea slender, largely membranous, with dense apical brush of setae and minute

sclerite at base. Maxillary palpi four-segmented; basalmost palpomere short, triangular; palpomere 2 elongate, distally expanded; palpomere 3 quadrate; apical palpomere weakly expanded (~1.2x as wide as penultimate palpomere), with membranous digitiform sensilla at apex. Labial palpi 3-segmented, terminal palpomere slender (approximately 0.5x width of penultimate palpomere) and slightly elongate (1.5x as long as 2nd palpomere) with membranous apex; interior faces of basal labial palpomeres thickly coated with campaniform or very short digitiform sensillae. Mentum subquadrate, trapezoidal, apex approximately 0.6x as wide as base. Submentum triangular, weakly transverse, separated from mentum by complete impressed groove.

Pronotum with fine, minute punctures across disc, bearing minute setae; posterior region of pronotum with 10–12 deep, broad submarginal punctures. Hind margin of pronotum with large, complete punctures: four smaller median punctures and two larger lateral punctures extending though pronotal margin to hypomeron. Lateral margins of pronotum with deep, broad dorsal and ventral punctures, nearly contiguous internally. Hind angles and posterior part of pronotal margins produced, pronotal base narrower than elytral bases. Male protarsi with basal segment weakly expanded, first three segments bearing tenent setae; male mesotarsi not expanded and without tenent setae. Male mesotibial apex with large, blunt spine (Fig. 4).

*Male terminalia.* Male sternum 8 broad, transverse. Male genital segment (Fig. 6) with slender tegmen, short anterior apophysis. Penis (= median lobe) of aedeagus simple, ovate, weakly tapering to blunt, flattened, recurved apex (Fig. 5). Parameres slender at base, broad and expanded apically, paramere apices truncate and bearing dense, interior-facing brush of setae; phallobase reduced to slender, symmetrical membrane, fused to paramere bases and encircling base of penis. Endophallus armed with many minute spines, without larger sclerites or teeth.

*Female terminalia.* Ovipositor with paired coxites bearing minute styli with multiple long setae. Bursa copulatrix and spermatheca membranous, with no visible sclerotized regions.

**Material examined. Holotype:** male, Verbatim labels: “AUSTL.: VIC.: Baw Baw Alpine Res., Neulynes Mill (0.7km NE), 1035m, 37°51'S, 146°15'E, 26.II.1993/ *Euc. delegatensis* forest w/ *Noth. cunn.*, *Blechnum* ground ferns;/ pyr.-fogging large old fungusy *Euc. regnans* logs, A. Newton & M. Thayer 930/ HOLOTYPE *Camisolus ptinoides* Seago, Leschen & Newton 2014.” Holotype deposited in ANIC.

**Paratypes:** AUSTRALIA: Victoria: Baw Baw NP, Mt. Erica Trail nr. carpark, DC056, FMHD#2008-194, 1090 m, 37°53'40"S, 146°21'16"E, *Nothofagus-Eucalyptus* forest/ berl. sifted moss 22.xii.2008 D. J. Clarke, 1♂ in ANIC [dissected by AES]; Baw Baw Alpine Res., Neulynes Mill (0.7 km NE), 1035m, ANMT 930, 37°51'S, 146°15'E, *Euc. delegatensis* forest w/*Noth. cunn.*, *Blechnum* ground ferns, 14-Feb-1993, pyr.-fogging large old *Euc.* logs (A. Newton & M. Thayer), 1♂, 1♀ in FMNH; 26-Feb-1993, pyr.-fogging large old fungusy *Euc. regnans* logs (A. Newton & M. Thayer), 3♂ [1 dissected on glycerin slide] and 2♀ [1 teneral] in FMNH, 1♀ [and holotype] in ANIC; Baw Baw Alpine Res., Neulynes Mill (1.2 km NE), 1140m, ANMT 816, 37°51'S, 146°15'E, *Euc. delegatensis* forest w/*Noth. cunn.* understory, 10-Feb-1987, pyr.-fogging fungusy logs (A. Newton & M. Thayer), 1♂, 1♀ in FMNH; Mt. Baw Baw Alpine Resort, 0.8 km above jct. C426 & South Face Rd., 1052m, 37°50.749'S, 146°14.702'E, *Eucalyptus* forest w/*Nothofagus* understory, ANMT 1257, 25.xi.2013, pyr.-fogging large old *Eucalyptus* log (M. Thayer), 4♂ [1 teneral], 2♀ in FMNH [1♂ in NZAC]; same label but, 30.xi.2013, pyr.-fogging old logs (A. Newton, M. Thayer & A. Seago), 1♀ in FMNH; same label but, 25.xi.2013, FMHD#2013-077 (ANIC Berl#4081), berl., very wet log & leaf litter (A. Newton & M. Thayer), 1♂ in FMNH; Mt. Baw Baw Alpine Resort, S side of car park 1, 1464m, 37°50.418'S, 146°15.735'E, snow gum forest, shrubby understory, ANMT 1256, 25.xi.2013, FMHD#2013-075 (ANIC Berl#4080), berl., wet leaf & log litter (A. Newton, M. Thayer & A. Seago), 1♂ in FMNH; Bogong N.P., Strawberry Saddle, 1650m, ANMT 804, 36°56'S, 147°19'E, *Euc. pauciflora* woodland, 22-Jan-1987, FMHD#87-199, berl., forest litter (A. Newton & M. Thayer) 1♀ in ANIC [dissected by AES]; Cumberland Scen. Res. (SW Cambarville), Cora Lynn Falls, 880m, ANMT 824, 37°34'S, 145°53'E, *Euc. regnans* forest w/*Noth. cunn.*, *Blechnum* ground ferns, 5-Feb-1987, pyr.-fogging fungusy *Euc. regnans* logs (A. Newton & M. Thayer), 1♂ in ANIC; Keppel Falls Scenic Res. (ENE Marysville), Myrtle Loop Tr., 780m, ANMT 932, 37°29'S, 145°50'E, *Noth. cunn.-Atherosperma-Acacia* rainforest w/*Dicksonia* treeferns, 16-Feb-1993, pyr.-fogging large old *Euc. regnans* logs (A. Newton & M. Thayer), 1♀ in ANIC; 16-Feb-1993, pyr.-fogging large old *Noth.* logs (A. Newton & M. Thayer), 1♂ in ANIC.

**Etymology.** The genus name *Camisolus* is a combination of part of the name *Camiarus* and the English *camisole* (a ladies' undergarment), alluding to both a morphological affinity with *Camiarus* and the punctate, “lacy” appearance of the elytra. The specific epithet *ptinoides* refers to this species' superficial resemblance to ptinine anobiids, e.g. *Ptinus* L.

***Camiarodes* gen. nov.**

(Figs. 8–11)

Type species: *Camiarodes nunni* sp. nov.

**Diagnosis.** Body shape (Fig. 8) long-legged, biconvex, similar to that of the New Zealand camiarine genera *Camiarus* and *Camiarites*; dorsum clothed mainly with long recumbent setae. Head without ocelli; epistomal suture present (stem visible in cleared or weakly pigmented specimens). Antennae elongate, with slender and weak five-segmented club with nearly enclosed periarticular gutters on segments 7, 9 and 10. Labial palp with palpomere 4 weakly expanded. Pronotum with dorsal surface irregular with weak depressions and grooves, anterior angles subangulate, sides sinuately narrowed toward hind margin; hind angles rounded. Scutellary shield visible, triangulate, and firmly attached to elytral bases. Elytra without transverse strigae, with deep striae marked by moderate punctures; epipleura without foveae. Abdominal ventrites 1–5 of equal lengths; abdominal process of ventrite 1 bifurcate. Legs elongate and robust; tarsi 5-5-5 in both sexes.

**Description.** *Head.* Head broad and constricted behind eyes; eyes round and protuberant, coarsely faceted, 11 facets across at greatest length. Head without conspicuous microsculpture but shallowly punctured. Epistomal suture present, with median stem visible in cleared or weakly pigmented specimens. Antennae (Fig. 8) elongate and slender; antennomeres not weakly expanded, antennomere 8 cylindrical, scarcely reduced, ~0.8x as long as preceding segment. Antennal insertions immediately posterior to epistomal suture, not concealed in dorsal view. Gular sutures present, narrowly separated. Tentorium with well developed anterior and posterior arms and broad tentorial bridge, dorsal arms present, extending approximately halfway to vertex of head and not associated with tentorial pits.

*Prothorax.* Pronotum transverse in dorsal view, subquadrate, clothed with vestiture of recumbent setae, surfaces irregular with shallow median groove (interrupted at middle), weak sublateral impressions, and lateral groove along posterior margin above carina; bounded on all sides by a bead which exposes the anterior part of hypomeron to dorsal view. Pronotum weakly explanate, widest at middle with anterior angles subangulate and posterior angles weak and subrounded. Hind margin of pronotum with four large, conspicuous, complete punctures. Pronotum with lateral carinae complete, exposing anterior part of hypomeron to dorsal view, without loose fringe of minute setae dorsally and ventrally. Hypomeron glabrous. Notosternal sutures distinct, connecting ventrolateral edge of broad cervical opening with lateral articulations of trochantins. Prosternum short, broad, without transverse carina delimiting procoxal cavities anteriorly and with prosternal process produced posteriorly and expanded to form part of procoxal closure. Coxal cavities completely closed externally by the meeting of the prosternal process and postcoxal projections. Procoxae projecting, coxal cavities weakly transverse; trochantins exposed.

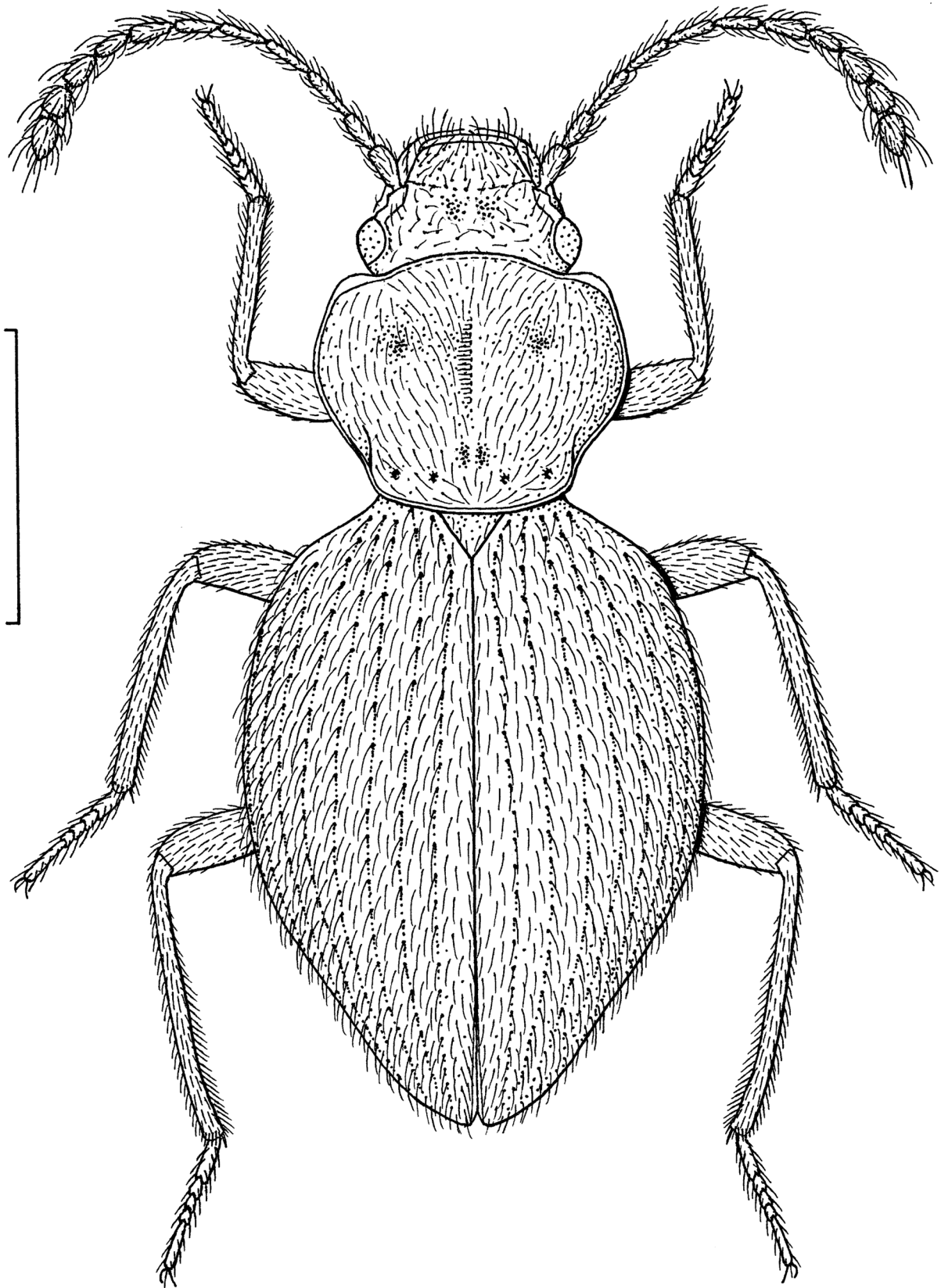
*Mesothorax.* Scutellary shield triangular, attached firmly to elytral bases; tergites of pterothorax reduced and transverse. Mesocoxae globular, narrowly separated by processes of meso- and metaventrites; mesocoxal cavities open, bounded laterally by mesanepisternal bases, delimited posteriorly by prominent subcoxal bead of the metaventrite that extends to about 2/3 the length of the coxa. Mesoventrite subquadrate, transverse, laterally fused to mesanepisterna marked internally by a ridge. Mesepimera complete, elongate, extending posteriorly to mesocoxal cavity and anteriorly to form lateral regions of prepectus. Mesotrochantins more or less triangulate, not concealed.

*Metathorax.* Metaventrite transverse, not carinate, discrimen absent. Metacoxae more or less globular, subconical, extending to lateral margins of metaventrite. Metacoxal cavities shallow, narrowly separated by a bifurcate abdominal process of the abdominal ventrite 1. Metepisternal-elytral clamp (metepisternal process) present as an elongate groove.

*Elytra.* Elytra firmly attached, convex and tapering posteriorly; each elytron with 10 punctate striae (obliterated at humeral angles) of which about five reach the abdominal apex; epipleura not reaching elytral apex, weakly convex and delimited by a bead, with only a few scattered large punctures, visible in lateral view. Hind wings completely absent.

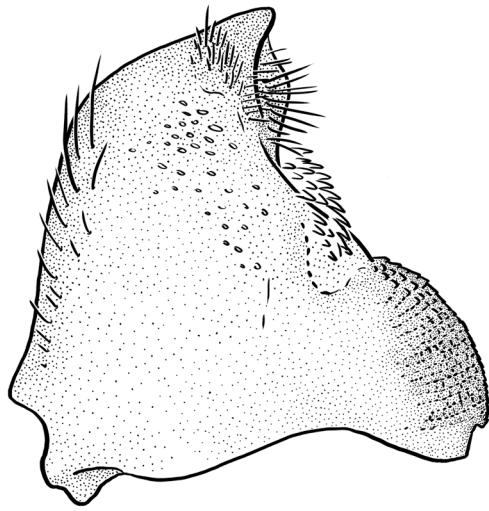
*Legs.* Legs long, slender, similar to those of other Camiarini. Tibiae clothed with long, erect setae and armed apically with short, blunt spines. Claws simple, lightly curved, each with low basal tooth. Empodium bisetose. Tarsi 5-5-5 in both sexes.



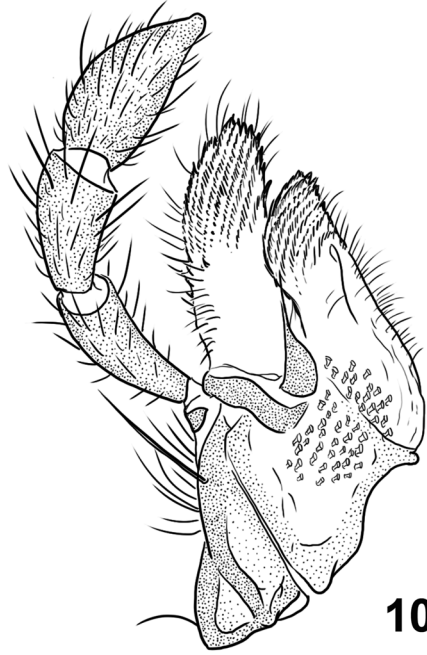


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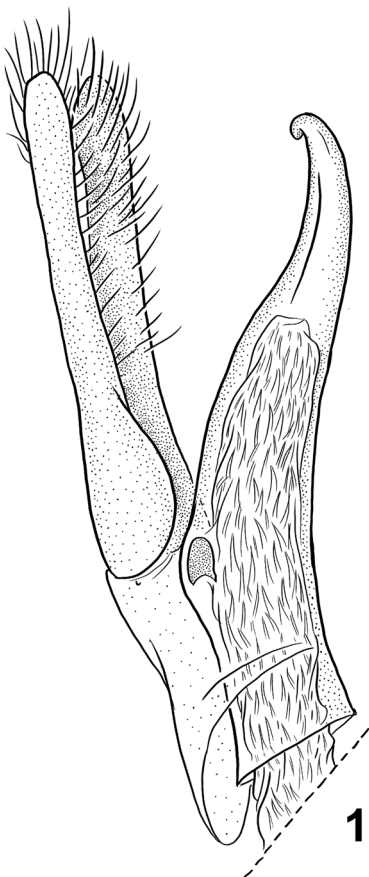
FIGURE 8. *Camiarodes nunni*, male: dorsal habitus. Scale bar = 1 mm.



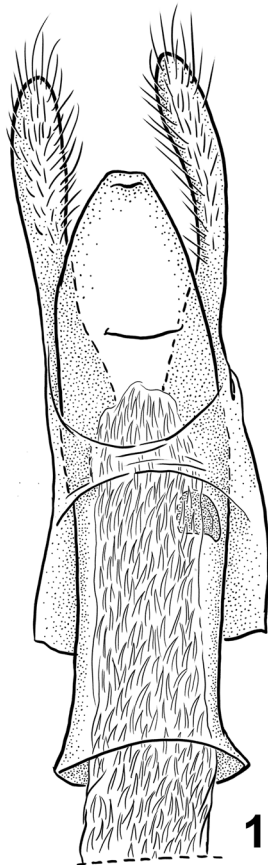
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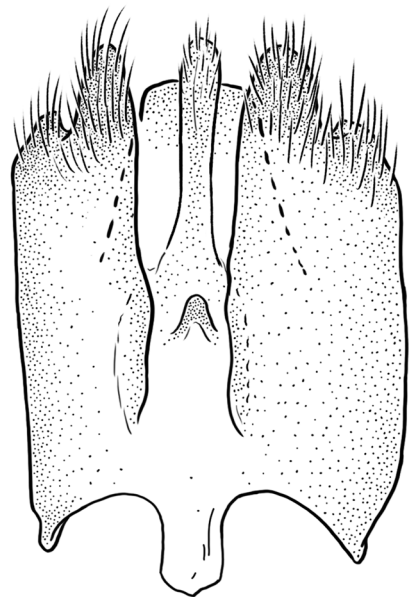
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11a



11b



12

**FIGURES 9–12.** *Camiarodes nunni*, male: (9) left mandible; (10) maxilla; (11a) aedeagus, lateral view; (11b) aedeagus, ventral view; (12) male genital segment, ventral view. Not to scale.

*Abdomen.* Abdominal ventrites 1–5 of equal lengths, not connate; abdominal process of ventrite 1 dorsally projecting and bifurcate, consisting of an anterior hook inserting into the metaventral notch and a posterior lamellum. Spiracle 8 apparently absent.

***Camiarodes nunni* sp. nov.**

Length 2.9–3.1 mm (n=2). Pronotal width 0.9–1.1 mm; elytral length 2.0–2.2 mm, elytral width 1.5–1.7 mm at broadest point, 1.2–1.4 mm at elytral bases. Head width at eyes approximately .50 mm. Color dark to light tan or brown, uniform or head and venter may be darker or hypomeron lighter; punctures more or less weakly impressed dorsally, though stronger on the epistoma and also larger and more strongly impressed on the elytral striae; vestiture present throughout apart from hypomeron, erect to suberect and decumbent and longer on the pronotum and elytra. Dorsum of head with surface irregular. Antennomeres 1–7 elongate, A8–A11 shorter with A10 slightly longer than wide; A1 and A2 subequal in length, slightly wider than segments A3–A6 which are extremely slender, elongate (> 4x as long as wide); A7 wider than preceding four, subequal to A6; A8 cylindrical, narrower than segments A7 and A9; A9–11 subequal, wider than other segments; A11 subconical, slightly longer than A10. Clypeus broad, transverse but slightly narrowed anteriorly; labrum transverse and subquadrate, ~2.5x as long as clypeus, weakly emarginated anteriorly, without trumpet-shaped sensillae. Mandibles somewhat triangulate tapering in apical 1/5; mandibular apex acute and not bifid; prostheca setose; mola ~0.30 as long as total length of mandible (measured along inner face), transversely ridged. Maxilla with lacinia and galea subequal, largely membranous and each with combs of 6 and 7 rows of blunt short spines, respectively; spines (uncus) and sensillae absent. Galea more slender, lacking minute sclerite at base. Maxillary palpi four-segmented; basalmost palpomere short and curved; palpomere 2 elongate and curved and not distally expanded, about 5x the length of segment 1; apical palpomere weakly expanded (~1.2x as wide as penultimate palpomere), membranous digitiform sensilla at apex not present (though smaller sensillae present apically). Labial palpi 3-segmented, terminal palpomere slender (approximately 0.4x width of palpomere 2) and slightly elongate (1.3x as long as palpomere 2) and not membranous; interior faces of basal labial palpomeres setose. Mentum transverse, trapezoidal, apex approximately 0.6x as wide as base. Submentum transverse and lacking groove.

Pronotum with two sublateral impressions in anterior half, a median longitudinal groove that is obliterated at the middle of disc, two lateral grooves at basal 1/3 along lateral carinae, and 4 deep, broad submarginal punctures at the base.

Male pro- and mesotarsi with tenent setae on tarsomeres 1–3, and tarsomere 4 of all tarsi lobed below.

*Male terminalia.* Male sternum 8 broad, transverse and deeply incised. Genital ring with tergite X more or less narrow with a posterior strut, laterotergites (tergites IX) apically setose and somewhat notched laterally, sternite IX broad. Aedeagus (Figs. 11a–b) with penis (median lobe) having sides more or less subparallel in dorsal view, ventrally compressed and sinuate in apical 1/3 and curved ventrally at apex. Parameres slender and about 2/3 the length of penis, apices rounded and setose, inner margins with setose; phallobase membranous about 1/2 length of penis, connecting dorsally by a membrane to form a ring. Endophallus spinose, with 2 elongate sclerites apically.

**Material examined. Holotype:** male, Verbatim labels [collected by J. T. Nunn]: “New Zealand FD Percy Saddle road end. 950m [ca. 45°34.2'S 167°18.9'E, teste J. T. Nunn] 15-Dec-98 / Amongst dead basal tussock leaves / HOLOTYPE *Camiarodes nunni* Seago, Leschen & Newton 2014.” Holotype deposited in NZAC.

**Paratypes** (all NZAC, except where indicated): same data as holotype [collector J. Nunn], 6♂ and 1♀ [1♂ in JNIC]; Spey River nr. Dashwood strm. 750' [ca. 45°32.7'S 167°12.7'E] 19.Jan.70 A.C. Eyles [in collectors hand] 2♂ [1♂ in FMNH is partly dissected in glycerin]; Wolfe Flat 1100 m Turret Ra. [ca. 45°33.5'S 167°18.0'E] // Manapouri Exp. Jan 70 G. Kuschel//moss [70/77.; hw on back of label], 1♂ [dissected in glycerin]; W[est] Arm Manapouri [ca. 45°31.4'S 167°16.5'E], 13.Jan.70 A.C. Ayles litter under fern in bush, 2♂ [one specimen with left antennomeres 6–11 and metatarsi missing]; West Arm/ Manapouri Exp. Jan 70 G.W. Ramsay/ Entomology Div D.S.I.R. New Zealand/ N. Z. Arthropod Collection, NZAC, Entomology Div. DSIR, Auckland NEW ZEALAND, 1♀ in FMNH; Mt. Barber 900–1200m [ca. 45°30'S 167°12'E], Wilmot Pass, Manapouri Exp. Jan 70 G. W. Ramsay, Mats [70/76; hw on back of label], Illustrated D. W. Helmore 2.5.00 [green label], Threatened Species Des. G. Hall & R. Leschen 2011 [orange label], NZAC04040191, 1♀ [left antenna missing]; Wilmot Pass 300m–630m [ca. 45°30.5'S 167°11.5'E], Manapouri Exp. Jan 70 G. W. Ramsay, *Polystichum vestitum*, Entomology Div D.S.I.R.

New Zealand, N. Z. Arthropod Collection, NZAC, Entomology Div. DSIR, Auckland NEW ZEALAND, 1♂ in ANIC [antennae missing].

**Etymology.** The genus name *Camiarodes* alludes to the morphological resemblance of this species to the genus *Camiarus*; it was originally coined as a manuscript name by Dr. Willy Kuschel (NZAC), who first recognized it as new. The specific epithet *nunni* honors John Nunn, through whose efforts the majority of these specimens were collected.

## Discussion

**Classification.** The following two characters support placement of *Camiarodes* and *Camisolus* in Camiarini *sensu* Newton 1998: presence of a metanepisternal-elytral clamp (e.g. Fig. 7) and an enlarged 4<sup>th</sup> palpomere (albeit less dramatically than in other Camiarini). The body shape of these genera also bears a closer resemblance to that of *Camiarus* than to any other described leioidid; common features include a narrow pronotum with expanded hind angles and large, deep subbasal punctures, elytra with deeply punctate striae and no transverse strigae, and a long-legged, dorsally setose scydmaenid-like habitus.

In light of the above characters, Camiarini appears to be the most appropriate tribal placement for these new taxa. However, Newton's (1998) definition of the tribe also includes the absence of an epistomal suture and mandibles with a weak or membranous molar region. *Camiarodes* and *Camisolus* possess epistomal sutures and mandibles with well-developed molae (Fig. 2). The maxillary morphology of *Camiarodes* and *Camisolus* also differs markedly from that of the other genera currently placed in Camiarini: instead of a small, slender galea and lacinia coupled with a dramatically inflated apical palpomere, the galea and lacinia are broad and membranous and the weakly expanded apical palpomeres more closely resemble the "unspecialized" maxilla of neopelatopines (e.g., *Neopelatops* Jeannel or *Eublackburniella* Jeannel). *Camiarodes* and *Camisolus* may also be sister taxa, sharing the aforementioned characters as well as the widened head with a large interocular distance and the dorsally exposed anterior part of the pronotal hypomeron. They share with *Camiarus* the punctate striae and narrow pronotum with a deeply punctate hind margin.

The two species, however, differ in many respects, and are thus described in separate genera. The body forms drastically differ (note the outlines of the prothorax and elytra, especially the narrow-waisted form of the prothorax of *Camiarodes*) with *Camisolus* lacking a median stem of the epistomal suture, having the posterior angles of the pronotum acutely produced and the medial part of the pronotal disc without impressions, and having nine rather than ten impressed striae on the elytra which bear large and deep rather than smaller and more shallow punctures. A full analysis of the phylogenetic relationships among all camiarine genera is underway, and will attempt to define generic groups within the subfamily and determine if *Camiarodes* and *Camisolus* are sister taxa.

**Morphology and natural history.** Little is known about the two species described here, other than the fact that both are known only from cool, moist, high-elevation habitats. These two species also share the metanepisternal-elytral process or clamp, which occurs in all camiarines. This metanepisternal process is morphologically variable across Camiarini: it is a short triangular process near the anterior end of the metanepisternum in most New Zealand genera, but an elongate flange that extends for most of the length of the metanepisternum in *Camiarodes* and *Inocatops*, and in the non-New Zealand genera (*Camisolus*, *Neocamiarus*). The presence of a metanepisternal-elytral clamp would presumably strengthen the joint between the elytra and sides of the thorax when the elytra are closed, and is not a surprising (or unique) development in flightless beetles that have no need to open the elytra, but it is apparently not directly associated with aptery in these genera since a well-developed clamp occurs in the only winged species of Camiarini, *Baeosilpha rufescens* Broun. The bifurcate abdominal process on ventrite 1 in *Camiarodes* forms a complex fitting with the metaventrite, which also may be a strengthening device.

Leioidids are diet-diverse, with most species fungus-feeding or saprophagous (Newton 1984, 1998, 2005). Direct observations have not been made on *Camiarodes* and *Camisolus*, but a dissected male of *Camiarodes nunni* contained indeterminate matter, one collapsed pollen grain, and one phragmospore, indicating a saprophagous diet in this species. The gut of one cleared and dissected male of *Camisolus ptinoides* had a large quantity of dark multichambered spores, hyphae and other indeterminate organic matter, suggesting that fungi are a prominent component of its diet. These observations, plus the well-developed mandibular molae and "unspecialized" maxillae

of these species, are all consistent with a saprophagous or mycophagous diet in these species that resembles that of most other leioidids, in contrast to the reduced mandibular molae and simplified maxillae in all of the remaining genera of Camiarini which suggest some other, more specialized diet in those genera.

*Camisolus ptinoides* has been found mainly in association with large old fungusy or moldy logs of *Eucalyptus* spp. or *Nothofagus cunninghamii* in moist mature forests at several scattered localities in the Victorian Alps, in some cases close to timberline. An attempt to recollect this species in 2013 by AES, AFN and Margaret Thayer was successful at the type locality, which was undisturbed, but not at the site near Cambarville which had been severely burned in the 2009 forest fires near Marysville.

Camiarinae are generally not found at high altitudes, and the true alpine fauna of New Zealand in particular has been little studied (Buckley *et al.*, 2015). One problem is differentiating alpine species from species that have a large altitudinal range from low altitudes (some from about sea level) to about 900 meters or more generally in forests, but also at forest edges adjacent to timberline, with records from tussocks and high altitude mosses and plants (e.g., see records in Marske *et al.* 2009; Seago and Leschen 2011). By contrast, *Camiarodes nunni* is known only from moderately high altitudes in eastern Fiordland close to or above timberline, and may be a true alpine/subalpine beetle. The species has been collected from litter of ferns and tussocks and in the “litter book” held in the NZAC, Willy Kuschel indicated that his sample from Wolfe Flat was taken at the “upper tarn” and consisted of “soft and hard mosses, *Celmisia walkeri*, *Ourisia*, *Oxalis lactea*, plants partly under or near *Dracophyllum* and *Coprosma*”. Fiordland itself has been poorly surveyed for insect groups, with only those regions easily accessible by road having been repeatedly sampled, while most of the remote highlands and valleys remain rarely visited or not sampled at all. Yet there are many species that are only found in Fiordland, e.g. plants (Garnock-Jones *et al.* 2000), vertebrates (Bell and Patterson 2008), and insects (Jewell, 2007; Hoare 2012), including beetles (Fikáček *et al.* 2013, Park and Carlton 2013, Seago and Leschen 2011), some of which are collected from specialized soil habitats and suggest that the area is a region of endemism. But further sampling is needed to assess the conservation status of species like *Camiarodes nunni*, which are considered “range-restricted” and included on the New Zealand Threatened Species List (Leschen *et al.* 2012).

Phylogenetic data place Fiordland species as sister taxa to the remaining lineages northward (Seago and Leschen 2011, Fikáček *et al.* 2013), and Liebherr *et al.* (2011) indicated that the geology of the area represents old subaerial terranes and other endemic genera such as *Camiarodes*, are likely to be discovered there. Genetic studies of plant taxa in the Southern Alps of New Zealand show relatively young divergences from lowland ancestors that are associated with the origin of open above-timberline habitats of around 1.9 Ma (Heenan and McGlone 2013). Divergence dates for alpine *Syrphetodes* Pascoe (Ulodidae) beetles are older than the plant divergences (3.3–9.0 Ma; Leschen and Buckley 2015), well after the initiation of mountain development (25 Ma) but consistent with accelerated uplift of the Southern Alps of around 5 Ma (King 2000). A phylogenetic study of Camiarini placing *Camiarodes* and *Camisolus* would determine if these high altitude leioidids are old relict taxa, or if *Camiarodes* is of more recent origin.

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