



## ***Atelophyllodes* gen. n., a new feather mite genus of the family Proctophyllodidae (Astigmata: Analgoidea) from lyrebirds (Passeriformes: Menuridae)**

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### **Abstract**

We describe a new feather mite genus *Atelophyllodes* gen. n. (Proctophyllodidae: Proctophyllodinae) with two new species from lyrebirds (Passeriformes: Menuridae) in Australia: *Atelophyllodes menurae* sp. n. (type species) from *Menura novaehollandiae* Latham, 1802, and *A. atyeoi* sp. n. from *M. alberti* Bonaparte, 1850. The unique features of *Atelophyllodes* that differentiate it from all other described genera of the subfamily Proctophyllodinae involve the structure of opisthosomal lobes in males: lobes are short and wide, with three pairs of extensions bearing bases of setae *h*<sub>2</sub>, *h*<sub>3</sub> and *f*<sub>2</sub>, and lack terminal lamellae on their posterior margins.

**Key words:** Proctophyllodinae, Australian endemics, basal oscines

### **Introduction**

The family Proctophyllodidae, the most species-rich family of feather mites, currently includes over 400 species in 40 genera and 2 subfamilies (Gaud & Atyeo 1996; Hernandez *et al.* 2007; Mironov 2009). Most representatives of this family inhabit large feathers with well developed vanes, such as the primary and secondary flight feathers, tail feathers, and greater covert feathers of wings, where they are located in the corridors created by barbs on the ventral side of the vanes. The exceptions are a few highly specialized genera in the subfamily Pterodectinae, which live inside quills of hummingbirds (Trochilidae). Proctophyllodids are almost entirely restricted to passerines (Passeriformes) and hummingbirds (Apodiformes: Trochilidae), with a few species known from other bird orders (Caprimulgiformes, Charadriiformes, Coraciiformes, Gruiformes, Musophagiformes, Piciformes, Psittaciformes and Trogoniformes) (Gaud & Atyeo 1996). Both subfamilies, Proctophyllodinae and Pterodectinae, appear to have originated on the common ancestor of passerines and have diversified in parallel with this vast group of hosts, with secondary colonizations of non-passerine hosts (Mironov 2009). Many passerine species bear representatives of both Proctophyllodinae and Pterodectinae, which sometimes live on the same feathers but occupy different locations along the vane (Mironov 2009; also numerous field observation by SM of live birds of the families Alaudidae, Dendrocolaptidae, Emberizidae, Sylviidae and Turdidae).

Despite the diversity of Australian birds, there has been very little exploration of their proctophyllodid fauna. This is particularly true for Australia's endemic passerine families. For example, up to now, lyrebirds (Menuridae), which represent the earliest lineage of oscines (Jønsson & Fjeldså 2006), were known to host only a single species from the subfamily Pterodectinae (the monotypic genus *Megalodectes* Park & Atyeo, 1971) (Trouessart 1885; Park & Atyeo 1971). Here we describe two new species of proctophyllodids that represent a new genus of the subfamily Proctophyllodinae found on the two extant species of lyrebirds.

## Material and methods

The material used in the present study was collected by Dr. Owen Seeman from dry museum skins of lyrebirds in the Tasmanian Museum and Art Gallery and by HP from a lyrebird specimen in the Queensland Museum. Mites were removed from birds by ruffling the skins over pieces of white paper that were then examined using a dissecting microscope. Mites were stored in 80% ethanol to preserve and rehydrate the exoskeletons. Mite specimens were cleared overnight in lactic acid and then slide-mounted in PVA medium (#6371A, BioQuip Products Inc., Rancho Dominguez, California). Slides were cured for a minimum of 4 days on slide warmers set at 40° C. Drawings were made using a drawing device attached to a Leica DM4000 light microscope with DIC illumination.

Descriptions of new taxa follow standard formats used for proctophyllodine feather mites (Atyeo & Braasch 1966; Atyeo & Gaud 1971a; Kudon 1982; Hernandez *et al.* 2007). General morphological terms, leg and idiosomal chaetotaxy follow Gaud & Atyeo (1996). All measurements are in micrometres ( $\mu\text{m}$ ). Measurement standards for particular structures are as follows: (i) idiosoma is measured from its anterior margin to lobar apices (in females, terminal appendages excluded); (ii) prodorsal shield length is measured along the midline, and width is the greatest width of its posterior part; (iii) hysterosoma is measured from the level of the sejugal furrow to the bases of setae *h3* in males and to the lobar apices in females; (iv) hysteronotal shield length is the greatest length from the anterior margin to lobar apices; width is measured at the anterior margin; (v) distance between setae of different pairs is the shortest distance between the transverse levels formed by setae of corresponding pairs;

Depositories of the type materials: QM - Queensland Museum, Brisbane, Australia; TMAG - Tasmanian Museum and Art Gallery, Hobart, Australia; ZISP - Zoological Institute, Saint Petersburg, Russia.

### Family Proctophyllodidae Trouessart and Ménégnin, 1884

#### Subfamily Proctophyllodinae Trouessart and Ménégnin, 1884

#### Genus *Atelophyllodes* gen. n.

Type species: *Atelophyllodes menurae* sp. n.

#### Diagnosis

Both sexes. Proctophyllodine mites of moderate size. Prodorsal shield: entire, covering most of prodorsum, length and greatest width subequal, posterior angles roughly rectangular or rounded, not extending to lateral margins of propodosoma, lateral margins without incision around scapular setae. Complement of idiosomal setae complete for Analgoidea except for vertical setae *vi*. Humeral shields well developed, fused with epimerites III and incorporating bases of setae *cp* and *c3*. Complement of leg setae complete for Proctophyllodidae. Epimerites I fused into a Y. Genua and femora of all legs strongly thickened, over twice as thick as corresponding tarsi. Articulation between genu and femur in all legs immovable. Setae *wa* of tarsi I, II anterior to corresponding setae *ra* and *la*. Solenidion  $\sigma 1$  of genu I longer than solenidion  $\omega 3$  on tarsus I.

Male. Opisthosoma wide, parallel-sided. Opisthosomal lobes short and wide, posterior margin of lobes with extensions bearing setae *f2*, *h2*, *h3*. Terminal lamellae absent. Terminal cleft present, small. Setae *f2* lanceolate, posterior to level of setae *ps2*. Setae *ps1* lanceolate. Setae *h3* large, situated marginally, setiform, comparable in size to setae *h2*. Genital apparatus at level of trochanters IV or posterior to it. Aedeagus short, not much longer than genital arch. Genital papillae close to genital arch. Genital shield(s) absent. Adanal shields represented by small plates at bases of *ps3*. Paragenital apodemes absent. Setae *g* and *ps3* distant from each other, arranged in narrow trapezium. Adanal suckers large, cylindrical (barrel-like). Corolla indented. Legs III, IV subequal in size, not hypertrophied. Solenidion  $\sigma 1$  on genu III approximately at midlevel of segment, longer than segment. Tarsus IV straight, attenuate apically. Setae *d*, *e* button-like.

Female. Females noticeably larger than males. Lobar region clearly demarcated from remaining part of opisthosoma by lateral concavities, shorter than  $\frac{1}{4}$  of hysterosoma. Opisthosomal lobes well developed, with terminal appendages. Terminal cleft V-shaped with rounded bottom. Hysteronotal shield entire, not separated into anterior and lobar parts. Setae *h2* macrosetae, setae *h3* setiform. Setae *ps1* lanceolate. Epigynum roughly semicircular, with short lateral extensions, tips of epigynum not extending to level of genital papillae.

Differential diagnosis. Among 17 previously known genera of Proctophyllodinae (Gaud & Atyeo 1996; Hernandez *et al.* 2007; Mironov 2009), the genus *Atelophyllodes* gen. n. most resembles *Ptyctophyllodes* Atyeo, 1967, associated with Trogonidae (Trogoniformes) (Aty eo 1967), in that males in both genera have short and wide opisthosomal lobes lacking terminal lamellae on their posterior margins. *Atelophyllodes* differs from *Ptyctophyllodes* and also from other known proctophyllodine genera by the following combination features: in both sexes, epimerites I are fused into a Y; genu and femur of legs I, II are over 2 times thicker than corresponding tarsi; in males, lamellar structure on the posterior opisthosoma are completely absent, paragenital apodemes are absent, and anal suckers are large and cylindrical; in females, the hysteronotal shield is not separated into anterior and lobar parts by unsclerotized integument. In both sexes of *Ptyctophyllodes*, epimerites I are fused in a narrow U, tarsi of legs I, II are approximately subequal in thickness to corresponding genu and femur; in males, paragenital apodemes formed by elongated epimerites IVa are present, and anal suckers are disc-like; in females, the hysteronotal shield is clearly separated into anterior and lobar parts. It is necessary to add that in *Ptyctophyllodes*, lamellar structures on opisthosoma are actually present (at least in the form of male which may be referred to as heteromorph), but these lamellae are situated on the dorsal surface of opisthosoma and are directed anteriorly.

Remarks. The fusion of epimerites I into a Y (a rare character state in Proctophyllodinae) is also present in *Anorthalloptes* Atyeo and Gaud, 1976 and *Mimicalges* Atyeo and Gaud, 1971, but males of these genera have quite differently shaped opisthosomas (elongate and attenuate to terminus), and strongly hypertrophied legs IV (Aty eo & Gaud 1971b, 1976).

Etymology. Contraction of *atelēs* (imperfect, G.) and the generic name *Proctophyllodes* to refer to the absence of terminal lamellae in males; gender masculine.

### ***Atelophyllodes menurae* sp. n.**

(Figs 1–3, 6A–E)

Type material. Male holotype, 1 male and 2 female paratypes from *Menura novaehollandiae* Latham, 1802, (TMAG accession number B4171) Australia, Tasmania, Florentine Valley, 42° 49' 34"S 146° 21' 22"E, 21 November 1984; collector A. Truchanas; 2 male paratypes from same host species (TMAG accession number B3668), Australia, Tasmania, Maydena, 42° 45' 22"S 146° 37' 26"E, 6 July 1963, collector unknown. Holotype, 1 female and 2 male paratypes—TMAG; 1 male and 1 female paratype—ZISP.

Male (holotype, range of measurements for 3 paratypes in parentheses). Idiosoma, length x width, 370 (345–355) x 180 (170–190), length of hysterosoma 230 (210–225). Prodorsal shield: lateral margins without incisions, antero–lateral extensions short and acute, posterior margin straight or slightly concave, length of shield 113 (110–115), width at posterior margin 105 (102–110), surface uniformly punctate (Fig. 1A). Scapular setae *se* separated by 62 (60–65). Scapular shields wide, with narrow suprategumental band along inner margin. Setae *c1* on soft tegument near anterior margin of hysteronotal shield. Setae *c2* situated on soft tegument, near anterior margin of humeral shields. Subhumeral setae *c3* lanceolate 24 (20–24) x 5.5 (5–5.5). Hysteronotal shield: greatest length 228 (214–225), width at anterior margin 104 (100–106), anterior margin straight, surface uniformly punctate. Distance between prodorsal and hysteronotal shields along midline 22 (18–25). Opisthosomal lobes wider than long, posterior margin with 3 bidentate extensions bearing bases of setae *h2*, *h3*, *f2*. Terminal cleft angle shaped, wide, with rounded anterior end, 29 (24–30) in length. Supranal concavity semi–ovate, open posteriorly. Setae *f2* lanceolate, 15 (13–15) x 4 (3.5–4), situated posterior to level of *ps2*. Setae *h1* approximately at level of anterior end of terminal cleft. Setae *ps1* lanceolate, 12 (11–12) x 3

(2.5–3), situated on margins of terminal cleft slightly anterior to level of setae *h3*. Distance between dorsal setae: *c2:d2* 80 (77–80), *d2:e2* 75 (65–75), *e2:h3* 69 (55–60), *d1:d2* 51 (48–53), *e1:e2* 13 (15–22), *h1:ps2* 13 (11–13), *f2:f2* 102 (95–100), *h2:h2* 78 (75–78), *h3:h3* 49 (49–51), *ps1:ps1* 33 (33–35), *ps2:ps2* 112 (108–110).

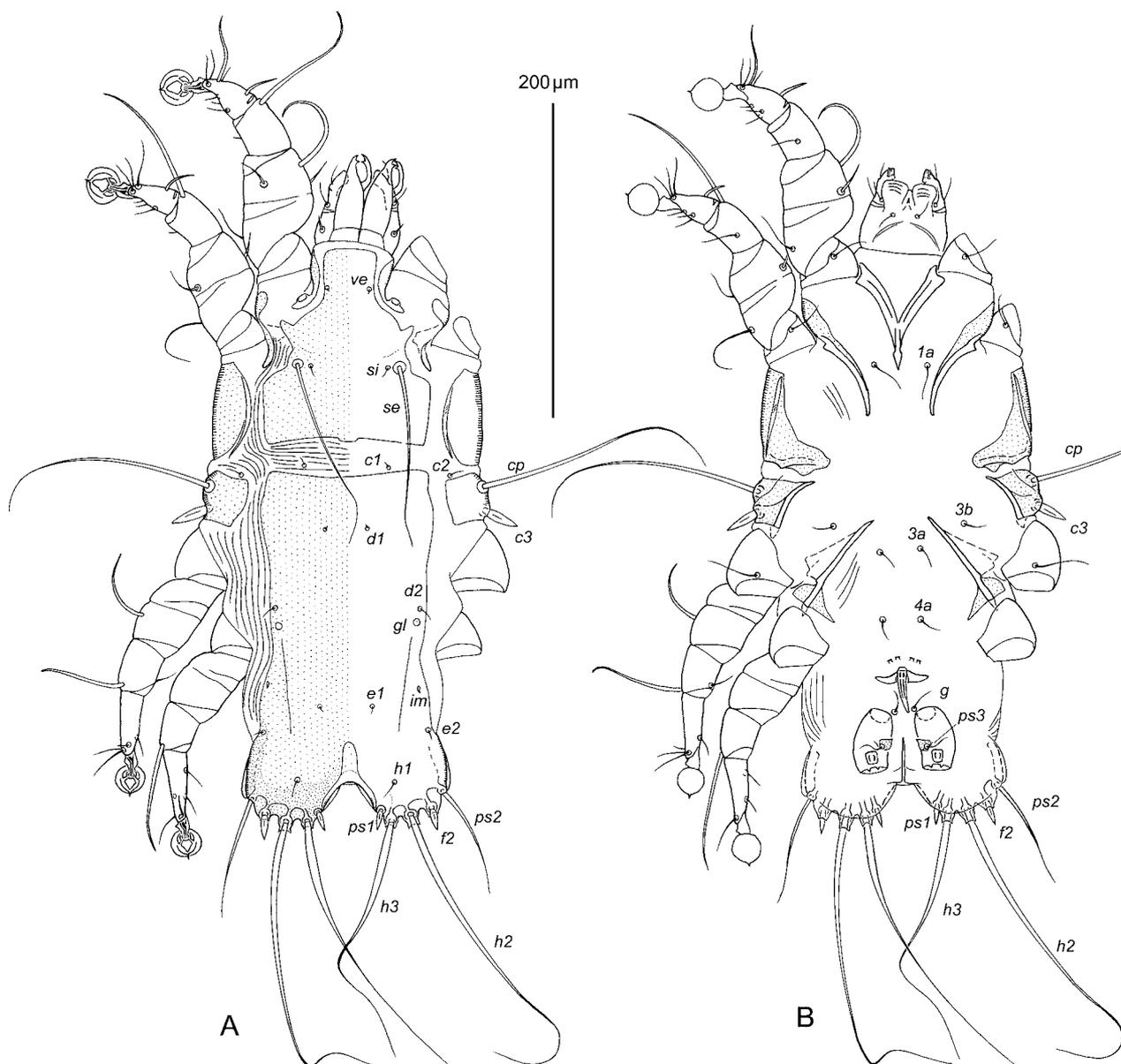
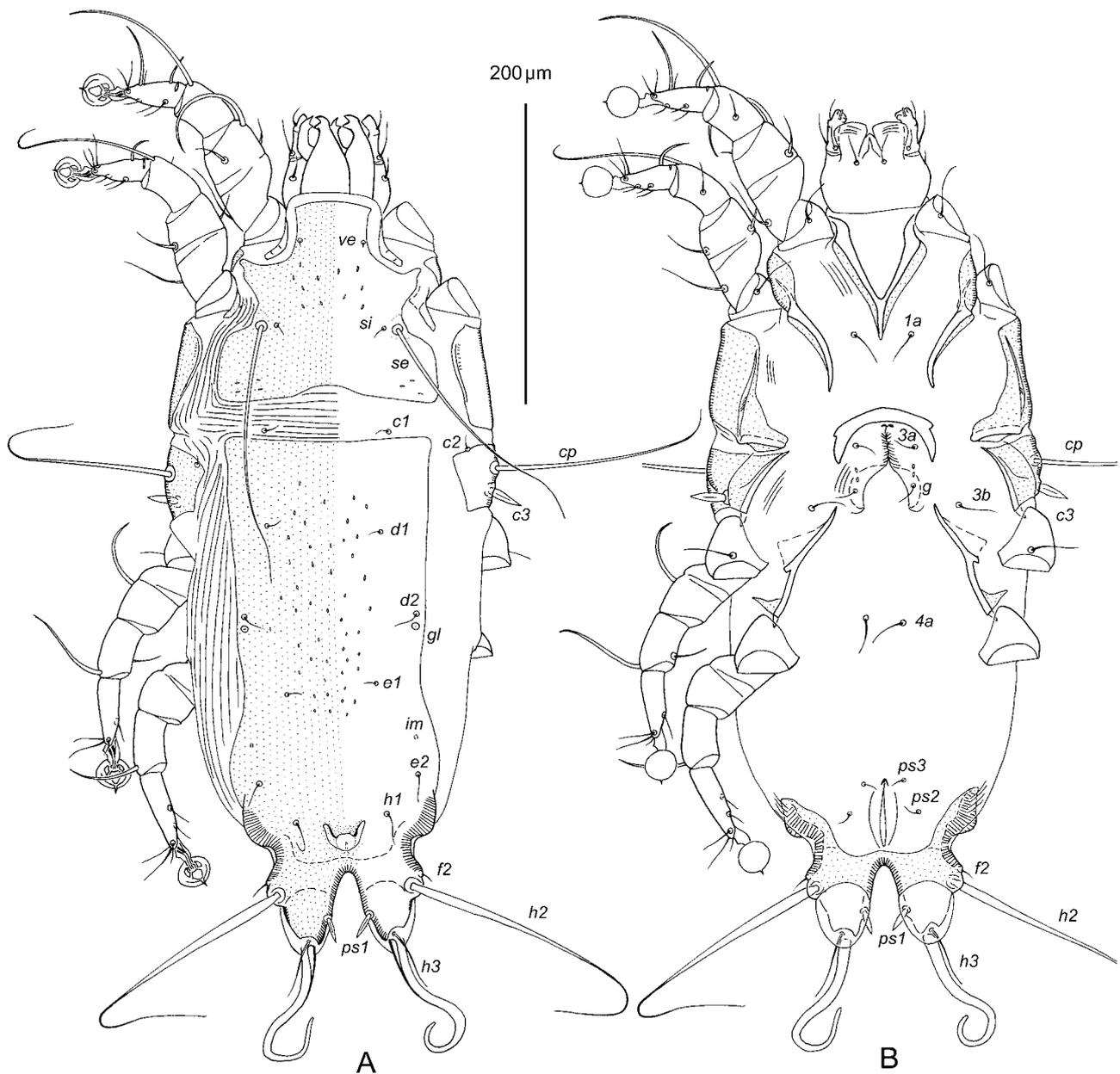


FIGURE 1. *Atelophyllodes menurae* sp. n., male. A—dorsal view, B—ventral view.

Sternum about half the total length of epimerites I (Fig. 1B). Epimerites I–IV without wide sclerotized areas. Sclerotized area of epimerites IIa with narrow longitudinal membrane. Epimerites IIIa extending to level of subhumeral setae *c3*. Epimerites IV with triangle-shaped sclerotized area at bases of trochanters IV. Epimerites IVa absent. Genital apparatus posterior to level of trochanters IV. Genital arch 11 (9–10) in length, 31 (28–30) in width at base. Aedeagus short, dagger-shaped, extending to level of setae *g*, length 29 (26–29). Genital papillae free, arranged in almost transverse row. Anal suckers large, cylindrical, slightly curved, 40 (40–44) long, 20 (18–20) in diameter in apical part, corolla not thickened, with 2 small teeth. Adanal shields as small plates around bases of setae *ps3*. Distance between ventral setae: *3b:3a* 12 (10–13), *3a:4a* 50 (45–50), *4a:g* 58 (53–60), *g:ps3* 22 (22–24), *ps3:ps3* 22 (22–26), *ps3:h3* 50 (44–50).

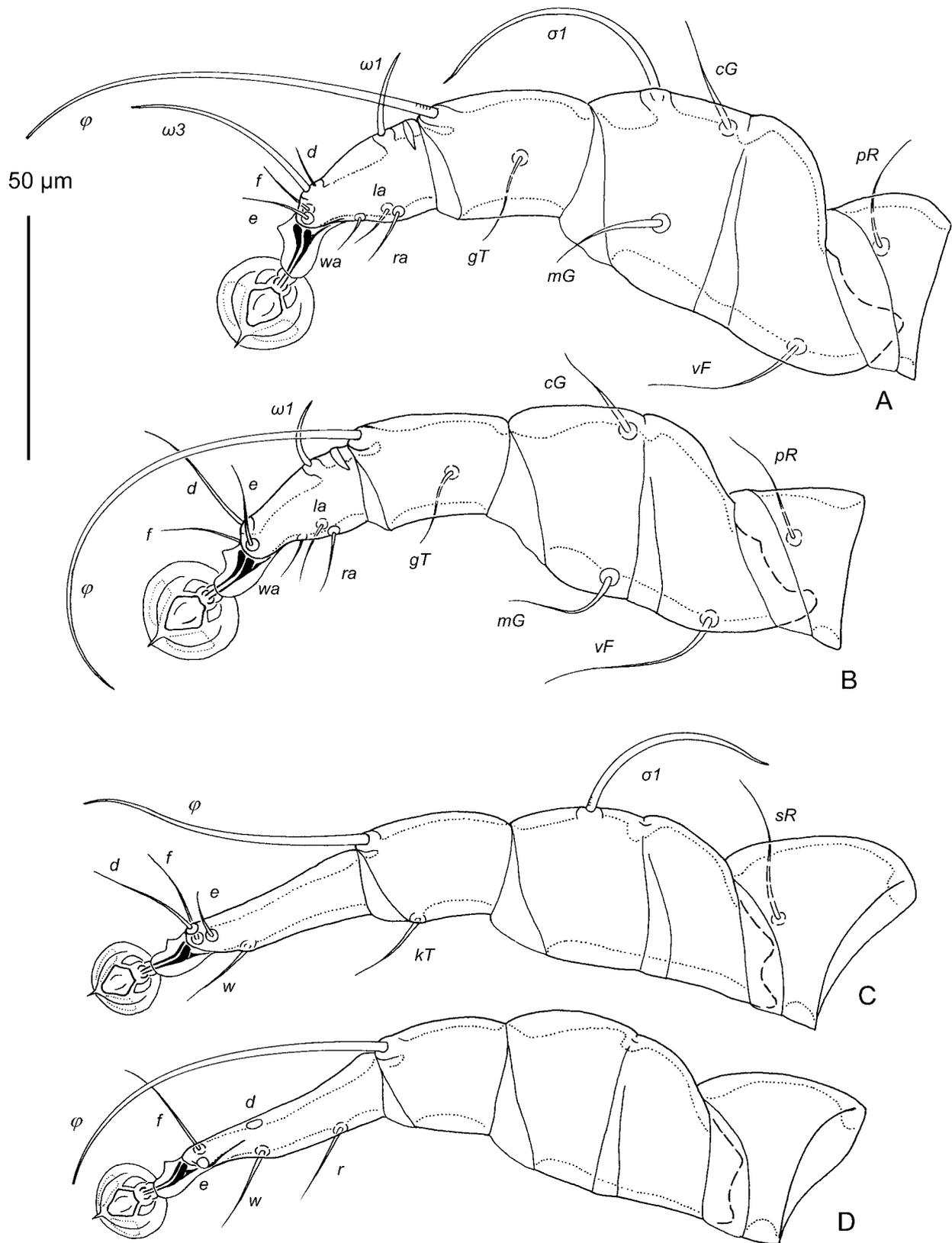


**FIGURE 2.** *Atelophyllodes menurae* sp. n., female. A—dorsal view, B—ventral view.

Genual setae *cGI*, *cGII* thickened basally, with filiform apex; setae *mGI*, *mGII* setiform. Solenidion  $\sigma 1$  of genu III approximately at midlevel of segment (Fig. 3C). Solenidion  $\phi$  of tibia IV extending to distal margin of ambulacral disc. Tarsus IV 44 (44–46) long, with subapical ridge; seta *d* at level of distal third of segment, setae *e* on distal end of subapical ridge (Fig. 3D).

Female (range of measurements for 2 paratypes). Idiosoma, length x width, 515–525 x 230–255, length of hysterosoma 355–365. Prodorsal shield: lateral margins without incisions, antero-lateral extensions short and acute, posterior margin medially with shallow concavity, surface punctate, with small dash-like lacunae in medial part and at posterolateral margins, length along midline 144–150, width at posterior margin 150–155 (Fig. 2A). Setae *se* separated by 95–100. Scapular shields as in male. Setae *c1* on soft tegument near anterior margin of hysteronotal shield. Setae *c2* on anterior margin of humeral shields. Setae *c3* lanceolate, 24–25 x 7–7.5. Distance between prodorsal and hysteronotal shields 35–44. Hysteronotal shield entire, anterior margin straight, total length (from anterior margin to lobar apices) 340–352, length from anterior margin to anterior end of terminal cleft 290–300, width at anterior margin 135–140, surface punctate, with sparse dash-like lacunae in median part. Width of lobar region at level of setae *h2* 105–108. Terminal cleft narrowly V-shaped

with rounded bottom, length 55–57, width at level of setae *ps1* 20–23. Supranal concavity circular, with pair of short grooves directed antero-laterally. Setae *h1* slightly anterior to level of supranal concavity. Setae *ps1* lanceolate, 20–21 x 3, situated on margins of terminal cleft, approximately at midlevel between setae *h2* and *h3*. Setae *h2* 190–200 long. Setae *h3* setiform, 43–45 in length, about 1/3 length of terminal appendages.



**FIGURE 3.** *Atelophyllodes menurae* sp. n., legs of male. A–D—legs I–IV, respectively.

Distance between dorsal setae:  $c2:d2$  115–122,  $d2:e2$  115–138,  $e2:h2$  70–76,  $h2:h3$  30–33,  $d1:d2$  55–58,  $e1:e2$  60–64,  $h1:h2$  46–51,  $h1:h1$  63–65,  $h2:h2$  90–93,  $h3:h3$  57–63,  $h2:ps1$  22–24.

Sternum about 1/3 of total length of epimerites I. Epimerites I–IV without large sclerotized areas. Sclerotized area of epimerites IIa with narrow longitudinal membrane (Fig. 3B). Epimerites IVa absent. Translobar apodemes of opisthosomal lobes present, fused to each other anterior to terminal cleft. Epigynum bow-shaped, 33–36 in length, 68–70 in width. Copulatory opening on posterior margin of supranal concavity; spermatheca and spermatheca as in Fig 6E. Distance between pseudanal setae:  $ps2:ps2$  48–50,  $ps3:ps3$  24–26,  $ps2:ps3$  20–22. Setae  $ps2$  situated at midlevel of anal opening.

General structure of legs I–IV as in male, except for relatively longer tarsi. Setae  $d$ ,  $f$  of tarsi III, IV subequal in length, corresponding setae  $e$  noticeably shorter. Solenidion of tibia IV slightly shorter than that on tibia III.

Etymology. The specific epithet derives from the generic name of the type host, and is a noun in the genitive case.

Note about the host: *Menura novaehollandiae* is not native to Tasmania. The species was introduced from the mainland Australian state of Victoria for conservation purposes, due to fear of extinction on the mainland from predation by foxes and hunting by humans (Higgins *et al.* 2001). Twenty birds were released in Tasmania between 1934 and 1949.

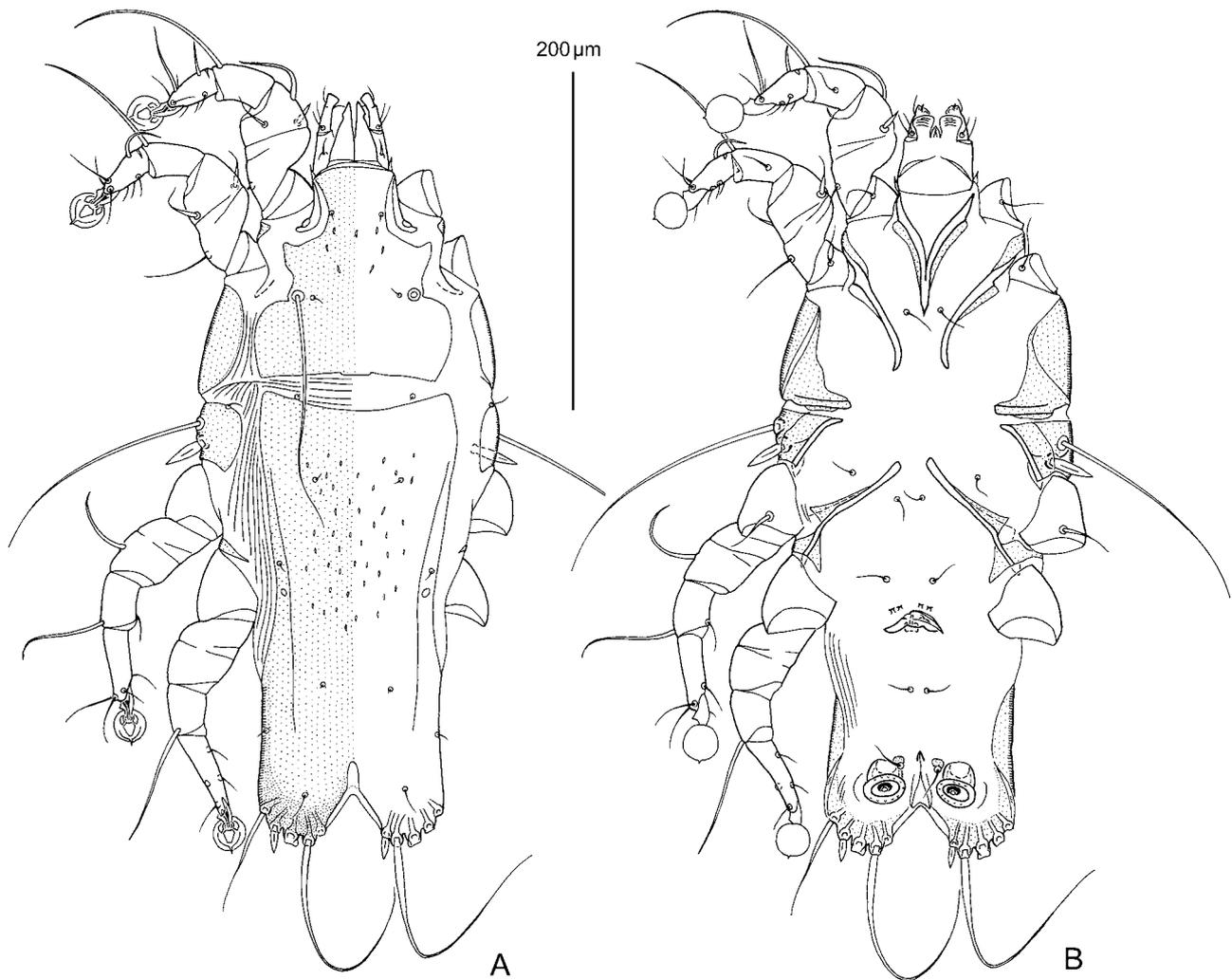
### ***Atelophyllodes atyeoi* sp. n.**

(Figs 4, 5, 6F–I)

Type material. Male holotype and 3 female paratypes from *Menura alberti* Bonaparte, 1850 (Queensland Museum accession number O.4427), Australia, Queensland, Acacia Plateau, 152° 18'E, 28° 20' S; 28 August 1947, collector unknown. Holotype (Queensland Museum accession number S88090) and 2 female paratypes (S88091, S88092)—QM; 1 female paratype—ZISP.

Male (holotype). Idiosoma, length x width, 392 x 177, length of hysterosoma 265. Prodorsal shield: lateral margins without incisions, antero-lateral extensions short and acute, posterior margin slightly concave, length of shield 122, width at posterior margin 110, surface uniformly punctate, with several dash-like lacunae in anterior part (Fig. 5A). Scapular setae  $se$  separated by 69. Scapular shields wide. Setae  $c1$  on soft tegument or on anterior margin of hysteronotal shield. Setae  $c2$  situated on anterior margin of humeral shields. Subhumeral setae  $c3$  lanceolate, 26 x 4.5. Hysteronotal shield: greatest length 258 (214–225), width at anterior margin 120, anterior margin concave, surface punctate, with small dash- and pit-like lacunae. Distance between prodorsal and hysteronotal shields 20. Opisthosomal lobes wider than long, posterior margin with 3 truncate extensions bearing bases of setae  $h2$ ,  $h3$ ,  $ps1$ . Setae  $h2$  missing in holotype. Terminal cleft angle-shaped, wide, with rounded anterior end, 31 in length. Supranal concavity semi-ovate, open posteriorly. Setae  $f2$  lanceolate, 10 x 3.5, situated posterior to level of  $ps2$ . Setae  $h1$  slightly anterior to level of anterior end of terminal cleft. Setae  $ps1$  lanceolate, 10 x 3.5, situated on margins of terminal cleft slightly anterior to level of setae  $h3$ . Distance between dorsal setae:  $c2:d2$  98,  $d2:e2$  93,  $e2:h3$  65,  $d1:d2$  51,  $e1:e2$  22,  $h1:ps2$  14,  $f2:f2$  88,  $h2:h2$  73,  $h3:h3$  53,  $ps1:ps1$  33,  $ps2:ps2$  100.

Sternum about 1/3 of total length of epimerites I (Fig. 5B). Epimerites I–IV without wide sclerotized areas. Sclerotized area of epimerites IIa with narrow longitudinal membrane. Epimerites IIIa extending to level of subhumeral setae  $c3$ . Epimerites IV with triangle-shaped sclerotized area at bases of trochanters IV. Epimerites IVa absent. Genital apparatus at level of trochanters IV. Genital arch 13 in length, 31 in width at base. Aedeagus short, dagger-shaped, 22 in length, extending slightly beyond base of arch, but does not extending to setae  $g$ . Genital papillae free, arranged in almost transverse row. Anal suckers large, cylindrical, slightly curved, with thickened corolla, 22 long, 23 in diameter at apical part, corolla with several small indentations. Adanal shields as small plates around bases of setae  $ps3$ . Distance between ventral setae:  $3b:3a$  13,  $3a:4a$  46,  $4a:g$  64,  $g:ps3$  42,  $ps3:ps3$  22,  $ps3:h3$  51.



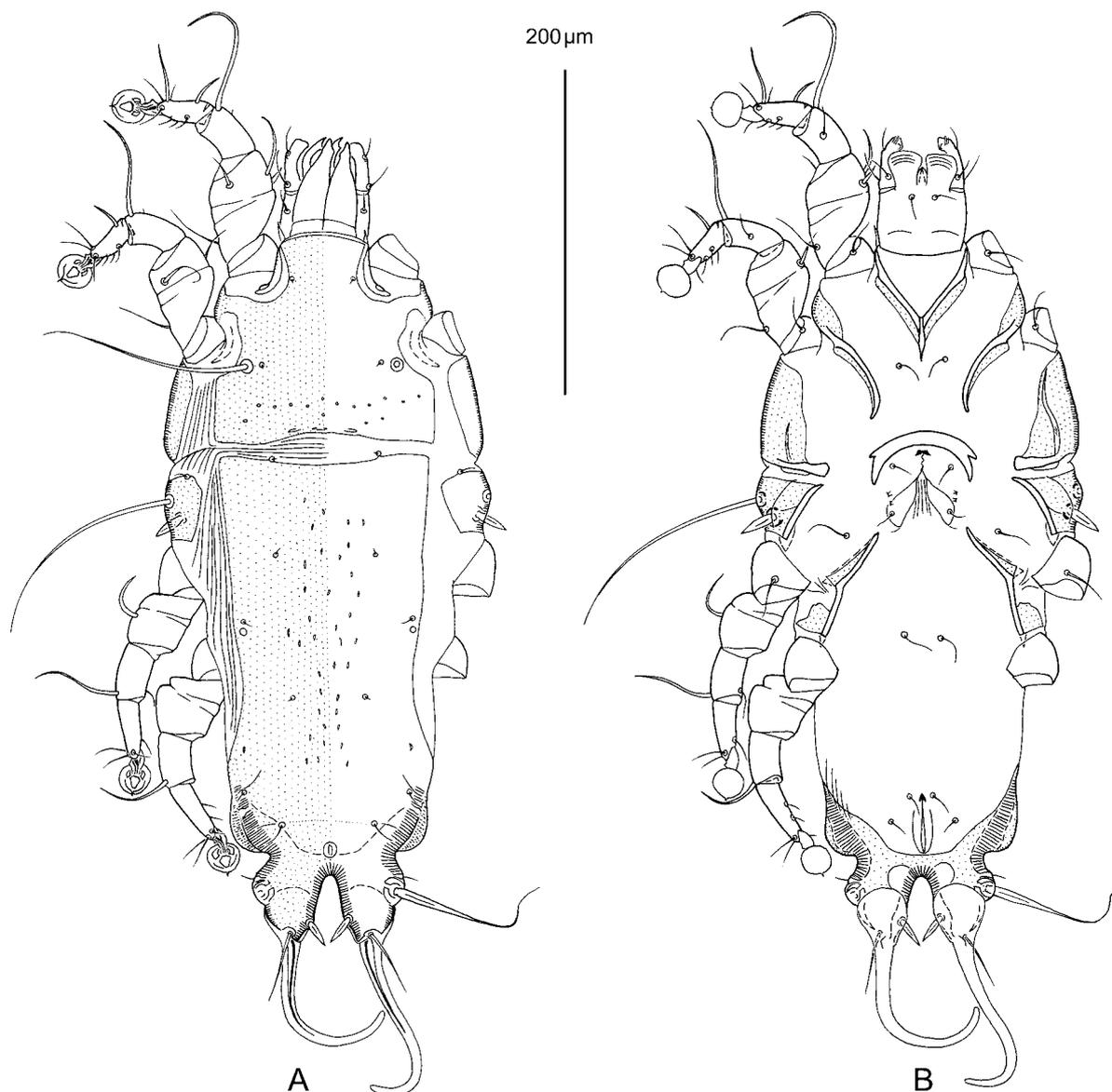
**FIGURE 4.** *Atelophyllodes atyeoi* sp. n., male. A—dorsal view, B—ventral view.

Genual setae *cGI* narrowly lanceolate; setae *cGII*, *mGI*, *mGII* thickened basally, with filiform apex (Figs. 6F, G). Solenidion  $\sigma 1$  of genu III approximately at midlevel of segment. Solenidion  $\phi$  of tibia IV extending to distal margin of ambulacral disc. Tarsus IV 51 long, with short apical extension; seta *d* situated at level of distal third of segment, seta *e* on apical extension (Fig. 6H).

Female (range of measurements for 3 paratypes). Idiosoma, length x width, 445–462 x 200–210, length of hysterosoma 305–320. Prodorsal shield: lateral margins without incisions, antero-lateral extensions fused with bases of epimerites Ia, posterior margin slightly concave, surface punctate, with small dash- and pit-like lacunae in posterior part, length along midline 130–137, width at posterior margin 140–145 (Fig. 5A). Setae *se* separated by 90–95. Scapular shields wide. Setae *c1* on soft tegument or on anterior margin of hysteronotal shield. Setae *c2* on anterior margin of humeral shields. Setae *c3* lanceolate, 22–24 x 7. Distance between prodorsal and hysteronotal shields 12–15. Hysteronotal shield entire, anterior margin straight or slightly concave, total length 310–320, length from anterior margin to anterior end of terminal cleft 263–280, width at anterior margin 135–140, surface punctate, with sparse dash-like lacunae in median part. Width of lobar region at level of setae *h2* 95–97. Terminal cleft V-shaped with rounded bottom, length 44–46, width at level of setae *ps1* 17–20. Supranal concavity circular. Setae *h1* anterior to level of supranal concavity. Setae *ps1* lanceolate, 22–23 x 4, situated on margins of terminal cleft, closer to level of setae *h3*. Setae *h2* about 100 long (retained only in one paratype). Setae *h3* setiform, 40 long, about 1/3 length of terminal appendages.

Distance between dorsal setae:  $c2:d2$  93–98,  $d2:e2$  105–110,  $e2:h2$  62–66,  $h2:h3$  26–28,  $d1:d2$  44–45,  $e1:e2$  60–64,  $h1:h2$  43–44,  $h1:h1$  53–58,  $h2:h2$  82–85,  $h3:h3$  46–55,  $h2:ps1$  13–17.

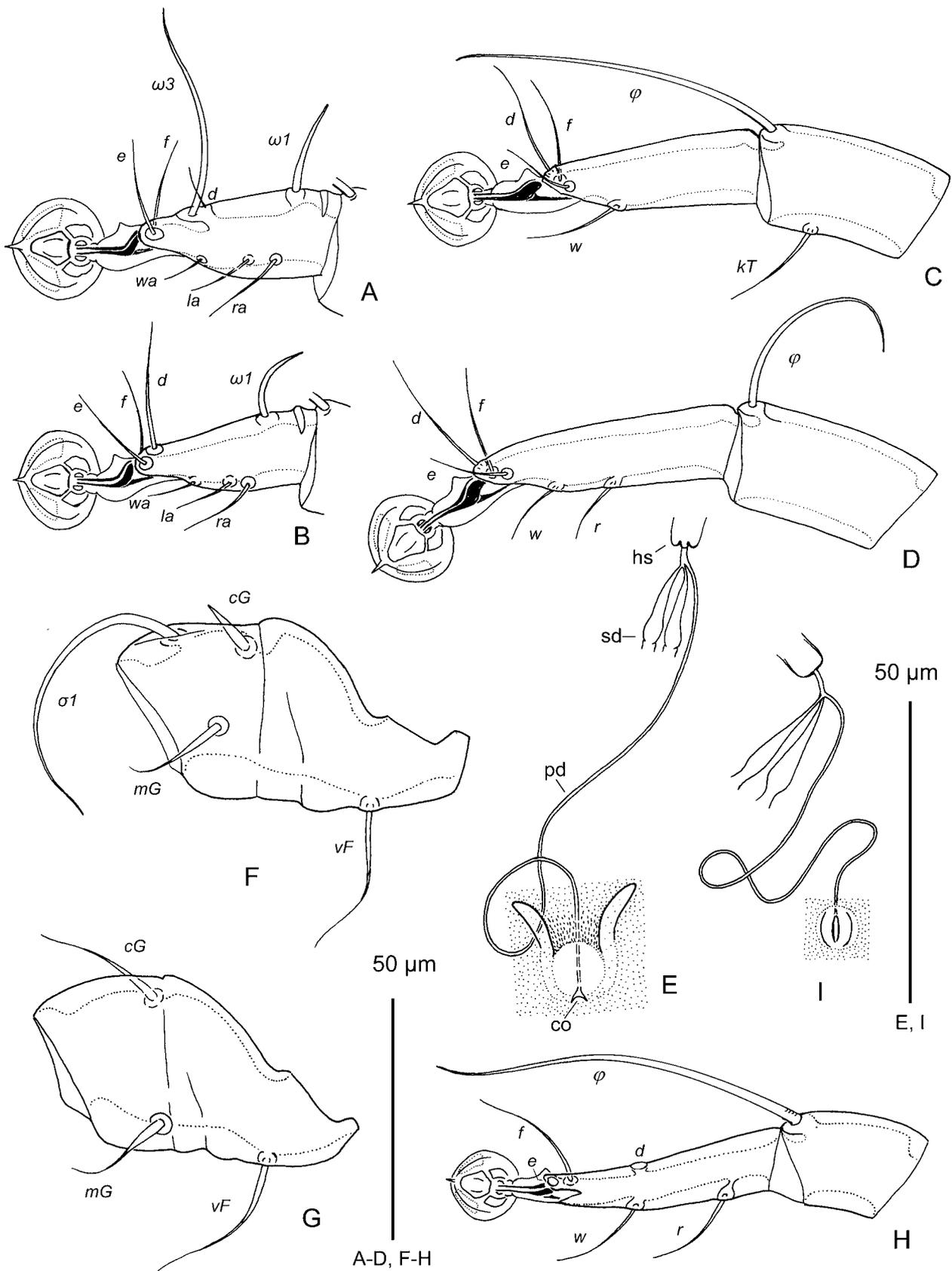
Sternum about 1/3 of total length of epimerites I (Fig. 5B). Epimerites I–IV without large sclerotized areas. Sclerotized area of epimerites IIa with narrow longitudinal membrane (in some individuals, this membrane may be short or absent on one side of body). Epimerites IVa absent. Translobar apodemes of opisthosomal lobes present, fused to each other anterior to terminal cleft. Epigynum thick bow-shaped, length 35–38, width 64–67. Copulatory opening represented by small slit in central part of supranal concavity; spermatheca and spermaducts as in Fig 6I. Distance between pseudanal setae:  $ps2:ps2$  40–44,  $ps3:ps3$  15–17,  $ps2:ps3$  15–18. Setae  $ps2$  situated at midlevel of anal opening.



**FIGURE 5.** *Atelophyllodes atyeoi* sp. n., female. A—dorsal view, B—ventral view.

General structure of legs I–IV as in male, except for relatively longer tarsi. Setae  $d$ ,  $f$  of tarsi III, IV subequal in length, corresponding setae  $e$  noticeably shorter. Solenidion  $\phi$  of tibia IV slightly shorter than that on tibia III.

**Etymology.** This species is named in honour of Tom Atyeo, one of the greatest feather mite systematists, who passed away in October 2008.



**FIGURE 6.** *Atelophyllodes* species, details. A–E—*Atelophyllodes menurae* sp. n., F–I *A. atyeoi* sp. n. A—tarsus I of female, B—tarsus II of female, C—tibia and tarsus III of female, D—tibia and tarsus IV of female, E—spermatheca and spermaducts, F—femur and genu I of male, G—femur and genu II of male, H—tibia and tarsus IV of male, I—spermatheca and spermaducts. co—copulatory opening, hs—head of spermatheca, pd—primary spermduct, sd—secondary spermduct.

## Key to *Atelophyllodes* species

1. Genual setae *cGI* thickened basally, with filiform apex (Fig. 3A). In males, genital organ posterior to level of trochanters IV; anal suckers twice as long as they are wide, corolla not thickened, with two small teeth; button-like seta *e* of tarsus IV at level of setae *f*; subapical ridge on tarsus IV present. In females, antero-lateral extensions of prodorsal shield free; supranal concavity circular, with two short grooves directed antero-laterally; macrosetae *h2* extending far beyond apices of terminal appendages ..... *Atelophyllodes menuræ* sp. n.
- Genual setae *cGI* lanceolate (Fig. 6F). In males, genital organ at level of trochanters IV; anal suckers as long as wide, corolla thickened, with several small indentations; button-like seta *e* situated on short apical extension of tarsus IV; subapical ridge on tarsus IV absent. In females, antero-lateral extensions of prodorsal shield extending to lateral margins of body and fused with bases of epimerites Ia; supranal concavity circular; macrosetae *h2* not extending to apices of terminal appendages ..... *Atelophyllodes atyeoi* sp. n.

## Acknowledgements

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## References

- Atyeo, W.T. (1967) Two new feather mite genera with polymorphic males (Analgoidea: Proctophyllodidae). *Journal of the Kansas Entomological Society*, 40, 465–471.
- Atyeo, W.T. & Braasch, N.L. (1966) The feather mite genus *Proctophyllodes* (Sarcoptiformes: Proctophyllodidae). *Bulletin of the University of Nebraska State Museum*, 5, 1–354.
- Atyeo, W.T. & Gaud, J. (1971a) A new genus of feather mites near *Proctophyllodes* Robin, 1877 (Analgoidea: Proctophyllodidae). *Journal of the Georgia Entomological Society*, 6, 43–50.
- Atyeo, W.T. & Gaud, J. (1971b) *Mimicalges*, an analgid-like genus of Proctophyllodidae (Acarina: Analgoidea). *Folia Parasitologica*, 18, 51–53.
- Atyeo, W.T. & Gaud, J. (1976) The probable association of a new genus of Proctophyllodidae with a New Guinean parrot (Acarina: Analgoidea). *Journal of the Kansas Entomological Society*, 49, 489–491.
- Gaud, J. & Atyeo, W.T. (1996) Feather mites of the World (Acarina, Astigmata): the supraspecific taxa. *Musée Royal de l'Afrique Centrale, Annales, Sciences Zoologiques*, 277, Pt. I, 193 pp.; Pt. II, 436 pp.
- Hernandes, F.A., Valim, M.P. & Mironov, S.V. (2007) Four new species and one new genus of the feather mite subfamily Proctophyllodinae (Astigmata: Proctophyllodidae) from Brazil. *Journal of Natural History*, 41 (41–44), 2653–2681.
- Higgins, P.J., Peter, J.M. & Steele, W.K. (2001) *Handbook of Australian, New Zealand & Antarctic Birds, Volume 5, Tyrant-flycatchers to Chats*. Oxford University Press, Oxford, 1269 pp.
- Jønsson, K.A. & Fjeldså, J. (2006) A phylogenetic supertree of oscine passerine birds (Aves: Passeri). *Zoologica Scripta*, 35, 149–186.
- Kudon, L.H. (1982) *Platyacarus*, a new genus of feather mites (Acarina: Proctophyllodidae). *Journal of the Georgia Entomological Society*, 17, 337–346.
- Mironov, S.V. (2009) Phylogeny of feather mites of the subfamily Pterodectinae (Astigmata: Proctophyllodidae) and their host associations with passerines (Aves: Passeriformes). *Proceedings of Zoological Institute RAS*, 313, 97–118.
- Park, C.K. & Atyeo, W.T. (1971) A generic revision of the Pterodectinae, a new subfamily of feather mites (Sarcoptiformes: Analgoidea). *Bulletin of the University of Nebraska State Museum*, 9, 39–88.
- Trouessart, E.L. (1884) 1885. Note sur la classification des Analgésiens et diagnoses d'espèces et de genres nouveaux. *Bulletin de la Société d'Etudes scientifiques d'Angers*, 14, 46–89.