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VERSITA

New feather mite species (Acari, Astigmata) from the Sulphur-crested Cockatoo *Cacatua galerita* and Yellow-crested Cockatoo *C. sulphurea* (Psittaciformes, Cacatuidae)

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Abstract

Two new genera and three new species of feather mites (Astigmata, Pterolichoidea, Analgoidea) are described from two closely related species of cockatoos, *Cacatua galerita* (type host) and *C. sulphurea* (Psittaciformes, Cacatuidae): *Astrolabelichus caudatus* gen. nov., sp. nov. (Pterolichidae), *Psittophagus lacunosus* sp. nov. (Pterolichidae), and *Cacatualges microdiscus* gen. nov., sp. nov. (Xolalgidae). The presence of the same set of mite species on these two species of parrots points to a very close affinity of *Cacatua sulphurea* and *C. galerita* and gives additional support for the recent hypothesis of the conspecificity of these birds.

Key words

Feather mites, new taxa, host-parasite relationships, Cacatuidae

Introduction

Feather mites (Acari, Astigmata) are a vast group of ectoparasites and commensals of birds. Several analyses have shown that cospeciation (or more probably evolutionary tracking) is a main mechanism in evolution of these mites, often resulting in similar topologies of mite and host phylogenetic trees (reviewed by Dabert 2005). Simple comparisons of the host range of particular feather mite taxa also show that particular bird taxa are well defined by particular closely related feather mite taxa. Only few described feather mite species are actually polyxenous and display a wide range of hosts, e.g. some Epidermoptidae (Fain 1965). Much more frequently feather mite species inhabit only few closely related hosts (oligoxeny) or are restricted to only one host species (monoxeny).

During investigation of feather mite fauna of parrots from the Australasian region we have examined two closely related species of cockatoos, the Sulphur-crested Cockatoo *Cacatua sulphurea* (J.F. Gmelin, 1788) and Yellow-crested Cockatoo *C. galerita* (Latham, 1790). These cockatoos are frequently treated as different species (e.g. Forshaw 1989, Sibley and Monroe 1990, Del Hoyo *et al*. 1997); however, studies based on molecular data have revealed that both species are phylogenetically very close (Brown and Toft 1999) or even conspecific (Schliebusch and Schliebusch 2001). Our analysis of feather mites inhabiting these two birds has shown that both have the same set of three new species of feather mites. This observation may be an additional argument for the hypothesis suggesting a conspecificity of these two cockatoos.

Materials and methods

The mite material was collected by the junior co-author (M.S.) in Zoological State Collection, Munich (Germany) from dry museum skins of parrots. Mites were extracted from the bird sample by hand according to the feather-ruffling method of Gaud and Atyeo (1996) and preserved in 70% ethanol. For light microscope study mites were mounted on slides in Faure medium (Evans 1992). Before mounting, mites were softened and cleared in 10% lactic acid at +55°C for 3–4 days.

The descriptions of new taxa follow the standard schemes used for related taxa of feather mites (Gaud and Atyeo 1996, Mironov *et al*. 2003). The nomenclature of idiosomal chaetotaxy follows Griffiths *et al*. (1990) and leg chaetotaxy is that of Atyeo and Gaud (1966). Taxonomic system, Latin and common names of hosts follow Del Hoyo *et al*. (1997). All measurements in the descriptions are given in micrometres (μm). Dimension ranges of male paratypes are given in parentheses following holotype data. Idiosoma length was meas-

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ured from the anterior margin of the prodorsum to the posterior end of the opisthosoma or to the level of the lobar apices excluding terminal lamellae (if present). Idiosoma width was measured at the level of setae *c2*. Length of the prodorsal shield was measured along its median line, and width at the widest portion posterior to the row of scapular setae *se* and *si*. The length of interlobar cleft in males was measured from the anterior end of the cleft to the level of setae *h3*. Measurements of distances between idiosomal setae of different pairs refer to the distance between transverse rows formed by setal pairs.

Abbreviations used in accession numbers of mite specimens and for institutions where materials are deposited are as follows: AMU – A. Mickiewicz University, Poznań, Poland; ZSM – Zoological State Collection, Munich, Germany.

Results

Family Pterolichidae Trouessart et Mégnin, 1884
Subfamily Pterolichinae Trouessart et Mégnin, 1884

Astrolabelichus gen. nov.

Type species: *Astrolabelichus caudatus* gen. nov., sp. nov. from *Cacatua galerita* (Psittaciformes, Cacatuidae).

Diagnosis: Pterolichine mites with almost rectangular subcapitulum. Pronotum without anterior horn-like extensions. Dorsal shields covering most of dorsal body surface. Prodorsal shield trapezoidal, not fused with scapular shields, with weakly developed antero-lateral extensions and with lateral incisions around setae *se*. Humeral shield separated into anterior and posterior fragments. Vertical setae *vi* and dorsal hysteronotal setae *e1*, *e2*, *f2* absent; dorsal hysteronotal setae *c1*, *d1*, *h1* present. Scapular setae *si* simple, setiform. Subhumeral setae *c3* lanceolate. All dorsal hysteronotal setae simple, setiform. Lateral idiosomal setae *c2*, *d2* short. Lateral bands of hysterosoma absent. Openings *gl* of hysteronotal glands absent; cupules *ia* present, situated posterior to setae *c2*; cupules *im* large, circular, positioned at level of trochanters IV or slightly posterior. Epimerites I free or V-shaped. Bases of epimerites I–IV not enlarged; coxal fields I, II without sclerotized areas. Tarsi I, II, longer than wide, cylindrical, without apicodorsal spines. Setae *ba* closer to setae *d* than to solenidion *ω1* on tarsi I, II. Solenidion *σ2* on genu I absent. Tibial setae *kT* III present, *kT* IV absent. Ambulacral discs circular, with two very small teeth on distal margin.

Males: Opisthosoma much narrower than greatest width of the body at sejugal region, with short, wide and apically rounded opisthosomal lobes. Posterior ends of the lobes with tongue-like terminal lamellae bearing transverse ridges on dorsal surface. Interlobar cleft roughly triangular; supranal concavity present, opens posteriorly to interlobar cleft. Setae *h1* distant from the terminal complex of setae, situated approximately at level of supranal concavity. Setae *3b*, *3a* arranged in transverse row, both anterior to setae *g*. Genital organ located approximately at level of trochanters III. Genital apodemes formed by enlarged epimerites IVa, extending anteriorly to the level of genital organ. Adanal suckers ovate, with wide radially striated membranes; corolla smooth. Adanal shields absent. Legs IV slightly hypertrophied, thicker than remaining ones. Tarsus IV with claw-like apicodorsal, paraxial apophysis. Seta *d* of tarsus IV reduced to small button; seta *e* absent (Fig. 3A).

Females: Posterior one third of opisthosoma modified into narrow cone-shaped terminal extension carrying terminal complex of setae and copulatory opening on its apex (Figs 2B and 3B). Hysteronotal shield split into main body and pygidial shield by transverse band of soft tegument at level of setae *h1*. Supranal concavity absent. Epigynum bow-like, situated at level of posterior ends of epimerites IIa.

Differential diagnosis

Within the *Rhytidelasma* generic group (Gaud and Atyeo 1996, Mironov and Pérez 2003a, Mironov *et al*. 2003), the

Table I. Setal characters of genera belonging to the *Rhytidelasma* generic group

Species	Setae						
	hysteronotum					tibiae	
	c1	*d1*	*e1*	*e2*	*f2*	*kT* III	*kT* IV
Arhytidelasma Gaud et Atyeo, 1996	+	–	–	–	–	–	–
Ceratolichus Dabert, Mironov et Ehrnsberger, 2004	+	–	–	–	–	–	–
Charmosylichus Dabert, Mironov et Ehrnsberger, 2004	+	–	–	–	–	+	+
Lorilichus Atyeo et Gaud, 1991	+	–	–	–	–	+	+
Astrolabelichus gen. nov.	+	+	–	–	–	+	–
Cacatolichus Mironov et Pérez, 2003	+	–	+	–	–	+	+
Psittocolus Gaud et Atyeo, 1996	+–	+	+	+	–	+–	–
Coracopsobius Gaud et Atyeo, 1996	+	+	+	–	–	+	+
Kakapolichus Mironov et Pérez, 2003	+	+	+	+	–	+	+
Neorhytidelasma Mironov et Pérez, 2003	+	+	+	+	–	+	+
Rhytidelasma Gaud, 1966	+	+	+	–	+–	+	+
Psitrichobius Mironov et Pérez, 2003	+	+	+	–	+	+	+

new genus belongs to the complex of genera that is characterized by loss of idiosomal setae *e1*, *e2*, and *f2* (*Arhytidelasma* Gaud et Atyeo, 1996, *Ceratolichus* Dabert, Mironov et Ehrnsberger, 2004, *Charmosylichus* Dabert, Mironov et Ehrnsberger, 2004, and *Lorilichus* Gaud et Atyeo, 1991; Table I). However, the new genus is easily distinguished by the unique combination of lost and retained setae on hysteronotum and legs. In contrast to the above-mentioned four genera it is the only genus that retains setae *d1*. In addition, only *Astrolabelichus* has tibial setae *kT* III present and *kT* IV absent. Among the

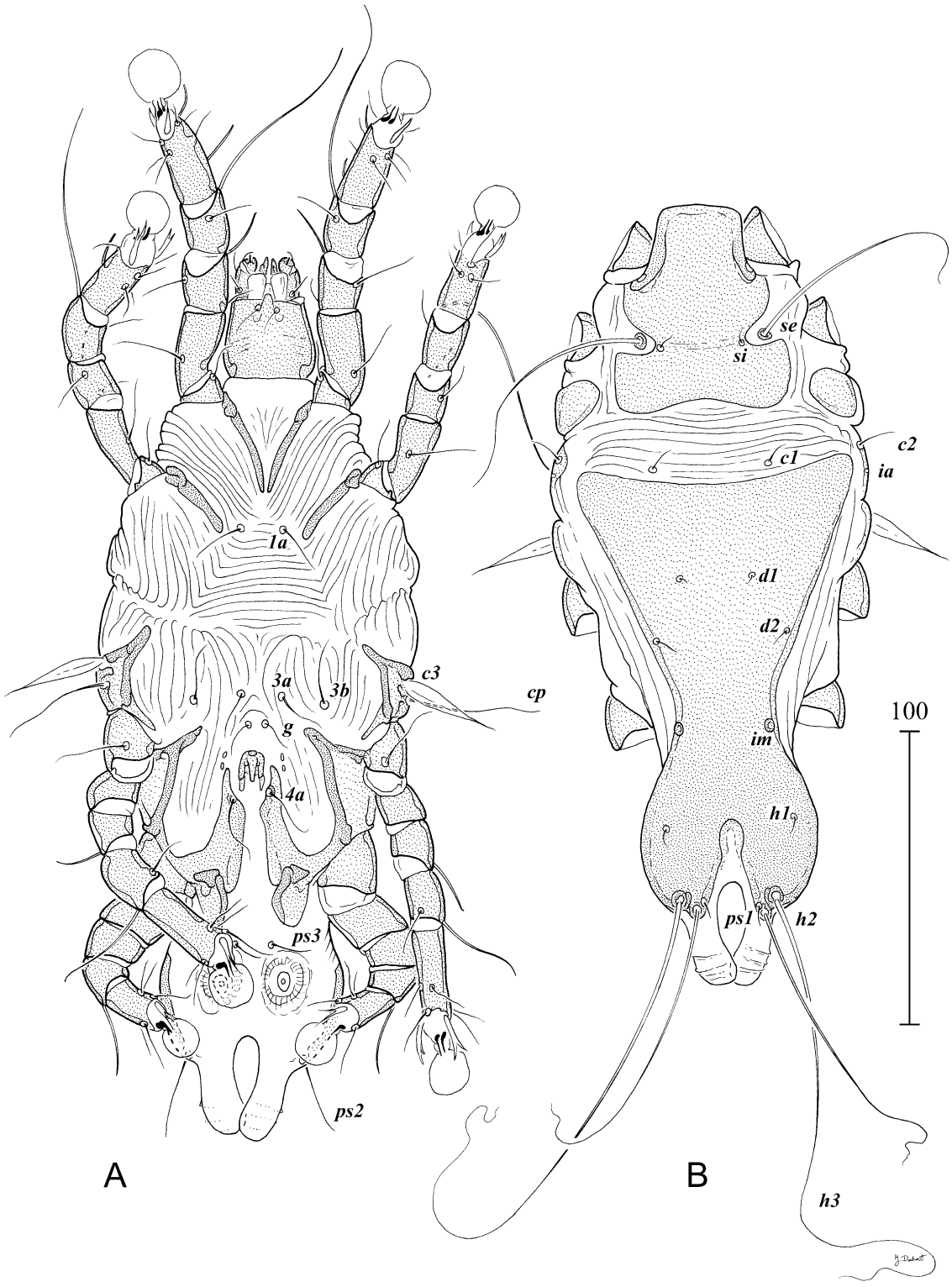

Fig. 1. Male of *Astrolabelichus caudatus* gen. nov., sp. nov.: **A** – ventral view, **B** – dorsal view

four genera mentioned above, these tibial setae are either both present (*Charmosylichus*, *Lorilichus*) or both absent (*Arhytidelasma, Ceratolichus*). Only in *Psittocolus tenuis* (Trouessart, 1884) setae *kT* of tibiae III and IV are arranged as in *Astrolabelichus*; but *Psittocolus* species retain hysteronotal setae *e1* and *e2*, which are absent in the new genus.

Probably the bizarre tail-shaped opisthosoma in females of *Astrolabelichus*, absent in all other members of the *Rhytidelasma* group, is a generic character; however, this interpretation awaits the discovery of more members of the new genus.

Etymology

Contraction of Astrolabe Bay, the locality of the specimens of the type species of the genus, and *Pterolichus*.

***Astrolabelichus caudatus* sp. nov.** (Figs 1–3)

Diagnosis: Monotypic genus – generic characters serve as diagnostic features of the species.

Type material from *Cacatua galerita*: 1 male holotype, 3 male and 3 female paratypes, Astrolabe Bay, New Guinea, 1900, coll. B. Hagen, AMU01744. One male and one female paratypes are deposited at ZSM, holotype male and remaining paratypes at AMU.

Additional material from *C. sulphurea*: 5 males and 3 females, Timor, 28 July 1911, coll. C.B. Haniel, AMU01745.

Description: Males (Figs 1A, B and 3A). Subcapitulum of gnathosoma almost rectangular, length 28, width 33 (size range in 3 paratypes 28–32 × 32–40). Body elongated L/W = 2.2–2.4. Idiosoma length of holotype 240, width 103 (230–252 × 95–113). Dorsal shields uniformly dotted, without ornamentation. Prodorsal shield 72 (67–73) in length, 63 (62–67) in width, with straight anterior margin and posterior angles widely rounded. Shield laterally incised around bases of setae *se*. Distance between scapular setae: *se-se* 40 (41–43), *si-si* 29 (27–31). Hysterosoma strongly narrowing from level of humeral shields to level of trochanters IV; opisthosomal part with convex lateral margins. Hysteronotal shield 165 (156–170) in length, 98 (92–103) in width; anterior margin concave; surface uniformly punctured. Hysteronotal gland openings *gl* absent. Hysteronotal lateral sutures visible from the anterior angles of the hysteronotal shield to level slightly posterior to cupules *im*. Cupules *im* with well-sclerotized margins set at level of trochanters IV. Supranal concavity elliptical, opens terminally into roughly triangular terminal cleft; length of cleft including supranal concavity 20 (20–22). Subhumeral setae *c3* lanceolate with thin distal part. Setae *h1* setiform, approximately as long as setae *c2*, *d2*, and *ps1*, located at level of anterior end of supranal concavity. Opisthosoma with short and rounded opisthosomal lobes. Terminal lamellae spatulate, slightly converging to midline, with 3–4 strong transverse ridges on dorsal side, length of lamellae from base of setae *h3* 22 (23–28), width at base 17 (12–13). Gap between lamellae elliptical, greatest width of gap 12 (8–17). Distances between setae and cupules: *c1-c1* 39 (38–43), *c1-d1* 36 (32–42), *d1-d2* 22 (21–27), *h1-h1* 44 (31–45), *h3-h3* 27 (23–32), *d2-h1* 69 (60–72), *d2-im* 31 (22–27). Epimerites I free, with posterior ends very close to each other (fused into a V in some paratypes). Genital apparatus slightly posterior to level of trochanters III; aedeagus short, not longer than genital arch. Trochanters IV flanked by narrow band connecting bases of epimerites IV and IVa. Epimerites IVa strongly elongated forming genital apodemes encompassing bases of setae *4a* and reaching midlevel of genital arch. Genital papillae at level of genital arch apex. Opisthoventral sclerites in form of very narrow bands. Distances between ventral setae: *3a-g* 15 (9–15), *g-4a* 26 (18–25), *4a-ps3* 53 (47–60). Legs I–III similar in length; legs IV distinctly thicker and shorter than remaining legs, their ambulacral discs not reaching apices of terminal lamellae. Tarsus IV with apico-dorsal spine-like process. Seta *d* of tarsus IV button-shaped.

Females (Figs 2A, B and 3B): Gnathosoma shaped as in male, subcapitulum dimensions (size range in 3 paratypes) 42–48 × 48–58. Idiosoma length 357–423, width 148–192. Prodorsal shield 90–102 in length, 83–92 in width, with shape similar to those in male. Distance between scapular setae *se-se* 52–58, *si-si* 38–45. Hysteronotal shield divided into two parts: anterior large fragment and weakly sclerotized pygidial part covering terminal extension of opisthosoma. Anterior part 162–198 in length, 133–147 in width, with slightly concave anterior and posterior margins. Subhumeral setae *c3* as in male. Setae *c1* set on the striated cuticle anterior to hysteronotal shield. Cupules *im* situated laterally to hysteronotal shield, equidistant to levels of setae *d2* and *h1*, or closer to *d2*. Setae *h1* as long as *ps1* and *ps2*, situated on transverse unsclerotized band separating anterior part of hysteronotal shield and its pygydial fragment. Bases of setae *ps1*, *ps2*, *h2*, and *h3* in distal half of terminal extension. Setae *ps1* set between bases of *h3*. Distances between setae and cupules: *c1-c1* 63–70, *c1-d1* 56–63, *d1-d2* 47–60, *h1-h1* 35–42, *h3-h3* 13–20, *d2-h1* 68–82, *d2-im* 35–42. Epimerites I free. Epigynum arched, 17–23 × 35–50. Setae *g* set at the level of *3b*, opisthoventral sclerites absent. Legs IV extending beyond terminus by distal half of tarsus. Ventral measurements: *3a-g* 32–49, *g-4a* 17–28, *4a-ps3* 105–120.

Etymology

From *caudatus* (L., with tail) to indicate the narrowed and elongated terminal tail-like part of the female opisthosoma.

***Psittophagus* Gaud et Atyeo, 1996**

The genus *Psittophagus* was originally established by Gaud and Atyeo (1996) within the family Falculiferidae Oudemans, 1905 (Gaud and Atyeo 1996) but after systematic reanalysis (Mironov and Galloway 2002) it was moved to the subfamily Pterolichinae (Pterolichidae). *Psittophagus* and the related genera *Psittaculobius* Mironov, Dabert et Ehrnsberger, 2003, *Nymphicilichus* Mironov et Galloway, 2002, and *Micropsittophagus* Mironov et Pérez, 2003 comprise the *Psittophagus* generic group, which is well defined by the loss of hystero-

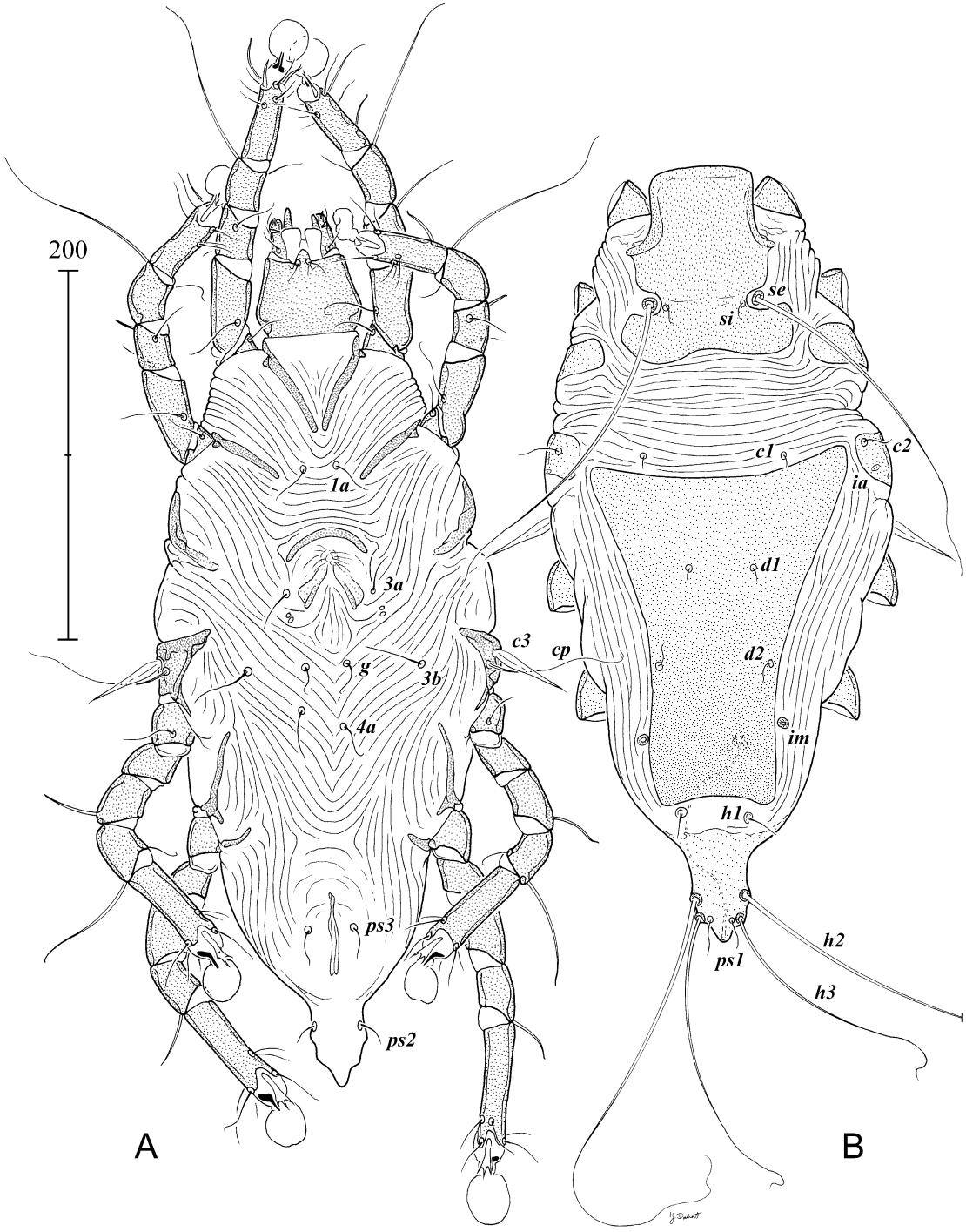

Fig. 2. Female of *Astrolabelichus caudatus* gen. nov., sp. nov.: **A** – ventral view, **B** – dorsal view

notal setae *d1* and *e1* (Mironov and Pérez 2003b, Mironov *et al*. 2003). In addition, most of these genera, with exception of *Micropsittophagus*, also lack setae *vi* in both sexes and have two pairs of heavily sclerotized ball-like internal structures in females. These structures of unclear function are unique within Pterolichoidea and are situated laterally in the sejugal region and in the posterior opisthosoma. Males of this generic group are considerably smaller than females and usually lack these structures. The genus *Psittophagus* is distinguishable from other genera of the group by the following combination of characters: epimerites I free, solenidion $\sigma 2$ on genu I absent, and setae *h1* present.

Four species of this genus have been previously described (Mironov *et al*. 2003). All species exclusively inhabit parrots

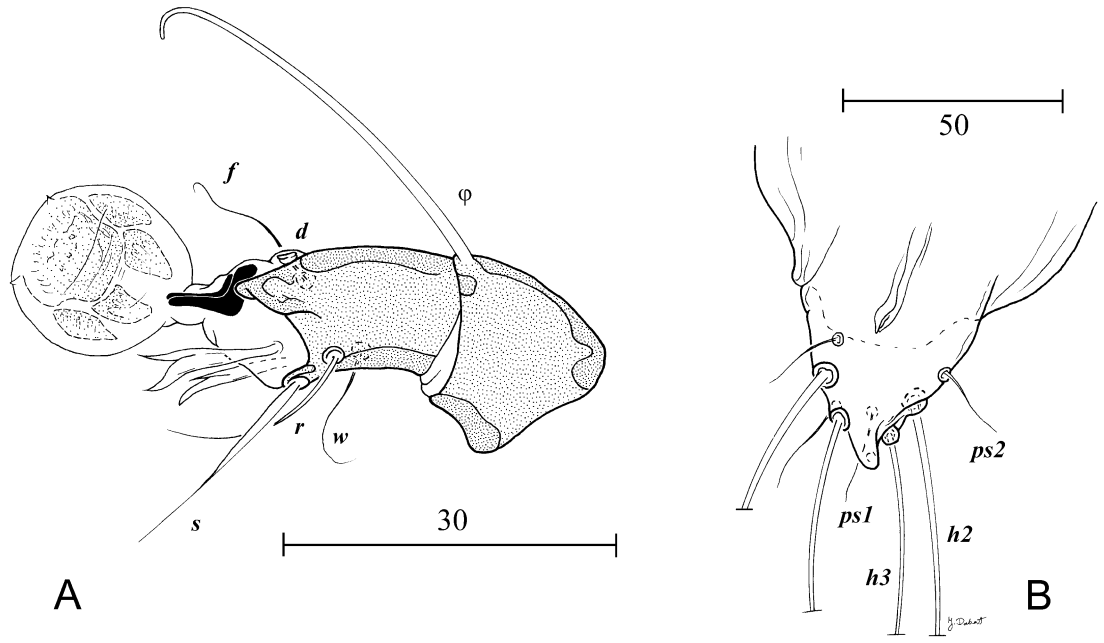

Fig. 3. Details of morphology of *Astrolabelichus caudatus* gen. nov., sp. nov.: **A** – tarsus IV of male, antaxial view, **B** – terminal part of female opisthosoma, latero-ventral view

of the family Cacatuidae and are restricted to the Australian region.

***Psittophagus lacunosus* sp. nov.** (Figs 4, 5A-D, 6 and 7)

Type material from *Cacatua galerita*: 1 male holotype, 19 male and 66 female paratypes, Astrolabe Bay, New Guinea, 1900, coll. B. Hagen, AMU01744. One male and one female paratypes are deposited at ZSM, holotype male and remaining paratypes at AMU.

Additional material from *C. sulphurea*: 1 male and 21 females, Timor, 28 July 1911, coll. C.B. Haniel, AMU01745.

Description: Males (Figs 4 and 5A, D). Subcapitulum of gnathosoma trapezoidal, 25 × 47 (size range in 10 paratypes 25–28 × 40–48). Idiosoma short and wide, 203 in length, 138 in width (idiosomal size range in paratypes 200–213 × 123–153). Hysterosoma noticeably narrowing terminally; lateral margins of opisthosoma strongly sclerotized and incised deeply at level of adanal suckers. Prodorsal shield entire, covering almost entire prodorsum, posterior angles elongated and fused with weakly sclerotized scapular shields, lateral margins without incisions around scapular setae, length of the shield along midline 71 (66–72); surface with many rounded lacunae posterior to level of scapular setae. Setae *si* needle-like, distance between scapular setae: *se-se* 50 (50–56), *si-si* 27 (27–32). Humeral shields narrow, triangular not fused with epimerites III. Setae *c2* needle-like, situated on the posterior margins of humeral shields. Subtegumental ball-like sclerotized structures in sejugal region absent. Hysteronotal shield long: greatest length 120 (118–130), width at anterior margin 98 (102–118), extending anteriorly to level of setae *c2*, anterior margin convex; entire surface of the shield covered with numerous rounded lacunae. Setae *c1* set on the anterior margin of hysteronotal shield. Openings *gl* of dark coloured hysteronotal glands set on lateral margins of opisthosoma, at level of genua IV. Cupules *im* set posterior to bases of setae *d2*. Setae *c3* longer than half of idiosomal width. Setae *e2* narrowly lanceolate. Opisthosomal lobes short, bluntly rounded, with protruding bases of terminal setae *h2*, *h3*. Terminal cleft semicircular, small, about 8 (5–7) in length. Setae *ps1* lanceolate, 13 × 3 (12–15 × 3–4).

Dorsal measurements (distances between setal rows and setal bases): *c1-c1* 33 (33–42), *d2-d2* 77 (77–87), *e2-e2* 45 (44–50), *c1-d2* 52 (52–60), *d2-e2* 53 (54–58), *h2-h2* 43 (38–46), *ps1-ps1* 18 (17–21).

Epimerites I free; bases of epimerites I–IV with heavily sclerotized ovate inflations; inflations of epimerites III and IV distinctly smaller than anterior ones. Genital apparatus slightly posterior to the level of trochanters IV, aedeagus much shorter than genital arch. Setae *4a* located posterior to genital arch base. Adanal suckers circular with several small knobs on corollae. Adanal shields absent. Opisthoventral shields narrow, hook-shaped; cupules *ih* situated on anterior end of these shields. Ventral measurements: *3a-3b* 25 (23–27), *3a-g* 23 (22–25), *g-4a* 28 (27–33), *4a-ps3* 18 (15–20), *ps3-ps3* 20 (20–23).

Legs IV extending beyond opisthosoma by tarsus. Setae *vF* on femora II longer than half of leg length and approximately twice longer than setae *pR* on trochanters II. Tarsal setae *f* II–IV as long as respective tarsi or longer. Solenidion *φ* of tibia IV subequal to length of tarsus IV. Length of tarsi: I 35 (30–37), II 37 (33–47), III 42 (30–40), IV 32 (30–33).

Females (Figs 5B, C, 6 and 7): Gnathosoma as in male, subcapitulum dimensions (size range in 10 paratypes) 35–42

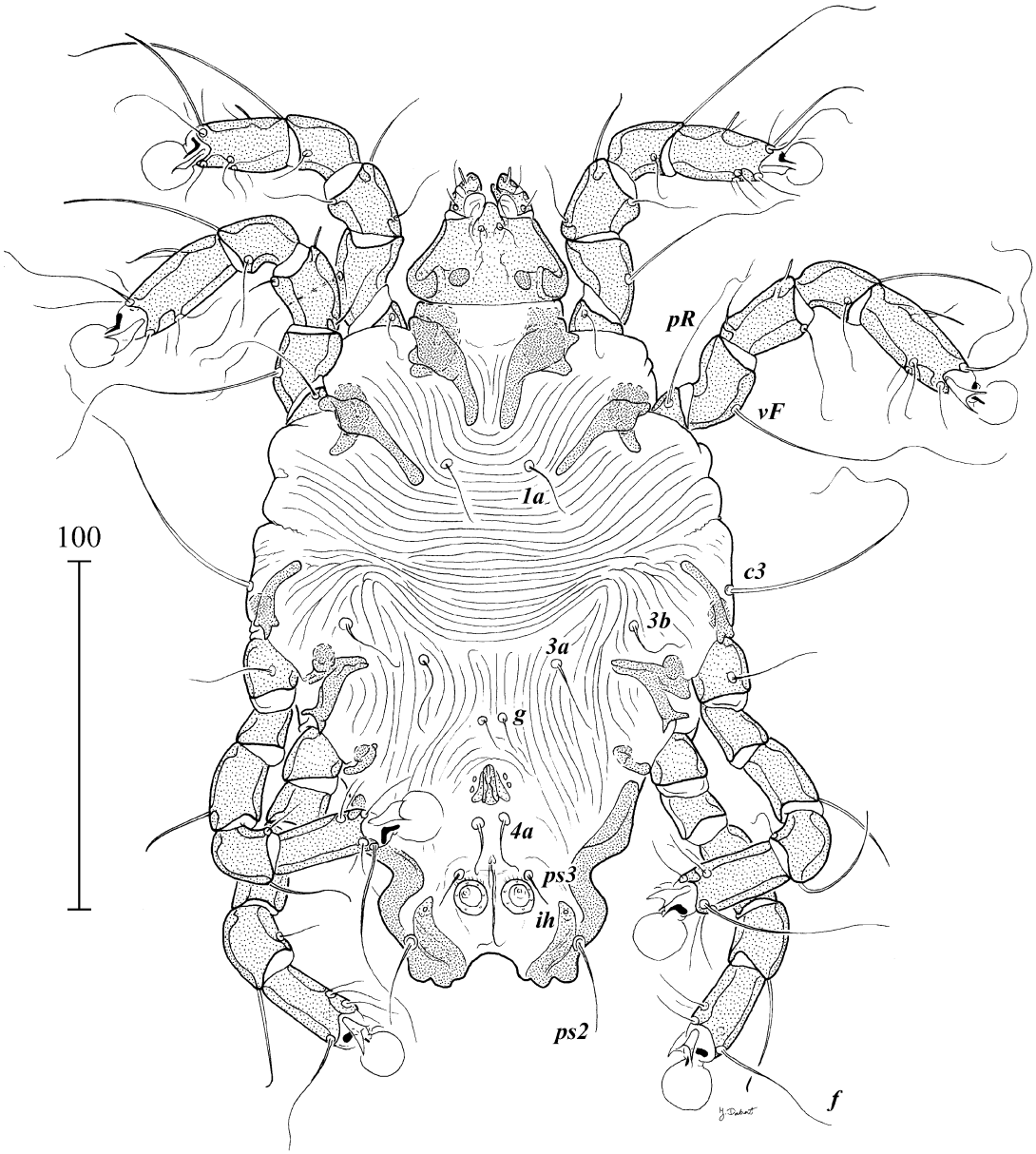

Fig. 4. Male of *Psittophagus lacunosus* sp. nov., ventral view

× 73–85. Idiosoma 340–373 in length, 205–238 in width. Prodorsal shield split into anterior and posterior pieces by transverse band of soft cuticle bearing scapular setae. Length of anterior part along midline 55–65, width 70–93, posterior part weakly sclerotized with poorly marked margins. Setae *si* thick, narrowly lanceolate, longer than distance between their bases; distance between scapular setae *se-se* 78–88, *si-si* 42–50. Scapular shields and humeral shields absent. Setae *c2* set on striated tegument and represented by macrosetae, as long as the body width. Hysteronotal shield as almost square plate; anterior end extending to level of trochanters IV, anterior angles obliquely cut; anterior margin straight; posterior end of the shield not reaching the terminal margin of opisthosoma; greatest length 112–123, width excluding very narrow lateral bands 142–155; entire surface of the shield covered with numerous rounded lacunae. Lateral bands of hysteronotal shield spreading from level anterior to hysteronotal gland openings *gl* to posterior angles of opisthosoma. Setae *d2* situated on striated tegument, near anterior angles of hysteronotal shield, setae shaped as macrosetae, longer than distance between them. Setae *e2* narrowly lanceolate. Subtegumental sclerotized structures in sejugal region ball-shaped, ones in posterior angles of opisthosoma shaped as very thick 'C's (Fig. 5B, C). Hysteronotal glands and openings *gl* shaped as in male; *gl* set at level of articulation of genu and femur IV. Cupules *im* situated on striated tegument slightly closer to level of setae *d2* than to level of *gl*. Setae *c3* long, about 2/3 of idiosomal width. Posterior end of opisthosoma blunt, with two pairs of small extensions carrying terminal setae *h2*, *h3*; margins between setae *h3* shallowly concave. Dorsal measurements:

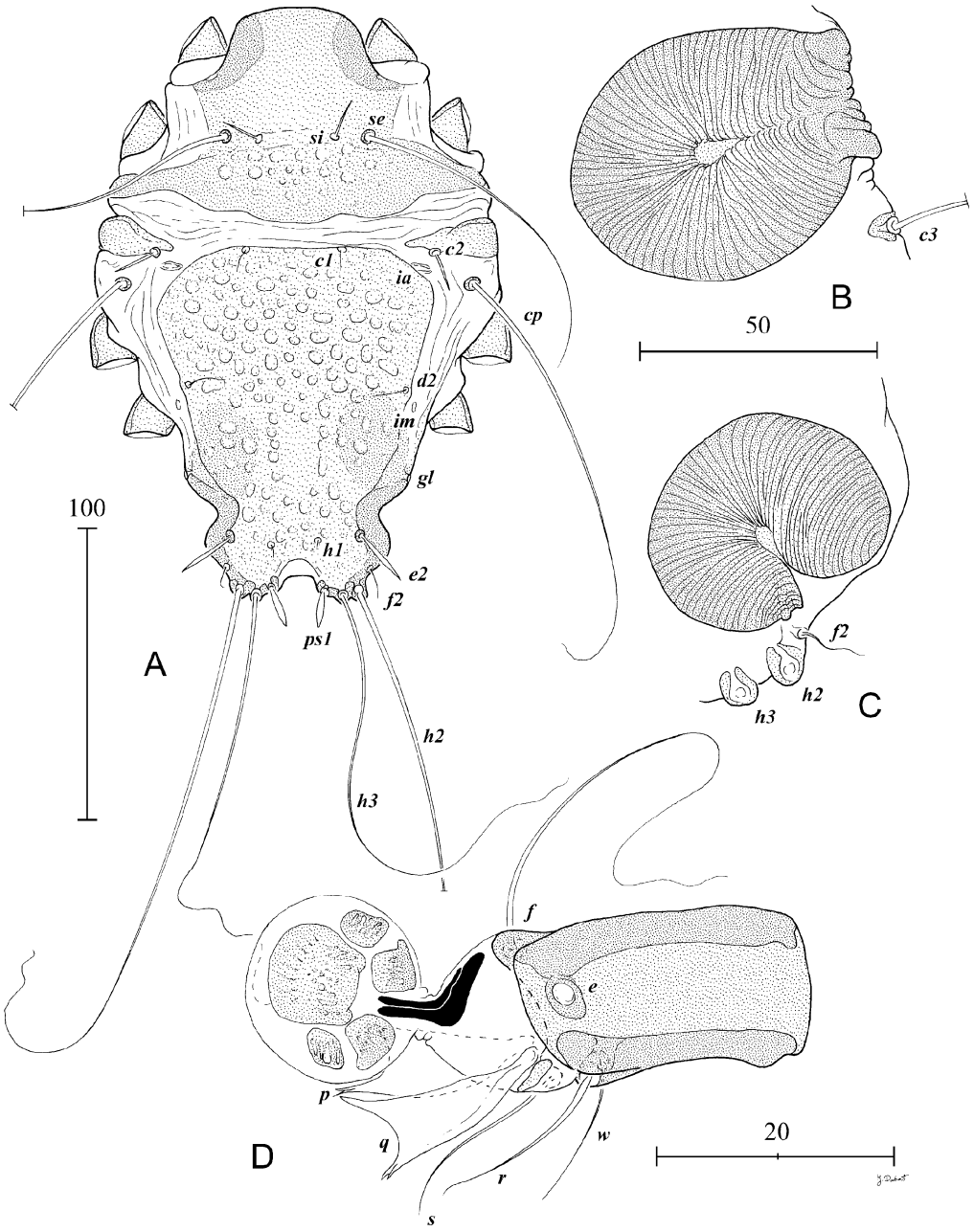

Fig. 5. Details of morphology of *Psittophagus lacunosus* sp. nov.: **A** – dorsal view of male, **B** – subtegumental sclerotized structure in sejugal region of female, **C** – subtegumental sclerotized structure in the postero-lateral opisthosoma of female, **D** – tarsus IV of male, antaxial view

c1-c1 53–67, *d2-d2* 112–137, *e2-e2* 117–133, *c1-d2* 63–80, *d2-e2* 100–112, *h2-h2* 68–85, *ps1-ps1* 27–35.

Epimerites I, II as in the male, but their bases with larger sclerotized inflations. Oviporus anterior to level of trochanters III. Ventral measurements: *3a-3b* 35–45, *3a-g* 27–35, *g-4a* 13–18.

Legs IV extending beyond the end of opisthosoma by distal half of tarsus. Length of tarsi: I 40–57, II 51–67, III 53–77, IV 75–95. Setae *pR* on trochanter II, *vF* on femora II and *f* on all tarsi as long as in males.

Differential diagnosis

The new species is most similar *Psittophagus obsoletus* (Mégnin et Trouessart, 1884) in the following combination of characters: in males, subintegumental ball-like structures in sejugal region are absent and setae *ps1* are lanceolate; in both sexes, hysteronotal shield is covered with numerous rounded lacunae. However, the males of new species differ from those of *P. obsoletus* and all other previously described species of *Psittophagus* by having rounded lacunae on prodorsal shield and lateral deep incisions on opisthosoma (Figs 4 and 5A).

In other known species of the genus, the prodorsal shield is uniformly punctured and the opisthosoma gradually narrows to posterior end, without noticeable incisions on lateral margins.

The females of *P. lacunosus* sp. nov. are very distinctive and differ from all known species of the genus by having setae *c2*, *d2* shaped as macrosetae (much longer than half of idiosoma width), and setae *e2* narrowly lanceolate. In females of

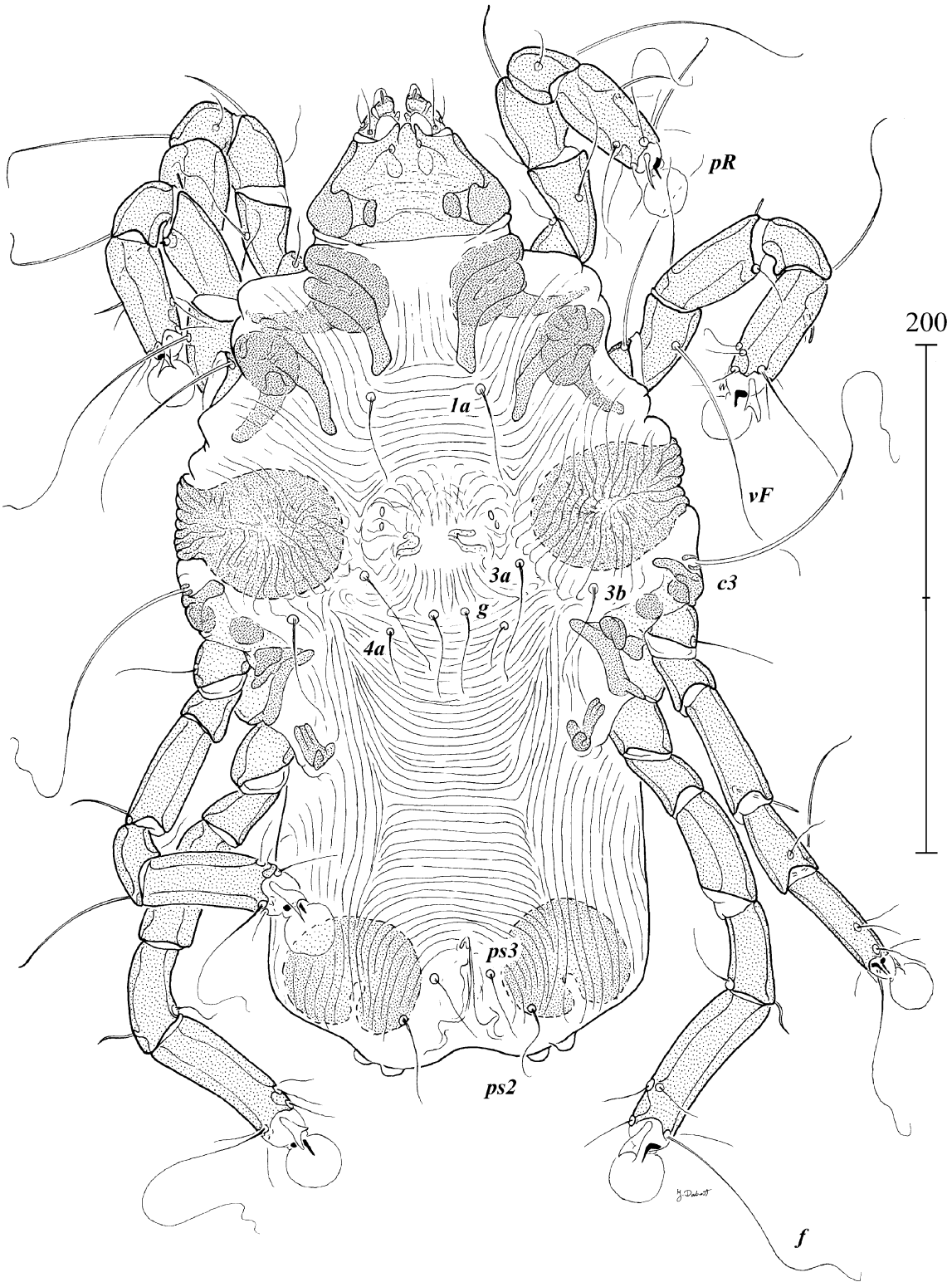

Fig. 6. Female of *Psittophagus lacunosus* sp. nov., ventral view

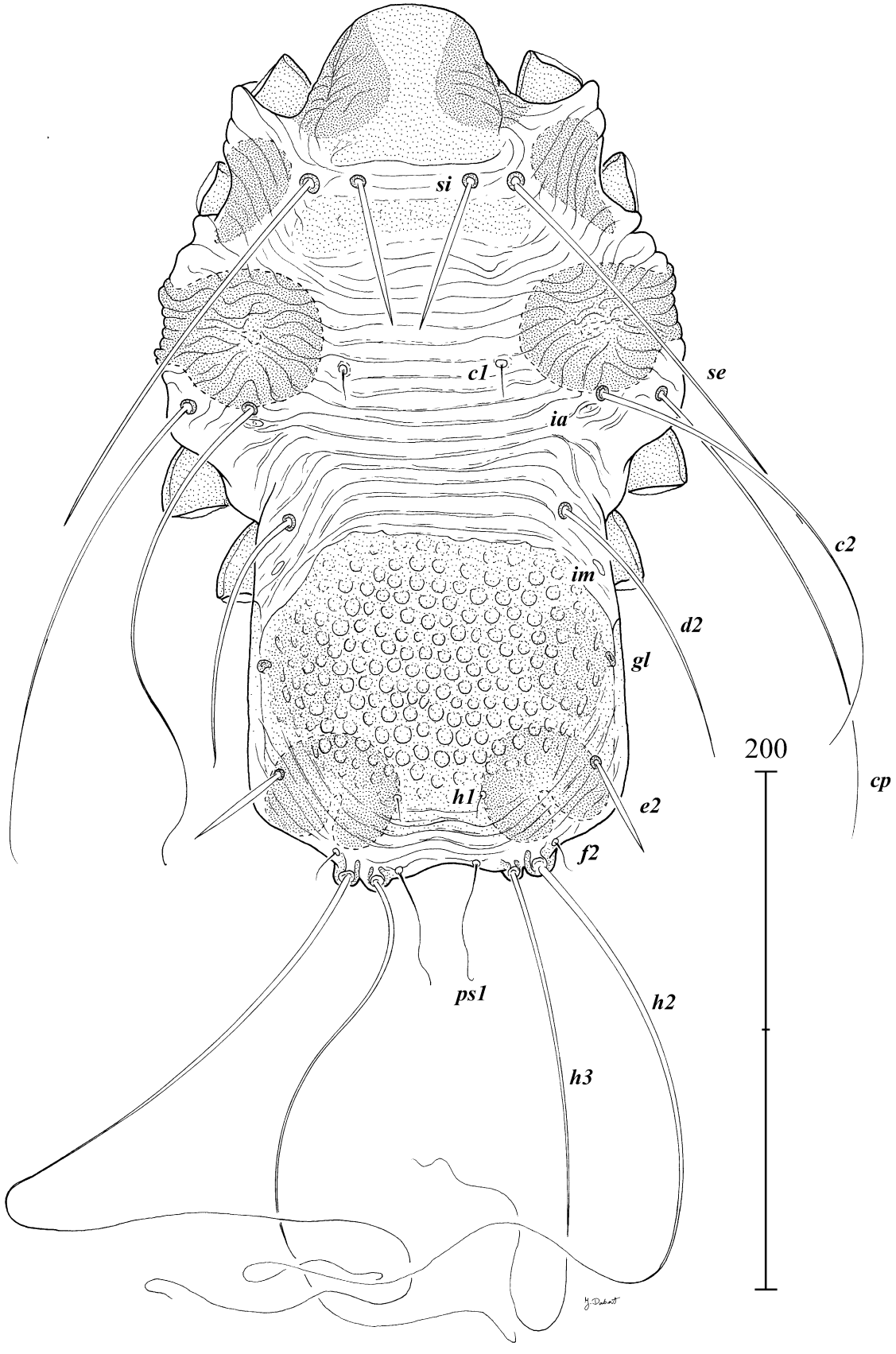

Fig. 7. Female of *Psittophagus lacunosus* sp. nov., dorsal view

other *Psittophagus* species, setae *c2*, *d2*, and *e2* are hair-like and much shorter than half of idiosoma width.

Etymology

The specific epithet (L., *lacunosus* – full of hollows) indicates the many rounded lacunae covering the dorsal shield in males and females.

Family Xolalgidae Dubinin, 1953
Subfamily Ingrassiinae Gaud et Atyeo, 1981

***Cacatualges* gen. nov.** (Figs 8–11 and 12A-F)

Type species: *Cacatualges microdiscus* sp. nov. from *Cacatua galerita* (Psittaciformes, Cacatuidae).

Fig. 8. Male of *Cacatualges microdiscus* gen. nov., sp. nov., ventral view

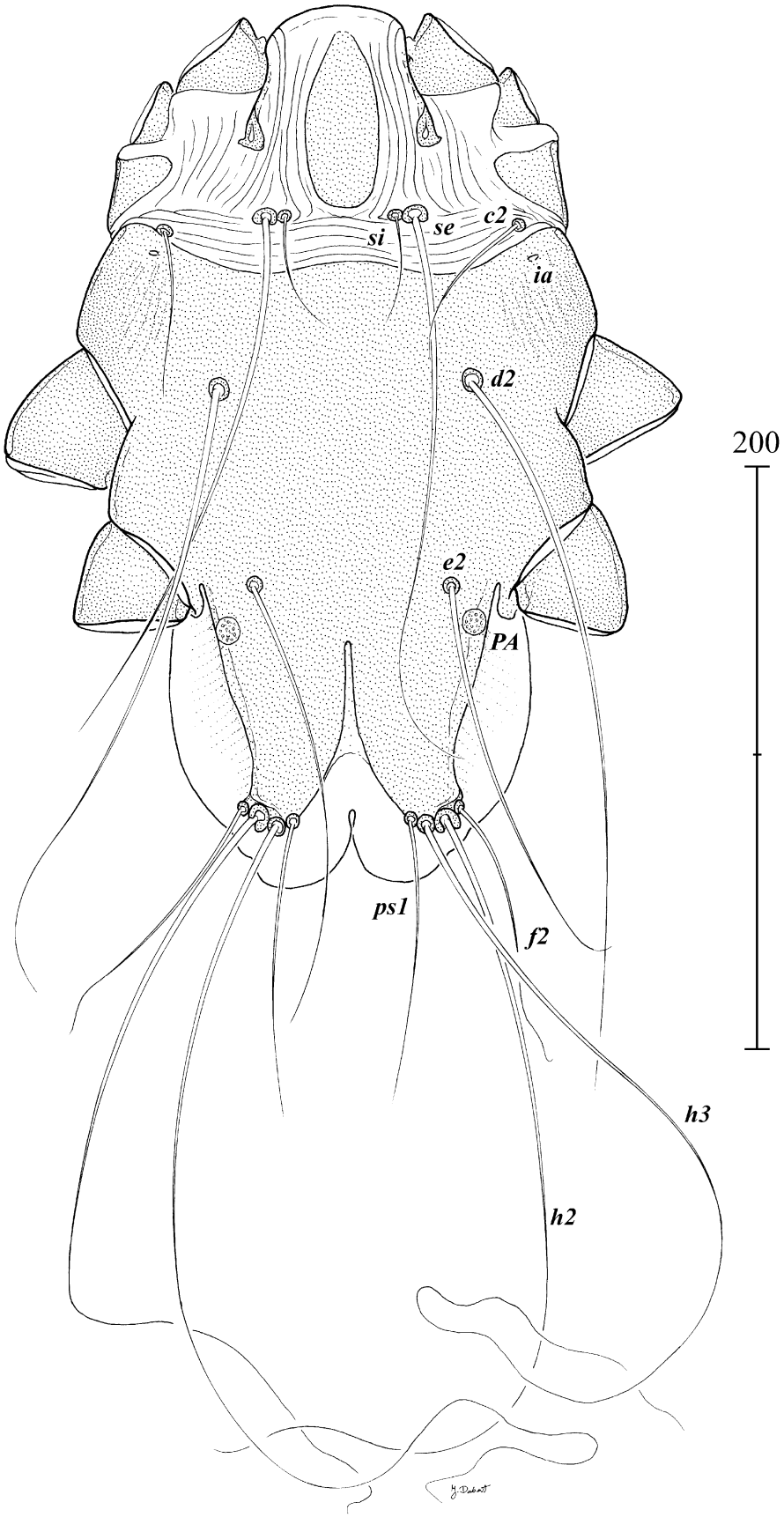

Fig. 9. Male of *Cacatualges microdiscus* gen. nov., sp. nov., dorsal view

Diagnosis: Ingrassiine mites with an almost rectangular subcapitulum. Prodorsal shield ovoid without postero-lateral extensions; scapular setae *se*, *si* outside of this shield. Scapular shields without flat suprategumental extensions on inner margin. Dorsal setae *c1*, *d1*, *e1*, *h1* absent. Openings *gl* of hysteronotal glands absent; only cupules *ia* distinct (males). Epimerites I fused as a Y, sternum about a half the total length of epimerites. Tibiae I with spine-shaped ventral apophysis, tibiae II without ventral apophysis. Retrograde paraxial apophysis of genu I and antaxial apophysis on femora II absent. Solenidion $\sigma 2$ on genu I absent. Setae *cG* on genua I and II and *mG* I dilated basally, setae *mG* II long, represented by thin macrosetae. Tarsus I with short dorsoapical spine; distal part of tarsus II elongated, narrowed to apex and curved. Tarsi I with four ventral setae: *la*, *ra*, *wa*, *s* (Fig. 12A). Tarsi II with two ventral setae: *wa, s* (Fig. 12B); both setae flattened with distal filament. Tarsus III with one ventral seta *w*, setae *s*, *r* absent (Fig. 12D). Only ambulacra I well developed, ovate; remaining ambulacra vestigial or absent (on tarsi III and IV in males, Fig. 12C, D).

Males: Hysteronotal shield fused with humeral shields and outer sclerites of epimerites IV to form an entire shield covering hysterosoma. Opisthosoma with long opisthosomal lobes separated by triangular terminal cleft; lobes and cleft surrounded by membrane forming widely rounded terminal extensions on lobar apices. Supranal concavity long, open posteriorly into terminal cleft. Genital organ located approximately at level of trochanters III. Genital shield present. Paragenital apodemes formed by continuations of epimerites IVa, anterior ends of which are fused to inner end of epimerites IIIa. Coxal fields IV closed. Adanal suckers elliptical with radially striated corolla and surrounded by smooth membrane. Adanal shield bow-shaped, bearing bases of setae *ps3*. Legs III and IV hypertrophied, lacking pretarsi. Tarsus III shaped as long slightly curved claw (Fig. 12D). Tarsus IV shorter and much thinner than corresponding tibia, with three apical spines (Fig. 12C). Seta *kT* III positioned paraxially and solenidion φ III antaxially; seta *d* of tarsus IV reduced to small spine; seta *e* IV absent.

Females: Dorsal hysterosoma without hysteronotal shield. Epigynum bow-shaped, situated at level of posterior ends of epimerites II. Setae *h2* and *h3* subequal in length. Setae *sR* II thin, shorter than corresponding femoragenua. Tarsi III, IV elongated, attenuating to apex and slightly curved, without apical spine, ambulacral disc strongly reduced as on tarsi II. Setae *d* on posterior tarsi as long as or longer than respective tarsus.

Differential diagnosis

The new genus *Cacatualges* belongs to a group of closely related and poorly differentiated ingrassiine genera that includes *Fainalges* Gaud et Berla, 1964 and *Dubininia* Vassilev, 1958. Based on the generic key features for these genera (Gaud and Atyeo 1996), the females of *Cacatualges* are similar to *Fainalges* in having long setae *d* on posterior tarsi (these setae in *Dubininia melopsittaci* Atyeo et Gaud, 1987 are also long) and to *Dubininia* by having thin and short setae *sR* on trochanters III. Both sexes of the new genus differ clearly from all named species of *Fainalges* by the shape of prodorsal shield and by the pattern of ambulacra reduction on legs II–III. In *Cacatualges*, the prodorsal shield lacks latero-terminal extensions and both scapular setae (*se*, *si*) are located off of this shield on the soft striated tegument. In all species of *Fainalges* the prodorsal shield has variously shaped latero-terminal extensions encompassing bases of scapular setae. Pretarsi (ambulacral stalk and disc) on legs I–IV in *Cacatualges* are either vestigial (tarsi II in males and II–IV in females) or absent (tarsi III–IV in males). In species of *Fainalges*, if the pretarsi are atrophied it concerns only legs III–IV. In these cases, the pretarsal stalks are either normally developed (males and females) or even elongated (females); when the ambulacral discs are lacking on legs III–IV it happens only in females but not in males (Pérez 1995). Reduction or loss of pretarsi II–IV in *Cacatualges* also allows it to be easily distinguished from all *Dubininia* species. All four pretarsi are present in both sexes of *Dubininia*; although the two posterior pairs of legs (III, IV) may be smaller than two anterior ones they are never vestigial or absent.

Etymology

Contraction of the generic host name *Cacatua* and *Analges*.

Remarks

Systematics of two genera closely related to *Cacatualges* is not satisfactory and the key features proposed for distinguishing both genera are problematic (Gaud and Atyeo 1996) because some characters, for instance the length setae *d* on posterior tarsi in females, do not serve well for their differentiation. The genus *Fainalges* is known only from New World parrots and currently includes twelve named species (Pérez 1995, Mironov *et al*. 2005). *Fainalges* represents a well-documented case of the multiple line duplication of parasites on a single host species (Pérez 1995, 1996). The taxonomic status is not sufficiently worked out but the situation in the second genus *Dubininia* is much more unclear. Five *Dubininia* species are described from parrots of the Old World; the remaining three species were reported from Falconiformes, Musophagiformes, and Coraciiformes and quite probably represent different genus or genera. This assemblage of mite taxa is in urgent need of systematic revision and redefinition of generic diagnoses.

***Cacatualges microdiscus* sp. nov.**

Type material from *Cacatua galerita*: 1 male holotype, 1 male and 2 female paratypes, Astrolabe Bay, New Guinea, 1900, coll. B. Hagen, AMU01744. One male and one female paratypes are deposited at ZSM, holotype male and remaining paratypes at AMU.

Additional material from *C. sulphurea*: 1 female, Timor, 28 July 1911, coll. C.B. Haniel, AMU01745.

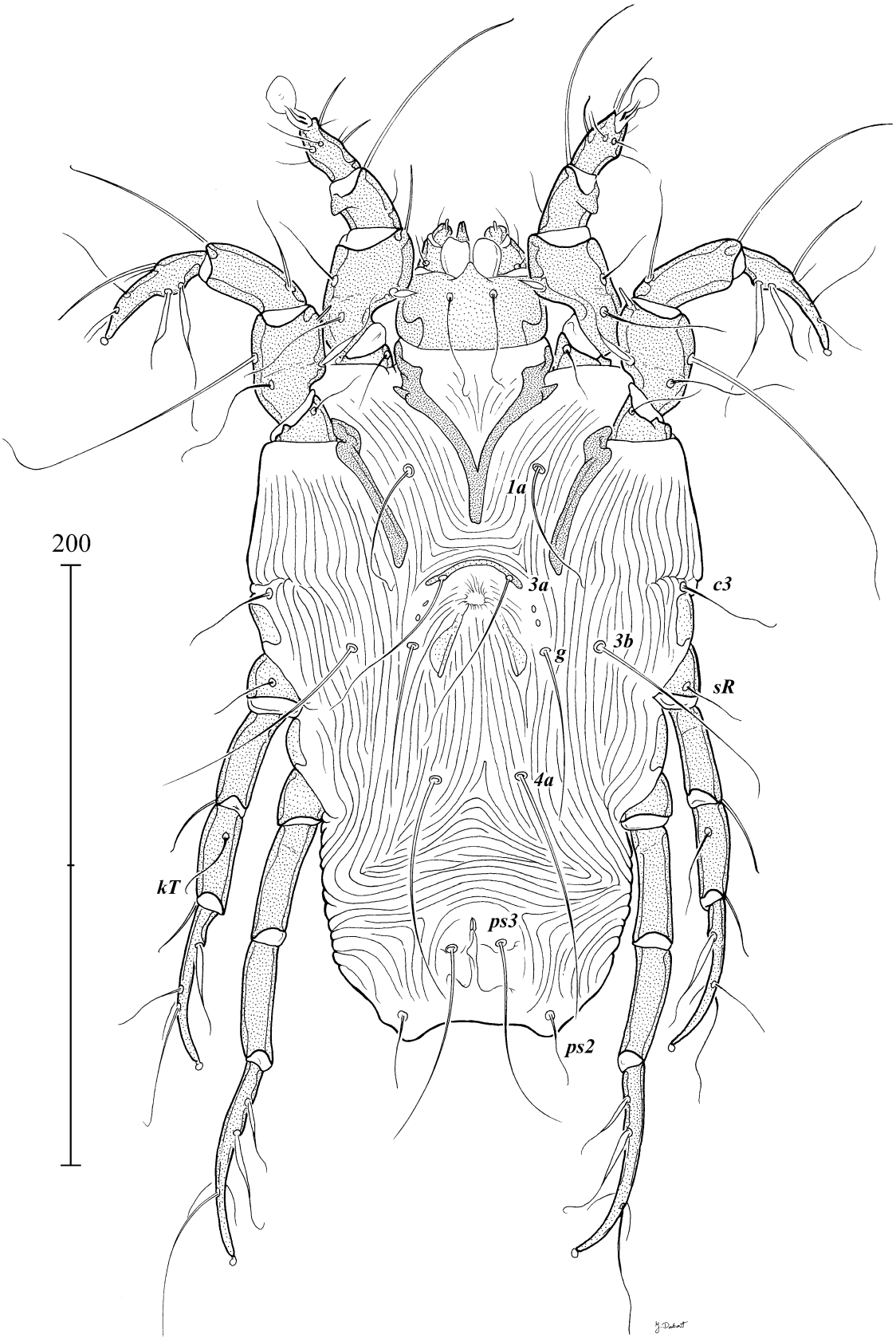

Fig. 10. Female of *Cacatualges microdiscus* gen. nov., sp. nov., ventral view

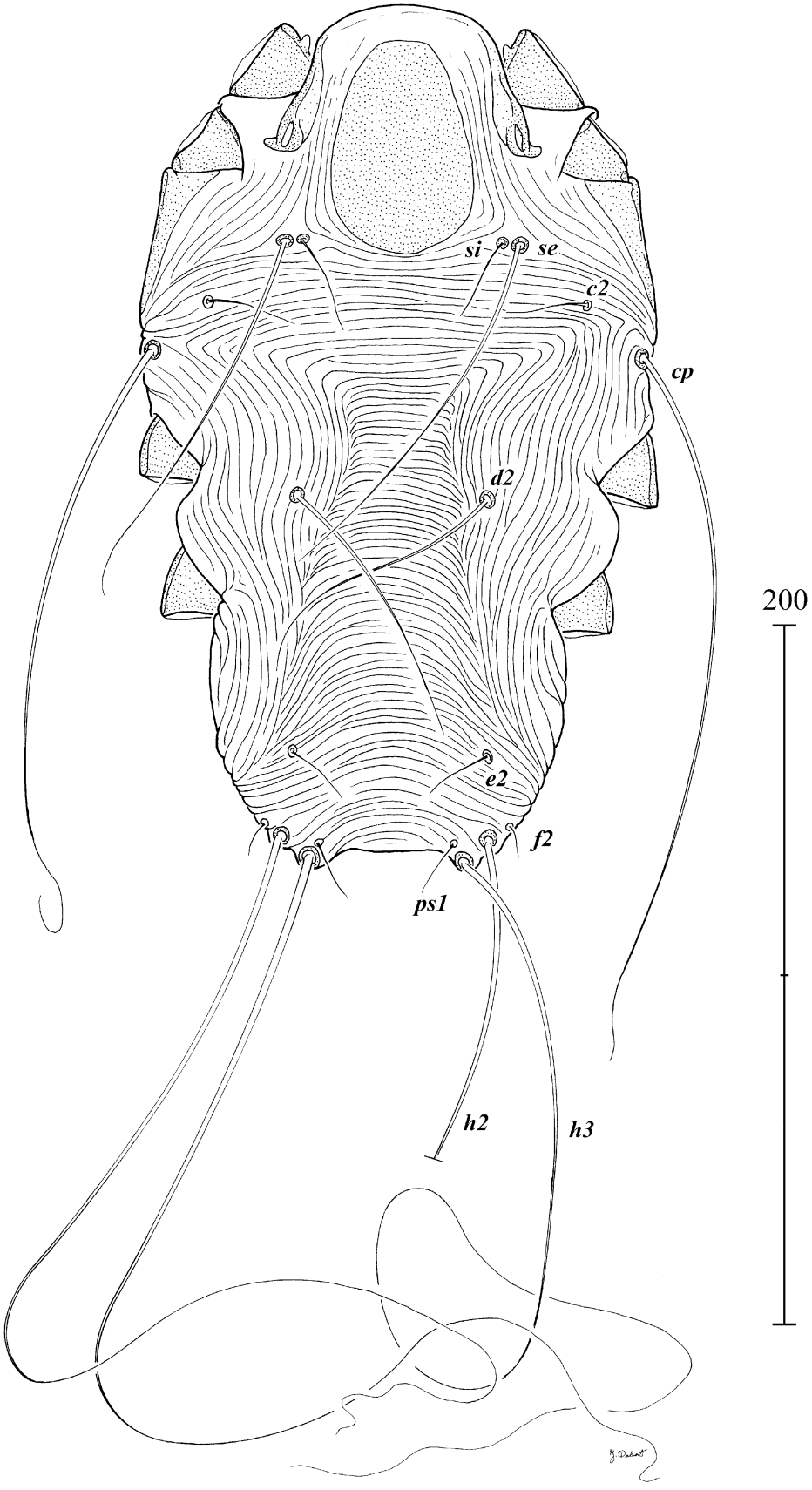

Fig. 11. Female of *Cacatualges microdiscus* gen. nov., sp. nov., dorsal view

Description: Males (Figs 8, 9 and 12A-D). Subcapitulum of gnathosoma rectangular, length 32 (32 in paratype), width 48 (45); subcapitular setae *subc* long (Fig. 8). Idiosoma length excluding terminal membrane 300 (283), greatest width 182 (187), propodosoma length 90 (82). Prodorsal shield ovoid, length 66 (64), greatest width 28 (30), posterior margin without postero-lateral extensions, setae *se* and *si* set off of this shield, *se-se* 52 (49), *si-si* 39 (40). Scapular shields triangular, relatively small. Hysteronotal shield weakly sclerotized except for antero-lateral parts (areas of proper humeral

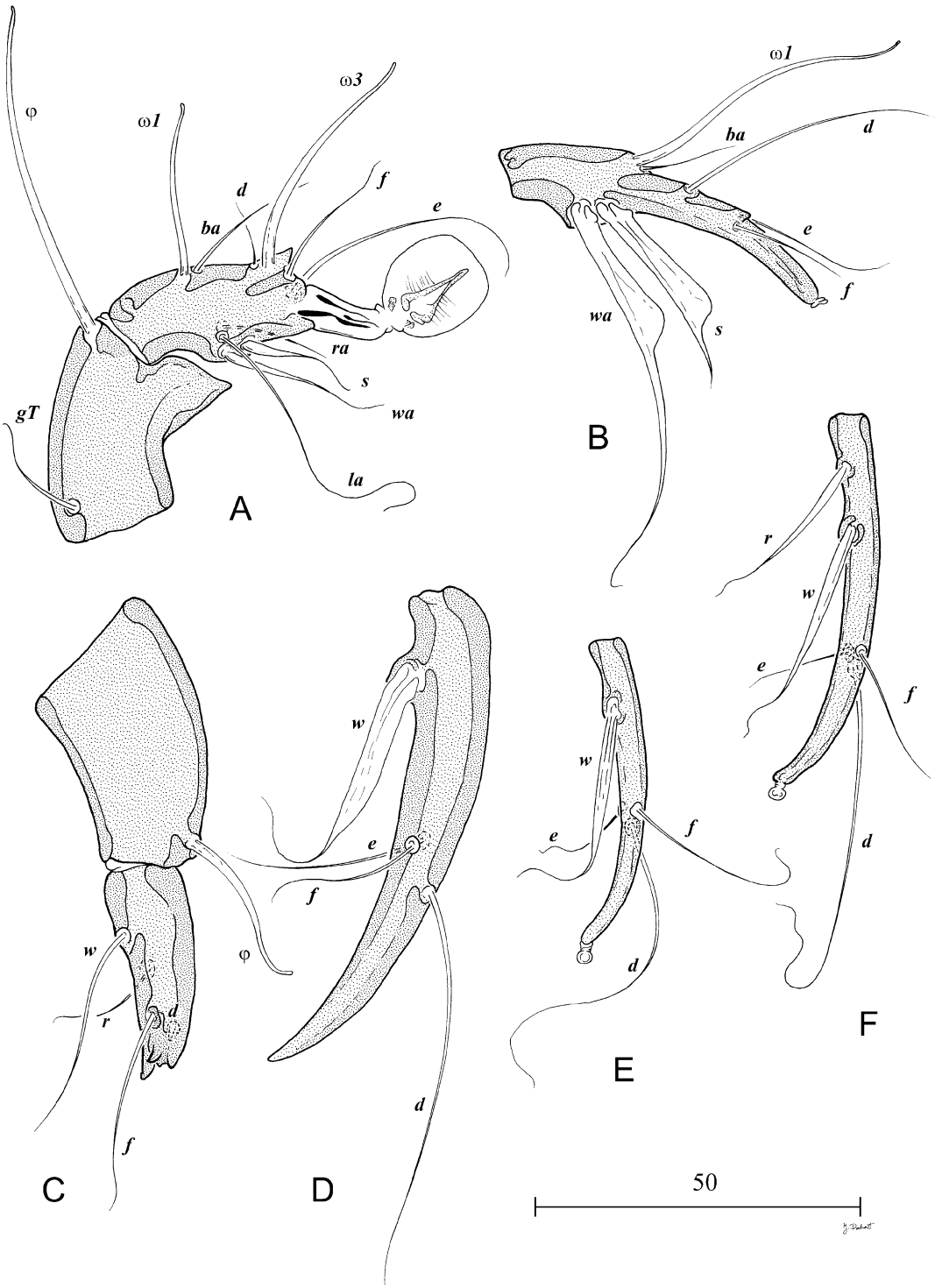

Fig. 12. Details of morphology of *Cacatualges microdiscus* gen. nov., sp. nov.: **A** – tibia and tarsus of leg I in male, paraxial view, **B** – tarsus II of male, paraxial view, **C** – tibia and tarsus of leg IV in male, antaxial view, **D** – tarsus III of male, antaxial view, **E** – tarsus III of female, antaxial view, **F** – tarsus IV of female, antaxial view

shields), anterior margin convex, greatest length of the shield (from anterior end to level of setae *h3*) 170. Two porous rounded areas (PA) postero-lateral to bases of setae *e2*. Setae *c2* on anterior margin of hysteronotal shield or slightly anterior to it. Terminal cleft triangular, length (from anterior end to bases of *h3*) 34 (52), greatest width (distance between *ps1*) 42 (43). Interlobar membrane well-developed, incision in the membrane slit-like, 27 (20) in length; terminal membranes widely rounded; lateral membranes slightly narrower than lobes. Setae *d2* and *e2* as macrosetae, extending beyond the apices of opisthosomal lobes. Distances between dorsal hysteronotal setal rows: *c2-d2* 57 (52), *d2-e2* 73 (60), *e2-h3* 85 (75).

Sternum short, about as long as the free parts of epimerites I. Coxal fields IV closed, without sclerotized area. Genital shield elliptical, weakly sclerotized, encompasses bases of genital setae *g*. Genital papillae set at level of genital apparatus. Total length of genital apparatus 30 (21); aedeagus as long as distance *3a-3a* (Fig. 8). Adanal shield bow-shaped with slightly thickened central part, bearing setae *ps3* near its ends. Setae *3a* situated on inner ends of epimerites IIIa, anterior to the level of *3b*, not extending to adanal shield; setae *3b* extending to lobar apices. Setae *4a* situated approximately at the level of setae *ps3*. Distance between ventral setal rows: *3a-g* 28 (25), *g-ps3* 53 (45). Trochanter I with tongue-shaped thin apophysis on inner margin. Apicoventral apophysis of tibiae I angular, wide. Tarsus II with elongated and attenuating distal half. Tarsus III curved, claw-like, as long as corresponding tibia. Tarsus IV short, with short apico-ventral claw on paraxial surface and with tridentate apical extension (Fig. 12C). Trochanteral setae *sR* III longer than length of trochanter + femoragenu III (Fig. 8). Setae *wa*, *s* of tarsus I dilated in basal part. Setae *cG* on femoragenua I–II lanceolate, *cG* II twice as long as *cG* I and with distal filament (Fig. 8). Setae *mG* I lanceolate with apical filament, *mG* II approximately as long as body width. Setae *wa* and *s* on tarsi II flat, spatuliform with distal filament (Fig. 12B). Ventral setae *w* of tarsus III dilated with distal filament, apicodorsal setae *d* as long as the podomere (Fig. 12D). Setae *kT* of tibia III reaching the mid-length of tarsus III. Ambulacral disc on tarsi I well-developed, on tarsi II vestigial, on tarsi III–IV absent (Fig. 12A-D).

Females (Figs 10–12E, F): Gnathosoma shaped as in male, subcapitulum dimensions (size range in 2 paratypes) 28–32 × 48–50. Idiosoma length 252–277, width 145–155, propodosoma length 77–90. Prodorsal shield 28–29 in length, 42–45 in width, shaped as in male. Distance between scapular setae: *se-se* 68–70, *si-si* 58–60; setae *se* reaching the midlevel between setae *d2* and *e2*. Hysteronotal shield absent. Scapular shields as narrow longitudinal triangles; humeral shields absent. Opisthosoma rounded with a pair of blunt terminal extensions bearing setae *h3* and slightly concave posterior margin between them. Setae *c2* and *e2* relatively short, less than one third of idiosoma width; setae *d2* long, over half of idiosoma width, their tips reaching to the bases of setae *e2*. Bases of setae *h3* located on terminal extensions. Setae *h2* and *h3* subequal in length, 1.5–2 times longer than body length. Distances between dorsal hysteronotal setal rows: *c2-d2* 57–67, *d2-e2* 65–78, *e2-h3* 33–35.

Epimerites I shaped as in males. Epigynum shallowly arched, 28–30 × 7–10. Setae *g* set on the ends of the epigynum; genital papillae posterior to tips of epigynum. All ventral setae relatively long; *1a*, *g*, *3a* and *ps3* subequal in length, about half-width of idiosoma, setae *3b* and *4a* more than half the width of idiosoma. Setae *4a* reaching the body terminus, *ps3* extending by distal half beyond posterior margin of opisthosoma. Setae *3a* and *3b* set at same transverse level. Ventral measurements *3a-g* 28, *g-ps3* 103–107.

Legs I–II and their apophyses and setae shaped as in male, except for setae *wa*, *s*, of tarsus I, which are setiform and not dilated. Legs III–IV without apophyses. Legs III reaching the body terminus by tarsal tips; tibiae IV extending beyond the body terminus. Tarsi III–IV narrow and curved ventrally. On legs III trochanteral setae *sR* thin and short, setae *kT* hair-like (Fig. 10). Setae *w* of tarsi III–IV expanded basally and filamentous apically; setae *d* of these segments slightly longer than respective podomeres. Seta *r* of tarsus IV dilated (Fig. 12F). Ambulacral disc on tarsi I well-developed, on tarsi II–IV vestigial (Figs 10 and 12E, F).

Etymology

Contraction of *micro* (L., little) and *discus* (L., a disc) to indicate the greatly reduced pretarsi II–IV.

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