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Two new feather mite species (Acari: Analgoidea) from the Tuamotu sandpiper *Aechmorhynchus parvirostris* (Charadriiformes: Scolopacidae)

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ABSTRACT: Two new species of analgoid feather mites are described from the Tuamotu sandpiper, *Aechmorhynchus parvirostris* (Peale, 1848), an endemic and endangered wader from the Tuamotu Islands. The new mites are: *Alloptes* (*Conuralloptes*) *aechmorhynchi* n. sp. (family Alloptidae), and *Ingrassia platyspina* n. sp. (family Xolalgidae). Brief references to the literature dealing with the taxonomy and diversity of the genera *Alloptes* Canestrini, 1879 and *Ingrassia* Oudemans, 1905 are provided.

KEYWORDS: Acari, Analgoidea, feather mites, *Alloptes*, *Ingrassia*, Tuamotu sandpiper, *Aechmorhynchus parvirostris*, new species.

Introduction

Feather mites belong to a morphologically very diverse and abundant group of arthropods that live permanently on the plumage and skin of birds. They have been recorded from host species belonging to all recent avian orders, except for penguins (order Sphenisciformes). Despite the great diversity shown by these highly specific commensal or parasitic Acari, the approximately 2400 described species (Mironov 2003) represent only a small part of the true world fauna of feather mites (Gaud & Atyeo 1982, 1996a, 1996b); this is mainly because mites have yet to be collected from a great number of currently unexamined avian species.

The Tuamotu sandpiper, *Aechmorhynchus parvirostris* (Peale, 1848) [formerly known as *Prosobonia cancellata* (Gmelin, 1789)], is an endangered species of the large wader family Scolopacidae (order Charadriiformes), endemic to the Tuamotu Islands in French Polynesia (Hayman et al. 1986: 337; Walters 1993; Dickinson 2003: 142). Two feather mite species of the superfamily Pterolichoidea were recently described from this host: *Montchadskiana prosoboniae* Dabert & Ehrnsberger, 1999 (family Pterolichidae) and *Phyllochaeta crassisoma* Dabert, 2003 (family Syringobiidae). In this paper, we describe two further new species of feather mites from the Tuamotu sandpiper, both belonging to the superfamily Analgoidea: one in the genus *Alloptes* Canestrini, 1879 (family Alloptidae) and another in the genus *Ingrassia* Oudemans, 1905 (family Xolalgidae).

Material and methods

The material studied was extracted from the plumage of one specimen of *Aechmorhynchus parvirostris*, collected by the Whitney South Sea Expedition in 1922 and preserved in alcohol. Originally held in the American Museum of Natural History (New York, USA) [Registration No. 10552], this bird was subsequently exchanged with the Museum of New Zealand Te Papa Tongarewa (Wellington,

New Zealand), where it is presently deposited in the bird collection, with Registration No. 27526. The mites were mounted in Hoyer's medium following the usual technique used for astigmatid mites (Evans 1992). The descriptions of the new species are presented in the standard format used for other feather mite taxa by Vasyukova & Mironov (1991) and Mironov (1998). Terminology referring to general morphology, as well as idiosomal and leg chaetotaxy, follows Gaud & Atyeo (1996a). All measurements are given in micrometres (µm). A full set of measurements is given only for the holotype (male) and one paratype (female), but the range of idiosomal size (length and width) is also given for the remaining paratypes. A measurement given as the 'distance between different pairs of setae' is the shortest distance between two transverse lines – i.e. perpendicular to the longitudinal axis of the mite body – formed by joining the alveoli of the setae in each pair.

Holotypes and paratypes of the new species are deposited in the Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand (MONZ), and other paratypes in the Zoological Institute of the Russian Academy of Sciences, St Petersburg, Russia (ZISP).

Systematics

Suborder Astigmata
Superfamily Analgoidea
Family Alloptidae Gaud, 1957
Subfamily Alloptinae Gaud, 1957

Genus *Alloptes* Canestrini, 1879

Alloptes is among the most species-rich genera of the family Alloptidae, comprising about 45 species. These mites inhabit the vanes of flight feathers and upper wing-coverts. All species of *Alloptes* are exclusively associated with hosts belonging to the order Charadriiformes. The diversity of *Alloptes* species has been extensively studied, especially from hosts inhabiting the Palaearctic region (Dubinin 1951, 1952; Vasyukova & Mironov 1991; Kivganov & Mironov 1992; Mironov & Kivganov 1993) and Africa (Gaud 1972), and, to a lesser extent, from Antarctic hosts (Atyeo & Peterson 1967). Four subgenera – *Alloptes* sensu stricto, *Apodalloptes* Gaud, 1972, *Conuralloptes* Gaud, 1972 and *Sternalloptes* Kivganov & Mironov, 1992 – are currently recognised within the genus, based on the structure of the setae on the anterior legs and the chaetotaxy of the opisthosoma (Gaud 1972; Kivganov & Mironov 1992). The diagnostic features of *Alloptes* subgenera as well as of other genera belonging to the *Alloptes* group were revised by Mironov in 1998. The taxonomy of *Alloptes* and the diagnosis of its species are mainly based on male characters; useful keys to identify species were published by Gaud (1972) for African hosts, and by Vasyukova & Mironov (1991) for hosts from the Palaearctic region.

***Alloptes (Conuralloptes) aechmorhynchi* new species**
(Figs 1–3)

TYPE MATERIAL: ♂ holotype, 4 ♂ and 5 ♀ paratypes ex *Aechmorhynchus parvirostris*, Maria Island, Tuamotu Group, French Polynesia, South Pacific Ocean, 2 June 1922, R.H. Beck & E.H. Quayle, Whitney South Sea Expedition (MONZ Reg. No. 27526). Holotype, 3 ♂ and 4 ♀ paratypes in MONZ; 1 ♂ and 1 ♀ paratypes in ZISP.

MALE: As in Fig. 1. Idiosoma size (length x width) in holotype 270 x 146 (idiosomal size in 4 paratypes 260–268 x 134–140). Prodorsal shield: posterior margin concave, surface without ornamentation, greatest length 73, width of posterior part 85, distance between setae *se* 91. Length of hysterosoma from sejugal furrow to bases of setae *ps1* 156. Hysteronotal shield (Fig. 1a): greatest length from anterior end to bases of setae *ps1* 170, width of anterior part 67, anterior margin slightly concave, lateral margin with small incision at level of trochanters III, setae *d2* on margin of these incisions, surface without ornamentation. Distance between prodorsal and hysteronotal shields along midline 24. Subhumeral setae *c3* lanceolate, 13 x 2.5. Opisthosoma gradually attenuate to posterior end; length of interlobar suture 54, width of opisthosoma at level of setae *h2* 33. Terminal lamella with three pairs of festoons, incision between inner pair slot-shaped (Fig. 2e). Setae *h2* slightly enlarged in basal half, greatest width 6.5. Setae *h3* absent, setae *ps2* greatly reduced. Distance between dorsal setae: *c2:d2* 34, *d2:ps1* 112 (108–112). Bases of trochanters I, II flanked by narrow sclerotised bands connecting bases of respective epimerites. Coxal setae *3a* situated posterior to *3b*, pseudanal setae *ps3* anterior to coxal setae *4a* (Fig. 1b). Bases of setae *4a* not surrounded by sclerites. Pregenital sclerites, connecting inner ends of epimerites IIIa and paragenital arch, separated from each other. Length of genital–anal field from its anterior end to bases of setae *ps1* 104. Length of genital arch 15, width 16. Terminal sclerotised area of opisthosoma not connected with ventral margins of hysteronotal shield flanking anal area. Distance between ventral setae: *3b–3a* 8, *3a–3g* 16,

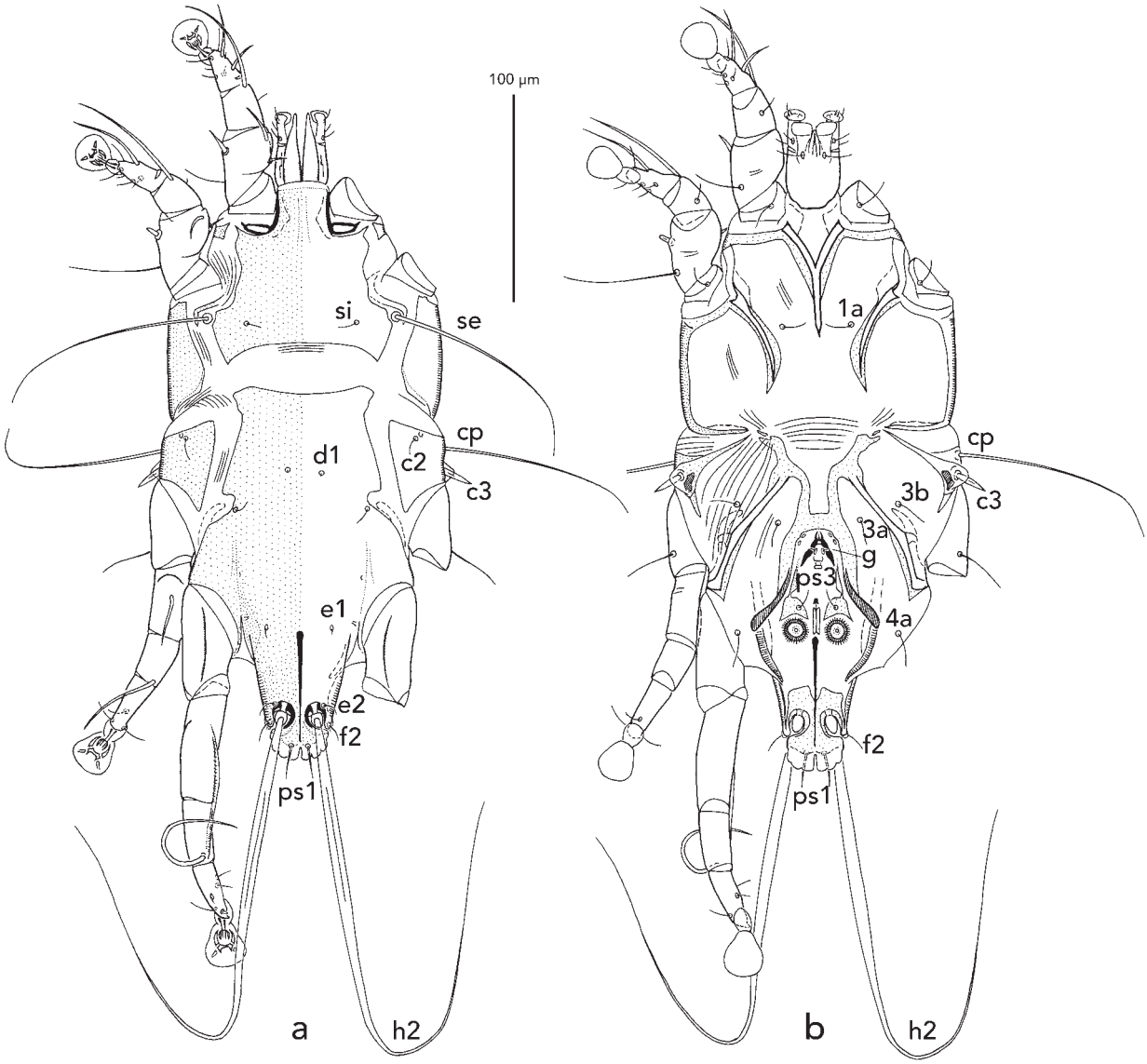

Fig. 1 *Alloptes* (*Conuralloptes*) *aechmorhynchi*, male: a, dorsal view; b, ventral view.

3a–4a 53, *g–ps3* 24, *ps3–ps1* 70, *4a–4a* 78. Setae *mG* of genu I spine-like, straight, with acute apex; seta *mG* II spine-like with bluntly rounded apex (Fig. 2a,b). Legs III slightly extending by length of ambulacral disc beyond the level of opisthosoma apex (Fig. 1). Legs IV 160 in length, femoragenu and tibia IV with longitudinal membranous crest; tarsus IV 33 in length (Fig. 2d).

FEMALE: As in Fig. 3. Idiosomal size (length x width): 375 x 140 (idiosomal size in 4 other paratypes: 360–380 x 130–140). Prodorsal shield as in the male, length 78, width of posterior part 88; distance between setae *se* 95. Length of hysterosoma 255. Setae *c3* lanceolate 12.5 x 2.5. Hysteronotal shield: anterior margin almost straight, anteromedian part with cell-like pattern, greatest length (from anterior margin to setae *h3*) 248, width of anterior part 64 (Fig. 3a). Setae *f2, ps1* present; setae *h1* anterior to setae *e2*. Distance between prodorsal and hysteronotal shields along midline 35. Opisthosomal lobes well developed, terminal cleft as a narrow V, 54 long. Distance between dorsal setae: *c2:d2* 53–58, *d2:e2* 93–94, *e2:h2* 43–45, *h2:h3* 35–37, *h2:h2* 56–57, *h3:h3* 28–36. Supranal concavity ovate, separated from terminal cleft. Coxal fields I, II as in the male. Epigynium bow-shaped, 16 x 54 (Fig. 3b). Legs I, II as in the male. Tarsi III, IV with small

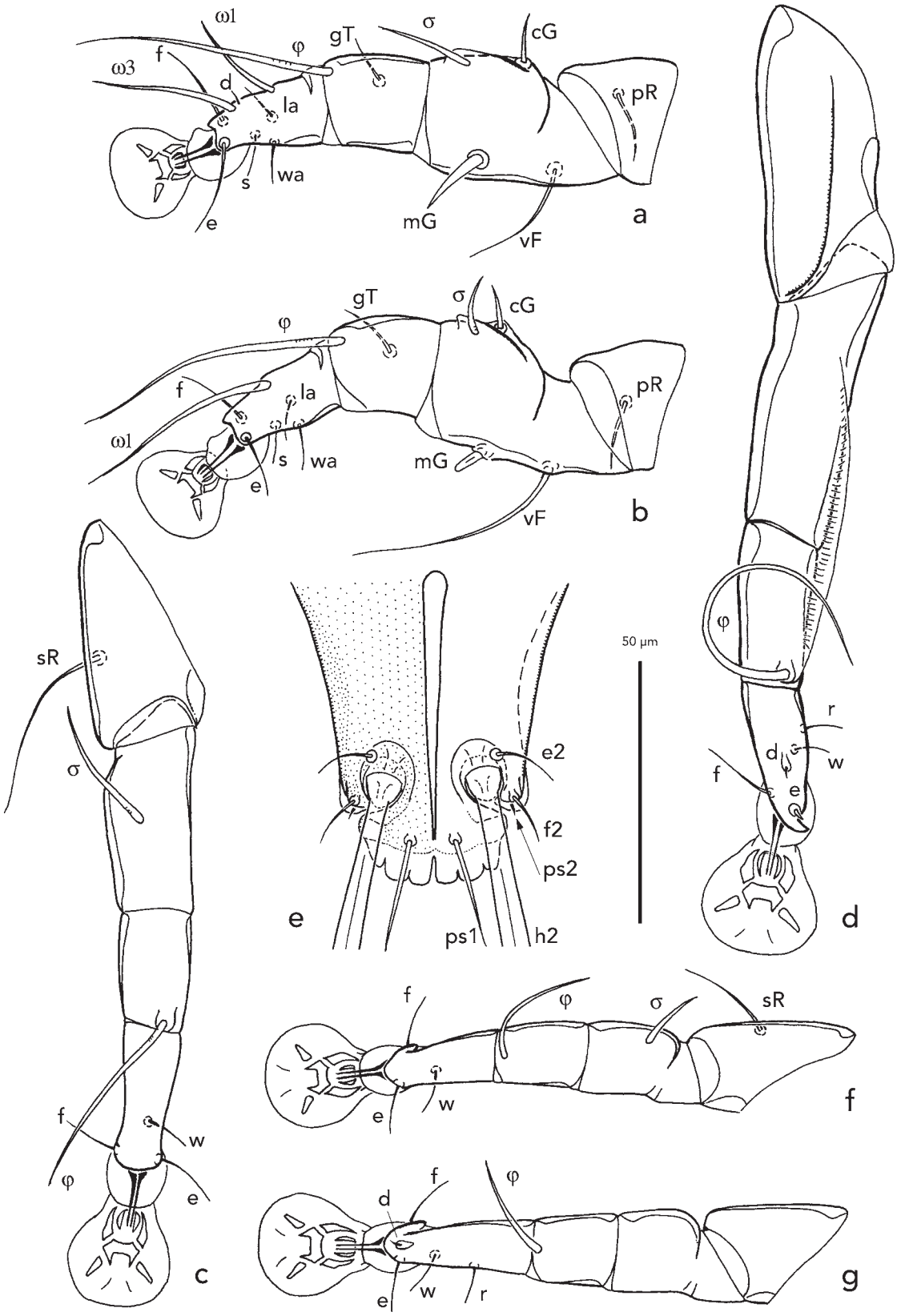

Fig. 2 *Alloptes* (*Conuralloptes*) *aechmorhynchi*, a–e, male; f–g, female: a, leg I, dorsal view; b, leg II, dorsal view; c, leg III, dorsal view; d, leg IV, dorsal view; e, posterior end of opisthosoma, dorsal view; f, leg III, dorsal view; g, leg IV, dorsal view.

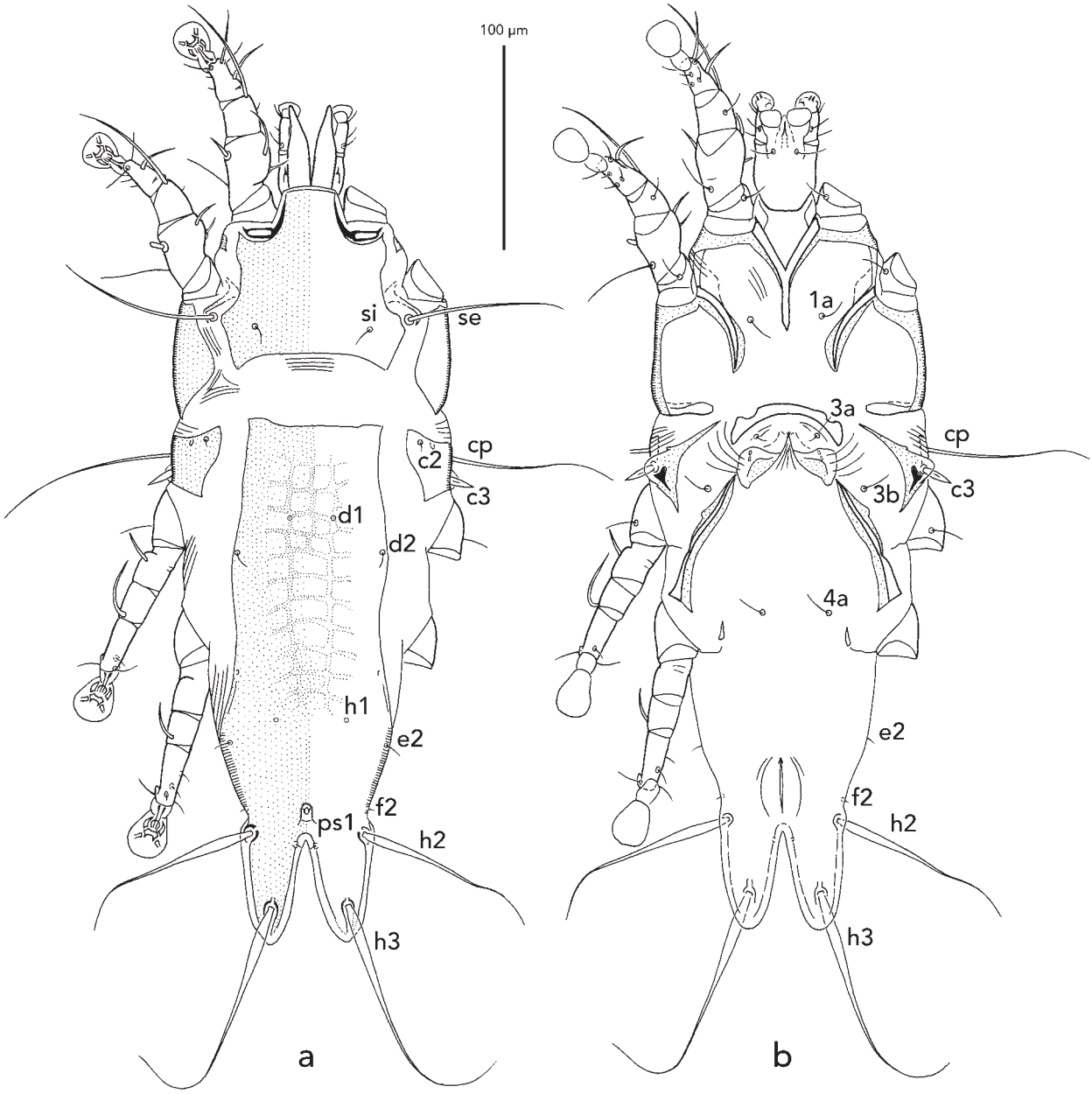

Fig. 3 *Alloptes* (*Conuralloptes*) *aechmorhynchi*, female: a, dorsal view; b, ventral view.

latero-apical crest (Fig. 2e,f). Ambulacra of legs IV attaining level of setae *h2*.

DIFFERENTIAL DIAGNOSIS: Within the subgenus *Conuralloptes* – comprising about 20 species – our new species belongs to a group of 15 species where the males have separated pregenital sclerites. *Alloptes* (*Conuralloptes*) *aechmorhynchi* is morphologically closest to *A.* (*C.*) *calidridis* Dubinin, 1951 – originally described from *Calidris ruficollis* (Pallas, 1776) (Charadriiformes: Scolopacidae) and also known from various *Calidris* species (Dubinin 1951; Gaud 1972; Vasyukova & Mironov 1991) – in having male leg III slightly extended beyond the apex of the opisthosoma. However, *A.* (*C.*) *aechmorhynchi* differs from *A.* (*C.*) *calidridis* by the following combination of characters: males of *A.* (*C.*) *aechmorhynchi* have the terminal sclerotised zone of the opisthosoma relatively short and not fused with the margins of the hysteronotal shield flanking the anal area, and setae *4a* situated on soft tegument (Fig. 1b); females of

A. (*C.*) *aechmorhynchi* have opisthosomal lobes relatively elongated, from 1.7 to 2 times longer than wide at the base, and a hysteronotal shield with a cell-like pattern (Fig. 3a). In contrast, males of *A.* (*C.*) *calidridis* have the terminal sclerotised area of the opisthosoma fused with the margins of hysteronotal shield flanking the anal area, and setae *4a* surrounded by small sclerotised plates; *A.* (*C.*) *calidridis* females have opisthosomal lobes relatively short, approximately as long as wide, and a hysteronotal shield uniformly punctured.

ETYMOLOGY: The epithet *aechmorhynchi* is an adjective in the genitive case derived from the genus of the type host.

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

Genus *Ingrassia* Oudemans 1905

Comprising 23 species, *Ingrassia* is the most species-rich genus within the subfamily Ingrassiinae. Within the host plumage, *Ingrassia* mites mainly inhabit the body covert feathers. Representatives of this genus live on species belonging to five orders of aquatic birds: Anseriformes, Charadriiformes, Pelecaniformes, Podicipediformes and Procellariiformes. However, the majority of *Ingrassia* species (17 species, or 74%) are known from charadriiform hosts (Gaud 1972; Gaud & Atyeo 1981; Chirov & Mironov 1990; Vasyukova & Mironov 1991). The true diversity of *Ingrassia* species occurring on hosts other than Charadriiformes is still unknown, with only a few species described from each of the four avian orders mentioned above (Černy 1967; Gaud 1973, Gaud & Atyeo 1981). Regarding knowledge according to geographic regions, the African fauna of *Ingrassia* mites was extensively studied by Gaud (1972), and that of the Palaearctic region by Gaud (1973), Chirov & Mironov (1990), Vasyukova & Mironov (1991) and Dabert (2000). Fewer *Ingrassia* species are known from other geographical regions (Atyeo & Peterson 1967; Černy 1967; Dabert & Ehrnsberger 1991). Identification keys to species of *Ingrassia* are available only for those associated with Charadriiformes from Africa (Gaud, 1972), and from the former USSR (Chirov & Mironov 1990; Vasyukova & Mironov 1991).

Ingrassia platyspina **new species**

(Figs 4–6)

TYPE MATERIAL: ♂ holotype, 7 ♂ and 6 ♀ paratypes ex *Aechmorhynchus parvirostris*, Maria Island, Tuamotu Group, French Polynesia, South Pacific Ocean, 2 June 1922, R.H. Beck & E.H. Quayle, Whitney South Sea Expedition (MONZ Reg. No. 27526). Holotype, 5 ♂ and 4 ♀ paratypes in MONZ, 2 ♂ and 2 ♀ paratypes in ZISP.

MALE: As in Fig. 4. Idiosoma size (length x width) in holotype 380 x 215 (idiosomal size in 6 paratypes 365–385 x 200–205), length of hysterosoma 200–205. Prodorsal shield: narrow longitudinal plate slightly enlarged and rounded posteriorly, 93 long, 22 wide, with a longitudinal row of small cells on its anterior end, and a posterior end extending beyond the level of scapular setae (Fig. 4a). Setae *se* separated by 73, situated on small sclerites. Inner margin of scapular shields smooth, without suprategumental process. Hysteronotal shield: anterior margin slightly concave, greatest length of the shield from anterior end to base of setae *h3* 245, width (distance between setae *c2*) 154. Length of terminal cleft from anterior end to base of setae *h3* 103, greatest width of terminal cleft (posterior to setae *ps1*) 46. Supranal concavity narrow, slit-like. Terminal membranous extensions on lobar apices tongue-like, length from base of setae *h3* to extension apices 45, width at base 26, length of incision between extensions 67. Distance between dorsal setae: *c2*:*d2* 53, *d2*:*e2* 51, *e2*:*h3* 130, *h3*:*h3* 54, *ps1*:*ps1* 35. Setae *ps1*, *ps2* at the same transverse level. Setae *c2* slightly longer and thicker than humeral seta *cp*. Sternum long, over three-quarters of total length of epimerites I. Anterior ends of epimerites IIIa bearing bases of setae *3a* connected with each other (Fig. 4b). Pregenital apodeme as a small inverted V. Genital apparatus small, about 8 in length. Genital sclerites bearing setae *F* present. Anterior ends of adanal apodemes extend to the level of pregenital apodeme. Coxal setae *3a* on epimerites IIIa separated by 21. Coxal fields IV completely sclerotised. Tarsus I, II with small apical spine (Fig. 5a–c). Tibiae I, II with scarcely expressed ventral process. Femoragenu II with rounded dorsobasal retrograde apophysis. Outer margin of tibia III with rectangular ledge bearing solenidion φ and with subapical flat spine; tarsus III with wide membranous crest along the entire outer margin of the segment, length of tarsus III 100 (Fig. 5d). Tarsus IV with bidentate apex and with longitudinal membranous crest on outer margin (Fig. 5e). Legs IV extending slightly beyond the level of insertions of setae *h3*.

FEMALE: As in Fig. 6. Idiosoma size (length x width) 360 x 156 (in other 5 paratypes 355–365 x 150–160). Prodorsal shield: a longitudinal plate greatly enlarged in its posterior

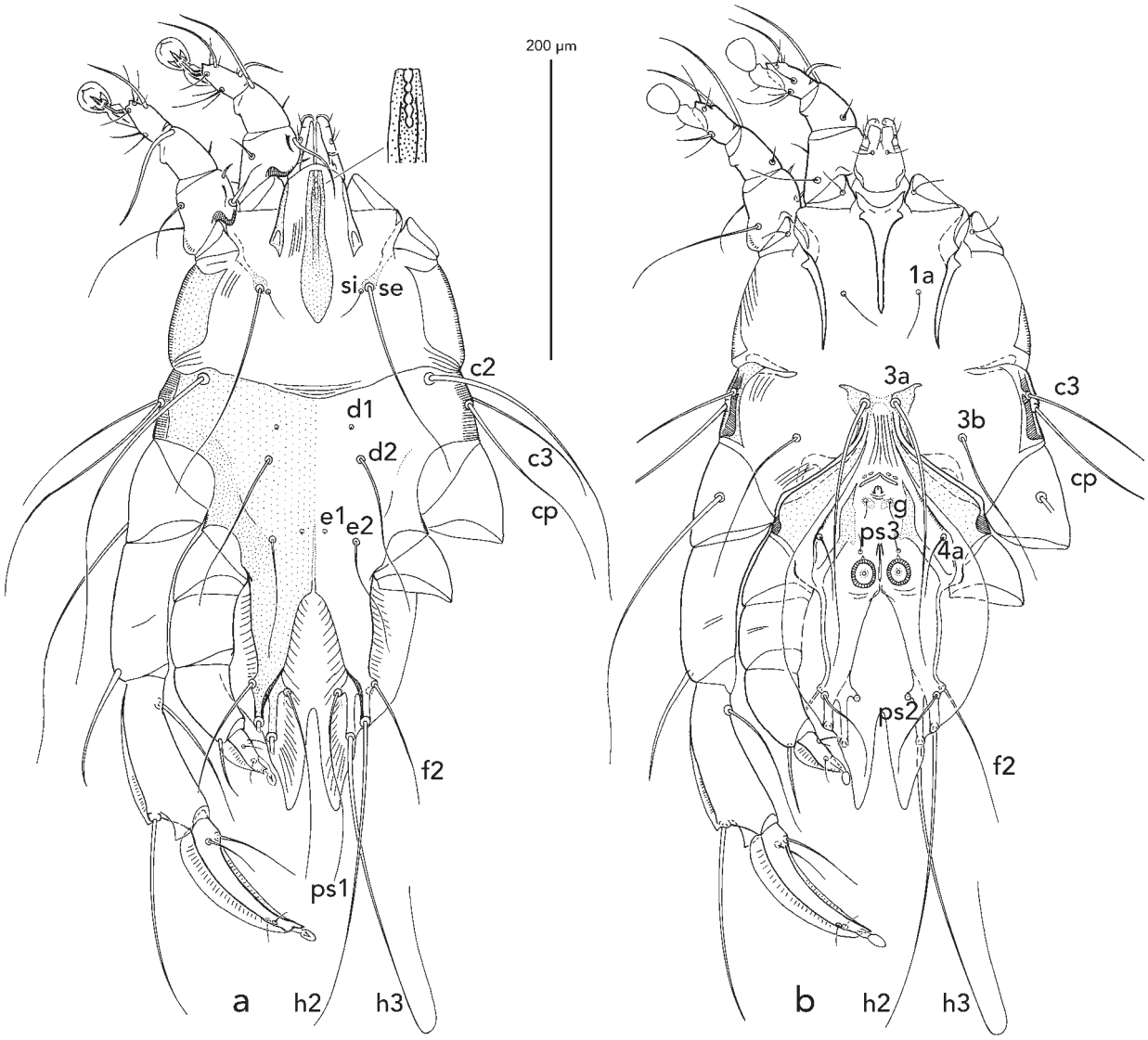

Fig. 4. *Ingrassia platyspina*, male: a, dorsal view; b, ventral view.

part; anterior end with a narrow incision, and posterior end semi-ovate, extending beyond the level of scapular setae; length 83, greatest width 40 (Fig. 6a). Setae *se* separated by 64, situated on small teardrop-shaped sclerites. Inner margin of scapular shields with flat, spine-shaped, suprategumental extension. Antero-mesal angle of humeral shields acute. Hysteronotal shield: anterior margin straight; posterior margin concave; posterior angles acute, extending beyond the level of setae *e2*; lateral margins slightly sinuous; greatest length of the shield 160, width of anterior margin 50, length of incision in posterior margin 24; setae *d1*, *e1* situated on the hysteronotal shield, distant from margins, and setae *d2* on lateral margins, *e2* on striated tegument. Distances between dorsal setae: *c2*:*d2* 82, *d2*:*e2* 80, *e2*:*h2* 74, *h2*:*h2* 43. Epigynium thin, almost straight, transverse sclerite, width 26, with tips not extending to bases of setae *3a* (Fig. 6b). Posterior extensions of oviporus folds acute, not extending to the level of setae *4a*. Legs I, II as in the male, except for the ventral process of tibiae not expressed. Legs IV extending to posterior end of opisthosoma.

DIFFERENTIAL DIAGNOSIS: *Ingrassia platyspina* is morphologically closest to *I. centrotibia* Gaud, 1972 – described from *Himantopus himantopus* (Linnaeus, 1758) (Charadrii-

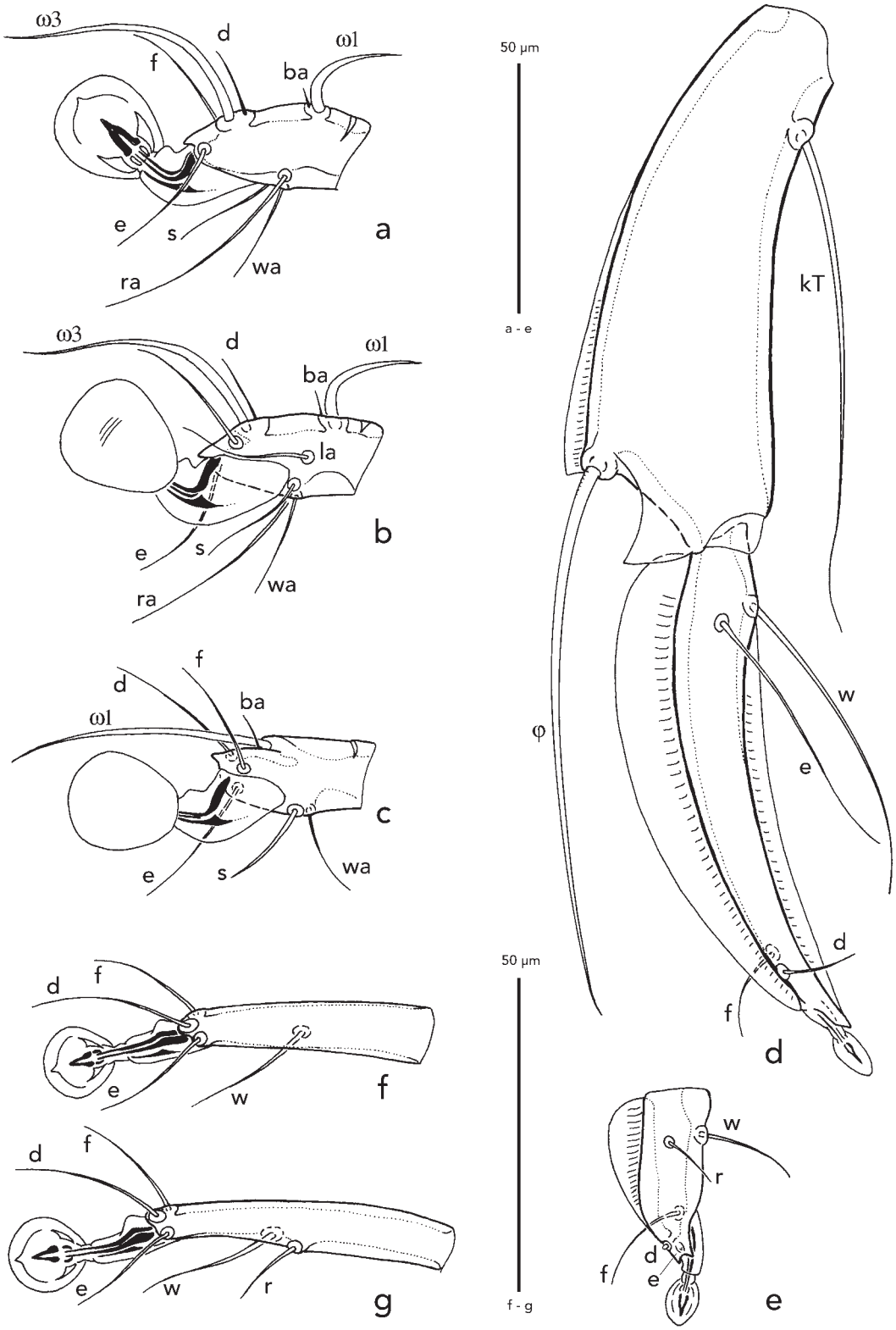

Fig. 5 *Ingrassia platyspina*, a–e, male; f–g, female: a, tarsus I, dorsal view; b, tarsus I, ventral view; c, tarsus II, ventral view; d, tibia and tarsus III, dorsal view; e, tarsus IV, dorsal view; f, tarsus III, dorsal view; g, tarsus IV, dorsal view.

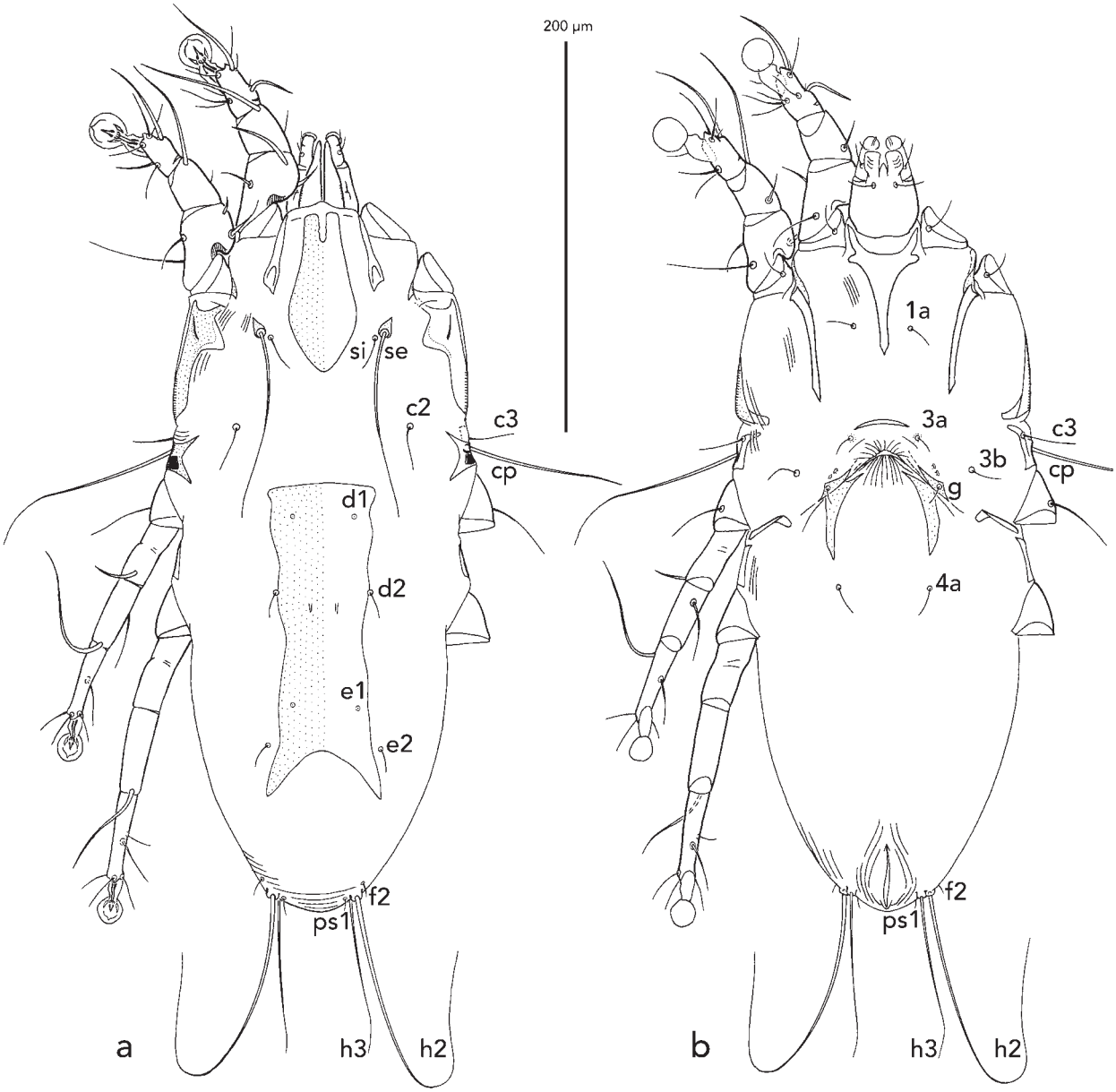

Fig. 6 *Ingrassia platyspina*, female: a, dorsal view; b, ventral view.

formes: Recurvirostridae), and also recorded from several *Charadrius* species (Charadriiformes: Charadriidae) in Africa (Gaud 1972) – in having a round retrograde dorsobasal apophysis on femoragenu II in both sexes, a flat spine-like extension on the inner margin of the scapular shields in females, and by the concave anterior margin of the hysteronotal shield in males. *Ingrassia platyspina* can be distinguished from *I. centrotibia* by the following male features: the suprategumental extensions on the inner margin of the scapular shield are absent, tibia III has a flat spine at the base of the tarsus (Fig. 5d), the outer ledge of tibia III – bearing solenidion φ – is rectangular, and tarsus IV has a longitudinal membranous crest along its outer margin (Figs. 4a, 5e); in females, the hysteronotal shield has a deeply concave posterior margin, and the posterior angles of the hysteronotal shield extend beyond the level of setae *e2* (Fig. 6a). In males of *I. centrotibia*, the inner margins of the scapular shields bear semi-round suprategumental extensions, tibia III has no spine at the base of the tarsus, the outer ledge of tibia III – bearing solenidion φ –

is acute, and tarsus IV has no membranous crest along its outer margin; in females, the hysteronotal shield has an almost straight posterior margin and scarcely extends beyond the level of setae *e2*. The structure of tibia III in males of *I. platyspina* is unique among all known species of the genus *Ingrassia* (Fig. 5d).

ETYMOLOGY: The epithet *platyspina* is a noun in apposition and refers to the flat apical spine on tibiae III of males.

Acknowledgements

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