Bicentenary of Ludwig Leichhardt: Contributions to Australia’s Natural History in honour of his scientific work exploring Australia

Edited by Barbara Baehr
A review of *Fedrizzia* mite species (Acari: Mesostigmata: Fedrizziiidae) found in association with Australian *Mastachilus* beetles (Coleoptera: Passalidae)

Owen D. SEEMAN
Natural Environment Program, Queensland Museum, PO Box 3300, South Brisbane, 4101, Australia. Email: owen.seeman@qm.qld.gov.au

ABSTRACT

Mites of the genus *Fedrizzia* from passalid beetles of the genus *Mastachilus* are reviewed, and two new species, *Fedrizzia classeni* sp. nov. and *Fedrizzia humei* sp. nov. are described, both associated with *Mastachilus polyphyllus* (Macleay, 1826). *Fedrizzia oudemansi* Womersley, 1959, is redescribed and shown to occur only on the southern form of *Mastachilus australasicus* (Percheron, 1841); previous records of this mite from *M. polyphyllus* are placed in *F. classeni*. A revised key to *Fedrizzia* is presented.

Fedrizziid mites are large, glossy brown mites that live with passalid beetles, a sub-social group of insects that live in family groups in rotting logs. Immature fedrizziid mites dwell in the beetle’s tunnels where they are predators, most likely on nematodes (Seeman 2000). Once becoming adults, they move on to their host beetle where they remain closely associated for the rest of their adult life. Although they attend to their host closely, feeding from the host has never been observed. Instead, they presumably are opportunistic predators and scavengers, leaving the beetle to feed in close proximity. In the laboratory, adults fed on nematodes and used their long filamentous cheliceral excrescences to mop-up the fluids from dead microarthropods (Seeman 2000). Females deposited eggs on the substrate in the laboratory, and probably do the same in the tunnels of passalid beetles.

The Fedrizziidae includes 34 species in three genera: *Fedrizzia* (11 species) *Neofedrizzia* (22 species), and *Parafedrizzia* (1 species) (Womersley 1959; Seeman 2007, 2009). Each passalid beetle species is host to one to seven species of fedrizziid mites, with smaller host species tending to have fewer mite species (Table 1). Mite species can also differ in geographical space. For example, *Pharochilus dilatatus* (Dalman, 1817) typically hosts the widespread species *Neofedrizzia camini* Womersley, 1959, but in the Bunya Mountains *P. dilatatus* is host to another species, *Neofedrizzia bunyas* Seeman, 2007, and *N. camini* is absent (Seeman 2007; Table 1). Consequently, the 34 species of Australian passalid beetles (Dibb 1938; Van Doesberg 1992) are likely to carry several times as many fedrizziid mite species. Add to this a multitude of other families of mites found on passalid beetles—12 in Australia, 25 worldwide—and it seems likely that Australian passalid beetles alone carry a startling number of undescribed species (Hunter 1993; Seeman 2001, 2002, 2007).

I here describe two new species of *Fedrizzia* from *Mastachilus polyphyllus* (Macleay, 1826), which hitherto had not been searched for fedrizziid mites. I also redescribe *Fedrizzia oudemansi* Womersley, 1959, which is found on the southern form of *Mastachilus australasicus* (Percheron, 1841).

MATERIALS AND METHODS

Mites were collected from the bottom of tubes containing beetles killed in 80% ethanol, or removed from pinned specimens. The mites
Table 1. Fedrizziid mites associated with Australian passalid beetles. Incidental records of mites that typically have other host beetles are not included (see Seeman 2007); passalid species that cannot be verified as hosts are not included. Host sizes from Dibb (1938) and specimens in the Queensland Museum.

<table>
<thead>
<tr>
<th>Passalidae beetle species</th>
<th>Host size (mm)</th>
<th>Fedrizziidae mite species</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subfamily Passalinae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Analaches australiensis</em></td>
<td>26–30</td>
<td><em>Fedrizzia bornemisszai</em></td>
</tr>
<tr>
<td><em>Austropassalus hultgreni</em></td>
<td>26–30</td>
<td><em>Neofedrizzia lepas</em></td>
</tr>
<tr>
<td><em>Gonatus sp.</em></td>
<td>20–33</td>
<td><em>Fedrizzia bornemisszai</em></td>
</tr>
<tr>
<td><em>Mastachilus australasicus</em> (southern form)</td>
<td>38–42</td>
<td><em>Fedrizzia abradoalves</em> <em>Fedrizzia oudemansi</em> <em>Fedrizzia parvipilus</em> <em>Fedrizzia sellnicki</em> <em>Neofedrizzia camini</em> <em>Neofedrizzia tragardhi</em> <em>Neofedrizzia vidua</em></td>
</tr>
<tr>
<td><em>Mastachilus australasicus</em> (northern form)</td>
<td>44–51</td>
<td><em>Neofedrizzia brooksi</em> <em>Neofedrizzia helenae</em> <em>Neofedrizzia imparmentum</em></td>
</tr>
<tr>
<td><em>Mastachilus polyphyllus</em></td>
<td>35–40</td>
<td><em>Fedrizzia classeni</em> <em>Fedrizzia humei</em></td>
</tr>
<tr>
<td><em>Mastachilus quaestionis</em></td>
<td>45–53</td>
<td><em>Fedrizzia parvipilus</em> <em>Fedrizzia sellnicki</em> <em>Neofedrizzia bunyas</em></td>
</tr>
<tr>
<td><em>Pharochilus dilatatus</em></td>
<td>28–32</td>
<td><em>Fedrizzia abradoalves</em> <em>Neofedrizzia camini</em> <em>Neofedrizzia cynota</em></td>
</tr>
<tr>
<td><em>Pharochilus scutellonotus</em></td>
<td>36–39</td>
<td><em>Neofedrizzia camini</em> <em>Neofedrizzia tragardhi</em></td>
</tr>
<tr>
<td><strong>Subfamily Aulacocyclinae</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Aulacocyclus edentulus</em></td>
<td>23–30</td>
<td><em>Neofedrizzia canestrini</em></td>
</tr>
<tr>
<td><em>Aulacocyclus fracticornis</em></td>
<td>22–28</td>
<td><em>Neofedrizzia canestrini</em></td>
</tr>
<tr>
<td><em>Aulacocyclus kaupi</em></td>
<td>27–29</td>
<td><em>Neofedrizzia canestrini</em></td>
</tr>
<tr>
<td><em>Aulacocyclus teres</em></td>
<td>35–40</td>
<td><em>Neofedrizzia jeffi</em> <em>Neofedrizzia susanae</em></td>
</tr>
</tbody>
</table>

1 *Neofedrizzia bunyas* replaces *N. camini* in the Bunya Mountains, SE Qld. 2 Known from single record only.

were then cleared in Nesbitt’s fluid, mounted in Hoyer’s medium, dried, and ringed with insulating varnish. Host beetles were identified with Dibb (1938) and Seeman (2002). Measurements and illustrations were made with the aid of a Nikon Eclipse 80i microscope equipped with DIC and a drawing tube. Morphology and setal designations follow those used in Seeman (2007). Measurements are in micrometres, and lengths and widths were measured at the longest or widest point of the relevant structure. Collection abbreviations are used for
the Queensland Museum, Brisbane (QM), the Australian National Insect Collection, Canberra (ANIC), and the South Australian Museum, Adelaide (SAMA).

SYSTEMATICS

Fedrizia Canestrini, 1884

Fedrizia Canestrini, 1884: 707; Seeman (2007: 15) [modern diagnosis]. Type species: Fedrizia grossipes Canestrini, 1884, by monotypy.


Fedrizia classeni sp. nov.

(Figs 1–3)

Fedrizia oudemansi – Seeman, 2007: 27 [only specimens from Rockwood].


Description. Both sexes: idiosoma length 725–810; dorsal shield with 3–6 larger pores medially; ventral shield with lineate reticulation laterally, smooth medially; ventrianal shield lineate-reticulate laterally and posteriorly, smooth anteromedially; marginal shield weakly lineate-reticulate; anterolateral corner of ventrianal shield not fused with ventral shield; exopodal pattering between CxII–III spotted; pedofoasae III absent; CxIV-marginal suture absent; femur III and IV with small lamellae, seta pv1 not significantly thickened; femur IV not elongated, larger than femur III; seta h1 smooth, slightly curved. Female: st2 length 5–8, st3–4 length 11–15, lyrifissure stp2 posterior to stpx; sternogynal shield with weak honeycomb-like reticulation internally, flanked by four pairs of pores and one pair of setae. Male: sternoventral shield without suture posterior to genital opening; genital opening flanked by one pair of pores; seta h1 curved, flattened slightly; seta h3 positioned posteromedial to h2.

Description. Female (n = 6). Idiosoma (Fig. 1A) length 725–810, width 540–610 (holotype 785 x 570). Dorsum. Dorsal shield with anterior hyaline projection bearing one pair of barbed setae, length 61–63; hypertrichous, with c. 230–260 minute setae; with numerous (c. 80) smaller pores and 3–6 larger medial pores (subcuticular gland 6–10 diameter); with sub-lateral line of 36 pores; dorsal patterning comprises fine transverse to oblique lines and incomplete reticulation; marginal setae length 6. Venter. Tritosternum base length 26–27, width 34–39 (Fig. 1B). Presternal and sternal shield smooth; presternal shield rectangular, length 30–32 at midline, width 87–95; st1 barbed, length 35–40; st2 barbed, length c. 55; st3 with few barbs, length 15, st4 with 1–2 barbs, length 11–15; posterolateral margin of sternal shield pointed, st3–4 4–8 anterior to posterior margin, pore stpx anterior to stp2. Sternogynal shield length 118–125, width 140–156, with weak internal honeycomb-like reticulation, not surrounded by smooth area; shield flanked by four pairs of pores and one pair of setae. Ventral shield lineate laterally, smooth medially, a large pore medially between CxIII–IV, without pore posteromedial CxIV, two pairs of large pores, c. 7–8 pairs of small round pores, 10 pairs of setae, the most posterior and lateral length 8–12. Ventrianal shield length 165–175, width 435–465, fine lineate network of reticulation laterally and posteriorly, smooth anteromedially, two pairs of setae anterior to anus, three lateral pairs length 12–16, paranal setae length 32–34; anterolateral corner of ventrianal shield not fused with ventral shield. Marginal shields with lineate reticulation.

Legs. T1 with seta pv1 with minute barbs, not thicker than seta av1. FeI with seta pv3 similar to seta pv1 and pv2. Fell with lamella distal to seta pv1, seta ad1 smooth, thickened. FellII with small lamella, seta pv1 not spine-like. FellIV similar to FellII, not elongated, length 95–100, width 74–80 at distal end, with small lamella, seta pv1 not spine-like, seta pd2 just proximal to seta ad2 (Fig. 2A). T2 with seta av2 spine-like, subequall in length to av3; Ta III with seta av2 thickened, subequal in length to seta av3. Legs II–IV with thin, setiform ad and pd setae.

Gnathosoma (Figs 2B–E). Seta h1 smooth, slightly curved, length 43–47, distance between h1–h1 20–24; h2 barbed length 28–36; h3 length 6–8, posterolateral h2; palpcoxal seta length 11–14. Corniculi on tubercles, tubercle length...
FIG. 1. *Fedrizzia classeni* sp. nov. Female: A, venter. B, tritosternum. Reticulation shown completely only on left-hand side of illustration.
corniculi palmate, tip toothed. Palp, seta av1 on trochanter with 8–9 branches, seta av2 barbed, spur with one sharp and two blunt processes (Figs 2C–D). Chelicera, fixed digit length 140, movable digit length 42, fixed digit with two large and two minute teeth; excrescences arise from an enlarged base of digit and comprise a large brush-like process, a ribbon-like process with a serrate edge, and a ribbon-like process with a crenate and toothed edge; processes extend at least 55 past end of chelicerae (Fig. 2E).

**Male** (n = 5). Idiosoma length 700–770, width 505–545. Presternal shield length 20–23 at midline, width 78–90; st1 barbed, length 27–30; st2 smooth, length 5; st3 smooth, length 10–12. Genital opening length 39–41, width 48–50. Suture posterior to genital opening absent (Fig. 3A).

*Seta h3* length 6, just anterior to h2 and closer to midline than h2. Seta h1 broadened, curved, length 38–42 (Fig. 3B).

**Etymology.** This species is named for Adolph Classen, who was second-in-charge during Leichhardt’s final expedition, but may have survived and lived out his life with the aboriginal people of central Australia.

**Remarks.** *Fedrizzia classeni* sp. nov. resembles *F. oudemani* in its size, setae and shield ornamentation. However, it bears a small lamella on femur III and IV, a characteristic found only, amongst *Fedrizzia*, in *Fedrizzia gilloglyi* Seeman, 2007, from Thailand. *Fedrizzia gilloglyi* is much larger (length 1140–1160) than *F. classeni* sp. nov. (length 700–810) and lacks pores flanking the sternogynal shield (4 pairs in *F. classeni*).
**Fedrizzia humei sp. nov.**
(Figs 4–6)

**Material examined.** HOLOTYPE: QM-S95267, ♀, Barakula State Forest, southeast Queensland, 26°26’S 150°30’E, 10–16.x.2004, C. Burwell, Cypress forest (samrcode 52067), ex *Mastachilus polyphylus* (Passalidae). PARATYPES: QM-S95268–9, ♀, ♂, same data as holotype; ANIC-51-00625, ♂, same data as holotype.

**Diagnosis.** Both sexes: idiosoma length 860; dorsal shield with eight large pores; ventral shield with mesh-like pattern; marginal and ventrional shields with mesh-like pattern; anterolateral corner of ventrional shield fused with ventral shield; exodopal patterned between CxII–III spotted; pedofosseae III absent; CxIV-marginal suture absent; femur III and IV without lamellae, seta pv1 not significantly thickened; femur IV elongated; seta h1 unmodified. Female: st2 length 28, st3 length 49–52, st4 length 16; lyrifissure stp2 anterior of stpx; sternogynal shield with honeycomb-like reticulation anteriorly, densely punctate posteriorly, flanked by 6–7 setae and 21 pores, surrounded by a smooth area extending 35 posterior of sternogynal shield. Male: sternoventral shield with suture posterior to genital opening demarking anterior smooth and posterior reticulated areas; genital opening not flanked by pores; seta h3 positioned level with h2.

**Description. Female** (n = 2): *Idiosoma* (Fig. 4) length 860, width 675–680. *Dorsum.* Dorsal shield with anterior hyaline projection bearing one pair of barbed setae, length 56–61; hypertrichous, with c. 210–230 minute setae; with numerous (c. 220) smaller pores and 8 larger medial pores (subcuticular gland 10–15 diameter); with sublateral line of c. 100 pores; dorsal patterning comprises transverse to oblique lines and extensive punctations; marginal setae length 8–12. *Venter.* Tritosternal base length 35, width 45 (Fig. 4B). Presternal and sternal shield with fine mesh-like reticulation arranged in larger polygons; presternal shield rectangular, length 31–33 at midline, width 121–127; st1 smooth, length c. 20; st2 length 28, st3 length 49–52, st4 length 16, st2–4 lightly barbed; posterolateral margin of sternal shield acutely pointed, st3–4 2–7 anterior to posterior margin, pore stpx posterior to stp2. Sternogynal shield length 100–103, width 160–166, with honeycomb-like reticulation anteriorly, otherwise densely punctate. Sternogynal shield surrounded by smooth area that extends 35 posterior of sternogynal shield; patch of smooth cuticle 40–45 diameter medially at posterior level of CxIV; remainder of ventral shield with mesh-like pattern. Sternogynal shield flanked by 6–7 setae (length 8–15) and 21 pores. Ventral shield with large pore (8 diameter) posteromeral of CxIV, four pairs of pores laterad CxIV, c. 16 pairs of small round pores, 10 pairs of setae, length of most posterior and lateral 10–12. Ventrianal shield length 115–120, width 375–390, with mesh-like reticulation anteriorly, becoming lineate-reticulate posteriorly, one pair setae just anterior of anus (length 6) (anteromedia ventrianal seta absent), three lateral pairs (length 10–20), paranal setae length 20; anterolateral corner of ventrional shield fused with ventral shield. Marginal shields with mesh-like to lineate reticulation (Fig. 4A).

*Legs.* Tr1 with seta pv1 with minute barbs, not thicker than seta av1. Fel with seta pv3 similar to seta pv1 and pv2. Fell with lamella distal to seta pv1, seta ad1 smooth and thickened. FelIII without lamella, seta pv1 not spine-like. FeIV enlarged (Fig. 5A), length 240–260, width 125–130 at distal end, without lamella, seta pv1 not spine-like, seta pd2 more proximal than seta ad2. TaII and III with seta av2 setiform, longer than seta av3; TaII av2 barbed. TaII av3 smooth. Legs II–IV with slightly thickened ad and pd setae, especially on femora and genua.

*Gnathosoma* (Fig. 5B). Seta h1 smooth, straight, length 68–74, distance between h1–h1 38–40; h2 smooth, length 44–55; h3 length 7, posterolateral h2; palpcoxal seta length 12. Corniculi on tubercles, tubercle length 10; corniculi palmate, tip toothed. Palp, seta av1 on trochanter with 8–9 branches, seta av2 with small barbs, spur with small denticles and blunt process. Chelicera, fixed digit length 175–180, movable digit length 63, fixed digit with two large and two minute teeth; excrescences arise from an enlarged base of digit and comprise a large brush-like process, a ribbon-like process with a serrate edge, and a ribbon-like process with a crenate and toothed edge; processes curled in specimens, but extend c. 75 past end of chelicerae.

**Male** (n = 2): *Idiosoma* length 930, width 695. Presternal shield length 29–32 at midline, width
FIG. 4. *Fedrizia humei* sp. nov. Female: A, venter; reticulation shown completely on prepeternal, sternal and ventrianal shields only on left-hand side; extensive reticulation shown incompletely on ventral shield to show setae, but central patch is smooth. B, tritosternum.
88–94; \( st1 \) smooth, length 35–45; \( st2 \) smooth, length c. 6; \( st3 \) smooth, length 20. Genital opening length 58–61, width 68–71. Small, medial smooth area medially, c. 50 diameter, at level of posterior margin of Cx IV. Suture posterior to genital opening separates smooth sternogenital shield from ventral shield. Ventral, ventrianal and marginal shields with mesh-like reticulation (Fig. 6A). \( Gnathosoma. \)

Seta \( h3 \) length 10–12, and level with \( h2 \) and closer to midline than \( h2 \). Palpcoxal seta length 13 (Fig. 6B).

**Etymology.** This species is named for Andrew Hume, who probably met Adolph Classen after Ludwig Leichhardt’s final expedition failed. Andrew Hume died during his second attempt to relocate the man he thought was Adolph Classen.
Remarks. *Fedrizzia humei* sp. nov. most closely resembles *F. grossipes* Canestrini, 1884, the type-species of *Fedrizzia*. The type specimens of this species are lost, and the species has never been collected again. Womersley (1959) thought he had collected a species similar to *F. grossipes*, and attributed it to *Fedrizzia* sp. cf. *grossipes*, but these were later shown to be *F. sellnicki* Womersley, 1959, and a poor match for *F. grossipes* (Seeman 2007). *Fedrizzia humei* sp. nov. matches *F. grossipes* in several ways (size, patterning, sutures), but Canestrini (1884) illustrated *F. grossipes* with an extensive smooth area surrounding the sternogynal shield (similar to *F. abradoalves*) and short setae st3. In contrast, *F. humei* has a small smooth area and long st3.

**Fedrizzia oudemansi** Womersley, 1959

(Fig. 7)


*Fedrizzia oudemansi* — Seeman, 2007: 27 [specimens from Tenterfield and Mt Glorious only].

**Material examined. New South Wales:** SAMA-N1952290, holotype, ♀, Glen Innes, 9.x.1956, G.F. Bornemissza, on *P. dilatatus* under a eucalyptus log. SAMA-N1952291–N1952293, paratypes, 2 ♂♂, ♀, same data as holotype [note that female paratype does not belong to this species, see below]. SAMA-N1952294, ♂, near Tenterfield, Washpool Ck, 8.x.1956, G.F. Bornemissza, on *P. dilatatus*. **Queensland:** QM-S74038–39, ♂, ♀, Mt Glorious, 6.v.1995, O. Seeman, ex passalid beetle; QM-S74036–37, 2 ♀♀, Mt Glorious, 21.xii.1995, O. Seeman, ex *M. australasicus*. QM-S95270–73, ♂, ♀, Kurrajong Picnic Area, Goomburra Section, Main Range.
National Park, 27°58'S 152°20'E, H. Urbina, J. Bartlett, O. Seeman, ex *M. australasicus*.

**Diagnosis.** Both sexes: idiosoma length 760–820; dorsal shield with 8–10 large pores medially; ventral shield with lineate reticulation laterally, smooth medially; marginal and ventrianal shields smooth; anterolateral corner of ventrianal shield fused with ventral shield; exopodal patterning between CxII–III spotted; pedofoseae III absent; CxIV–marginal suture absent; femur III and IV without lamellae, seta *pv1* not significantly thickened; femur IV not elongate, similar to femur III; seta *h1* thickened. Female: setae *st1–4* length 6–11; lyrifissure *stp2* posterior to stpx; sternogynal shield smooth, flanked by one pair of pores and two pairs of setae. Male: sternoventral shield without suture posterior to genital opening; genital opening flanked by one pair of pores; seta *h1* curved, flattened slightly; seta *h3* positioned level with and mesad of *h2*.

**Description. Female:** Idiosoma length 760–820, width 615–645 (holotype 760 x 615). Dorsum. Dorsal shield with anterior hyaline projection bearing one pair of barbed setae, length 65; hypertrichous, with c. 180 minute setae; with numerous (c. 80) smaller pores and 8–10 larger medial pores (subcuticular gland 10–15 diameter); with sublateral line of 16–20 pores; dorsal patterning comprises fine transverse to oblique lines and extensive fine punctations; marginal setae length 6–8. Venter. Tritosternum base length 30–32, width 37–40. Presternal and sternal shield smooth; presternal shield crown-shaped, length 29–32 at midpoint, width 92–100; st1 barbed, length 40–52; st2–4 length 6–11; posteralateral margin of sternal shield pointed, st3–4 3–6 anterior to posterior margin, pore stpx anterior to stpx. Sternoventral shield length 112–120, width 156–167, smooth, flanked by one pair of pores and two pairs of setae. Ventral shield lineate laterally, smooth medially, with a large pore between CxIII–IV, without large pore posteromedial CxIV, three pairs of large pores and 11 pairs of small round pores, 10 pairs of setae, most posterior and lateral length 10–12. Ventrianal shield length 170–185, width 420–475, smooth, paranal setae length 38–42, lateral and anteromedial setae length 18, setae just anterior to anus length 8–10; anterolateral corner of ventrianal shield fused with ventral shield. Marginal shields smooth (Fig. 7A).

**Legs.** Tr1 with seta *pv1* with minute barbs, not thicker than seta *av1*. FeI with seta *pv3* similar to seta *pv1* and *pv2*. Fell with lamella distal to seta *pv1*, seta *ad1* with small barbs, thickened. FellII without lamella, seta *pv1* not spine-like. FeIV not enlarged (Fig. 7C), length 100, width 70 at distal end, without lamella, seta *pv1* not spine-like, seta *pd2* just proximal to seta *ad2*. Tall with seta *av2* spine-like, longer than seta *av3*; Tall with seta *av2* spine-like, subequal to seta *av3*. Legs II–IV setae *ad* and *pd* thickened.

**Gnathosoma.** Seta *h1* smooth, straight, thickened slightly, length 48–50, distance between *h1*–*h1* 21; *h2* finely barbed, length 40; *h3* length 10, posteralateral *h2*; palpcoxal seta length 14. Corniculi on tubercles, tubercle length 12; corniculi palmate, tip toothed. Palp, seta *av1* on trochanter with 11 branches, seta *av2* barbed; trochantal spur with sharp process and two blunt processes. Chelicera, fixed digit length 135, movable digit length 36, fixed digit with two large and two minute teeth; excrescences arise from an enlarged base of digit and comprise a large brush-like process, a ribbon-like process with a serrate edge and a toothed edge, and a ribbon-like process with a crenate and toothed edge; processes extend at least 50 past end of chelicerae.

**Male:** Idiosoma length 745–770, width 570–580. Presternal shield length 23–26 at midline, width 93–98; st1 with nine barbs, length 41–45; st2 smooth, length 8; st3 smooth, length 33–37. Genital opening length 44–48, width 54–57, flanked by one pair of pores. Suture posterior to genital opening absent (Fig. 7B). Gnathosoma. Seta *h1* flattened, with fine tip, length 42–48. Seta *h2* length 9. Seta *h3* length 8–9, level with and mesad of *h2*.

**Remarks.** Seeman (2007) erred by identifying the specimens from Rockwood (described above as *F. classeni* sp. nov.) as *F. oudemansi*. As these were the best available specimens of his putative *F. oudemansi*, they were used as the reference point for the key. Consequently, a new key is required and is provided below. *Fedrizza oudemansi* is similar to *F. classeni* sp. nov., but like most *Fedrizza* species, it lacks lamellae on legs III–IV (present in *F. classeni* sp. nov.).

The paratype female (SAMA-N1952293) is not *F. oudemansi*. The slide has spoiled too much...
to make any further judgement, but it is larger (length c. 900) and clearly has a reticulated sternogynal shield. *Fedrizzia oudemansi* is smaller (760–820) and has a smooth sternogynal shield.

**Key to Female *Fedrizzia* Species**

Idiosomal lengths and countries of origin are given for each species and are given to help eliminate some, but not all, species in couplets. The key is based on Seeman (2007), and illustrations of characters in the key are provided in that paper.

1. Femur III and IV with large lamellae, seta *pv1* thickened. Pedofossae III present.


3. Posterior of sternogynal shield not flanked by a cluster of pores. Ventral shield with small flange that overlaps the posterior of

---

**FIG. 7. *Fedrizzia oudemansi* Womersley, 1959.**

- **A**, female, holotype, sternogynal shields; length and form of *st1*, *st3* and *st4* from non-type material.
- **B**, male, non-type, sternogynal shields.
- **C**, male, non-type, leg IV, left-hand side anterior view; femoral setae labelled.
Review of Fedrizzia mites

sternogynal shield. Idiosoma length 1140–1160. [Thailand].

— Posterior of sternogynal shield flanked by 4 pores. Ventral shield does not overlap sternogynal shield. Idiosoma length 725–810. [Northern NSW, Southeast Qld].

Fedrizzia gilloglyi Seeman

4. Ventral shield entirely lineate-reticulate, sometimes smooth medially, never with mesh-like pattern.

— Ventral shield with mesh-like pattern laterally and sometimes postero-medially.

Fedrizzia classeni sp. nov.


Fedrizzia parvipilus Seeman

6. Femur IV elongated, obviously longer than femur III. Sternogynal shield length 140. Idiosoma length 800–850. [Papua New Guinea].

Fedrizzia carabi Womersley

Fedrizzia oudemansi Womersley


Fedrizzia strandi (Oudemans)


— Ventrianal shield lineate- reticulate or with weak mesh-like reticulation anteriorly; if with mesh-like reticulation, then idiosoma > 1100.

Fedrizzia himei sp. nov.

9. Sternogynal shield surrounded by smooth area extending to posterior level of Cx IV; sternal setae st3 short. Idiosoma length 900. [Australia].

Fedrizzia grossipes Canestrini

— Sternogynal shield surrounded by smooth area extending no further than anterior margin of Cx IV; sternal setae st3 long, length 49–52. Idiosoma length 860. [Southeast Qld].

Fedrizzia humei sp. nov.

10. Smooth area surrounding sternogynal shield delineated by a suture, the area extensive, extending well past level of CxIII–IV. Idiosoma length 1020–1070. [Southeast Qld].

Fedrizzia abradoalves Seeman

11. Lateral setae of ventrianal shield length 20–30; sternogynal shield with strong honeycomb-like reticulation. Idiosoma length 1160–1260. [Southeast Qld, Northern NSW].

Fedrizzia sellnicki Womersley


Fedrizzia derricki Womersley

Fedrizzia bornemisszai Womersley

Key to Male Fedrizzia Species

1. Femur III and IV with large lamellae, seta pv1 thickened. Pedofossae III present. Exopodal patterning between CxII–III striped. Idiosoma length 1260. [Papua New Guinea].

Fedrizzia scutata (Womersley)

2. Femur III and IV without lamellae.

Fedrizzia gilloglyi Seeman

3. Sternoventral shield reticulate. Seta h1 with bulbous base. Idiosoma length 1160. [Thailand].

Fedrizzia grossipes Canestrini

— Sternoventral shield smooth. Seta h1 blade-like, base not bulbous. Idiosoma length 700–770. [Southeast Qld].

Fedrizzia classeni sp. nov.

— Sternoventral shield with mesh-like pattern laterally and sometimes postero-medially. ............................................. 8
5. Sternoventral shield without suture posterior to genital opening, intercoxal region smooth. .......................... 6
— Sternoventral shield with suture posterior to genital opening demarking smooth (anterior) and reticulate (posterior) regions. .................................................. 7
— Seta h1 distally flattened, without swollen base. Process of palp trochanter with single sharp spur and two blunt spurs. Idiosoma length 745–770. [Southeast Qld, NSW]. ........ Fedrizzia oudemansi Womersley
— Sternal setae st2–3 length > 15. Idiosoma length 760. [Buru, Indonesia]. ................................. Fedrizzia strandi (Oudemans)
8. Suture posterior to genital opening well separated from genital opening, at level of Cx III–IV. Idiosoma length 900. [Qld] ......................... Fedrizzia grossipes Canestrini
— Suture posterior to genital opening close to genital opening, at level of mid CxIII. Idiosoma length usually > 900. ................ 9
9. Ventrianal shield with mesh-like reticulation medially, excepting small bare patches. ......................................... 10
— Ventrianal shield without mesh-like reticulation medially, lineate-reticulate instead. ................................. 12
10. Ventral shield without smooth area between, or just posterior of, Cx IV. Idiosoma length 1160–1260. [Southeast Qld] ......................... F. sellnicki Womersley
— Ventral shield with small, medial smooth area between, or just posterior of, Cx IV Idiosoma length < 1100. .................. 11
— Without smooth area on ventrianal shield, just anterior of ventrianal shield. Ventrianal shield mostly covered in mesh-like reticulation. Marginal shields with areas of mesh-like reticulation. Idiosoma length 930. [Southeast Qld] ..................... Fedrizzia humei sp. nov.
— Ventrianal shield length 139, width 406. Idiosoma length 905. [Eastern Qld]. ................................. Fedrizzia bornemisszai Womersley

DISCUSSION

With the addition of these two species of Fedrizzia, 12 species of fedrizziid mites are now known from the three Australian species of Mastachilus (Table 1). The southern form of M. australasicus hosts seven species, but I have never captured all seven from the same beetle, with four being the typical number. The southern form of M. australasicus is not common in rainforest, which has been the focus of my previous collecting, so some of these records may represent use of this host species only when it occurs in rainforest. This may be the case for F. parvipilus, F. sellnicki and N. vidua, which are typically found on the much larger M. quaestionis, a rainforest specialist. More than one species of passalid can occupy the same log, so it is also possible that these host records represent incidental use of M. australasicus as a host. Mastachilus australasicus is common at Goomburra State Forest in open forests that fringe rainforest habitats. Here, M. australasicus hosts the remaining four species of fedrizziid mite, and none of the species found on M. quaestionis, or their host beetle, were found there.

Mastachilus usually hosts species of Neofedrizzia (Table 1), and the absence of this genus from M. polyphyllus most likely reflects that these new species were collected from two beetles at one locality. Further collecting from this host species will almost certainly discover undescribed species of Neofedrizzia.
ACKNOWLEDGEMENTS

I am very grateful for the assistance of Hector Urbina (Louisiana State University), Justin Bartlett (Queensland Department of Agriculture, Forestry & Fisheries) and Chris Burwell (QM), who collected some of the new material presented in this paper, and to Leslie Chisholm (South Australian Museum), who organised the loan of the type material of *F. oudemansi*. I also appreciated useful comments and corrections made by Dr Bruce Halliday (Australian National Insect Collection) and an anonymous referee. Finally, I thank Barbara Baehr, who instigated this volume celebrating the bicentenary of Ludwig Leichhardt’s birthday, and to QM for supporting it, which gave me the opportunity to prepare this work.

LITERATURE CITED


