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Revision of *Poliaspis* (Hemiptera, Coccoidea, Diaspididae), with descriptions of 8 new species from Australia

Nate Hardy[1,†], Rosa C. Henderson[2,‡]

1 *Entomology, Department of Biology, University of New Mexico, Museum of Southwestern Biology, 167 Castetter Hall, MSC03 2020, Albuquerque, NM 87131–0001* **2** *Landcare Research, Private Bag 92170, Auckland 1142, New Zealand*

† *urn:lsid:zoobank.org:author:1FB6D5B1-8F65-4842-9011-C70BD7769B2B*
‡ *urn:lsid:zoobank.org:author:93978ED6-3054-48DF-B8C4-541EC7EF75E3*

Corresponding author: *Nate Hardy* (nbhardy@gmail.com)

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Abstract

Eight new Australian species of *Poliaspis* are described and illustrated: *P. alluvia* **sp. n.**, *P. araucariae* **sp. n.**, *P. ceraflora* **sp. n.**, *P. naamba* **sp. n.**, *P. nalbo* **sp. n.**, *P. narungga* **sp. n.**, *P. ozothamnae* **sp. n.**, and *P. waibenensis* **sp. n.** Two described species are transferred into *Poliaspis* and are redescribed and illustrated: *Lineaspis callitris* (Laing) originally described by Laing as a species of *Poliaspis*, is transferred back into *Poliaspis* as *P. callitris* Laing, **comb. rev.**, and *Leonardaspis wilga* (Leonardi) is transferred to *Poliaspis* as *P. wilga* (Leonardi), **comb. n.** Descriptions and illustrations are also provided for six of the fourteen previously-named *Poliaspis* species, including five from Australia: *P. attenuata* Brimblecombe, *P. elongata* Brimblecombe, *P. exocarpi* Maskell, *P. nitens* Fuller, and *P. syringae* Laing. Both *P. cycadis* Comstock and *P. gaultheriae* Green become junior synonyms of *P. media* Maskell. The species not treated here are *P. intermedia* Fuller (the location of the types is unknown and Fuller's description is inadequate), *P. casuarinicola* Lindinger (missing types), *P. incisa* Takagi and de Faveri (recently, and well described in Takagi and de Faveri 2011), and the six New Zealand species recently revised by Henderson (2011). In addition, *Laingaspis lanigera* (Laing), the adult female of which has 8 clusters of perivulvar pores – as in *Poliaspis* species – is redescribed and illustrated. Lectotypes are designated for *L. lanigera, P. callitris, P. exocarpi, P. media,* and *P. wilga*. A key is provided to the species of *Poliaspis,* excluding *P. casuarinicola* and *P. intermedia* but including *P. incisa* and the New Zealand species: *P. chathamica* Henderson, *P. floccosa* Henderson, *P. lactea* (Maskell), *P. media* Maskell, *P. raouliae* Henderson and *P. salicornicola* Henderson.

Keywords

taxonomy, species descriptions, armored scale insects

Introduction

Many armored scale insects (Diaspididae) are pests, and armored scales are disproportionately common in invasive faunas. About 2,500 species of armored scale insects have been described, and ten percent of these (250 spp.) are known to occur in Australia (http://scalenet.info/country_taxon/Australia/Diaspididae/).

Maskell (1880) erected the genus *Poliaspis* by monotypy for *P. media*, a New Zealand species having eight groups of perivulvar pores occurring on the ventromedial surfaces of abdominal segments 6 and 5. Fourteen additional species sharing that distinction were described and added to *Poliaspis* by Maskell and other authors (Comstock 1883; Maskell 1892; Fuller 1897, 1899; Lidgett 1898; Laing 1929; Brimblecombe 1959; Henderson 2011). Seven described species of *Poliaspis* are from Australia. The Australian Plant Pest Database, integrating specimen data from several Australian insect collections, contains 398 sample records for *Poliaspis* species. Only 25% of these are identified to species. Amongst the unidentified material in the Australian National Insect Collection, and the Queensland Primary Industries Insect Collection, eight undescribed *Poliaspis* species were recognized.

Here, these eight new species of *Poliaspis* as well as six of the fourteen previously-named species are described and illustrated. We transfer two described species into *Poliaspis* and redescribe and illustrate these. We also redescribe and illustrate *Laingaspis lanigera* (Laing), the adult female of which has a similar distribution of perivulvar pores, but differs substantially in another key morphological feature. A key to the species of *Poliaspis* is provided, excluding *P. casuarinicola* and *P. intermedia,* but including *Poliaspis incisa* Takagi & De Faveri, recently described from Northern Queensland on mangroves (Takagi and De Faveri 2011).

Methods

Depositories are abbreviated as follows: ASCU, Agricultural Scientific Collections Unit, Orange Agricultural Institute, New South Wales; BMNH, the Natural History Museum, London, UK; NZAC, New Zealand Arthropod Collection, Auckland, NZ; QDPI, Queensland Primary Industries and Fisheries, Brisbane, Queensland, Australia; QMBA, Queensland Museum, Brisbane.

Measurements were made using the measurement tools in NIS-Elements BR 3.00, SPI (Build 455). For species with ≤ 10 specimens, measurements were taken from all specimens; for those with >10 specimens, 10 specimens were measured, chosen to represent the range of host plants and geographic localities present in the sample. The morphological terms for Diaspididae follow those of Miller and Davidson (2005). To make a clear distinction between the gland spines occurring on the pygidial margin, and the gland spines / tubercles occurring in submarginal areas anterior of the pygidium, all gland spines / tubercles anterior of the pygidium are referred to as gland tubercles. Because scale insects are bilaterally symmetrical,

only one side of the body is described unless discussing features on the midline. For example, the number of anterolateral perivulvar pores given is that on one side of the body (not the sum of both sides), but the number of anteromedial pores is the total found in the cluster of pores extending across the midline (rather than dividing that number by 2). Species descriptions inherit and override attributes from the generic description, which can be thought of as an abstract base class as per the recommendations of Cook et al. (2010).

Following the convention for scale insects, each figure displays the dorsal body surface on the left side of the page, and the ventral body surface on the right. Enlargements of diagnostic features are located around the margin of each main figure. Geographic coordinates are provided for each collection location (with a few exceptions). If this information was not part of the original collection data (most cases), approximated coordinates are provided in square brackets. We estimated coordinates via the Google Geocoding API (http://code.google.com/apis/maps/documentation/geocoding/), automating requests via a Python script (available from NBH by request).

Taxonomy

Genus *Poliaspis* Maskell
http://species-id.net/wiki/Poliaspis

Poliaspis Maskell, 1880: 293. Type species: *Poliaspis media* Maskell, monotypy.

Description. *Scale cover.* Round to elongate-oval, white, flocculent wax sometimes present, exuvia terminal (after Henderson 2011).

Slide-mounted adult female. Body outline variable: linear, turbinate, pyriform, fusiform or oval, prepygidial abdominal margin weakly incised between segments to strongly lobed. Margin of pygidium rounded; incised between median lobes in some species, not incised in others. Two pairs of lobes in all species except *Poliaspis wilga* comb. n. (only medial pair) and some New Zealand species (3rd lobe represented by three pointed projections); median lobes zygotic (except in *P. ceraflora*), parallel or divergent, apex variable – rounded or pointed; pair of setae between median lobes in most species; second lobes bi-lobed or undivided; basal scleroses present or absent. Simple gland spines present; most species with 1 gland spine on each side of each pygidial segment (other than segment 8), but gland spines may be absent on segment 7 (in area adjacent to lateral margin of medial lobe, e.g. *P. ozothamnae* sp. n.), or absent from pygidial segment 5 (*P. ceraflora* sp. n., *P. callitris* comb. rev.), or 2–6 may be present on each side of segments 5 and 6 (*P. ozothamnae*; *P. nalbo* sp. n.); length of gland spines variable, from about as long as median lobes to > 5 × length of median lobes. Anus in anterior third of pygidium; opening round. Trilocular pores in cluster near each anterior spiracle, some species also with pores near posterior spiracles. Antenna with 1 or 2 fleshy setae. Perivulvar pores quinquelocular, in 8 groups;

5 groups on abdominal segment 6, and 3 groups on abdominal segment 5. Dorsal ducts 2-barred; ducts on pygidial margin larger than medial ducts in most species; distribution of enlarged marginal ducts: 1 between median and second lobes; 1–2 on segment 6, laterad of second lobes; 2 on segment 5; dorsal ducts (other than those on margin) decreasing in size anteriorly; absent from abdominal segment 7; discrete submarginal and submedial rows of ducts present on any of abdominal segments 2–6: 1–10 submedial ducts present on abdominal segment 6, 4–12 submarginal and 4–15 submedial ducts present on segment 5. Some species with dorsal boss present on submargin of each of abdominal segments 1 and 3. Small ducts similar to dorsal ducts present on ventral submargin. Ventral gland tubercles in marginal / submarginal clusters on thoracic and pre-pygidial abdominal segments. Microducts present on venter, at least along abdominal submargin.

Comments. Nearly all other armored scale insect species have perivulvar pores in no more than 5 clusters, and restricted to abdominal segment 7. Species of *Leucaspis* Signoret and *Lopholeucaspis* Balachowsky are exceptions to this generalization; more than 5 clusters of multilocular pores may be present on the abdomen, but the extra pores occur on the submargin of abdominal segments 6 and 5. More pertinent exceptions are species in the African genera *Rolaspis* Hall, *Tecaspis* Hall, and *Dentachionaspis* MacGillivray, which have extra perivulvar pores, which occur in the same places as in *Poliaspis* (Hall 1946; Munting 1965, 1967). Described African species with extra groups of perivulvar pores invariably have marginal macroducts with elongate ductules. This feature is enough of a reason for us to refrain from taking any nomenclatural action at this time.

Key to species of *Poliaspis* (excluding *P. intermedia*, and *P. casuarinicola*)
* denotes New Zealand species

1 Gland spines either absent or more than one gland spine on each side of at least some pygidial segments **2**
– One gland spine on each pygidial segment 7
2 Gland spines absent; marginal macroducts not differentiated from dorsal macroducts; dorsal ducts on pygidium numerous, not arranged into discrete submedial and submarginal clusters; medial lobe pointed, smaller than second lobe ..... ***P. narungga* sp. n.**
– Gland spines present; marginal macroducts usually larger than dorsal ducts; dorsal ducts on pygidium arranged into distinct, transverse submedial and submarginal clusters; medial lobe either larger or smaller than second lobe ... **3**
3 Median lobes non-zygotic ..... ***P. ceraflora* sp. n.**
– Median lobes zygotic **4**
4 One gland spine on each side of each of abdominal segments 7 and 6; gland spines absent from segment 5; median lobes much smaller than second lobes ..... ***P. callitris* comb. rev.**
– Two or more gland spines present on each side of each of abdominal segments 6 and 5, or on 5 and 4; median lobes prominent, much larger than second lobes **5**

5 Marginal macroducts not much larger than dorsal ducts on pygidium, 1 present on each side of abdominal segment 7, and in a discrete cluster of 2–5 ducts on segment 6 ..... ***P. chathamica*** **Henderson***

– Marginal macroducts clearly larger than dorsal ducts on pygidium, 1 present on each side of abdominal segment 7, and 0 or 1 on segment 6 ..... **6**

6 Gland spine present between medial and second lobes; cluster of gland tubercles anterior to anterior spiracles ..... ***P. nalbo*** **sp. n.**

– Gland spine absent between medial and second lobes; no cluster of gland tubercles anterior to anterior spiracles ..... ***P. ozothamnae*** **sp. n.**

7 Body shape linear **8**

– Body shape fusiform, pyriform, or oval, not linear **9**

8 Median lobes longer than wide ..... ***P. attenuata*** **Brimblecombe**

– Median lobes wider than long ..... ***P. elongata*** **Brimblecombe**

9 Second lobes absent ..... ***P. wilga*** **(Leonardi), comb. n.**

– Second lobes present **10**

10 Median lobes smaller than second lobes **11**

– Median lobes larger than or equal to second lobes **14**

11 Numerous marginal macroducts crowded along the pygidial margin and submargin, without a clear gap between those on each pygidial segment ..... ***P. floccosa*** **Henderson***

– No more than 2 enlarged macroducts on margin of each pygidial segment, with a clear gap between those on each pygidial segment **12**

12 About 7 submedial ducts on each side of abdominal segment 6; median lobes short and broad, pygidial margin between lobes not incised ..... ***P. nitens*** **Fuller**

– ≤ Five submedial ducts on each side of abdominal segment 6; median lobes not short and broad, pygidial margin between lobes incised **13**

13 Median lobes divergent, each lobe with rounded apex; 1–2 submedial duct on dorsal surface of abdominal segment 6; gland spines ca. 2–3 × as long as median lobes ..... ***P. araucariae*** **sp. n.**

– Median lobes parallel, each lobe with pointed or notched apex; 2–5 ducts on dorsal surface of abdominal segment 6; gland spines ca. 4–5 × as long as median lobes ..... ***P. exocarpi*** **Maskell**

14 Median lobes prominent, with more than half total lobe length extending beyond margin **15**

– Much less than half total lobe length of median lobes extending beyond margin **17**

15 One enlarged marginal macroduct on each side of abdominal segment 6; lobules of lobe 2 fused into a single triangular-shaped lobe ..... ***P. salicornicola*** **Henderson***

– Two marginal macroducts on each side of abdominal segment 6; second lobe bi-lobed **16**

16 Median lobe zygosis a broad band, posterior spiracles with 2–35 pores, anterior spiracles with 8–150 pores.....***P. lactea*** **(Maskell)***

– Median lobe zygosis a narrow strap, posterior spiracles with 1–3 pores, anterior spiracles with 5–19 pores.....***P. syringae*** **Laing**

17 Submedial ducts on dorsum of abdominal segment 5 in cluster 2–3 ducts deep.....**18**

– Submedial ducts on dorsum of abdominal segment 5 in transverse linear row.....**19**

18 Submedial ducts present on dorsum of abdominal segment 2; ca. 8 submedial ducts on dorsum of abdominal segment 6; median lobes divergent.....
.....***P. alluvia*** **sp. n.**

– Submedial ducts absent on dorsum of abdominal segment 2; ca. 4 submedial ducts on dorsum of abdominal segment 6; median lobes parallel.....
.....***P. incisa*** **Takagi and de Faveri**

19 Second lobes without basal scleroses; marginal macroducts in a group of 2–4 each side of median lobes and a group of 3–6 on each side of segment 6 .....
.....***P. raouliae*** **Henderson***

– Second lobes with basal scleroses; 1 marginal macroduct each side of median lobes and 2 marginal macroducts on each side of segment 6 .....**20**

20 Gland spines ca. 1 × length of marginal macroducts .....***P. media*** **(Maskell)***

– Gland spines ca. 2–4 × length of marginal macroducts **21**

21 Conspicuous duct spur, about as long as lateral lobule of second lobe present between medial and second lobe; usually 4 submedial ducts on dorsal surface of abdominal segment 6; pores usually absent from around posterior spiracle..
.....***P. waibenensis*** **sp. n.**

– Conspicuous ducts spur, about as long as lateral lobule of second lobe not present between medial and second lobe; usually 2–3 submedial ducts on dorsum of abdominal segment 6; ca. 2 pores present near posterior spiracle..
.....***P. naamba*** **sp. n.**

Poliaspis alluvia **Hardy & Henderson, sp. n.**
urn:lsid:zoobank.org:act:62654309-96F2-413D-BD3C-1DF6CFA5BCBA
http://species-id.net/wiki/Poliaspis_alluvia
Fig. 1

Material examined. Holotype: 1 adult female: Australia, QLD, Mt Whitestone [-27.67, 152.16], ex Loranthaceae, 13.6.1989, M Taylor (ANIC).

Description, n=1. Slide-mounted holotype female 952 µm long, body outline pyriform, thoracic and abdominal lobes weakly produced. Pygidium with 2 pairs of lobes; median lobes divergent, with dentate apex; margin between lobes incised to a variable degree; second lobe bi-lobed, each lobule with basal sclerosis, more strongly developed on medial lobule. Gland spines 24–38 µm long, 2–3 × length

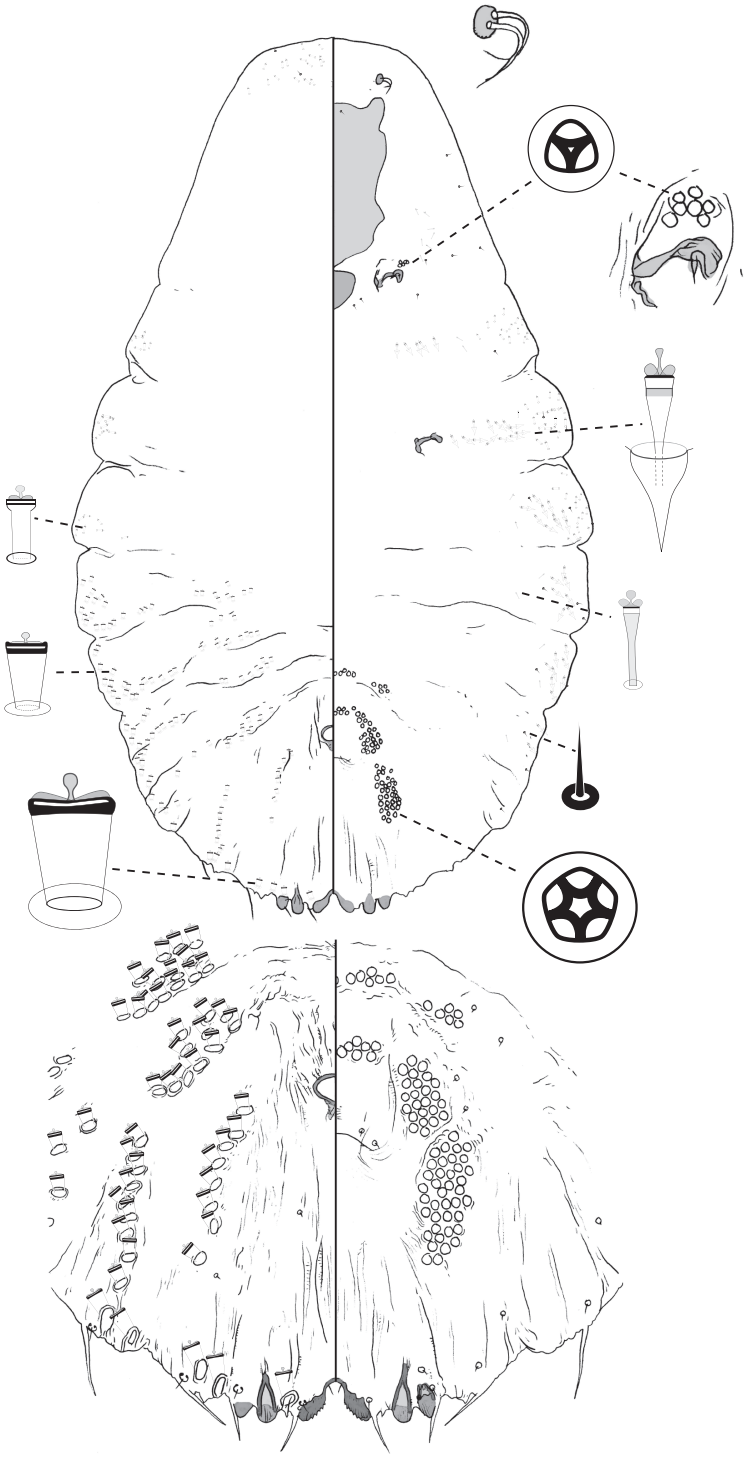

Figure 1. *Poliaspis alluvia* Hardy and Henderson sp. n., adult female.

of median lobes, 1 gland spine on margin of each pygidial segment; pair of setae between median lobes. Dorsal ducts smaller than marginal ducts present in rows; 8 submedial ducts present on segment 6; ca. 9 submarginal and ca. 10 submedial ducts on segment 5; ducts also present on segment 2. Perivulvar pores numerous: ca. 12 posteromedial, ca. 20 posterolateral, ca. 40 posterior, ca. 12 anteromedial, and ca. 5 anterolateral. Trilocular pores in cluster of 7–8 near anterior spiracle; 4 near posterior spiracle. Microducts few to numerous on dorsum of head, scattered anterior to anterior spiracles and mesad of gland tubercles on thorax and abdomen, few or absent on median abdomen. Antenna with 2 fleshy setae.

Comments. The relatively large number (ca 8) of submedial ducts on abdominal segment 6, as well as the large number of perivulvar pores (ca 90) can be used to distinguish *P. alluvia* from other species of *Poliaspis.*

Etymology. The species name is taken from the Latin word *alluvio,* meaning flood, in commemoration of the flooding of the Brisbane river in January 2011.

Poliaspis araucariae **Hardy & Henderson, sp. n.**
urn:lsid:zoobank.org:act:6A0B48DA-1DC6-4F89-8429-506E76B6EE00
http://species-id.net/wiki/Poliaspis_araucariae
Fig. 2

Material examined. Holotype: female: Australia, QLD, Taromeo [-26.83, 152.12], *Araucaria bidwillii*, 1.9.1937, A Brimblecombe, 165; 1185/10387 (ANIC).

Paratypes: QLD: 10 adult females: Gallangowan [-27.93, 151.67], ex *Araucaria cunninghamii*, 15.2.1944, Se/1945 (QDPI); 8 adult females: same data as holotype (QDPI).

Description, n=7. Slide-mounted adult female 724–1658 μm long (holotype 1016 μm long), body outline fusiform-pyriform, thoracic and abdominal lobes produced. Pygidium with 2 pairs of lobes; median lobes divergent, connected medially by narrow sclerotic strap, lobes with rounded apex; margin between lobes weakly incised; second lobe bi-lobed, each lobule with basal sclerosis, more strongly developed on medial lobule. Gland spines 12–27 μm long, 2–3 × length of median lobes, 1 gland spine on margin of each pygidial segment; pair of minute setae absent between median lobes. Dorsal ducts similar in size to marginal ducts; present in rows; 1–2 submedial ducts present on segment 6; ca. 6 submarginal and ca. 5 submedial ducts on segment 5. Perivulvar pores: 5–14 posteromedial, 9–20 posterolateral, 23–27 posterior, 1–8 anteromedial, and 7–12 anterolateral. Trilocular pores in cluster of 2–4 near anterior spiracle; absent from posterior spiracle. Microducts scattered on head dorsum, anterior to anterior spiracles and mesad of gland tubercles on thorax and abdomen. Antenna with 2 fleshy setae.

Comments. The one or two submedial ducts on abdominal segment 6, in addition to the absence of setae between the median lobes (also absent in *P. callitris*, and *P. nitens*) can be used to distinguish *P. araucariae* from other species of *Poliaspis.*

Etymology. The species name refers to the host species: *Araucaria cunninghamii* and *A. bidwillii.*

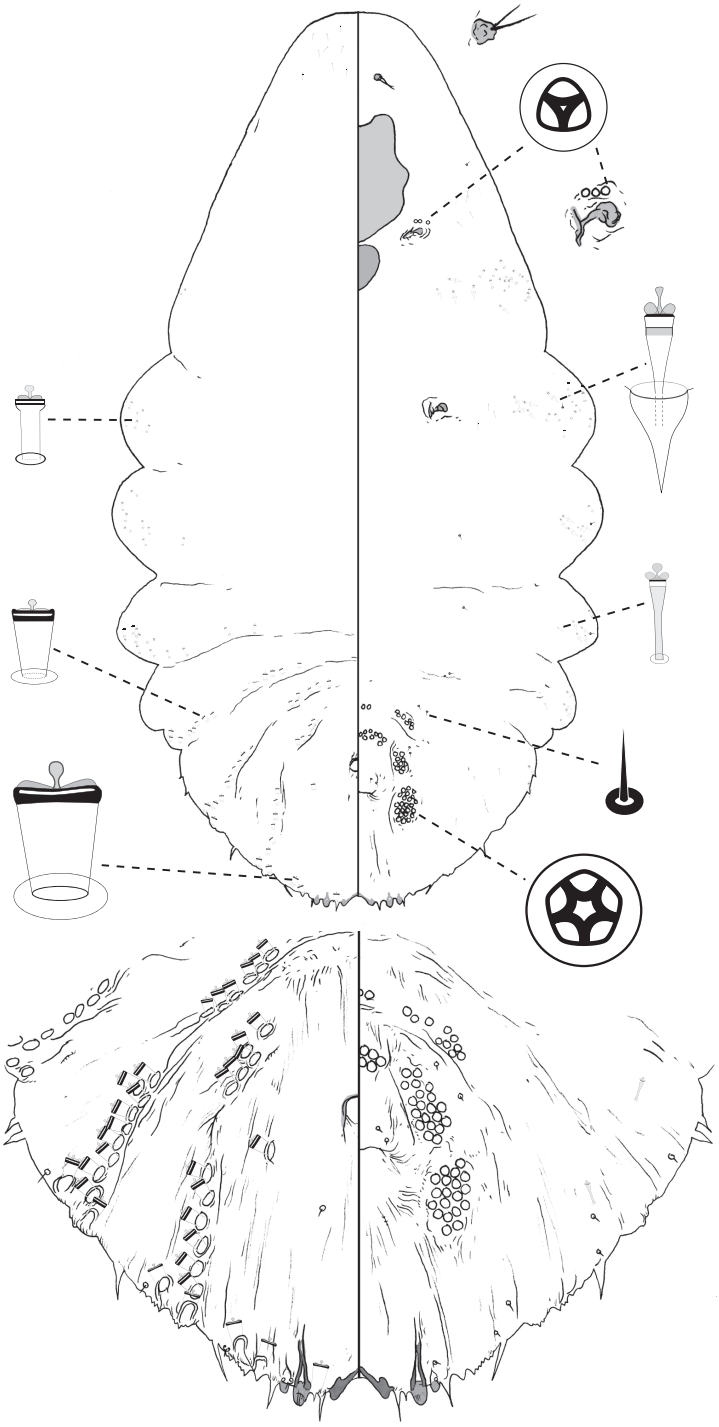

Figure 2. *Poliaspis araucariae* Hardy and Henderson sp. n., adult female.

Poliaspis attenuata **Brimblecombe**
http://species-id.net/wiki/Poliaspis_attenuata
Fig. 3

Poliaspis attenuata Brimblecombe, 1959: 401–403

Material examined. Paratype: QLD. 1 adult female: Yarraman [-26.84, 151.98], ex *Croton insularis*, 1.9.1948, A Brimblecombe (QDPI).

Description, n=1. Slide-mounted paratype female 1644 μm long, body outline linear, abdominal lobes weakly produced. Pygidium with 2 pairs of lobes; median lobes divergent, longer than wide, connected medially by narrow sclerotic strap, each lobe with dentate apex; margin between lobes incised; second lobe bi-lobed, medial lobule with basal sclerosis. Gland spines 18–37 μm long, ca. 2 × length of median lobes, 1 gland spine on margin of each pygidial segment; pair of setae present between median lobes. Dorsal ducts smaller than marginal ducts; present in rows; 2 submedial ducts present on segment 6; 4 submarginal and 5–6 submedial ducts on segment 5. Perivulvar pores: 4 posteromedial, 9–10 posterolateral, 17–18 posterior, 6 anteromedial, and 3–4 anterolateral. Trilocular pores in cluster of ca. 2 near anterior spiracle; absent from posterior spiracle. Microducts scattered on dorsal surface of head, plus medial and submarginal areas of anterior abdominal segments. Antenna with 1 fleshy setae.

Comments. Adult females of *P. attenuata* are most similar to those of *P. elongata* Brimblecombe. Both have elongate, linear bodies. *P. attenuata* females can be distinguished on the basis of the longer-than wide, divergent median lobes (wider than long in *P. elongata*, with rounded apices).

Poliapsis callitris **Laing, comb. rev.**
urn:lsid:zoobank.org:act:1C15AF8B-51E2-4C01-B689-1D43E4598E3F
http://species-id.net/wiki/Poliapsis_callitris
Fig. 4

Poliaspis callitris Laing, 1929: 19–20.
Lineaspis callitris (Laing), change of combination, Borchsenius, 1966: 103.

Material examined. Lectotype female here designated, 1 of 8 specimens on slide labelled "Australia, VIC, Mallee, on *Callitris* sp., JE Dixon, no.11,1919, IBE 1385, EE Green det. ~~*?Chionaspis striata*~~, *Poliaspis callitris* Laing sp. n." The Lectotype is the only un-distorted adult female on slide. (BMNH)

Paralectotypes: (i) the remaining 7 females on the lectotype slide; (ii) 2 adult females on second slide with same collection data and no BM number (BMNH).

Other Material: QLD. 3 adult females: Australia, QLD, Lake Broadwater Conservation park [-27.35, 151.1], on stems of *Callitris* sp., 19.11.1985, J Donald-

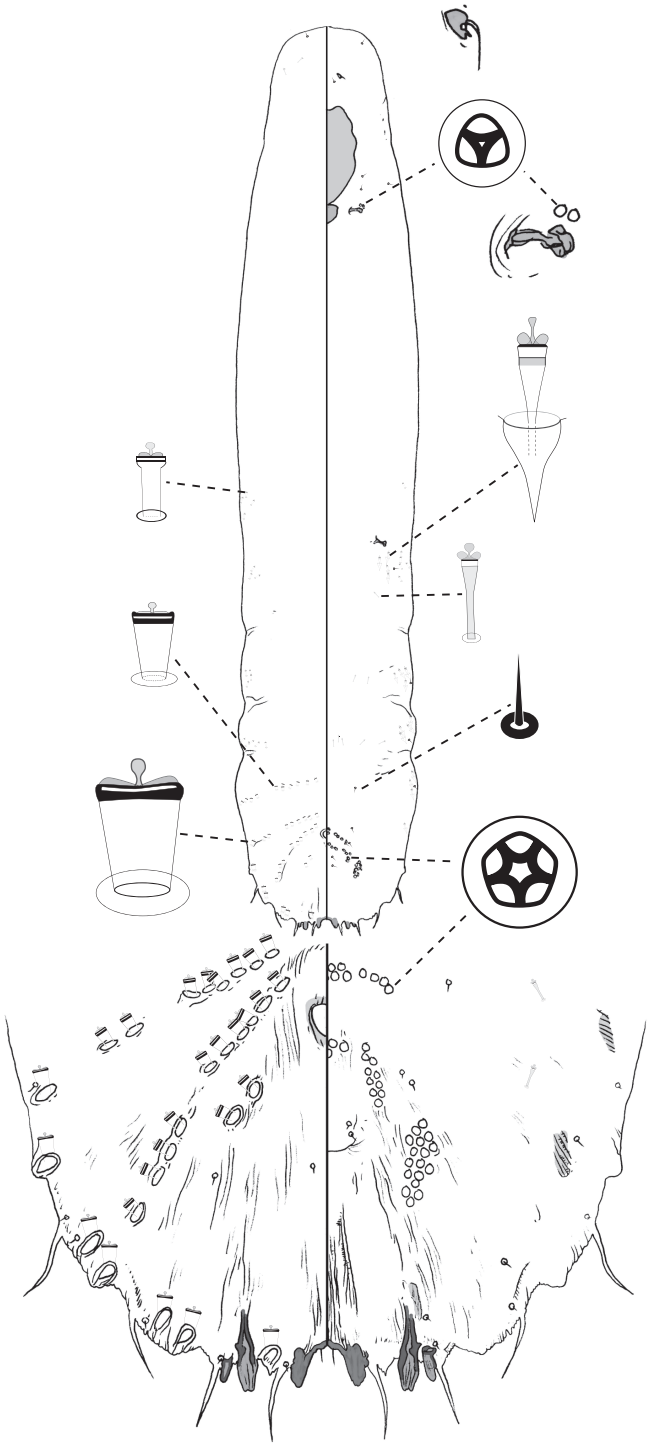

Figure 3. *Poliaspis attenuata* Brimblecombe, adult female.

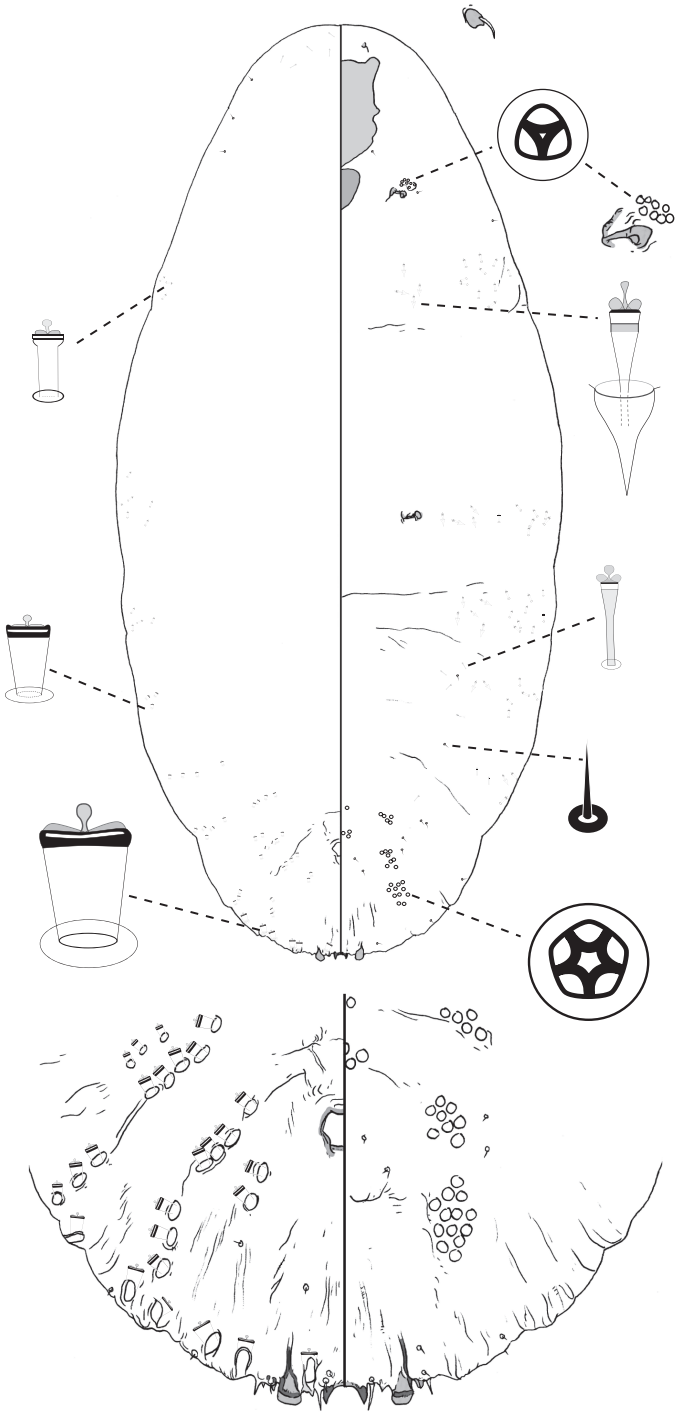

Figure 4. *Poliaspis callitris* Laing comb. rev., adult female.

son (QDPI); 1 adult female: Southport [-27.97, 153.41], ex *Callitris columellaris*, 15.8.1953, A Brimblecombe (QDPI); 8 adult females: Southport [-27.97, 153.41], *Cupressus macrocarpa*, 10.1936, A Brimblecombe (QDPI).

Description, n=7. Slide-mounted adult female 581–1188 µm long (holotype 945 µm long), body outline fusiform, without distinct thoracic and abdominal lobes. Pygidium with 2 pairs of lobes; median lobes zygotic, much smaller than medial lobule of second lobe, each lobe with pointed apex; margin between median lobes not incised; second lobe bi-lobed, lateral lobule minute in some specimens (including holotype), medial lobule with strong basal sclerosis. Gland spines 7–11 µm long, about same length as median lobes, 1 gland spine on margin of each of pygidial segments 6 and 7 (i.e. lateral of each lobe), gland spines absent from segment 5; pair of setae absent between median lobes. Dorsal ducts smaller than marginal ducts; present in rows; 2 submedial ducts present on segment 6; ca. 3 submarginal and ca. 4 submedial ducts on segment 5. Perivulvar pores: 2–5 posteromedial, 7–11 posterolateral, 5–13 posterior, 2 anteromedial, and 2–5 anterolateral. Trilocular pores in cluster of 9–15 near anterior spiracle; absent from posterior spiracle. Microducts scattered on dorsal surface of head, mesad of gland tubercles on abdomen. Antenna with 1 fleshy seta.

Comments. Adult females of *P. callitris* can be distinguished from other species of *Poliaspis* on the basis of (1) setae between median lobes absent (also absent in *P. araucariae* and *P. nitens*); and (2) the relatively large number of pores near anterior spiracle (9–15) and no pores near posterior spiracle (other species of *Poliaspis* having many pores near anterior spiracle have at least a few near posterior spiracle). It shares having only 1 small gland spine on the margin of abdominal segments 6 and 7 with *P. ceraflora,* but that species has non-zygotic median lobes.

Poliaspis ceraflora Hardy & Henderson, sp. n.

urn:lsid:zoobank.org:act:1C15AF8B-51E2-4C01-B689-1D43E4598E3F
http://species-id.net/wiki/Poliaspis_ceraflora
Fig. 5

Material examined. Holotype: female: Australia, WA, Perth [-31.95, 115.86], ex *Chamelaucium uncinatum*, 7.1989, J Donaldson (ANIC).

Paratypes: WA. 5 adult females: same data as holotype (QDPI); 6 adult females: Perth City Council Nursery, ex *Melaleuca* sp., 8.1973 (ANIC).

Description, n=10. Slide-mounted adult female 807–1639 µm long (holotype 1076 µm long), body outline pyriform, thoracic and abdominal lobes weakly produced (undulate). Pygidium with 2 pairs of lobes; median lobes non-zygotic (separate), each lobe with rounded apex; margin between median lobes not incised; second lobe bi-lobed, lateral lobule minute, medial lobule with small basal sclerosis. Gland spines minute, 7–11 µm long, 1 gland spine lateral of each lobe; pair of setae absent between median lobes. Dorsal ducts smaller than marginal

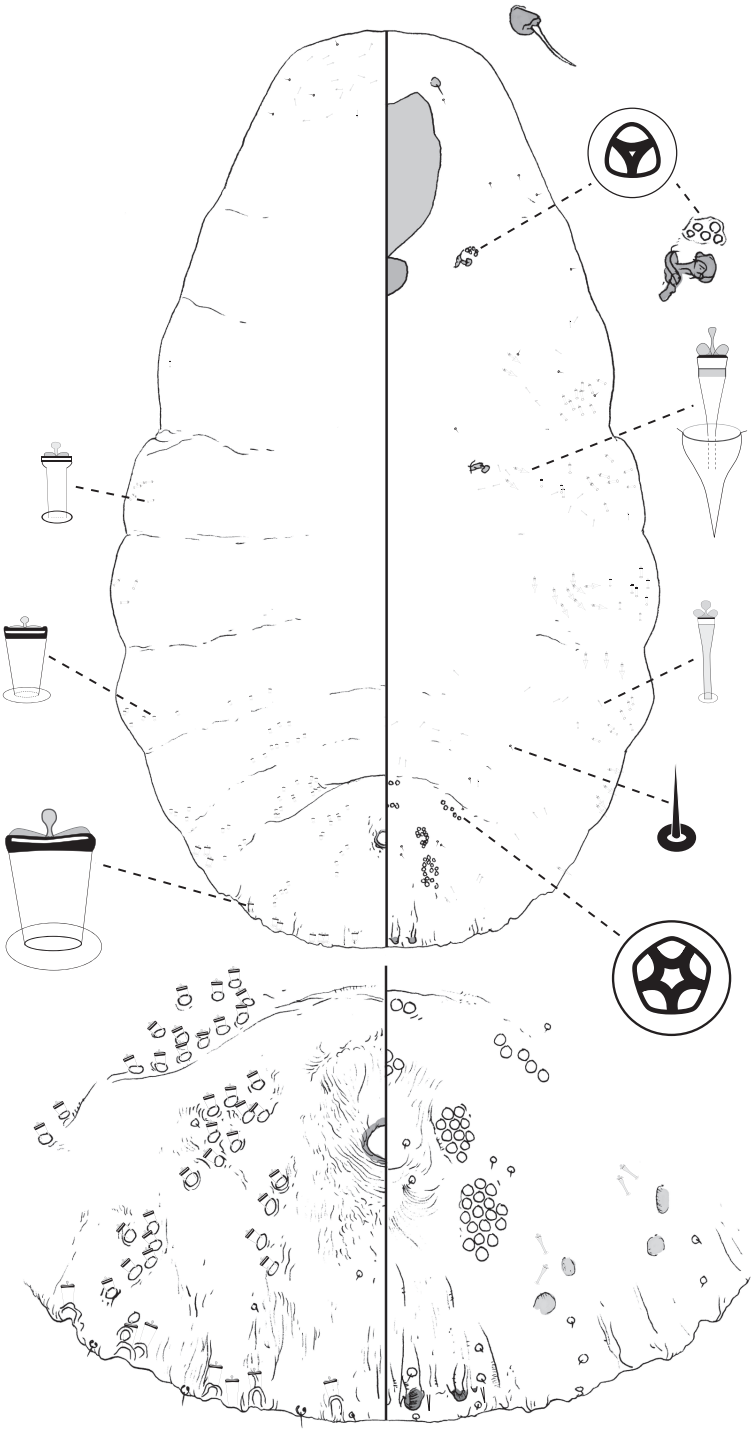

Figure 5. *Poliaspis ceraflora* Hardy and Henderson sp. n., adult female.

ducts; present in non-linear clusters; ca. 4 submedial ducts present on segment 6; ca. 6 submarginal and ca. 8 submedial ducts on segment 5. Marginal ducts: 1 on segment 7, 3 on segment 6, 3–4 on segment 5. Perivulvar pores: 4–5 posteromedial, 9–11 posterolateral, 15–24 posterior, 4–5 anteromedial, and 4–6 anterolateral. Trilocular pores in cluster of 4–5 near anterior spiracle; absent from posterior spiracle. Microducts numerous on dorsal surface of head, scattered mesad of gland tubercles on thorax, in medial and submarginal areas of abdomen. Antenna with 1 fleshy seta.

Comments. This is the only species of *Poliaspis* with non-zygotic median lobes. The two pairs of minute gland spines are also distinctive, although *P. callitris* Laing shares the character of possessing only two pairs of small gland spines.

Etymology. The species name is derived from the Latin words for wax (*cera*) and flower (*floris*), in reference to the common name, wax flower, of the host plant genus *Chamelaucium*.

***Poliaspis elongata* Brimblecombe**
http://species-id.net/wiki/Poliaspis_elongata
Fig. 6

Poliaspis elongata Brimblecombe, 1959: 403–405

Material examined. Paratypes: QLD. 6 adult females: Tugun [-28.14, 153.5], ex *Leptospermum whitei*, 30.9.1947, A Brimblecombe (QDPI).

Description, n=6. Slide-mounted adult female 1323–1886 µm long, body outline linear, with margins of anterior abdominal segments distinctly lobed. Pygidium with 2 pairs of lobes; median lobes zygotic, each lobe wider than long, with rounded apex; margin between lobes not deeply incised; second lobe bi-lobed, lateral lobule small, medial lobule with strong basal sclerosis. Gland spines 22–40 µm long, about 3 × length of median lobes, 1 gland spine on lateral margin of each pygidial segment; pair of minute setae between median lobes. Dorsal ducts smaller than marginal ducts; present in loose rows; 3 submedial ducts present on segment 6; ca. 4 submarginal and ca. 8 submedial ducts on segment 5. Perivulvar pores: 5–8 posteromedial, 8–12 posterolateral, 17–20 posterior, 5–8 anteromedial, and 3–7 anterolateral. Trilocular pores in cluster of 4 near anterior spiracle; absent from posterior spiracle. Microducts numerous on dorsal surface of head, scattered on ventral surface of abdomen. Antenna with 1 fleshy seta.

Comments. Adult females of *P. elongata* are most similar to *P. attenuata*. See comments under *P. attenuata* for discussion.

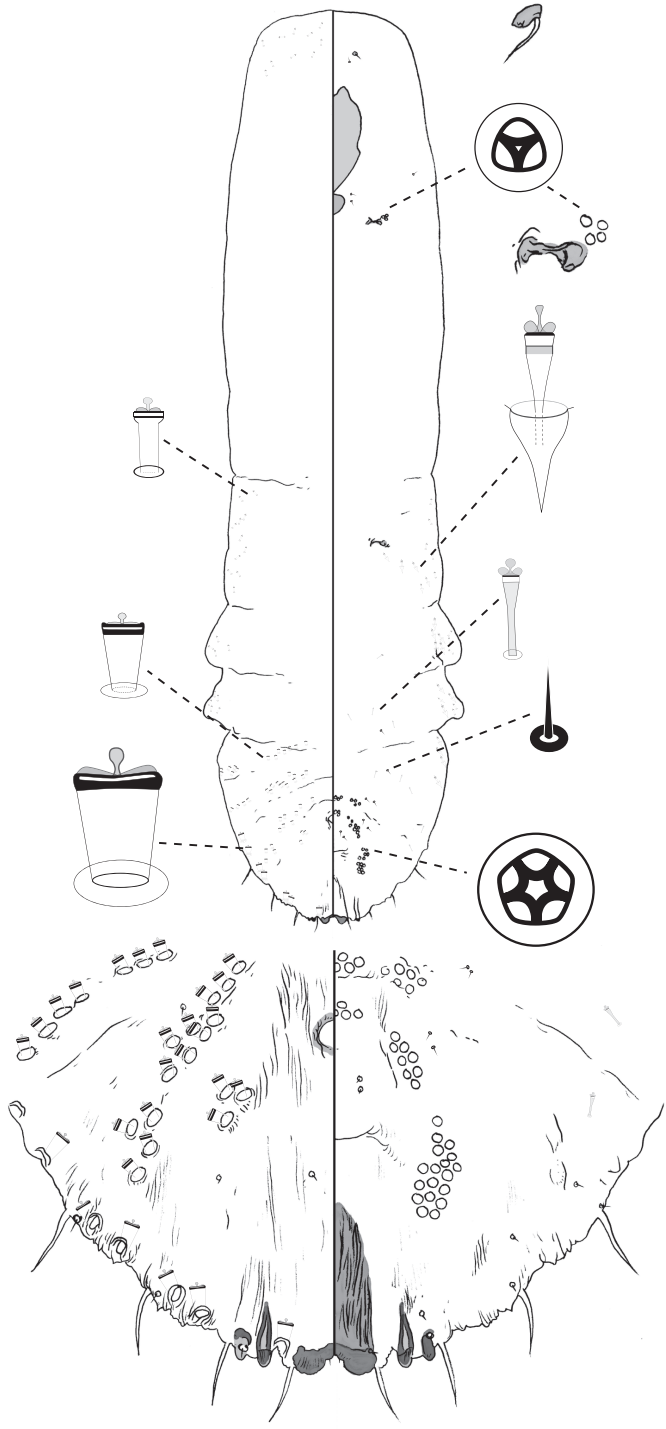

Figure 6. *Poliaspis elongata* Brimblecombe, adult female.

***Poliaspis exocarpi* Maskell**
http://species-id.net/wiki/Poliaspis_exocarpi
Fig. 7

Poliaspis exocarpi Maskell, 1892: 17.

Material examined. Lectotype: female, here designated to preserve nomenclatural stability. On an original slide labelled "*Poliaspis exocarpi*, adult female, 1891, W.M.M.". AUSTRALIA, Mordialloc [-38.00, 145.09], near Melbourne, on *Exocarpus cupressiformis*, by Mr. French (NZAC). Paralectotypes: (i) 1 female, slide label data as above (NZAC); (ii) (not examined) 1 (BMNH); 12 (USNM).

Other material: QLD. 1 adult female: Amamoor [-26.35, 152.68], ex pumpkin, 8.12.1927, H 151a (QDPI); 1 adult female: Amamoor [-26.35, 152.68], ex *Cucurbita maxima*, 12.12.1927, H 151b (QDPI); 13 adult females: Bamaga [-10.89, 142.39], on leaves of *Asteromyrtus lysicephala*, 10.9.1983, J Donaldson (QDPI); 3 adult females: Chinchilla [-26.74, 150.63], ex *Eremocitrus glauca*, 1.12.1981, J Baker (QDPI); 9 adult females: Dalby-Tara-St George Road Junction, on stems of *Apophyllum anomalum*, 21.11.1985, J Donaldson (QDPI); 4 adult females: Dauan Island [-9.43, 142.53], on leaves, 25.6.1995, J Grimshaw, JFG 2722 (QDPI); 4 adult females: Drillham [-26.64, 149.98], on leaves of *Geijera parviflora*, 30.4.1953, A Brimblecombe (QDPI); 7 adult females: Emu Vale [-28.23, 152.25], ex *Euroschinus falcata*, 12.2.1939, A Brimblecombe, 399 (QDPI); 13 adult females: Fletcher [-28.77, 151.87], ex *Jacksonia scoparia*, 11.1949, (QDPI); 4 adult females: Gabba Island [-9.77, 142.63], on leaves of *Exocarpus latiflolius*, 13.6.2000, J Grimshaw, JFG 5107 (QDPI); 4 adult females: Gabba Island [-9.77, 142.63], on leaves of *Exocarpus latiflolius*, 4.6.2003, J Grimshaw (QDPI); 1 adult female: Hopevale [-15.29, 145.11], ex *Cycas* sp., 6.6.2000, B Waterhouse, JFG 5380 (QDPI); 10 adult females: Imbil [-26.47, 152.7], ex *Euroschinus falcata*, 10.1936 (QDPI); 7 adult females: Jandowae [-26.78, 151.11], on leaves of *Eremocitrus glauca*, 26.6.1989, J McAlpine, N5149 (QDPI); 3 adult females: Lake Broadwater Conservation park [-27.35, 151.1], on leaves of *Amyema congener*, 21.11.1985, J Donaldson (QDPI); 5 adult females: Punsand Bay [-10.87, 142.39], on leaves of *Garcinia warvenii*, 24.7.2003, J Grimshaw, (QDPI); 7 adult females: Texas [-28.85, 151.17], ex *Geijera parviflora*, 10.1954, A Brimblecombe (QDPI); 2 adult females: Yarraman [-26.84, 151.98], ex *Xanthoxylon brachyacanthum*, 6.6.1947, A Brimblecombe, IIE number 1283/10665 (BMNH). VIC. 3 adult females: Dandenong Range [-37.83, 145.35], ex *Exocarpus stricta*, E Green, BM Reg. Number 1926–415 (BMNH).

Description, n=10. Slide-mounted adult female 847–1544 μm long, body outline pyriform to fusiform, with weakly-developed lobes on pre-pygidial abdominal segments. Pygidium with 2 pairs of lobes; median lobes zygotic, parallel, each lobe about as wide as long, with pointed apex, 1–2 notches present in some specimens; margin between median lobes weakly incised; second lobe bi-lobed, lobules similar in size, medial lobule with basal sclerosis. Gland spines 27–43 μm long, about 4–5 × length of

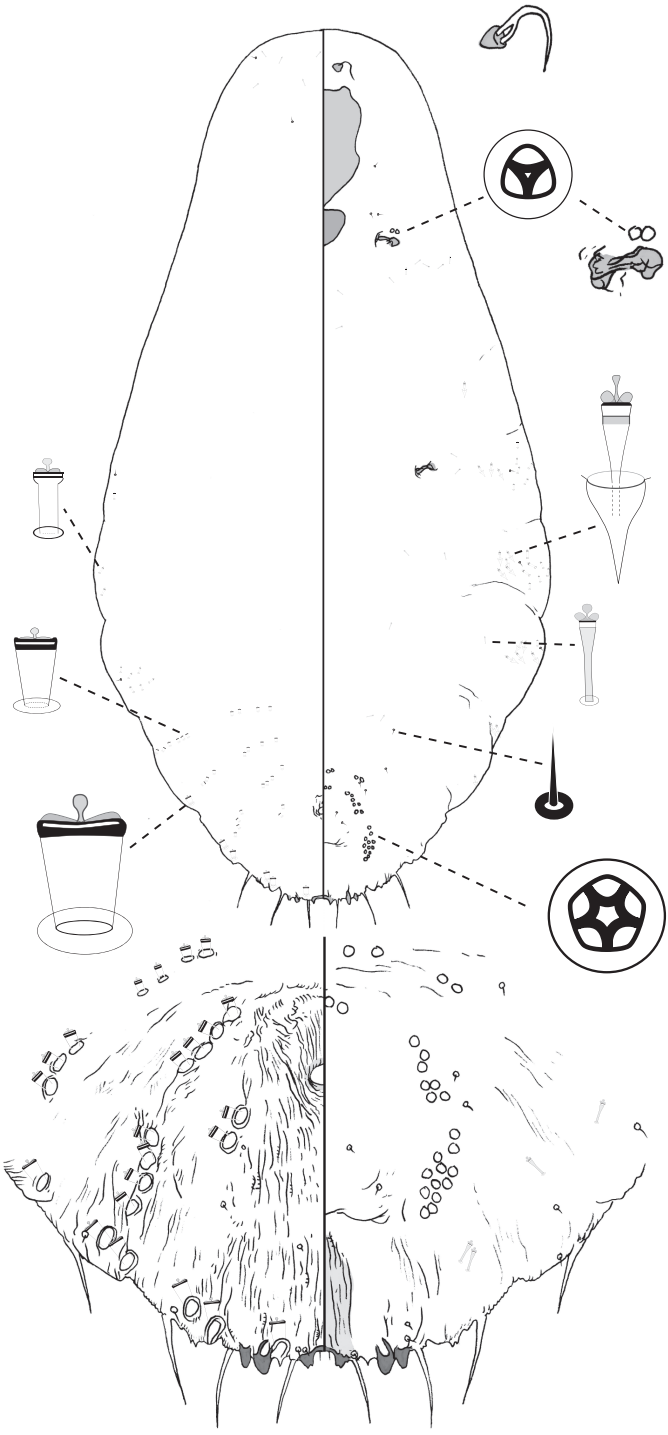

Figure 7. *Poliaspis exocarpi* Maskell, adult female.

median lobes, 1 gland spine on lateral margin of each pygidial segment; pair of setae between median lobes. Dorsal ducts smaller than marginal ducts; present in transverse linear rows; 2–5 submedial ducts present on segment 6; ca. 4 submarginal and ca. 4 submedial ducts on segment 5. Perivulvar pores: 1–3 posteromedial, 6–15 posterolateral, 12–24 posterior, 2–3 anteromedial, and 2–7 anterolateral. Trilocular pores in cluster of 1–8 near anterior spiracle; 0–3 around posterior spiracle. Microducts scattered on dorsal surface of head, plus ventral surface of abdomen. Antenna with 1 fleshy seta.

Comments. *P. exocarpi* is far and away the most polyphagous and wide spread species of *Poliaspis* in Australia. There is also a considerable amount of morphological variation present among samples (e.g. the number of submedial ducts on dorsum of abdominal segment 6). The relatively small size of the median lobes (smaller than or equal in size to second lobes) and the relatively long size of the gland spines (up to 43 μm, about 5 × length of medial lobes) are also diagnostic.

Poliaspis media **Maskell**

http://species-id.net/wiki/Poliaspis_media
Fig. 8

Poliaspis media Maskell, 1880: 293
Poliaspis cycadis Comstock, 1883: 126–128. Syn. nov.
Poliaspis gaultheriae Green, 1920: 126–129. Syn. nov.

Material examined. *Poliaspis media* Maskell

Lectotype designated by Henderson (2011). Female, New Zealand, labelled "Poliaspis media, females, from Leucopogon Fraseri (epacrid), June 1878 W.M.M." (NZAC). This is one of 3 slides remounted from 1 original Maskell slide by RC Henderson, 2001.

Poliaspis cycadis Comstock

Lectotype female here designated, the middle female of 3 on an original slide with two labels: (a) "*Poliaspis cycadis* Comst. [= undeciphered word]," (b) "816, *Poliaspis cycadis*, C.P. & Glye," both labels outlined in red and the coverslip ringed in black. USA: Washington DC, in conservatory, ex *Cycas revoluta* (USNM)

Paralectotypes: (i) the remaining 2 females on the lectotype slide; (ii) 1 female, same collection data (part of type material), subsequently remounted (BMNH); (iii) 2 females, each on a separate slide labelled: *Poliaspis cycadis* Comst., Type, on *Dion edulis*, Dept. Agr. D.C.; these subsequently remounted, and with scale cover under separate glass cover slip (USNM).

Poliaspis gautheriae Green

Lectotype female here designated, the female third from the label "TYPE" and marked with an arrow on the slide, in a row of 6 females: on *Gaultheria depressa*, Botanic Gardens, Edinburgh, Scotland; additional data on envelope: Coll. W. Evans, Oct 1919 (BMNH).

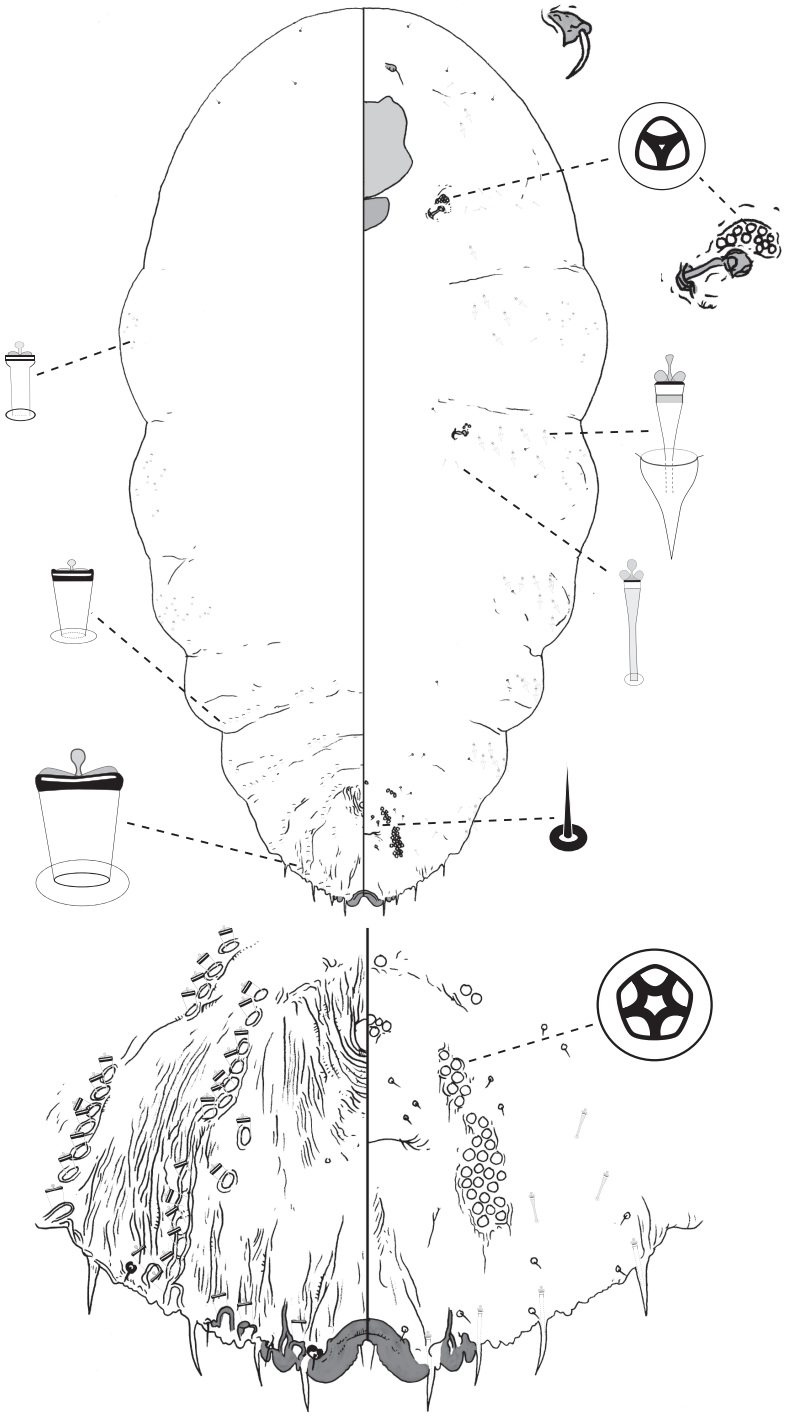

Figure 8. *Poliaspis media* Maskell, adult female.

Paralectotypes, all with same collection data: (i) the other 5 females and 4 2nd-exuvia on the lectotype slide; (ii) 7 females, 4 2nd-exuvia and 1 1st-exuvium; (iii) 3 females; (iv) 4 females, on *Gaultheria* 'cycadis' (under glass), November 1919, ex coll. E.E. Green (BMNH).

Comments. The type material of *P. cycadis* is morphologically inseparable from *P. media*. Both species were discovered at about the same time (1880s) and at first the host differences (cycads versus wide host range) and geographic disjunction of North America and New Zealand presented a conundrum. Examination of the type material of *P. gaultheriae*, previously synonymized with *P. cycadis* by Balachowsky (1954), revealed it to be conspecific, but the only recorded host of *P. gaultheria*e was *Gaultheria depressa*, an endemic New Zealand plant that had been transported from NZ to Scotland. Thus the logical connection to *P. media* as the senior synonym became more credible. A further point is that specimens identified as *P. cycadis* collected on *Cycas revoluta* from Kew Gardens, UK, 1887, Coll. J.W. Douglas, are misidentifications of a mixture of *Poliaspis syringae* Laing and *Furchadaspis zamiae* (Morgan). We suggest that various collections of *Poliaspis* species on cycads may be chance populations on these host plants.

***Poliaspis naamba* Hardy & Henderson, sp. n.**
urn:lsid:zoobank.org:act:4B995A20-0F3B-47C9-97EB-97CC3B0B52DC
http://species-id.net/wiki/Poliaspis_naamba
Fig. 9

Material examined. Holotype: female: Australia, QLD, Nambour [-26.63, 152.96], of *Melaleuca* sp., 4.2.2005, C Freebaim (QDPI);

Paratypes: QLD. 2 adult females: Bray Park, Brisbane [-27.3, 152.98], ex *Melaleuca* sp., 6.3.2005, C Freebaim (QDPI); 3 adult females: Cooloola National Park [-26.1, 153.04], on leaves and stems of *Monotoca scoparia*, 7.4.1987, J Donaldson (QDPI); 3 adult females: Indooroopilly [-27.5, 152.97], on leaves of *Melaleuca* sp., 6.1989, J Grimshaw (QDPI); 2 adult females: Indooroopilly, 30.10.1998, C Neale (QDPI); 10 adult females: Indooroopilly, of *Melaleuca* sp., 28.2.2005, C Neale (QDPI); 2 adult females: Kenmore [-27.51, 152.94], on leaves of *Melaleuca nodosa*, 2.1953, G Smith (QDPI); 7 adult females: Mareeba [-16.99, 145.42], ex *Melaleuca bracteata*, 12.2004, B Pinese (QDPI); 1 adult females: Mareeba, on leaves of *Melaleuca* sp., 30.1.1982, J Donaldson (QDPI); 2 adult females: Nambour [-26.63, 152.96], of *Melaleuca* sp., 4.2.2005, C Freebaim (QDPI); 1 adult females: Yarraman [-26.84, 151.98], on leaves of *Guoia semiglauca*, 20.3.1952, F Muell. (QDPI).

Description, n=10. Slide-mounted adult female 942–1475 μm long (holotype 1475 μm), body outline fusiform to pyriform, with weakly-developed lobes on prepygidial abdominal segments. Pygidium with 2 pairs of lobes; median lobes zygotic, divergent, lobes connected via strong sclerosis, each lobe wider than long, with rounded, dentate apex; margin between lobes incised; second lobe bi-lobed, medial lobule

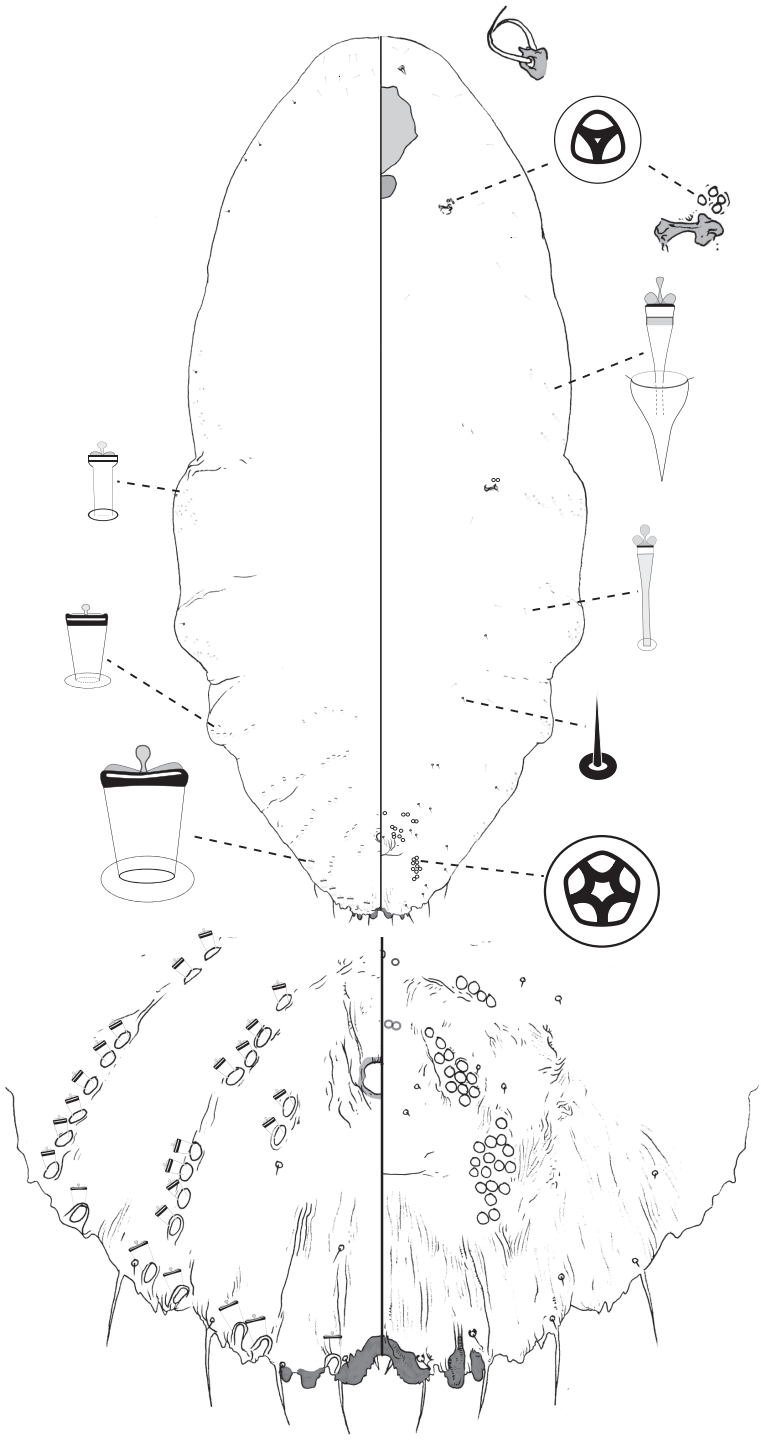

Figure 9. *Poliaspis naamba* Hardy and Henderson sp. n., adult female.

larger and with stronger basal sclerosis. Gland spines 19–45 μm long, 2–3 × length of median lobes, 1 gland spine on lateral margin of each pygidial segments; pair of setae between median lobes. Dorsal ducts smaller than marginal ducts; present in rows; 2–4 submedial ducts present on segment 6; ca. 4 submarginal and ca. 4 submedial ducts on segment 5. Perivulvar pores: 1–3 posteromedial, 10–15 posterolateral, 15–23 posterior, 2–4 anteromedial, and 2–5 anterolateral. Trilocular pores in cluster of 3–4 near anterior spiracle; 1–2 near posterior spiracle. Microducts numerous on dorsal surface of head, scattered on ventral surface of abdomen and thorax. Antenna with 1–2 fleshy setae.

Comments. *P. naamba* is very similar to *P. waibenensis* sp. n. *P. naamba* adult females can be distinguished from those of *P. waibenensis* by (1) lacking a strong duct spur between the medial and second lobes (present in *P. waibenensis*); (2) having pores associated with the posterior spiracles (lacking in *P. waibenensis*); and (3) with pre-pygidial margin of abdomen only weakly lobed (strongly lobed in P. waibenensis). The two species also have different host associations, with *P. naamba* almost always collected from *Melaleuca* species, and *P. waibenensis* from mangrove plants.

Etymology. The species name is taken from the Aborignal word *naamba* used in reference to red bottlebrush *Melaleuca viminalis*. This species has been most often found associated with *Melaleuca* species.

Poliaspis nalbo **Hardy & Henderson, sp. n.**

urn:lsid:zoobank.org:act:393A0E21-FA95-4361-8242-CACB6473FEC1
http://species-id.net/wiki/Poliaspis_nalbo
Fig. 10

Material examined. Holotype: female: Australia, QLD, Maleny [-26.76, 152.85], in flower heads of *Cryptandra scortechinii*, 9.1987, D Hockings (ANIC);

Paratypes: QLD. 4 adult females: same data as holotype (QDPI).

Description, n=5. Slide-mounted adult female 685–998 μm long (holotype 998 μm long), body outline elongate oval, margin of thorax and pre-pygidial abdominal segments undulate. Pygidium with 2 pairs of lobes; median lobes large, zygotic, parallel, lobes connected via sclerotic strap, each lobe wider than long, rounded, with dentate apex; margin between lobes incised; second lobe not bi-lobed. Gland spines 17–24 μm long, only slightly longer than median lobes, 1 gland spine on lateral margin of pygidial segment 7 (between medial and second lobes); 2 spines on margin of segment 6; 3 spines on margin of segment 5; pair of setae between median lobes. Dorsal ducts undifferentiated from marginal ducts, except for single larger marginal duct on segment 7; present in clusters (i.e. less organized than rows); 1 submedial duct present on segment 6; ca. 7 marginal-submarginal and ca. 6 submedial ducts on segment 5. Perivulvar pores: 3–4 posteromedial, 14–16 posterolateral, 18–23 posterior, 3–6 anteromedial, and 2–5 anterolateral. Trilocular pores in cluster of 6–8 near anterior spiracle; 2–3 near posterior spiracle. Microducts absent from dorsal surface of head, scattered on ventral surface of head, thorax and abdomen. Antenna

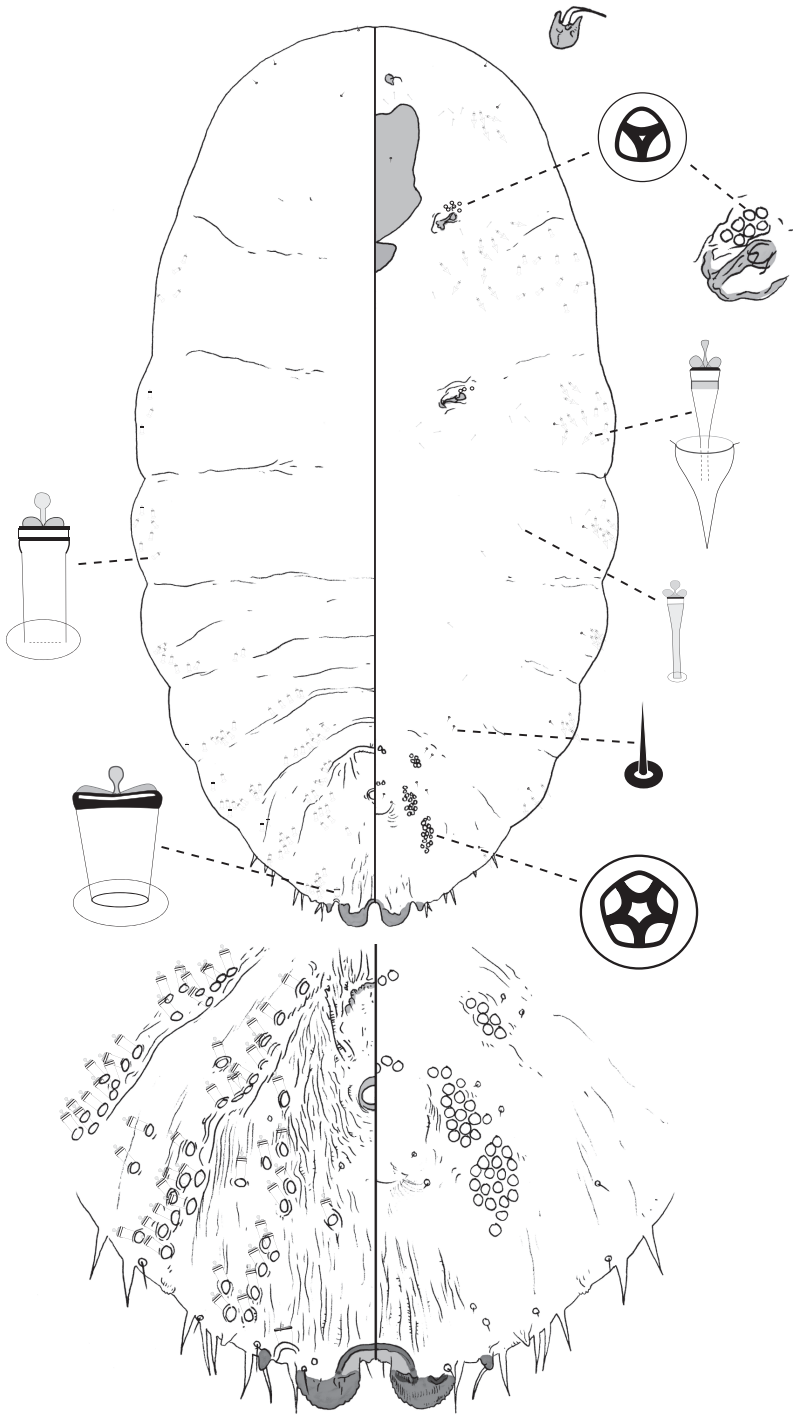

Figure 10. *Poliaspis nalbo* Hardy and Henderson sp. n., adult female.

with 1 fleshy seta. Cluster of gland tubercles on ventral surface of head anterior to anterior spiracle, in addition to the submarginal / marginal clusters present more posteriorly.

Comments. In contrast to many other Australian species of *Poliaspis*, which are very similar to one another, *P. nalbo* is very distinctive. It can be easily recognized by (1) the large, rounded, parallel median lobes; (2) the extra gland spines on the margin of abdominal segments 5 and 6; (3) the cluster of gland tubercles present on the ventral surface of the head (also present in *P. narungga*); (4) the absence of microducts from the dorsal surface of the head.

Etymology. The species name is taken from the name of one of the aboriginal groups that originally populated the type locality Maleny, the Nalbo people.

Poliaspis narungga **Hardy & Henderson, sp. n.**
urn:lsid:zoobank.org:act:5685916A-CDD0-448F-A4BD-D38EF9B8E7D7
http://species-id.net/wiki/Poliaspis_narungga
Fig. 11

Material examined. Holotype: female: Australia, SA, Inneston, Yorke Peninsula [-35.28, 136.94], ex *Correa ?reflexa*, 1.1975, D Symon (ANIC). Holotype is on slide with 7 additional adult females arranged in two rows. Holotype is in top row, second from left.

Paratypes: SA. 7 adult females: on same slide as holotype (ANIC).

Other material: Australia, 4 adult females, intercepted in quarantine in New Zealand, Auckland, MAF, Lynfield, ex *Goeznowia vericosa*, 7.7.1997, J. McMillan, (NZAC).

Description, n=8. Slide-mounted adult female 1136–1858 μm long (holotype 1552 μm long), body outline elongate oval. Pygidium with 2 pairs of lobes; median lobes zygotic, parallel, lobes connected via narrow sclerotic strap, each lobe ca. as wide as long, pointed, smaller than second lobes, margin between lobes not incised; second lobe bi-lobed, each lobule triangular, with blunt or pointed tip. Gland spines absent; pair of setae between median lobes. Dorsal ducts undifferentiated from marginal ducts; numerous on dorsum of pygidium, not organized into discrete submedial and submarginal clusters. Perivulvar pores: 2–7 posteromedial, 15–28 posterolateral, 30–50 posterior, 4–9 anteromedial, and 7–14 anterolateral. Trilocular pores in cluster of 5–8 near anterior spiracle; absent near posterior spiracle. Microducts absent from dorsal surface of head, scattered on ventral surface of head, thorax and abdomen. Antenna with 1 fleshy seta. Cluster of gland tubercles on ventral surface of head anterior to anterior spiracle, in addition to the submarginal / marginal clusters present more posteriorly.

Comments. *P. narungga* is the only species of *Poliaspis* in which the adult females lack gland spines, but gland tubercles are numerous in submarginal areas of the abdomen and thorax, including a cluster anterior to the anterior spiracle. Also distinctive are (1) the lack of differentiation between marginal and dorsal ducts, and (2) the dorsal macroducts on the pygidium not being arranged into distinct submedial and submarginal clusters.

Etymology. The Narungga people were the inhabitants of the Yorke Peninsula prior to the arrival of Europeans.

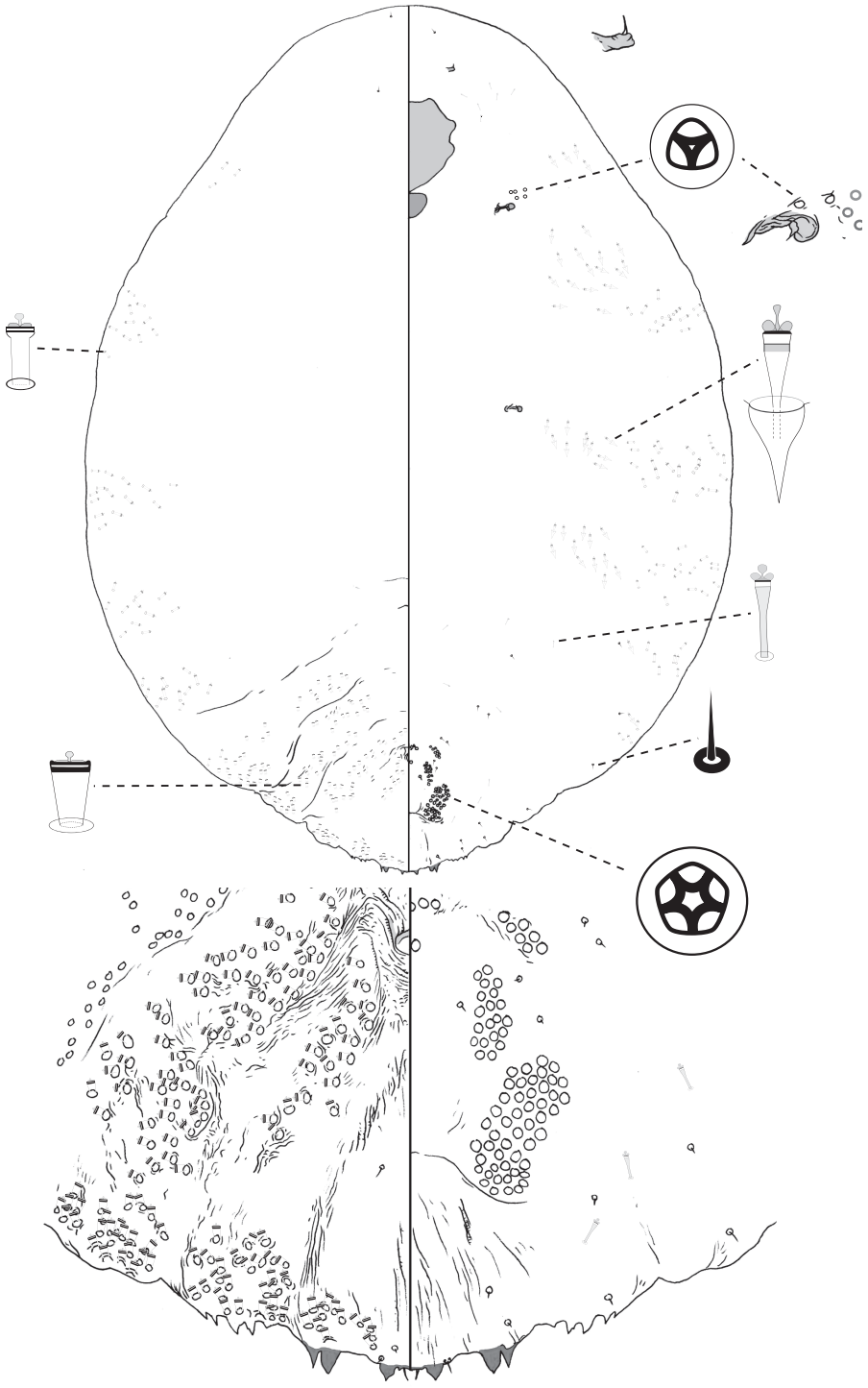

Figure 11. *Poliaspis narungga* Hardy and Henderson sp. n., adult female.

***Poliaspis nitens* Fuller**
http://species-id.net/wiki/Poliaspis_nitens
Fig. 12

Poliaspis nitens Fuller, 1897: 5.

Material examined. *Dry material*: WA. Guilford, ex *Daviesia* sp., Newman 1912, number 5, WWF 516, ASCT00006373, ASCT00006372; Kalamunda, ex *Daviesia* sp, Newman 1912, number 2, WWF 517 [corresponds to Froggatt's collection number 516], ASCT00006371.

VIC. 2 adult females: Sandringham [-37.95, 145.00], ex *Exocarpus cupressiformis*, C French, IEE 1814; 2 adult females, same coll. data (misidentified as *P. exocarpi*) (BMNH). WA. 2 adult females: 4 miles S of Pemberton [-27.47, 153.02], ex stem of *Gastrolobium* sp., 27.2.1964, SWB (QDPI). WA. 1 adult female mounted from the ASCT0000637 dry material.

VIC. 1 adult female: Dandenong Range [-37.97, 145.24], ex *Exocarpus stricta*, 2.7.1914, No. 178 G. Brittin Collection (NZAC).

Description, n=6. Slide-mounted adult female 1026–1513 μm long, body outline fusiform-pyriform, thoracic and abdominal lobes not produced. Pygidium with 2 pairs of lobes; median lobes short and broad, connected medially by broad sclerosis, each lobe with rounded apex; margin between lobes not incised; second lobe bi-lobed, inner lobule with strong basal sclerosis. Gland spines 17–27 μm long, 2–5 × length of median lobes, 1 gland spine on margin of each pygidial segment; pair of setae between median lobes not observed. Dorsal ducts much smaller than marginal ducts; present in rows; 7 submedial duct present on segment 6; 6 submarginal and 7 submedial ducts on segment 5. Perivulvar pores: 1–4 posteromedial, 7–14 posterolateral, 12–26 posterior, 2–4 anteromedial, and 5–11 anterolateral. Trilocular pores in cluster of 2 near anterior spiracle; absent from posterior spiracle. Microducts scattered on head, posteromedial of anterior spiracle, anteromedial of posterior spiracle, and across abdomen. Antenna with 1 long, curved fleshy setae.

Comments. Fuller (1897) described the median lobes of *P. nitens* as being very short and wide. That is unique among *Poliaspis* species and matches the material we have examined from ASCU, which was also collected from the same host and area. No setae were observed between the median lobes, but there appear to be a pair of empty setal sockets present and it is possible that the setae have broken off.

The adult female of *P. nitens* can be distinguished from other species of *Poliaspis* on the basis of the very short and broad median lobes. Three other species treated here have median lobes smaller than the second lobes: *P. callitris*, *P. exocarpi* and *P. araucariae.* In *P. exocarpi* and *P. araucariae* the body margin between median lobes is slightly incised, and in *P. araucariae* the median lobes are strongly divergent. In *P. callitris* the body margin is not clearly incised between the median lobes, but each medial lobe is longer than wide and has a pointed apex.

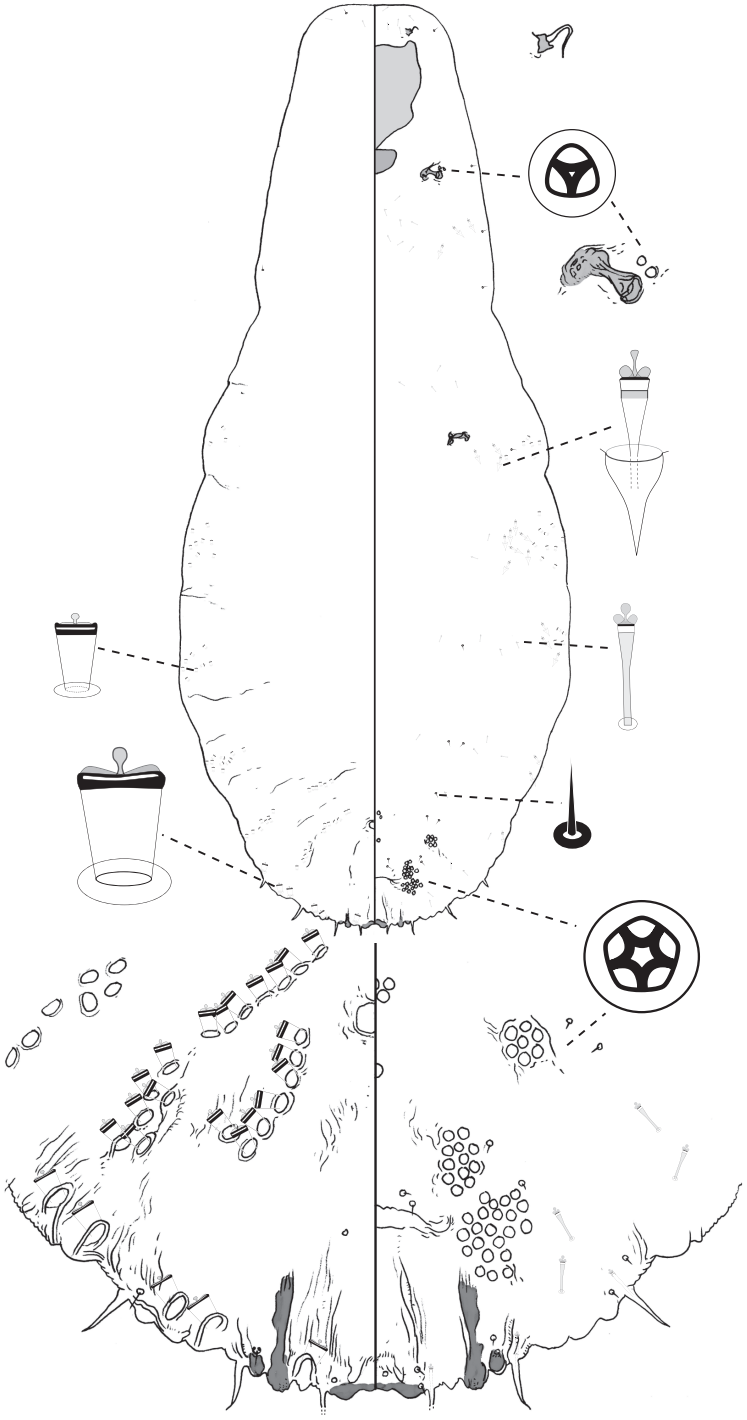

Figure 12. *Poliaspis nitens* Fuller, adult female.

***Poliaspis ozothamnae* Hardy & Henderson, sp. n.**
urn:lsid:zoobank.org:act:1E486663-2B38-4C1A-A2B7-225A5062FA40
http://species-id.net/wiki/Poliaspis_ozothamnae
Fig. 13

Material examined. Holotype: female: Australia, QLD, Brisbane [-27.47, 153.02], ex *Ozothamnus diosmifolius*, 17.4.1986, N Gough (ANIC).

Paratypes: QLD. 6 adult females: same data as holotype (QDPI). SA. 7 adult females: Second Valley [-35.52, 138.22], ex *Pulteneae involucrata*, 13.10.1965, HM Brookes (ANIC).

Description, n=10. Slide-mounted adult female 809–1256 μm long, body outline turbinate. Pygidium with 2 pairs of lobes; median lobes zygotic, parallel, close-set, lobes connected via narrow sclerosis, each lobe wider than long, apex obtuse-rounded and dentate; margin between lobes not incised; second lobe not bi-lobed, roughly pointed, apex notched in some specimens, close to medial lobe. Gland spines 8–17 μm long, about as long as median lobes, gland spine absent from margin of pygidial segment 7 (between medial and second lobes), 4–7 spines on margin of each of abdominal segments 5–6; pair of setae between median lobes. Marginal ducts: 1 on abdominal segment 7, 1 on segment 6, not differentiated from dorsal ducts on segment 5. Dorsal ducts present in clusters (i.e. several ducts across); ca. 5 submedial ducts present on segment 6; ca. 12 marginal-submarginal and ca. 12 submedial ducts on segment 5. Perivulvar pores: 3–6 posteromedial, 7–15 posterolateral, 10–18 posterior, 4–5 anteromedial, and 3–6 anterolateral. Trilocular pores in cluster of 7–16 near anterior spiracle; 2–8 near posterior spiracle. Microducts absent on dorsal surface of head, scattered on ventral surface of thorax and abdomen. Antenna with 1 fleshy seta. Gland tubercles absent from ventral surface of head anterior to anterior spiracle.

Comments. *P. ozothamnae* is distinguishable from other species of *Poliaspis* by having (1) the second lobe close set to medial lobe, without a gland spine near lateral edge of medial lobe; (2) only 2 differentiated marginal ducts; (3) the 2–8 pores near each posterior spiracle; and (4) having multiple gland spines on each pygidial segment other than 8.

Etymology. The species name is taken from the host name *Ozothamnus diosmifolius*.

***Poliaspis syringae* Laing**
http://species-id.net/wiki/Poliaspis_syringae
Fig. 14

Poliaspis syringae Laing, 1929: 17–19.

Material examined. Lectotype female here designated: Australia, Victoria, Kew, on lilac, C Plumridge, No. 40 (1925), L.B.E. 1413 (BMNH).

Paralectotypes: collection data same as lecotype: 3 females on one slide.

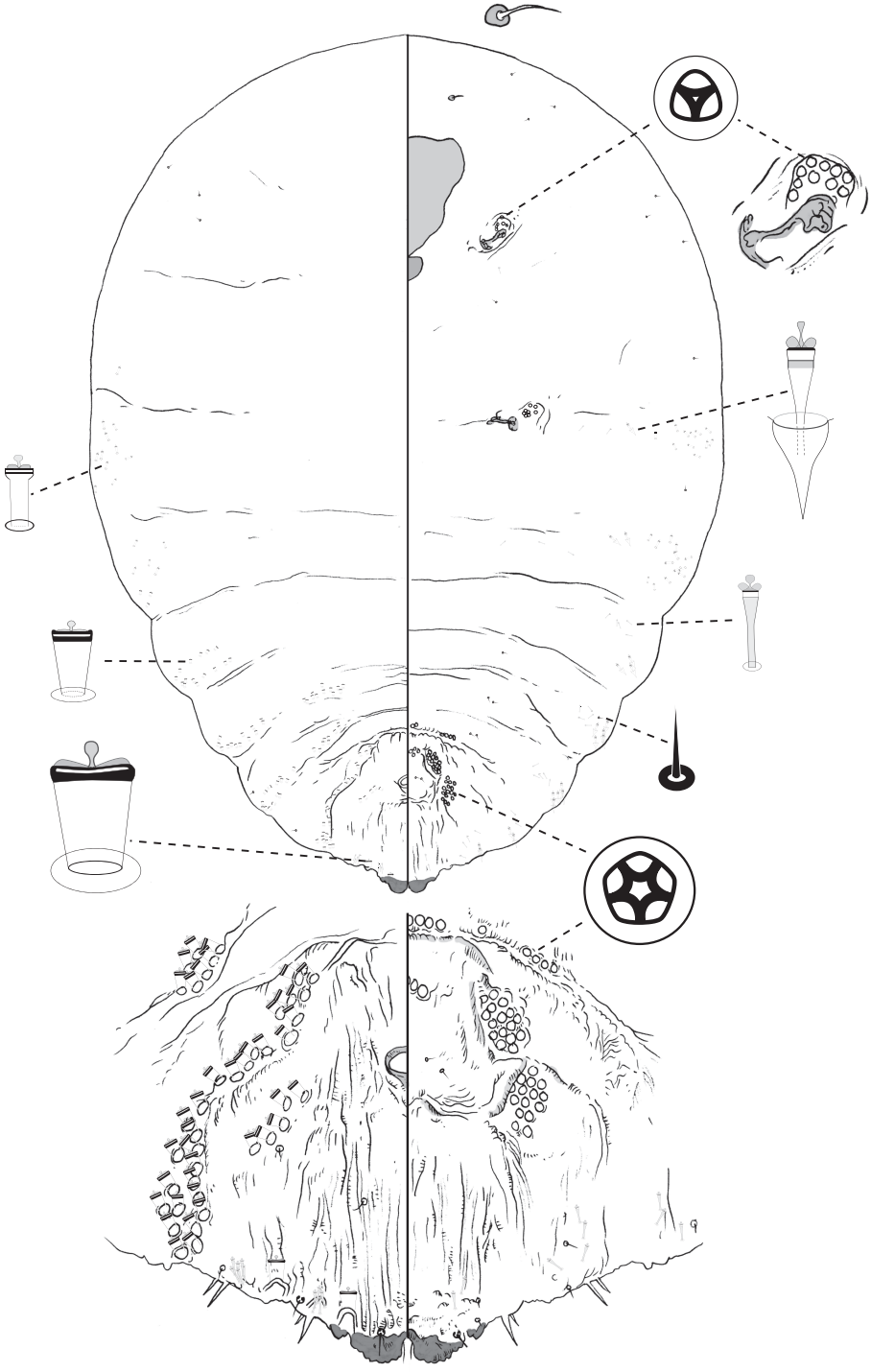

Figure 13. *Poliaspis ozothamnae* Hardy and Henderson sp. n., adult female.

Other material: QLD. 4 adult females: 12 Mile Barramundi Reserve, near Bajool [-23.65, 150.64], ex native citrus, 28.9.2005, R Elder (QDPI); 5 adult females: Darnley Island [-9.58, 143.79], ex *Capparis* sp., 25.4.1996, J Grimshaw, JFG 3291 (QDPI); 4 adult females: Hannaford [-27.44, 150.04], ex *Eremocitrus glauca*, 4.7.1979, P Fayden (QDPI);13 adult females: Marmor [-23.68, 150.71], ex *Eremocitrus glauca*, 10.1955, A Brimblecombe (QDPI); 2 adult females: Yarraman [-26.84, 151.98], ex *Capparis nobilis*, 8.1947, A Brimblecombe, 2111; 1314/10729 (QDPI); 2 females, UK, Royal Gardens, Kew, England, ex coll. J.W. Douglas, on *Cycas revoluta*, 1887 (BMNH).

Description, n=10. Slide-mounted adult female 453–1662 μm long, body outline oval, margin of thorax and abdomen undulate. Pygidium with 2 pairs of lobes; median lobes large, zygotic, divergent, connected via a narrow strap, each lobe wider than long, apex rounded and dentate; margin between lobes incised; second lobe bi-lobed, lateral lobule minute, each lobule with rounded apex, basal scleroses absent. Gland spines 17–34 μm long, 1–2 × as long as median lobes, 1 gland spine on margin of each pygidial segment; pair of setae between median lobes. Dorsal ducts smaller than marginal ducts, in rows; ca. 4 submedial ducts present on segment 6; ca. 6 submarginal and ca. 3 submedial ducts on segment 5. Perivulvar pores: 2–6 posteromedial, 10–15 posterolateral, 13–24 posterior, 1–6 anteromedial, and 2–4 anterolateral. Trilocular pores in cluster of 5–19 near anterior spiracle; 1–3 near posterior spiracle. Microducts absent on dorsal surface of head, scattered on ventral surface of thorax and abdomen. Antenna with 1 fleshy seta.

Comments. *P. syringae* is most similar to *P. naamba* and *P. waibenensis*. Adult females of *P. syringae* can be distinguished from those by (1) median lobes much larger than second lobes (similar in size in *P. naamba* and *P. waibenensis*); and (2) second lobes without basal sclerosis (present in P. *naamba* and P. *waibenensis*). The specimens examined here are from *Eremocitrus* (or native citrus) and *Capparis*. The specimens from *Capparis* are larger than those from *Eremocitrus* (smallest from *Capparis* 1233 μm, largest from *Eremocitrus* 1056 μm), have more pores around the anterior spiracle (ca 18 vs ca. 6), and have slightly longer gland spines on the longer side of the range observed among samples from *Eremocritus*.

***Poliaspis waibenensis* Hardy & Henderson, sp. n.**
urn:lsid:zoobank.org:act:
http://species-id.net/wiki/Poliaspis_waibenensis
Fig. 15

Material examined. Holotype: female: Australia, QLD, Thursday Island [-10.58, 142.22], on leaves of *Lumnitzera racemosa*, 2.9.2004, B Waterhouse (ANIC).

Paratypes: QLD. 10 adult females: Atherton [-17.27, 145.48], on leaves of *Parsonsia straminea*, 1.2.1982, J Donaldson (QDPI); 6 adult females: Hammond Island [-10.55, 142.21], on leaves of *Rhizophora* sp., 29.11.1993, J Grimshaw (QDPI); 7 adult females:

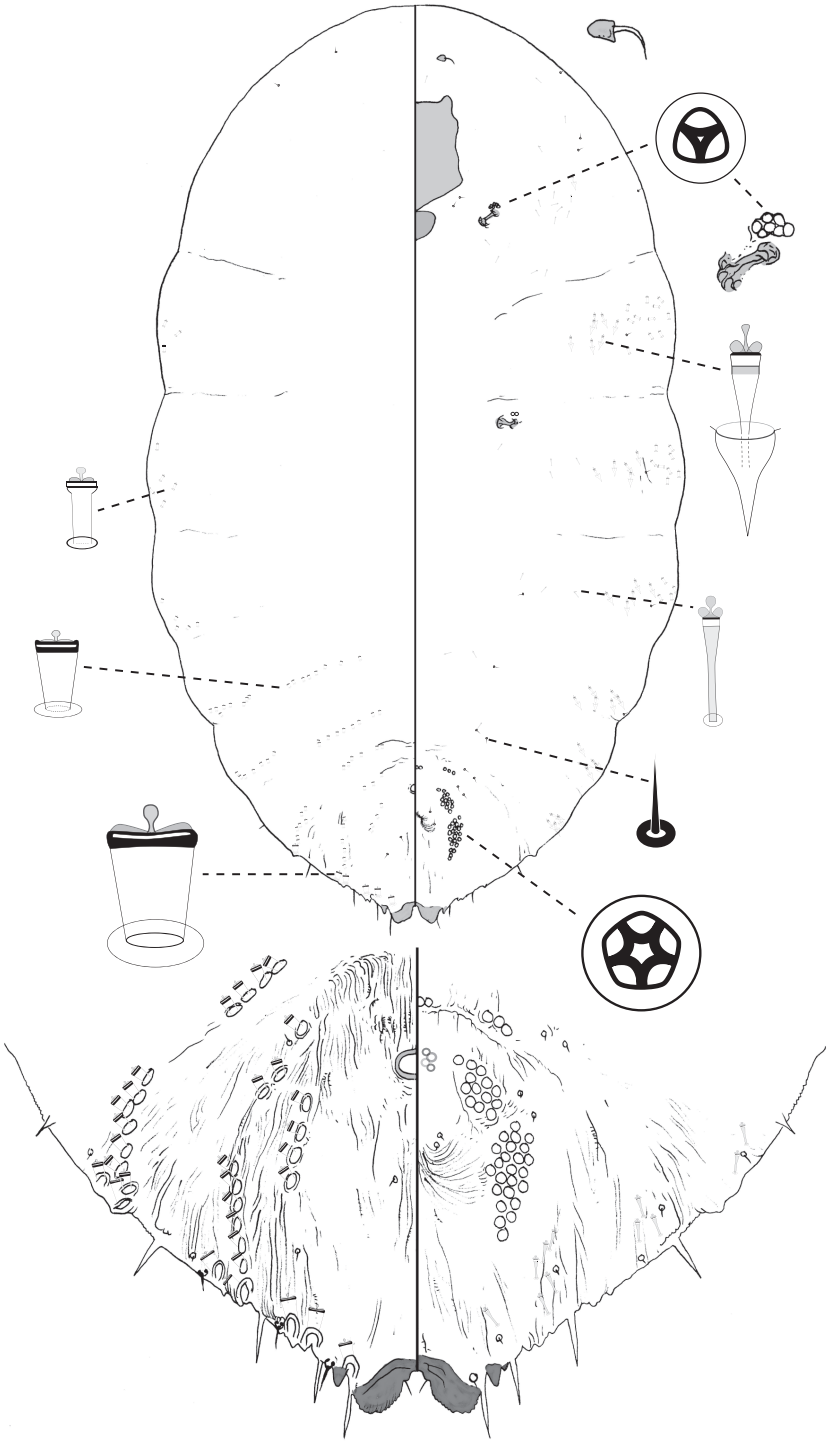

Figure 14. *Poliaspis syringae* Laing, adult female.

Thursday Island, on leaves of *Pemphis acidula*, 6.9.1983, J Donaldson (QDPI); 5 adult females: Thursday Island, ex mangrove, 16.5.1985, J Donaldson (QDPI); 4 adult females: same data as holotype (QDPI). WA. 3 adult females: Sunday Island [-16.4, 123.19], on leaves of *Ficus* sp., 13.5.2002, A Williams (QDPI); 3 adult females: Willie Creek via Broome [-17.96, 122.24], ex mangrove, 7.8.2003, A Postle, C Brockway (QDPI).

Description, n=10. Slide-mounted adult female 1101–2040 μm long (holotype 2040 μm long), body outline fusiform to pyriform, with weakly-developed lobes on pre-pygidial abdominal segments. Pygidium with 2 pairs of lobes; median lobes zygotic, divergent, lobes connected via broad (more than half width of lobes) sclerosis, each lobe wider than long, with rounded apex; margin between lobes incised; second lobe bi-lobed, ca. as large as medial lobe, medial lobule larger and with stronger basal sclerosis. Gland spines 25–47 long long, 2–3 × length of median lobes, 1 gland spine on lateral margin of each pygidial segment; pair of setae between median lobes. Conspicuous, duct spur present between medial and second lobe, as long as medial lobe. Dorsal ducts smaller than marginal ducts; present in rows; 4 submedial ducts present on segment 6; ca. 6 submarginal and ca. 6 submedial ducts on segment 5. Perivulvar pores: 2–6 posteromedial, 6–11 posterolateral, 15–28 posterior, 0–3 anteromedial, and 4–7 anterolateral. Trilocular pores in cluster of 1–5 near anterior spiracle; absent near posterior spiracle in most specimens (2 present in specimens from *Parsonsia*). Microducts absent on dorsal surface of head, scattered on ventral surface of abdomen and thorax. Antenna with 2 fleshy setae.

Comments. *P. waibenensis* is very similar to *P. naamba*. See comments under *P. naamba* for discussion.

Etymology. The species name is taken from the Torres Strait Islander name for Thursday Island: Waiben, meaning 'place of no water.'

***Poliaspis wilga* (Leonardi), comb. n.**
http://species-id.net/wiki/Poliaspis_wilga
Fig. 16

Mytilaspis wilga Leonardi, 1903: 43–44.
Lepidosaphes wilga (Leonardi), change of combination, Sanders, 1906: 17.
Leonardaspis wilga (Leonardi), change of combination, MacGillivray, 1921: 287.

Material examined. Lectotype female here designated, female slide labelled: 'on wilga, *Geijera parviflora*, Condobolin, 17.x.1900, WW Froggatt (339), BM 1964–4, CIE' (BMNH).

Paralectotypes: 12 slides with same data as Lectotype (BMNH); 1 slide with 4 females labelled "co-type, *Mytilaspis wilga*, Green [crossed out and replaced in pencil by 'Leon.'], 'Wilga' *Geijera parviflora*, NS Wales, Australia, coll. WW Froggett no. 339 [no date]." On cover: "*Lepidosaphes wilga* Leon., on *Geijera*, Australia, coll. WW Froggatt, BM 1940, 180, [no collection date]."

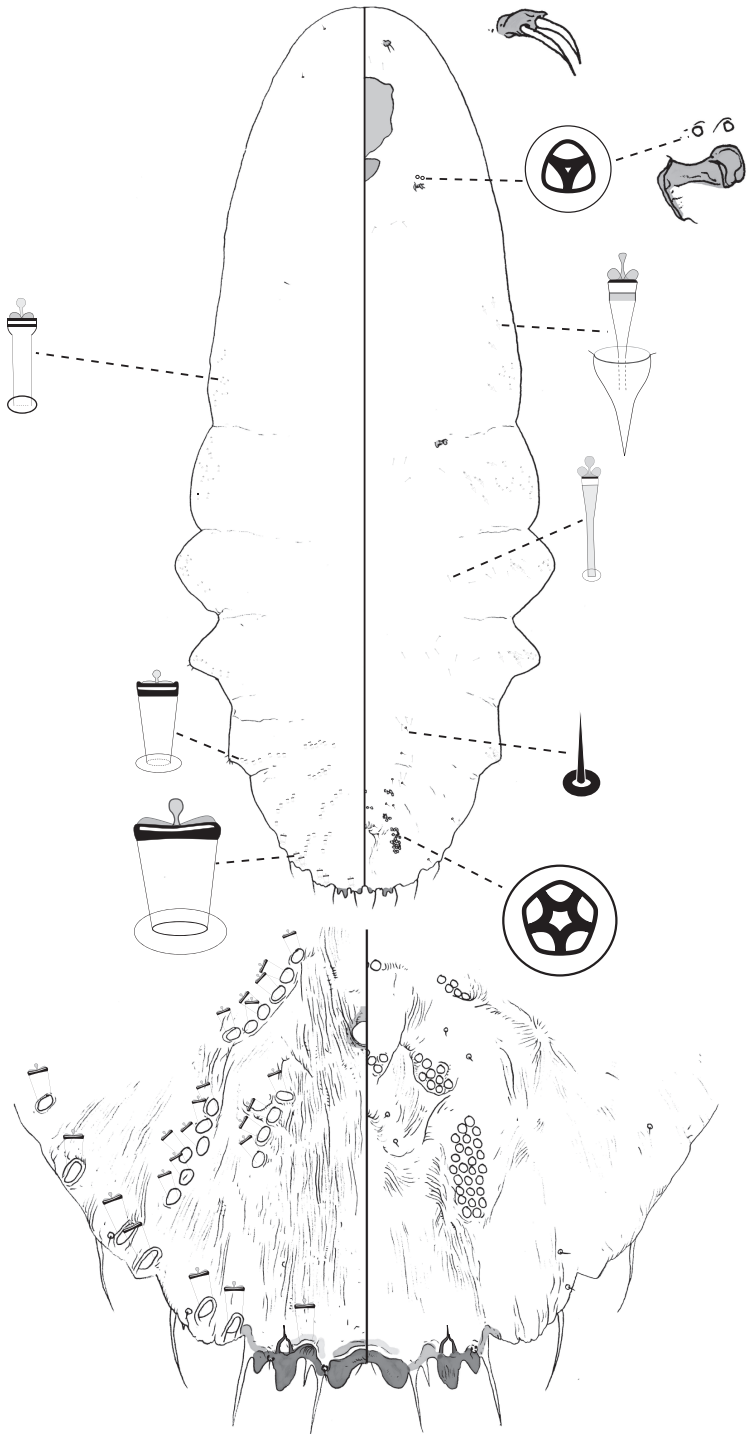

Figure 15. *Poliaspis waibenensis* Hardy and Henderson sp. n., adult female.

Other Material: NSW. 2 adult female: Glenmore via Bourke [-30.09, 145.94], ex *Eremophila* sp., 10.3.1994, D Sparks (QDPI); 5 adult females: McCatheys, Dunsandle Rds [?], on leaves of *Eremophila deserti*, 11.10.1994 (QDPI). VIC. 6 adult females: Merbein [-34.17, 142.05], ex *Myoporum* sp., 8.3.1948, P26 (QDPI).

Description, n=10. Slide-mounted adult female 939–1542 µm long (Holotype 1130 µm long), body outline oval. Pygidium with 1 pair of lobes; median lobes small, zygotic, parallel, lobes connected via narrow sclerosis, each lobe wider than long, rounded; margin between lobes not incised. Gland spines 9–24 µm long, ca. 1–2 × as long as median lobes, 1 gland spine on lateral margin of each pygidial segment; pair of setae between median lobes. Marginal ducts: 1 on abdominal segment 7, ca. 4 on segment 6, ca. 3 on segment 5. Dorsal ducts smaller than marginal ducts; present in clusters (i.e. less organized than rows); 4–6 submedial ducts present on segment 6; 5–7 marginal-submarginal and ca. 9 submedial ducts on segment 5. Perivulvar pores: 3–4 posteromedial, 10–19 posterolateral, 13–27 posterior, 0–4 anteromedial, and 1–8 anterolateral. Trilocular pores in cluster of 2–5 near anterior spiracle; absent near posterior spiracle. Microducts numerous on dorsal surface of head, scattered on ventral surface of thorax and abdomen. Antenna with 2 fleshy setae.

Comments. *P. wilga* is the only species of *Poliaspis* to have only the median lobes present. It can also be recognized by the loose groupings of more than 2 marginal ducts on abdominal segments 6 and 7.

***Laingaspis lanigera* (Laing)**
http://species-id.net/wiki/Laingaspis_lanigera
Fig. 17

Poliaspis lanigera Laing, 1929: 20–21.
Laingaspis lanigera (Laing), Borchsenius and Williams, 1963: 365.

Material examined. Lectotype female here designated, adult female on slide labelled: Australia, NT, Darwin, on mangrove, GF Hill, BM 1916–225 [with "Type" label] (BMNH).

Paralectotypes: adult female on slide with same data as Lectotype, marked as Paratype [sic] (BMNH); 4 slides of females with same basic data but variously with "Port Darwin on Foreshore, IBE 647," "GF Hill no. 682, from type material, BM 1940–180," "IBE 151 / GE Hill 682" (BMNH); 6 poor quality single-specimen slide mounts of males, labelled "Australia, Port Darwin, GF Hill, 16.vi.1916, BM 1922–155" – probably part of the type series even though rigistered years later.

Other material: QLD. 5 adult females: Jacky Jacky Creek [-10.94, 142.51], on leaves of *Aegiceras corniculatum*, 16.1.1998, J Grimshaw, B Waterhouse (QDPI); 5 adult females: New Mapoon [-10.87, 142.39], on stems of *Acalypha milkeriana*, 14.1.1998, J Grimshaw (QDPI).

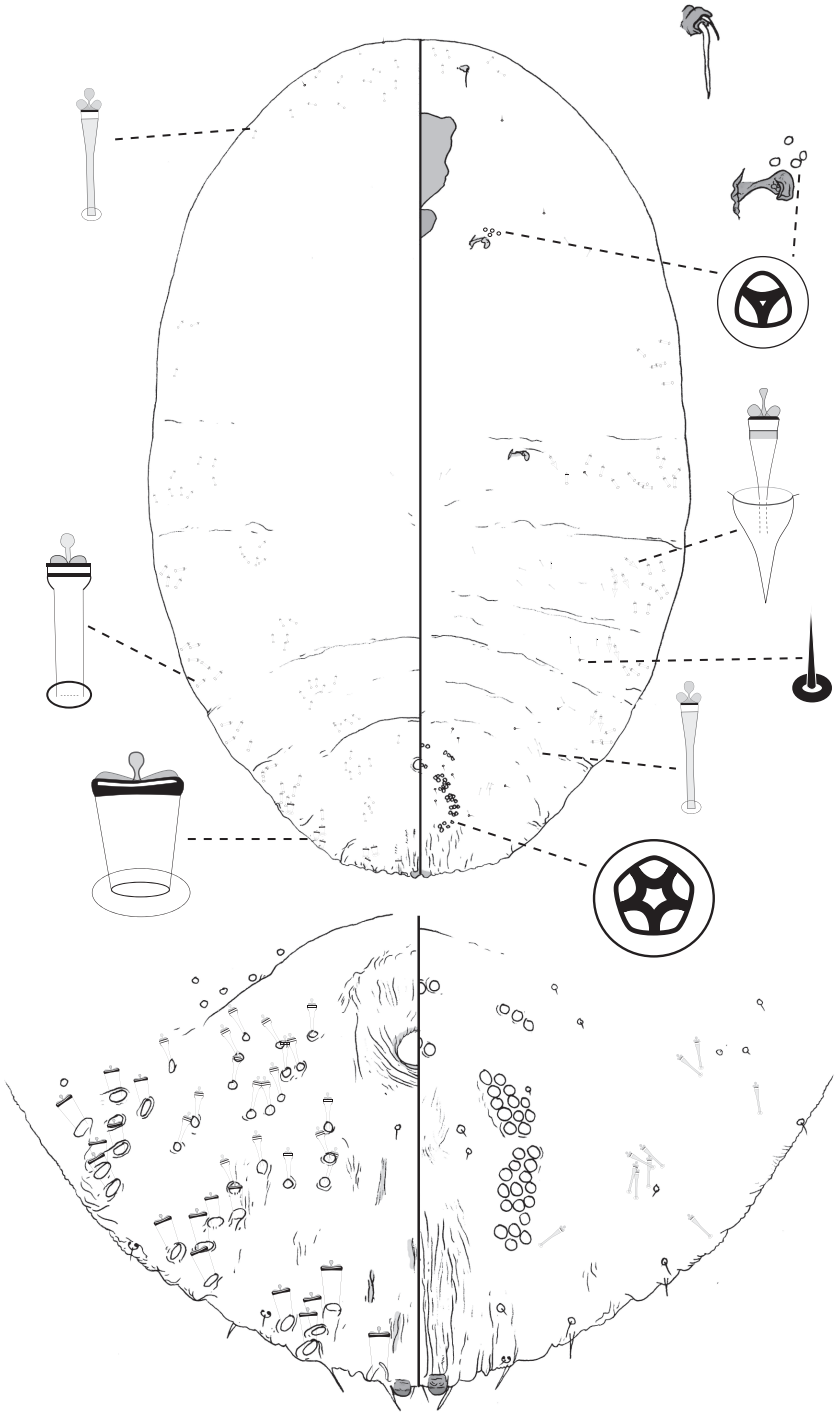

Figure 16. *Poliaspis wilga* (Leonardi) comb. n., adult female.

Description. Slide-mounted adult female 965–1126 μm long (Holotype 1026 μm long), body outline oval. Margin of pygidium rounded, serrate. Median lobes dinstinct, with pointed apices, rest of pygidial margin densely-packed with gland spines and sclerotic teeth, some of which may be homologous to lobes. Anus in anterior third of pygidium; opening round. Dorsomedial ducts on pygidium longer than marginal and submarginal ducts; present in 2 clusters near anus; ca. 5 ducts in anterior cluster and ca. 3 in posterior one. Trilocular pores in cluster of 2–3 around each anterior spiracle, absent near posterior spiracles. Antenna with 2 fleshy setae. Perivulvar pores quinquelocular, in 7–8 groups; 5 groups on abdominal segment 7, and 2 or 3 groups on abdominal segment 6; 0–4 posteromedial, 5–7 posterolateral, 11–15 posterior, 0–3 anteromedial, and 0–4 anterolateral. Dorsal ducts 1-barred; dense along margin and submargin of pygidial dorsum, plus a few in clusters near anus. Gland tubercles in marginal / submarginal clusters on thoracic and pre-pygidial abdominal segments.

Comments. This species has the diagnostic distribution of perivulvar pores found among species of *Poliaspis* but differs in an important feature: namely, 1-barred ducts arranged in a dense marginal swath on the pygidial dorsum. 1-barred ducts and gland tubercles, which are also present in this species, is an unusual combination among armored scale insect species.

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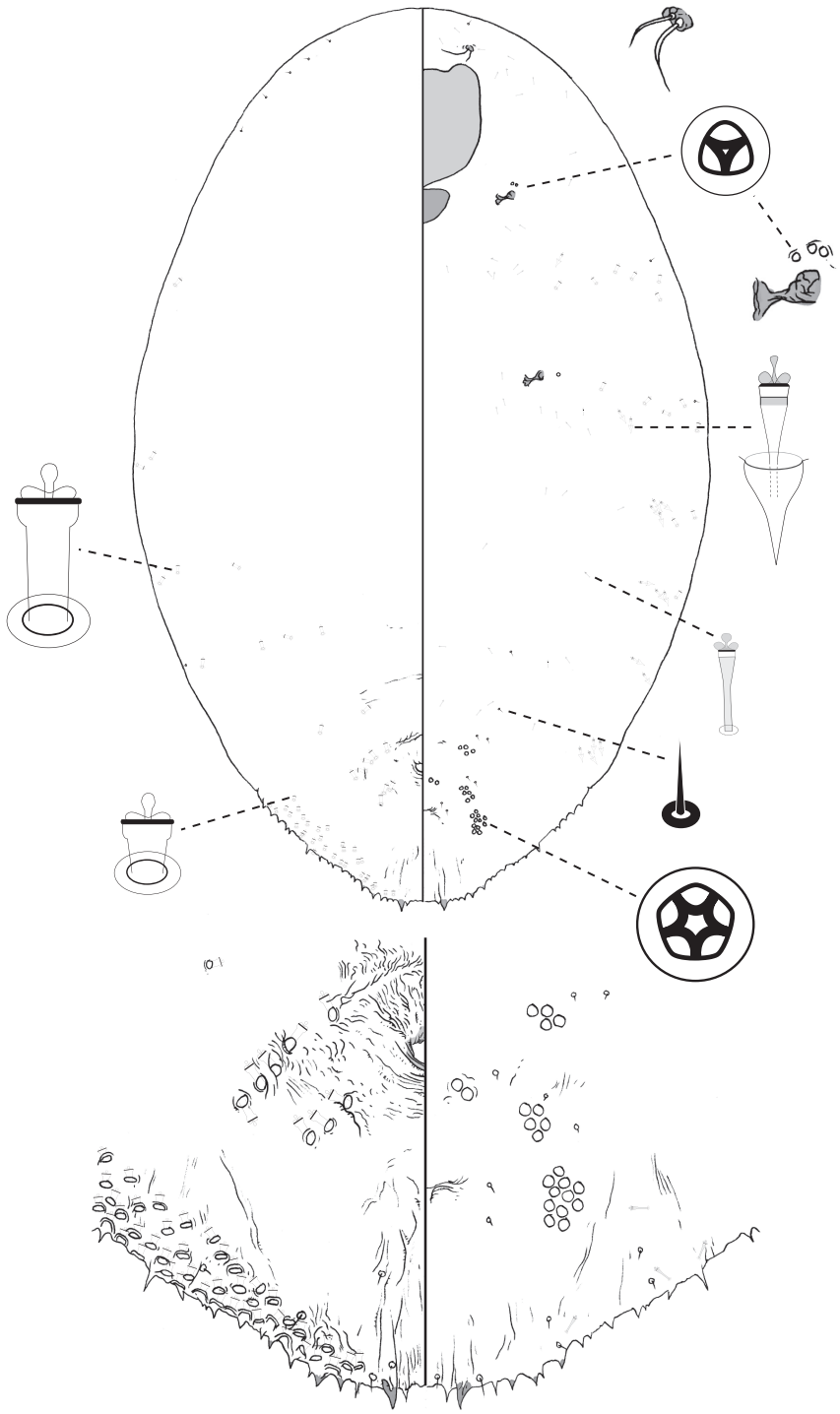

Figure 17. *Laingaspis lanigera* (Laing), adult female.

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RESEARCH ARTICLE

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Six new species of *Acomoptera* from North America (Diptera, Mycetophilidae)

Peter H. Kerr†

California Department of Food and Agriculture, Plant Pest Diagnostics Branch, 3294 Meadowview Rd., Sacramento, CA, 95832–1448 USA

† *urn:lsid:zoobank.org:author:5CB6CB75-75C8-402D-A3BE-194D6442D48C*

Corresponding author: *Peter H. Kerr* (pkerr@cdfa.ca.gov)

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Abstract

Six new species are described, raising the number of North American *Acomoptera* species to seven and the genus total to ten, and nearly doubling the number of species within the putative clade containing *Acomoptera*, *Drepanocercus*, and *Paratinia*. These novel species forms have implications for the concept of *Acomoptera* that in turn, may impact our understanding of its generic relationships and the evolution and composition of Gnoristinae and Sciophilinae. The new species, *A. crispa*, *A. digitata*, *A. echinosa*, *A. forculata*, *A. nelsoni*, and *A. vockerothi*, are compared with the type species of the genus, *A. plexipus* (Garrett), whose diagnostic features are imaged and illustrated for the first time. The European species, *A. difficilis* (Dziedzicki) is also illustrated and compared. *Acomoptera spinistyla* (Søli) **comb. n.** is transferred from *Drepanocercus*. A key to species is provided. Future work will seek to incorporate this knowledge into a systematic phylogenetic study of relationships between these species and their sister taxa.

Keywords

Systematics, Sciophilinae, Sciophilini, Gnoristinae, Gnoristini, *Paratinia*, *Drepanocercus*, fungus gnats, new species

Introduction

The genus *Acomoptera* (Diptera: Mycetophilidae) was established by Vockeroth (1980) for a single Nearctic species, *Acomoptera plexipus* (Garrett) and has included only one European species, *A. difficilis* (Dziedzicki). The genus may also be present in China (Wu and Yang 1990).

By originally placing the type species in *Eudicrana*, Garrett (1925) implicitly suggested it was affiliated with the subfamily Sciophilinae (Sciophilini). Vockeroth considered *Acomoptera* a member of the Gnoristinae (Gnoristini to some authors) although he doubted its proper placement (Vockeroth 1980, 1981; Väisänen 1986). Since then, the subfamilial placement of *Acomoptera* has gone back and forth, some preferring Gnoristinae (Vockeroth 1981, Blagoderov 1998, Polevoi and Jakovlev 2004, Ševčík and Chandler 2008) while others Sciophilinae (Bechev 1999, Kjærandsen et al. 2007, Kjærandsen and Jordal 2007). Most recently, Rindal et al (2009) recovered *Acomoptera* clustered within a paraphyletic Gnoristinae in a molecular study involving small fragments of two nuclear (18S, 28S) and one mitochondrial gene (16S).

This schizophrenic classification history for *Acomoptera* largely follows the various interpretations applied to *Acomoptera*'s putative sister taxa, *Paratinia* Mik and *Drepanocercus* Vockeroth. *Paratinia* and *Drepanocercus* have been placed either together in Sciophilinae (Bechev 1999, Kjærandsen et al. 2007), or simultaneously in Sciophilinae and Gnoristinae, respectively (Vockeroth 1980, 1981; Søli 1993, 1997; Polevoi and Jakovlev 2004). As noted by Vockeroth (1980), *Acomoptera* resembles *Paratinia* Mik in eye shape, facial and antennal structure, thoracic setation, and wing venation. Søli (1993) notes that *Paratinia* appears closely related to *Drepanocercus* on account of having nearly naked eyes, a bare proepisternum, a distinct paratergite, and a well-developed phragma; these states are also shared with *Acomoptera* (except in the last character). *Drepanocercus* and *Paratinia* are recovered as sister taxa in Søli (1997), although this study did not include *Acomoptera*. In more recent morphological studies of the family, *Drepanocercus*, *Paratinia*, and *Acomoptera* are recovered together (Chris Borkent, pers. comm.).

Before investigations into the phylogenetic relationships of *Acomoptera* and other genera proceed further, it is first important to recognize the diversity of species within *Acomoptera* itself. The holotype of the type species, *Acomoptera plexipus* (Garrett), is a female and now badly damaged and covered by fungal spores (Fig. 21B). Vockeroth (1980) associated males to the holotype by matching wing venation and proximity of collecting locality, but described the genus without illustrating the male genitalia, which are diagnostic for species. Since it was thought that only one species was present in North America, and this species was weakly characterized, *Acomoptera* collected in the region were typically assumed to be *A. plexipus*. In fact, the Nearctic supports an impressive diversity of *Acomoptera*. Recent studies in California and elsewhere in North America revealed a number of undescribed species that show a surprising degree of morphological variation, particularly in the male genitalia. These novel forms have implications for the concept of the genus and the clade including its putative sister-groups. This may in turn, also impact our understanding of the

evolution and composition of two large subfamilies of Mycetophilidae, the Gnoristinae and Sciophilinae.

Here, an additional six new species are described, raising the number of North American *Acomoptera* species to seven. These new species are compared with *A. plexipus* (Garrett), whose diagnostic features are imaged and illustrated. The European species, *A. difficilis* is also illustrated and compared. A key to species of the genus is included and apparent phylogenetic affiliations between congeners are briefly discussed.

Materials and methods

Terminology for wing venation generally follows McAlpine (1981), however interpretation of radial veins consistent with Søli (1997). Terminology for thoracic and genitalic morphology largely follows Wood (1991), McAlpine (1981), and Vockeroth (1981). Terminology of thoracic sclerites and wing veins is standardized in Figs 7 and 8, respectively. Whole specimens and genitalia were macerated in 10% KOH at approx. 95°C for 15–20 minutes to remove soft tissue, then rinsed in distilled water and dilute glacial acetic acid, and dissected in water. All genitalia preparations were placed in a drop of DMHF and dry mounted onto a small card with transparent backing, held to the pin beneath the specimen. Illustrations and plates were made using Adobe Illustrator and Adobe Photoshop Creative Suite software, aided by digital images taken using a Q-imaging Micropublisher 5.0 scope-mounted digital camera. Habitus images were taken with the same digital camera, using an LED dome lighting system (Kerr et al. 2008). Material examined includes holdings deposited in the California State Collection of Arthropods, Sacramento, California, USA (CSCA); Canadian National Collection (CNC); California Academy of Sciences, San Francisco, California, USA (CASC); and the private collection of Olavi Kurina (Tartu, Estonia). Paratypes are also deposited in 100% EtOH in the Frozen Tissue Collection of the CSCA (CSCA-FTC) at -80°C for DNA preservation. Specific collection holding and deposition information is provided in the species accounts. High resolution images of studied material are deposited and publicly available in Morphbank (http://www.morphbank.net/). Morphbank image numbers are cited within brackets, in the figure captions, and serve as embedded links.

Taxonomy

***Acomoptera* Vockeroth**
http://species-id.net/wiki/Acomoptera

Acomoptera Vockeroth, 1980: 534

Type species. *Eudicrana plexipus* Garrett, 1925: 4, by subsequent designation.

Diagnosis. This genus may be distinguished from most mycetophilid genera by the following combination of wing characters: Sc ending in C, sc-r present near middle

of Sc, and R4 present and displaced from Rs by more than 2.5× its own length. *Acomoptera* may be distinguished from *Paratinia* by having wing membrane bare and from *Drepanocercus* by having the cubital fork near the level or distad of sc-r. *Acomoptera* is distinguished from *Phoenikiella* Chandler by having a setose Sc, with sc-r positioned near the middle of this vein.

Description. Body length 4.5 to 7.1 mm. Ocelli three, subequal or median ocellus reduced, lateral ocellus separated from eye margin by approximately its own diameter or clearly less. Eye with a broad distinct emargination above antennal base, with microsetae usually scattered and short, but sometimes more numerous and longer. Frons bare between ocelli and antennal bases. Frontal tubercle present. Antenna two to four times as long as thorax, 2/3rds to approximately same length as abdomen; antennal bases nearly touching, separated only by narrow tip of frontal tubercle; all flagellomeres densely setulose, elongate, flagellomere length decreases gradually toward tip. Palpus with five palpomeres; palpomere 1 short, as wide as long, remaining palpomeres longer than wide (except sometimes palpomere 2 as wide as long); palpomere 2 clearly shorter than or subequal to palpomere 3; palpomere 4 three to six times longer than wide; palpomere 5 thinner than others, six to eleven times longer than wide, usually subequal to combined length of palpomeres 3 and 4. Scutum with short appressed acrostichal and dorsocentral setae and longer and more erect sublateral setae, the intervening areas bare. Scutellum with three or four irregular rows of short to long setae, sometimes bare medially. Paratergite present; antepronotum with setae on posterior half, proepisternum bare; mesopleuron, metapleuron, and prosternum bare; metanotum with one to three erect setae laterad of base of halter; mediotergite and laterotergite bare; phragma not well developed. Wing unmarked, with dense microtrichia, without macrotrichia. Costal vein extends beyond R_5, between approx. 0.25× and 0.33× distance between R_5 and M_1; sc-r crossvein present, slightly distad of middle of Sc, proximal of Rs; R4 present (when missing, teratogenic), located approx. 3× its own length from Rs, forming an elongate radial cell; medial fork approx. 3× longer than stem; cubital fork arises near level or distad of sc-r and proximad of medial fork, cubital stem shorter than CuA_1 and approx. equal in length to or longer than CuA_2; all cross veins bare on upper surface, all longitudinal veins setose on upper surface, except CuP and the first two sections of M bare (as an exception, *A. crispa* sp. n. may have a few setae on M_{1+2}); wing veins R_1, R_5, M_1, and sometimes M_2 with at least some setae on lower surface. Hind coxa with a single vertical row of setae on at least proximal half (sometimes weak). Tibial bristles short but distinct, the longest between half and full tibial diameter in length. Anteroapical depressed area of fore tibia ovate and well developed. Tibial spur pairs of equal length, hind tibial spurs usually longer than mid tibial spurs, but sometimes mid and hind spurs subequal in length. Tarsal claws each with one or two small ventral teeth. Empodia small. Sternite 1 bare. Sternites 2 to 7 each with a pair of broad, poorly defined, submedian to sub lateral fold-lines. Terminalia not rotated. Epandrium (tergite 9) between three times as wide as long to slightly wider than long. Hypandrium (sternite 9) fused with gonocoxites, the synsclerite with or without a narrow transverse membranous area across ventral surface, with or without a ventral preapical hook-like

process directed posteriorly. Gonostylus variously formed, often divided into two or three lobes. Posterodorsal process attached to the median dorsal angles of the gonocoxites variously shaped, sometimes arising as a distinctive bilobed wing-like structure whose posterior margins are darkened and toothed. Cerci broad, flat, broadly rounded apically, with fine setae. Hypoproct broad, semicircular, weakened anteromedially.

Female sternite 8 deeply emarginate posteriorly, the rest of the median area membranous or lightly sclerotized. Sternite 9 with two weakly sclerotized anterolateral areas and two slender, more heavily sclerotized submedian processes projecting posteriorly. Tergite 10 short, setose, fused on either side with sternite 10. Sternite 10 well developed, membranous medially, tapering on posterior half, posterior margin extending to apex of first segment of cercus. Cercus 2-segmented, first segment almost twice as long as wide, second segment oval.

Key to the *Acomoptera* of the world (males)

1 Hook-like or fork-like hypandrial lobe present (Figs 5B, 5E, 17B, 17E, 23B, 23E) **2**

– Hypandrial lobe absent **4**

2 Hypandrial lobe fork-like (Figs 16D, 17A–C)..... ***A. forculata* sp. n.**

– Hypandrial lobe hook-like (Figs 5B, 23B)..... **3**

3 Hypandrial lobe long, subtending the gonostyli in part (Fig. 5E); gonostylus with club-like, ventral process that extends well beyond rest of gonostyus posteriorly (Figs 4A–C, 5A–B, 5E); Europe ..... ***A. difficilis* Dziedzicki**

– Hypandrial lobe short, not reaching beyond posterior margin of gonocoxites (Figs 22B, 23B, 23E); gonostylus without large, posteriorly-directed club-like process; North America..... ***A. plexipus* Garrett**

4 Gonostylus with three apical lobes of similar size and shape..... ..... ***A. sinica* Wu & Yang**

– Gonostylus variously shaped, without three subequal lobes..... **5**

5 Gonocoxites with well-developed, paired structure ('gonocoxal comb') dorsomedially (Figs 2A, 13A, 19A, 25A) **6**

– Gonocoxites without such well-developed dorsomedial structure (e.g., Fig. 11A) **9**

6 Posterior face of gonostyli with prominent cluster of curved setae dorsally (Figs 3A–B, 3D–E, 26A–B, 26D–E)..... **7**

– Posterior face of gonostyli without such curved setae (Figs 14A–B, 14D–E, 20A–B, 20D–E) **8**

7 Gonocoxites with transverse, denticulate ridge of cuticle ventrally (Fig. 26B) ; outermost dorsal margin of gonostylus swept forward (Fig. 26D–E); ventromedial process of gonostylus usually unforked (Fig. 26E)..... ***A. vockerothi* sp. n.**

– Gonocoxites smooth ventrally, without transverse, denticulate ridge (Fig. 3B) ; uppermost lateral margin of gonostylus swept forward (Fig. 3D–E); ventromedial process usually forked (Fig. 3E) ..... ***A. crispa* sp. n.**

8 Inner face of gonostylus toothed dorsally (Fig. 20A) ..... ***A. nelsoni* sp. n.**
– Inner face of gonostylus smooth dorsally (Fig. 14A)..... ***A. echinosa* sp. n.**
9 Fork of cubital wing vein distad of base of r-m (Fig. 8); hypandrium entire (Fig. 11B) ..... ***A. digitata* sp. n.**
– Cubital fork proximal to r-m (Ševčík 2004: fig. 1, Søli, 1993: fig. 1); hypandrium with unsclerotized area near posterior margin (Søli, 1993: fig. 2B) ..... ***A. spinistyla* (Søli), comb. n.**

***Acomoptera crispa* sp. n.**
urn:lsid:zoobank.org:act:30939031-FE99-43C1-B4D4-62D9FED2D02F
http://species-id.net/wiki/Acomoptera_crispa
Figs 1–3

Type Material. Holotype: ♂, "B.C., Hixon, 21.v.1966, E.D.A. Dyer" [53.420° –122.595°] / "HOLOTYPE 11G483 ♂ *Acomoptera crispa* Kerr 2011" [red label]. Deposited in CNC, specimen glued directly to the pin, missing ultimate two right palpomeres, missing ultimate 10 (left) and 9 (right) antennal flagellomeres, missing all legs except mid left, both wings partially torn but complete; otherwise in fair condition. Specimen dissected, male genitalia preserved in DMHF, on card marked "11G483" pinned below specimen.

Figure 1. *Acomoptera crispa* sp. n., habitus, lateral view [691239]. Scale line = 1 mm.

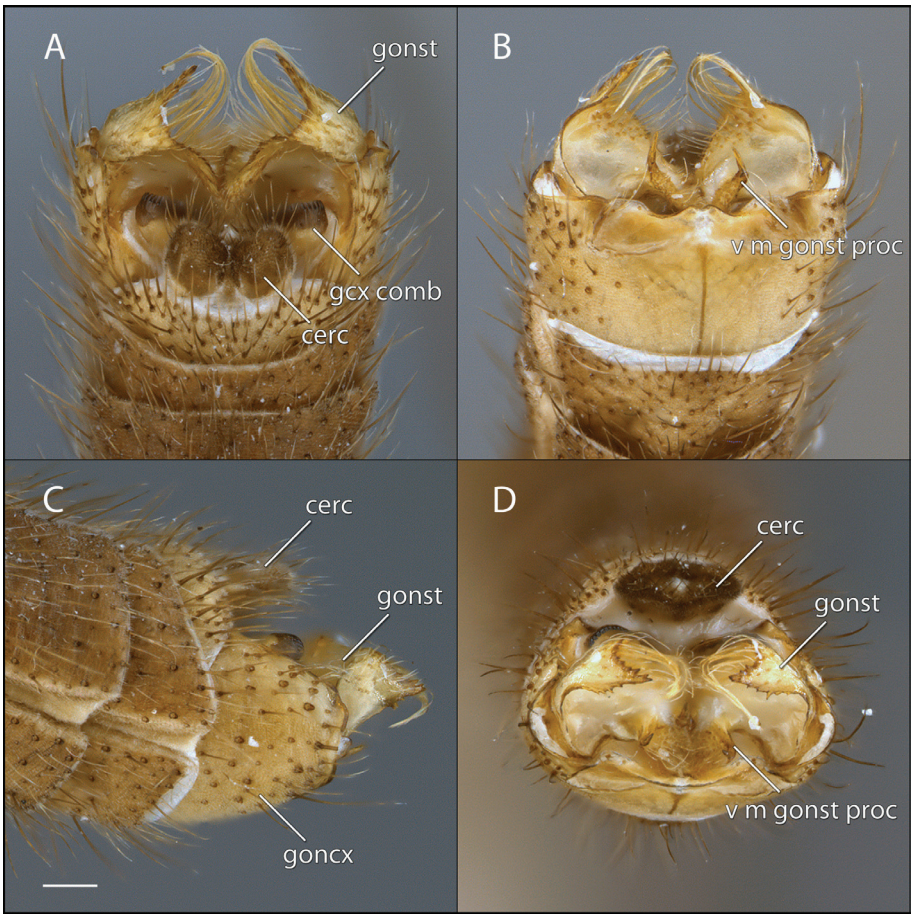

Figure 2. *Acomoptera crispa* sp. n., male genitalia, images: **A** dorsal view [691235] **B** ventral view [691236] **C** lateral view [691237] **D** posterior view [691237]. Scale line = 0.1 mm. Abbreviations: **cerc** cercus **epand** epandrium **gcx comb** gonocoxal comb **goncx** gonocoxites **gonst** gonostylus **v m gonst proc** ventromedial gonostylus process.

Diagnosis. This species is most similar to *A. vockerothi* in having similarly-shaped gonostyli that feature a line of long, curved setae near the dorsal margin. *Acomoptera crispa* may be separated from *A. vockerothi* by the gonocoxites lacking a posteromedial denticulate ridge ventrally (Fig. 2B, 3B). It is also distinguished by having a longer, narrower ventromedial gonostylus lobe, which is usually forked (Fig. 3E) and the outer dorsal lobe is broadly attached laterally (Figs 2D, 3D–E).

Description. Male. Body length: 6.0 mm. Wing length: 5.8 mm.

Coloration (Fig. 1). Head light brown; palpomeres yellow to yellowish brown. Antennal scape and pedicel yellow to yellowish brown, flagellomeres yellowish increasingly yellowish brown toward tip. Thorax yellowish brown; area of scutum bearing acrostichal and dorsocentral setae defined by darker coloration, scutum setae gold- or

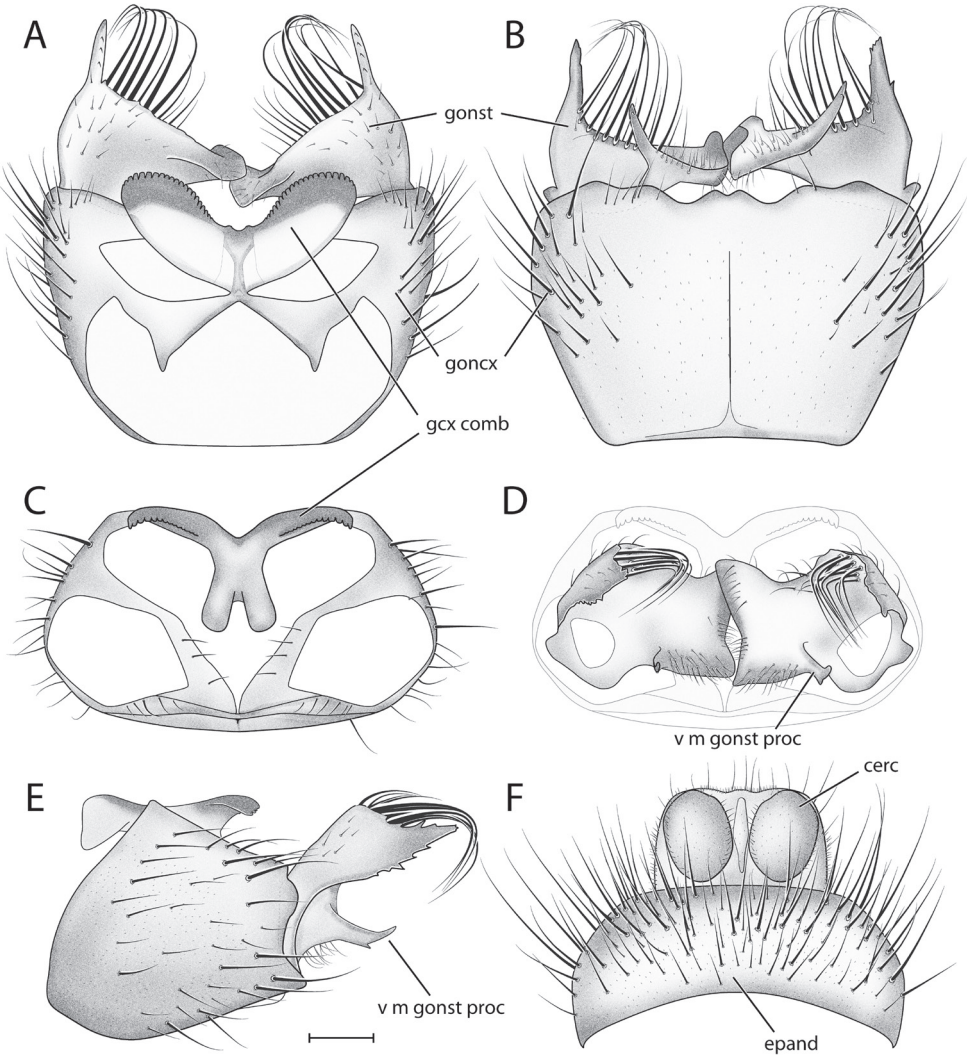

Figure 3. *Acomoptera crispa* sp. n., male genitalia, illustrated: **A** gonopods, dorsal view [691241] **B** gonopods, ventral view [691242] **C** gonocoxites, with gonostyli removed, posterior view [691244] **D** gonostyli, posterior view [691244] **E** gonopods, lateral view [691243] **F** epandrium, dorsal view [691240]. Scale line = 0.1 mm. Abbreviations: **cerc** cercus **epand** epandrium **gcx comb** gonocoxal comb **goncx** gonocoxites **gonst** gonostylus **v m gonst proc** ventromedial gonostylus process.

golden brown-colored. Mid leg becoming increasingly brown towards tarsi; coxae yellowish or cream-colored; femur yellowish, tibia yellowish brown, tarsi brown (other legs missing, but likely having similar coloration). Wing hyaline without markings, wing veins yellowish brown; haltere stem and knob yellow to light yellowish brown. Abdominal segments concolorous, yellowish brown, with scattered yellow and brown setae. Terminalia yellowish brown.

Head. Ocelli slightly raised; middle ocellus approx. same size as lateral ocelli; lateral ocellus located approx. width of ocellus or less from eye margin, separated from median ocellus by approx. twice its own diameter. Eyes with sparse, inconspicuous microsetae, which are approximately as long as width of facet. Antennal length probably approx. 4.0 mm (approx. 0.8× length of abdomen). Palpus approx. 1.0–1.25× width of head (anterior view); length of palpomeres 2 and 3 subequal; palpomere 4 approx. 4.5× longer than wide; palpomere 5 approx. 10× longer than wide, subequal to or longer than combined length of palpomeres 3 and 4.

Thorax. Antepronotum bearing setae; remaining thoracic sclerites bare. Wing venation similar to others in the genus (e.g., *A. digitata* sp. n., Fig. 8); costal vein extends beyond R_5, approx. 0.25× distance between R_5 and M_1; R_1, R_5, and M_1, with at least some setae on lower surface.

Male Genitalia (Figs 2–3). Epandrium approx. 3× wider than long (Fig. 3F). Gonocoxites with dorsomedial comb (Figs 3A, 3C). Gonostylus complex, as shown in Figs 2, 3A–B, 3D–E.

Female unknown.

Etymology. The species epithet “crispa" is an adjective meaning curly in Latin, and refers to the long curved setae of the gonostylus.

***Acomoptera difficilis* (Dziedzicki)**
http://species-id.net/wiki/Acomoptera_difficilis
Figs 4–5

Paratinia difficilis Dziedzicki, 1885: 169

Material Examined. 1 ♂, “SWEDEN: Ög: Fröåsa, 57.8833°N, 15.6666°E, N.Franc & Co 10.v–10.vi.2004, Malaise Trap" deposited in the collection of O. Kurina.

***Acomoptera digitata* sp. n.**
urn:lsid:zoobank.org:act:593ECF9D-76E8-40E6-8C99-200FA32A64B8
http://species-id.net/wiki/Acomoptera_digitata
Figs 6–11

Type Material. Holotype: ♂, “USA, Oregon, Curry Co., small seep (#2) on Elko road, 42°23.122'N 124°13.736'W 925m, 2.vi.2009 G. Courtney CSCA09L472" / “HOLOTYPE 09D070 ♂ *Acomoptera digitata* Kerr 2011" [red label]. Deposited in CSCA, complete specimen in excellent condition, mounted on gray point.

Paratypes: 10 ♂♂, 1♀ “USA: CA: Del Norte Co, SixRiversNF, ForRoute16N02, nr. BearBasin Outlk, 41.8016°N, 123.7369°W, 1500masl, 3.vi-24.vii.2009 P.H.Kerr & O.Lonsdale, 6m MT, CSCA09L526" [CSCA].

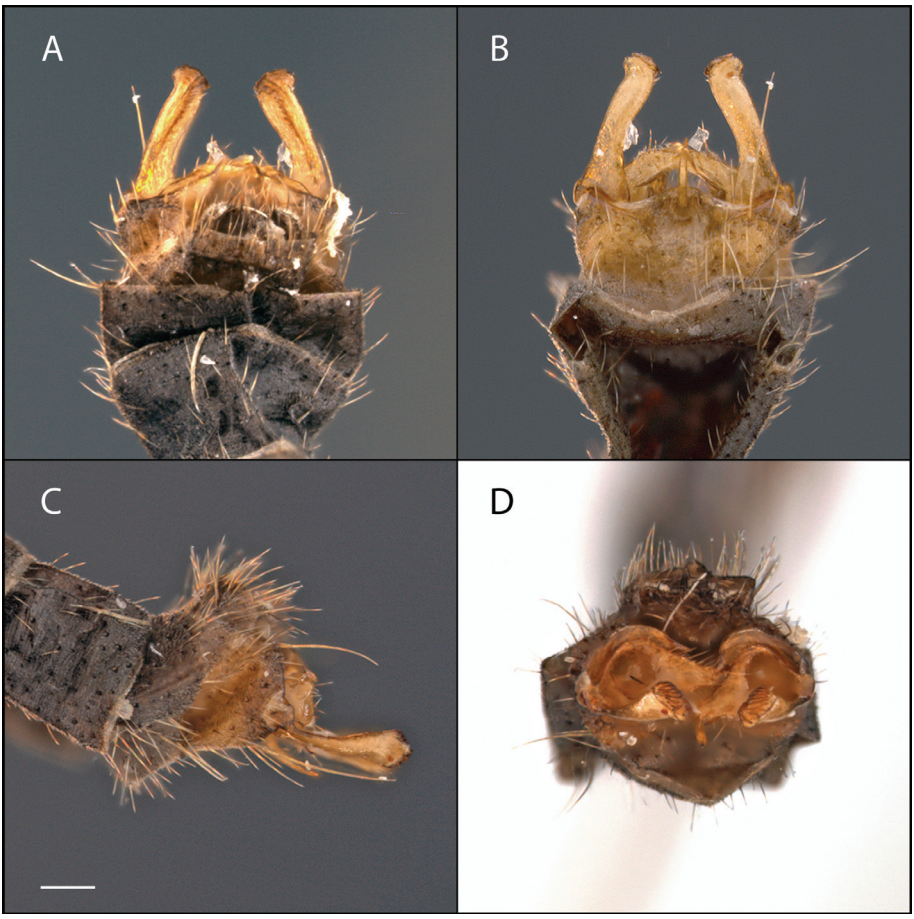

Figure 4. *Acomoptera difficilis*, male genitalia, images: **A** dorsal view [691256] **B** ventral view [691257] **C** lateral view [691258] **D** posterior view [691259]. Scale line = 0.1 mm.

Diagnosis. This species may be distinguished from all other *Acomoptera* species by the dorsoventrally elongate suboval shape of the gonostylus, which features a prominent, finger-like lobe that projects inward (Fig. 11D) and a ventral, posterior-protruding lip that bears an elongate, narrow process (Figs 11D–E).

Description. Male. Body length (n=6): 5.2–6.4 mm (avg = 5.9 mm). Wing length: 5.0–6.1 mm (avg = 5.6 mm).

Coloration (Figs 6A, 7). Head brown; palpomeres light brown. Antennal scape light brown, pedicel and flagellomeres yellow to yellowish brown. Thorax variously brown to cream-colored, in parts; pair of darker brown markings on scutum laterad of dorsocentral setae, scutum setae gold- or golden brown-colored; antepronotum, proepisternum, and proepimeron dark brown, anepisternum, katepisternum, and meron brown; anepimeron cream-colored and noticeably lighter in color than surrounding sclerites; laterotergite brown; metanepisternum and metakatepisternum brown to dark brown; mediotergite brown centrally, cream-colored laterally. Legs becoming increasingly brown towards

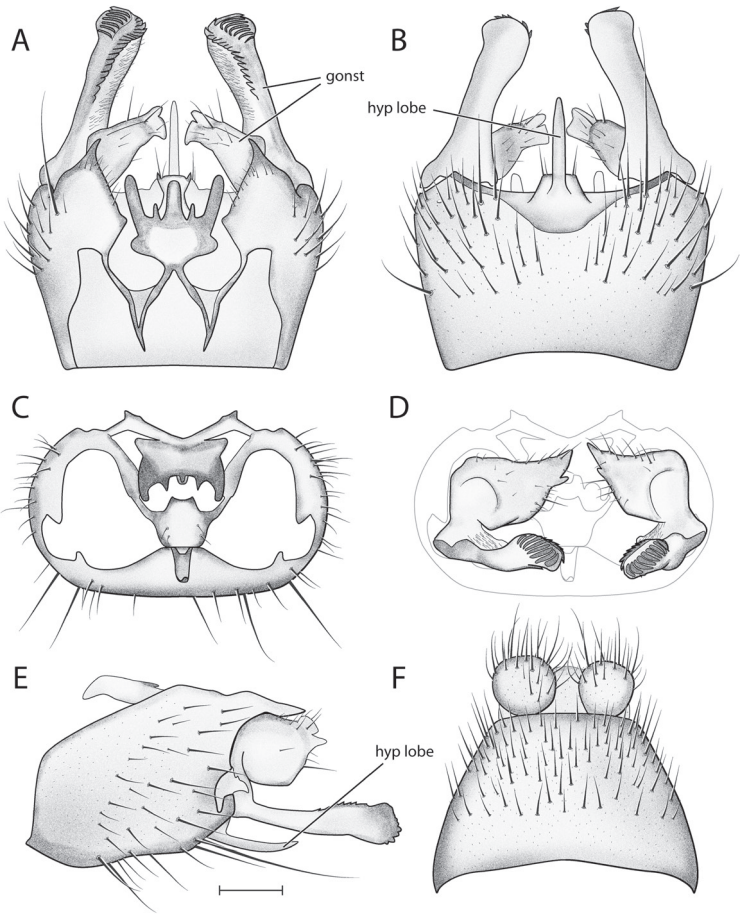

Figure 5. *Acomoptera difficilis*, male genitalia, illustrated: **A** gonopods, dorsal view [691261] **B** gonopods, ventral view [691262] **C** gonocoxites, with gonostyli removed, posterior view [691264] **D** gonostyli, posterior view [691265] **E** gonopods, lateral view [691263] **F** epandrium, dorsal view [691263]. Scale line = 0.1 mm. Abbreviations: **gonst** gonostylus **hyp lobe** hypandrial lobe.

tarsi, coxae cream-colored (coxal setae yellow); femur yellowish or cream-colored, tibia yellowish brown, tarsi light brown. Wing hyaline without markings, wing veins light brown; haltere stem and knob cream-colored to yellowish brown. Abdominal segments concolorous, brown, with golden brown setae. Terminalia yellowish brown to brown.

Head. Ocelli slightly raised; middle ocellus smaller or about the same size as lateral ocelli; lateral ocellus located approx. its own width (approx. width of two eye facets) from eye margin, separated from median ocellus by 2–3× its own diameter. Eyes with sparse, inconspicuous microsetae, which are approximately as long as width of facet. Face with brown setae, longest of which approx. same length as width of face. Antennal length approx. 0.75× length of abdomen. Palpus shorter than width of head (anterior view); palpomere 2 clearly shorter than palpomere 3; palpomere 4 approx. 3× longer than wide; palpomere 5 approx. 6× longer than wide, shorter than combined length of palpomeres 3 and 4.

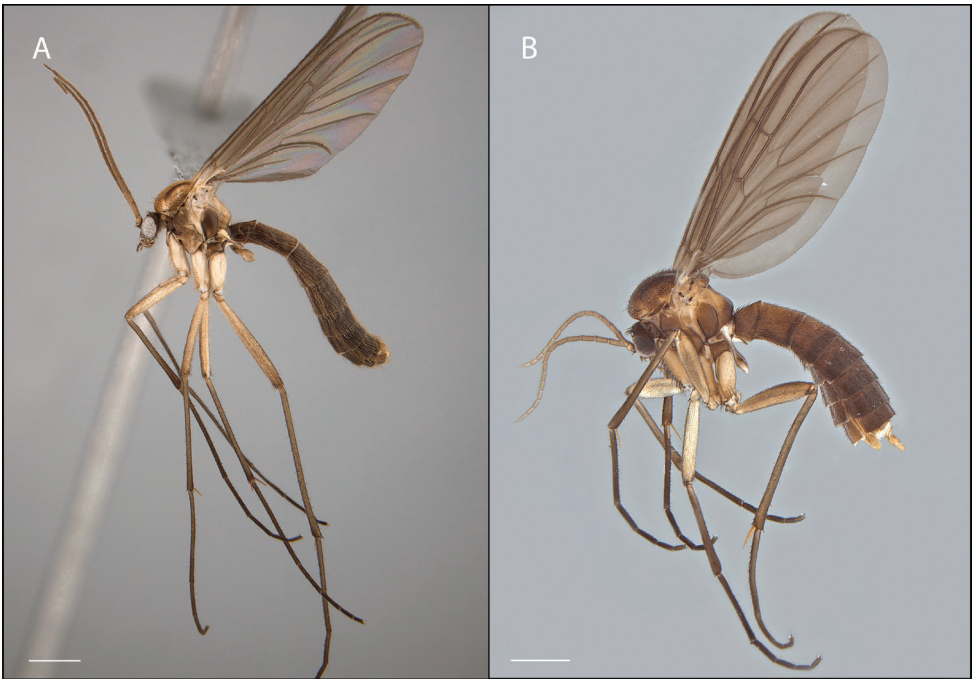

Figure 6. *Acomoptera digitata* sp. n., habitus, lateral view: **A** male [691271] **B** female [691264]. Scale line = 1 mm.

Thorax (Fig. 7). Antepronotum bearing setae; remaining thoracic sclerites bare. Tarsal claw usually with two small ventral teeth. Wing venation as in Fig. 8; costal vein extends beyond R_5, approx. 0.25× distance between R_5 and M_1; R_1, R_5, and M_1 with at least some setae on lower surface.

Male Genitalia (Figs 10–11). Epandrium approx. 2× wider than long (Fig. 11F). Gonocoxites without developed dorsomedial comb (Figs 11A, 11C). Gonostylus complex, as shown in Figs 10, 11A–B, 11D–E.

Female. Body length (n=1): 5.9 mm; wing length (n=1): 5.6 mm.

As male in all aspects except the following:

Generally moderately darker than male (Fig. 6B). Antennal scape brown, pedicel and flagellomeres light brown, yellowish brown, or brown. Scutum setae black. Legs becoming increasingly brown towards tarsi, coxae light brown (coxal setae black); fore femur yellowish or cream-colored, mid and hind femora light brown or brown; tibia and tarsi brown to light brown. Wing membrane darker and wing veins stronger than in male; abdominal setae black. Terminalia yellowish or yellowish light brown, form as in Fig. 9.

Comment. The female specimen was united with males on the basis of similar coloration patterns (e.g., bicolored mediotergite) and having been collected with males at a locality known only for this species.

Etymology. The species epithet “digitata" is an adjective derived from the Latin word for finger, referring to the adaxial process of the gonostylus.

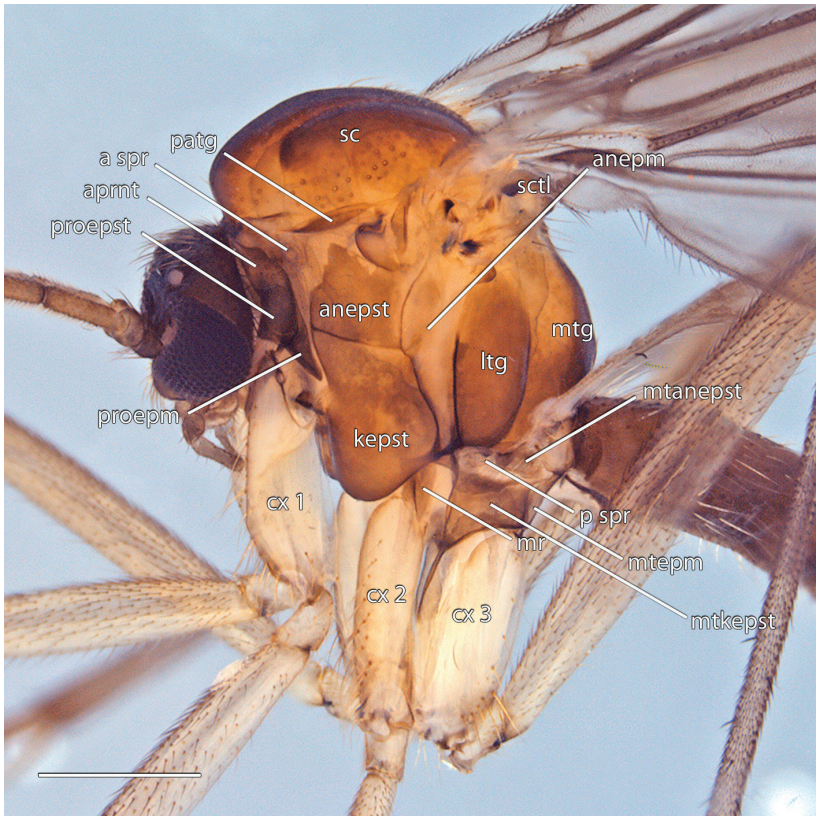

Figure 7. *Acomoptera digitata* sp. n., thorax, lateral view [692363]. Scale line = 0.5 mm. Abbreviations: **anepm** anepimeron **anepst** anepisternum **aprnt** antepronotum **a spr** anterior spiracle **cx** coxa **kepst** katepisternum **ltg** laterotergite **mr** meron **mtg** mediotergite **mtanepst** metanepisternum **mtepm** metepimeron **mtkepst** metakatepisternum **p spr** posterior spiracle **patg** paratergite **proepm** proepimeron **proepst** proepisternum **sc** scutum **sctl** scutellum.

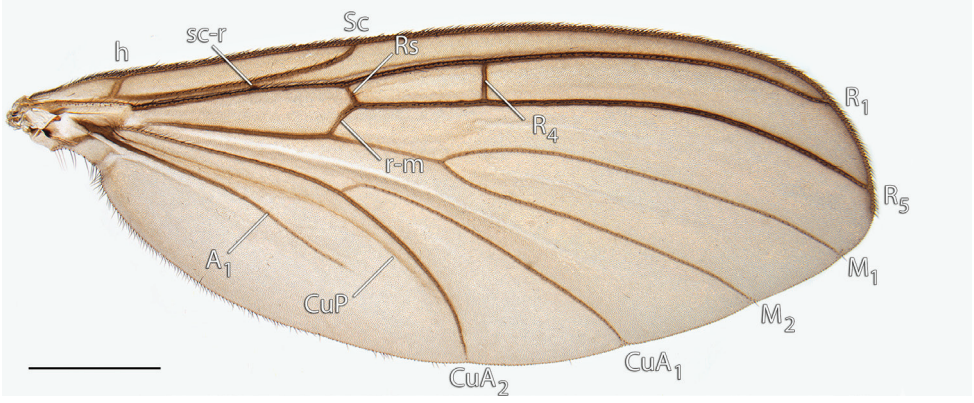

Figure 8. *Acomoptera digitata* sp. n., wing, dorsal view [692360]. Scale line = 1 mm.

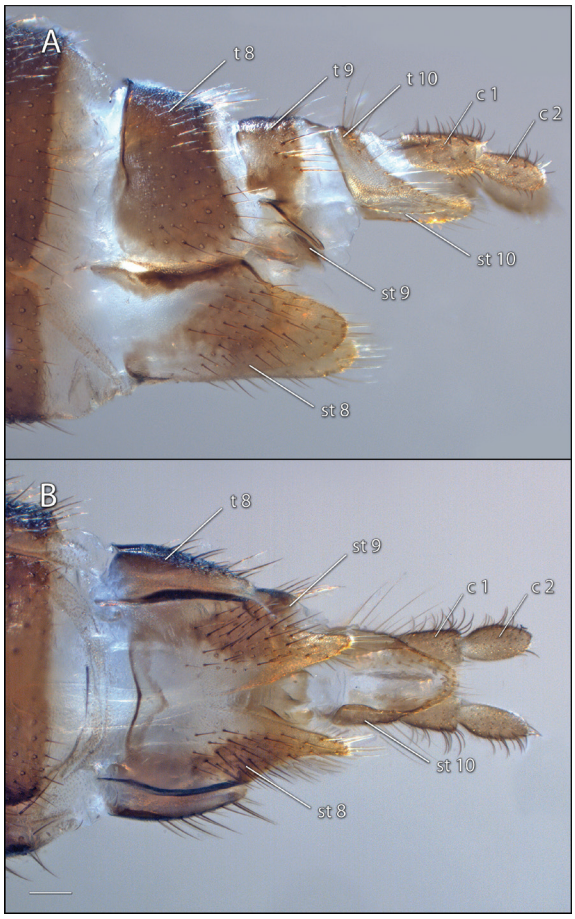

Figure 9. *Acomoptera digitata* sp. n., female genitalia: **A** lateral view [692365] **B** ventral view [692366]. Scale line = 0.1 mm. Abbreviations: **c** cercus **st** sternite **t** tergite.

***Acomoptera echinosa* sp. n.**
urn:lsid:zoobank.org:act:E046E3C3-A83A-4010-973C-4C5C97528913
http://species-id.net/wiki/Acomoptera_echinosa
Figs 12–14

Type Material. Holotype: ♂, "USA: OR: Lincoln Co., Waldport, Malaise trap, 44.4266°N, -124.0513°W, 56masl, 1–15.ix.2010, John D. Pinto CSCA11L044" / "HOLOTYPE 11G099 ♂ *Acomoptera echinosa* Kerr 2011" [red label]. Deposited in CSCA, complete specimen in excellent condition, mounted on gray point.

Paratypes: 1 ♂, "USA: CA: Humboldt Co., Patrick's Point SP, redwood grove behind visitor center, 41°08.11'N 124°09.28'W, ~10masl, 10.iv.2008-12.ii.2009 P. Kerr, P. Haggard CSCA09L117" [CSCA] 1 ♂, "Canada: B.C., Upper Carmanah Valley, 4.vii–15.vii.1991 N. Winchester, FF.MT4" [48.67° -124.69°; CASC] 1 ♂, "Canada:

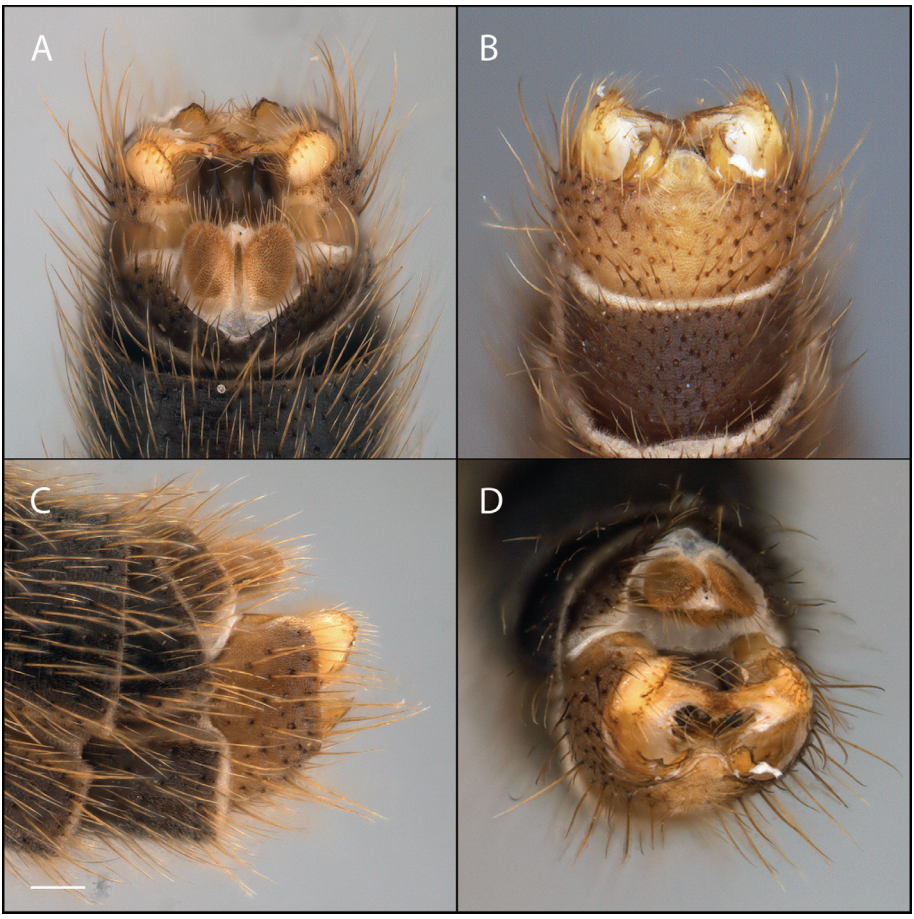

Figure 10. *Acomoptera digitata* sp. n., male genitalia, images: **A** dorsal view [692367] **B** ventral view [692368] **C** lateral view [692369] **D** posterior view [692370]. Scale line = 0.1 mm.

B.C., Upper Carmanah Valley, 28.viii–9.ix.1991 N. Winchester, FF.MT1" [48.67° -124.69°; CASC].

Diagnosis. This species is similar to *A. nelsoni* sp. n. in that the male gonocoxites display a prominent dorsomedial comb (Fig. 14A) and the outer surface of the gonostyli bear denticulations (Figs 14B, 14D). The gonostyli of both species are also similar in that the dorsoapical margin comes to an acute point and is darker in color than the rest of the gonostylus (Fig. 14D). The gonostyli of *A. echinosa* sp. n., however, lack denticulations on the inner surface of the gonostyli dorsally (Figs 13A, 14A).

Description. Male. Body length (n=2): 6.5–6.9 mm (avg = 6.7 mm). Wing length: 4.8–5.7 mm (avg = 5.3 mm).

Coloration (Fig. 12). Head brown; palpomeres light brown. Antennal scape light brown, pedicel yellowish, base of first flagellomere yellowish, otherwise flagellomeres

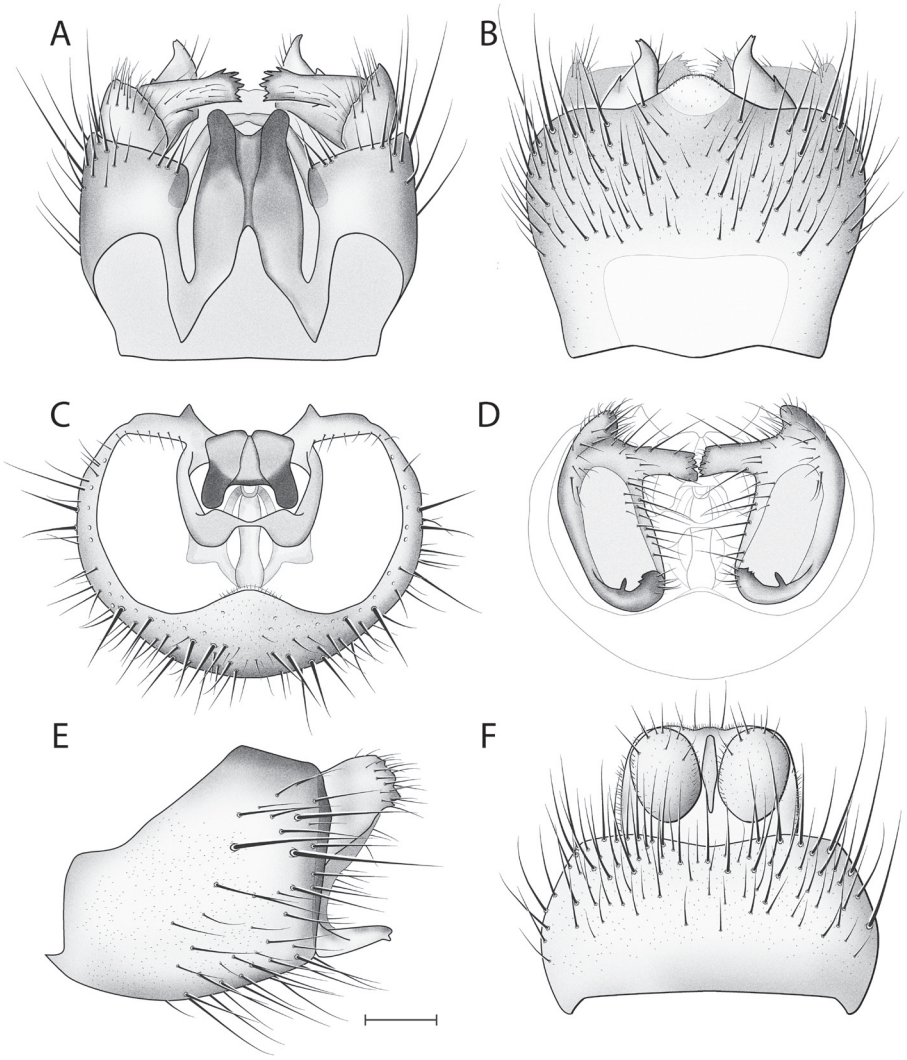

Figure 11. *Acomoptera digitata* sp. n., male genitalia, illustrated: **A** gonopods, dorsal view **B** gonopods, ventral view **C** gonocoxites, with gonostyli removed, posterior view **D** gonostyli, posterior view **E** gonopods, lateral view **F** epandrium, dorsal view. Scale line = 0.1 mm.

between R_5 and M_1; R_1, R_5, and M_1 with at least some setae on lower surface (ventral M_2 sometimes with setae, also).

Male Genitalia (Figs 13–14). Epandrium approx. 2× wider than long (Fig. 14F). Gonocoxites with developed dorsomedial comb (Figs14A, 14C). Gonostylus complex, as shown in Figs 13, 14A–B, 14D–E.

Female unknown.

Etymology. The species epithet “echinosa" is an adjective derived from the Greek word meaning hedgehog or sea-urchin, referring to the spiny surface of the gonostylus.

Figure 12. *Acomoptera echinosa* sp. n., habitus, lateral view [691282]. Scale line = 1 mm.

brown. Thorax cream-colored to brown; scutum brown to dark brown; dorsocentral areas of scutum defined by lighter brown coloration, scutum setae gold- or golden brown-colored; laterotergite and mediotergite light brown to cream-colored. Legs becoming increasingly brown towards tarsi, coxae cream-colored; femur yellowish or cream-colored, tibia yellowish brown to brown, tarsi brown. Wing hyaline without markings, wing veins light brown; haltere stem and knob cream-colored to light brown. Abdominal segments concolorous, brown, slightly darker posteriorly, with golden brown setae. Terminalia yellowish brown to brown.

Head. Ocelli slightly raised; middle ocellus clearly smaller than (approx. 0.25× size of) lateral ocelli, lateral ocellus located approx. width of ocellus or less from eye margin, separated from median ocellus by approx. twice its own diameter or a little more. Eyes with sparse, inconspicuous microsetae, which are approximately as long as width of facet. Face with golden brown setae, longest of which approx. same length as width of face. Antenna and abdomen subequal in length. Palpus approx. 1× width of head (anterior view); length of palpomeres 2 and 3 nearly subequal (palpomere 3 longer); palpomere 4 approx. 6× longer than wide; palpomere 5 approx. 11× longer than wide, subequal to or shorter than combined length of palpomeres 3 and 4.

Thorax. Antepronotum bearing setae; remaining thoracic sclerites bare. Tarsal claw usually with one small ventral tooth. Wing venation similar to others in the genus (e.g., *A. digitata* sp. n., Fig. 8); costal vein extends beyond R_5, approx. 0.33× distance

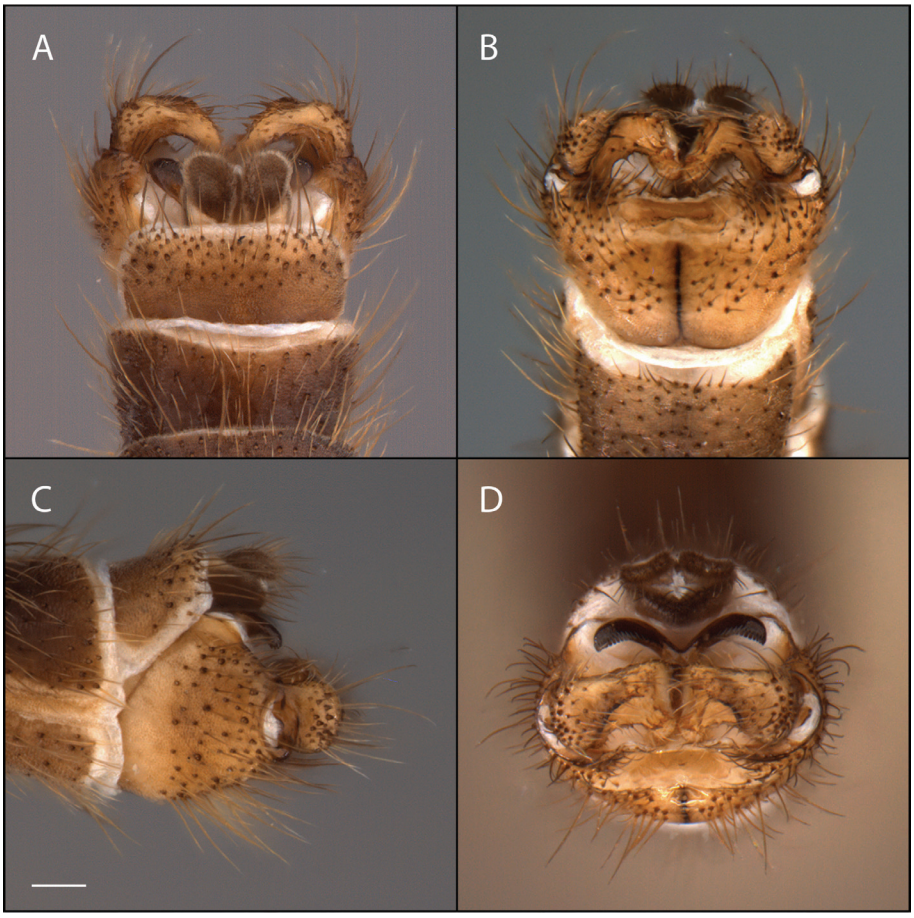

Figure 13. *Acomoptera echinosa* sp. n., male genitalia, images: **A** dorsal view [691278] **B** ventral view [691279] **C** lateral view [691280] **D** posterior view [691281]. Scale line = 0.1 mm.

***Acomoptera forculata* sp. n.**
urn:lsid:zoobank.org:act:3D24FE01-05C3-4A59-9A2E-0E6FB2F342AA
http://species-id.net/wiki/Acomoptera_forculata
Figs 15–17

Type Material. Holotype: ♂, "7 Mi. E. Griffith, Ont., 31.v.1983, B.E. Cooper" [45.181° -77.237°] / "HOLOTYPE 11G479 ♂ *Acomoptera forculata* Kerr 2011" [red label]. Deposited in CNC, specimen glued directly to the pin, missing last left antennal segment, right front leg, and left hind leg. Otherwise in excellent condition.

Paratypes: 1 ♂, same data as holotype [CNC]; 1 ♂, "N.S., CBHNt.Pk., Mackenzie Mt., 400m PG639848, 27.V.1984 / birch & fir, B.E. Cooper" [46.738° -60.650°; CNC]; 1 ♂, same data, except collected 28.V.1984 [CNC]; 1 ♂, same data, except collected 7.VI.1984 [CNC]; 2 ♂, "N.S., CBHNt.Pk., Pleasant Bay PG682873,

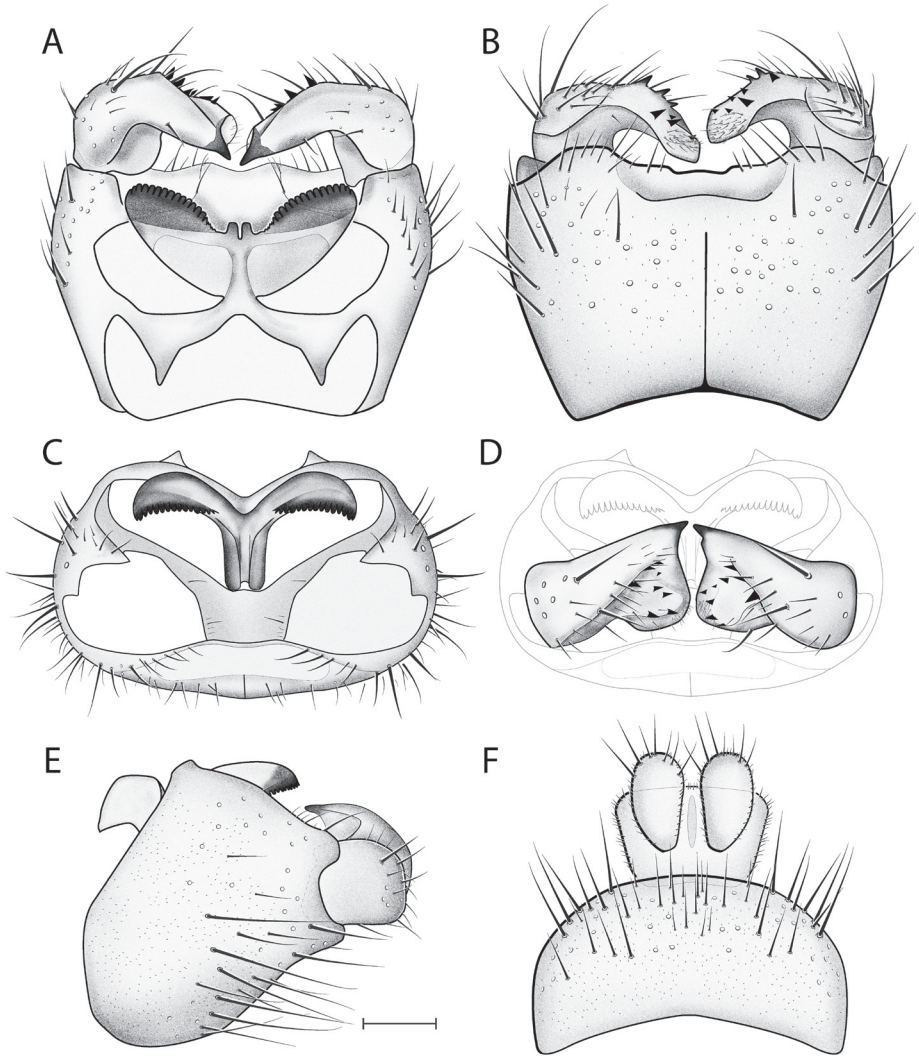

Figure 14. *Acomoptera echinosa* sp. n., male genitalia, illustrated: **A** gonopods, dorsal view [691284] **B** gonopods, ventral view [691285] **C** gonocoxites, with gonostyli removed, posterior view **D** gonostyli, posterior view [691287] **E** gonopods, lateral view [691286] **F** epandrium, dorsal view [691283]. Scale line = 0.1 mm.

6.VI.1984 / mixed forest, B.E. Cooper" [46.738° -60.650°; CNC]; 1 ♂, "N.S., CBHNt.Pk., North Mt. Bog PG767865, 3.VI.1984, B.E. Cooper" [46.738° -60.650°; CNC]; 2 ♂♂, "N.S., C.B.N.P., Black Brook, 2–4-VI-1983, Herbs QG035833 6.VI.1984" [46.738° -60.650°; CNC]; 1 ♂, "Kouchibouguac N.P., N.B., 18.VI.1977, G.A. Calderwood" [46.814° -64.928°; CNC];

Diagnosis. This species is unique in the genus for having a forked hypandrial lobe (Fig. 16D). The form of the gonostylus (Fig. 17D) is reminiscent of that displayed by *A. difficilis* (Fig. 5D), but the posterior-projecting ventrolateral process is significantly shorter (Fig. 17E).

Figure 15. *Acomoptera forculata* sp. n., habitus, lateral view [691292]. Scale line = 1 mm.

Description. Male. Body length (n=7): 4.5–5.6 mm (avg = 5.0 mm). Wing length: 4.1–4.7 mm (avg = 4.4 mm).

Coloration (Fig. 15). Head brown; palpomeres yellowish light brown. Antennal scape brown, pedicel yellowish light brown, base of first flagellomere yellowish light brown, remaining flagellomeres slightly darker. Thorax mostly brown; scutum uniformly brown to dark brown and/or area of acrostichal setae darkened, areas laterad of dorsocentral setae with darker brown markings, scutum setae gold- or golden brown-colored; laterotergite and mediotergite light brown to brown. Legs darkening towards tarsi (although in some cases, hind legs less so), coxae yellowish or cream-colored; femur yellowish light brown, tibia and tarsi light brown to brown. Wing hyaline without markings, wing veins light brown; haltere stem and knob cream-colored to light brown. Abdominal tergites 2–5 brown, with posterior margins yellowish or cream-colored; other segments concolorous brown; abdomen with golden brown setae. Terminalia yellowish brown to brown.

Head. Ocelli slightly raised; middle ocellus slightly smaller than (approx. 0.6-0.8× size of) lateral ocelli, lateral ocellus located approx. width of ocellus from eye margin, separated from median ocellus by 2–3× its own diameter. Eyes with sparse, inconspicuous microsetae, which are approximately as long as width of facet. Face with brown setae, longest of which approx. same length as width of face. Antenna approx. 0.75–0.9× length of abdomen. Palpus approx. 0.7× width of head (anterior view); length of palpomeres 2 and 3 nearly subequal (palpomere 3 longer); palpomere 4 approx. 4×

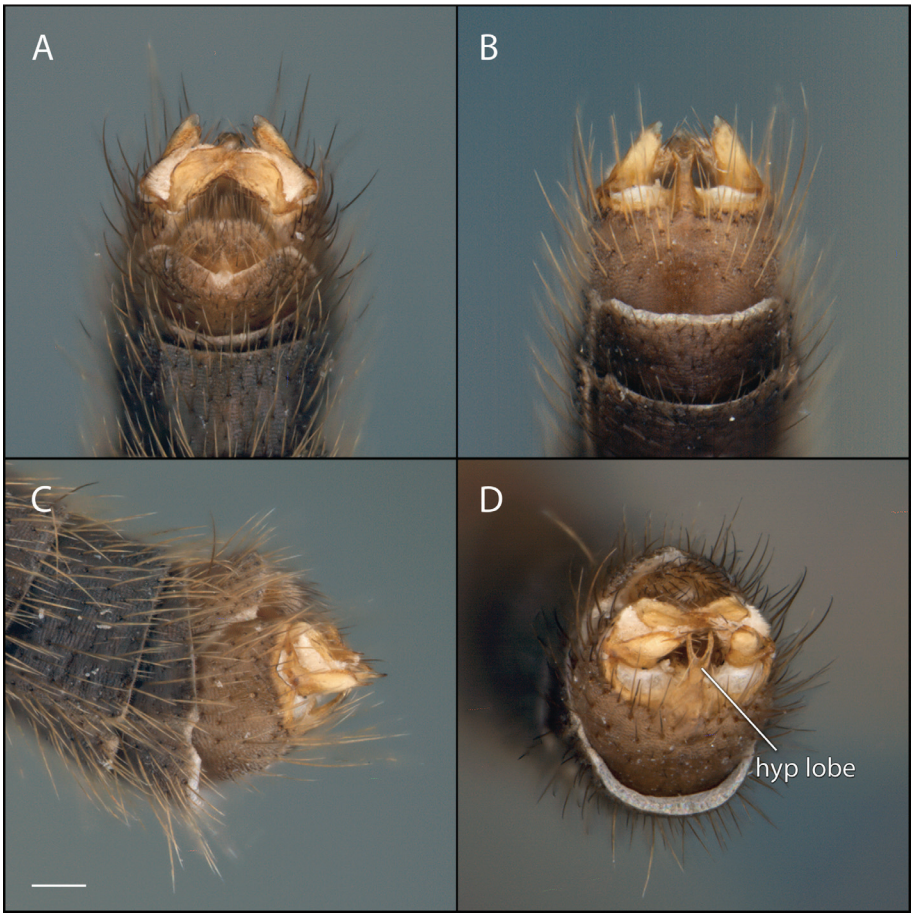

Figure 16. *Acomoptera forculata* sp. n., male genitalia, images: **A** dorsal view [691288] **B** ventral view [691289] **C** lateral view [691290] **D** posterior view [691291]. Scale line = 0.1 mm. Abbreviations: **hyp lobe** hypandrial lobe.

longer than wide; palpomere 5 approx. 6× longer than wide, subequal to or shorter than combined length of palpomeres 3 and 4.

Thorax. Antepronotum bearing setae; remaining thoracic sclerites bare. Wing venation similar to others in the genus (e.g., *A. digitata* sp. n., Fig. 8); costal vein extends beyond R_5, approx. 0.33× distance between R_5 and M_1; R_1, R_5, and M_1 with at least some setae on lower surface (although often lacking on M_1).

Male Genitalia (Figs 16–17). Epandrium slightly wider (1.3x) than long (Fig. 17F). Gonocoxites with dorsomedial structure bearing elongated lobes, not developed as dorsomedial comb (Figs 17A, 17C). Hypandrial lobe present, forked (Fig. 16D). Gonostylus complex, as shown in Figs 16, 17A–B, 17D–E.

Female unknown.

Etymology. The species epithet "forculata" is an arbitrary combination of letters alluding to the prominently forked hypandrial lobe.

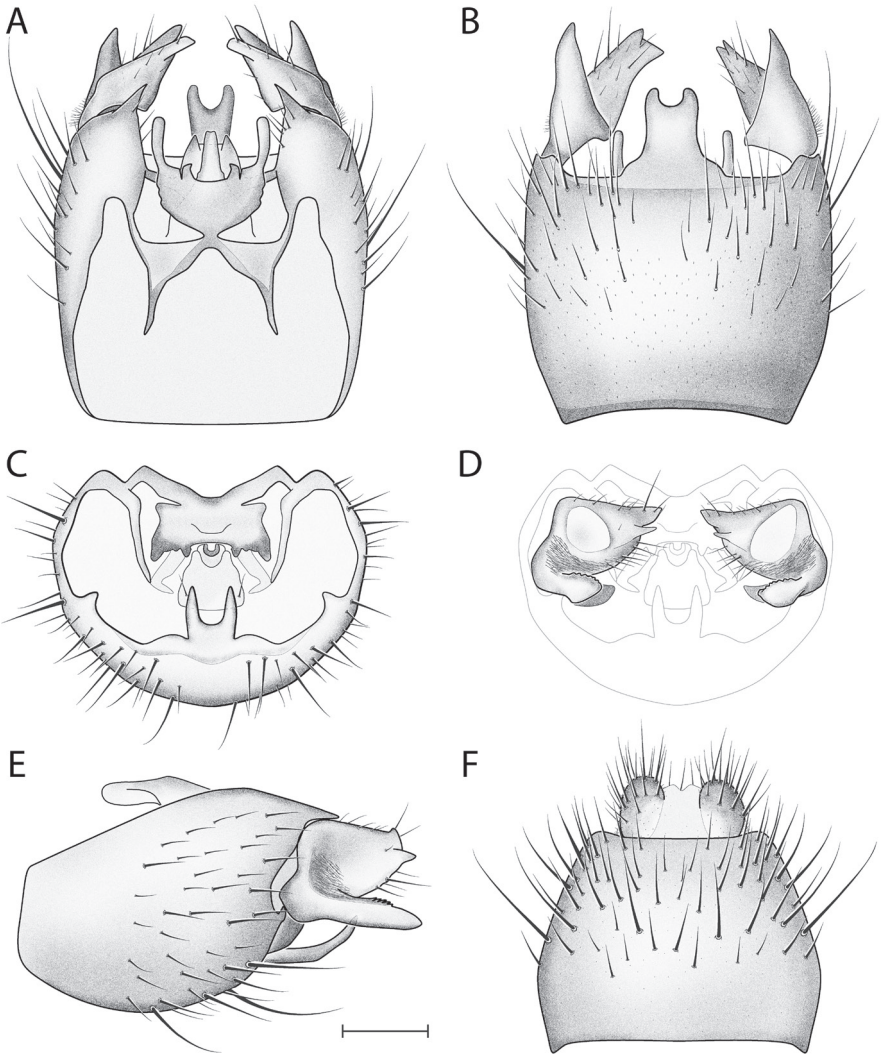

Figure 17. *Acomoptera forculata* sp. n., male genitalia, illustrated: **A** gonopods, dorsal view [691294] **B** gonopods, ventral view [691295] **C** gonocoxites, with gonostyli removed, posterior view [691297] **D** gonostyli, posterior view [691298] **E** gonopods, lateral view [691296] **F** epandrium, dorsal view [691293]. Scale line = 0.1 mm.

***Acomoptera nelsoni* sp. n.**
urn:lsid:zoobank.org:act:4295F099-F09F-4B04-AAF8-C25F00BA0C49
http://species-id.net/wiki/Acomoptera_nelsoni
Figs 18–20

Type Material. Holotype: ♂, "USA: CA: Humboldt Co., Patrick's Point SP, forest behind visitor center MT#1 (6m), 41°08.11'N 124°09.28'W, ~10masl, 3.iii-10.iv.2008

P.H.Kerr&P.A.Nelson CSCA08L359" / "HOLOTYPE 10F621 ♂ *Acomoptera nelsoni* Kerr 2011" [red label]. Deposited in CSCA, mounted on gray point, missing ultimate 5 segments of antennae, left front and mid legs, otherwise in good condition. Specimen dissected, male genitalia preserved in DMHF, on card marked "10F621" pinned below specimen.

Paratypes: 3 ♂♂, "Canada: B.C., Upper Carmanah Valley, UTM: 10U CJ 803006, 12–27.viii.1991 N. Winchester, TZ.MT3" [48.67° -124.69°; CASC]; 1 ♂, "Canada: B.C., Upper Carmanah Valley, 28.viii–9.ix.1991 N. Winchester, TZ.MT4" [48.67° -124.69°; CASC].

Diagnosis. The male gonopods of *A. nelsoni* sp. n. are similar to *A. echinosa* sp. n., as noted above. The gonostyli of *A. nelsoni*, however, are unique in having denticulations arranged in rows, which are present on the inner surface of the gonostyli dorsally (Fig. 20A), in addition to the profile of its form in both dorsal and ventral views (Figs 19A–B, 20A–B). The gonocoxal dorsomedial comb is also unique, in being swept back and more narrow than in other *Acomoptera* species that have this structure (Fig. 20A).

Description. Male. Body length (n=1): 7.1 mm. Wing length (n=1): 6.0 mm.

Coloration (Fig. 18). Head brown; palpomeres yellowish darkening to brown distally. Antennal scape light brown, pedicel yellowish, base of first flagellomere yellowish, otherwise flagellomeres brown. Thorax cream-colored to brown; scutum brown to dark brown; darker in areas immediately laterad of dorsocentral setae, scutum setae gold- or golden brown-colored; laterotergite and mediotergite light brown to cream-colored. Legs becoming increasingly brown towards tarsi, coxae cream-colored; femur yellowish or cream-colored, tibia yellowish brown to brown, tarsi brown; hind legs lighter in color. Wing hyaline without markings, wing veins brown; haltere stem cream-colored to light brown, knob brown. Abdominal segments concolorous brown, with brown setae. Terminalia yellowish brown to brown.

Head. Ocelli slightly raised; middle ocellus clearly smaller than (approx. .25× size of) lateral ocelli, lateral ocellus located approx. width of ocellus or less from eye margin, separated from median ocellus by approx. twice its own diameter. Eyes with sparse, inconspicuous microsetae, which are approximately as long as width of facet. Face with mostly brown setae, longest of which approx. same length as width of face. Antenna and abdomen elongate (probably) subequal in length. Palpus approx. 1× width of head (anterior view); palpomere 2 clearly shorter than palpomere 3; palpomere 4 approx. 6× longer than wide; palpomere 5 approx. 11× longer than wide, subequal to or shorter than combined length of palpomeres 3 and 4.

Thorax. Antepronotum bearing setae; remaining thoracic sclerites bare. Wing venation similar to others in the genus (e.g., *A. digitata* sp. n., Fig. 8); costal vein extends beyond R_5, approx. 0.33× distance between R_5 and M_1; R_1, R_5, and M_1 with at least some setae on lower surface.

Male Genitalia (Figs 19–20). Epandrium approx. 2× wider than long (Fig. 20F). Gonocoxites with developed dorsomedial comb (Figs20A, 20C). Gonostylus complex, as shown in Figs 19, 20A–B, 20D–E.

Female unknown.

Figure 18. *Acomoptera nelsoni* sp. n., habitus, lateral view [691303]. Scale line = 1 mm.

Etymology. The species is named after Peter A. Nelson of Santa Cruz, CA, long-time mentor and friend. He greatly facilitated the collection of this species and many others in the California North Coast region.

***Acomoptera plexipus* (Garrett)**
http://species-id.net/wiki/Acomoptera_plexipus
Figs 21–23

Eudicrana plexipus Garrett 1925: 4

Type Material. Holotype examined: ♀, "Vancouver, B.C., 27.3.15 / wing 2693 / HOLOTYPE, Eudicrana plexipus, Garrett, CNC No7849 / MONOTYPE EUDICRANA PERPLEXUS ♀ <signature> C.B.D. Garrett " [CNC]. Specimen dissected, with female genitalia retained in glass vial pinned below specimen. Specimen in bad condition, covered with fungal spores (Fig. 21B).

Material Examined. 1 ♂, "Mt. Thornhill Terrace, B.C., 26-VII 1960, C.H. Mann / along trail in hemlock forest 2500' / 11G478 <dissection card>" [54.532°N, -128.567°W; CNC]; 1 ♂, "Johnston Canyon, 4700' Banff, ALTA., 18 July, 1962, W.R.M. Mason / 11G490 <dissection card>" [51.237°N, -115.855°W; CNC] ; 1 ♂, "Ont., Iroquois Falls, 30.vi.1987, J.R. Vockeroth / Populus-Picea wood; rich un-

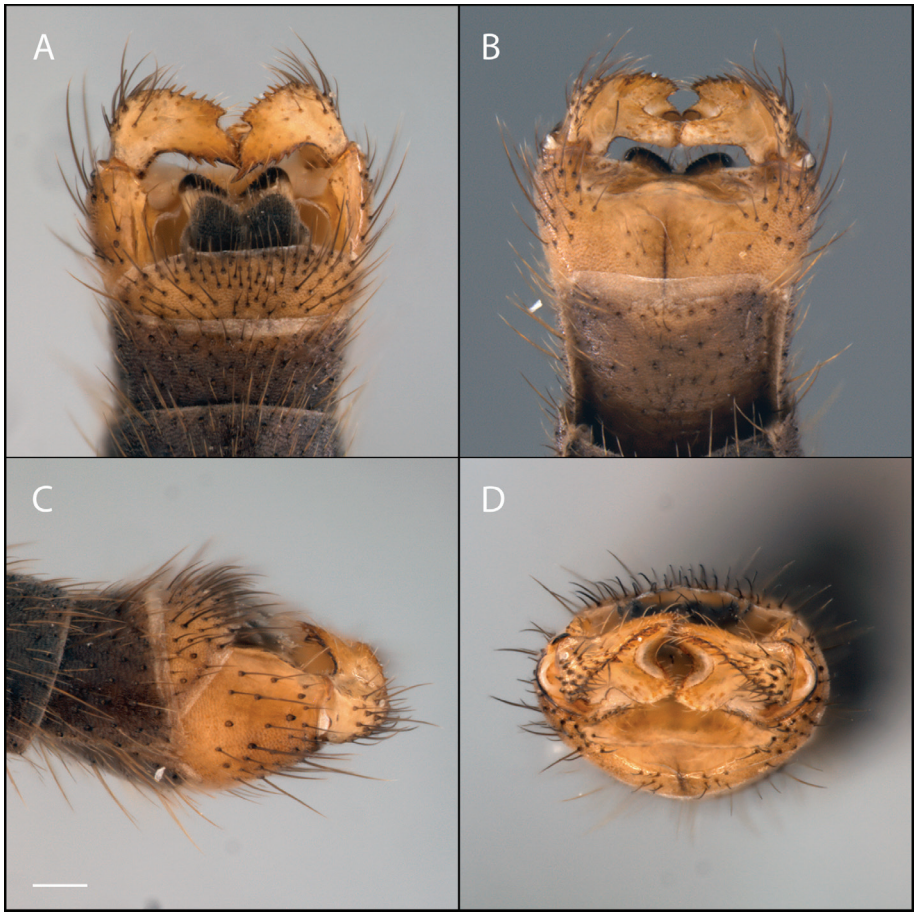

Figure 19. *Acomoptera nelsoni* sp. n., male genitalia, images: **A** dorsal view [691299] **B** ventral view [691300] **C** lateral view [691301] **D** posterior view [691302]. Scale line = 0.1 mm.

dergrowth" [48.768°N, -80.673°W; CNC]; 1 ♂, "N.S., CBHNt.Pk., PG706863, 2.VI.1984, B.E. Cooper" [46.738°N, -60.650°W; CNC]; 1 ♂, "N.S., CBHNt.Pk., Mackenzie Mt., 400m PG639848, 7.VI.1983 / birch & fir, B.E. Cooper" [46.738°N, -60.650°W; CNC]; 1 ♂, "N.B., Victoria Co., 1982, G.R.Parker" [CNC].

Diagnosis. This species is easily distinguished from all other *Acomoptera* in having a short preapical hook arising from the gonocoxites ventromedially (Figs 23B–C, 23E); a narrow, bifid process arising from the gonocoxites dorsomedially (Figs 23A, 23C); and the unique form of the gonostylus (Figs 22, 23A–B, 23D–E).

Description. Male. Body length (n=4): 5.0–6.1 mm (avg = 5.8 mm). Wing length: 4.7–5.8 mm (avg = 5.3 mm).

Coloration (Fig. 21). Head brown; palpomeres yellowish darkening to brown distally or brown throughout. Antennal scape and pedicel brown; base of first flagel-

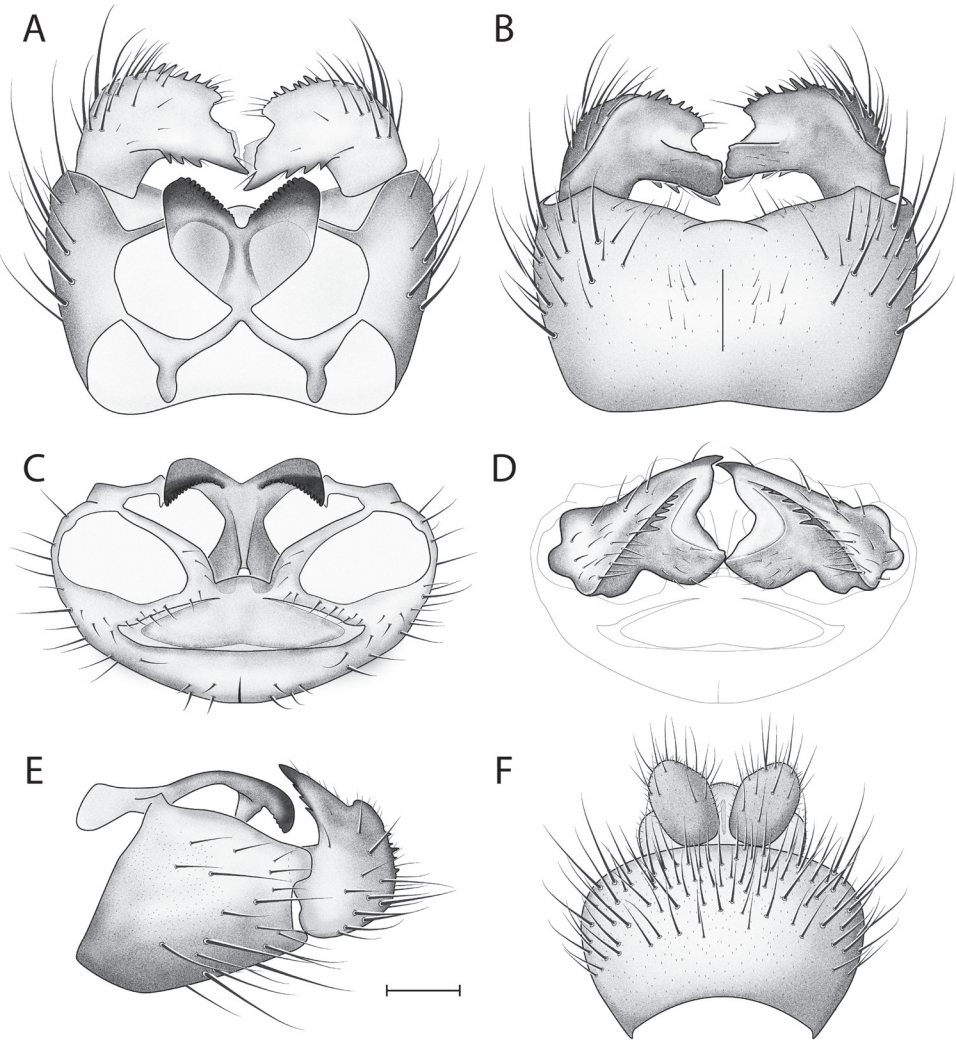

Figure 20. *Acomoptera nelsoni* sp. n., male genitalia, illustrated: **A** gonopods, dorsal view [691305] **B** gonopods, ventral view [691306] **C** gonocoxites, with gonostyli removed, posterior view [691308] **D** gonostyli, posterior view [691309] **E** gonopods, lateral view [691307] **F** epandrium, dorsal view [691304]. Scale line = 0.1 mm.

lomere yellowish, otherwise flagellomeres brown. Thorax mostly brown, with some lighter areas (e.g., mediotergite); scutum brown to dark brown; darker in areas of acrostichal and dorsocentral setae, scutum setae gold- or golden brown-colored. Legs becoming increasingly brown towards tarsi, coxae cream-colored; femur yellowish or cream-colored, tibia yellowish brown to brown, tarsi brown; hind legs lighter in color. Wing hyaline without markings, wing veins brown; haltere cream-colored to light brown. Abdominal segments concolorous brown, with predominantly light, golden setae. Terminalia mostly brown, except gonostyli yellowish.

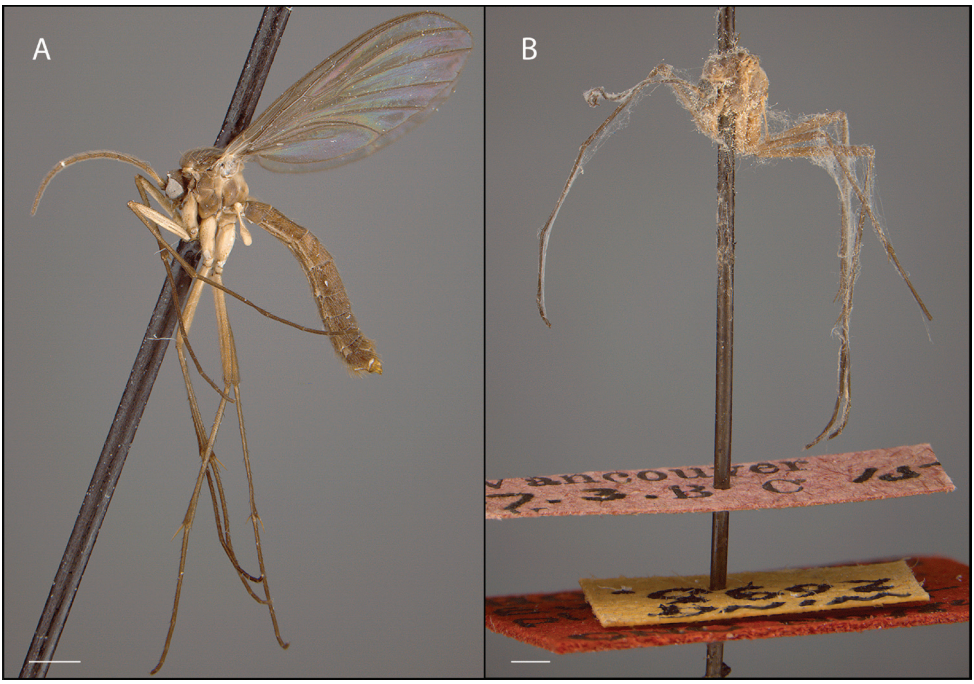

Figure 21. *Acomoptera plexipus*, habitus, lateral view: **A** male [691315] **B** female, holotype [691310]. Scale line = 1 mm.. Scale line = 1 mm.

Head. Ocelli slightly raised; middle ocellus approximately same size as lateral ocelli, lateral ocellus located approx. width of ocellus or slightly less from eye margin, separated from median ocellus by approx. twice its own diameter. Eyes with numerous microsetae, longest approx. twice as long as width of facet. Face with mostly brown setae, longest of which approx. same length as width of face. Antenna approximately 2/3rds length of abdomen. Palpus approx. 1× width of head (anterior view); palpomere 2 short, as wide as long, remaining palpomeres longer than wide; palpomere 4 approx. 4× longer than wide; palpomere 5 approx. 7× longer than wide, subequal to or shorter than combined length of palpomeres 3 and 4.

Thorax. Antepronotum bearing setae; remaining thoracic sclerites bare. Wing venation similar to others in the genus (e.g., *A. digitata* sp. n., Fig. 8), may exhibit teratological variations (e.g., loss of R_4 (Fig. 21; in this specimen, R_4 lost on left wing but present on right wing)); costal vein extends beyond R_5, approx. 0.3× distance between R_5 and M_1; R_1, R_5, and M_1 with at least some setae on lower surface.

Male Genitalia (Figs 22–23). Epandrium approx. 1.7× wider than long (Fig. 23F). Gonocoxites with dorsomedial fork (Figs 23A, 23C) and short ventral hook (Figs 23B–C, 23E). Gonostylus complex, as shown in Figs 22, 23A–B, 23D–E.

Female as described by Vockeroth (1980).

Figure 22. *Acomoptera plexipus*, male genitalia, images: **A** dorsal view [691311] **B** ventral view [691312] **C** lateral view [691313] **D** posterior view [691314]. Scale line = 0.1 mm.

Acomoptera sinica Wu & Yang, 1990

Acomoptera sinica Wu & Yang, 1990: 276

Comment. Specimens of this species were unavailable for examination. The crude illustrations in the original publication show this species having genitalia that are significantly different from known *Acomoptera* and the description lacks critical additional information. For this reason, the proper generic placement of this species has not been confirmed.

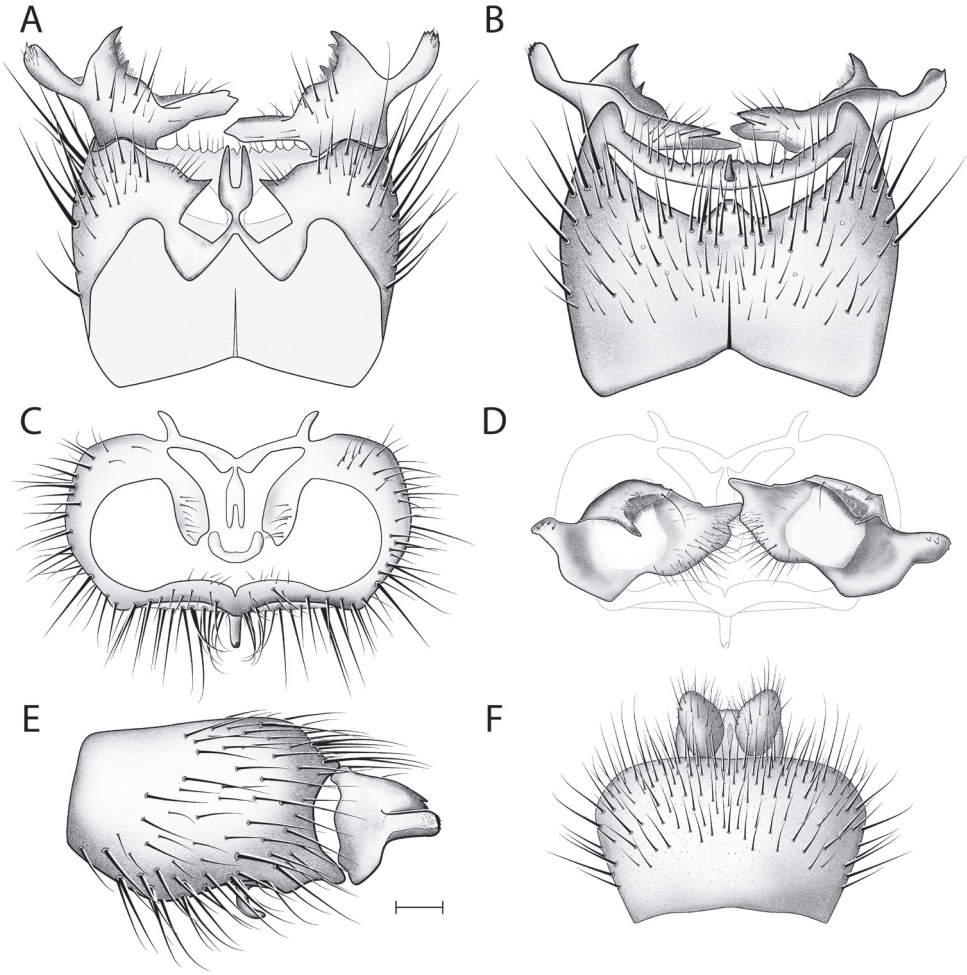

Figure 23. *Acomoptera plexipus*, male genitalia, illustrated: **A** gonopods, dorsal view [691317] **B** gonopods, ventral view [691318] **C** gonocoxites, with gonostyli removed, posterior view [691320] **D** gonostyli, posterior view [691321] **E** gonopods, lateral view [691319] **F** epandrium, dorsal view [691316]. Scale line = 0.1 mm.

***Acomoptera spinistyla* (Søli, 1993), comb. n.**
http://species-id.net/wiki/Acomoptera_spinistyla

Drepanocercus spinistylus Søli, 1993: 74

Material Examined. 2 ♂♂, "SLOVAKIA centr., 1200 m, Polana Biosphere Reserve, Zadná Polana N.N.Res., 6.5.–3.7.2006 Malaise trap, J. Ševčík & J. Roháček leg." [48.66°N, 19.49°E].

Drepanocercus was originally defined on the basis of having the cubital fork very near the base of the wing and elongated female cerci (Vockeroth, 1980). *Acomoptera spinistyla* shows neither of these features and in its original placement, prevents a clear distinction between *Drepanocercus* and *Acomoptera*. The spiky gonostyli of *D. spinistylus* recall similar conditions found in *Acomoptera* species such as *A. digitata* (Fig. 11D) and *A. plexipus* (Fig. 23D). Furthermore, in *A. spinistyla* and *A. plexipus*, there is a bifurcate dorsomedial process (Søli, 1993: fig. 2D, Fig. 23A) and a broad gap before the posterior margin of the hypandrium (Søli, 1993: fig. 2B, Fig. 23B). For these reasons, it seems appropriate that this species be transferred to *Acomoptera*. Further study is needed to evaluate the position of *Drepanocercus ensifer*; for now, it remains separated from *Acomoptera* by its original defining characters.

***Acomoptera vockerothi* sp. n.**
urn:lsid:zoobank.org:act:A2DAD9AC-96F0-4478-B172-A5C4BB21EF14
http://species-id.net/wiki/Acomoptera_vockerothi
Figs 24–26

Type Material. Holotype: ♂, "Can: Manitoba, 2mi., ne. Treesbank, along, Souris R. 11.viii.1993, 49°40'N 99°36'W, B. Gallaway MT" / "HOLOTYPE 11G627 ♂ *Acomoptera vockerothi* Kerr 2011" [red label]. Deposited in CNC, complete specimen in excellent condition, glued directly to the pin.

Paratypes: **CANADA:** 1 ♂, same data as holotype [CNC]; 4 ♂♂, "Ont., Iroquois Falls, 30.vi.1987, J.R. Vockeroth" [48.768° -80.673°; CNC]; 1 ♂, "Ont., Iroquois Falls, 7.vii.1987, J.R. Vockeroth / 11G495" [48.768° -80.673°; CNC]; 1 ♂, "N.Burgess Twp., Lanark Co., ONT., 7.ix.1970, D.M. Wood" [45.010° -76.359°; CNC]; 1 ♂, "Thwartway Island, St. Lawrence Is. National Park / A. Carter, Aug 27, 1976, Malaise Trap, Code 4529-G" [44.294° -76.150°; CNC]; 1 ♂, "King Mt., Old Chelsea, QUE., June 16-1960, J.G. Chillcott" [45.489° -75.864°; CNC]; 1 ♂, "Duncan Lake, Nr. Rupert, Que., 1.IX.1971, J.F.McAlpine" [54.690° -75.989°; CNC]; 1 ♂, "N.S., CBHNt.Pk., Mackenzie Mt., 300m PG645851, 29.VIII.1983 / Picea Betula woods" [46.738° -60.650°; CNC]; 1 ♂, "N.S., CBHNt.Pk., Lone Shieling, 300m PG731861, 21.VIII.1983 / Maple forest with fern undergrowth, J.R. Vockeroth" [46.738° -60.650°; CNC]; 1 ♂, "N.S., S. Harbour, Bch. PG962943, 12.VIII.1983, J.R. Vockeroth" [46.866° -60.468°; CNC]; **USA:** 1 ♂, "Laurel, MD., 25 May 65, Malaise Trap / 11G482" [39.099° -76.359°; CNC]; 3 ♂♂, "Laurel, MD., 26 May 65, Malaise Trap" [39.099° -76.359°; CNC]; 1 ♂, "Highlands, Macon Co., N.C. 3850', 35°3.2'N, 83°11.3'W, June 21, 1958, Jean L. Laffoon" [ISUI]; 1 ♂, "Highlands, Macon Co., N.C. 3850', 35°3.2'N, 83°11.3'W, at light, VII-5-1958, Jean L. Laffoon" [ISUI]; 1 ♂, "Clear Creek, 1 mile so. Highlands, Macon Co., No. Car. 3000', 35°1.5'N, 83°11.5'W, VII-1-1958, J. Laffoon" [ISUI]; 2 ♂♂, "Robin Branch (near Wayah Bald), 4000', Macon Co., No. Car., 35°10.1'N, 83°35.1'W, VII-3-1958, J. Laffoon" [ISUI].

Figure 24. *Acomoptera vockerothi* sp. n., habitus, lateral view [691250]. Scale line = 1 mm.

Diagnosis. This species is most similar to *A. crispa* sp. n. in having similarly-shaped gonostyli that feature a line of long, curved setae near the dorsal margin, as mentioned above. The gonocoxites of *A. vockerothi* bears a posteromedial denticulate ridge ventrally, however (Figs 25B, 26B). It is also distinguished by having a short, unforked ventromedial gonostylus lobe (Fig. 26E) and the outer dorsal lobe is broadly attached dorsally (Figs 25, 26A–B, 26D–E).

Description. Male. Body length (n=10): 4.6–6.3 mm (avg = 5.6 mm). Wing length: 4.5–5.3 mm (avg = 5.0 mm).

Coloration (Fig. 24). Head brown; palpomeres yellow to yellowish brown. Antennal scape, pedicel, and flagellomeres yellow to yellowish brown, flagellomeres darker than scape and pedicel. Thorax cream-colored to yellowish or light brown; area of scutum bearing acrostichal and dorsocentral setae defined by darker coloration, scutum setae gold- or golden brown-colored. Legs becoming increasingly brown towards tarsi, coxae yellowish or cream-colored; femur yellowish, tibia yellowish brown, tarsi brown. Wing hyaline without markings, wing veins brown; haltere stem and knob yellow to light yellowish brown. Abdominal segments concolorous, yellowish brown to brown, with scattered yellow or golden brown setae. Terminalia yellowish brown.

Head. Ocelli slightly raised; middle ocellus approx. same size as lateral ocelli; lateral ocellus located approx. width of ocellus or less from eye margin, separated from median ocellus by approx. twice its own diameter. Eyes with sparse, inconspicuous microsetae, which are approximately as long as width of facet. Face with brown setae, longest of

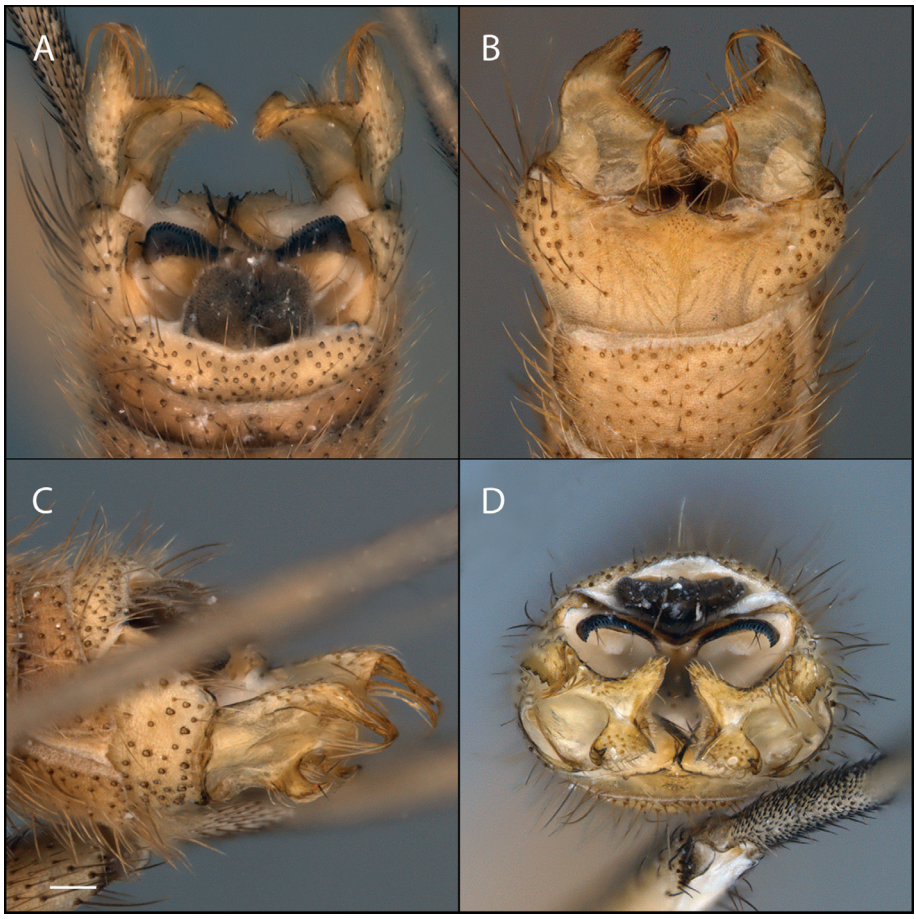

Figure 25. *Acomoptera vockerothi* sp. n., male genitalia, images: **A** dorsal view [691246] **B** ventral view [691247] **C** lateral view [691248] **D** posterior view [691249]. Scale line = 0.1 mm.

which approx. same length as width of face. Antennal length approx. 0.8× length of abdomen. Palpus approx. 1.0–1.25× width of head (anterior view); length of palpomeres 2 and 3 subequal; palpomere 4 approx. 4.5× longer than wide; palpomere 5 approx. 10× longer than wide, subequal to or longer than combined length of palpomeres 3 and 4.

Thorax. Antepronotum bearing setae; remaining thoracic sclerites bare. Wing venation similar to others in the genus (Vockeroth 1980: fig. 3); costal vein extends beyond R_5, approx. 0.33× distance between R_5 and M_1; R_1, R_5, M_1, and M_2 with at least some setae on lower surface.

Male Genitalia (Figs 25–26). Epandrium approx. 3× wider than long. Gonocoxites with dorsomedial comb (Figs 26A). Gonostylus complex, as shown in Figs 25, 26A–B, 25D–E.

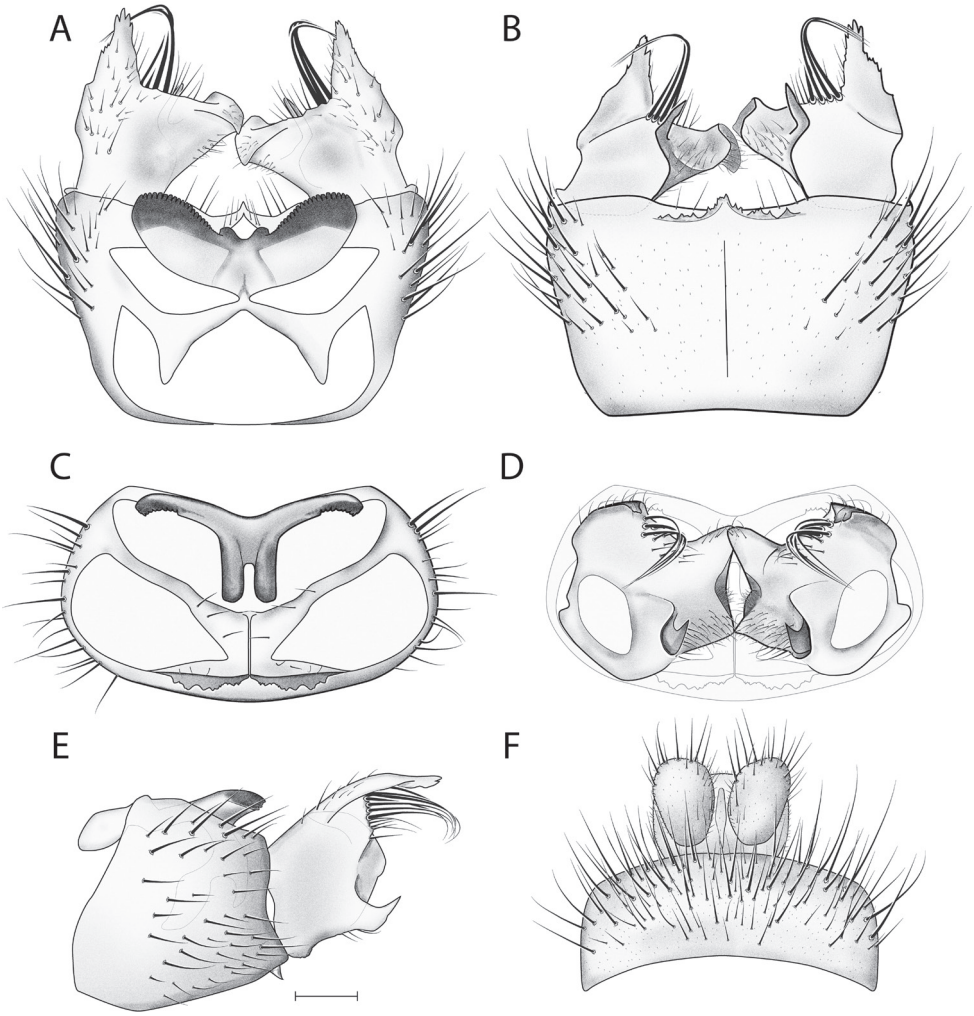

Figure 26. *Acomoptera vockerothi* sp. n., male genitalia, illustrated: **A** gonopods, dorsal view [691252] **B** gonopods, ventral view [691253] **C** gonocoxites, with gonostyli removed, posterior view **D** gonostyli, posterior view [691255] **E** gonopods, lateral view [691254] **F** epandrium, dorsal view [691251]. Scale line = 0.1 mm.

Female unknown.

Etymology. The species is named after J.R. Vockeroth, a remarkably friendly and engaging person, legendary figure in the history of Dipterology, author of the genus, and frequent collector of this species.

Discussion

Hypotheses of relationship among *Acomoptera* species were not explicitly tested, however shared features of the male genitalia suggest self-evident affiliations. The shared presence of a well-developed dorsomedial gonocoxal comb is an important feature for uniting *A. crispa, A. echinosa*, *A. nelsoni,* and *A. vockerothi* (Figs 2A, 11A, 19A, 25A). All of these species are described for the first time here, and represent a newly-recognized lineage within the genus. Within this group, *A. crispa* and *A. vockerothi* exhibit exceptionally similar morphologies of the gonostylus. Overlap in gonostylus form also suggests a close relationship between *A. echinosa* and *A. nelsoni*.

A second group appears composed of *A. forculata*, *A. plexipus*, and the European species, *A. difficilis*. These species have a hypandrial lobe in the form of an apical hook or fork and a three-part gonostylus bearing a marginal lobe, whose similarity is especially noticeable when viewed from the lateral perspective (Figs 5E, 17E, 23E). Within this group, the dorsomedial structure of the gonocoxites in *A. difficilis* and *A. forculata* is developed in much the same way (Figs 5A, 17A), suggesting a close relationship between these taxa. The position of *A. digitata* remains unclear.

In light of this newly expanded *Acomoptera* concept, boundaries of sister taxa may be revisited, particularly those of *Drepanocercus*. Chandler (1999) asserted that *A. spinistyla* is an intermediate between the type species of *Drepanocercus* (*D. ensifer* (Garrett 1925)) and *Acomoptera*, based on the intermediate position of the cubital fork. The position of this fork is obscured in some specimens due to the base of CuA_1 either being weak or obsolete (e.g., Søli 1993: fig. 1), as it is in *D. ensifer* (e.g., Vockeroth 1980: fig. 6). Ševčík (2004) notes, however, that there is variation in this character in *A. spinistyla* and frequently, specimens have CuA_1 complete, with a clear attachment point to CuA_2. In such specimens, the fork is approximately at the level of sc-r, just proximad of r-m (Ševčík 2004: fig. 1). The phylogenetic significance of the position of the cubital fork remains unknown in this and other mycetophilid groups, such as in *Tetragoneura* Winnertz and its relatives. For now, however, *Drepanocercus* remains defined on the basis of having the cubital fork very near the base of the wing and elongated female cerci (Vockeroth 1980).

Given the expanded morphological diversity now known to exist within *Acomoptera*, the generic relationships may be addressed in a more comprehensive manner, particularly with respect to *Paratinia* and *Drepanocercus*, and their relation to established members of Gnoristinae and Sciophilinae. This will be the topic of future phylogenetic study.

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First record of Acaenitinae (Hymenoptera, Ichneumonidae) from South America with description of a new species and a key to the world species of *Arotes* Gravenhorst

Carol Castillo[1,†], Ilari E. Sääksjärvi[1,‡], Andrew M.R. Bennett[2,§], Gavin R. Broad[3,|]

1 *Zoological Museum, Section of Biodiversity and Environmental Sciences, Department of Biology, FIN-20014, University of Turku, Finland* **2** *Canadian National Collection of Insects, Agriculture and Agri-Food Canada, Ottawa, Ontario K1A 0C6, Canada* **3** *Department of Entomology, Natural History Museum, Cromwell Road, London, London SW7 5BD, UK*

† *urn:lsid:zoobank.org:author:5BCF7981-1803-40E0-8149-884AD2CCA525*
‡ *urn:lsid:zoobank.org:author:2B80E7A4-FEA6-4493-80C1-5B28FB0CDB8F*
§ *urn:lsid:zoobank.org:author:044FC632-2219-4A9F-BDDB-9E6C214E2D97*
| *urn:lsid:zoobank.org:author:D06689DE-526F-4CFA-8BEB-9FB38850754A*

Corresponding author: *Carol Castillo* (hedonazur@yahoo.com)

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Abstract

A new species of Acaenitinae, *Arotes ucumari* Castillo & Sääksjärvi, **sp. n.**, is described and illustrated representing the first record of the subfamily from South America. The new species was collected from a premontane tropical rain forest in the Peruvian Andes at 1500 m. A key to the world species of *Arotes* Gravenhorst, 1829 is provided. The subspecies *Arotes albicinctus moiwanus* (Matsumura, 1912) is raised to species rank, *Arotes moiwanus* **stat. n.**

Keywords

Amazonia, *Arotes*, Neotropics, parasitoid wasp, Peru, rainforest

Introduction

The Acaenitinae is one of the most conspicuous subfamilies of Ichneumonidae (Hymenoptera). It is clearly monophyletic as defined by at least one striking synapomorphy: the very long and triangular hypopygium of the female, although less developed in some species of the *Coleocentrus* group. The subfamily was traditionally classified in two tribes, the Acaenitini and Coleocentrini (Townes 1971). However, Wahl and Gauld (1998) suggested that this classification be discontinued as Coleocentrini is paraphyletic with regard to Acaenitini.

Many acaenitines are large in size, vividly coloured and possess long ovipositors. Despite this, little is known about their biology and specimens are rare in entomological collections. Many species of the subfamily live in ancient forests and in the Neotropics have been found in highlands (Gauld 1991). Most genera occur in the Old World, whereas only five have been reported from the New World (Townes 1971; Gauld 1984, 1991). Only one of these, *Arotes* Gravenhorst, has previously been reported from the Neotropics, where two species, *A. pammae* Gauld and *A. facialis* (Cameron) have been described from Costa Rica and Guatemala respectively (Cameron 1886; Gauld 1991). In addition, *Coleocentrus rufus* Provancher has been collected from the Cayman Islands (a single specimen in CNC). Townes and Townes (1960) suggested an Old World origin for the subfamily with a relatively recent conquest of the New World via the Bering Strait.

The aim of the present paper is to describe a new species of *Arotes* from the tropical Peruvian Andes. Also, we raise to species rank *Arotes moiwanus* stat. n. and provide a key to the world species of the genus.

Material and methods

The only known specimen of the new species is deposited in The Natural History Museum, University of San Marcos, Lima, Peru (UNSM). The specimen is currently on loan to the Zoological Museum, University of Turku, Finland (ZMUT). We searched for more Neotropical specimens of *Arotes* at the Natural History Museum, London (NHM), the Canadian National Collection of Insects, Ottawa (CNC) and the American Entomological Institute, Gainesville, Florida (AEI).

To verify the new species status of our Peruvian specimen, we examined specimens of 10 of the 15 previously described *Arotes* species in CNC and NHM and also compared it to descriptions of all the described species. We were not able to examine specimens of *A. annulicornis* Kriechbaumer, *A. flaviscutatus* Wang & Huang, *A. odontus* Uchida, *A. nigricoxis* (Förster) and *A. sugiharai* Uchida. All species except for *A. nigricoxis* have been included in the key on the basis of original descriptions, online images of Japanese specimens (Hokkaido University, http://neosci-gw.museum.hokudai.ac.jp/html/modules/pukiwiki/641.html), and their inclusion in previous keys, namely those of Uchida (1934), Kolarov (1997) and Sheng and Sun (2009). The presented key

is modified from the keys of Townes and Townes (1960), Gauld (1991) and Kolarov (1997).

Observations were made using Olympus SZX10 and SZ40 stereomicroscopes. Layer photos of the holotype were taken using an Olympus SZX16 with motorized focus drive attached to an Olympus E520 digital camera. Digital photos were combined by using the programmes Deep Focus 3.1 and Quick PHOTO CAMERA 2.3. Images of specimens in BMNH were taken with a Canon EOS 450D digital camera attached to a Leica MZ12 stereomicroscope and with a Canon EOS 450D with a Pentax 50 mm macro lens. Several partially focused images were combined using Helicon Focus v. 4.80 software. Digital photos at CNC were made using a Leica MZ16 stereomicroscope with motorized focus drive attached to a Leica DFC420 digital camera. Photos were combined using Leica Application Suites Montage Multifocus software. Morphological terminology and forms of description follow those of Gauld (1991).

Taxonomy

Genus *Arotes* Gravenhorst
http://species-id.net/wiki/Arotes

Arotes Gravenhorst, 1829: 449. Type: *Arotes albicinctus* Gravenhorst, by monotypy.
Asthenomeris Förster, 1869: 168. Type: *Asthenomeris nigricoxis* Förster, 1888, by subsequent inclusion by Schmiedeknecht, 1888. Synonymized by Townes et al., 1965.
Sphalerus Kriechbaumer, 1878: 41. Type: *Sphalerus bifasciatus* Kriechbaumer (= *albicinctus*), by monotypy.
Retanisia Cameron, 1886: 299. Type: *Retanisia facialis* Cameron, by monotypy. Synonymized by Townes and Townes, 1960.

Diagnosis. *Arotes* can be distinguished from other genera of Acaenitinae by combination of both of the following characters: hind tarsal claws with a sharp, accessory tooth near apex of claw and areolet of fore wing open with intercubitus distal to vein 2*m-cu*.

Description. Moderately large wasps, mostly black, black and white or black and yellow; legs may be reddish or yellowish in part; antennae with or without white band; fore wing with or without dark spots. Mandible with dorsal tooth equal to or slightly shorter than ventral tooth; clypeus with a pre-apical transverse ridge, the apical edge with medial tubercle in most species; subocular sulcus complete; face centrally swollen, with weak transverse ridges or weak central rugose ridges, and with median vertical ridge which extends between antennae and onto frons as distinct carina; occipital carina complete dorsally. Notaulus strong, reaching posteriorly to centre of mesoscutum; scutellum flattened, laterally carinate at least at anterior end; submetapleural carinae more or less complete, not expanded anteriorly; propodeum quite long, with more or less clearly defined area superomedia; propodeal spiracle elliptical. Fore wing without areolet, intercubitus distal to 2*m-cu*; vein 2*m-cu* with two well-separated bullae. All

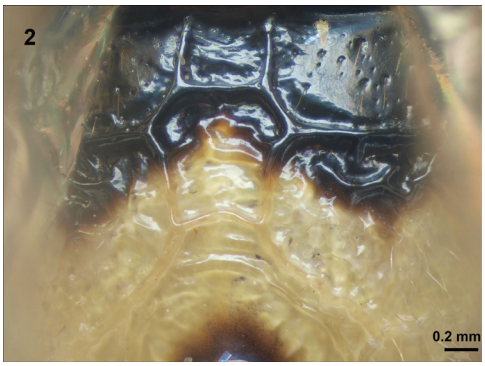
tarsal claws with sharp, accessory tooth near apex of claw. Ventral swelling of 1st sternite from acute to smoothly rounded, bearing numerous, long, erect hairs; ovipositor projecting beyond apex of metasoma by about 1.8-2.7 times length of hind tibia; ovipositor with ventral ridges apically that are vertical and widely spaced.

Key to the world species of *Arotes*

Note. *Asthenomeris nigricoxis* Förster is a species of *Arotes* according to Townes et al. (1965), but specimens of this species are not known to us and the original description (Schmiedeknecht 1888) is too brief to allow diagnosis from its congeners. For this reason it is omitted from the key below.

Specimens at CNC with intermediate colour patterns indicate that *A. albicinctus* (Gravenhorst) and *A. annulicornis* Kriechbaumer may be synonyms.

1	Propodeum completely black (Fig. 1) **2**
–	Propodeum with at least some light colour (Figs 2-3) **8**
2(1)	Fore wing with one or two discrete, dark spots (Figs 4-5) or, if male and spot indistinct, antennal flagellum apically broadly yellow-white..... **3**
–	Fore wing lacking discrete, dark spots, at most vaguely infuscate on apical margin; male antenna not broadly yellow-white apically **7**
3(2)	Fore wing with two discrete dark marks, one at apex of wing and one adjacent to pterostigma..... ***A. sugiharai*** **Uchida** (eastern Palaearctic: Japan)
–	Fore wing with only apical dark mark **4**
4(3)	Flagellum entirely dark ..... ***A. facialis*** **(Cameron)** (Neotropical: Guatemala)
–	Flagellum not entirely dark: lighter ventrally than dorsally and/ or with a medial light band..... **5**
5(4)	Hind femur predominantly orange-red .... ***A. ustulatus*** **Kriechbaumer** (western Palaearctic)
–	Hind femur predominantly black or dark brown **6**
6(5)	Hind tibia orange to orange-brown in basal half ....***A. odontus*** **Uchida** (eastern Palaearctic: Russia – Sakhalin Oblast)
–	Hind tibia pale yellow or ivory in basal half ....***A. maurus*** **Rohwer (some specimens)** (western and central Nearctic)
7(2)	First and second tergites with light-coloured posterior margins ....***A. albicinctus*** **(Gravenhorst)** (trans-Palaearctic and Oriental)
–	First and second tergites completely black..... .....***A. annulicornis*** **Kriechbaumer** (western and central Palaearctic)
8(1)	Hind tibia entirely black except may be narrowly light coloured at extreme base..... **9**
–	Hind tibia broadly yellow/white at base, can be black apically, or mostly yellow or red **10**



Figures 1–3. Propodeum of neotropical species of *Arotes*, posterodorsal view. **1**. *Arotes facialis*, **2**. *Arotes ucumari* sp. n., **3**. *Arotes pammae*.

Figures 4–5. Habitus, lateral view. **4**. *Arotes ucumari* sp. n., holotype female (Peru). **5**. *A. pammae*.

9(8) Antennal flagellum without white band (Fig. 4); first sternite sub-basally with smoothly rounded projection.....***A. ucumari* sp. n.** (Neotropical: Peru)

– Antennal flagellum with white band (Fig. 5); first sternite sub-basally with acutely angled, sharp projection ....***A. pammae* Gauld** (Neotropical: Costa Rica)

10(8) Hind tibia completely yellow or orange, at most, slightly darker orange at apex **11**

– Hind tibia with some dark colour (black or brown) **13**

11(10) First sternite sub-basally strongly convex, like a tubercle ..... ***A. flaviscutatus* Wang & Huang** (Oriental: China – Fujian Province)

– First sternite sub-basally weakly convex, not tuberculate **12**

12(11) Mesoscutum black or orange, sometimes with restricted lighter coloured areas, but not a continuous lighter coloured stripe along notaulus; middle of pronotum just dorsoposterior to pronotal trough almost impunctate, punctures separated by much more than their diameter ..... ***A. melleus* (Say) (some specimens)** (central and eastern Nearctic)

– Mesoscutum black with extensive yellow or white regions, notaulus completely encompassed by a wide yellow or white stripe; middle of pronotum punctate, punctures separated by their own diameter or less ..... ***A. decorus* Say** (southcentral and eastern Nearctic)

13(10) Mesoscutum black or orange, notaulus not completely encompassed by a wide yellow or white stripe **14**

– Mesoscutum black with extensive yellow or white regions, notaulus completely encompassed by a wide yellow or white stripe **16**

14(13) Metapleuron extensively rugose to rugoso-punctate (Fig. 6) ..... ***A. maurus* Rohwer (some specimens)** (western and central Nearctic)

– Metapleuron finely to densely punctate without rugosity **15**

15(14) Metapleuron polished with fine punctures separated by much more than their diameter (Fig. 7); hind femur ventrally evenly narrowing subapically towards apex; female with mesoscutum ranging from completely fulvous (most specimens) to completely black ..... ***A. melleus* (Say) (some specimens)** (central and eastern Nearctic)

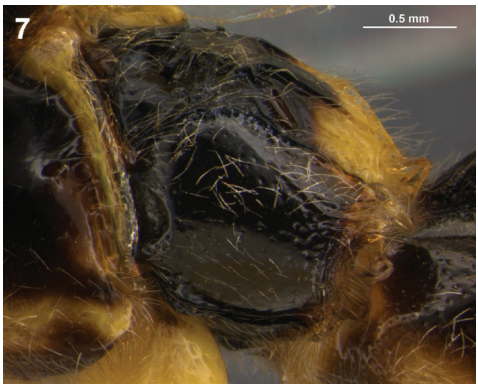
- Metapleuron sub-polished with coarser punctures separated by their own diameter or less; hind femur ventrally with a strong, subapical swelling that narrows abruptly towards apex; female with mesoscutum completely black ..... ***A. moiwanus* (Matsumura)** (eastern Palaearctic and Oriental)

16(13) Hind tibia with at least basal 0.4 light coloured (basal 0.6 light in some specimens) ..... ***A. amoenus* Cresson** (southcentral and eastern Nearctic)

– Hind tibia with no more than basal 0.2 light coloured ..... ***A. maculatus* Sheng & Sun** (eastern Palaearctic: China – Henan Province)

***Arotes ucumari* Castillo & Sääksjärvi, sp. n.**
urn:lsid:zoobank.org:act:6F98E674-ED64-4EEA-9DD9-3DAD72D6C30F
http://species-id.net/wiki/Arotes_ucumari

Type locality. Peru, Dept. of Cusco, Manu National Park, Cosñipata valley, San Pedro, 13°02'58'' S, 71°32'13'' W, 1500 m elev., C. Castillo leg., 20 September 2007.



Figures 6–7. Metapleuron, lateral view. **6**. *A. maurus*, **7**. *A. melleus*.

Figures 8–9. Head, dorsal view. **8**. *A. albicinctus*, **9**. *A. moiwanus*.

Type specimen. Holotype female, pinned. Original label: "Peru, CU, San Pedro, 13°02'58'' S, 71°32'13'' W, 1500 m, Malaise trap, 20.ix.2007, C. Castillo". UNSM.

Diagnosis. *Arotes ucumari* sp. n. (Fig. 4) can be distinguished from all other described *Arotes* spp. by combination of all the following characters: 1) hind tibia black; 2) scutellum yellow; 3) antenna without a medial light coloured band; 4) hind femur ventrally not or only slightly swollen subapically.

A. ucumari sp. n. is readily distinguished from other New World species of *Arotes* (except *A. facialis*) on account of its totally black antennae (character 3). It differs from *A. facialis* in that it has more extensive yellow colouration on the meso- and metasoma (*A. facialis* is almost completely black). In addition, the propodeal carina-

tion of the three neotropical species is different (Figs 1-3). The area superomedia of *A. facialis* is hexagonal to subcircular whereas that of *A. ucumari* is irregularly octagonal (Fig. 2). In coloration, *A. ucumari* is similar to *A. pammae* Gauld (Fig. 5) but may be separated from that species by the black antennae, smoothly rounded first sternite of metasoma and the propodeal carination (in *A. ucumari*, the anterior transverse carina joins the area superomedia at its upper half and the shape of the area superomedia is irregularly octagonal).

Description. Female. Habitus in Figure 4. Lower face broad, inner margins of eyes ventrally divergent; frons concave, smooth; antenna with 34 flagellomeres; antenna about as long as fore wing. Pronotum with striae directed to hind corner of pronotum, middle of pronotum just dorsoposterior to pronotal trough impunctate; mesoscutum with lobes sparsely, coarsely punctate, closely punctate on front side; scutellum more closely punctate than mesoscutum; mesopleurum anteriorly, ventrally coarsely punctate; metapleurum coarsely, closely punctate but, above submetapleural carina punctures are separated by more than their diameter; propodeum with area superomedia clearly delineated, almost hexagonal anteriorly, posteriorly narrowed, so that it is irregularly octagonal (Fig. 2), posterior border of area superomedia concave; anterior transverse carina joining area superomedia at its upper half; lateral longitudinal carina only delineating area externa and area posteroexterna; area petiolaris confluent with area posteroexterna. Fore wing length 14 mm, wing without areolet, with cross vein 2*rs-m* (or 3*rs-m*, depending on interpretation) distal to 2*m-cu*. Hind femur ventrally with a slight subapical swelling. First metasomal sternite with projection smoothly rounded; ovipositor projecting beyond apex of metasoma by about 1.9 times length of hind tibia.

Yellowish species with black marks. Head light yellow with temple, frons and inner margin of occiput black; antenna black except infuscate tip on last flagellomere. Mesosoma mostly light yellow with dorsal and hind margins of pronotum black, mesoscutum black with yellow marks on lateral and hind regions of central lobe, U-shaped mark in dorsal view, lateral sides of mesoscutum, scutellum and metanotum also yellow, hind margin of mesopleurum, mesosternum and anterior half of propodeum black. Wings slightly yellowish, with apex broadly infumate, pterostigma and veins black. Fore and mid legs with light yellow on dorsal surfaces of trochanters and femora, most of tibiae and all tarsi infuscate; hind leg black with yellow marks on lower half of coxa, two oval yellow marks on dorsal and lateral sides of coxa, most of trochanter and ventral half of femur light yellow. Metasoma black, tergites 1-2 with broad yellowish marks close to hind margin, tergite 3 almost entirely black, tergites 4+ with hind margins and lateral spots light yellow; subgenital plate infuscate with upper margin yellowish; ovipositor orange, ovipositor sheaths black with dull yellow tip.

Male. Unknown.

Biology. The host of *A. ucumari* sp. n. is not known. North American *Arotes* species have been reared from *Melandrya* (Melandryidae), *Leptura* (Cerambycidae) and *Tomoxia* (Mordellidae) (Townes and Townes 1960; Gauld 1991).

Ecology. The type locality is in a primary forest at the south east limit of Manu National Park. On the eastern slopes of the Andes, this altitude (1500 m) is considered

as a major ecotone between the humid montane forest and the premontane forest belt (Young and Leon 1999). It differs from both highland Andean and lowland Amazonian vegetation formations. The Andean foothills of Manu-Tambopata are considered to be a super-humid region (Killeen 2007). The annual precipitation in 2007, when the holotype was collected, was 3158 mm. The mean maximum and minimum temperatures were between 21,6 and 11,3 degrees Celsius (SENAMHI, National Service of Meteorology and Hydrology of Peru).

Etymology. Ucumari is the quechuan name for the only South American species of bear, *Tremarctos ornatus*, the Spectacled Bear. Just as is possible in the case of the Acaenitinae parasitoid wasps, the tremarctine bears reached the New World via the Bering Strait, and expanded their range southwards into North and South America. By naming the new species as *Arotes ucumari* we hope to draw attention to the conservation of both of these rare tropical Andean species.

The status of *Phaenolobus* (*Acoenitus*) *moiwanus* Matsumura, 1912

During the process of comparing specimens to verify the new species status of *Arotes ucumari*, examination of material of *A. albicinctus* and its subspecies *A. albicinctus moiwanus* at NHM and CNC revealed differences that could indicate that these two forms may represent two distinct species. Since Uchida (1934), *Phaenolobus* (*Acoenitus*) *moiwanus* Matsumura, 1912 has been regarded as a subspecies of *Arotes albicinctus* (Gravenhorst, 1829) (e.g. Townes et al. 1965; Yu and Horstmann 1997). Our examination found the differences listed in Table 1.

In most ichneumonid species in which subspecies are recognized, the only indicator of subspecies is colour, not sculpture. For example, *Campoplex sugiharai sugiharai* (Uchida), *C. sugiharai australis* Momoi and *C. sugiharai okinawensis* Momoi (see Momoi 1970). Such a major difference in the sculpture of the frons (striate versus sparsely punctate) generally indicates two species. We believe that the sculptural differences of the frons correlated with major colour differences of the scutellum and propodeum are clear indicators that *A. albicinctus* and *A. moiwanus* are two distinct species. *Arotes moiwanus* stat. n. is hereby recognized as a valid species. We have not seen males of *A. moiwanus* but we expect these characters to remain valid.

Discussion

Whereas description of a species based on a single specimen is not ideal, we are confident that the species is distinct based on the unique combination of characters listed in the diagnosis and our assessment of species-specific characters within the genus *Arotes*. For example, the presence of a completely black flagellum in *A. ucumari* is very rare for the genus (in the previously described species only *A. facialis* from Guatemala has this character, all other species have either a medial pale band or are lighter on the ventral surface

Table 1. Key morphological differences between *A. albicinctus* and *A. moiwanus*

A. albicinctus	*A. moiwanus*
Frons with strong oblique striations extending from medial ocellus towards eye. Orbit with dense, coarse punctures near antenna (Fig. 8).	Frons with weak striations or striations absent between medial ocellus and eye. Orbit with moderately fine, sparse punctures near antenna (Fig. 9).
Scutellum and propodeum black.	Scutellum and propodeum marked with light colour (creamy-white to yellow).

of the flagellum than the dorsal surface). It is highly unlikely that *A. ucumari* and *A. facialis* are conspecific because the body of *A. facialis* is almost completely black (Gauld 1991), whereas *A. ucumari* has large yellow regions on the body (Fig. 4). In addition, the area superomedia of *A. facialis* is hexagonal to subcircular (Fig. 1) compared to *A. ucumari* in which this area is much wider anteriorly than posteriorly (Fig. 2).

In our opinion, it is important to describe the new species now, rather than wait for additional material to be collected. Considering the extensive collecting done in this region, for example, the Colombian Arthropod Project (CAP) from 2001 to 2003, 188 Malaise trap months in Peru from 1998-2001 (Sääksjärvi et al. 2004) and 6 years of canopy fogging in Ecuador since 1994 (Erwin et al. 2005), it is unlikely that a great number of additional acaenitines will be rapidly collected. The description of this species will draw attention to the presence of acaenitines in South America which will hopefully lead to the discovery of additional material (both in collections and from future collecting by other individuals).

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RESEARCH ARTICLE

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A survey of East Mediterranean *Dasumia* (Araneae, Dysderidae) with description of new species

Kadir Boğaç Kunt[1,†], Recep Sulhi Özkütük[2,‡], Mert Elverici[3,§]

1 *Poligon Sitesi 71/27-B TR-06810 Dodurga, Çayyolu, Ankara, Turkey* **2** *Department of Biology, Faculty of Science, Anadolu University, TR- 26470 Eskişehir, Turkey* **3** *Department of Biological Sciences, Faculty of Arts and Sciences, Middle East Technical University, TR-06531 Ankara, Turkey*

† *urn:lsid:zoobank.org:author:13EEAB4A-F696-41D7-A323-2333410BF5D7*
‡ *urn:lsid:zoobank.org:author:7A21C546-989F-417F-BCC3-8D682CCF2B62*
§ *urn:lsid:zoobank.org:author:E5590C56-F430-41D5-AD6A-2ADE157AB439*

Corresponding author: *Kadir Boğaç Kunt* (chaetopelma@gmail.com)

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Abstract

Dasumia gasparoi **sp. n.** is described based on specimens of both sexes. The new species is compared with the similar *D. crassipalpis* (Simon, 1882), described from Syria; and with *D. mariandyna* Brignoli, 1979, the only previously known species of the genus recorded from Turkey. Furthermore, we point out that, due to some contradictions to the original description of the genus, *D. mariandyna* may necessarily belong to another genus. Detailed morphological descriptions, diagnosis and figures of the copulatory organs of the new species are presented.

Keywords

Harpacteinae, spider, Turkey

Introduction

Dasumia is a genus of the family Dysderidae and includes 13 previously described species (Platnick 2011). Ten are distributed in Europe, two in the Middle East and one in

Turkey. *Dasumia* belongs in the subfamily Harpacteinae, and differs from other genera by the absence of ventral spines on the metatarsi and anterior tibiae; the posterior tarsi with either two claws or with an additional single tiny claw; by the typical arrangement of the cheliceral dentition and by having an abruptly curled embolus in males or more or less sclerotized posterior diverticulum of vulva in females (Thorell 1875; Dunin 1992; Deeleman-Reinhold 1993).

During our survey of the Turkish spider fauna, we encountered some interesting dysderid specimens in Kahramanmaraş province, a region that constitutes a transition zone between the Turkish Mediterranean region and the south-eastern region of Anatolia. Initially, examination of the sternum morphology suggested the specimens were members of the subfamily Harpacteinae. However, the structure of copulatory organs did not conform with the known species of *Harpactea* Bristowe, 1939 and *Stalagtia* Kratochvíl, 1970 from Turkey, nor did they show any similarity with those of *Dasumia mariandyna* Brignoli, 1979, which represented the only known *Dasumia* species recorded from Turkey. Kahramanmaraş is located close to Syria, so we then examined members of Harpacteinae known from Syria and the Middle East. This revealed similarities between our specimens and those of *Dasumia crassipalpis* from Syria, which had previously been described as *Harpactes crassipalpis* by Simon (1882) and later transferred to *Dasumia* by Alicata (1974), based on the structure of the previously unknown female genitalia.

The purpose of this study is to describe and illustrate a new species of *Dasumia* from Turkey and to discuss its placement in the genus together with the Syrian *D. crassipalpis* and the Turkish endemic *D. mariandyna*.

Materials and methods

All specimens were collected from Kahramanmaraş province of Turkey (Fig. 1). The specimens were collected from under stones using a hand aspirator. Digital images of the pedipalps and vulvae were taken with a Leica DFC295 digital camera attached to a Leica S8AP0 stereomicroscope, with 5–15 photographs taken in different focal planes and combined using image stacking software. Photographic images were edited using PHOTOSHOP CS2 and COREL-DRAW X3 was used to create the plates. All measurements are in mm. Terminology for the body measurements follows Chatzaki and Arnedo (2006). Terminology for the copulatory organs is adapted from Alicata (1974) and Deeleman-Reinhold (1993). On the male copulatory organ, additional apophyses developed on the structure called the "Apophysis$_a$" are named as "Apophysis$_{a1, a2}$, etc" relating to their sequential order relative to that of Apophysis$_{a1.}$ The following abbreviations are used in the text: **AL**, abdominal length; **CL**, carapace length; **CWmax**, maximum carapace width; **CWmin**, minimum carapace width; **AME**, anterior median eyes; **PLE**, posterior lateral eyes; **PME**, posterior median eyes; **AMEd**, diameter of anterior median eyes; **PLEd**, diameter of posterior lateral eyes; **PMEd**, diameter of posterior

Figure 1. Collecting localities of Turkish *Dasumia* species. ★ terra typica, *D. gasparoi* sp. n. ● *D. mariandyna*

median eyes; **ChF**, length of cheliceral fang; **ChG**, length of cheliceral groove; **ChL**, total length of chelicera (lateral external view); **Ta**, tarsus; **Me**, metatarsus, **Ti**, tibia; **Pa**, patella; **Fe**, femur; **Tr**, trochanter; **C**, coxa; **D**, dorsal; **pl**, prolateral; **rl**, retrolateral; **V**, ventral; **cKBK**, Personal collection of Kadir Boğaç Kunt, Ankara, Turkey; **AUZM**, Anadolu University, Zoology Museum, Eskişehir, Turkey; **SMF**, Senckenberg Museum, Frankfurt am Main, Germany.

Taxonomy

***Dasumia* Thorell, 1875**
In Thorell, 1875: 100, type species *Dasumia taeniifera* Thorell, 1875

***Dasumia gasparoi* sp. n.**
urn:lsid:zoobank.org:act:8E19F1DC-74BA-47D4-A505-6498414B4CCE
http://species-id.net/wiki/Dasumia_gasparoi

Material examined. Holotype. ♂ (AUZM), TURKEY, **Kahramanmaraş Province**, Pazarcık District, c. 5 km S of Narlı Town [37°19'11.78"N; 37°10'16.19"E], 07.03.2008, under stones, leg. E.A.Yağmur. **Paratypes:** 1 ♀ (AUZM); 1 ♀ (SMF), together with holotype.

Derivatio nominis. The new species is named in honour of the Italian geologist & arachnologist Dr. Fulvio Gasparo, who has made great contributions to the taxonomy of the family Dysderidae.

Diagnosis. *Dasumia gasparoi* sp. n. can be readily identified by the unique structure of male and female copulatory organs. It is most similar to *D. crassipalpis* from which it can be differentiated as follows:

1. In *D. gasparoi* sp. n. the transition zone between the tegulum and the distal appendages is more notable than in *D. crassipalpis*.

2. In *D. gasparoi* sp. n. the tip of the falciform embolus is sharper and taller and the embolus extends beyond Apophysis$_b$, whereas in *D. crassipalpis*, the embolus only reaches the middle of Apophysis$_b$.

3. Apophysis$_a$ and Apophysis$_b$ show explicit differences in structure between the two species.

4. In *D. gasparoi* sp. n. the spermatheca are relatively wider. Distal crest of spermatheca is shorter and thicker in *D. gasparoi* sp. n. than in *D. crassipalpis* (see Alicata 1974).

Measurements. (Holotype ♂ / Paratype n=2 ♀)**: AL** 3.50 / 4.47-4.50; **CL** 3.20 / 3.25-3.50; **CWmax** 2.50 / 2.75-2.80; **CWmin** 1.25 / 1.59-1.44 ; **AMEd** 0.16 / 0.17-0.18; **PLEd** 0.15 / 0.14-0.15; **PMEd** 0.11 / 0.14-0.12 ; **ChF** 0.58 / 0.66-0.66; **ChG** 0.47 / 0.52-0.53 ; **ChL** 1.37 / 1.60-1.62. Leg measurements are given in Table 1.

Description. Carapace dark brown anteriorly, yellowish brown posteriorly and blackish brown laterally. AME, PLE and PME in a circular arrangement. AME separated. PLE and PME clearly separated. Sternum, labium, gnathocoxae and chelicerae yellowish brown. Sternum blackish brown laterally (Figs 2 – 5). Cheliceral groove with two retromarginal and two promarginal teeth. Teeth on the promargin originate at the base of the groove and end in the middle. Retromarginal teeth originate in alignment with the point at which the promarginal teeth stop, and continue to the top of the cheliceral groove. Teeth on retromargin relatively smaller and more widely separated, when compared with those on the promargin (Figs 6, 7). Cheliceral groove long, top of the labium and gnathocoxae covered with short hairs. In males, joint of trochanter to gnathocoxa thicker and deeper (see Fig. 3). Abdomen greyish to light brown, with short, thin blackish hair over the entire surface. Females with a strongly developed linear postpedicelar and trapezoid epigastric scutum (Fig. 8). Males also have these structures, but they appear thinner and have less colour. Legs yellowish to light brown with sparse blackish setae. Periphery of articulation points dark brown.

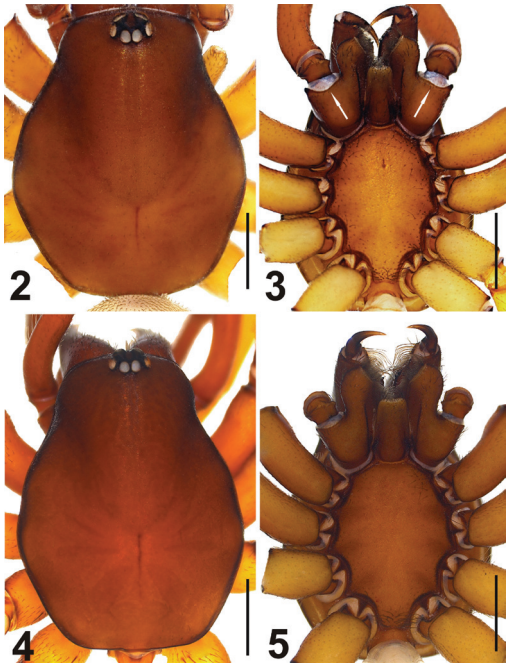
Leg IV > Leg I > Leg II > Leg III. Tarsi with three claws. Bent claws and middle claws are well developed (Figs 9, 10, 11, 12).

Tarsi III and IV with fine scopulae (Figs 9-12). Legs III and IV with fine metatarsal scopulae along the ventral surface, covering slightly less than the distal half of the segment. Dorsal part of coxae III and IV with 1-4 spines. Details of leg spination are given in Table 2.

In males, palpal tibia almost double the size of the tarsus. Tarsus bullet-shaped in lateral view. Tegulum yellowish brown; approximately as long as wide, and with a spherical shape. Between the distal appendages and tegulum, there is a visible transition region, peripherally sclerotized in places (Figs 13, 14). Tip of embolus adjacent to Apophysis$_b$ (Figs 13, 15). Embolic base wide and triangular. Embolus falciform, tapering distally, blackish and well sclerotized along its length (Figs 15, 16). Apophysis$_a$ triangular, sepa-

Table 1. Leg measurements of *Dasumia gasparoi* sp. n.

(Holotype ♂ / Paratype ♀)	Fe	Pa	Ti	Me	Ta
Leg I	3.00 / 3.08	1.80 / 1.88	2.76 / 2.60	2.68 / 2.48	0.63 / 0.48
Leg II	2.50 / 2.56	1.60 / 1.68	2.40 / 2.24	2.60 / 2.50	0.63 / 0.60
Leg III	2.10 / 2.16	1.05 / 1.12	1.75 / 1.68	2.05 / 2.04	0.55 / 0.44
Leg IV	2.96 / 3.00	1.40 / 1.60	2.50 / 2.56	2.64 / 3.20	0.63 / 0.64



Figures 2–5. *Dasumia gasparoi* sp. n. **2**, **3** (♂) carapace, sternum **4**, **5** (♀) ditto. Scale lines: 0.25 mm.

Table 2. Leg spination of *Dasumia gasparoi* sp. n.

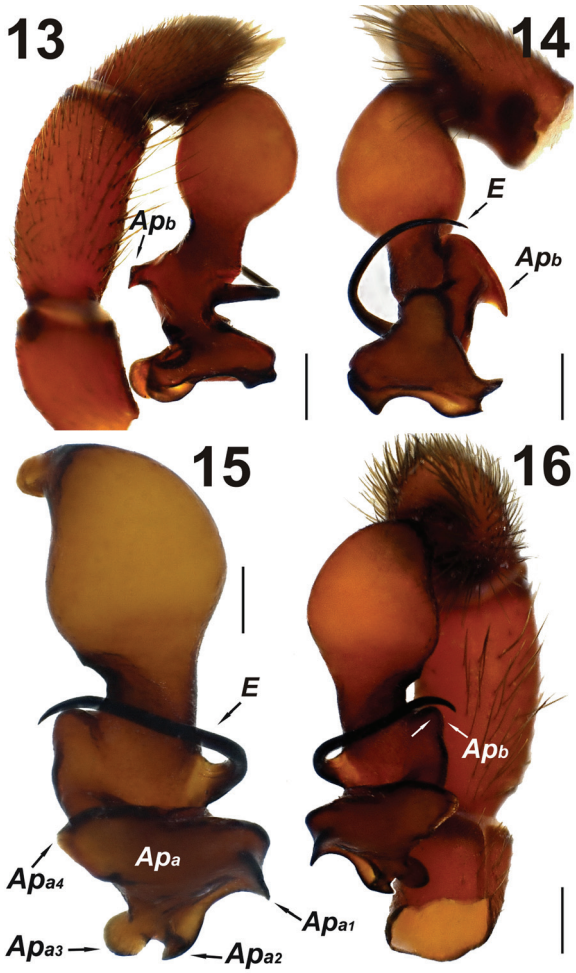
♂ (Holotype)	Leg I	Leg II	Leg III	Leg IV
C	0	0	2 pl	3 pl 1 D
Tr	0	0	0	0
Fe	4 pl	5 pl	3 D 4 rl	9 D
Pa	0	0	2 D 1 rl	0
Ti	0	0	2 pl 1 D 4 rl 5 V	4 pl 4 rl 5 V
Me	0	0	3 pl 6 rl 2 V	4 pl 1 D 5 rl 6 V
♀ (Paratype)				
C	0	0	1 pl	2 pl
Tr	0	0	1 rl	1 rl
Fe	2 pl	1 pl	3 D 3 rl	8 D
Pa	0	0	2 D 1 rl	0
Ti	0	0	2 pl 1 D 3 rl 2 V	4 pl 1 D 3 rl 5 V
Me	0	0	4 pl 6 rl 2 V	4 pl 4 rl 5 V

Figures 6–8. *Dasumia gasparoi* sp. n. **6, 7** cheliceral teeth **8** female, ventral view Scale line: (6, 7) 0.1 mm.

Figures 9–12. Leg tarsi of *Dasumia gasparoi* sp. n. **9** Leg I **10** Leg II **11** Leg 3 **12** Leg IV Scale line: 0.25 mm.

rated from embolus and Apophysis$_b$ (Fig. 13). Details of palp in ventral view: Apophysis$_{a1}$ short and sharp, beak-shaped at the right corner; Apophysis$_{a2}$ semicircular at the left corner; Apophysis$_{a3}$ (which is stubbier than apophyses$_{a1}$ and Apophysis$_{a4}$) ear-shaped at the rear corner. All of these apophyses with well sclerotized margins (Fig. 15).

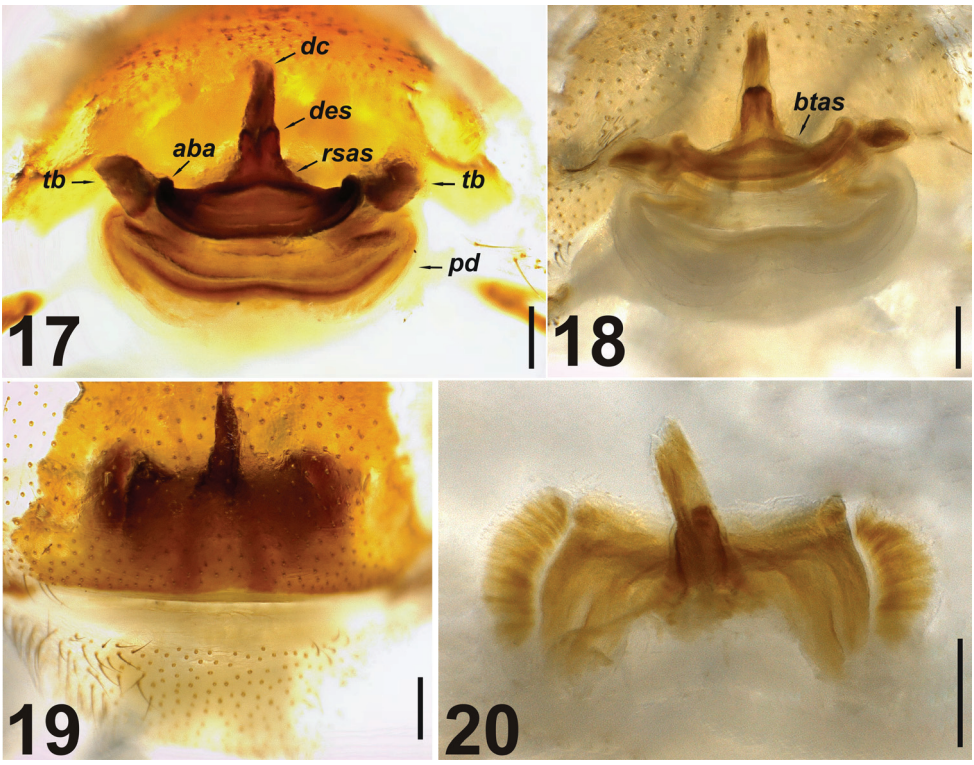
Vulva generally well sclerotized. Distal crest medium-sized and butt-ended. Distal expansion of the spermatheca wider than distal crest and visually hump-shaped. Rod-



Figures 13–16. Male palp of *Dasumia gasparoi* sp. n. Abbreviations: Ap_a Apophysis$_a$ Ap_b Apophysis$_b$ ***E*** embolus. Scale lines: 0.25 mm.

shaped part of the anterior spermatheca short and broader towards the base. Basal transverse part of the anterior spermatheca appears merged with the anterior basal arc. Both structures well sclerotized from centre to periphery. In dorsal view, anterior basal arc arc-shaped; basal transverse part of the anterior spermatheca forming a downward chevron shape. Transverse bar longer than the anterior basal arc. The surface area of the posterior spermatheca is wider than the anterior spermatheca. Transverse bar ends with one snake head-shaped structure at either side; and in contact with posterior diverticulum over complex membranous channel network (Figs 17, 18, 19).

Note. In ventral view, and looking at an angle of 70° from the surface to the vulva, we observed symmetrically located, reniform structures consisting of helicoidal canals inside both sides of the vulva (Fig. 20). The origin and function of these structures is unknown.



Figures 17–20. Vulva of *Dasumia gasparoi* sp. n. **17, 18** dorsal view **19, 20** ventral view. Abbreviations: ***aba*** anterior basal arc ***btas*** basal transverse part of the anterior spermatheca ***dc*** distal crest ***des*** distal expansion of the spermatheca ***pd*** posterior diverticulum ***rsas*** rod-shaped part of the anterior spermatheca ***tb*** transverse bar. Scale lines: 0.5 mm.

Ecology. Samples were collected during early spring from under stones (using a hand aspirator) in steppe habitat with scrubs of *Quercus coccifera* and with pine woods located close by. The collection locality was on low land at the middle of a mountainous region, which may enhance the probability of this species being an endemic.

***Dasumia crassipalpis* (Simon, 1882)**
http://species-id.net/wiki/Dasumia_crassipalpis

Harpactes c.: Simon, 1882: 224, f. 7-8 (D ♂).
Harpactocrates c.: Reimoser, 1919: 11.
D. c.: Alicata, 1974: 40, f. 1-4 (T ♂ from *Harpactocrates*, D ♀).

Material examined. 1 ♂ (AUZM), **ISRAEL**, Mount Meron, 17.XII.2010, leg. C. Drees

Detailed comparison of *D. gasparoi* sp. n. and *D. crassipalpis*. Unfortunately, due to lack of material, we were unable to compare females of the two species. Here we

Table 3. Leg measurements of *Dasumia crassipalpis*

♂	Fe	Pa	Ti	Me	Ta
Leg I	2.67	1.85	2.65	2.57	0.64
Leg II	2.69	1.66	2.54	2.49	0.62
Leg III	2.20	1.16	1.75	2.24	0.57
Leg IV	3.12	1.49	2.60	3.06	0.58

Table 4. Leg spination of *Dasumia crassipalpis*

♂	Leg I	Leg II	Leg III	Leg IV
C	0	0	1 pl 1 D	7 pl 2 D
Tr	0	0	0	1 rl
Fe	4 pl	1 pl	3 D 3rl	9 D
Pa	0	0	2 D 1 rl	1 D
Ti	0	0	2 pl 1 D 3 rl 5 V	4 pl 1 D 3 rl 5 V
Me	0	0	3 pl 6 rl 2 V	5 pl 5 rl 5 V

comment on general similarities and differences observed from comparison of male specimens from both species; and from the description of female *D. crassipalpis* given by Alicata (1974) with the female of *D. gasparoi* sp. n., as follows:

Body coloration and general appearance similar in both species.

Arrangement of cheliceral teeth on cheliceral groove similar, but in *D. crassipalpis,* distance between teeth on promargin and retromargin relatively wider.

In the original description of *D. crassipalpis,* carapace width for males was given as 3.2 mm (see Simon 1882, page 224). Our *D. crassipalpis* specimen from Israel has a carapace width of 3.26 mm. Based on the body measurements of *D. gasparoi* sp. n., there are no significant differences between the two species. However, the legs of *D. crassipalpis* from Israel are relatively shorter than *D. gasparoi* sp. n. (see Table 3).

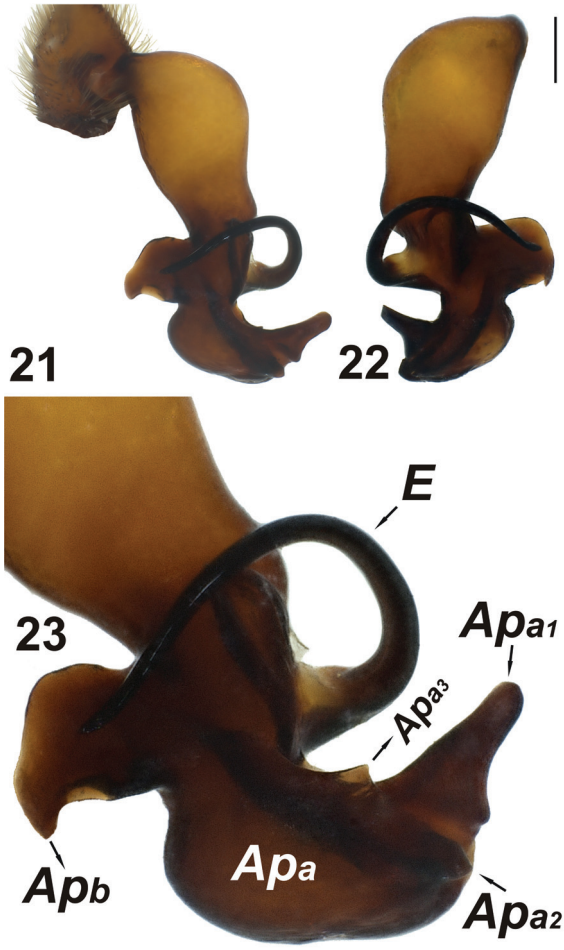
Leg spination similar in both species. Legs III and IV of female *D. gasparoi* sp. n. and leg IV of male *D. crassipalpis* exhibit trochanteric retrolateral spines, which is an interesting observation (see Table 2 and 4).

Linear postpedicelar and trapezoid epigastric scutum present in males of both species, in *D. gasparoi* sp. n. pale; in *D. crassipalpis* even paler.

In *D. crassipalpis*, morphology of the distal appendages distinctive on male palp. Apophysis$_{b}$ longer and wider. Also, in *D. gasparoi* sp. n., Apophysis$_{a1}$ shorter and projecting downwards; while in *D. crassipalpis* it is well developed, apparent and projected upwards. In *D. crassipalpis* palp when viewed ventrally, except for Apophysis$_{a1}$, the remaining apophyses are located at the right corner of Apophysis$_{a}$, close to Apophysis$_{a1}$ (Figs 21, 22, 23).

Even though there are structural differences apparent, the vulvae of both species are similar and generally well sclerotized (see Alicata 1974).

A short assessment on the distribution of *Dasumia crassipalpis*. First described as *Harpactes crassipalpis* by Simon (1882) on the basis of male specimens collected from



Figures 21–23. Male palp of *Dasumia crassipalpis*. Abbreviations: ***Ap***$_a$ Apophysis$_a$ ***Ap***$_b$ Apophysis$_b$ ***E*** embolus. Scale line (21, 22): 0.25 mm.

Syria, females were subsequently described by Alicata (1974); and based on the previously unknown female genitalia, the species was transferred to the genus *Dasumia.* Simon reported the terra typica of *D. crassipalpis* as "Syria", without giving any further detail (see Simon 1882). Moreover, Syria was the land of the Ottoman Empire in those days, and some provinces today known as Turkish were included with the rest of the region then known as Syria. For this reason, it is hard to draw a northern border line for the distribution of the species. However, considering that the only male specimen examined for the purpose of this study was collected in Israel, it may be assumed that *D. crassipalpis* is distributed along the line of Syria, Lebanon and Israel. Although we have not yet collected this species during our extensive arachnological field studies at the Turkey-Syria border, it is possible that this species reaches Turkey at the north and Jordan at the south of its range.

Figures 24–25. *Dasumia mariandyna* (topotype). **24** male palp **25** cheliceral teeth. Scale line: (24) 0.25 mm.

***Dasumia mariandyna* Brignoli, 1979**
http://species-id.net/wiki/Dasumia_mariandyna

D. m.: Brignoli, 1979: 312, f. 9-11 (D ♂♀).
D. m.: Le Peru, 2011: 222, f. 240 (♂♀).

Material examined. 1 ♂ (AUZM) **TURKEY**, **Düzce Province**, Akçakoca District, c. 1 km south of Kepenç Village [41° 4'11.89"N; 31° 7'9.06"E], 22.V.2008, under leaf litter, leg. K.B. Kunt; 1 ♂ (AUZM), **Bolu Province**, Abant [40°40'39.36"N; 31°28'18.78"E], 13.IX.2009, under leaf litter, leg. K.B. Kunt.

Comparison of *D. gasparoi sp. n.* and *D. mariandyna*. Brignoli defined the relation of *D. mariandyna* to other species of the genus as follows: "The new species is not related to the Greek and Near Eastern species; it can be easily distinguished from all known species by the genitalia" (see Brignoli 1979, page 313). Indeed, *D. mariandyna* can be easily distinguished by the copulatory organs from the Middle Eastern representative of the genus, *D. crassipalpis* and from *D. gasparoi* sp. n. which is very close to *D. crassipalpis*. Another very important issue is that the arrangement of cheliceral teeth in *D. mariandyna* clearly does not conform with the characteristic arrangement of cheliceral teeth in this genus. Nevertheless, *D. mariandyna* just like *D. gasparoi* sp. n. and *D. crassipalpis*, also possesses 3 claws on tarsi III and IV. In accordance with the data mentioned above and by considering embolus/bulbus proportion of the species, the place of *D. mariandyna* in the subfamily Harpacteinae should be rediscussed, for it is possible that *D. mariandyna* may belong to another genus.

Results and discussion

With the description of *D. gasparoi* sp. n., the total number of *Dasumia* species is now 14 and the total number of dysderid spiders known from Turkey is raised to 47. Even if we ignore *D. sancticedri* Brignoli, 1978 (described in the genus *Dasumia* and associated with *D. crassipalpis* by Brignoli) which has a suspiciously different palpal structure questioning its correct placement in the genus *Dasumia* (see Brignoli, 1978, page 173. figures 1, 2); it is not unreasonable to think that spiders exist in the Eastern Mediterranean basin includes similar but different species which are slightly different from the European taxa in the structure of copulatory organs. The relationships between the European and Eastern Mediterranean representatives of the genus will be clarified following future revisions and with studies including molecular systematics.

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