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# NEW GENUS AND TWO NEW SPECIES OF CHEWING LICE (PHTHIRAPTERA: ISCHNOCERA) PARASITIZING NEW GUINEAN *PELTOPS* (PASSERIFORMES: ARTAMIDAE)

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**KEY WORDS**

Phthiraptera
Ischnocera
New Genus
New Species
New Guinea

**ABSTRACT**

The genus *Sarahcultrix* n. gen. (Phthiraptera: Ischnocera) is described and illustrated based on 2 new species of chewing lice from New Guinean birds in the genus *Peltops* Wagler, 1829 (Passeriformes: Artamidae). These species are: *Sarahcultrix ypsilophora* n. sp. ex *Peltops montanus* Stresemann, 1921, and *Sarahcultrix sphenura* n. sp. ex *Peltops blainvillii* (Garnot, 1827).

New Guinea is home to a huge diversity of birds, with approximately 350 species of breeding perching birds (Passeriformes) alone (Pratt and Beehler, 2015). However, the chewing louse fauna of the region is poorly known. Recent investigations of the *Philopterus*- and *Brueelia*-complexes of chewing lice, both of which are largely limited to passeriform hosts, have revealed a large, previously unknown, diversity on the genus and species levels (Gustafsson and Bush, 2014, 2017; Najer et al., 2016; Mey, 2017). At least some of these new genera appear to be endemic to the Australo-Papuan region, echoing the importance of this region for the evolution of corvoid birds (Jønsson et al., 2011; Aggerbeck et al., 2014) and the many groups of birds endemic to this region (Clements et al. 2019).

The majority of the ischnoceran chewing lice known from passeriform hosts across the world belong to either the *Philopterus*-complex or the *Brueelia*-complex. However, there are some exceptions. For instance, several genera of the *Degeeriella*-complex (sensu Clay, 1958) are found on passeriform hosts, including the genera *Picicola* Clay and Meinertzhagen, 1938, (normally considered to include *Tyrannicola* Carriker, 1956a, and *Pittidicola* Eichler, 1982) and *Cotingacola* Carriker, 1956b. Here, 2 new species belonging to a previously unknown genus in the *Degeeriella*-complex are described from 2 New Guinean endemic hosts.

## MATERIALS AND METHODS

Examined specimens were deposited in the Berenice Pauahi Bishop Museum, Honolulu, Hawaii (BPBM). Specimens were examined and measured with a Nikon Eclipse E600 microscope (Nikon, Belmont, California) fitted with an Olympus DP25 camera (Olympus, Center Valley, Pennsylvania) and digital measuring software (ImageJ 1.48v, Wayne Rasband, https://imagej.nih.gov/). Illustrations were drawn by hand, using a drawing tube. Line drawings were scanned, collated, and edited in GIMP (www.gimp.org). Terminology and abbreviations for setal, structural, and genitalic characters follow Gustafsson and Bush (2017) and include: *ads* = anterior dorsal seta; *mts* = marginal temporal seta; *os* = ocular seta; *pns* = post-nodal seta; *psps* = principal post-spiracular seta; *pts* = post-temporal seta; *s* = sensillus. Measurements (Table I) are given in millimeters for the following dimensions: TL = total length (along midline); HL = head length (along midline); HW = head width (at temples); PRW = prothoracic width; PTW = pterothoracic width; AW = abdominal width (at segment V). Host taxonomy follows Clements et al. (2019).

## DESCRIPTION

### *Sarahcultrix* n. gen.

(Figs. 1–10)

*Description:* Head circumfasciate, frons concave (Fig. 5). Marginal carina broad and expanded at frons. Ventral carina not interrupted or displaced anteriorly at midline. Dorsal preantennal suture present, arched posteriorly. Dorsal anterior plate with rounded posterior margin. Head chaetotaxy as in Figure 5; *ads* situated on posterior margin of dorsal anterior plate; *s4–7* absent; *pns* and *pts* short setae or mesosetae; *os* and *mts1 mesosetae*, other temporal setae short. Antennae sexually

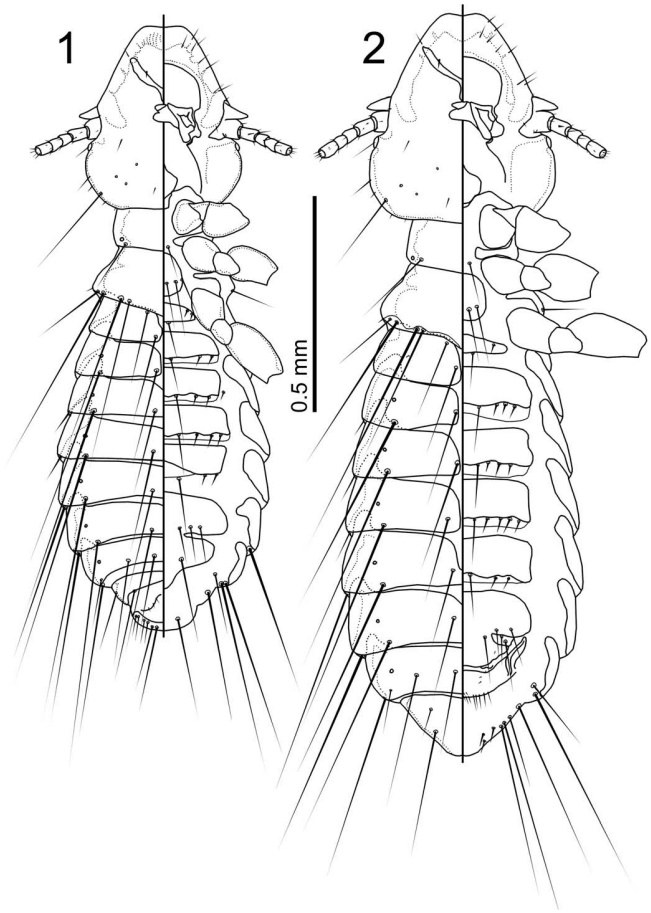
Version of Record, first published online with fixed content and layout, in compliance with ICZN Arts. 8.1.3.2, 8.5, and 21.8.2 as amended, 2012. ZooBank publication registration: urn:lsid:zoobank.org:pub:D4F0A701-2D65-4A87-B675-1DC951B0EA66.

**Table I.** Measurements of the 2 species of *Sarahcultrix* n. gen. described herein. Measurements are given in millimeters for the following dimensions: TL = total length (along midline); HL = head length (along midline); HW = head width (at temples); PRW = prothoracic width; PTW = pterothoracic width; AW = abdominal width (at segment V). Mean values (in parentheses) given for samples where n > 10.

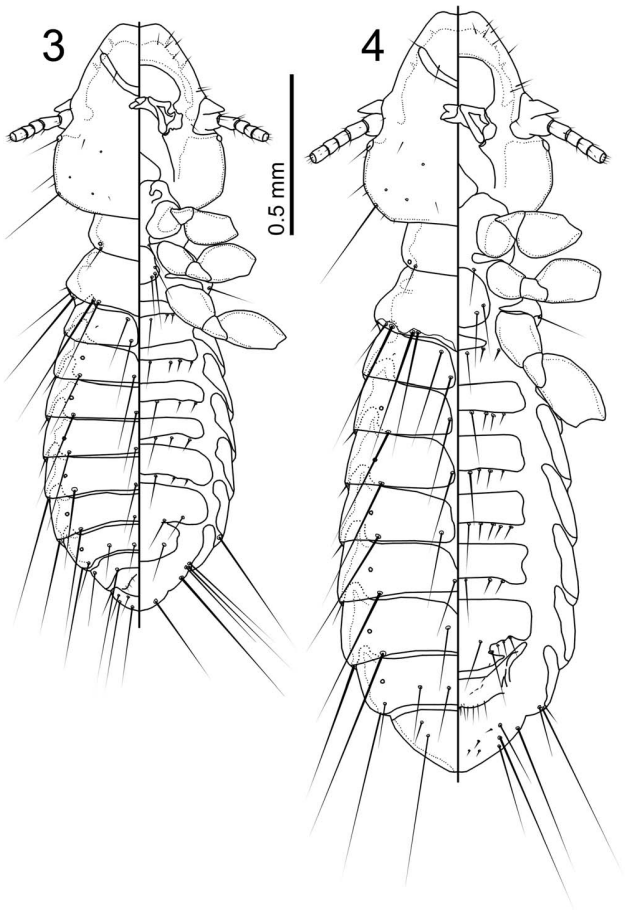
| Species | *Sarahcultrix ypsilophora* n. sp. | | *Sarahcultrix sphenura* n. sp. | |
|---|---|---|---|---|
| Sex | Male | Female | Male | Female |
| Number | 9* | 10† | 1 | 10‡ |
| TL | 1.35–1.40 | 1.58–1.69 | 1.25 | 1.60–1.73 |
| HL | 0.41–0.43 | 0.44–0.48 (0.46) | 0.41 | 0.44–0.46 (0.45) |
| HW | 0.36–0.38 | 0.39–0.43 (0.41) | 0.35 | 0.40–0.42 (0.41) |
| PRW | 0.22–0.23 | 0.23–0.25 (0.24) | 0.23 | 0.25–0.27 (0.26) |
| PTW | 0.31–0.34 | 0.34–0.40 | 0.32 | 0.36–0.39 (0.38) |
| AW | 0.37–0.48 | 0.51–0.55 | 0.47 | 0.44–0.55 |

* n = 4 for TL, n = 8 for HL and AW.
† n = 6 for TL, n = 7 for AW, n = 8 for PTW.
‡ n = 5 for TL, n = 9 for AW.

monomorphic. Thoracic and abdominal segments and chaetotaxy as in Figures 1 and 2. At least tergopleurites IV–IX+X in male and VI–VIII in female medianly continuous; tergopleurites IX+X and XI fused in female. Sternal plates present on abdominal segments II–VI in both sexes; laterally with 2–4 short, often elongated thorn-like setae on each side. Male subgenital plate formed from sternal plates VII–VIII, not reaching posterior margin of abdomen. Female subgenital plate formed from sternal plates VII–VIII, not reaching vulval margin. Male genitalia as in Figure 7. Mesomere and parameres fused to basal apodeme. Median section of mesosome bulging, with 2 microsetae on each side. Endomere not fused, elongated anterio-laterally.




**Figures 1, 2.** *Sarahcultrix ypsilophora* n. sp. (**1**) Male habitus, dorsal and ventral views. (**2**) Female habitus, dorsal and ventral views.




**Figures 3, 4.** *Sarahcultrix sphenura* n. sp. (**3**) Male habitus, dorsal and ventral views. (**4**) Female habitus, dorsal and ventral views

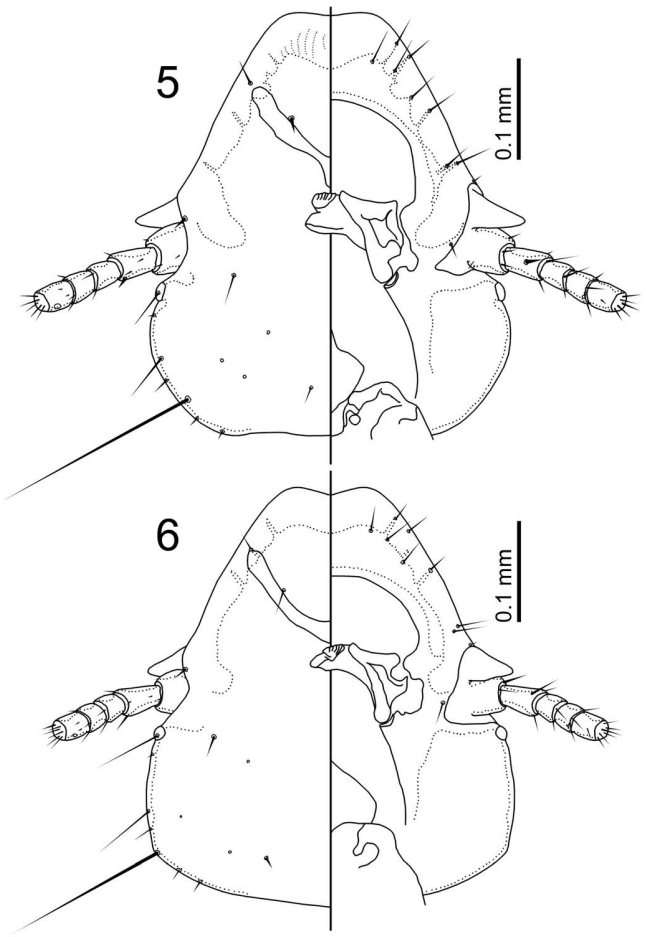
## Taxonomic summary

*Type species: Sarahcultrix ypsilophora* n. sp.

*Geographic range:* New Guinea.

*Host distribution:* Only known from the genus *Peltops* Wagler, 1829 (Artamidae). *Picicola bimaculatus* (Piaget, 1885) is known from hosts in the same family, but the redescription of this species by Williams (1979) shows substantial differences in head shape, tergal plates, and the structure of the male genitalia between *Sarahcultrix* and *P. bimaculatus*. No specimens of *P. bimaculatus* were examined, and it is therefore not included in *Sarahcultrix* here.

*ZooBank registration:* urn:lsid:zoobank.org:act:A890F3A7-5780-41D3-9817-A93F0106ADF8.



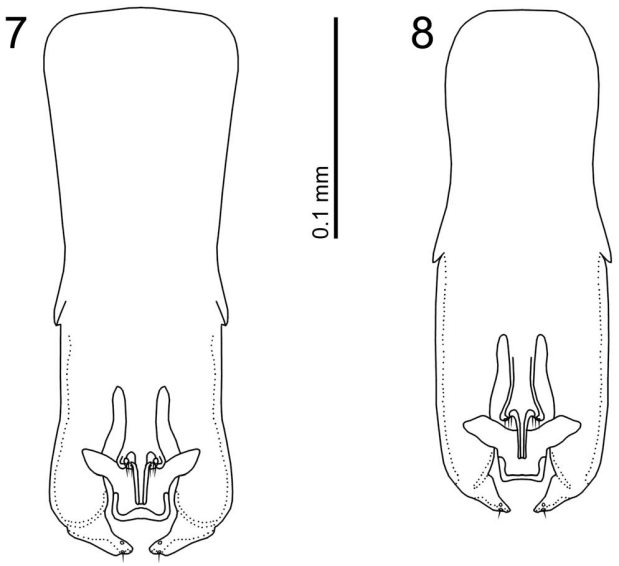

**Figures 5, 6.** Male heads, dorsal and ventral views. (**5**) *Sarahcultrix ypsilophora* n. sp. (**6**) *Sarahcultrix sphenura* n. sp.

*Etymology: Sarahcultrix* is named in honor of Dr. Sarah E. Bush (University of Utah), in recognition of her long work with chewing lice, and as a thanks for our long and fruitful co-operation on the *Brueelia*-complex. This is combined with Latin "*cultrix*" for "someone [female] who bestows care or labor on something." Gender: feminine.

## Remarks

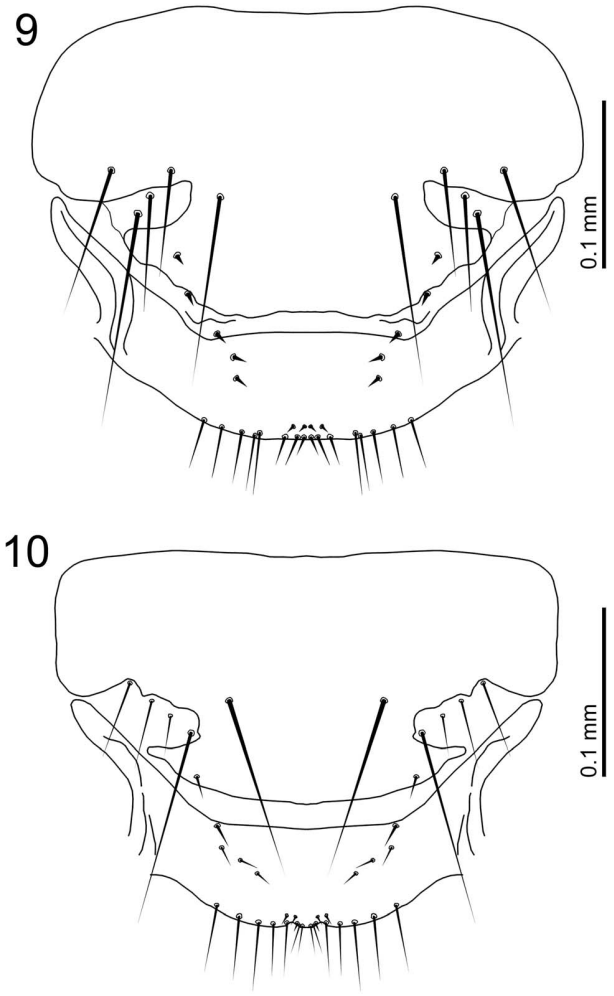
*Sarahcultrix* belongs to the *Degeeriella*-complex, and may be closely related to the *Picicola*-group within this complex. The systematics of this group are poorly known, and *Picicola* as presently circumscribed (e.g., Price et al., 2003) comprises a large number of morphologically different forms that are not closely related (Johnson et al., 2002). In the key to the chewing louse genera of passeriform hosts published by Price et al. (2003), *Sarahcultrix* keys to *Cotingacola*, a genus otherwise restricted to the Neotropics. The single character uniting *Sarahcultrix* and *Cotingacola* in the key of Price et al. (2003) is the shape of the dorsal anterior plate, which has a convex posterior margin in both genera.

*Sarahcultrix* can be separated from *Cotingacola* by the following combination of characters (for illustrations of *Cotingacola*, see Clayton and Price, 1998; Valim and Weckstein, 2012): Frons concave in *Sarahcultrix* (Fig. 5), but rounded or (rarely) flattened or tapered in *Cotingacola*; *mts1* and *mt3* both macrosetae in *Cotingacola*, but *mts1* mesoseta in *Sarahcultrix* (Fig. 5); male tergopleurites IV–VI and female tergopleurites VI–VII medianly continuous in *Sarahcultrix* (Figs. 1, 2), but medianly separated in *Cotingacola*; short, in some specimens elongated thorn-like setae present on sternites II–VI in both sexes of *Sarahcultrix* (Figs. 1, 2), but no such setae present in *Cotingacola*; terminal segment of female abdomen with median indentation in *Cotingacola*, but more or less rounded in *Sarahcultrix* (Figs. 1, 2); male subgenital plate reaches or approaches distal margin of abdomen in *Cotingacola*, but does not reach posterior to segment IX+X in *Sarahcultrix* (Fig. 1).




**Figures 7, 8.** Male genitalia, ventral views. (**7**) *Sarahcultrix ypsilophora* n. sp. (**8**) *Sarahcultrix sphenura* n. sp.

Comparisons with *Picicola* are complicated by the large variation within this genus, and species from the host groups Pittidae, Furnariidae, Tyrannidae, and Galbuliformes are probably better considered different genera (see Dalgleish, 1969; Somadder and Tandan, 1977; Williams, 1979). *Sarahcultrix* can be separated from *Picicola* s. str. (i.e., *Picicola candidus* and *Picicola snodgrassi* species groups sensu Dalgleish, 1969) by the following combination of characters (for illustrations of *Picicola* see Dalgleish 1969): Frons concave in *Sarahcultrix* (Fig. 1), but rounded or convergent to median point in *Picicola* (except *Picicola triphias* Clay and Meinertzhagen, 1938); *os* and *mts1* macrosetae in *Picicola*, but mesosetae in *Sarahcultrix* (Fig. 5); male tergopleurites IV–VI and female tergopleurites VI–VII medianly continuous in *Sarahcultrix* (Figs. 1, 2), but medianly separated in *Picicola*; sternal plates present on abdominal segments II–VI in both sexes in *Sarahcultrix* (Figs. 1, 2), but absent on at least segments II–III in *Picicola*; short, in some specimens elongated thorn-like setae present on sternites II–VI in both sexes of *Sarahcultrix* (Figs. 1, 2), but no such setae present in *Picicola*; terminal segment of female abdomen with median indentation in *Picicola*, but more or less rounded in *Sarahcultrix* (Figs. 1, 2); tergopleurites II–VII in both sexes with




**Figures 9, 10.** Female subgenital plates and vulval margins, ventral views. (**9**) *Sarahcultrix ypsilophora* n. sp. (**10**) *Sarahcultrix sphenura* n. sp.

setae between the *ss* and the *psps* in *Picicola*, but without such setae in *Sarahcultrix* (Figs. 1, 2).

### *Sarahcultrix ypsilophora* n. sp.

(Figs. 1, 2, 5, 7, 9)

*Description both sexes:* Head shape, structure and chaetotaxy as in Figure 5; frons shallowly concave. Anterior section of marginal carina with inner decoration. Dorsal preantennal suture extended posteriorly along midline. Preantennal nodi large, bulging, and extending medianly. Temples rounded. Thoracic and abdominal segments as in Figures 1, 2.

*Male:* Thoracic and abdominal chaetotaxy as in Figure 1; visible pores present between the setae of tergites IV–VI in several examined males; in some males, setae emerge from these pores. These pores are typically present only on 1 side, and are absent in the majority of the examined males, and therefore not illustrated. Tergopleurite III divided medianly. Basal apodeme long (Fig. 7). Endomere as in Figure 7; bulging section of mesomere overlaps proximal part of endomere. Parameres stout. Measurements as in Table I.

*Female:* Thoracic and abdominal chaetotaxy as in Figure 2. Subgenital plate and vulval margin as in Figure 9; setae of subgenital plate long. Vulval margin flattened medianly, with 6–9 marginal setae and 0–3 submarginal setae on each side; median marginal setae shorter than lateral marginal setae; 4–5 short, stout oblique setae anterior to margin. Measurements as in Table I.

#### Taxonomic summary

*Type host: Peltops montanus* Stresemann, 1921—mountain peltops.

*Type locality:* 10 km W of Bulolo, Morobe Province, Papua New Guinea.

*Specimens deposited:* Holotype ♂, 10 km W of Bulolo, elev. 780 m, Morobe Province, Papua New Guinea, 11 August 1967, A.C. Ziegler, BBM-NG-53941 (BBM) [marked with back dot on slide]. Paratypes 7♂, 9♀, same data as holotype (BBM); 1♂, 1♀, Wau Creek, elev. 1,220 m, Morobe District, Papua New Guinea, 14 March 1963, H. Clissold, BBM-[NG-]20430 (BBM).

*ZooBank registration:* urn:lsid:zoobank.org:act:2D765AE0-B907-43F8-94EF-1EA00C0A06D8.

*Etymology:* The species name is constructed from "*upsilon*," Greek for the letter Y, and "*pherein*," modified to "*phoros*," Greek for "to bear." This refers to the Y-shaped dorsal preantennal suture.

#### Remarks

*Sarahcultrix ypsilophora* can be separated from *S. sphenura* n. sp. by the following characters: head proportionately more slender and with rounded temples in *S. ypsilophora* (Fig. 5), but broader with more angular temples in *S. sphenura* (Fig. 6); dorsal preantennal suture extended slightly posteriorly along midline in *S. ypsilophora* (Fig. 5; however the extent of the suture differs between specimens), but not in *S. sphenura* (Fig. 6); male tergopleurite III divided medianly in *S. ypsilophora* (Fig. 1), but medianly continuous in *S. sphenura* (Fig. 3); male mesomere extended farther posterior with bulging section overlapping with endomere in *S. ypsilophora* (Fig. 7), but not overlapping in *S. sphenura* (Fig. 8); setae of female subgenital plate longer and stouter in *S. ypsilophora* (Fig. 9) than in *S. sphenura* (Fig. 10), and shape of both vulval margin and subgenital plates of both sexes differ between species (Figs. 1, 3, 9, 10).

### *Sarahcultrix sphenura* n. sp.

(Figs. 3, 4, 6, 8, 10)

*Description both sexes:*. Head shape, structure and chaetotaxy as in Figure 6; frons shallowly concave. Anterior section of marginal carina without clear inner decoration. Dorsal preantennal suture not extended posteriorly along midline. Preantennal nodi moderate, not bulging. Temples somewhat angular. Thoracic and abdominal segments as in Figures 3 and 4.

*Male:* Thoracic and abdominal chaetotaxy as in Figure 3. Tergopleurite III continuous medianly. Basal apodeme shorter (Fig. 8). Endomere as in Figure 8; bulging section of mesomere not overlapping proximal part of endomere. Parameres smaller. Measurements as in Table I.

*Female:* Thoracic and abdominal chaetotaxy as in Figure 3. Subgenital plate and vulval margin as in Figure 10; only central

setae of subgenital plate long, lateral setae shorter. Vulval margin rounded medianly, with 7–10 marginal setae and 0–3 submarginal setae on each side; median marginal setae shorter than lateral marginal setae; 3–5 short, stout oblique setae anterior to margin. Measurements as in Table I.

### Taxonomic summary

*Type host: Peltops blainvillii* (Garnot, 1827)—lowland peltops.

*Type locality:* Saputa River, vicinity of Popondetta, Northern Province, Papua New Guinea.

*Specimens deposited:* Holotype ♂, Saputa River, elev. 200 ft., vicinity of Popondetta, Northern Province, Papua New Guinea, 1 October 1963, H. Clissold, BBM-NG-29972 (BBM). Paratypes 10♀, Amboga River, elev. 61 m, Northern Province, Papua New Guinea, 10 October 1963, H. Clissold, BBM-NG-29927 (BBM).

*ZooBank registration:* urn:lsid:zoobank.org:act:3580748B-9D6A-4E6F-8A80-FD1A88D048EC.

*Etymology:* The species name is constructed from "*sphenos*," Greek for "wedge," and "*oura*," Greek for "tail," referring to the wedge-shaped marginal thickenings of the terminal segments of the female.

### Remarks

For a comparison with *S. ypsilophora* n. sp., see this species.

## DISCUSSION

In recent decades, several new genera of chewing lice have been described from Australo-Papuan endemic host groups, including both ischnoceran (Mey, 2004, 2017; Gustafsson and Bush, 2017) and amblyceran lice (Price and Hellenthal, 2005). This suggests that a large diversity of chewing lice remains to be discovered in the region.

However, the discovery of a new genus of *Degeeriella*-complex lice on oscine passeriform hosts in New Guinea is unexpected. With few exceptions, all lice in this complex known from passeriform hosts are from suboscine hosts (e.g., Pittidae for "*Pittidicola*," Tyrannidae and Furnariidae for "*Tyrannicola*," Cotingidae for *Cotingacola*), most of which are Neotropical in distribution. On oscine passeriforms, these are typically replaced by lice in the *Brueelia*-complex (Gustafsson and Bush, 2017). This may suggest that the *Brueelia*-complex evolved on passeriform hosts after the split between the suboscines and oscines. However, exceptions in both directions are known, including the species *Picicola bimaculatus*, known from the cracticid *Gymnorhina tibicen* (Latham, 1802). By contrast, some suboscine hosts are known to be parasitized by lice in the *Brueelia*-complex (Gustafsson and Bush, 2017). Whether these exceptions support the argument of Clay (1958) that the *Degeeriella*-complex "must have been present on birds at an early stage of their evolution" and subsequently patchily replaced by lice belonging to other complexes cannot presently be assessed. More collections are needed, especially from areas such as New Guinea that have been crucial for the evolution of the hosts, and where potentially "relict" host–parasite associations, such as that between *Peltops* spp. and *Sarahcultrix* spp., may thus be expected.

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