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## Research article

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# Four new species of *Brueelia* Kéler, 1936 (Phthiraptera: Ischnocera) from African hosts, with a redescription of *Nirmus bicurvatus* Piaget, 1880

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**Abstract.** Four new species of *Brueelia* Kéler, 1936 are described and illustrated. All of them parasitize African endemic host species in the families Passeridae, Ploceidae, and Estrildidae (Passeriformes). They are: *Brueelia pofadderensis* sp. nov. ex *Passer melanurus damarensis* Reichenow, 1902 and *P. m. vicinus* Clancey, 1958; *B. semiscalaris* sp. nov. ex *Granatina granatina* (Linnaeus, 1758); *B. sima* sp. nov. ex *Malimbus nitens* (Gray, 1831); *B. tersichore* sp. nov. ex *Euplectes jacksoni* (Sharpe, 1891) and *E. progne delamerei* (Shelley, 1903). In addition, *Brueelia bicurvata* (Piaget, 1880) is redescribed and reillustrated from non-type material. A summary of all published records of lice in the *Brueelia* complex from Africa since 1980 is provided. We also estimate the unknown diversity of African species of *Brueelia* based on an index of host specificity calculated for each host family independently. The unknown diversity is estimated to be over 1000 species of *Brueelia* from African hosts, compared to the <50 species in this genus currently recorded from Africa.

**Keywords.** Phthiraptera, new species, *Brueelia* complex, species diversity, host specificity.

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## Introduction

The chewing lice of African songbirds have long been poorly known (Ledger 1980; Gustafsson & Bush 2015; Light *et al.* 2016; Takano *et al.* 2017, 2018). In particular, very few species of lice belonging to the *Brueelia* complex (sensu Gustafsson & Bush 2017) have ever been reported from Africa. In his summary of the chewing lice known from sub-Saharan Africa, Ledger (1980) listed only 3 species of *Meropoecus* Eichler, 1940, 36 species of *Brueelia* Kéler, 1936 and 16 species of *Sturnidoecus* Eichler, 1944 (note that Ledger overlooked the many African species of *Sturnidoecus* described in Ansari 1968). Of these, only 25 species have been recorded from birds that breed in sub-Saharan Africa; the remaining lice in the list in Ledger (1980) concern species known from hosts that migrate to Africa from Eurasia. In at least some cases, this list includes species of lice that have never been recorded in sub-Saharan Africa, but which occur on hosts that migrate to this region.

In recent decades, many new records of lice in the *Brueelia* complex have been published from African countries (e.g., Balakrishnan & Sorenson 2006; Sychra *et al.* 2010a, 2010b; Najer *et al.* 2012; Gustafsson & Bush 2015, 2017; Bush *et al.* 2016; Light *et al.* 2016; Takano *et al.* 2017, 2018; Gustafsson *et al.* 2018). However, in many of these reports, lice of the *Brueelia* complex have not been identified to species level, and few new species of lice in this complex have been described from Africa since 1980 (Fig. 1; Appendix). Data from several published phylogenies that include African lice of the *Brueelia* complex (Bush *et al.* 2016; Light *et al.* 2016; Takano *et al.* 2017, 2018) and from a morphological survey (D.R. Gustafsson and S.E. Bush, unpublished data) show that the diversity of lice in this complex is very high in Africa, and a vast number of species remain undescribed. The lack of descriptions, illustrations and identification keys for African lice of the *Brueelia* complex limits our understanding of the biogeography and evolution of these lice and their host associations.

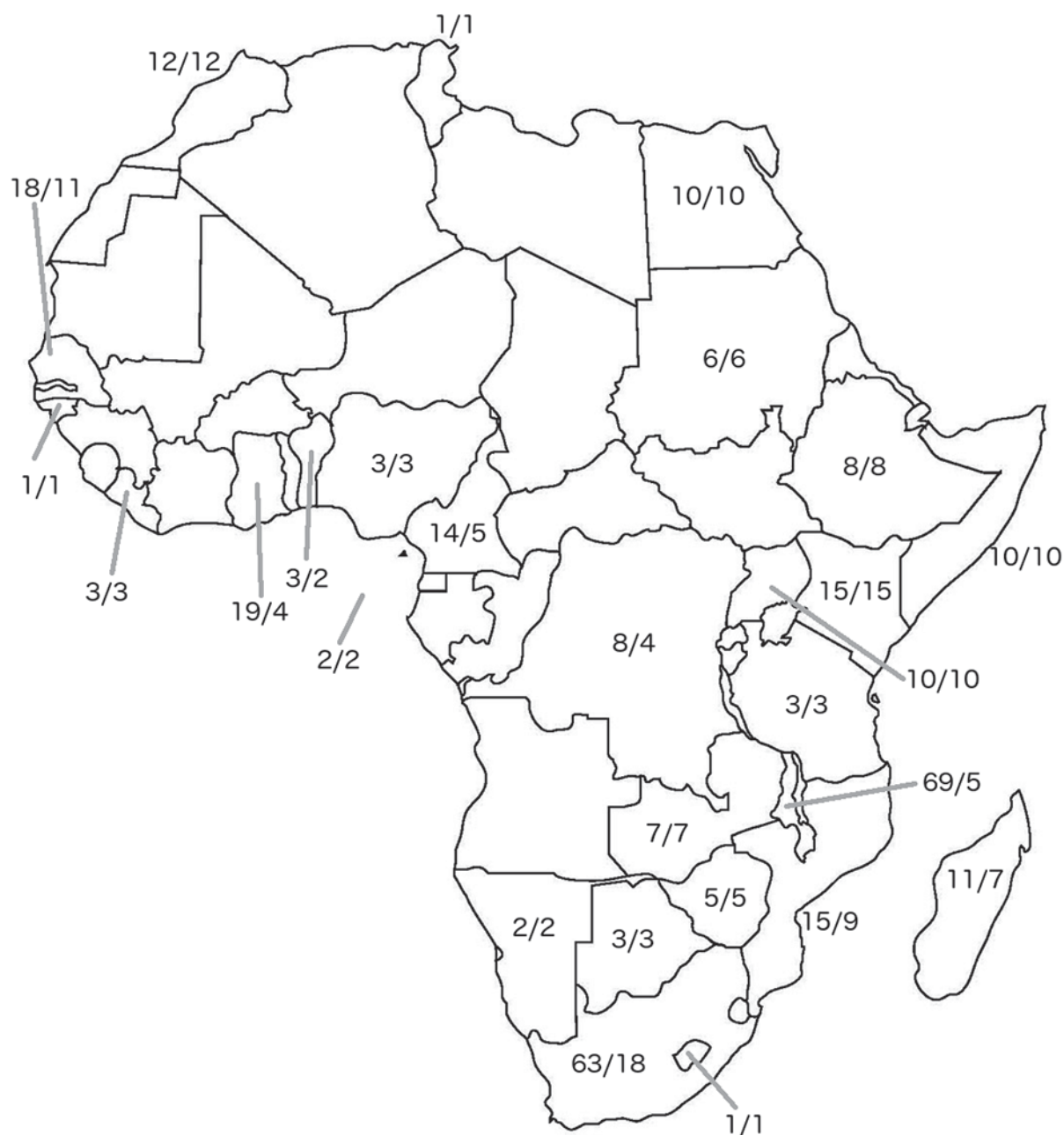
Here, we provide descriptions of four new species of *Brueelia* from Africa, as well as a redescription of *Nirmus bicurvatus* Piaget, 1880. All five species treated here are from host species that are endemic to Africa, and all five hosts belong to families that are very speciose in this region.

## Material and methods

All material examined is deposited as slide-mounted specimens at the Natural History Museum, London (NHML). Specimens were examined in an Olympus CX31 microscope. Illustrations were drawn by hand, using a drawing tube fitted to the microscope. Line drawings were scanned, collated and edited in GIMP ([www.gimp.org](http://www.gimp.org)). Grey lines in all illustrations denote the approximate extent of dark pigmentation; note that these patterns typically differ slightly between specimens of the same species, and sometimes between sides of the same specimen.

Measurements were made from photographs in Quick Photo Micro ver. 3.1 (Promicra, Prague, Czech Republic) and are given for the following dimensions (in mm):

- AW = abdominal width (at segment V)
- HL = head length (at midline)
- HW = head width (at temples)
- PRW = prothoracic width (at posterior end)
- PTW = pterothoracic width (at posterior end)
- TL = total length (at midline)



**Fig. 1.** Map of Africa, showing the number of species of chewing lice in the *Brueelia* complex reported from each country since Ledger (1980), including the records published herein. The first number represents the total number of records of host–louse associations reported for each country, disregarding that some records from different host species may refer to the same louse species. The second number represents the number of louse species identified to species level. Countries with no records of lice of the *Brueelia* complex since 1980 are unmarked. References to lice in the *Brueelia* complex known from each country can be found in the Appendix. Note that as no precise collection locality is given on older slides, records for Sudan and South Sudan are here presented together. The numbers ‘2/2’ in the Gulf of Guinea refer to São Tomé and Príncipe, which is not visible on the map. The islands of Réunion (France) and St. Helena (United Kingdom) are also not visible on the map; both have 1 record of a louse of the *Brueelia* complex in the time period, in both cases identified to species level. In addition to the records shown here, one species was recorded from “Northern Africa” and one from “Congo”, with no more detailed locality given on the slide labels.

The terminology of chaetotaxy and morphological structures follows Gustafsson & Bush (2017), and includes:

<i>aps</i>	=	accessory post-spiracular setae
<i>ps</i>	=	paratergal setae
<i>psps</i>	=	principal post-spiracular setae
<i>pst1–2</i>	=	parameral setae 1–2
<i>pts</i>	=	post-temporal seta
<i>sts</i>	=	sternal setae
<i>tps</i>	=	tergal posterior setae
<i>vms</i>	=	vulval marginal setae
<i>vos</i>	=	vulval oblique setae
<i>vss</i>	=	vulval submarginal setae

Counts of *vos* include the distal *vos* typically situated median to the *vss*. Setal characters are given in italics.

Host taxonomy follows Clements *et al.* (2018).

An index of specificity (IS) was calculated for all host families from which *Brueelia* are known in Africa, following Valim & Weckstein (2013). Two estimates were calculated: one based only on the IS of identified species of *Brueelia*, and one on the IS of identified species of *Brueelia* plus unidentified species recorded from Africa (see Appendix). The latter IS was calculated under the assumption that all unidentified species listed as ‘*Brueelia* sp.’ in the Appendix are accurately assigned to genus, which is likely not the case for many specimens.

## Results

The index of specificity was calculated for the genus *Brueelia* in Africa, following Valim & Weckstein (2013); from this index, two estimates of the diversity of this genus in Africa were calculated (Table 1). In Table 1, an IS of 1 means that all species of *Brueelia* are host-specific within this host family. In host families for which  $IS > 1$ , each host species is on average parasitized by more than one species of *Brueelia*; for instance, different host subspecies being parasitized by different species of *Brueelia* would give an  $IS > 1$ . An  $IS < 1$  indicates that at least some *Brueelia* species parasitizing hosts in this family are not host-specific, but occur on more than one host species.

In almost all host families, the IS of *Brueelia* is 1, suggesting that *Brueelia* are generally host-specific. For nine host families,  $IS < 1$ ; however, in most of these cases, the species of *Brueelia* parasitizing hosts in this family have been poorly described, and some of these cases may represent misidentifications. Only one host family, Corvidae, has an  $IS > 1$ .

Our two calculations of IS are based of different sets of reported taxa, and thus the two estimates of diversity of *Brueelia* are slightly different. However, both estimates suggest that well over 1000 species of *Brueelia* may occur in Africa. Only 30 species of *Brueelia* have been recorded from Africa since 1980 (Appendix). Using the IS estimate that includes unidentified specimens of *Brueelia* suggests that only 2.24% of the African diversity of *Brueelia* is currently known; using the more conservative IS estimate, and ignoring unidentified *Brueelia*, this number is 2.64%.



**Table 1** (continued on next page). Estimate of the known and unknown diversity of *Brueelia* Kéler, 1936 in Africa based on an index of host specificity, following Valim & Weckstein (2013). Host taxonomy and species numbers follow Clements *et al.* (2018); louse numbers follow Gustafsson & Bush (2017) and Gustafsson *et al.* (2018). Host numbers in the African fauna includes residents, wintering migrants, introduced species and vagrants, following Lepage (2018). IS is the ‘index of specificity’ of Valim & Weckstein (2013), and represents #*Brueelia* species/host species of *Brueelia*. Estimates have been rounded off to the closest whole number. The second estimate includes the specimens listed as ‘*Brueelia* sp.’ in the Appendix, recorded from Africa after 1980 but not identified to species. Species are included in this estimate under the assumption that all species listed as ‘*Brueelia* sp.’ in the Appendix belong to the genus *Brueelia*; most likely, this is incorrect in some cases, and the numbers given are thus probably overestimates. The following host families (# African species in parentheses) are presently not known to be parasitized by any species of *Brueelia*, and are therefore not included in the list below: Aegithalidae (1), Bernieridae (11), Buphagidae\* (2), Calyptomenidae (8), Campephagidae\* (14), Certhiidae (2), Chaetopidae(2), Cinclidae(1), Eurylaimidae\*(1), Hirundinidae\*(42), Hyliotidae(4), Hypocoliidae(1), Modulatricidae(3), Nicatoridae(3), Oriolidae\*(9), Panuridae (1), Pellorneidae\* (8), Philepittidae (4), Phylloscopidae (20), Picathartidae (2), Pittidae (2), Promeropidae (2), Stenostiridae (6), Tichodromidae (1), Vireonidae (1). Species in many of these families (marked with \*) are known to be parasitized by other genera in the *Brueelia* complex (e.g., *Indocephalantes* Gustafsson & Bush, 2017, on hosts in the Campephagidae), which may replace *Brueelia* on these hosts.

Host family	Known world fauna				African fauna				Including unidentified after 1980					
	Bird species	<i>Brueelia</i> species	Host species for <i>Brueelia</i>	IS	Bird species	Estimate of African <i>Brueelia</i> species	<i>Brueelia</i> species	Host species for <i>Brueelia</i>	IS	Estimate of African <i>Brueelia</i> species	<i>Brueelia</i> species	Host species for <i>Brueelia</i>	IS	Estimate of African <i>Brueelia</i> species
<b>Passeriformes</b>														
Acrocephalidae	61	1	1	1	33	33	1	1	1	1	33	1	1	33
Alaudidae	97	4	5	0.80	80	64	5	6	0.83	67	67	6	0.83	67
Cisticolidae	145	1	1	1	131	131	6	6	1	131	131	6	1	131
Corvidae	128	4	3	1.33	20	27	4	3	1.33	27	27	3	1.33	27
Dicruridae	25	1	1	1	9	9	2	2	1	9	9	2	1	9
Emberizidae	44	3	6	0.50	27	14	6	9	0.67	18	18	9	0.67	18
Estrildidae	140	5	5	1	83	83	13	13	1	83	83	13	1	83
Fringillidae	225	14	14	1	65	65	17	17	1	65	65	17	1	65
Laniidae	33	6	6	1	24	24	6	6	1	24	24	6	1	24
Leiothrichidae	146	5	5	1	23	23	5	5	1	23	23	5	1	23
Locustellidae	61	1	1	1	18	18	1	1	1	18	18	1	1	18
Macrosphenidae	21	0	0	0	18	0	1	1	1	18	18	1	1	18
Malaconotidae	50	0	0	0	50	0	2	2	1	50	50	2	1	50
Monarchidae	99	0	0	0	12	0	1	1	1	12	12	1	1	12

**Table 1** (continued). Estimate of the known and unknown diversity of *Brueelia* Kéler, 1936 in Africa based on an index of host specificity, following Valim & Weckstein (2013).

Host family	Known world fauna				African fauna			Including unidentified after 1980		
	Bird species	<i>Brueelia</i> species	Host species for <i>Brueelia</i>	IS	Bird species	Estimate of African <i>Brueelia</i> species	<i>Brueelia</i> species	Host species for <i>Brueelia</i>	IS	Estimate of African <i>Brueelia</i> species
<b>Passeriformes</b> (continued)										
Motacillidae	67	5	7	0.71	43	31	7	9	0.78	33
Muscicapidae	317	2	2	1	158	158	4	4	1	158
Nectariniidae	139	1	1	1	93	93	2	2	1	93
Paridae	63	7	7	1	19	19	7	7	1	19
Passeridae	42	5	7	0.71	28	20	10	12	0.83	23
Ploceidae	116	5	6	0.83	113	94	13	14	0.93	105
Prunellidae	13	2	2	1	2	2	2	2	1	2
Pycnonotidae	143	3	3	1	74	74	10	10	1	74
Regulidae	6	1	1	1	3	3	1	1	1	3
Remizidae	11	2	2	1	7	7	2	2	1	7
Scotocercidae	36	1	1	1	6	6	1	1	1	6
Sittidae	27	5	5	1	2	2	5	5	1	2
Sturnidae	122	15	16	0.94	53	50	19	20	0.95	50
Sylviidae	33	4	5	0.80	30	24	5	6	0.83	25
Troglodytidae	85	1	1	1	1	1	1	1	1	1
Turdidae	170	7	9	0.78	33	26	8	10	0.80	26
Vangidae	39	0	0	0	31	0	1	1	1	31
Viduidae	20	1	1	1	20	20	4	4	1	20
Zosteropidae	130	0	0	0	25	0	1	1	1	25
<b>Piciformes</b>										
Lybiidae	41	0	0	0	41	0	1	1	1	41
Picidae	232	3	7	0.43	35	15	3	7	0.43	15
<b>Total</b>	3127	115	131		1410	1136	177	193		1337

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Order Phthiraptera Haeckel, 1896  
Suborder Ischnocera Kellogg, 1896  
Family Philopteridae Burmeister, 1838  
*Brueelia* complex sensu Gustafsson & Bush 2017

Genus *Brueelia* Kéler, 1936

*Philopterus* Nitzsch, 1818: 288 partim.  
*Nirmus* Nitzsch, 1818: 291 partim.  
*Degeeriella* Neumann, 1906: 60 partim.  
*Brueelia* Kéler, 1936: 257.  
*Painjunirmus* Ansari, 1947: 285.  
*Allobrueelia* Eichler, 1951: 36 partim.  
*Nigronirmus* Złotorzycka, 1964: 248.  
*Spironirmus* Złotorzycka, 1964: 261.  
*Serinirmus* Soler Cruz *et al.*, 1987: 244.

### Type species

*Brueelia rossittensis* Kéler, 1936: 257 (= *Nirmus brachythorax* Giebel, 1874: 134) by original designation.

### Remarks

Clay (1954) discussed the use of the *post-spiracular sensillum* in determining homology in the abdominal chaetotaxy of Ischnocera. She stated that in *Brueelia*, these sensilla are known from segments III–VII, whereas in all other groups of ischnoceran lice, they are never found posterior to segment V. Gustafsson & Bush (2017) included these sensilla in their illustrations, but neglected to discuss their importance in the text. Based on our investigation of several hundred species of lice in the *Brueelia* complex, it seems that these sensilla occur on segments II–III only in the following genera: *Brueelia*, *Teinomordeus* Gustafsson & Bush, 2017, *Acronirmus* Eichler, 1953 and *Sychraella* Gustafsson & Bush, 2017. In all other genera of the *Brueelia* complex, these sensilla only occur on segments IV–V. However, they are typically very hard to see, especially in species with reduced tergopleurites.

Gustafsson & Bush (2017) also neglected to explicitly state that it is the position of post-spiracular setae in relationship to this sensillum that determines whether they are *psps* or *aps*. Any setae positioned laterally to the sensillum are *aps*, whereas any setae situated immediately median to this sensillum are *psps*. Note that *aps* and *psps* on the first abdominal segment bearing post-spiracular setae (often segment V or VI in *Brueelia*) may be similar in length. Moreover, in some species of, e.g., *Olivinirmus* Złotorzycka, 1964 there may be more than one *psps* per side on some segments. To our knowledge, no species in the *Brueelia* complex has more than one *aps* per side on any segment.

Several of the species here belong to a group of pied *Brueelia* species found mainly on African hosts in the families Ploceidae, Estrildidae and Paridae. The only species of this group known from hosts outside Africa is *Brueelia plocea* (Lakshminarayana, 1968), from India. We have seen many additional species in this group, all from African hosts; however, suitable hosts in the same genera are found in South Asia. We here refer to this group as the “African pied *Brueelia*” group, to distinguish it from the New World *ornatissima* group, which have similar pigmentation patterns. This group comprises the following species: *Brueelia plocea* (Lakshminarayana, 1968); *B. queleae* Sychra & Barlev in Sychra *et al.*, 2010a; *B. cantans* Sychra in Sychra *et al.*, 2010b; *B. aguilarae* Gustafsson & Bush, 2017; *B. mpumalagensis* Gustafsson *et al.*, 2018; *B. semiscalaris* sp. nov.; *B. terspichore* sp. nov.; *B. sima* sp. nov.

The main characteristic of this group is the striking pigmentation pattern. This varies slightly between species, but typically includes having dark pigmentation on the anterior and posterior margins of sternites III–VI, the female tergopleurite IX+X, along the lateral margins of the abdomen, around the distal section of femora I–III and on the subgenital plates. The dark areas are generally at least dark brown, but may appear black in some species; both sternal and subgenital plates typically have distinct translucent fenestrae in both sexes.

In the phylogeny of Bush *et al.* (2016), members of this group (e.g., *Brueelia queleae* and *Brueelia* sp. (= *B. mpumalangensis*) ex *Melaniparus niger*) were placed in different parts of the tree, suggesting that they do not form a natural group; however, these placements received no statistical support. Apart from pigmentation patterns, the morphological characters of this group are also very diverse, suggesting that the division of this group in the phylogeny of Bush *et al.* (2016) may be correct.

Nevertheless, for the purposes of identification and keying, we consider the ‘African pied *Brueelia*’ group a useful grouping to help sort out the vast diversity of species of *Brueelia* on African hosts. As more species of *Brueelia* from African hosts become known, the relationships of the species in this informal group may have to be revised, and the group may be found to be artificial. We provide a key to the described species in this group below.

#### Key to the ‘African pied *Brueelia*’

Note that the dorsal abdominal setae in the original illustration of *Brueelia plocea* have been translocated to the ventral side (Lakshminarayana 1968). No dorsal setae are given in the original description (*ibid.*: table II), but multiple setae are illustrated on some segments; we interpret all setae on these segments except the *sts* as dorsal setae. The female of *B. plocea* is undescribed.

- |  |  |
|--|--|
| 1. Male .....  | 2  |
| – Female .....   | 9  |
| 2. <i>Accessory post-spiracular setae</i> present on tergopleurite V (Fig. 9) .....  | 3  |
| – <i>Accessory post-spiracular setae</i> absent on tergopleurite V (Fig. 23) .....   | 6  |
| 3. <i>Tergal posterior setae</i> present on tergopleurites V–VI .....  | 4  |
| – <i>Tergal posterior setae</i> absent on tergopleurites V–VI (Fig. 9) .....   | 5  |
| 4. Frons rounded; <i>aps</i> present on tergopleurite IV .....   |  |
| ..... <i>Brueelia queleae</i> Sychra & Barlev in Sychra <i>et al.</i> , 2010a  |  |
| – Frons flattened; <i>aps</i> absent on tergopleurite IV .....   | <i>Brueelia cantans</i> Sychra in Sychra <i>et al.</i> , 2010b |
| 5. <i>Tergal posterior setae</i> present on tergopleurite VII (Fig. 9); dark pigmentation of subgenital plate limited to anterior margin (Figs 9, 40) .....  | <i>Brueelia semiscalaris</i> sp. nov.                          |
| – <i>Tergal posterior setae</i> absent on tergopleurite VII; dark pigmentation of subgenital plate extensive along lateral margins, reaching distal end of subgenital plate .....                          | <i>Brueelia aguilarae</i> Gustafsson & Bush, 2017              |
| 6. Preantennal head narrowly rounded .....   | <i>Brueelia plocea</i> (Lakshminarayana, 1968)                 |
| – Preantennal head broad, frons either rounded or flattened (Fig. 25) .....  | 7  |
| 7. <i>Tergal posterior setae</i> present on tergopleurite VI (Fig. 23) (absent in single examined specimen from <i>E. p. delamerei</i> ); 2 <i>ps</i> on each side of abdominal segment IV (Fig. 23) ..... | <i>Brueelia terpsichore</i> sp. nov.                           |
| – <i>Tergal posterior setae</i> absent on tergopleurite VI (Fig. 30); 1 <i>ps</i> on each side of abdominal segment IV (Fig. 30) .....   | 8  |

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8. Preantennal area roughly trapezoidal, with flattened frons (Fig. 32); *tps* present on tergopleurite VII (Fig. 30) ..... *Brueelia sima* sp. nov.  
 – Preantennal area roughly semioval, with rounded frons; *tps* absent on tergopleurite VII .....  
 ..... *Brueelia mpumalangensis* Gustafsson *et al.*, 2018
9. Frons rounded ..... 10  
 – Frons flattened (Fig. 31) ..... 11
10. Subgenital plate largely translucent, with lateral areas of dark pigmentation clearly separated from anterior band of dark pigmentation ..... *Brueelia queleae* Sychra & Barlev in Sychra *et al.*, 2010a  
 – Subgenital plate largely dark, with lateral and anterior sections of dark pigmentation fused .....  
 ..... *Brueelia mpumalangensis* Gustafsson *et al.*, 2018
11. *Pleural setae* present on abdominal segment IV (Fig. 10) ..... 12  
 – *Pleural setae* absent on abdominal segment IV (Fig. 31) ..... *Brueelia sima* sp. nov.
12. Subgenital plate with largely dark pigmentation apart from a central more or less T-shaped translucent fenestra (sections of this fenestra may be interrupted as in Fig. 29) ..... 13  
 – Subgenital plate largely translucent, but with central arched section of dark pigmentation connected to anterior band of dark pigmentation as in Figs 15, 39 ..... *Brueelia semiscalaris* sp. nov.
13. Vulval margin with distinct median point ..... *Brueelia aguilarae* Gustafsson & Bush, 2017  
 – Vulval margin without distinct median point (Fig. 29) ..... 14
14. Subgenital plate almost entirely dark, with translucent areas small and isolated from each other (Figs 29, 41) ..... *Brueelia terpsichore* sp. nov.  
 – Subgenital plate with clear central T-shaped translucent fenestrum .....  
 ..... *Brueelia cantans* Sychra in Sychra *et al.*, 2010b

*Brueelia pofadderensis* sp. nov.

[urn:lsid:zoobank.org:act:374AAEBC-FB7D-455F-86A9-D3BC2360AD78](http://urn:lsid:zoobank.org:act:374AAEBC-FB7D-455F-86A9-D3BC2360AD78)

Figs 2–8, 37–38

**Type host**

*Passer melanurus damarensis* Reichenow, 1902 – Cape sparrow (Passeridae).

**Type locality**

Pofadder, Cape Province, South Africa.

**Other hosts**

*Passer melanurus vicinus* Clancey, 1958.

**Diagnosis**

*Brueelia pofadderensis* sp. nov. is a fairly typical species of *Brueelia* from hosts in the genus *Passer* Brisson, 1760. This informal group of *Brueelia* parasitizing *Passer* spp. is characterized by long, slender heads with convex lateral margins of the preantennal area, elongated parameres and the presence of *aps* but not *psps* on the male tergopleurite V. We have seen several undescribed species of this group (D.R. Gustafsson and S.E. Bush, in prep.), but the only described species in this group is *Brueelia cyclothorax* (Burmeister, 1838) (including *N. subtilis* Nitzsch in Giebel, 1874 and *B. obligata* Eichler, 1954). No adequate illustrations or descriptions of *B. cyclothorax* have been published, but partial illustrations



were published by Eichler (1954) and Złotorzycka (1964, 1977). Note that the illustration in Eichler (1954) of the female abdomen mixes dorsal and ventral setae and characters on the same side. The frons in his illustrations are also incorrectly illustrated, as the hyaline margin has collapsed in his specimens.

*Brueelia pofadderensis* sp. nov. can be separated from *B. cyclothorax* by the following characters: abdominal segment III in both sexes without *ps* in *B. pofadderensis* sp. nov. (Figs 2–3), but with 1 *ps* on each side in *B. cyclothorax*; male tergopleurite IV without *aps* in *B. pofadderensis* sp. nov. (Fig. 2), but with *aps* in *B. cyclothorax*; antero-lateral corners of mesosomal lobes blunt in *B. pofadderensis* sp. nov. (Figs 5–6), but acute in *B. cyclothorax*; distal section of mesosome almost square-shaped in *B. pofadderensis* sp. nov. (Figs 5–6), but with more convergent lateral margins in *B. cyclothorax*; parameres more elongated in *B. cyclothorax* than in *B. pofadderensis* sp. nov. (Fig. 7).

### Etymology

The specific epithet is derived from the type locality.

### Material examined

#### Holotype

SOUTH AFRICA • ♂, ex *Passer melanurus damarensis*; Cape Province, Pofadder; May 1949; R. Meinertzhagen leg.; NHML 19050.

#### Paratypes

SOUTH AFRICA • 3 ♂♂; same data as for holotype; NHML 19050.

UNKNOWN COUNTRY • 1 ♂, 1 ♀, ex *Passer melanurus demarensis*; locality unknown; Mar. 1913; J. Waterston Collection, formerly South Africa Museum; British Museum; NHML 1930-232.

#### Other material

SOUTH AFRICA • 1 ♂, 1 ♀, ex *Passer melanurus vicinus*; West Transvaal, Potchefstroom; May 1953; British Museum; NHML 1955-660 • 2 ♂♂, 1 ♀, ex *Passer melanurus vicinus*; Transvaal, Ventersdorp; 12 Jul. 1954; H.E. Paterson leg.; British Museum; NHML 1955-660.

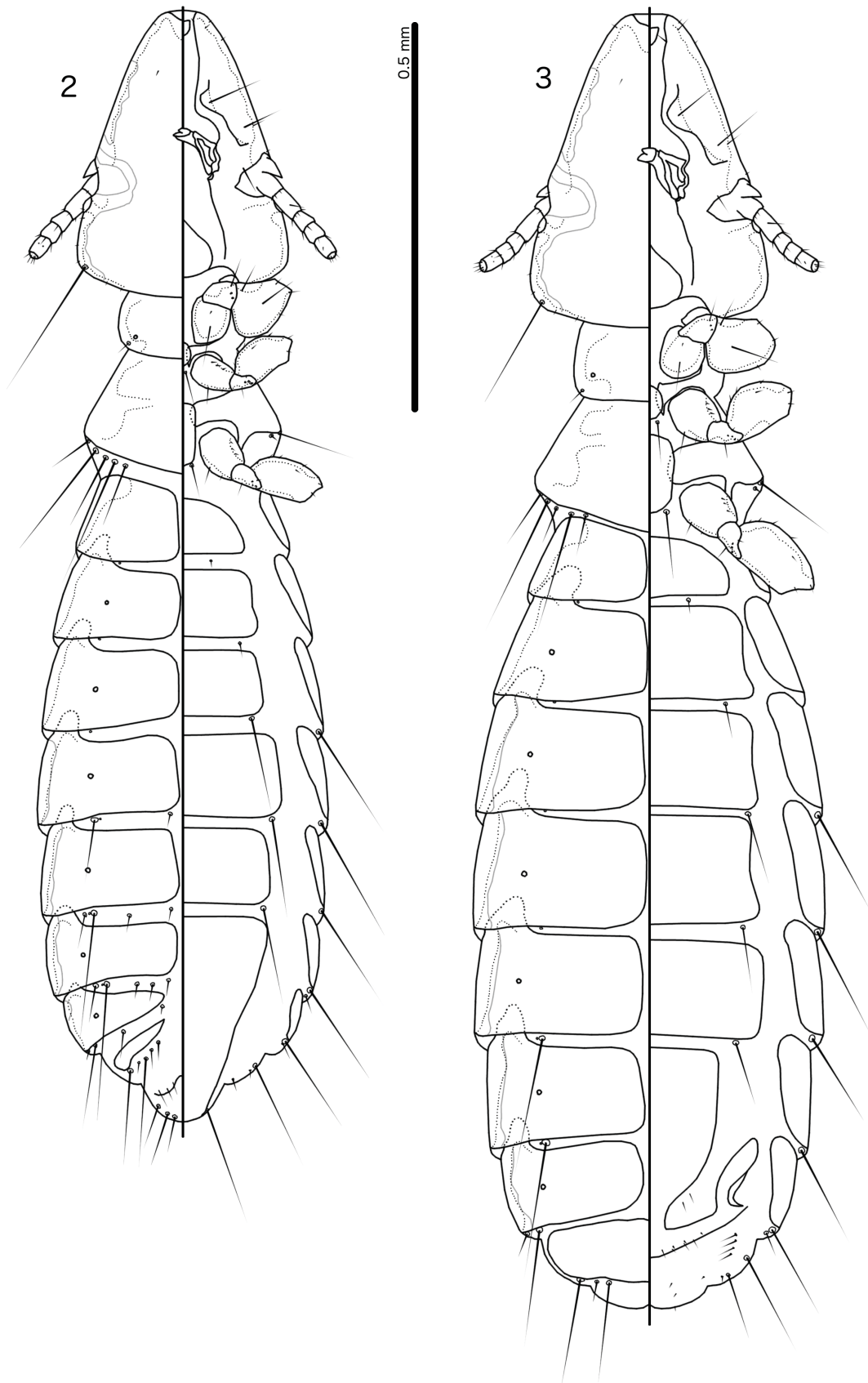
### Description

Head slenderly rounded, dome-shaped (Fig. 4), lateral margins of preantennal area convex, frons slightly convex. Marginal carina narrow, with shallowly undulating median margins, displaced and widened at oculus. Ventral anterior plate large, with flat to shallowly concave anterior margin. Head chaetotaxy and pigmentation patterns as in Fig. 4; head sensilla and *pts* not visible in examined specimens. Pre- and postocular nodi of similar size. Marginal temporal carina slender, with undulating median margin. Gular plate broad, lanceolate. Thoracic and abdominal segments and pigmentation patterns as in Figs 2–3, 37–38.

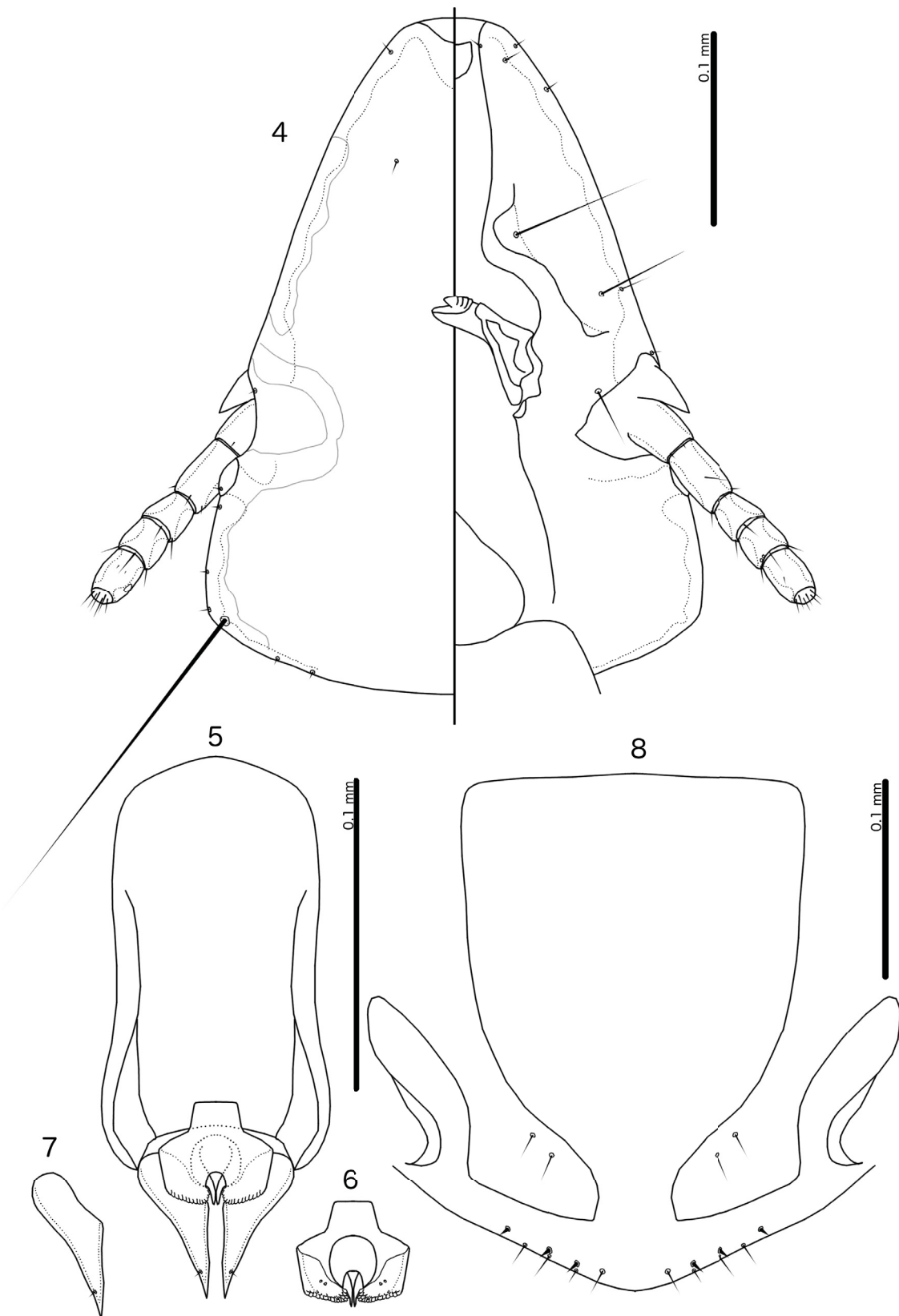
#### Male

Thoracic and abdominal chaetotaxy as in Fig. 2; 1–2 *tps* on tergopleurite VI. Basal apodeme broad, with shallowly concave lateral margins (Fig. 5). Proximal mesosome broadly trapezoidal, widening slightly distally (Fig. 6). Mesosomal lobes wide, angular, with extensive rugose area along distal margin. Gonopore oval, slightly longer than wide. Penile arms reach beyond distal margin of mesosome. Parameres slender, elongated distally (Fig. 7); *pst1–2* as in Fig. 7. Measurements ex *P. m. damarensis* (n = 5): TL = 1.30–1.40; HL = 0.34–0.35; HW = 0.26–0.27; PRW = 0.16–0.18; PTW = 0.27; AW = 0.35–0.38. Measurements ex *P. m. vicinus* (n = 3): TL = 1.39–1.51; HL = 0.34–0.36; HW = 0.26–0.30; PRW = 0.16–0.19; PTW = 0.27–0.31; AW = 0.36–0.41.

GUSTAFSSON D.R. *et al.*, Four new *Brueelia* (Phthiraptera: Ischnocera) from Africa



**Figs 2–3.** *Brueelia pofadderensis* sp. nov. ex *Passer melanurus damarensis* Reichenow, 1902. **2.** ♂, holotype (NHML 19050), habitus, dorsal and ventral views. **3.** ♀, habitus, dorsal and ventral views.



**Figs 4–8.** *Brueelia pofadderensis* sp. nov. ex *Passer melanurus damarensis* Reichenow, 1902. 4–7. ♂, holotype (NHML 19050). 4. Head, dorsal and ventral views. 5. Genitalia, dorsal view. 6. Mesosome, ventral view. 7. Paramere, dorsal view. 8. ♀, subgenital plate and vulval margin, ventral view.

### Female

Thoracic and abdominal chaetotaxy as in Fig. 3. Subgenital plate rounded trapezoidal, with moderately wide connection to cross piece (Fig. 8). Vulval margin convergent to rounded median point, in specimen from type host subspecies with 2–3 short, slender *vms* and 3 short, thorn-like *vss* on each side; 3 short, slender *vos* on each side of subgenital plate; distal 1 *vos* median to *vss*. In material from *P. m. vicinus*, with 4 short, slender *vms* and 3–5 short, thorn-like *vss* on each side of vulval margin, and 2–3 short, slender *vos* on each side of subgenital plate, with distal 1 *vos* situated median to *vss*. Measurements ex *P. m. damarensis* (n = 1): TL = 1.66; HL = 0.40; HW = 0.30; PRW = 0.20; PTW = 0.31; AW = 0.46. Measurements ex *P. m. vicinus* (n = 2): TL = 1.69–1.81; HL = 0.37–0.40; HW = 0.29–0.34; PRW = 0.17–0.21; PTW = 0.29–0.33; AW = 0.40–0.47.

### Remarks

Specimens from the Transvaal host subspecies, *Passer melanurus vicinus*, differ from the specimens from the type host subspecies by having proportionately shorter and more rounded preantennal heads, in size and in the female genital chaetotaxy; the latter character may be different only due to the small number of specimens examined. The male genitalia and abdominal chaetotaxy are essentially similar between the two populations. We presently do not consider these differences substantial enough to warrant the erection of a new taxon for the specimens from Transvaal, but note that in some other cases, different host subspecies are parasitized by different species of *Brueelia* (D.R. Gustafsson and S.E. Bush, in prep.).

### *Brueelia semiscalaris* sp. nov.

[urn:lsid:zoobank.org:act:FB13FA53-0431-4E3B-9050-04D1BDEA14C5](http://urn:lsid:zoobank.org:act:FB13FA53-0431-4E3B-9050-04D1BDEA14C5)

Figs 9–15, 39–40

### Type host

*Granatina granatina* (Linnaeus, 1766) – violet-eared waxbill (Estrildidae).

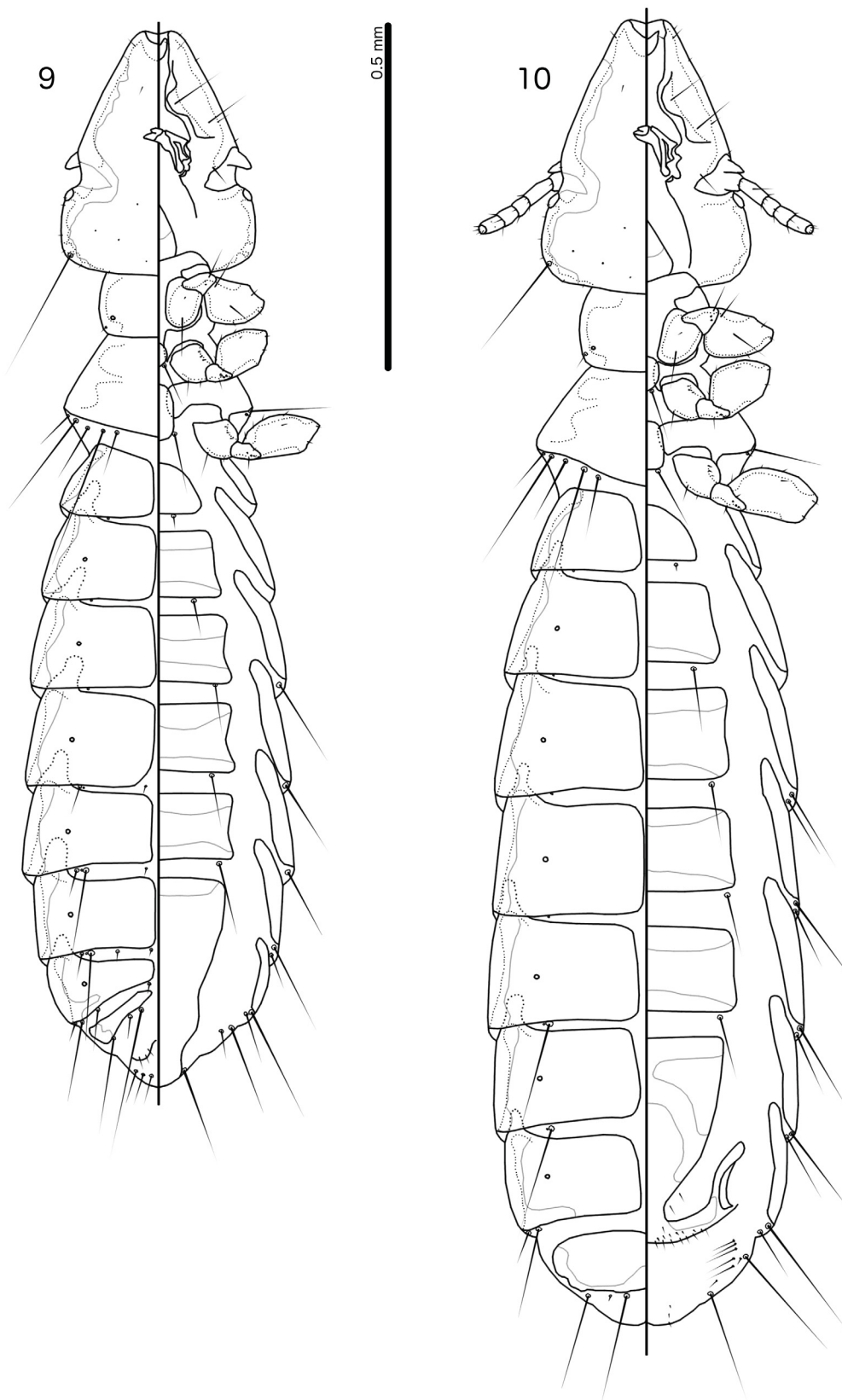
### Type locality

Mahalapye, Botswana.

### Diagnosis

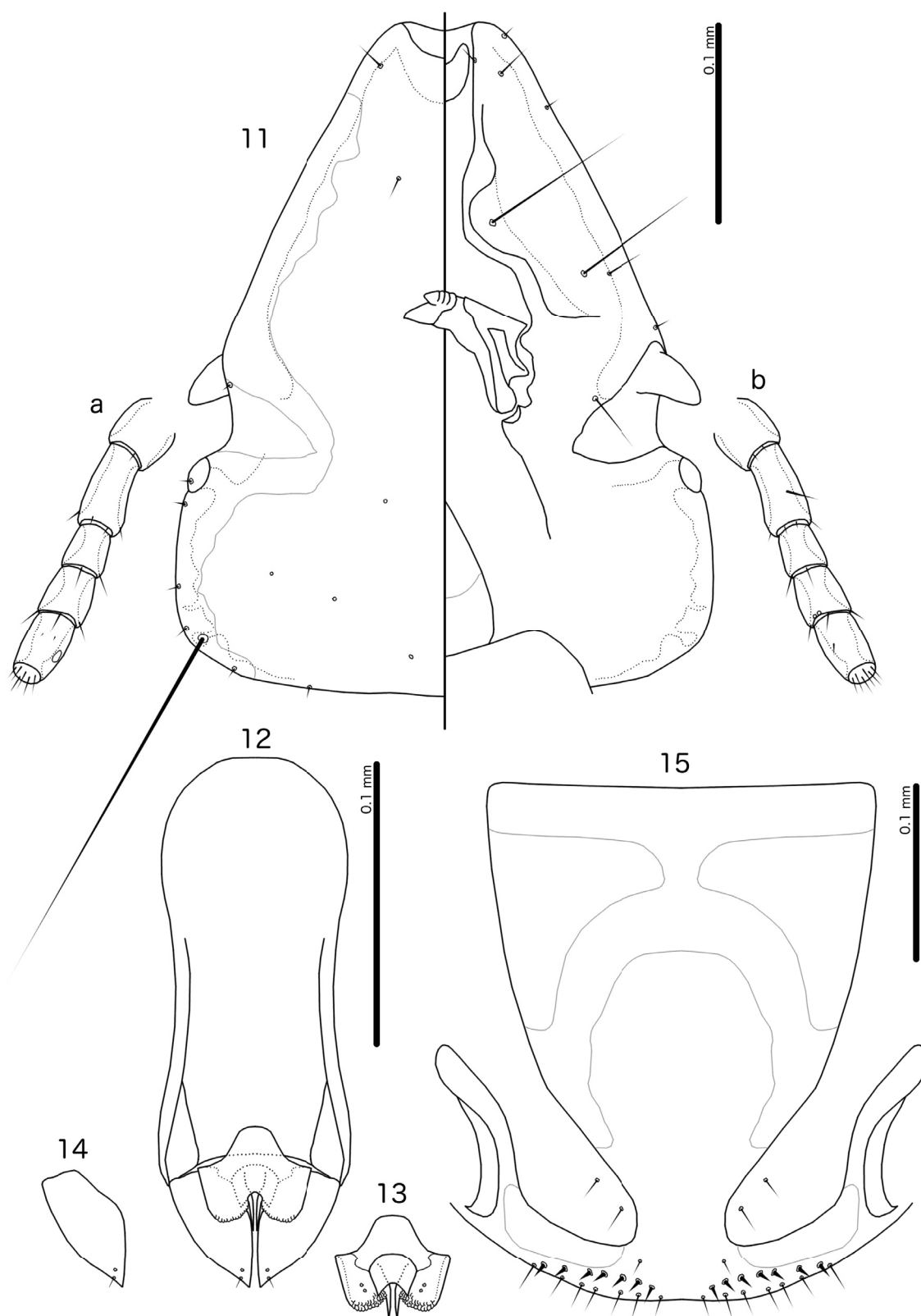
*Brueelia semiscalaris* sp. nov. belongs to the “African pied *Brueelia*” group (see above), but is the palest described member of this group. Within this group, *B. semiscalaris* sp. nov. is most similar to *B. aguilarae* Gustafsson & Bush, 2017, with which it shares the following characters: head relatively slender (Fig. 11), with flattened frons and only slightly convex lateral margins of the preantennal area; mesosome with nearly parallel lateral margins and somewhat angular postero-lateral corners (Fig. 13); *aps* absent on male tergopleurite IV (Fig. 9); *tps* absent on male tergopleurites V–VI (Fig. 9); *ps* present on female abdominal segment IV (Fig. 10).

*Brueelia semiscalaris* sp. nov. can be separated from *B. aguilarae* by the following characters: *tps* present on male tergopleurite VII in *B. semiscalaris* sp. nov. (Fig. 9), but absent in *B. aguilarae*; parameres broad and roughly oval in *B. semiscalaris* sp. nov. (Fig. 14), but slender and elongated in *B. aguilarae*; proximal mesosome with convex lateral margins in *B. aguilarae*, but with concave lateral margins in *B. semiscalaris* sp. nov. (Fig. 13); gonopore about as long as wide and penile arms reaching beyond distal margin of mesosome in *B. semiscalaris* sp. nov. (Fig. 13), but gonopore very short and penile arms not reaching posterior margin of mesosome in *B. aguilarae*; female subgenital plate with central translucent, T-shaped fenestra in *B. aguilarae*, but with arched central dark pigmentation in *B. semiscalaris* sp. nov.



**Figs 9–10.** *Brueelia semiscalaris* sp. nov. ex *Granatina granatina* (Linnaeus, 1766). **9.** ♂, holotype (NHML 1956-561), habitus, dorsal and ventral views. Antennae distorted in original, and not illustrated. **10.** ♀, habitus, dorsal and ventral views.





**Figs 11–15.** *Brueelia semiscalaris* sp. nov. ex *Granatina granatina* (Linnaeus, 1766). **11–14.** ♂, holotype (NHML 1956-561). **11.** Head, dorsal and ventral views; **a–b.** Antennae from ♀, dorsal and ventral views. **12.** Genitalia, dorsal view. **13.** Mesosome, ventral view. **14.** Paramere, dorsal view. **15.** ♀, subgenital plate and vulval margin, ventral view.

(Figs 15, 39); vulval margin with flattened median section in *B. semiscalaris* sp. nov. (Fig. 15), but with median point in *B. aguilarae*.

### Etymology

The specific epithet is derived from the Latin ‘*semi*’ for ‘partial, incomplete’ and ‘*scalaris*’ for ‘ladder’, referring to the pigmentation pattern of the abdomen.

### Type material

#### Holotype

BOTSWANA • ♂; Bechuanaland (= Botswana), Mahalapye; 21 Dec. 1955; British Museum; NHML 1956-561.

#### Paratype

BOTSWANA • ♀; same data as for holotype.

### Description

Head rounded trapezoidal (Fig. 11), lateral margins of preantennal area slightly convex proximally and slightly concave distally, frons concave. Marginal carina moderate, deeply displaced and much widened at osculum, with almost even median margin. Ventral anterior plate large, with deeply concave anterior margin. Head chaetotaxy and pigmentation patterns as in Fig. 11. Preantennal nodi elongated. Preocular nodi much larger than postocular nodi. Marginal temporal carina moderate in width, with undulating median margin. Gular plate slender, lanceolate. Thoracic and abdominal segments and pigmentation patterns as in Figs 9–10, 39–40.

#### Male

Antennae folded ventrally in single examined male and cannot be illustrated accurately. Seemingly similar to female antennae (Fig. 11a–b) in shape and proportions, but paler. Thoracic and abdominal chaetotaxy as in Fig. 9; *aps* present on tergopleurite V; *tps* present on tergopleurite VII. Proximal basal plate almost entirely translucent, exact extent hard to ascertain; here illustrated tentatively (Fig. 12); slender with concave lateral margins. Proximal mesosome rounded trapezoidal, rather broad (Fig. 13). Mesosomal lobes with nearly parallel lateral margins and somewhat angular postero-lateral corners; rugose area extensive at distal end. Gonopore arched, about as wide as long. Penile arms long, reaching beyond distal margin of mesosome. Parameres broadly oval, not much elongated distally, with *pst1–2* as in Fig. 14. Measurements (n = 1): TL = 1.51; HL = 0.35; HW = 0.28; PRW = 0.18; PTW = 0.28; AW = 0.38.

#### Female

Thoracic and abdominal chaetotaxy as in Fig. 10; *ps* present on abdominal segment IV. Subgenital plate rounded triangular, with broad connection to cross piece and unique pigmentation pattern (Fig. 15). Vulval margin flattened, median section somewhat concave, with 6–7 short, slender *vms* and 7–8 short, thorn-like *vss* on each side; 3 short, slender *vos* on each side of subgenital plate; distal 1 *vos* just anterior to *vss*. Measurements (n = 1): TL = 1.91; HL = 0.40; HW = 0.31; PRW = 0.20; PTW = 0.32; AW = 0.46.

### *Brueelia bicurvata* (Piaget, 1880)

Figs 16–22

*Nirmus bicurvatus* Piaget, 1880: 159, pl. 13, fig. 8.

*Degeeriella bicurvata* – Harrison 1916: 109.

*Brueelia bicurvata* – Hopkins & Clay 1952: 53. — Gustafsson & Bush 2017: 38.

### Type host

*Vidua paradisaea* (Linnaeus, 1758) – long-tailed paradise whydah (Ploceidae).

### Type locality

Original material from the Leiden Museum, but no type locality given by Piaget (1880).

### Material examined

ZAMBIA • 2 ♂♂, 2 ♀♀, ex *Vidua paradisaea obtusa*; North Rhodesia [= Zambia], Luanshya; 26 May 1955; British Museum; NHML 1955-486, ML/121.

### Description

Head rounded trapezoidal (Fig. 18), lateral margins of preantennal area slightly convex proximally, but slightly concave distally, frons broadly flattened to slightly concave. Marginal carina slender, deeply displaced and much widened at osculum, and with median margin slightly undulating. Ventral anterior plate oblong, with rounded posterior margin. Head chaetotaxy and pigmentation pattern as in Fig. 18. Preantennal nodi elongated. Preocular nodi larger than postocular nodi. Marginal temporal carina slender, with slightly undulating median margin. Gular plate slenderly lanceolate. Thoracic and abdominal segments and pigmentation patterns as in Figs 16–17.

#### Male

Male subgenital plate does not reach terminal end of abdomen (Fig. 16). Thoracic and abdominal chaetotaxy as in Fig. 16. Basal apodeme broad, with concave lateral margins (Fig. 19). Proximal mesosome broad, convergent to median point, and with lateral extensions, making entire structure somewhat arrow-shaped (Fig. 20). Mesosomal lobes long and broad, with almost parallel lateral margins, rounded postero-lateral corners, and extensive rugose area along distal margin. Gonopore roughly semi-oval, about as long as wide. Penile arms long, reaching beyond distal margin of mesosome. Parameres long and broad, distal section elongated, with *pstl*-2 as in Fig. 21. Measurements (n = 2): TL = 1.48–1.51; HL = 0.36; HW = 0.30; PRW = 0.20; PTW = 0.29–0.31; AW = 0.40–0.41.

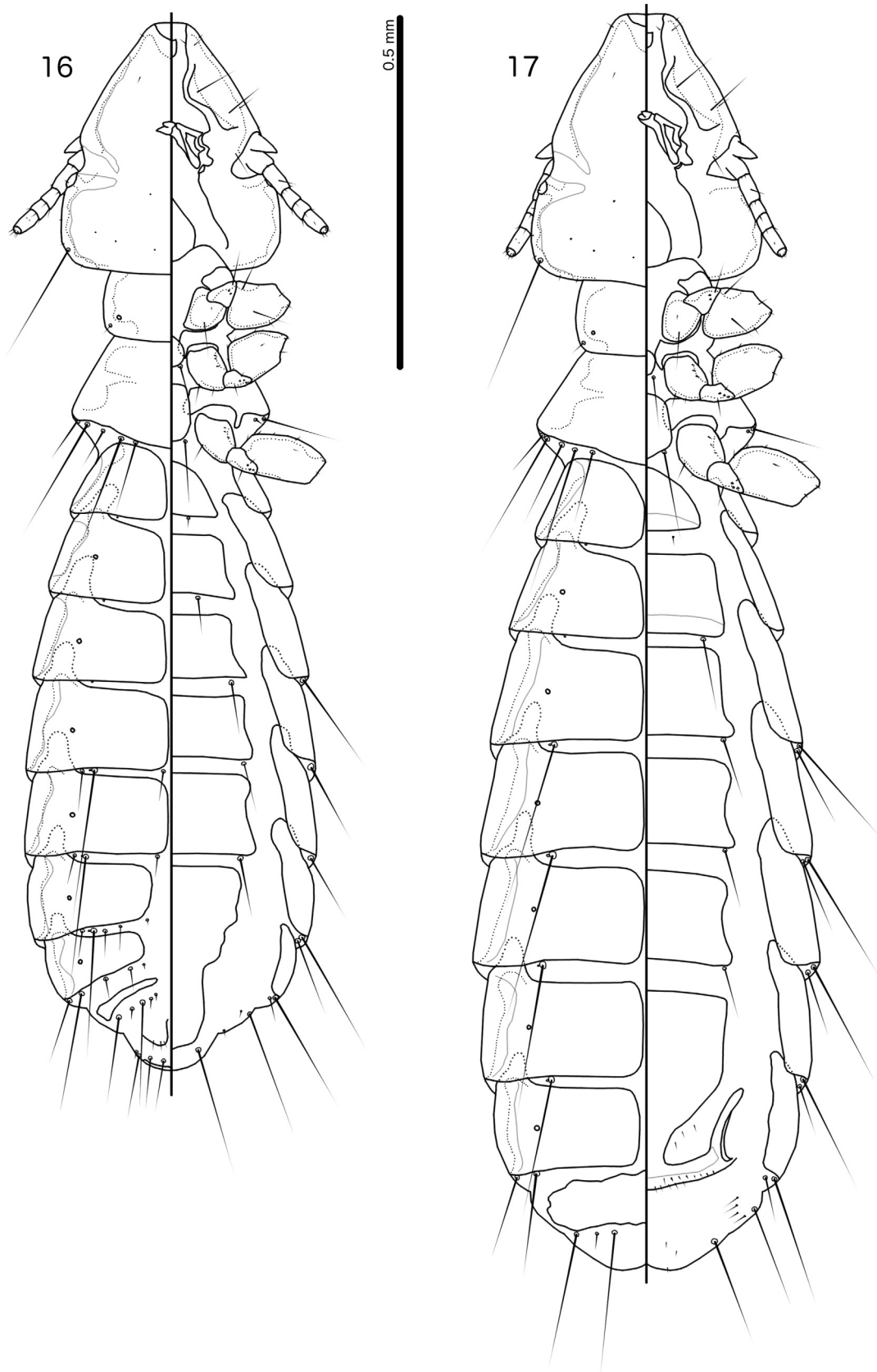
#### Female

Thoracic and abdominal chaetotaxy as in Fig. 17; *psps* present on tergopleurites IV–VII. Subgenital plate shaped as in Fig. 22, with broad connection to cross piece. Vulval margin somewhat convergent to median point, with 3–5 short, slender *vms* and 5–8 short, thorn-like *vss* on each side; 2–4 short, slender *vos* on each side of subgenital plate; distal 1 *vos* median to *vss*. Measurements (n = 2): TL = 1.76–1.81; HL = 0.37–0.39; HW = 0.31–0.34; PRW = 0.20–0.21; PTW = 0.30–0.33; AW = 0.44–0.47.

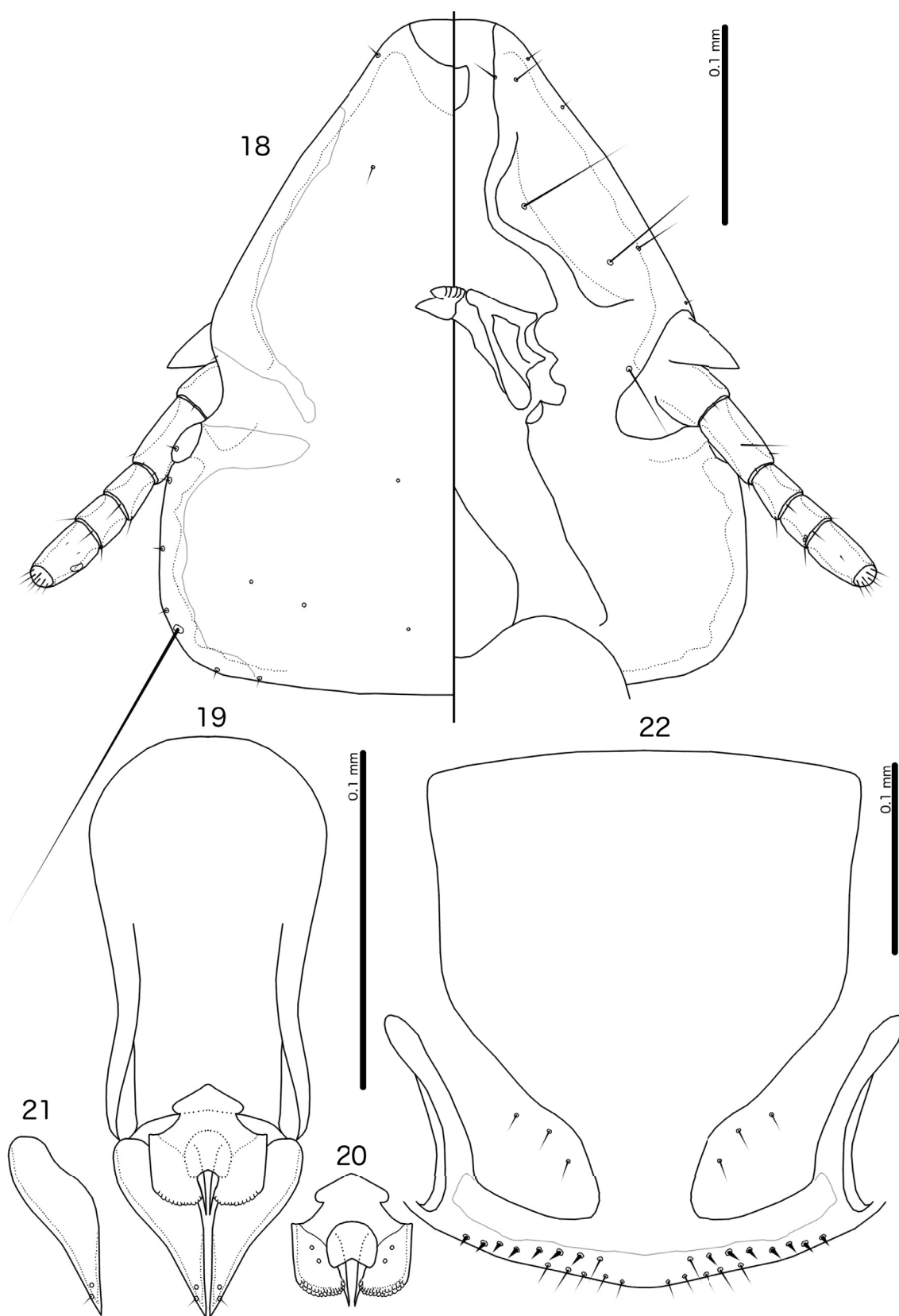
### Remarks

The presence of *psps* on the female tergopleurites IV–V is unusual in *Brueelia*. No examples of females with *psps* on these segments were included in the list of variation in abdominal chaetotaxy of *Brueelia* published by Gustafsson & Bush (2017: table 3). We know of no other species of *Brueelia* in which *psps* are present on the female tergopleurite IV, but *psps* are present on the female tergopleurite V in several species of *Brueelia* found on icterid hosts (Cicchino & Castro 1996). Carriker (1963) illustrated setae on female tergopleurites III–VII in the position of *psps* in *B. mirabile* Carriker, 1963, but did not illustrate any *sts*. It is therefore doubtful whether these setae represent *psps* or *sts* translocated to the dorsal side; we have not examined Carriker's material. In females of most genera in the *Brueelia* complex, *psps* are absent on tergopleurites IV–V, and the general absence of these setae in *Brueelia* (except in *B. bicurvata*) is unusual for the complex (Gustafsson & Bush 2017: table 2).

A specimen of *Brueelia* from *Vidua macroura* was included in the phylogeny of Bush *et al.* (2016), but its placement as sister to the remaining *Brueelia* s. str. received no statistical support. As *psps* are



**Figs 16–17.** *Brueelia bicurvata* (Piaget, 1880) ex *Vidua paradisaea* (Linnaeus, 1758) (NHML 1955-486, ML/121). **16.** ♂, habitus, dorsal and ventral views. **17.** ♀, habitus, dorsal and ventral views.



**Figs 18–22.** *Brueelia bicurvata* (Piaget, 1880) ex *Vidua paradisaea* (Linnaeus, 1758) (NHML 1955-486, ML/121). **18.** ♂, head, dorsal and ventral views. **19.** ♂, genitalia, dorsal view. **20.** ♂, mesosome, ventral view. **21.** ♂, paramere, dorsal view. **22.** ♀, subgenital plate and vulval margin, ventral view.



commonly found on female tergopleurites IV–V in many other genera of the *Brueelia* complex (see Gustafsson & Bush 2017), it is possible that this represents the ancestral condition in the *Brueelia* complex, and that this placement as sister to the remaining *Brueelia* is correct.

Notably, these setae are present in both *Formicaphagus* Carriker, 1957 (see Price & Clayton 1996) and *Formicaticola* Carriker, 1957 (see Price & Clayton 1995), two of the genera most closely related to the *Brueelia* complex in the phylogeny of Bush *et al.* (2016). In the closest relative, *Neopsittaconirmus* Conci, 1942, the distribution of *psps* varies, e.g., present on III–VII in *N. albus* (Le Souëf & Bullen, 1902) (Price & Emerson 1978), but present only on IV–V in many species (Guimarães 1974) and only on IV in *N. gracilis* Guimarães, 1974 (see also Sychra 2005).

***Brueelia terpsichore* sp. nov.**

urn:lsid:zoobank.org:act:A5296B28-CC4A-430B-928B-9A92B2AC5E2B

Figs 23–29, 41–42

**Type host**

*Euplectes jacksoni* (Sharpe, 1891) – Jackson’s widowbird (Ploceidae).

**Type locality**

Kenya.

**Other host**

*Euplectes progne delamerei* (Shelley, 1903) – long-tailed widowbird.

**Diagnosis**

*Brueelia terpsichore* sp. nov. belongs to the informal ‘African pied *Brueelia*’ group (see above). Within this group, *B. terpsichore* sp. nov. is not particularly similar to any species. The extensive dark pigmentation of the sternites and subgenital plates of both sexes, the abdominal chaetotaxy, and the head shape suggests that *B. aguilarae* may be the closest relative of *B. terpsichore* sp. nov. These two species can be separated by the following characters: *tps* present on male tergopleurites VI–VIII in *B. terpsichore* sp. nov. (Fig. 23), but absent in *B. aguilarae*; male abdominal segment IV with 2 *ps* on each side in *B. terpsichore* sp. nov. (Fig. 23), but with 1 *ps* on each side in *B. aguilarae*; *aps* absent on male tergopleurite V in *B. terpsichore* sp. nov. (Fig. 23), but present in *B. aguilarae*; proximal mesosome broadly rounded in *B. aguilarae*, but trapezoidal in *B. terpsichore* sp. nov. (Fig. 27); translucent fenestra of female subgenital plate T-shaped in *B. aguilarae*, but divided into smaller, isolated fenestrae in *B. terpsichore* sp. nov. (Figs 29, 41; note that there is some variation between specimens in this species); vulval margin gently rounded in *B. terpsichore* sp. nov. (Fig. 29), but convergent to median point in *B. aguilarae*.

**Etymology**

The specific epithet is in honor of the Greek muse Terpsichore, goddess of dance; ultimately from the Greek ‘*terpo*’ for ‘I delight’ and ‘*khoros*’ for ‘dance’. This refers to the peculiar lekking behaviour of the type host, which includes the construction of a small stage on which the male dances by jumping high into the air and singing to attract females (Andersson 1989, 1991).

**Material examined**

**Holotype**

KENYA • ♂, ex *Euplectes jacksoni* (as *Drepanoplectes jacksoni*); Kenya; Jan. 1936; R. Meinertzhagen leg.; NHML 6084 (lower male on slide).

### Paratypes

KENYA • 2 ♂♂, 10 ♀♀; same data as for holotype; NHML 6081, 6082, 6084 (not lower male on slide), 6210.

### Other material

KENYA • 1 ♂, 1 ♀, ex *Euplectes progne delamerei* (as *Drepanoplectes progne delamerei*); Kenya; Jan. 1936; R. Meinertzhagen leg.; NHML 6714.

### Description

Head rounded trapezoidal (Fig. 25), lateral margins of preantennal area slightly convex or almost straight, frons broadly flattened. Marginal carina broad, deeply displaced and much widened at osculum, with undulating median margin. Ventral anterior plate not visible. Head chaetotaxy and pigmentation pattern as in Fig. 25. Preantennal nodi large, bulging. Pre- and postocular nodi large. Marginal temporal carina broad, with distinctly undulating median margin. Gular plate slender, lanceolate. Thoracic and abdominal segments and pigmentation patterns as in Figs 23–24, 41–42.

### Male

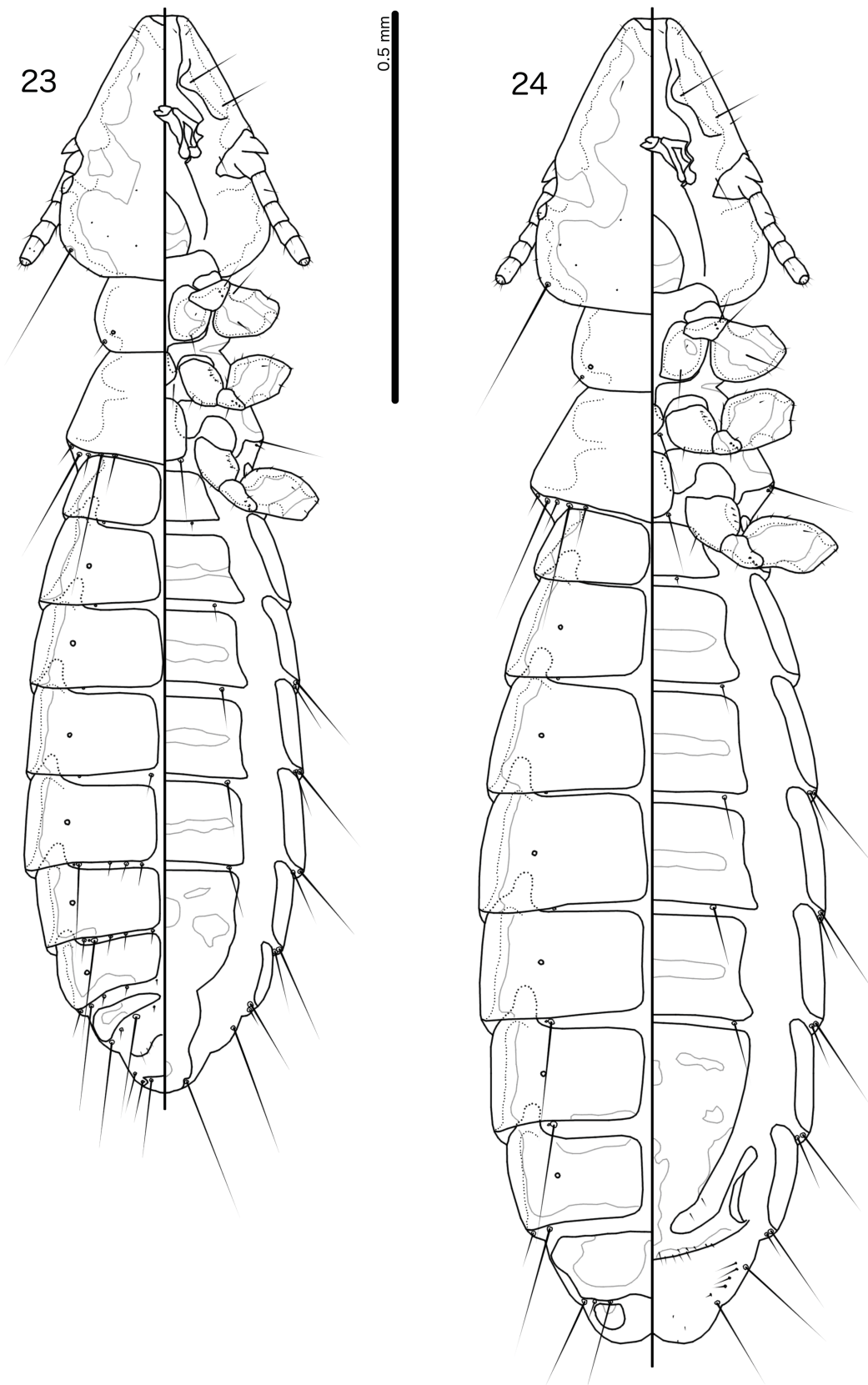
Thoracic and abdominal chaetotaxy as in Fig. 23. Anterior section of basal apodeme not pigmented and cannot be seen clearly in examined specimens; illustration here is approximate (Fig. 26). Proximal mesosome rounded trapezoidal, widening distally, with concave lateral margins (Fig. 27). Mesosomal lobes relatively slender, rounded distally, with rugose area limited to distal margin. Gonopore crescent-shaped, slightly wider than long. Penile arms short, not reaching beyond distal margin of mesosome. Parameres elongated, tapering gently (Fig. 28); *pst1*–2 as in Fig. 28. Measurements ex *Euplectes jacksoni* (n = 3): TL = 1.42–1.48; HL = 0.33–0.34; HW = 0.26–0.28; PRW = 0.19; PTW = 0.26–0.27; AW = 0.36–0.37. Measurements ex *E. progne delamerei* (n = 1): TL = 1.44; HL = 0.34; HW = 0.26; PRW = 0.19; PTW = 0.27; AW = 0.35.

### Female

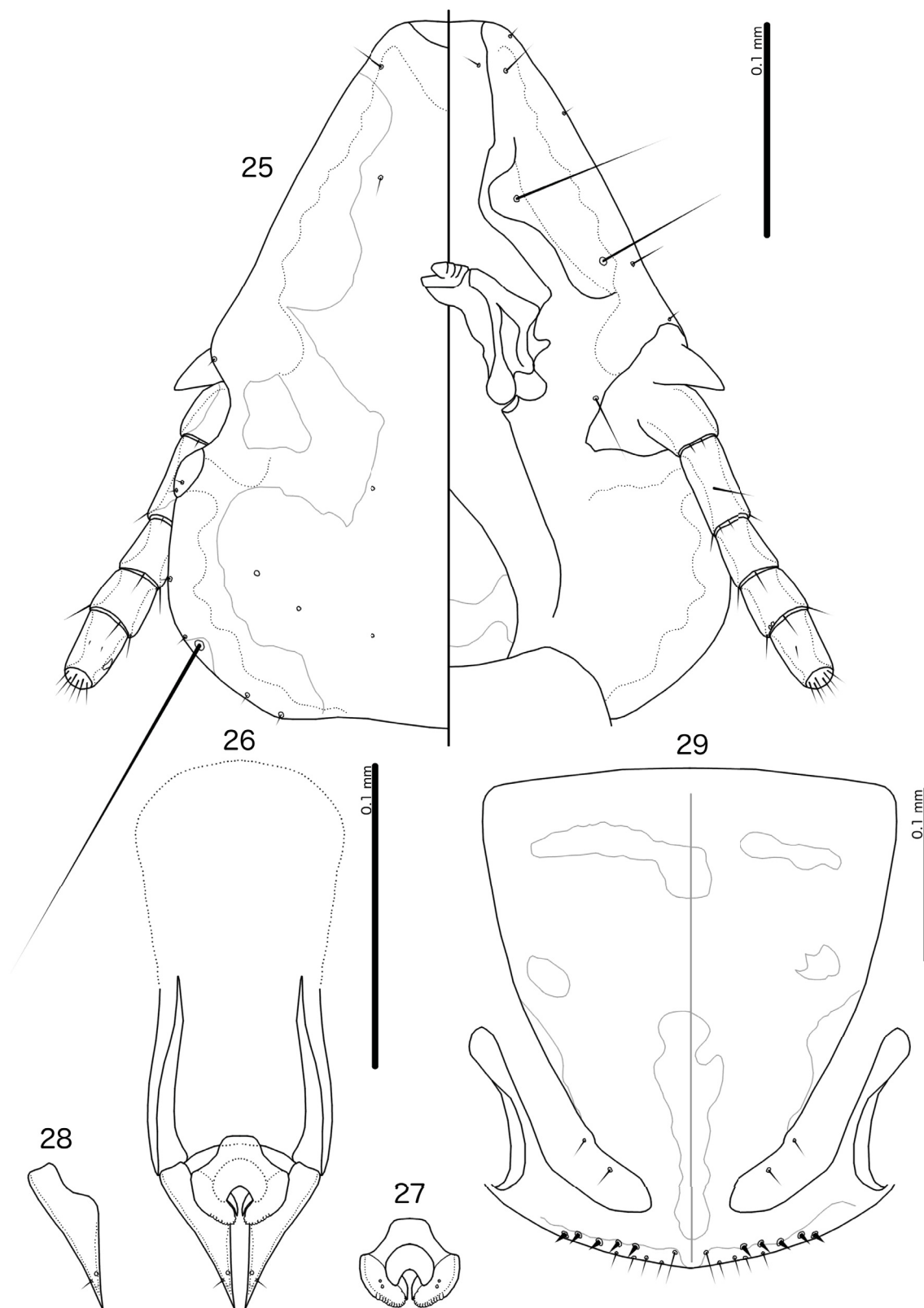
Thoracic and abdominal chaetotaxy as in Fig. 24. Pigmentation pattern of subgenital plate differing slightly between specimens; two variants shown in Fig. 29 (separated by grey line), one with antero-lateral fenestra connected to antero-median fenestra and one with these fenestrae unconnected. Antero-median fenestra generally pale brown in pigmentation, may extend posteriorly to approach postero-median fenestra (not shown). Exact shape of postero-lateral fenestrae and translucent lateral borders of distal subgenital plate also differ between specimens. Subgenital plate rounded triangular, with moderate connection to cross piece. Vulval margin gently rounded, with 3–5 short, slender *vms* and 4–6 short, thorn-like *vss* on each side; 2–3 short, slender *vos* on each side of subgenital plate; distal 1 *vos* median to *vss*. Material from both host species with same vulval chaetotaxy. Measurements ex *Euplectes jacksoni* (n = 10): TL = 1.58–1.73 (1.66); HL = 0.36–0.38 (0.37); HW = 0.28–0.31 (0.30); PRW = 0.19–0.22 (0.21); PTW = 0.28–0.31 (0.30); AW = 0.40–0.44 (0.42). Measurements ex *E. progne delamerei* (n = 1): TL = 1.73; HL = 0.37; HW = 0.30; PRW = 0.21; PTW = 0.31; AW = 0.40.

### Remarks

No significant differences have been found between specimens from the two host species, except that the single examined male from *Euplectes progne delamerei* lacks *tps* on tergopleurite VI. These are present in all specimens from the type host; however, the number varies between 1 and 2. As only one male from *E. p. delamerei* was examined, we presently do not attach any significance to this difference, as the *psps* on this segment is also missing on one side. The absence of these setae may thus be due to individual variation.



**Figs 23–24.** *Brueelia terpsichore* sp. nov. ex *Euplectes jacksoni* (Sharpe, 1891). 23. ♂, holotype (NHML 6084), habitus, dorsal and ventral views. 24. ♀, habitus, dorsal and ventral views.



**Figs 25–29.** *Brueelia terpsichore* sp. nov. ex *Euplectes jacksoni* (Sharpe, 1891). 25–28. ♂, holotype (NHML 6084). 25. Head, dorsal and ventral views. 26. Genitalia, dorsal view. 27. Mesosome, ventral view. 28. Paramere, dorsal view. 29. ♀, subgenital plate and vulval margin, ventral view.

***Brueelia sima* sp. nov.**

urn:lsid:zoobank.org:act:3657A29B-5BDB-4E90-A0EC-AD665F787BC7

Figs 30–36, 43–44

**Type host**

*Malimbus nitens* (Gray, 1831) – blue-billed malimbe (Ploceidae).

**Type locality**

Batouri, Cameroon.

**Diagnosis**

*Brueelia sima* sp. nov. is part of the informal ‘African pied *Brueelia*’ group (see above). Within this group, *B. sima* sp. nov. does not appear to be particularly similar to any other species, but the head shape and proportions are most reminiscent of those in *B. cantans* Sychra in Sychra *et al.*, 2010. These two species can be separated by the following characters: in *B. cantans*, *aps* and *tps* are present on male tergopleurites V–VI, but they are absent in *B. sima* sp. nov. (Fig. 30); multiple *tps* are present on male tergopleurite VII in *B. cantans*, but only a single *tps* is present on this segment in males of *B. sima* sp. nov. (Fig. 30); the mesosome has angular postero-lateral corners in *B. cantans*, but has rounded postero-lateral corners in *B. sima* sp. nov. (Fig. 34); parameres less elongated in *B. sima* sp. nov. (Fig. 35) than in *B. cantans*; the female subgenital plate with an anterior transversal fenestra, interrupted medianly, and with a large central fenestra separated from the anterior transversal fenestra in *B. sima* sp. nov. (Figs 36, 43), but with all these fenestrae continuous in *B. cantans*.

**Etymology**

The specific epithet is derived from the Latin ‘*simus*’ for ‘snub-nosed’, referring to the relatively short and broad preantennal area of this species.

**Type material**

**Holotype**

CAMEROON • ♂; French Cameroons [= Cameroon], Batouri; 15 May 1959; J. Mouchet leg.; British Museum; NHML 1960-295.

**Paratype**

CAMEROON • ♀; same data as for holotype; NHML 1960-295.

**Description**

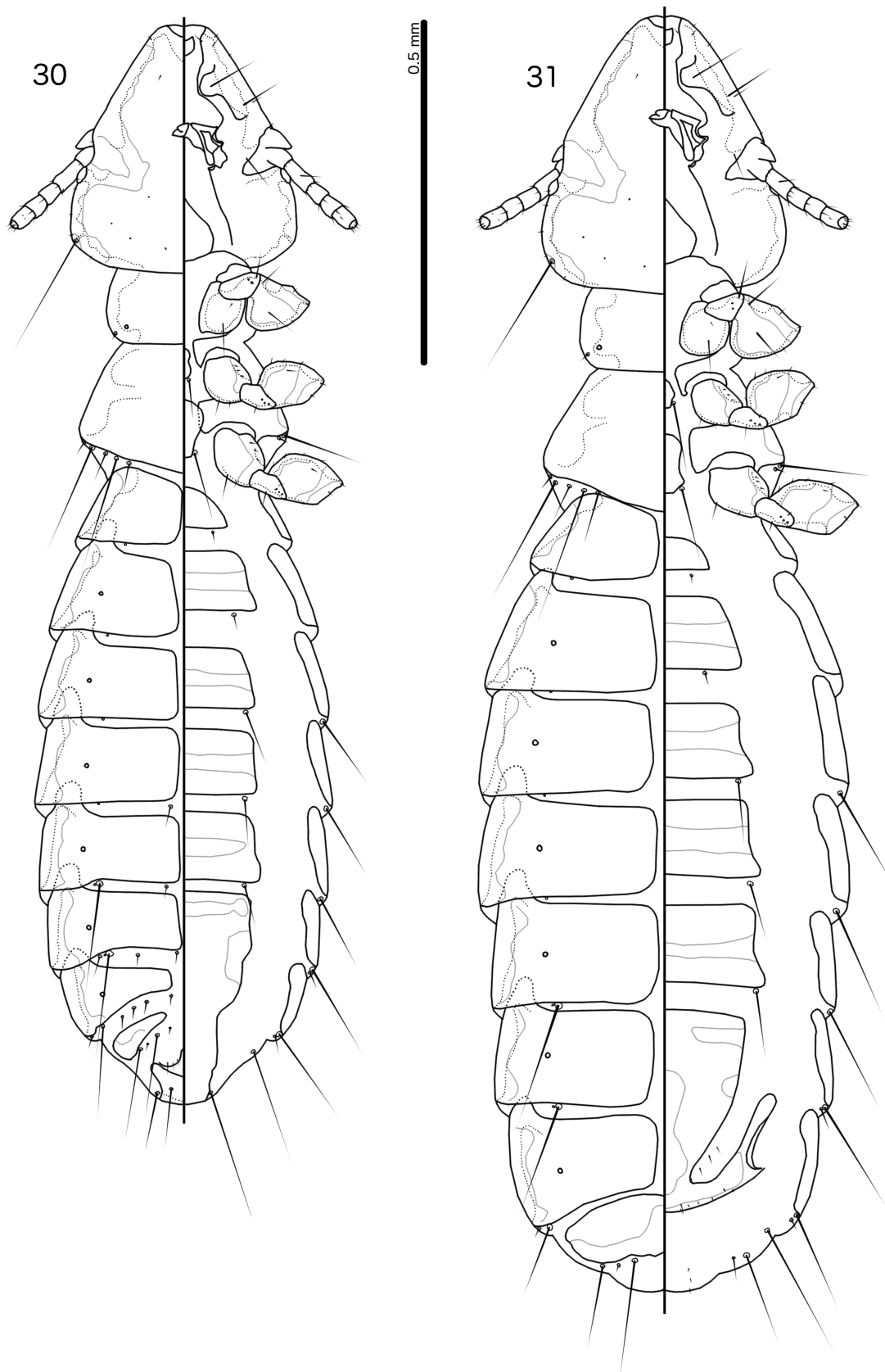
Head rounded trapezoidal (Fig. 32), lateral margins of preantennal area slightly convex, frons broadly flattened. Marginal carina broad, deeply displaced and much widened at osculum, and with undulating median margin. Ventral anterior plate broad, shield-shaped. Head chaetotaxy and pigmentation pattern as in Fig. 32. Preantennal nodi bulging, elongated. Preocular nodi much larger than postocular nodi. Marginal temporal carina broad, with distinctly undulating median margin. Gular plate broad, with concave antero-lateral margins. Thoracic and abdominal segments and pigmentation patterns as in Figs 30–31, 43–44.

**Male**

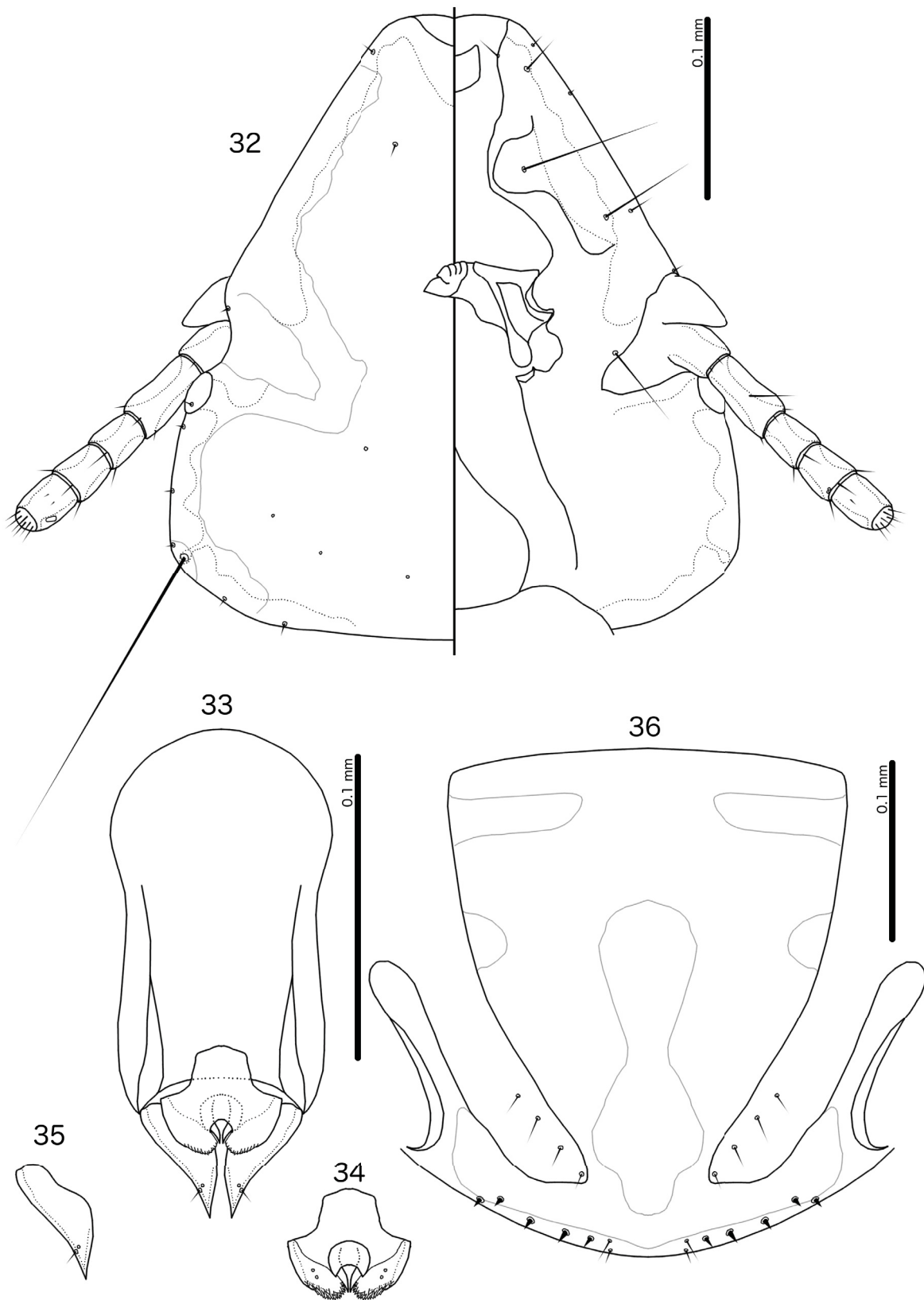
Thoracic and abdominal chaetotaxy as in Fig. 30. Basal apodeme broad, lateral margins concave (Fig. 33). Proximal mesosome roughly trapezoidal, widening slightly distally, and with anterior margin convergent to median point (Fig. 34). Mesosomal lobes broad, rounded distally, with extensive rugose area at distal end. Gonopore crescent-shaped, slightly wider than long. Penile arms short, not reaching



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**Figs 30–31.** *Brueelia sima* sp. nov. ex *Malimbus nitens* (Gray, 1831). **30.** ♂, holotype (NHML 1960-295), habitus, dorsal and ventral views. **31.** ♀, habitus, dorsal and ventral views.



**Figs 32–36.** *Brueelia sima* sp. nov. ex *Malimbus nitens* (Gray, 1831). **32–35.** ♂, holotype (NHML 1960-295). **32.** Head, dorsal and ventral views. **33.** Genitalia, dorsal view. **34.** Mesosome, ventral view. **35.** Paramere, dorsal view. **36.** ♀, subgenital plate and vulval margin, ventral view.

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beyond distal margin of mesosome. Parameres broad, not much elongated distally; *pst1*–2 as in Fig. 35. Measurements ( $n = 1$ ): TL = 1.56; HL = 0.36; HW = 0.32; PRW = 0.23; PTW = 0.31; AW = 0.43.

### Female

Thoracic and abdominal chaetotaxy as in Fig. 31. Pigmentation pattern of subgenital plate as in Fig. 36; note that transition between brown and translucent areas of subgenital plate is gradual, and exact borders of translucent fenestra here approximate. Subgenital plate rounded triangular (Fig. 36), with broad connection to cross piece. Vulval margin gently rounded, with 1 short, slender *vms* and 4–5 short, thorn-like *vss* on each side; 3–6 short, slender *vos* on each side of subgenital plate; distal 1 *vos* median to *vss*. Measurements ( $n = 1$ ): TL = 1.80; HL = 0.39; HW = 0.35; PRW = 0.24; PTW = 0.35; AW = 0.53.

### Remarks

The abdomen of the single examined female is partially disrupted due to mounting; however, one side of every segment is undistorted. We have here illustrated the abdomen tentatively, based on the undistorted sides. However, the gonapophysal setae on segments VIII–X are absent on both sides of the specimen and are not illustrated here. These setae are present in all other species of the *Brueelia* complex, and when more specimens of *B. sima* sp. nov. are examined, it is likely that these setae will be found.

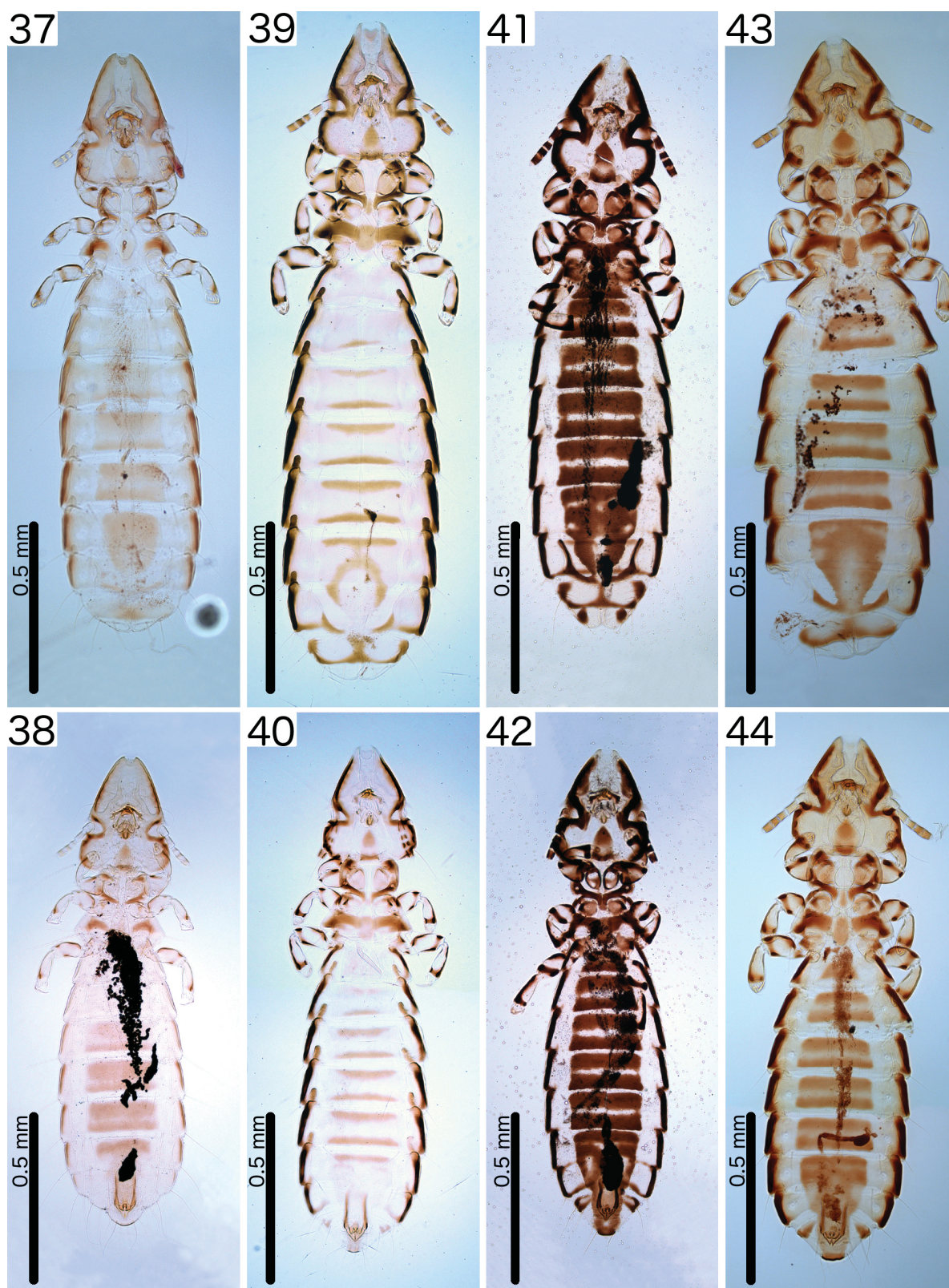
### Discussion

The genetic data published by Bush *et al.* (2016), Light *et al.* (2016) and Takano *et al.* (2017, 2018) suggest that many of the *Brueelia* complex louse records from Africa represent distinct species, most of which appear to be host-specific. However, the vast majority of the species of chewing lice on African birds remain undescribed. We estimate that the potential *Brueelia* fauna of African passeriforms and piciforms comprises well over 1000 species (Table 1). The actual number of *Brueelia* recorded from Africa (including this report) is below 50 species. It is thus fair to say that the *Brueelia* fauna of Africa is almost entirely unknown, with less than 5% of the potential species described so far. These numbers are even worse when other genera in the *Brueelia* complex are included (data not shown).

For instance, 305 bird species that could potentially be parasitized by lice of the *Brueelia* complex (i.e., Passeriformes, Trogoniformes, Meropidae, Picidae) are listed as resident in South Africa by Sinclair *et al.* (2014). Chewing lice of the *Brueelia* complex have been reported from 51 of these potential host species since 1980, but only 18 of these reports are identified to species level (Appendix). Assuming that most of the lice of the *Brueelia* complex in South Africa are host-specific, and that most of the resident host species are infested with at least one louse species of the *Brueelia* complex, this suggests that the number of such species in South Africa may be underestimated by a factor of ten. The number of species of the *Brueelia* complex in all of Africa is most likely even more badly underestimated. The entirety of sub-Saharan West Africa has only 31 identified records of lice in the *Brueelia* complex (Appendix), but the region is home to over 560 species of potential host species (Borrow & Demey 2014). Note that these numbers do not include migrants to these regions, and the number of potential host species is therefore much higher if non-resident bird species are included.

In addition, many passeriform birds are parasitized by more than one species of chewing lice of the *Brueelia* complex (Gustafsson & Bush 2017). Moreover, there are indications that some host species are infested with different species of lice in the same genus in different parts of its range (e.g., *Brueelia* spp. on different subspecies of *Plocepasser mahali* (Smith, 1836); Gustafsson & Bush, in prep.). In some cases, multiple *Brueelia* species occur on the same host even in the absence of different host subspecies (e.g., *B. zohrae* Ansari, 1956 and *B. moreli* Ansari, 1957, both on *Ptilostomus afer* (Linnaeus, 1766)). By contrast, some species of lice in the *Brueelia* complex occur on multiple host species (e.g., Balakrishnan & Sorenson 2006; Bush *et al.* 2016), sometimes including host species from different families. Notably, four of the new genera described by Gustafsson & Bush (2017) are presently known only from African





**Figs 37–44.** Habitus photos of the species of *Brueelia* described as new herein, showing overall pigmentation patterns. 37. *B. pofadderensis* sp. nov., ♀. 38. *B. pofadderensis* sp. nov., ♂. 39. *B. semiscalaris* sp. nov., ♀. 40. *B. semiscalaris* sp. nov., ♂. 41. *B. terpsichore* sp. nov., ♀. 42. *B. terpsichore* sp. nov., ♂. 43. *B. sima* sp. nov., ♀. 44. *B. sima* sp. nov., ♂. All photographs are to scale.

endemic host groups. The undescribed diversity and host associations of African lice in the *Brueelia* complex may thus outweigh the known diversity significantly.

To a large extent, the lack of identifications to species level in these reports is due to the fact that very few chewing lice in the *Brueelia* complex have even been described from Africa. There is thus no framework of descriptions and illustrations with which to compare collected specimens. Here, we describe four new species of *Brueelia* from African hosts and redescribe one species. Three of these species belong to an apparently widely distributed informal group, characterised by their striking pigmentation patterns; a key to this informal group is provided. We hope that, together with those recently published by Gustafsson & Bush (2015, 2017) and Gustafsson *et al.* (2018), the descriptions, illustrations and key characters presented here will make future identifications and descriptions of African species of *Brueelia* easier, and help us better understand the biodiversity and evolutionary history of the *Brueelia* complex.

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**Appendix** (continued on next 15 pages). Species of chewing lice in the *Brueelia* complex (sensu Gustafsson & Bush 2017) reported from Africa since Ledger (1980). Louse taxonomy follows Gustafsson & Bush (2017); however, many of the specimens identified only to genus level have not been examined, and may in fact belong to a different genus than listed below. For brevity, louse subgenera have been excluded, and host subspecies are included only if reported in the original publication. Host taxonomy follows Clements *et al.* (2018).

Host species	Louse species	Country	Reference
<b>Cuculiformes</b>			
<b>Cuculidae</b>			
<i>Coua caerulea</i>	<i>Couata angulata</i> (Piaget, 1880)	Madagascar	Gustafsson & Bush 2017
	<i>Koanirmus koaphilus</i> Mey, 2017	Madagascar	Mey 2017
<i>Coua cristata pyropyga</i> Grandidier, 1867	<i>Couata dodekopter</i> Gustafsson & Bush, 2017	Madagascar	Gustafsson & Bush 2017
<i>Coua serriana</i> Pucheran, 1845	<i>Couata goniodes</i> (Piaget, 1880)	Madagascar	Gustafsson & Bush 2017
	<i>Tesonirmus teso</i> Mey, 2017	Madagascar	Mey 2017
<i>Coua</i> sp.	<i>Couata angulata</i> (Piaget, 1880)	Madagascar	Mey 2017
<b>Piciformes</b>			
<b>Lybiidae</b>			
<i>Buccanodon duchaillui</i> (Cassin, 1856)	<i>Gnimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Tricholaema leucomelas</i> (Boddaert, 1783)	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<b>Picidae</b>			
<i>Dendropicos goertae</i> (Müller, 1776)	<i>Brueelia goertae</i> Dalgleish, 1971	Cameroon	Gustafsson & Bush 2017
<b>Coraciiformes</b>			
<b>Brachypteraciidae</b>			
<i>Brachypteracias leptosomus</i> (Lesson, 1833)	<i>Buerelius longiceps</i> (Piaget, 1880)	Madagascar	Bush <i>et al.</i> 2016; Gustafsson & Bush 2017
	<i>Buerelius subsimus</i> Clay & Tandan, 1967	Madagascar	Gustafsson & Bush 2017
<b>Meropidae</b>			
<i>Merops albicollis</i> Vieillot, 1817	<i>Meropsiella erythropteri</i> (Piaget, 1885)	Cameroon	Williams 1981; Gustafsson & Bush 2017
		Ghana	Bush <i>et al.</i> 2016; Gustafsson & Bush 2017
		Sierra Leone	Williams 1981; Gustafsson & Bush 2017

Appendix (continued). Species of chewing lice in the *Brueelia* complex (sensu Gustafsson & Bush 2017) reported from Africa since Ledger 1980.

Host species	Louse species	Country	Reference
<i>Merops apiaster</i> Linnaeus, 1758	<i>Meropoecus meropis</i> (Denny, 1842)	Egypt	Gustafsson & Bush 2017
		Morocco	Gustafsson & Bush 2017
		South Africa	Gustafsson & Bush 2017
		Uganda	Gustafsson & Bush 2017
	<i>Meropsiella apiastri</i> (Denny, 1842)	Egypt	Williams 1981
		Malawi	Bush <i>et al.</i> 2016; Gustafsson & Bush 2017
		Morocco	Gustafsson & Bush 2017
		South Africa	Gustafsson & Bush 2017
		Sudan <sup>1</sup>	Gustafsson & Bush 2017
		Uganda	Williams 1981; Gustafsson & Bush 2017
		Zambia	Gustafsson & Bush 2017
<i>Merops bullocki</i> Vieillot, 1817	<i>Meropoecus emersoni</i> Tendeiro, 1961	Ghana	Gustafsson & Bush 2017
	<i>Meropsiella erythropteri</i> (Piaget, 1885)	Senegal	Najer <i>et al.</i> 2012
		Ghana	Williams 1981; Gustafsson & Bush 2017
		Senegal	Najer <i>et al.</i> 2012
<i>Merops bullockoides</i> (Smith, 1834)	<i>Meropoecus mossambicensis</i> Tendeiro, 1989	Mozambique	Tendeiro 1989
	<i>Meropsiella bullockoda</i> (Williams, 1981)	Kenya	Williams 1981; Gustafsson & Bush 2017
		Mozambique	Williams 1981; Gustafsson & Bush 2017
		South Africa	Williams 1981
		Zambia	Williams 1981
<i>Merops gularis</i> Shaw, 1798	<i>Meropsiella erythropteri</i> (Piaget, 1885)	Ghana	Bush <i>et al.</i> 2016; Gustafsson & Bush 2017
<i>Merops hirundineus</i> Lichtenstein, 1793	<i>Meropsiella erythropteri</i> (Piaget, 1885)	Mozambique	Williams 1981
		Tanzania	Williams 1981; Gustafsson & Bush 2017
		Zimbabwe	Williams 1981; Gustafsson & Bush 2017
<i>Merops nubicooides</i> De Murs & Pucherans, 1846	<i>Meropoecus eichleri</i> Tendeiro, 1989	Mozambique	Tendeiro 1989
	<i>Meropsiella erythropteri</i> (Piaget, 1885)	Zimbabwe	Williams 1981; Gustafsson & Bush 2017

<sup>1</sup> Almost all specimens from Sudan were collected by Richard Meimertzhagen, who was stationed in Kenya. It thus seems likely that at least some of these specimens were collected in what is today South Sudan; however, the only locality information given on the slides is “Sudan”.



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**Appendix (continued).** Species of chewing lice in the *Brueelia* complex (sensu Gustafsson & Bush 2017) reported from Africa since Ledger 1980.

Host species	Louse species	Country	Reference
<i>Merops nubicus</i> Gmelin, 1788	<i>Meropsiella erythropteri</i> (Piaget, 1885)	Sudan	Williams 1981; Gustafsson & Bush 2017
<i>Merops oreobates</i> (Sharpe, 1892)	<i>Meropsiella erythropteri</i> (Piaget, 1885)	Kenya	Williams 1981; Gustafsson & Bush 2017
<i>Merops orientalis cleopatra</i> Nicoll, 1910	<i>Meropsiella erythropteri</i> (Piaget, 1885)	Egypt	Gustafsson & Bush 2017
<i>Merops orientalis viridissimus</i> Swainson, 1837	<i>Meropoecus debeauxi</i> Conci, 1941	Nigeria	Gustafsson & Bush 2017
<i>Merops persicus persicus</i> Pallas, 1773	<i>Meropsiella erythropteri</i> (Piaget, 1885)	Sudan	Williams 1981; Gustafsson & Bush 2017
<i>Merops pusillus cyanostictus</i> Cabanis, 1869	<i>Meropoecus meropis</i> (Denny, 1842)	Egypt	Gustafsson & Bush 2017
<i>Merops pusillus meridionalis</i> (Sharpe, 1892)	<i>Meropsiella erythropteri</i> (Piaget, 1885)	Kenya	Williams 1981; Gustafsson & Bush 2017
<i>Merops pusillus pusillus</i> Müller, 1776	<i>Meropsiella erythropteri</i> (Piaget, 1885)	Somalia	Gustafsson & Bush 2017
		Malawi	Bush <i>et al.</i> 2016; Gustafsson & Bush 2017
		South Africa	Gustafsson & Bush 2017
	<i>Meropoecus debeauxi</i> Conci, 1941	Nigeria	Gustafsson & Bush 2017
		Sierra Leone	Gustafsson & Bush 2017
		Mozambique	Williams 1981
<i>Merops revoilii</i> Oustalet, 1882	<i>Meropsiella erythropteri</i> (Piaget, 1885)	Somalia	Gustafsson & Bush 2017
	<i>Meropoecus debeauxi</i> Conci, 1941	Somalia	Gustafsson & Bush 2017
<i>Merops variegatus loringi</i> (Mearns, 1915)	<i>Meropsiella erythropteri</i> (Piaget, 1885)	Somalia	Williams 1981; Gustafsson & Bush 2017
<i>Merops variegatus variegatus</i> Vieillot, 1817	<i>Meropsiella erythropteri</i> (Piaget, 1885)	Uganda	Gustafsson & Bush 2017
		Uganda	Williams 1981
<b>Passeriformes</b>			
<b>Acrocephalidae</b>			
<i>Iduna similis</i> Richmond, 1897	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
<b>Alaudidae</b>			
<i>Alauda arvensis cantarella</i> Bonaparte, 1850	<i>Brueelia parviguttata</i> (Blagoveshtchensky, 1940)	Morocco	Gustafsson & Bush 2017
<i>Mirafra africana</i> Smith, 1836	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<b>Bernieridae</b>			
<i>Bernieria madagascariensis</i> (Gmelin, 1789)	<i>Guimaraesiella</i> sp.	Madagascar	Bush <i>et al.</i> 2016
<i>Randia pseudozosterops</i> Delacour & Berlioz, 1931	<i>Aratricerca</i> sp.	Madagascar	Bush <i>et al.</i> 2016
<i>Xanthomixis cinereiceps</i> Sharpe, 1881	<i>Guimaraesiella</i> sp.	Madagascar	Bush <i>et al.</i> 2016

Appendix (continued). Species of chewing lice in the *Brueelia* complex (sensu Gustafsson & Bush 2017) reported from Africa since Ledger 1980.

Host species	Louse species	Country	Reference
<b>Buphagidae</b>			
<i>Buphagus africanus</i> Linnaeus, 1766	<i>Buphagoecus husaini</i> (Ansari, 1968)	Kenya	Gustafsson & Bush 2017
<i>Buphagus erythrorhynchus</i> (Stanley, 1814)	<i>Buphagoecus prominens</i> (Ansari, 1968)	Ethiopia	Gustafsson & Bush 2017
<b>Campephagidae</b>			
<i>Coracina pectoralis</i> Jardine & Selby, 1828	<i>Indocephalanetes</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Cyanograucaculus azureus</i> (Cassin, 1852)	<i>Indocephalanetes</i> sp.	Ghana	Bush <i>et al.</i> 2016
<i>Lobotos oriolinus</i> Bates, 1909	<i>Indocephalanetes loboccapatrix</i> Gustafsson & Bush, 2017	“Congo”	Gustafsson & Bush 2017
<b>Cisticolidae</b>			
<i>Apalis flavida</i> (Strickland, 1852)	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Calamonastes fasciolatus</i> (Smith, 1847)	<i>Sturmidoecus</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Camaroptera brachyura</i> (Vieillot, 1820)	<i>Guimaraesiella</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Cisticola fuvicapilla</i> (Vieillot, 1817)	<i>Sturmidoecus</i> sp.	Senegal	Najer <i>et al.</i> 2012
<i>Cisticola lais</i> (Hartlaub & Finsch, 1870)	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Cisticola natalensis</i> (Smith, 1843)	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Prinia erythroptera</i> (Jardine, 1849)	<i>Brueelia</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Prinia maculosa</i> (Boddaert, 1783)	<i>Sturmidoecus</i> sp.	Senegal	Najer <i>et al.</i> 2012
<i>Prinia subflava</i> (Gmelin, 1789)	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
	<i>Brueelia priniae</i> Najer & Sychra in Najer <i>et al.</i> , 2012	Senegal	Najer <i>et al.</i> 2012
<b>Corvidae</b>			
<i>Corvus albicollis</i> Latham, 1790	<i>Corvonirmus leucocephalus</i> (Nitzsch in Giebel, 1866)	Kenya	Gustafsson & Bush 2017
		Lesotho	Gustafsson & Bush 2017
		Nigeria	Gustafsson & Bush 2017
		Tanzania	Gustafsson & Bush 2017
		Uganda	Gustafsson & Bush 2017

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Host species	Louse species	Country	Reference
<i>Corvus albus</i> Müller, 1776	<i>Corvonirmus</i> sp.?	Ghana	Bush <i>et al.</i> 2016
	<i>Corvonirmus quadrangularis</i> (Rudow, 1869)	Botswana	Gustafsson & Bush 2017
		Kenya	Gustafsson & Bush 2017
		Liberia	Gustafsson & Bush 2017
		Mozambique	Gustafsson & Bush 2017
		Namibia	Gustafsson & Bush 2017
		South Africa	Gustafsson & Bush 2017
		Sudan	Gustafsson & Bush 2017
		Tanzania	Gustafsson & Bush 2017
		Uganda	Gustafsson & Bush 2017
		Sudan	Gustafsson & Bush 2017
<i>Corvus capensis capensis</i> Lichtenstein, 1823	<i>Hecatrishula bipunctata</i> (Rudow, 1870)	South Africa	Gustafsson & Bush 2017
	<i>Corvonirmus variegatus</i> (Ansari, 1957)	Namibia	Gustafsson & Bush 2017
	<i>Hecatrishula nawabi</i> (Ansari, 1957)	Ethiopia	Gustafsson & Bush 2017
	<i>Corvonirmus variegatus</i> (Ansari, 1957)	Somalia	Gustafsson & Bush 2017
<i>Corvus corax tingitanus</i> Irby, 1874	<i>Corvonirmus argulus</i> (Burmeister, 1838)	Egypt	Gustafsson & Bush 2017
		Morocco	Gustafsson & Bush 2017
		“Northern Africa”	Gustafsson & Bush 2017
<i>Corvus cornix pallescens</i> (Madarasz, 1904)	<i>Corvonirmus uncinus</i> (Burmeister, 1838)	Egypt	Gustafsson & Bush 2017
	<i>Corvonirmus theresae</i> (Ansari, 1957)	Ethiopia	Gustafsson & Bush 2017
<i>Corvus rhipidurus</i> Hartert, 1918		Kenya	Gustafsson & Bush 2017
		Uganda	Gustafsson & Bush 2017
<i>Garrulus glandarius whitakeri</i> Hartert, 1903	<i>Olivinirmus glandarii</i> (Denny, 1842)	Morocco	Gustafsson & Bush 2017
	<i>Brueelia moreli</i> Ansari, 1957	Senegal	Gustafsson & Bush 2017
<i>Ptilostomus afer</i> (Linnaeus, 1766)	<i>Brueelia zohrae</i> Ansari, 1956	Uganda	Gustafsson & Bush 2017
		Guinea-Bissau	Gustafsson & Bush 2017
		Sudan	Gustafsson & Bush 2017
<i>Pica pica mauritanica</i> Malherbe, 1845	<i>Brueelia</i> sp.	Ghana	Bush <i>et al.</i> 2016
	<i>Olivinirmus agatirensis</i> Mey, 2017	Morocco	Mey 2017

Appendix (continued). Species of chewing lice in the *Brueelia* complex (sensu Gustafsson & Bush 2017) reported from Africa since Ledger 1980.

Host species	Loose species	Country	Reference
<i>Pyrrhocorax pyrrhocorax barbarus</i> Vaurie, 1954	<i>Hecatrishula docilis</i> (Ansari, 1956)	Morocco	Gustafsson & Bush 2017
<i>Zavattariornis stresemanni</i> Moltoni, 1938	<i>Brueelia zavattariornis</i> Ansari, 1956	Ethiopia	Gustafsson & Bush 2017
<b>Dicruridae</b>			
<i>Dicrurus adsimilis</i> (Bechstein, 1794)	<i>Brueelia</i> sp.	Senegal	Najer <i>et al.</i> 2012
<i>Dicrurus modestus</i> Hartlaub, 1849	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
	<i>Guimaraesiella</i> sp.	Ghana	Bush <i>et al.</i> 2016
<b>Emberizidae</b>			
<i>Emberiza cabanisi</i> (Reichenow, 1875)	<i>Brueelia</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Emberiza flaviventris</i> Stephens, 1815	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Emberiza tahapisi</i> Smith, 1836	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<b>Estrildidae</b>			
<i>Amadina fasciata</i> (Gmelin, 1789)	<i>Mirandofures fasciata</i> (Sychra in Sychra <i>et al.</i> , 2010b)	Senegal	Sychra <i>et al.</i> 2010b
<i>Amandava subflava</i> (Vieillot, 1819)	<i>Brueelia</i> sp.	Cameroon	Balakrishnan & Sorenson 2006
<i>Coccopygia melanotis</i> (Temminck, 1823)	<i>Mirandofures</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Cryptospiza reichenovii</i> (Hartlaub, 1874)	<i>Mirandofures</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Estrilda astrild</i> (Linnaeus, 1758)	<i>Mirandofures astrildae</i> (Tendeiro & Mendes, 1994)	São Tomé and Príncipe	Tendeiro & Mendes 1994
<i>Estrilda erythronotus</i> (Vieillot, 1817)	<i>Mirandofures</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Euodice cantans</i> (Gmelin, 1789)	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Granatina granatina</i> (Linnaeus, 1758)	<i>Brueelia cantans</i> Sychra in Sychra <i>et al.</i> , 2010b <i>Brueelia semiscalaris</i> sp. nov.	Senegal	Sychra <i>et al.</i> 2010b
<i>Hypargos niveoguttatus</i> Peters, 1868	<i>Brueelia</i> sp.	Botswana	This report
<i>Lagonoticta rara</i> (Antinori, 1864)	<i>Mirandofures</i> sp. <i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
	<i>Brueelia</i> sp.	Malawi	Bush <i>et al.</i> 2016
	<i>Brueelia</i> sp.	Cameroon	Balakrishnan & Sorenson 2006

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Host species	Louse species	Country	Reference
<i>Lagonosticta rhodopareia</i> (Heuglin, 1868)	<i>Mirandofures</i> sp.	Mozambique	Bush <i>et al.</i> 2016
<i>Lagonosticta rubricata</i> (Lichtenstein, 1823)	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Lagonosticta rufopicta</i> (Fraser, 1843)	<i>Brueelia</i> sp.	Cameroon	Balakrishnan & Sorenson 2006
<i>Lagonosticta senegala</i> (Linnaeus, 1766)	<i>Brueelia senegala</i> Sychra in Sychra <i>et al.</i> , 2010b	Cameroon	Balakrishnan & Sorenson 2006
<i>Lonchura cucullata</i> (Swainson, 1837)	<i>Mirandofures lonchurae</i> (Tendeiro & Mendes, 1994)	Senegal	Sychra <i>et al.</i> 2010b
		Benin	Takano <i>et al.</i> 2017
		São Tomé and Príncipe	Tendeiro & Mendes 1994
<i>Pytilia afra</i> (Gmelin, 1789)	<i>Brueelia</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Pytilia hypogrammica</i> Sharpe, 1870	<i>Sturmidoecus</i> sp.	Cameroon	Balakrishnan & Sorenson 2006
<i>Pytilia melba</i> (Linnaeus, 1758)	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Uraeginthus angolensis</i> (Linnaeus, 1758)	<i>Mirandofures</i> sp.	Malawi	Bush <i>et al.</i> 2016
<b>Fringillidae</b>			
<i>Crithagra gularis</i> (Smith, 1836)	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Crithagra mozambica</i> (Müller, 1776)	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Fringilla coelebs africana</i> Levaillant, 1850	<i>Brueelia kluzi</i> Balát, 1955	Morocco	Gustafsson & Bush 2017
<i>Serinus canicollis</i> (Swainson, 1838)	<i>Brueelia</i> sp.	Malawi	Bush <i>et al.</i> 2016
		South Africa	Takano <i>et al.</i> 2018
<b>Hirundinidae</b>			
<i>Cecropis abyssinica puella</i> (Temminck & Schlegel, 1845)	<i>Acronirmus gracilis</i> (Burmeister, 1838)	Ghana	Gustafsson & Bush 2017
<i>Cecropis abyssinica unitatis</i> (Sclater & Mackworth-Preed, 1942)	<i>Acronirmus gracilis</i> (Burmeister, 1838)	Kenya	Gustafsson & Bush 2017
<i>Cecropis senegalensis saturator</i> (Bannermann, 1923)	<i>Acronirmus gracilis</i> (Burmeister, 1838)	Kenya	Gustafsson & Bush 2017
<i>Delichon urbicum urbicum</i> (Linnaeus, 1758)	<i>Acronirmus gracilis</i> (Burmeister, 1838)	Malawi	Bush <i>et al.</i> 2016; Gustafsson & Bush 2017
<i>Hirundo aethiopicus amadoni</i> White, 1956	<i>Acronirmus gracilis</i> (Burmeister, 1838)	Morocco	Gustafsson & Bush 2017
		Somalia	Gustafsson & Bush 2017

Appendix (continued). Species of chewing lice in the *Brueelia* complex (sensu Gustafsson & Bush 2017) reported from Africa since Ledger 1980.

Host species	Louse species	Country	Reference
<i>Hirundo angolensis</i> Bocage, 1868	<i>Acronirmus gracilis</i> (Burmeister, 1838)	Zambia	Gustafsson & Bush 2017
<i>Hirundo rustica rustica</i> Linnaeus, 1758	<i>Acronirmus gracilis</i> (Burmeister, 1838)	Morocco	Gustafsson & Bush 2017
<i>Hirundo rustica savignii</i> Stephens, 1817	<i>Acronirmus gracilis</i> (Burmeister, 1838)	Egypt	Gustafsson & Bush 2017
<b>Lanidae</b> <sup>2</sup>			
<i>Corvinella melanoleuca</i> (Jardine, 1831)	<i>Brueelia rigbyi</i> Gustafsson & Bush, 2015	South Africa	Gustafsson & Bush 2015, 2017
<i>Corvinella melanoleuca expressa</i> Clancey, 1961	<i>Sturnidoecus australafricanus</i> Gustafsson & Bush, 2017	South Africa	Gustafsson & Bush 2017
<i>Eurocephalus rueppelli</i> Bonaparte, 1853	<i>Teinomordeus enteloseus</i> Gustafsson & Bush, 2017	Somalia	Gustafsson & Bush 2017
		Ethiopia	Gustafsson & Bush 2017
<b>Leiothrichidae</b>			
<i>Turdoides aylmeri aylmeri</i> (Shelley, 1885)	<i>Pricetiella brueliodes</i> (Ansari, 1956)	Somalia	Gustafsson & Bush 2017
<i>Turdoides fulva acaciae</i> (Lichtenstein, 1823)	<i>Brueelia magnini</i> Ansari, 1956	Sudan	Gustafsson & Bush 2017
<i>Turdoides hartlaubii</i> (Bocage, 1868)	<i>Pricetiella nivea</i> (Ansari, 1956)	Zimbabwe	Gustafsson & Bush 2017
<i>Turdoides tenebrosa</i> (Hartlaub, 1883)	<i>Pricetiella koka</i> Gustafsson & Bush, 2017	Ethiopia	Gustafsson & Bush 2017
<b>Locustellidae</b>			
<i>Bradypterus cinnamomeus</i> (Rüppell, 1840)	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
<b>Macrophenidae</b>			
<i>Sylvietta rufescens</i> (Vieillot, 1817)	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<b>Malaconotidae</b>			
<i>Dryoscopus cubla</i> (Shaw, 1809)	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
		Mozambique	Bush <i>et al.</i> 2016
<i>Laniarius aethiopicus</i> (Gmelin, 1789)	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Laniarius barbarus</i> (Linnaeus, 1758)	<i>Brueelia</i> sp.	Senegal	Najer <i>et al.</i> 2012

<sup>2</sup> Gustafsson & Bush (2017) reported *Brueelia ericiata* (Burmeister, 1838) from a South African *Lanius collurio* Linnaeus, 1758. This report is in error, and represents an undescribed species of *Brueelia* from *Lanius collaris* Linnaeus, 1766.



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Host species	Louse species	Country	Reference
<i>Laniarius erythrogaster</i> (Cretzschmar, 1829)	<i>Titanomessor sexloba</i> Gustafsson & Bush, 2017	Uganda	Gustafsson & Bush 2017
<i>Laniarius ferrugineus</i> (Gmelin, 1788)	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Laniarius fuelleborni</i> (Reichenow, 1900)	<i>Guimaraesiella</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Malacototus blanchoti</i> Stephens, 1826	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Nilais afer</i> (Latham, 1801)	<i>Sturnidoecus</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Tchagra australis</i> (Smith, 1836)	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Tchagra senegalus</i> (Linnaeus, 1766)	<i>Sturnidoecus wittei</i> Tendeiro, 1963	South Africa	Takano <i>et al.</i> 2018
<i>Tchagra senegalus armenus</i> (Oberholser, 1906)	<i>Guimaraesiella</i> sp.	Zimbabwe	Gustafsson & Bush 2017
<i>Tchagra senegalus habessinica</i> (Hemprich & Ehrenberg, 1833)	<i>Sturnidoecus wittei</i> Tendeiro, 1963	Malawi	Bush <i>et al.</i> 2016
<i>Tchagra senegalus kalahari</i> (Roberts, 1932)	<i>Sturnidoecus wittei</i> Tendeiro, 1963	Democratic Republic of the Congo	Gustafsson & Bush 2017
<i>Tchagra senegalus orientalis</i> (Cabanis, 1869)	<i>Sturnidoecus wittei</i> Tendeiro, 1963	Mozambique	Gustafsson & Bush 2017
<i>Tchagra tchagra natalensis</i> (Reichenow, 1903)	<i>Sturnidoecus wittei</i> Tendeiro, 1963	Zambia	Gustafsson & Bush 2017
<i>Telophorus sulfureopectus</i> (Lesson, 1831)	<i>Guimaraesiella</i> sp.	Ethiopia	Gustafsson & Bush 2017
		Zimbabwe	Gustafsson & Bush 2017
		Mozambique	Gustafsson & Bush 2017
		Mozambique	Gustafsson & Bush 2017
		Malawi	Bush <i>et al.</i> 2016
<b>Monarchidae</b>			
<i>Terpsiphone viridis</i> (Statius Müller, 1776)	<i>Brueelia</i> sp.	Senegal	Najer <i>et al.</i> 2012
		South Africa	Takano <i>et al.</i> 2018
<b>Motacillidae</b>			
<i>Anthus</i> sp.	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Anthus trivialis trivialis</i> (Linnaeus, 1758)	<i>Brueelia fertianci</i> Balát, 1955	Morocco	Gustafsson & Bush 2017
<i>Macronyx capensis</i> (Linnaeus, 1766)	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Motacilla capensis</i> Linnaeus, 1766	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018

Appendix (continued). Species of chewing lice in the *Brueelia* complex (sensu Gustafsson & Bush 2017) reported from Africa since Ledger 1980.

Host species	Louse species	Country	Reference
<i>Motacilla flava</i> Linnaeus, 1758	<i>Brueelia kratochvili</i> Balát, 1958	Egypt	Gustafsson & Bush 2017
<b>Muscicapidae</b>			
<i>Copsychus albospectularis</i> (Eyndoux & Gervais, 1836)	<i>Guimaraesiella</i> sp.	Madagascar	Bush <i>et al.</i> 2016
<i>Cossypha anomala</i> (Shelley, 1893)	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Cossypha caffra</i> (Linnaeus, 1771)	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Cossypha heuglini</i> Hartlaub, 1866	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Melaenornis silens</i> (Shaw, 1809)	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Muscicapa striata</i> (Pallas, 1764)	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Myrmecocichla arnotti</i> (Tristram, 1869)	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Pogonochila stellata</i> (Vieillot, 1818)	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Pseudalethe fuelleborni</i> (Reithenow, 1900)	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Sheppardia sharpei</i> (Shelley, 1903)	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
<b>Nectariniidae</b>			
<i>Chalcomitra senegalensis</i> (Linnaeus, 1766)	<i>Brueelia chalcomitrae</i> Najer & Sychra in Najer <i>et al.</i> , 2012	Senegal	Najer <i>et al.</i> 2012
<i>Cinnyris chalybaeus</i> (Linnaeus, 1766)	<i>Sturmidoecus</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Nectarinia famosa</i> (Linnaeus, 1766)	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<b>Nicatoridae</b>			
<i>Nicator chloris</i> (Valenciennes, 1826)	<i>Guimaraesiella</i> sp.	Ghana	Bush <i>et al.</i> 2016
<b>Oriolidae</b>			
<i>Oriolus auratus</i> Vieillot, 1817	<i>Maculinirmus</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Oriolus larvatus</i> Lichtenstein, 1823	<i>Maculinirmus</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Oriolus oriolus</i> (Linnaeus, 1758)	<i>Maculinirmus mundus</i> (Nitzsch [in Giebel], 1866)	Egypt	Gustafsson & Bush 2017

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**Appendix** (continued). Species of chewing lice in the *Brueelia* complex (sensu Gustafsson & Bush 2017) reported from Africa since Ledger 1980.

Host species	Louse species	Country	Reference
<b>Paridae</b>			
<i>Melaniparus niger</i> (Vieillot, 1818)	<i>Brueelia mpumalagensis</i> Gustafsson <i>et al.</i> , 2018 <i>Brueelia</i> sp. <sup>3</sup>	South Africa Malawi	Gustafsson <i>et al.</i> 2018 Bush <i>et al.</i> 2016
<i>Parus major excelsus</i> Buvty, 1857	<i>Brueelia picea</i> Gustafsson <i>et al.</i> , 2018	South Africa Morocco	Johnson <i>et al.</i> 2002; Bush <i>et al.</i> 2016; Takano <i>et al.</i> 2018 Gustafsson <i>et al.</i> 2018
<b>Passeridae</b>			
<i>Gymnoris superciliosus</i> Blyth, 1845 <i>Passer diffusus</i> (Smith, 1836)	<i>Brueelia</i> sp. <i>Brueelia</i> sp. <i>Guimaraesiella</i> sp.	Malawi South Africa South Africa	Bush <i>et al.</i> 2016 Takano <i>et al.</i> 2018 Takano <i>et al.</i> 2018
<i>Passer domesticus</i> (Linnaeus, 1758)	<i>Brueelia cyclothorax</i> (Burmeister, 1838) <i>Rostrinirmus ruficeps</i> (Nitzsch [in Giebel], 1866)	South Africa Réunion Egypt	Gustafsson & Bush 2017 Gustafsson & Bush 2017
<i>Passer griseus</i> (Vieillot, 1817)	<i>Brueelia</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Passer melanurus</i> (Statius Müller, 1776)	<i>Brueelia</i> sp. <i>Rostrinirmus</i> sp.	South Africa South Africa	Takano <i>et al.</i> 2018 Bush <i>et al.</i> 2016; Takano <i>et al.</i> 2018
<i>Passer melanurus damarensis</i> Reichenow, 1902	<i>Brueelia pofadderensis</i> sp. nov.	South Africa	This report
<i>Petronia petronia barbata</i> Erlanger, 1899 <i>Plocepasser mahali</i> (Smith, 1836)	<i>Brueelia alexandrii</i> Eichler, 1953 <i>Brueelia</i> sp.	South Africa Tunisia South Africa	Gustafsson & Bush 2017 Takano <i>et al.</i> 2018
<b>Platysteiridae</b>			
<i>Batis capensis</i> (Linnaeus, 1766) <i>Batis soror</i> Reichenow, 1903 <i>Platysteira cyanea</i> (Müller, 1776)	<i>Guimaraesiella</i> sp. <i>Guimaraesiella</i> sp. <i>Guimaraesiella</i> sp.	Malawi Mozambique Malawi	Bush <i>et al.</i> 2016 Bush <i>et al.</i> 2016 Bush <i>et al.</i> 2016
<b>Ploceidae</b>			
<i>Amblyospiza albifrons</i> (Vigors, 1831) <i>Anaplectes rubriceps</i> (Sundevall, 1850)	<i>Sturnidoecus</i> cf. <i>basilewskyi</i> Tendeiro, 1963 <i>Brueelia</i> sp.	Benin Malawi	Takano <i>et al.</i> 2017 Bush <i>et al.</i> 2016

<sup>3</sup> These specimens have been examined, and are conspecific with *B. mpumalagensis* Gustafsson *et al.* 2018, which had not been formally described at the time these phylogenies were published.

Appendix (continued). Species of chewing lice in the *Brueelia* complex (sensu Gustafsson & Bush 2017) reported from Africa since Ledger 1980.

Host species	Louse species	Country	Reference
<i>Euplectes albonotatus</i> (Cassin, 1848)	<i>Brueelia</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Euplectes ardens</i> (Boddaert, 1783)	<i>Sturnidoecus</i> sp.	Malawi	Bush <i>et al.</i> 2016
	<i>Brueelia</i> sp.	Malawi	Bush <i>et al.</i> 2016
	<i>Sturnidoecus</i> sp.	Mozambique	Bush <i>et al.</i> 2016
		Benin	Takano <i>et al.</i> 2017
		Malawi	Bush <i>et al.</i> 2016
		Mozambique	Bush <i>et al.</i> 2016
<i>Euplectes fransiscanus</i> (Isert, 1879)	<i>Brueelia aguilarae</i> Gustafsson & Bush, 2017	Somalia	Gustafsson & Bush 2017
<i>Euplectes hordeaceus</i> (Linnaeus, 1758)	<i>Sturnidoecus mon</i> Gustafsson & Bush, 2017	Ghana	Gustafsson & Bush 2017
<i>Euplectes jacksoni</i> (Sharpe, 1891)	<i>Brueelia terpsichore</i> sp. nov.	Kenya	This report
<i>Euplectes progne delamerei</i> (Shelley, 1903)	<i>Brueelia terpsichore</i> sp. nov.	Kenya	This report
<i>Malimbus nitens</i> (Gray, 1831)	<i>Brueelia sima</i> sp. nov.	Cameroon	This report
	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Plocepasser rufoscapulatus</i> Büttikofer, 1888	<i>Brueelia</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Ploceus capensis</i> (Linnaeus, 1766)	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Ploceus cucullatus</i> (Müller, 1776)	<i>Brueelia</i> sp.	South Africa	Bush <i>et al.</i> 2016; Takano <i>et al.</i> 2018
<i>Ploceus cucullatus bohndorffi</i> Reichenow, 1887	<i>Sturnidoecus basilewskyi</i> Tendeiro, 1963	Democratic Republic of the Congo	Gustafsson & Bush 2017
<i>Ploceus cucullatus cucullatus</i> (Müller, 1776)	<i>Sturnidoecus basilewskyi</i> Tendeiro, 1963	Cameroon	Gustafsson & Bush 2017
		Senegal	Gustafsson & Bush 2017
<i>Ploceus cucullatus nigriceps</i> (Layard, 1867)	<i>Sturnidoecus basilewskyi</i> Tendeiro, 1963	Mozambique	Gustafsson & Bush 2017
<i>Ploceus melanocephalus</i> (Linnaeus, 1758)	<i>Sturnidoecus textoris</i> Tendeiro, 1964	Democratic Republic of the Congo	Gustafsson & Bush 2017
<i>Ploceus ocularis</i> Smith, 1839	<i>Sturnidoecus</i> sp.	Mozambique	Bush <i>et al.</i> 2016
<i>Ploceus velatus</i> Viellot, 1819	<i>Brueelia</i> sp.	South Africa	Johnson <i>et al.</i> 2002; Bush <i>et al.</i> 2016; Takano <i>et al.</i> 2018
	<i>Sturnidoecus</i> sp.	Malawi	Bush <i>et al.</i> 2016
		South Africa	Takano <i>et al.</i> 2018

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**Appendix** (continued). Species of chewing lice in the *Brueelia* complex (sensu Gustafsson & Bush 2017) reported from Africa since Ledger 1980.

Host species	Louse species	Country	Reference
<i>Ploceus xanthops</i> (Hartlaub, 1862)	<i>Sturnidoecus xanthops</i> Tendeiro, 1963	Democratic Republic of the Congo	Gustafsson & Bush 2017
<i>Quelea quelea</i> (Linnaeus, 1758)	<i>Sturnidoecus</i> sp.	Malawi	Bush <i>et al.</i> 2016
	<i>Brueelia quelea</i> Sychra & Bartlev in Sychra <i>et al.</i> , 2010a	Malawi	Bush <i>et al.</i> 2016; Gustafsson & Bush 2017
<i>Quelea quelea quelea</i> (Linnaeus, 1758)	<i>Sturnidoecus</i> sp.	Senegal	Sychra <i>et al.</i> 2010a
		South Africa	Takano <i>et al.</i> 2018
<i>Quelea quelea lathamii</i> (Smith, 1836)	<i>Sturnidoecus somnodraco</i> Gustafsson & Bush, 2017	Malawi	Bush <i>et al.</i> 2016
		Senegal	Gustafsson & Bush 2017
<i>Sporopipes squamifrons</i> (Smith, 1836)	<i>Brueelia</i> sp.	Malawi	Gustafsson & Bush 2017
		South Africa	Takano <i>et al.</i> 2018
<b>Pycnonotidae</b>			
<i>Arizelocichla milanjensis</i> (Shelley, 1894)	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Bleda canicapillus</i> (Hartlaub, 1854)	<i>Guimaraesiella</i> sp.	Ghana	Bush <i>et al.</i> 2016
<i>Bleda eximius</i> (Hartlaub, 1855)	<i>Guimaraesiella</i> sp.	Ghana	Bush <i>et al.</i> 2016
<i>Bleda notatus</i> (Cassin, 1856) <sup>4</sup>	<i>Brueelia</i> sp.	Democratic Republic of the Congo	Light <i>et al.</i> 2016
<i>Bleda syndactylus</i> (Swanson, 1837)	<i>Brueelia</i> sp.	Democratic Republic of the Congo	Light <i>et al.</i> 2016
<i>Chlorocichla flaviventris</i> (Smith, 1834)	<i>Guimaraesiella</i> sp.	Ghana	Bush <i>et al.</i> 2016
		South Africa	Takano <i>et al.</i> 2018
<i>Criniger barbatus</i> (Temminck, 1821)	<i>Guimaraesiella</i> sp.	Ghana	Bush <i>et al.</i> 2016
<i>Eurilla latirostris</i> (Strickland, 1844)	<i>Brueelia</i> sp.	Democratic Republic of the Congo	Light <i>et al.</i> 2016
<i>Eurilla virens</i> (Cassin, 1857)	<i>Guimaraesiella</i> sp.	Ghana	Bush <i>et al.</i> 2016
		Malawi	Bush <i>et al.</i> 2016

<sup>4</sup>The host was recorded as *Bleda ugandae* van Someren, 1915, which was treated as a synonym of *B. notatus* (Cassin, 1856) by Clements *et al.* (2018).

Appendix (continued). Species of chewing lice in the *Brueelia* complex (sensu Gustafsson & Bush 2017) reported from Africa since Ledger 1980.

Host species	Louse species	Country	Reference
<i>Phyllastrephus albigularis</i> (Sharpe, 1881)	<i>Guimaraesiella</i> sp.	Ghana	Bush <i>et al.</i> 2016
<i>Phyllastrephus flavostriatus</i> (Sharpe, 1876)	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Phyllastrephus icterinus</i> (Bonaparte, 1850)	<i>Brueelia</i> sp.	Democratic Republic of the Congo	Light <i>et al.</i> 2016
<i>Pycnonotus barbatus</i> (Desfontaines, 1789)	<i>Brueelia</i> sp.	Ghana	Bush <i>et al.</i> 2016
<i>Pycnonotus nigricans</i> (Vieillot, 1818)	<i>Brueelia pseudognatha</i> Gustafsson & Bush, 2017	Malawi	Bush <i>et al.</i> 2016
<i>Pycnonotus tricolor</i> (Hartlaub, 1862)	<i>Brueelia</i> sp. <sup>5</sup>	South Africa	Gustafsson & Bush 2017; Takano <i>et al.</i> 2018
<i>Stelgidillas gracilirostris</i> Strickland, 1844	<i>Brueelia</i> sp.	South Africa	Johnson <i>et al.</i> 2002; Bush <i>et al.</i> 2016
	<i>Guimaraesiella</i> sp.	South Africa	Takano <i>et al.</i> 2018
		Malawi	Bush <i>et al.</i> 2016
<b>Sturnidae</b>			
<i>Acridotheres tristis tristis</i> (Linnaeus, 1766)	<i>Brueelia chayanh</i> Ansari, 1955	St. Helena	Gustafsson & Bush 2017
<i>Cinnyricinclus leucogaster</i> (Boddaert, 1783)	<i>Sturnidoecus</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Cinnyricinclus leucogaster verreauxi</i> (Bocage, 1870)	<i>Sturnidoecus porphyrogenitus</i> Gustafsson & Bush, 2017	Mozambique	Gustafsson & Bush 2017
<i>Creatophora cinerea</i> (Meuschen, 1787)	<i>Brueelia coryliventer</i> Gustafsson & Bush, 2015	Kenya	Gustafsson & Bush 2015, 2017
<i>Lamprotornis australis</i> (Smith, 1836)	<i>Sturnidoecus afzali</i> Ansari, 1968	Kenya	Gustafsson & Bush 2017
<i>Lamprotornis bicolor</i> Gmelin, 1789	<i>Brueelia clara</i> Gustafsson & Bush, 2015	Namibia	Gustafsson & Bush 2015, 2017
<i>Lamprotornis chalybaeus chalybaeus</i> Hemprich & Ehrenberg, 1828	“ <i>Brueelinae</i> ”	South Africa	Zlotorzycska <i>et al.</i> 1999
	<i>Sturnidoecus eichleri</i> Ansari, 1968	Ethiopia	Gustafsson & Bush 2017
<i>Lamprotornis chalybaeus nordmanni</i> (Hartert & Neumann, 1914)	<i>Sturnidoecus eichleri</i> Ansari, 1968	Kenya	Gustafsson & Bush 2017
<i>Lamprotornis chloropterus</i> Swainson, 1838	<i>Sturnidoecus</i> sp.	South Africa	Gustafsson & Bush 2017
<i>Lamprotornis iris</i> (Oustalet, 1879)	<i>Sturnidoecus distinguendus</i> Ansari, 1968	Malawi	Bush <i>et al.</i> 2016
		Uganda	Gustafsson & Bush 2017

<sup>5</sup> This specimen has been examined and is conspecific with *B. pseudognatha* Gustafsson & Bush, 2017, which had not been formally described at the time this phylogeny was published.



GUSTAFSSON D.R. *et al.*, Four new *Brueelia* (Phthiraptera: Ischnocera) from AfricaAppendix (continued). Species of chewing lice in the *Brueelia* complex (sensu Gustafsson & Bush 2017) reported from Africa since Ledger 1980.

Host species	Louse species	Country	Reference
<i>Lamprotornis meevesi</i> (Wahlberg, 1856)	<i>Sturnidoecus parvifrons</i> Ansari, 1968	Botswana	Gustafsson & Bush 2017
		Mozambique	Gustafsson & Bush 2017
		Zambia	Gustafsson & Bush 2017
		Zimbabwe	Gustafsson & Bush 2017
<i>Lamprotornis nitens</i> (Linnaeus, 1766)	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<i>Lamprotornis purpureus</i> (Statius Müller, 1776)	<i>Sturnidoecus senegalensis</i> (Rudow, 1869)	South Africa	Gustafsson & Bush 2017; Takano <i>et al.</i> 2018
	<i>Brueelia</i> sp.	Ghana	Bush <i>et al.</i> 2016
	<i>Sturnidoecus</i> sp.	Ghana	Bush <i>et al.</i> 2016
<i>Lamprotornis splendidus bairlandensis</i> (Neumann, 1920)	<i>Sturnidoecus meinertzhageni</i> Ansari, 1968	Zambia	Gustafsson & Bush 2017
<i>Lamprotornis splendidus splendidus</i> (Vieillot, 1822)	<i>Sturnidoecus meinertzhageni</i> Ansari, 1968	Cameroon	Gustafsson & Bush 2017
<i>Lamprotornis superbus</i> (Rüppell, 1845)	<i>Sturnidoecus theresae</i> Ansari, 1968	Uganda	Gustafsson & Bush 2017
<i>Neocichla gutturalis</i> (Bocage, 1871)	<i>Brueelia</i> sp.	Somalia	Gustafsson & Bush 2017
<i>Onychognathus blythii</i> (Hartlaub, 1859)	<i>Sturnidoecus clayae</i> Ansari, 1968	Malawi	Bush <i>et al.</i> 2016
<i>Onychognathus morio</i> (Linnaeus, 1766)	<i>Sturnidoecus clayae</i> Ansari, 1968	Malawi	Bush <i>et al.</i> 2016
<i>Onychognathus tenuirostris</i> (Rüppell, 1836)	<i>Brueelia</i> sp.	Somalia	Gustafsson & Bush 2017
<i>Onychognathus tenuirostris theresae</i> Meinertzhagen, 1937	<i>Sturnidoecus illustris</i> Ansari, 1968	Kenya	Gustafsson & Bush 2017
<i>Speculipastor bicolor</i> Reichenow, 1879	<i>Sturnidoecus opeca</i> Ansari, 1968	Kenya	Gustafsson & Bush 2017
<i>Spreeo albicapillus albicapillus</i> Blyth, 1856	<i>Brueelia tkachi</i> Gustafsson & Bush, 2015	South Africa	Gustafsson & Bush 2017
		Somalia	Gustafsson & Bush 2015, 2017
<b>Sylviidae</b>			
<i>Sylvia subcaeruleum</i> (Vieillot, 1817)	<i>Brueelia</i> sp.	South Africa	Johnson <i>et al.</i> 2002; Bush <i>et al.</i> 2016; Takano <i>et al.</i> 2018

Appendix (concluded). Species of chewing lice in the *Brueelia* complex (sensu Gustafsson & Bush 2017) reported from Africa since Ledger 1980.

Host species	Louse species	Country	Reference
<b>Turdidae</b>			
<i>Geokichla gurneyi</i> (Hartlaub, 1864)	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Neocossyphus poensis</i> (Strickland, 1844)	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Turdus libonyana</i> (Smith, 1836)	<i>Sturmidoecus</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Turdus merula syriacus</i> Hemprich & Ehrenberg, 1833	<i>Guimaraesiella amsel</i> (Eichler, 1951)	Morocco	Gustafsson & Bush 2017
<i>Turdus olivaceus pondoensis</i> Reichenow, 1917	<i>Guimaraesiella ilmasae</i> (Ansari, 1956)	South Africa	Gustafsson & Bush 2017
<i>Turdus pelios</i> Bonaparte, 1850	<i>Guimaraesiella turdinulae</i> (Ansari, 1956)	Senegal	Najer <i>et al.</i> 2012
<i>Turdus philomelos</i> Brehm, 1831	<i>Sturmidoecus</i> sp.	Ghana	Bush <i>et al.</i> 2016
<i>Turdus smithi</i> Bonaparte, 1850	<i>Guimaraesiella turdinulae</i> (Ansari, 1956)	Egypt	Gustafsson & Bush 2017
	<i>Brueelia</i> sp.	South Africa	Takano <i>et al.</i> 2018
<b>Vangidae</b>			
<i>Prionops plumatus</i> (Shaw, 1809)	<i>Brueelia</i> sp.	Senegal	Najer <i>et al.</i> 2012
	<i>Guimaraesiella</i> sp.	Malawi	Bush <i>et al.</i> 2016
<i>Vanga curvirostris</i> (Linnaeus, 1766)	<i>Guimaraesiella</i> sp.	South Africa	Takano <i>et al.</i> 2018
		Malawi	Bush <i>et al.</i> 2016
<b>Viduidae</b>			
<i>Vidua camerunensis</i> Grote, 1922	<i>Brueelia</i> sp.	Cameroon	Balakrishnan & Sorenson 2006
<i>Vidua macroura</i> (Pallas, 1764)	<i>Sturmidoecus</i> sp.	Cameroon	Balakrishnan & Sorenson 2006
	<i>Brueelia</i> sp.	Cameroon	Balakrishnan & Sorenson 2006
		Malawi	Bush <i>et al.</i> 2016
<i>Vidua paradisaea</i> (Linnaeus, 1758)	<i>Brueelia bicurvata</i> (Piaget, 1880)	South Africa	Takano <i>et al.</i> 2018
<i>Vidua wilsoni</i> (Hartert, 1901)	<i>Brueelia</i> sp.	Zambia	This report
		Cameroon	Balakrishnan & Sorenson 2006
<b>Zosteropidae</b>			
<i>Zosterops senegalensis</i> Bonaparte, 1850	<i>Brueelia</i> sp.	Malawi	Bush <i>et al.</i> 2016

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