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Chewing lice (Phthiraptera: Amblycera and Ischnocera) from wild birds in southern Vietnam, with descriptions of two new species

TOMAS NAJER[1,3], OLDRICH SYCHRA[1], FILIP KOUNEK[1], IVO PAPOUSEK[1] & NGUYEN MANH HUNG[2]

[1]*Department of Biology and Wildlife Diseases, Faculty of Veterinary Hygiene and Ecology, University of Veterinary and Pharmaceutical Sciences, Palackeho tr. 1/3, 612 42 Brno, Czech Republic*

[2] *Department of Parasitology, Institute of Ecology and Biological Resources (IEBR), Vietnam Academy of Science and Technology (VAST), 18-Hoang Quoc Viet, Hanoi, Vietnam*

[3]*Corresponding author. E-mail: tomas.najer@gmail.com*

Abstract

A total of 239 individuals of 50 bird species were examined for chewing lice (Insecta: Phthiraptera) in southern Vietnam. Fifty-six birds of 20 species were parasitised by 15 species of lice belonging to 10 genera from two suborders, Amblycera: *Menacanthus*, *Meromenopon*, *Myrsidea*, and Ischnocera: *Alcedoecus*, *Brueelia*, *Cuculicola*, *Meropoecus*, *Penenirmus*, *Philopteroides* and *Philopterus*. Thirteen louse samples from Passeriformes were identified to genus only because they contain inadequate material. A total of 29 host-louse associations were found, of which nine are new, including: (1) two new species of the genus *Brueelia*, which are described and named in this paper: *Brueelia binhchauensis* from *Megalaima lineata* (Vieillot, 1816) (Piciformes: Megalaimidae), and *Brueelia malacocincla* from *Malacocincla abbotti* Blyth, 1845 (Passeriformes: Pellorneidae); (2) first records of lice from *Cyornis hainanus* (Ogilvie-Grant, 1900); and (3) the first record of *Myrsidea claytoni* Hellenthal & Price, 2003 from *Cymbirhynchus macrorhynchos* (Gmelin, 1788) (Passeriformes: Eurylaimidae), here regarded as a case of natural host-switching. A portion of the mitochondrial cytochrome oxidase I (COI) gene for some species of chewing lice was sequenced in order to assess their genetic divergences.

Key words: Phthiraptera, lice, *Alcedoecus*, *Brueelia*, *Cuculicola*, *Menacanthus*, *Meromenopon, Meropoecus*, *Myrsidea Penenirmus*, *Philopteroides*, *Philopterus*, new species, new host-louse associations, host-switching, birds, Coraciiformes, Cuculiformes, Passeriformes, Piciformes, Vietnam, mitochondrial COI gene

Introduction

There are 889 species of birds recorded from Vietnam (Lepage 2013), of which 460 are known as hosts of 758 species of chewing lice (Insecta: Phthiraptera) belonging to 11 genera (Price *et al.* 2003; Sychra *et al.* 2009; Najer *et al.* 2012a,b). However, there are only ten species of chewing lice recorded from Vietnam itself (Mey 2004; Sychra *et al.* 2009; Najer *et al.* 2012a,b), with all the other species known from neighbouring countries. Whereas our previous papers (Sychra *et al.* 2009; Najer *et al.* 2012a,b) presented data on chewing lice found in northern Vietnam, the aim of this paper is to present new data on those from southern Vietnam, including the descriptions of two new species. A portion of the mitochondrial cytochrome oxidase I (COI) gene was also sequenced for some species in order to assess their genetic divergences in comparison to previously described species.

Material and methods

Wild birds were examined in three locations within the sector Nam Cat Tien, a part of Cat Tien National Park, and in one location within Binh Chau—Phuoc Buu National Park, both in southern Vietnam. The first location in Nam Cat Tien was surrounding a rubbish dump next to the tourist dormitory of Cat Tien NP, at 121 m above sea level (11°25' N, 107°25' E); the second location was a scrub forest path next to the ranger station in the southern part of

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the NP, at 110 m above sea level (11°24' N, 107°24' E); and the third location was in an evegreen dipterocarp forest, north of the headquarters of the NP, at 139 m above sea level (11°25' N, 107°25' E). The location in Binh Chau—Phuoc Buu NP was in a dry coastal forest path near the ranger station in the central part of the park, at 66 m above sea level (10°31' N, 107°28' E).

From 9 to 22 September 2011, birds were captured alive, examined, deloused as described by Sychra *et al.* (2009), and subsequently released. Identifications of bird species were based on Robson (2008), but their taxonomy follows Clements *et al.* (2012). Lice were identified primarily using papers by Ansari (1947, 1955), Dalgleish (1972), Emerson & Elbel (1956), Hellenthal & Price (2003), Mey (2004), Price & Emerson (1977), Rudow (1869), Sychra *et al.* (2011) and Williams (1981). The nomenclature of the lice follows Price *et al*. (2003). Also, chewing lice belonging to the genus *Brueelia* were compared with all species of this genus known from birds which occur in Vietnam according to Lepage (2013). These papers were also used for comparisons: Ansari (1956a, 1956b, 1956c, 1957a,b,c), Mey (1982), Najer *et al.* (2012a, b), Piaget (1880), Sychra *et al.* (2009) and Złotorzycka (1997).

In the following descriptions, all measurements are in millimeters with abbreviations for measurements as follows: PAW, preantennal width at the bases of the coni; PAL, preantennal length, taken from the bases of the coni to the anterior hyaline margin; TW, temple width; POL, postantennal length, taken from the bases of the coni to the temporal margin; HL, head length at midline; PW, prothorax width; ML, metathorax length; MW, metathorax width; AWV, abdomen width at level of segment V; AL, abdomen length; TL, total length; and GW, male genitalia width. All morphological features including characterization of abdominal setae of *Brueelia* were measured and described according to Cicchino & Castro (1996) and Najer *et al.* (2012a). The descriptions of the new species are attributed to the first two authors of this paper.

The types of the new species described in this paper are deposited in the Department of Zoological Museum of the Institute for Ecology and Biological Resources, Vietnamese Academy of Science and Technology, Hanoi, Vietnam (IEBR VAST). Where indicated, some paratypes and other material will be deposited in the Moravian Museum, Brno, Czech Republic (MMBC) and in the Natural History Museum, London, United Kingdom (BMNH). Sequences of a 379–382 bp fragment of the mitochondrial cytochrome oxidase I (COI) gene were obtained from: *Penenirmus pici* (from *Picus canus hessei*), *Menacanthus eurysternus* (from *Pycnonotus blanfordi* and *P. finlaysoni*), *Alcedoecus annulatus* (from *Halcyon smyrnensis*), and *Cuculicola coromandus* (from *Clamator coromandus*) using methods described by Johnson *et al.* (2002). Those sequences were aligned and compared with sequences already available in GenBank in order to determine their genetic divergences, using MEGA 5.2.1 (Tamura *et al.* 2011). We used sequences of the following louse species: *Alcedoecus alatoclypeatus* from *Halcyon malimbica* from Africa (GenBank accession numbers AY314807 and AF545669); *Cuculicola* sp. from *Chrysococcyx klaas* from Ghana (AF444857); *Cuculicola atopus* from *Piaya cayana* from Mexico (AF444856); *Menacanthus eurysternus* from *Lybius torquatus* from Africa (AF545725); *Menacanthus* sp. from *Lagonosticta rara* from Cameroon (DQ887248); *Penenirmus pici* from *Picus mentalis* and *Blythipicus rubiginosus* from Borneo (AF545745, AF356706, AF356707). All newly generated DNA sequences are deposited in GenBank under accession numbers (KF385882–KF385886).

Results

A total of 27 individuals of 10 non-passerine bird species belonging to the orders Coraciiformes, Cuculiformes and Piciformes were examined for chewing lice. Seven species of lice in six genera were collected from 14 birds of five species: six species previously described and named (Table 1), and one species representing a new, unnamed species of the genus *Brueelia* that is described below. The highest prevalence was found on *Merops leschenaulti* Vieillot, 1817, with all 10 birds examined parasitised by lice: two birds were infested by the three louse species known from this host (Price *et al.* 2003: 311), three birds with *Brueelia erythropteri* (Piaget, 1885) and *Meropoecus smithi* Emerson & Elbel, 1956, two with *B. erythropteri* and *Meromenopon marshalli* Price & Emerson, 1977, one bird carried *Meromenopon marshalli* and *Meropoecus smithi*, and two birds harboured *B. erythropteri* only. No chewing lice were found on the following species from these bird orders: Coraciiformes: *Alcedo meninting* Horsfield, 1821 (6 specimens examined) and *Ceyx erithaca* (Linnaeus, 1758) (1); Cuculiformes: *Cacomantis merulinus* (Scopoli, 1786) (1) and *Chrysococcyx xanthorhynchus* (Horsfield, 1821) (1); Piciformes: *Sasia ochracea* Hodgson, 1837 (2).

TABLE 1. List of birds and chewing lice recorded from them in southern Vietnam in 2011.

Host	Species of chewing lice	P	♂	♀	N	Location
Order Coraciiformes						
Family Meropidae						
Merops leschenaulti Vieillot, 1817 Chestnut-headed bee-eater	*Meromenopon marshalli* Price & Emerson, 1977 (A)	5/10	2	2	6	Cat Tien
" " "	*Meropoecus smithi* Emerson & Elbel, 1956 (I)	6/10	7	4	4	Cat Tien
" " "	*Brueelia erythropteri* (Piaget, 1885) (I)	9/10	19	18	10	Cat Tien
Family Alcedinidae						
Halcyon smyrnensis (Linnaeus, 1758) White-throated kingfisher	*Alcedoecus annulatus* Ansari, 1955 (I)	1/3	3	1	1	Cat Tien
Order Cuculiformes						
Family Cuculidae						
Clamator coromandus (Linnaeus, 1766) Chestnut-winged cuckoo	*Cuculicola coromandus* (Rudow, 1869) (I)	1/1	4	2	0	Cat Tien
Order Piciformes						
Family Megalaimidae						
§ *Megalaima lineata* (Vieillot, 1816) Lineated barbet	* *Brueelia binhchauensis* n. sp. (I)	1/1	7	5	12	Binh Chau
Family Picidae						
Picus canus Gmelin, 1788 Grey-faced woodpecker	*Penenirmus pici* (Fabricius, 1798) (I)	1/1	3	8	19	Binh Chau
Order Passeriformes						
Family Pycnonotidae						
Alophoixus ochraceus Moore, 1854 Ochraceous bulbul	*Myrsidea ochracei* Hellenthal & Price, 2003 (A)	5/9	8	10	30	Cat Tien
" " "	* *Brueelia* sp. (I)	1^{1}/9	0	0	1	Cat Tien
" " "	* *Brueelia* sp. (I)	1/1	0	7	4	Binh Chau
Iole propinqua (Oustalet, 1903) Grey-eyed bulbul	*Myrsidea ochracei* Hellenthal & Price, 2003 (A)	1/1	2	5	4	Cat Tien
Pycnonotus blanfordi Jerdon, 1862 Streak-eared bulbul	*Menacanthus eurysternus* (Burmeister, 1838) (A)	7/7	8	16	43	Cat Tien
" " "	*Myrsidea pycnonoti* Eichler, 1947 (A)	1/1	1	0	1	Binh Chau
Pycnonotus finlaysoni Strickland, 1844 Stripe-throated bulbul	*Menacanthus eurysternus* (Burmeister, 1838) (A)	7/15	14	10	18	Cat Tien
" " "	*Philopteroides cucphuongensis* Mey, 2004 (I)	1^{1}/15	2	1	1	Cat Tien
" " "		0/8	-	-	-	Binh Chau

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TABLE 1. (Continued)

Host	Species of chewing lice	P	♂	♀	N	Location
Family Eurylaimidae						
Cymbirhynchus macrorhynchos (Gmelin, 1788) Black-and-red broadbill	* *Myrsidea claytoni*, Hellenthal & Price, 2003 (A)	2/2	10	8	19	Cat Tien
" " "	* *Brueelia* sp. (I)	1^1/2	1	0	0	Cat Tien
Family Dicruridae						
Dicrurus aeneus Vieillot, 1817 Bronzed drongo	*Myrsidea* sp. (A)	1/4	0	2	1	Cat Tien
Dicrurus hottentottus (Linnaeus, 1766) Hair-crested drongo	*Myrsidea sindianus* Ansari, 1955 (A)	1/1	1	1	8	Cat Tien
" " "	*Philopterus petrescuae* Adam, 2011 (I)	1^1/1	1	1	0	Cat Tien
" " "	*Myrsidea sindianus* Ansari, 1955 (A)	1^2/5	2	0	1	Binh Chau
" " "	*Philopterus petrescuae* Adam, 2011 (I)	1^2/5	0	2	0	Binh Chau
Dicrurus paradiseus (Linnaeus, 1766) Greater racket-tailed drongo	*Brueelia* sp. (I)	1^2/5	0	1	0	Cat Tien
" " "	*Philopterus* sp. (I)	1^2/5	0	0	2	Cat Tien
Family Pellorneidae						
Malacocincla abbotti Blyth, 1845 Abbott's babbler	* *Brueelia malacocincla* n. sp. (I)	1/1	1	2	0	Cat Tien
Malacopteron cinereum Eyton, 1839 Scaly-crowned babbler	* *Brueelia* sp. (I)	1/14	0	1	0	Cat Tien
<< " " " >>		0/5	-	-	-	Binh Chau
Pellorneum ruficeps Swainson, 1832 Puff-throated babbler	*Myrsidea* sp. (A)	1/1	0	3	7	Binh Chau
<< " " " >>		0/3	-	-	-	Cat Tien
Family Muscicapidae						
§ *Cyornis hainanus* (Ogilvie-Grant, 1900) Hainan blue-flycatcher	* *Myrsidea* sp. (A)	1/4	0	0	4	Cat Tien
Copsychus malabaricus (Scopoli, 1786) White-rumped shama	*Myrsidea* sp. (A)	1/11	1	0	0	Cat Tien
Family Phylloscopidae						
Phylloscopus trochiloides (Sundevall, 1837) Greenish warbler	* *Brueelia* sp. (I)	1/5	0	1	0	Cat Tien
<< " " " >>		0/2	-	-	-	Binh Chau

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TABLE 1. (Continued)

Host	Species of chewing lice	P	♂	♀	N	Location
Family Monarchidae						
Hypothymis azurea (Boddaert, 1783) Black-naped monarch	*Myrsidea* sp. (A)	1[2]/4	0	1	0	Cat Tien
<< " " " >>	* *Brueelia* sp. (I)	1[2]/4	0	1	0	Cat Tien
<< " " " >>		0/3	-	-	-	Binh Chau

P = prevalence as number of birds parasitised/number of birds examined
♂, males; ♀, females; N, nymphs
(A) = Amblycera, family Menoponidae
(I) = Ischnocera, family Philopteridae
* = new host-louse association
§ = first record of lice from this host
[1] = the louse species mentioned above was also found on this particular bird
[2] = this louse species was found on this particular bird only

A total of 220 individuals of 40 passerine species belonging to seven families were also examined. The families with the greatest number of birds captured were Pycnonotidae and Muscicapidae, each with 42 birds (19%), represented by 4 and 9 species respectively. The most numerous bird species examined was *Pycnonotus finlaysoni* Strickland, 1844 (23 birds, 10.5%). Fourty-two birds (19%) of 15 species were parasitised with 269 chewing lice (mean intensity = 6.4) belonging to five genera (Table 1). A total of eight identified species of lice were found on passerine hosts: seven species previously described and named, and one representing a new, unnamed species of the genus *Brueelia* that is described below (Table 1). Thirteen samples were identified at generic level only because they contain an insufficient number of adults or nymphs only (Table 1), but each sample does not necessarily represent a different species. Also, this paper includes first records of lice from *Cyornis hainanus* (Ogilvie-Grant, 1900) and *Megalaima lineata* (Vieillot, 1816), and 29 host-louse associations, of which nine are new (Table 1).

No chewing lice were recorded from the following species of these passerine families: Pittidae: *Pitta soror* Wardlaw-Ramsay, 1881 (1 specimen examined); Aegithinidae: *Aegithina lafresnayei* (Hartlaub, 1844) (1); Corvidae: *Crypsirina temia* (Daudin, 1800) (2); Nectariniidae: *Aethopyga siparaja* (Raffles, 1822) (1), *Arachnothera hypogrammicum* (Müller, 1843) (8), *A. longirostra* (Latham, 1790) (13), *Chalcoparia singalensis* (Gmelin, 1789) (2), *Cinnyris jugularis* (Linnaeus, 1766) (2); Muscicapidae: *Copsychus saularis* (Linnaeus, 1758) (2), *Cyornis rubeculoides* (Vigors, 1831) (2), *C. tickelliae* Blyth, 1843 (15), *Ficedula zanthopygia* (Hay, 1845) (1), *Larvivora cyane* (Pallas, 1776) (3), *Muscicapa latirostris* (Raffles, 1822) (3), *M. sibirica* (Gmelin, 1789) (1); Phylloscopidae: *Phylloscopus tenellipes* Swinhoe, 1860 (2); Pellorneidae: *Pellorneum tickelli* Blyth, 1859 (4); Timaliidae: *Macronous gularis* (Horsfield, 1822) (14), *Timalia pileata* Horsfield, 1821 (6); Cisticolidae: *Orthotomus atrogularis* Temminck, 1836 (8), *Prinia flaviventris* (Delessert, 1840) (2), *P. hodgsonii* Blyth, 1844 (1), *P. inornata* Sykes, 1832 (1), *P. rufescens* Blyth, 1847 (3).

Species descriptions

Suborder Ischnocera Kellogg, 1896

Family Philopteridae Burmeister, 1838

Genus *Brueelia* Kéler, 1936

Brueelia binhchauensis Najer & Sychra, new species

(Figs 1A–B, 2A–D, 5A–B)

Type host: *Megalaima lineata* (Vieillot, 1816)—Lineated barbet.

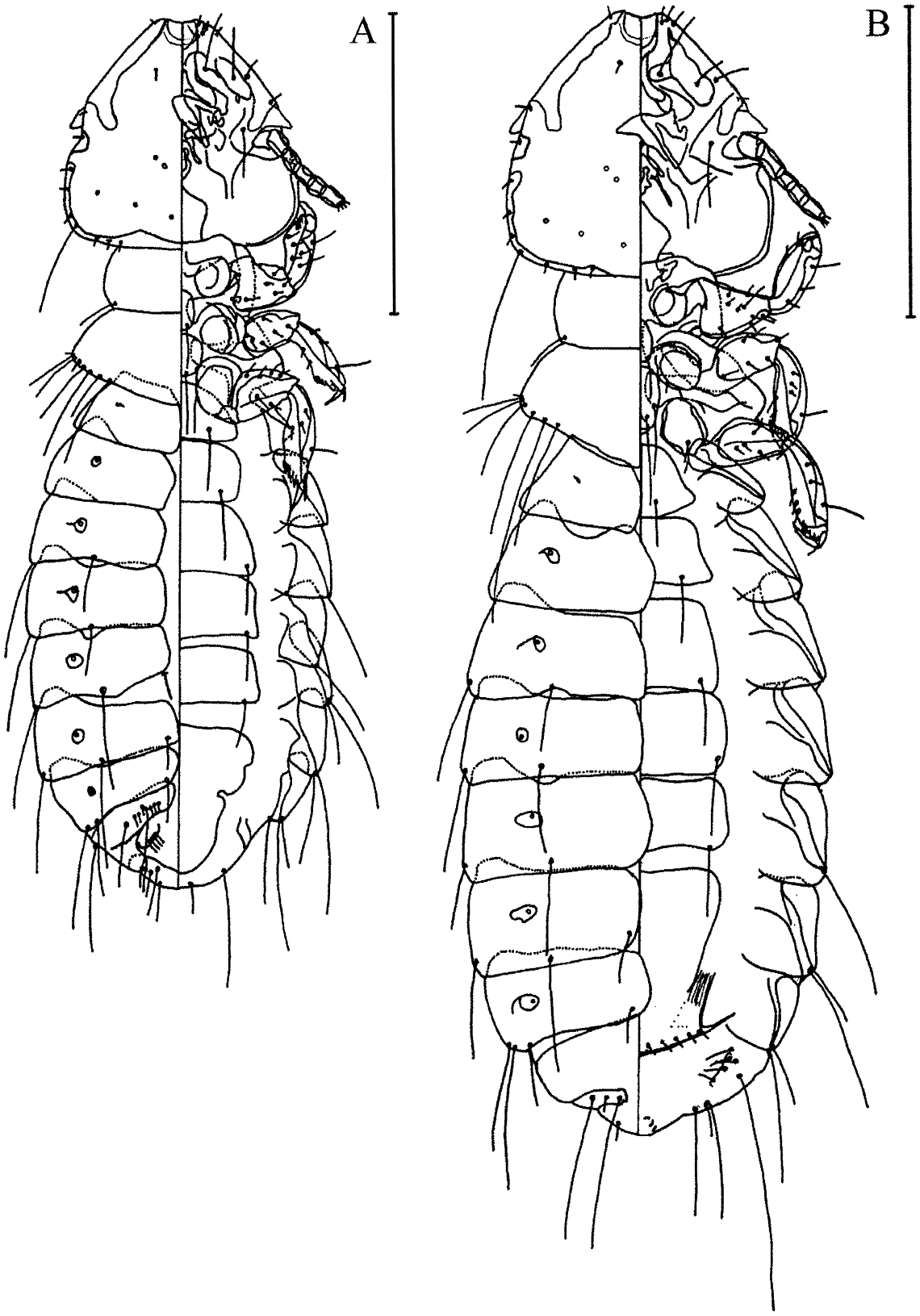

FIGURE 1. *Brueelia binhchauensis*: A, dorso-ventral view of male. B, dorso-ventral view of female. Scales = 0.50 mm for both figures.

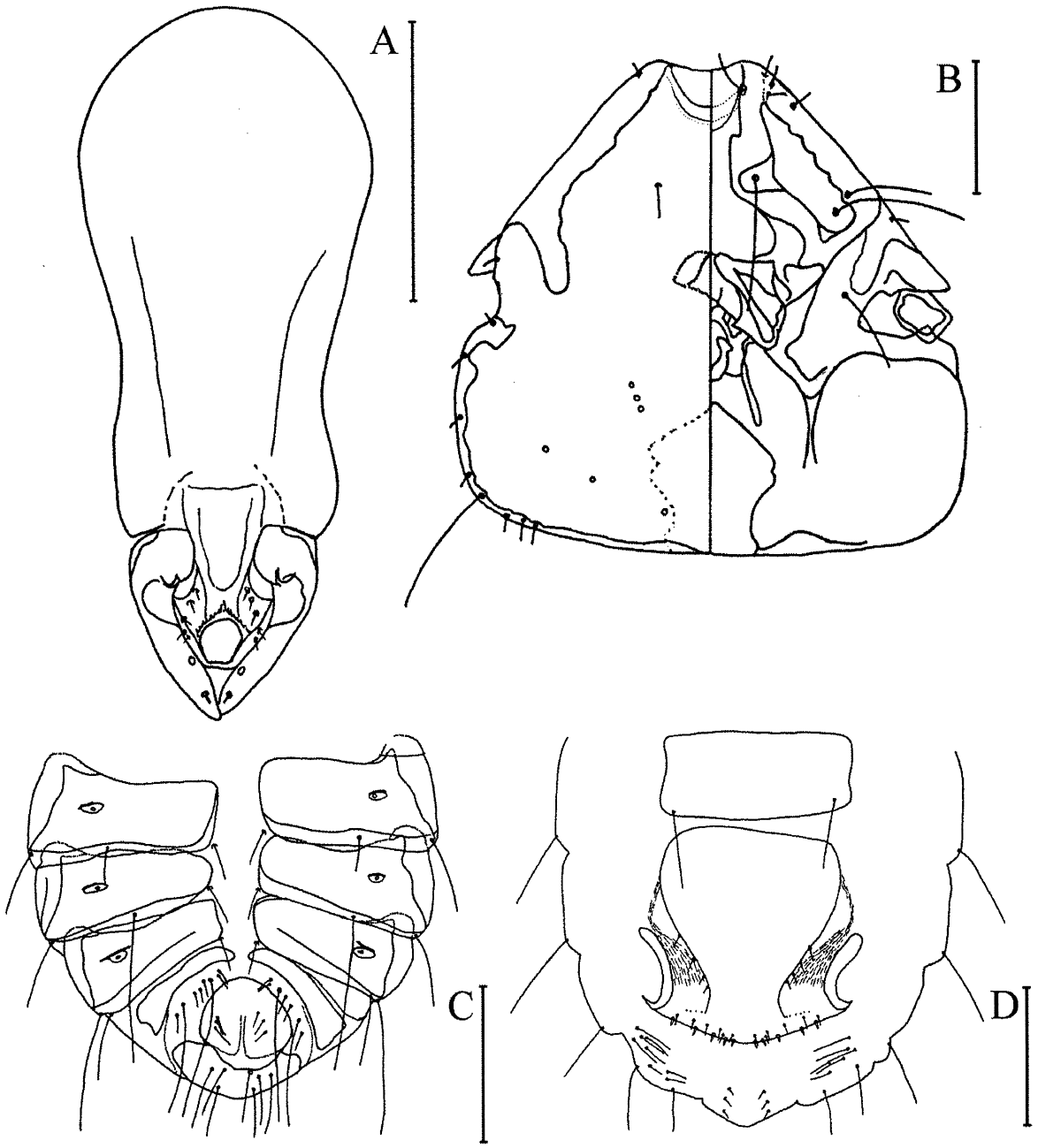

FIGURE 2. *Brueelia binhchauensis*: A, male genitalia. B, dorso-ventral view of head of male. C, dorsal view of male terminalia. D, ventral view of female terminalia. Scales = 0.10 mm for all figures.

Male (n = 7) (Figs 1A, 5A). Head slightly shorter than wide (HL/TW = 0.93–0.95), with postantennal region longer than the preantennal (PAL/POL = 0.95), and a slightly concave anterior margin (Fig. 2B, 5B). Marginal carina complete with straight lateral margins and an anterior hyaline margin; anterior portion indented with a rounded area of sclerotization within the indentation (type "b" in Johnson *et al.* 2002) (Fig. 2B). Metanotum with 8 setae (2 short, 4 medium long and 2 long) on each side of posterior margin. The outermost lateral short seta is also included.

Tergal setae: postspiracular seta present on each side of tergites IV–VIII; postspiracular accessory and tergal posterior setae absent on tergites II–VIII; sutural setae short (0.40–0.50) present on each side of tergites VI–VIII. Tergite IX–X narrow and divided medially with 2 long and 4–6 short setae, on each side; tergite XI with 6–8 setae (Fig. 2C). Abdominal sterna II–VII with a pair of short lateral setae. Paratergal setae: II–III, 0; IV–V, 0–1; VI, 1–2; VII, 2–3; VIII, 3. Internal incrassations in pleural areas relatively wide, moderately pigmented (type "b" in Johnson

et al. 2002). Male genitalia as in Fig. 2A: with stout parameres with enlarged round bases, one sensilla and one minute subapical seta each; endomeral complex with conspicuous central "hole" with serrated anterior margin and 4–5 short setae on each side. Dimensions: PAW, 0.35–0.37; PAL, 0.18–0.19; TW, 0.42; POL, 0.19–0.20; HL, 0.39–0.40; PW, 0.27; ML, 0.16–0.17; MW, 0.36–0.39; AWV, 0.52–0.56; AL, 0.78–0.91; TL, 1.44–1.57; GW, 0.10–0.12.

Female (n = 5) (Figs 1B, 5B). Head shape as for male (HL/TW = 0.91–0.96), with preantennal region longer than the postantennal (PAL/POL = 1.1). Metanotum with 7 setae (1 very short, 2 short, 1 medium long, 2 long and 1 very long) on each postero-lateral margin. The outermost lateral short seta is also included.

Tergal setae: postspiracular seta present on each side of tergites IV–VIII; postspiracular accessory and tergal posterior setae absent on tergites II–VIII; sutural seta present on each side of tergites VII–VIII. In one specimen, the sutural setae on tergite VII are absent on both sides. Tergite VIII with one medium long and 2 long setae on each postero-lateral corner; tergite IX–X with 1–2 short and 2–3 long setae, on each side. Paratergal setae: II–III, 0; IV–V, 0–1; VI, 1–2; VII, 2–3; VIII, 2–3. Ventral terminalia as in Fig. 2D, subgenital plate wide; vulval margin significantly convex, with 8–12 spine-like and 10–14 fine minute setae. Dimensions: PAW, 0.39–0.42; PAL, 0.20–0.22; TW, 0.45–0.47; POL, 0.19–0.21; HL, 0.41–0.45; PW, 0.28–0.30; ML, 0.17–0.20; MW, 0.39–0.42; AWV, 0.63–0.71; AL, 1.05–1.19; TL, 1.78–1.90.

Type material. Holotype ♂ ex *Megalaima lineata*, **VIETNAM**: surroundings of the ranger station in the central part of the park, Binh Chau—Phuoc Buu National Park, Ba Ria—Vung Tau Province, Dong Nam Bo Region (10°31' N, 107°28' E), 27 September 2011, Najer & Sychra leg. (IEBR VAST, O. Sychra V65). Paratypes: 1♂, 2♀ with the same data as holotype (IEBR VAST, O. Sychra V63 and V65); 2♂, 2♀ with the same data as holotype (MMBC, O. Sychra V64 and V66); 1♂, 1♀ with the same data as holotype (BMNH, O. Sychra V67).

Remarks. The holotype male (Fig. 5A) has a more concave anterior margin than the paratypes, but it was probably distorted during the preparation of the slide. Despite this fact, we selected this specimen as holotype because it has clearly visible genitalia. On the other hand, all paratype males have an slightly concave anterior margin as in females (Fig. 5B), but they have distorted genitalia. *Brueelia punjabensis* (Ansari, 1947), from *Megalaima virens* (Boddaert, 1783), and *Brueelia binhchauensis* are the only species of *Brueelia* known from the family Megalaimidae. Both species are very close morphologically. In particular, they have the same head shape with preantennal region as long as the postantennal and a straight entire marginal carina with slightly concave anterior margin. This feature places both species close to three other species of *Brueelia* known from Vietnamese birds: *B. alophoixi* Sychra, 2009, *B. elbeli* Ansari, 1957 and *B. glandarii* (Denny, 1842). Both *Brueelia binhchauensis* and *B. punjabensis* can be easily separated from *B. alophoixi* by body shape, the latter being much longer and narrower (see Sychra *et al.* 2009, figs 1, 3). *Brueelia binhchauensis* can be separated from *B. elbeli* and *B. glandarii* by their different chaetotaxy, especially by the presence of postspiracular acessory and tergal posterior setae on some tergites in both latter species and sutural setae on all tergites in *B. glandarii* (see Ansari 1956, 1957b). Finally, *Brueelia binhchauensis* can be separated from *B. punjabensis* by the following combination of features: (1) a characteristic chaetotaxy, especially with sutural setae on tergites VI–VIII (Figs 1A–B); (2) the shape of male genitalia, especially the endomeral complex with large central "hole" (Fig. 2A); and (3) a shorter head (HL not more than 0.45 vs. HL 0.47–0.48).

Etymology. The species epithet derives from the name of the Binh Chau—Phuoc Buu National Park, situated in southern Vietnam, which is also the type locality of this new louse species.

Brueelia malacocincla Najer & Sychra, new species

(Figs 3A–B, 4A–D, 5C–D)

Type host: *Malacocincla abbotti* Blyth, 1845—Abbott's barbler

Male (n = 1) (Figs 3A, 5C). Head almost as long as wide (HL/TW = 0.97), with preantennal region longer than the postantennal (PAL/POL = 1.14), and with slightly concave anterior margin (Figs 4B, 5C). Dorsal head plate arcuate, with concave anterior and convex posterior margins (Fig. 4B); marginal carina with straight lateral margins, and lateral and medial interruptions, the latter shaped as in type "e" in Johnson *et al.* (2002). Metasternal plate with 2 medium long setae; metanotum with 8 setae (1 short, 6 medium long and 1 long) on each side of posterior margin. The outermost lateral short seta is also included.

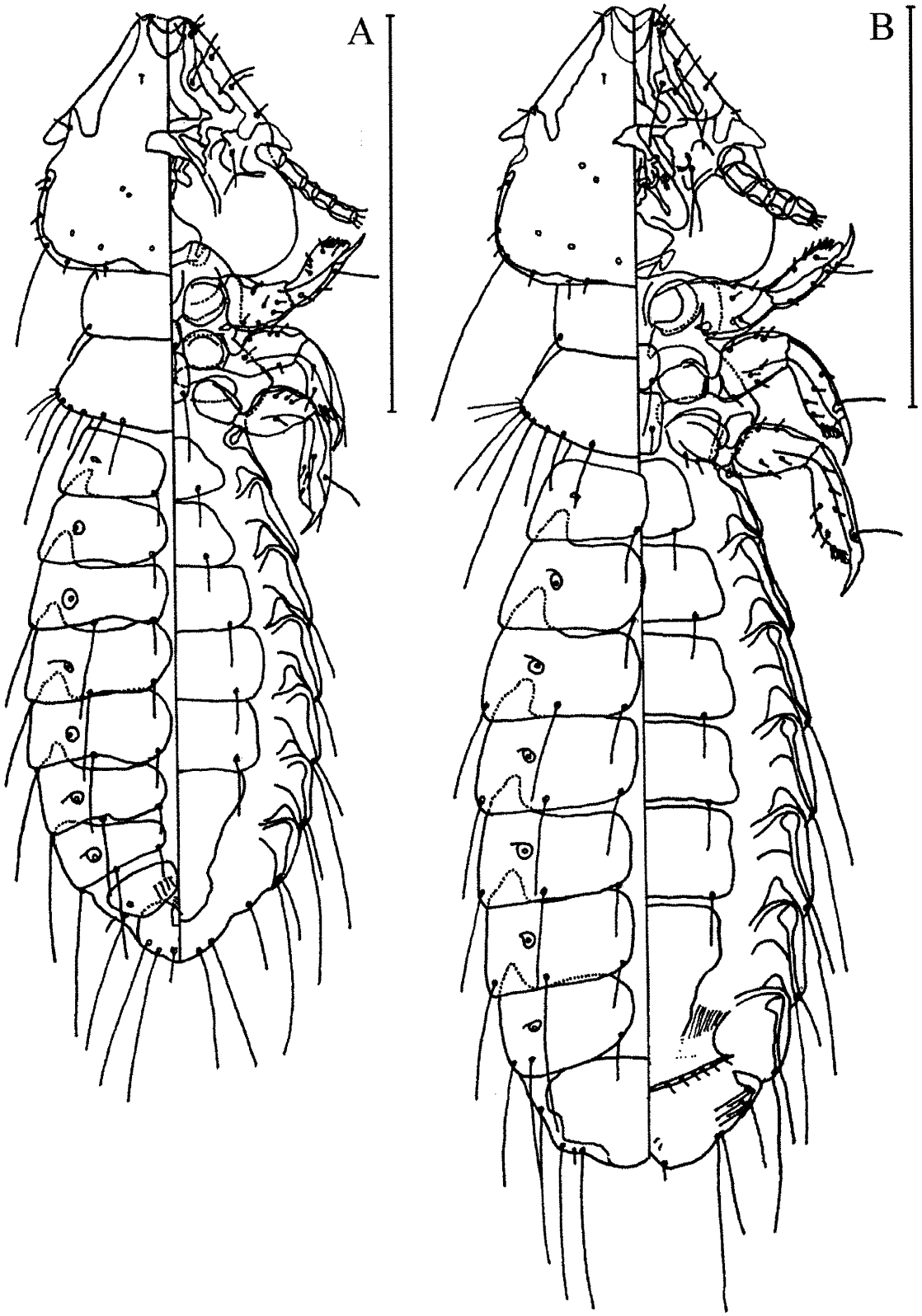

FIGURE 3. *Brueelia malacocincla*: A, dorso-ventral view of male. B, dorso-ventral view of female. Scales = 0.50 mm for both figures.

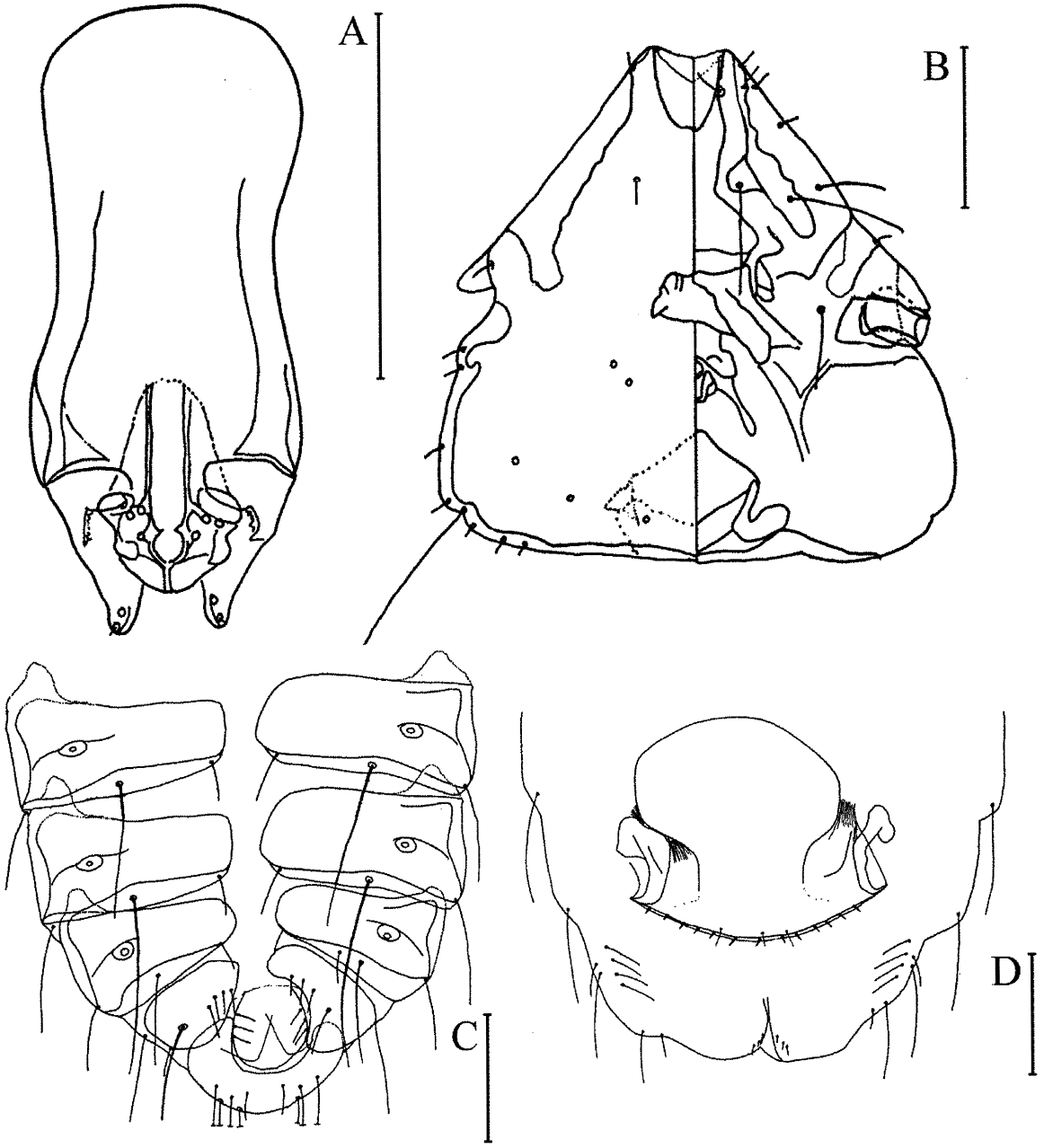

FIGURE 4. *Brueelia malacocincla*: A, male genitalia. B, dorso-ventral view of head of male. C, dorsal view of male terminalia. D, ventral view of female terminalia. Scales = 0.10 mm for all figures.

Tergal setae: postspiracular seta on each side of tergites IV–VIII; postspiracular accessory and tergal posterior setae absent on all segments; sutural seta short, present on each side of tergite II–VIII; tergite IX–X wide and divided medially with one long and 3–4 short setae on each side; tergite XI with 9 setae (Fig. 4C), on each side. Abdominal sterna II–VII with a pair of short lateral setae. Paratergal setae: II–III, 0; IV, 2; V, 1; VI–VIII, 2. Internal incrassations in pleural areas moderately pigmented (type "b" in Johnson *et al.* 2002). Male genitalia as in Fig. 4A, with short stout parameres with enlarged round heads and one sensilla plus one minute subapical seta each, and an oval endomeral plate with central straight and parallel sclerotizations with three minute sensillae on each side. Dimensions: PAW, 0.28; PAL, 0.16; TW, 0.35; POL, 0.14; HL, 0.34; PW, 0.21; ML, 0.12; MW, 0.29; AWV, 0.40; AL, 0.70; TL, 1.24; GW, 0.08.

Female (n = 1) (Figs 3B, 5D). Head almost as long as wide (HL/TW = 0.97), with preantennal region longer than the postantennal (PAL/POL = 1.27). Metanotum with 9 setae (1 short, 7 medium long and 1 long setae) on each postero-lateral margin. Tergal setae: postspiracular seta on each side of tergites IV–VIII; postspiracular

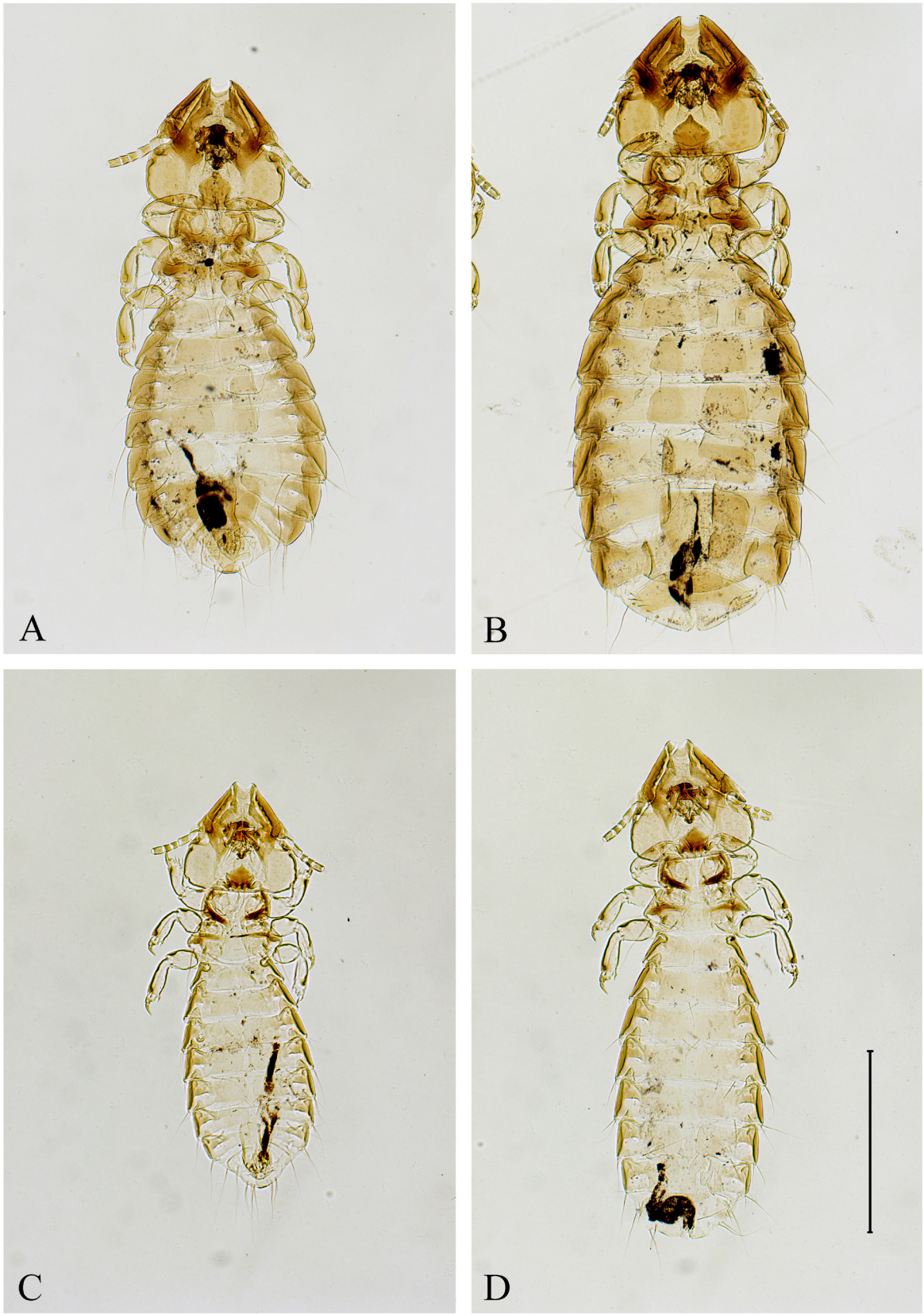

FIGURE 5. A, Holotype male of *Brueelia binhchauensis*. B, Paratype female of *Brueelia binhchauensis*. C, Holotype male of *Brueelia malacocincla*. D, Paratype female of *Brueelia malacocincla*. Scale = 0.50 mm for all figures.

accessory and tergal posterior setae absent on all segments; sutural seta short, present on each side of tergites II–VIII. Tergite VIII with 2 long setae on each postero-lateral corner; tergite IX–X with 1 short and 2 long setae, on each side. Paratergal setae: II–III, 0; IV, 1; V–VII, 2; VIII, 3. Ventral terminalia as in Fig. 4D, subgenital plate wide; vulval margin significantly convex, with 13 spine-like and 3 fine minute setae. Dimensions: PAW, 0.31; PAL, 0.19; TW, 0.38; POL, 0.15; HL, 0.37; PW, 0.23; ML, 0.14; MW, 0.32; AWV, 0.46; AL, 0.93; TL, 1.50.

Type material. Holotype ♂ ex *Malacocincla abbotti*, **VIETNAM**: surroundings of a rubbish dump next to the tourist dormitory, Nam Cat Tien National Park, Dong Nai Province, Dong Nam Bo Region (11°25' N, 107°25' E), 11 September 2011, Najer & Sychra leg (IEBR VAST, O. Sychra V86). Paratype: 1♀ with same data as holotype (IEBR VAST, O. Sychra V86).

Remarks. *Brueelia malacocincla* represents the first ischnoceran species found on babblers of the family Pellorneidae. Besides *Brueelia hrabali* Najer & Sychra, 2012, described from *Macronous gularis* of the family Timaliidae (Najer *et al.* 2012b), *B. malacocincla* is the second species of *Brueelia* recorded from babblers in Vietnam. Also, *Menacanthus eurysternus* (Burmeister, 1838), and *B. malacocincla* are the only louse species known from babblers of the genus *Malacocincla* (see Price *et al.* 2003). *Brueelia malacocincla* can be easily distinguished from *B. hrabali* by its completely different shape of head and body, as well as by other features (see Najer *et al.* 2012b). Furthermore, *B. malacocincla* can be morphologically separated from other species of *Brueelia* known from birds which may occur in Vietnam by the following combination of features: (1) marginal carina straight with lateral interruption (Fig. 4B); (2) shape of the dorsal head plate, as in Fig. 4B; (3) the presence of sutural setae on tergites II–III; (4) the characteristic shape of male genitalia with oval endomeral plate with central straight sclerotizations (Fig. 4A).

Etymology. The species epithet is a noun in apposition derived from the generic name of the type host.

Discussion

With the exception of the new species *Brueelia binhchauensis*, all species of chewing lice found on non-passerines in this study and all their host-louse associations were already known (Price *et al.* 2003). However, the original descriptions of *Alcedoecus annulatus* Ansari, 1955 and *Cuculicola coromandus* (Rudow, 1869) are relatively poor. Although the morphological features of the lice included in this study and obtained from their type hosts agree with those given in the original descriptions, we believe that those descriptions are not sufficient for a precise differentiation from morphologically similar species. Considering that there are no published revisions of *Alcedoecus* or *Cuculicola*, and that no type material is easily available for comparison, complete morphological revisions are needed to identify future collections of lice of these genera, especially from new hosts. Similarly, the obtained COI sequences (GenBank accession numbers KF385882 and KF385883) are currently no more helpful for a taxonomic classification, because there are only few sequences of the genera *Alcedoecus* and *Cuculicola* available for comparison in GenBank, as follows: *Alcedoecus alatoclypeatus* from *Halcyon malimbica* from Africa (GenBank accession numbers AY314807 and AF545669); *Cuculicola* sp. from *Chrysococcyx klaas* from Ghana (AF444857) and *Cuculicola atopus* from *Piaya cayana* from Mexico (AF444856). Furthermore, those species are relatively distant, with uncorrected p-distances of our sequences reaching >20%, which is within the range of observed intergeneric distances.

Uncorrected percent sequence divergences between our sample of *Penenirmus pici* from *Picus canus hessei* (GenBank accession number KF385884, this study) and *P. pici* from *Picus mentalis* and *Blythipicus rubiginosus* from Borneo (GenBank accession numbers AF545745, AF356706, AF356707) reported by Johnson *et al.* (2001, 2003) are 7.7–9.3%. Similarly, the uncorrected percent sequence divergences between *Menacanthus eurysternus* from *Pycnonotus blanfordi* and *P. finlaysoni* (GenBank accession numbers KF385885 and KF385886, this study), and *M. eurysternus* from *Lybius torquatus* from Africa (GenBank accession number AF545725) reported by Johnson *et al.* (2003), and *Menacanthus* sp. from *Lagonosticta rara* from Cameroon (GenBank accession number DQ887248) reported by Balakrishnan & Sorenson (2007) are 4.5–7.1% (our two sequences being identical). The low genetic variability of these two louse species shown by molecular data justifies the conspecific status of the populations from different host species, despite their distant geographic origins. Percent sequence divergences between closely related species of amblyceran lice are usually over 10% (Price *et al.* 2008 and references therein).

Regarding Passeriformes, all identified species of chewing lice found on birds of the family Pycnonotidae were

already known, except for the *Brueelia* sp. found on *Alophoixus ochraceus*, which remains undetermined because only females and nymphs were collected during our study, and at least one male is necessary for a reliable identification of *Brueelia* species (see Ansari 1957c). The two most numerous bird species captured for this study—*Pycnonotus finlaysoni* and *Alophoixus ochraceus*—belong to the Pycnonotidae, and most of the lice collected during this work were found on birds of this family—186 lice of five species belonging to four genera (*Brueelia*, *Menacanthus*, *Myrsidea* and *Philopteroides*).

Although McClure & Ratanaworabhan (1973) recorded *Myrsidea* sp. from *Cymbirhynchus macrorhynchos* from eastern Asia, our records represent the first species determination of a *Myrsidea* from this host as well as a new host-louse association for *Myrsidea claytoni*. This louse was originaly described from *Pycnonotus eutilotus* from Sarawak and *P. sinensis* from Hong Kong (Hellenthal & Price 2003). While both type hosts belong to the family Pycnonotidae, the new host, *C. macrorhynchos*, is a member of the family Eurylaimidae. Our finding represents an interesting case of natural host-switching between unrelated hosts. Although the first ischnoceran louse found on *C. macrorhynchos*—identified as *Brueelia* sp. in this study—seems to be different from other *Brueelia* known from bird species which may occur in Vietnam, we believe that it is not advisable to base the description of a new species on a single male only.

Lice were found on three species of the family Dicruridae, but *Dicrurus hottentottus* was the only host carrying known species of lice—*Myrsidea sindianus* Ansari, 1955 and *Philopterus petrescuae* Adam, 2011. The comments made above for *Alcedoecus annulatus* and *Cuculicola coromandus* also apply to *Myrsidea sindianus*. Among the Dicruridae, *Dicrurus hottentottus* was the most numerous bird species captured during this study (six birds). Regarding the other two species of drongos, we collected only one female of *Brueelia* plus two nymphs of *Philopterus* from *Dicrurus paradiseus*, and two females plus one nymph of *Myrsidea* from *D. aeneus* (Table 1). It was not possible to identify these lice at the species level.

Two of our records of lice from three species of Pellorneidae represent new host-louse associations (Table 1). However, we could identify and describe one species only—*Brueelia malacocincla* from *Malacocincla abbotti*—because louse samples from *Malacopteron cinereum* and *Pellorneum ruficeps* do not include any male, not allowing a determination at the species level. Price *et al.* (2003) listed *Malacocincla abbotti* as a host of the amblyceran *Menacanthus eurysternus*, but included that bird in the family Timaliidae, following Howard & Moore (1991). Considering that *Malacocincla* is now placed in the Pellorneidae, our new species *Brueelia malacocincla* is the first ischnoceran louse recorded from this latter family. Hence, *Brueelia hrabali* Najer & Sychra, 2012 is from a babbler of the family Timaliidae in northern Vietnam, while *B. malacocincla* parasitises a member of the other family of babblers, the Pellorneidae. According to the Fahrenholz's Rule (Fahrenholz 1913; Hodberg *et al.* 1997), the great morphological differences between these two species of *Brueelia* (see above) is further evidence supporting the split of babblers into two separate families, Timaliidae and Pellorneidae, as claimed by Clements *et al.* (2012).

All louse samples from the remaining four bird species belonging to the families Muscicapidae (two species), Phylloscopidae (1) and Monarchidae (1) collected during this study contain either a single adult specimen or nymphs only (Table 1). Although they represent three new host-louse associations, it was not possible to identify these lice at the species level. Therefore, the specimens have been kept for comparisons and descriptions after more samples from the same hosts are collected in our future studies.

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