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Five new species of *Myrsidea* Waterston (Phthiraptera: Menoponidae) from bristlebills and greenbuls (Passeriformes: Pycnonotidae) in Ghana

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Abstract

Five new species of chewing lice of the genus *Myrsidea* Waterston from the passerine family Pycnonotidae are described and illustrated. They and their type hosts are: *M. masoni* ex *Bleda eximius* (Hartlaub), *M. chesseri* ex *Criniger barbatus* (Temminck), *M. palmeri* ex *Andropadus curvirostris* Cassin, *M. wombeyi* ex *Bleda syndactylus* (Swainson), and *M. marksi* ex *Phyllastrephus albigularis* (Sharpe). These represent the first species of pycnonotid *Myrsidea* to be described from African hosts. Partial mitochondrial cytochrome oxidase I (COI) sequences were collected for these species and additional species of *Myrsidea*, which support the genetic distinctiveness of these new species.

Key words: chewing lice, *Myrsidea*, Phthiraptera, Menoponidae, Pycnonotidae, Africa

Introduction

Price *et al.* (2003) recognize over 200 species of *Myrsidea* Waterston, with the vast majority of these from hosts in the avian order Passeriformes. However, when Hellenthal and Price (2003) treated the *Myrsidea* of bulbuls (Pycnonotidae) and described 16 new species, they noted that they had seen no material of this genus from African members of the family. They postulated that this absence "…raises the issue as to whether collecting from these other hosts presents unusual difficulties or whether they simply are not as blessed with lice as the species of bulbuls or whether the lice are lying in collections awaiting their turn for a taxonomic study." An expedition by the senior author and colleagues to Ghana in 2003 resulted in the collection of specimens of *Myrsidea* from 6 species of bristlebills and greenbuls (Pycnonotidae). We have found these to represent 5 new species and it is our purpose here to describe and illustrate them.

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In the following descriptions, all measurements are in millimeters. Abbreviations are: TW, temple width; HL, head length; PW, prothorax width; MW, metathorax width; AWIV, abdomen width at segment IV; LSVII, length of longer inner tergal seta on VII; ANW, female anus width; TL, total length; GL, male genitalia length. Tergal setal counts include postspiracular setae and all setae between them; sternal setae on segment II do not include aster setae. The scientific and common names for the hosts follow those of Dickinson (2003). Holotypes are deposited in the U. S. National Museum of Natural History, Washington, DC; paratypes are distributed between that collection and that of the Illinois Natural History Survey, Champaign.

In addition, partial mitochondrial COI sequences were collected for these species and other species of *Myrsidea* to evaluate their genetic distinctiveness and phylogenetic relationships.

Genus *Myrsidea* Waterston

Myrsidea Waterston 1915: 12. Type species: *Myrsidea victrix* Waterston by original designation.

A brief characterization of this genus as it pertains to the pycnonotid lice in this study is as follows.

Head (Fig. 1) rounded anteriorly; no lateral notch or slit; inner occipital setae much longer than minute outer setae; no ventral sclerotized processes; gula with heavier longer posterior seta on each side.

Thorax (Fig. 1) with pronotum having 6 long posterior setae; no central setae; and 3 short setae at each lateral angle. Mesonotum with 2 minute medioanterior setae adjacent to postnotum and 2 at posterior margin. Metanotum without central setae; with 6 short lateral and anterior setae; and with 6 posterior marginal setae. Prosternal plate well developed, elongate, with 2 short anterior setae; metasternal plate large, diamond shaped; venter of femur III with setal brush.

Abdomen (Figs. 1, 6) with undivided tergites; no anterior setae except very small corner seta on each side of tergite I; sternite I small, without setae; sternite II enlarged, with aster of heavy setae at each lateroposterior corner. Pleurites without anterior setae. Female anus oval, without inner setae; subgenital plate of fused sternites VII–IX, with serrated posterior margin; setae given for VII represent those anteriorly located in region of segment VII, and those for VIII–IX are the remainder of the plate setae. Male subgenital plate of fused sternites VIII–IX; setae given for VIII represent those anteriorly located in region of segment VIII; the remainder of the plate setae are not quantified, but their state may be seen on the various figures; genitalia of characteristic shape (Fig. 5), with spinous sac having associated sclerites (Figs. 4, 8, 10, 15). Sexual dimorphism limited to male with smaller dimensions and differences associated with genitalic features of posterior abdomen. Female with either modification of abdominal tergites (Figs. 6, 11) or with

essentially unmodified tergites (Figs. 7, 9, 16). Male tergal segments unmodified (Figs. 1, 14). For brevity, these characters are not repeated in discussing each species.

Myrsidea masoni Johnson and Price, new species (Figs. 1–6)

Type host. *Bleda eximius* (Hartlaub), the Green-tailed Bristlebill.

Male. As in Fig. 1. Hypopharyngeal sclerites strongly developed (Fig. 2); gula usually with 3 setae on each side (Fig. 3), much less often 4; metasternal plate usually with 4 setae, rarely 5. Tergal setae: I, 6, rarely 7; II, 11–14; III–V, 13–20; VI, 14–17; VII, 12–15; VIII, 10–12. Postspiracular setae very long on I–VIII. Sternal setae: II, each aster of 5, rarely 4 or 6, setae, remainder with 22–31; III, 8–15; IV, 25–34; V, 30–41; VI, 28–35; VII, 12–20; VIII, 3–5. Genital sac sclerite as in Fig. 4. Dimensions: TW, 0.41–0.43; HL, 0.27–0.30; PW, 0.25–0.28; MW, 0.36–0.38; AWIV, 0.46–0.49; LSVII, 0.08–0.10; GL, 0.39–0.43; TL, 1.15–1.22.

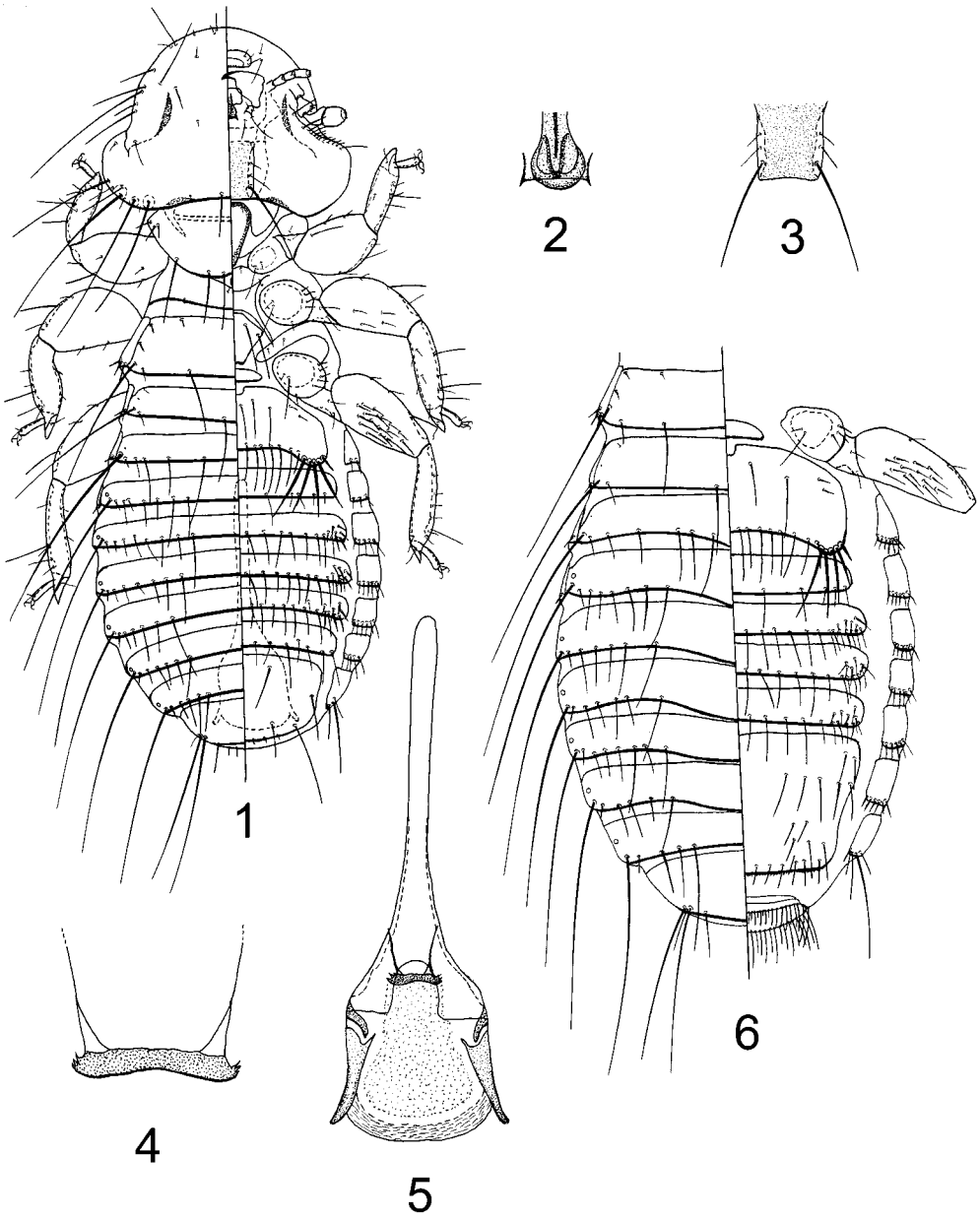
Female. Head as for male (Figs. 1–3), metanotum and abdomen as in Fig. 6. Tergites I and VIII unmodified, II–VII with medioposterior convexity. Tergal setae: I, 6; II, 9–17; III–V, 13–19; VI, 14–17; VII, 11–15; VIII, 10–11. Postspiracular setae as for male. Sternal setae: II, each aster with 5 setae, much less often 6, remainder with 20–27; III, 9–17; IV, 28–41; V, 33–43; VI, 26–39; VII, 9–15; VIII–IX with 11–15 marginal, 10–16 anterior setae. Anus with 39–45 ventral fringe setae, 30–35 dorsal. Dimensions: TW, 0.46–0.49; HL, 0.31–0.32; PW, 0.28–0.32; MW, 0.43–0.48; AWIV, 0.59–0.64; LSVII, 0.11–0.14; ANW, 0.21–0.24; TL, 1.42–1.54.

Type material. Female holotype, ex *B. eximius*, GHANA: Goaso, 20 March 2003, K. P. Johnson, BDM 801. Paratypes: 5 females, 5 males, same data as holotype; 3 females, 2 males, same except JDW 569; 2 females, 4 males, same except 19 March 2003, BDM 793; 2 females, 2 males, same except 21 March 2003, BDM 810; 2 females, 2 males, same except 24 March 2003, MJM 061.

Other material. Ex *B. canicapillus* (Hartlaub), the Grey-headed Bristlebill, 3 females, 7 males, GHANA (BDM 779, BDM 788, JDW 556, MJM 045).

Remarks. This species is characterized by the strongly developed hypopharyngeal sclerites for both sexes, the female with the highly distinctive medioposterior convexity of abdominal tergites II–VII, and the male by structure of the genital sac sclerite. While the male genital sac sclerite form is similar to that of some of the pycnonotid *Myrsidea* species described by Hellenthal and Price (2003), the configuration of the female tergal development is unique to *M. masoni*.

Etymology. This species is named for Ian Mason (CSIRO, Australian National Wildlife Collection) in recognition of his assistance in collecting lice from a wide variety of birds.

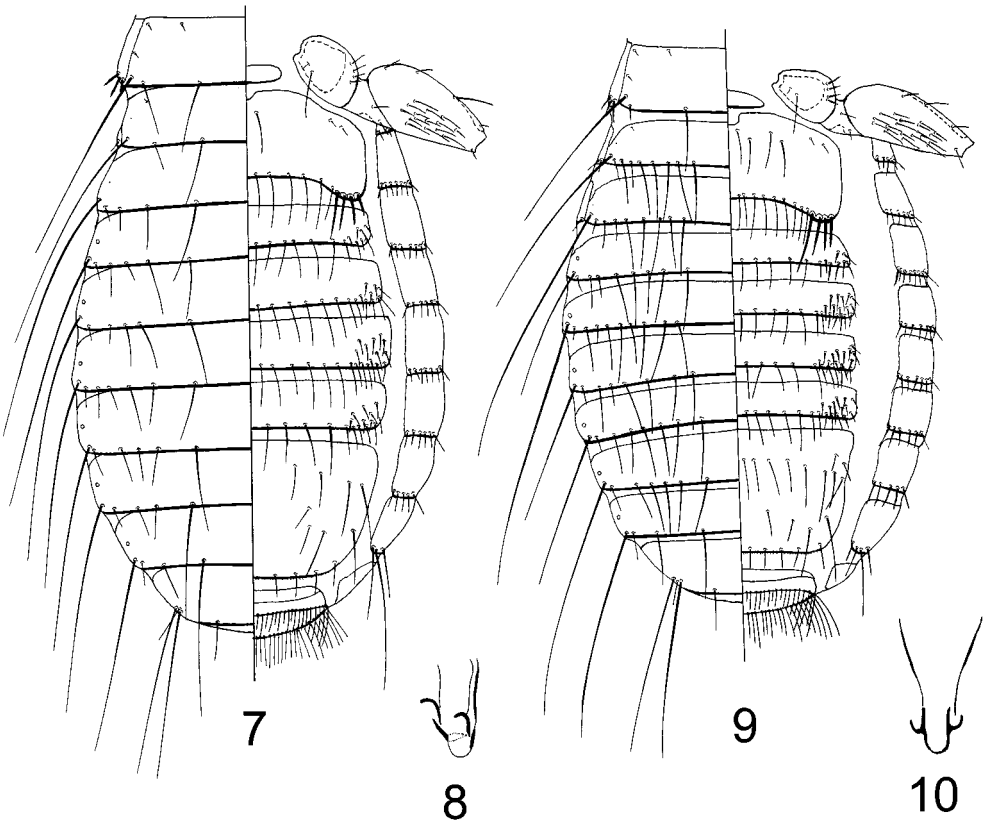


FIGURES 1–6. *Myrsidea masoni*. 1, Dorsoventral male. 2, Male hypopharynx. 3, Male gula. 4, Male genital sac sclerite. 5, Male genitalia. 6, Female metanotum and dorsoventral abdomen.

Myrsidea chesseri Johnson and Price, new species (Figs. 7–8)

Type host. *Criniger barbatus* (Temminck), the Western Bearded Greenbul.

Male. Head and thorax much as for *M. masoni*; gula with 4 setae on each side; metasternal plate with 4–6 setae. Tergal setae: I, 6–7; II–III, 10–11; IV–VI, 10–12; VII, 8–9; VIII, 8. Postspiracular setae very long on I–VIII. Sternal setae: II, each aster with 4 setae, remainder with 15–17; III, 19–20; IV–V, 30–34; VI, 26–29; VII, 8; VIII, 4. Genital sac sclerite as in Fig. 8. Dimensions: TW, 0.43; HL, 0.30–0.31; PW, 0.27–0.29; MW, 0.37–0.40; AWIV, 0.51–0.52; LSVII, 0.13–0.14; GL, 0.42–0.43; TL, 1.30.



FIGURES 7–10. 7–8, *Myrsidea chesseri*. 7, Female metanotum and dorsoventral abdomen. 8, Male genital sac sclerite. 9–10, *M. palmeri*. 9, Female metanotum and dorsoventral abdomen. 10, Male genital sac sclerite.

Female. Head and thorax as for male, except gula with 4–5 setae on each side and metasternal plate with 6 setae. Abdomen as in Fig. 7. Tergites I–VIII of similar size, with straight posterior margin. Tergal setae: I, 7; II, 11; III–IV, 12; V–VI, 13; VII, 9; VIII, 8. Postspiracular setae as for male. Sternal setae: II, each aster with 4 setae, remainder with 17; III, 28; IV, 35; V, 43; VI, 34; VII, 8; VIII–IX with 9 marginal, 8 anterior setae. Anus with 36–37 ventral and dorsal fringe setae. Dimensions: TW, 0.48; HL and PW, 0.32; MW, 0.46; AWIV, 0.61; LSVII, 0.22; ANW, 0.25; TL, 1.56.

Type material. Female holotype, ex *C. barbatus*, GHANA: Goaso, 19 March 2003, K. P. Johnson, BDM 794. Paratypes: 2 males, same data as holotype.

Remarks. Both sexes of *M. chesseri* are separated from those of *M. masoni* by having consistently fewer tergal setae on III–VIII; more setae on sternite III and fewer on sternite VII; each side of gula with 4, less often 5, setae; metasternal plate usually with 6 setae; and each aster on sternite II with only 4 setae. The female of *M. chesseri* has fewer subgenital plate setae and the male has a distinctively different structure of the genital sac sclerite. The combination of features of chaetotaxy of both sexes, the relatively unmodified female abdominal tergites, and the structure of the male genital sac sclerite support separation of *M. chesseri* from previously described species.

Etymology. This species is named for Terry Chesser (U.S. National Museum of Natural History) in recognition of his assistance in collecting lice from a wide variety of birds.

Myrsidea palmeri Johnson and Price, new species (Figs. 9–10)

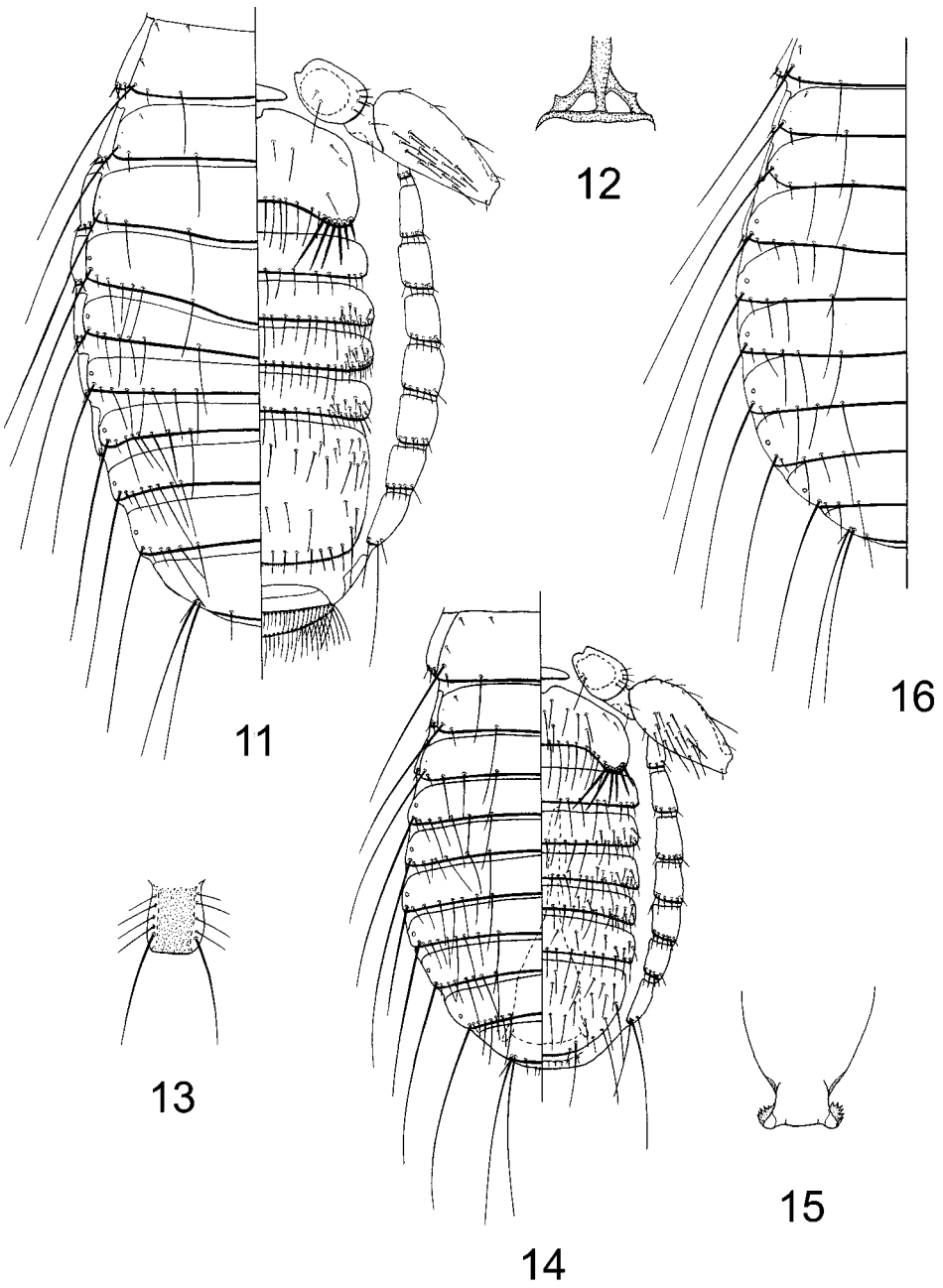
Type host. *Andropadus curvirostris* Cassin, the Plain Greenbul.

Male. Head and thorax much as for *M. masoni*; gula with 4 setae on each side; metasternal plate with 6, less often 5, setae. Tergal setae: I, 13–14, II, 15–17; III, 17; IV, 18–19; V, 16–17; VI–VII, 15–18; VIII, 10–11. Postspiracular setae very long on I–II, IV, and VII–VIII, shorter on III and V–VI. Sternal setae: II, each aster with 4 setae, remainder with 26–28; III, 21–23; IV, 36–41; V, 37–45; VI, 32–38; VII, 14–18; VIII, 6. Genital sac sclerite as in Fig. 10. Dimensions: TW, 0.41–0.43; HL, 0.29–0.30; PW, 0.26–0.28; MW, 0.37–0.38; AWIV, 0.46–0.49; LSVII, 0.11; GL, 0.40–0.41; TL, 1.20–1.22.

Female. Head and thorax as for male, except 1 of 8 gular sides with only 3 setae. Abdomen as in Fig. 9. Tergites I–VIII unmodified. Tergal setae: I, 17–19; II, 18–19; III, 15–18; IV, 16–19; V, 15–16; VI, 13–16; VII, 12–13; VIII, 8. Postspiracular setae as for male. Sternal setae: II, each aster with 4, rarely 5, setae, remainder with 27–32; III, 21–27; IV, 40–46; V, 48–53; VI, 39–43; VII, 16–21; VIII–IX with 11–14 marginal, 8–11 anterior setae. Anus with 33–37 ventral fringe setae, 34–40 dorsal. Dimensions: TW, 0.46–0.47; HL, 0.31–0.32; PW, 0.29–0.30; MW, 0.42–0.45; AWIV, 0.56–0.62; LSVII, 0.10–0.15; ANW, 0.22–0.23; TL, 1.45–1.52.

Type material. Female holotype, ex *A. curvirostris*, GHANA: Goaso, 27 March 2003, K. P. Johnson, BDM 847. Paratypes: 3 females, 3 males, same data as holotype.

Remarks. Both sexes of *M. palmeri* are separated from those of the first two species by having the shorter postspiracular setae on III and V–VI and more setae on tergites I–II. Additionally, both sexes have fewer setae in each sternite II aster and more setae on sternite III, the gula, and the metasternal plate than *M. masoni*, and more setae on sternite VII than *M. chesseri*. The male of *M. palmeri* is further recognized by its distinctive genital sac sclerite. The lack of extreme female tergal development, both sexes with shorter postspiracular setae on III and V–VI, and the male with the unique genital sac sclerite distinguish *M. palmeri* from all previously known species of this genus.



FIGURES 11–16. 11–15, *Myrsidea wombeyi*. 11, Female metanotum and dorsoventral abdomen. 12, Male hypopharynx. 13, Male gula. 14, Male metanotum and dorsoventral abdomen. 15, Male genital sac sclerite. 16, *M. marksi*, female metanotum and dorsal abdomen.

Etymology. This species is named for Robert Palmer (CSIRO, Australian National Wildlife Collection) in recognition of his assistance in collecting lice from a wide variety of birds.

Myrsidea wombeyi Johnson and Price, new species (Figs. 11–15)

Type host. *Bleda syndactylus* (Swainson), the Common Bristlebill.

Male. Head and thorax much as in Fig. 1; hypopharyngeal sclerites weakly developed (Fig. 12); gula usually with 5 setae on each side (Fig. 13), much less often 4; metasternal plate with 4 setae. Abdomen as in Fig. 14. Tergal setae: I, 6, rarely 7; II, 9–13; III, 13–18; IV, 15–18; V, 15–21; VI, 17–20; VII, 16–18; VIII, 12–16. Postspiracular setae shorter on V than on IV and VI. Sternal setae: II, each aster with 6 setae, much less often 5, remainder with 29–36; III, 15–17; IV, 38–41; V, 42–50; VI, 40–47; VII, 31–41; VIII, 21–26. Genital sac sclerite as in Fig. 15. Dimensions: TW, 0.44–0.46; HL and PW, 0.30–0.32; MW, 0.42–0.44; AWIV, 0.51–0.54; LSVII, 0.10–0.13; GL, 0.43–0.47; TL, 1.36–1.45.

Female. Head and thorax much as for male; each side of gula with 5 setae, less often 6. Abdomen as in Fig. 11. Tergites I–III largest, II with only modest medioposterior convexity, III with pronounced convexity; following tergites IV–VI slightly reduced. Tergal setae: I, 6; II, 8–10; III–IV, 12–16; V, 13–17; VI, 15–18; VII, 16–20; VIII, 12–16. Postspiracular setae as for male. Sternal setae: II, each aster with 6 setae, much less often 5 or 7, remainder with 21–30; III, 16–19; IV, 38–46; V, 42–53; VI, 45–49; VII, 24–29; VIII–IX with 11–14 marginal, 13–17 anterior setae. Anus with 48–56 ventral fringe setae, 43–54 dorsal. Dimensions: TW, 0.49–0.53; HL, 0.32–0.34; PW, 0.33–0.34; MW, 0.50–0.53; AWIV, 0.68–0.73; LSVII, 0.12–0.16; ANW, 0.27–0.30; TL, 1.69–1.81.

Type material. Female holotype, ex *B. syndactylus*, GHANA: Goaso, 16 March 2003, B. Marks, BDM 769. Paratypes: 1 female, 1 male, same data as holotype; 1 female, 1 male, same except 17 March 2003, K. P. Johnson, BDM 780; 1 female, same except 18 March 2003, KPJ 122; 2 females, 1 male, same except BDM 786; 3 females, 2 males, same except JDW 557; 1 female, 1 male, same except 21 March 2003, BDM 807; 1 female, 1 male, same except MJM 053.

Remarks. This species differs from all other known pycnonotid *Myrsidea*, except for the following new species, in having the hypopharyngeal sclerites only weakly developed. This feature, along with the female tergal configuration, both sexes with the large number of setae on tergites VII–VIII and sternites V–VII, and the unique male genital sac sclerite, enables easy identification of this new species.

Etymology. This species is named for John Wombey (CSIRO, Australian National Wildlife Collection) in recognition of his assistance in collecting lice from a wide variety of birds.

Myrsidea marksi Johnson and Price, new species (Fig. 16)

Type host. *Phyllastrephus albigularis* (Sharpe), the White-throated Greenbul.

Male. Head and thorax similar to *M. wombeyi*; gula with 4–5 setae on each side. Tergal setae: I, 5–6; II, 9–11; III–VI, 11–15; VII, 10–16; VIII, 8–9. Postspiracular setae very

long on I–VIII. Sternal setae: II, each aster with 6 setae, less often 5, remainder with 20–22; III, 14–16; IV–VI, 28–32; VII, 20–22; VIII, 11–12. Genital sac sclerite much as in Fig. 15. Dimensions: TW, 0.41–0.42; HL, 0.28–0.30; PW, 0.27–0.29; MW, 0.38–0.40; AWIV, 0.48–0.51; LSVII, 0.09–0.12; GL, 0.41–0.43; TL, 1.26–1.31.

Female. Head and thorax as for male. Dorsal abdomen as in Fig. 16. Tergite III with only slight medioposterior convexity; other tergites with relatively straight posterior margin. Tergal setae: I, 6; II–V, 10–13; VI, 11–15; VII, 10–12; VIII, 8. Postspiracular setae as for male. Sternal setae: II, each aster with 6 setae, remainder with 18–22; III, 14–16; IV–VI, 31–38; VII, 15; VIII–IX with 11–13 marginal and anterior setae. Anus with 43–47 ventral fringe setae, 35–44 dorsal. Dimensions: TW, 0.45–0.46; HL and PW, 0.30–0.31; MW, 0.41–0.44; AWIV, 0.60–0.63; LSVII, 0.12–0.13; ANW, 0.21–0.23; TL, 1.50–1.58.

Type material. Female holotype, ex *P. albigularis*, GHANA: Goaso, 19 March 2003, K. P. Johnson, BDM 789. Paratypes: 1 male, same data as holotype; 1 male, same except 21 March 2003, JDW 574; 3 females, 2 males, same except 24 March 2003, BDM 822.

Remarks. *Myrsidea marksi* is allied with *M. wombeyi* in being the only two known species of pycnonotid *Myrsidea* with weakly developed hypopharyngeal sclerites. Both sexes of *M. marksi*, with consistently smaller dimensions and reduced numbers of setae on tergites III–VIII and sternites IV–VII, are easily separated from those of *M. wombeyi*.

Etymology. This species is named for Ben Marks (Louisiana State University) in recognition of his interest in African Pycnonotidae and for his aid in the collection of lice used in this study.

Discussion

The five species of *Myrsidea* in this study fall into two easily distinguished groups — the first of these having strongly developed hypopharyngeal sclerites (*M. masoni*, *M. chesseri*, and *M. palmeri*) and the second having weakly developed hypopharyngeal sclerites (*M. wombeyi* and *M. marksi*). Further differences between these groups involve the structure of the male genital sac sclerite and the degree of development of the female tergites. Since all of these hosts were collected at the same locality, it becomes apparent that there are strong factors maintaining this degree of host specificity. In addition, it was surprising to find *M. masoni* occurring on two species of *Bleda*, with a third species of *Bleda* harboring a *Myrsidea* species with a markedly different morphology. *Bleda eximius* is generally considered to be more closely related to *B. canicapillus* than either is to *B. syndactylus* (Fishpool and Tobias 2005), which may explain why the former two bird species share a louse species.

DNA sequences of a 379 base pair portion of the mitochondrial COI gene (GenBank Accession numbers DQ366667-73) support our taxonomic findings. Uncorrected percent sequence divergences between species described herein range from 13.1% (between *M. wombeyi* and *M. marksi*) to 22.1% (between *M. palmeri* and *M. wombeyi*). For two spe-

cies in which more than one individual louse was sequenced, sequence divergences within species were 2.3% (for two *M. wombeyi* ex *B. syndactylus*) and 0.5% (for *M. masoni* between *B. eximius* and *B. canicapillus*). Maximum likelihood phylogenetic analyses of these sequences (Fig. 17) support the conclusions from morphology uniting *M. wombeyi* and *M. marksi* into a distinct group. However, the relationships among the remaining species and other species of *Myrsidea* is less clear. Given the results of this recent collecting and taxonomic evaluation, and that over 40 species of African Pycnonotidae currently have no records of *Myrsidea*, we expect that more louse species remain to be discovered from this group of birds.

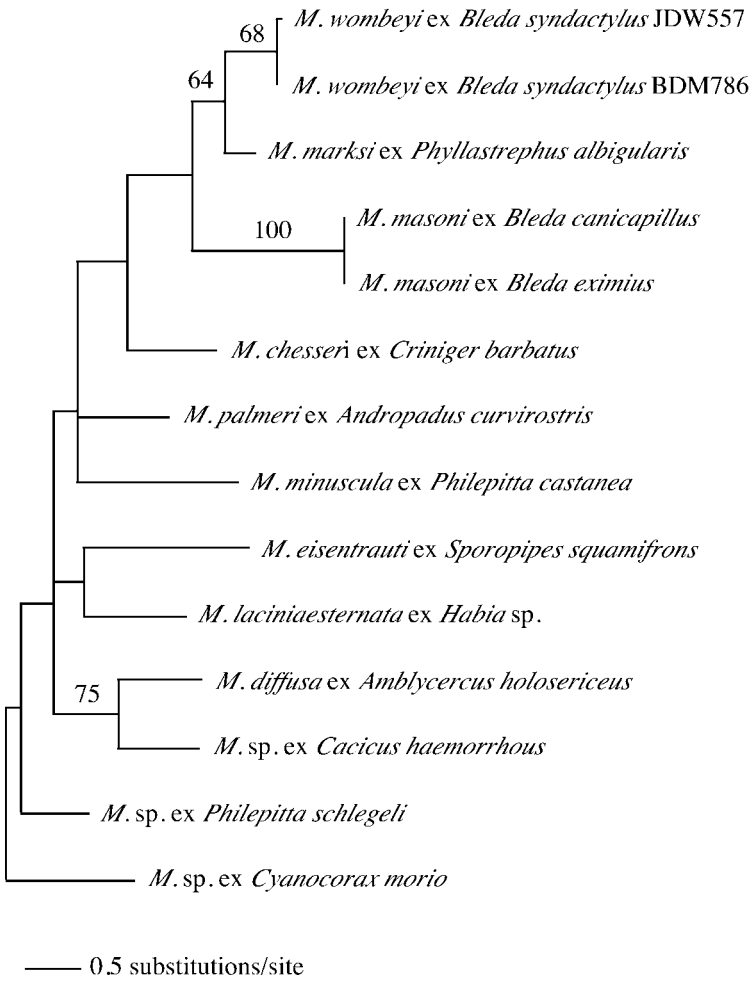


FIGURE 17. Phylogeny based on maximum likelihood analysis of a 379 base pair portion of the mitochondrial COI gene. Searches involved 10 random addition replicates using a GTR + I + G model (parameters A = 0.303, C = 0.178, G = 0.158, T = 0.361; A–C = 16.33, A–G = 382.25, C–G = 32.94, C–T = 400.05, G–T = 1.0; alpha = 0.148, I = 0.158). Numbers above branches are support from 100 likelihood bootstrap replicates (only values >50% shown). Branches proportional to substitutions per site (scale indicated). Tree rooted on *Dennyus hirundinus* (not shown). *M.* = *Myrsidea*.

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