Taxonomic Review of Physconeloides (Phthiraptera: Philopteridae) from the Columbiformes (Aves), Including Descriptions of Three New Species

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ABSTRACT We provide a comprehensive taxonomic review of Physconeloides, a genus of ischnoceran chewing lice found on pigeons and doves (Columbiformes). Thirteen previously known Physconeloides species are redescribed and 16 new synonyms are designated: P. rubripes Carriker, P. rubripes longulus Tendeiro, P. pilobosci P. auritae Tendeiro and P. zenai Carriker. P. recurvatus Eichler, P. choconisi Carriker and P. montana Carriker are synonyms of P. ceratocercus Ewing, P. silvestris Tendeiro is a synonym of P. perijae Carriker, P. keleti Kaddou and P. brandti Kaddou are synonyms of P. spenceri Emerson and Ward; P. wolffietrichi Kaddou is a synonym of P. anolai Carriker; and Conicocotacanthus mattogrossensis Guimarães, P. passerinae Emerson, P. euryema pretiosa Carriker, P. talpaci Carriker and P. picui Tendeiro are synonyms of P. euryema (Carriker). Three new species are also described: P. moorei (type host Geotrygon lineata), P. johnsoni (type host Columbina passerina bahamensis), and P. robbinsi (type host Metriopelia ceciliae). A key is provided for identification of the 16 recognized species.

KEY WORDS Ischnocera, Physconeloides, Columbiformes, taxonomy

The chewing louse genus Physconeloides Ewing currently contains 30 specific and subspecific names for lice, all of which are parasites of pigeons and doves (Columbiformes). In this article, we redescribe 13 of the previously named species, designate 16 new junior synonyms, describe 3 new species, and provide a key for identification of the 16 species we recognize. Material examined included a large number of museum specimens, as well as fresh material collected in Mexico by D.H.C. Methods used to remove lice from hosts are described in Clayton (1990).

All measurements are in millimeters. Abbreviations for measured structures are defined at 1st use. Host classification follows Howard and Moore (1991). For brevity, generic and group features are not repeated in the species descriptions. Key characters are for both sexes unless otherwise stated. Under the Material section, we indicate parenthetically, following the locality, the number of host individuals from which lice were collected.

Physconeloides Ewing


Members of this genus are characterized as follows. Head with angulate temples, each side with 2 very long marginal setae; pair of outer preantennal projections and pair of ventral lateroanterior projections, these being blunt to sharply pointed; dark elongate carina between these projections on each side; prominent circumfasciate thick anterior margin. Pronotum with single lateroposterior seta; metanotum with pair of long to very long lateroposterior corner setae and closely associated pair of short to long marginal setae mediad to these on each side; sternum with complex supporting sclerites of typical shape. Abdomen rounded, with extensive pleural thickenings and weakly developed associated tergites; segments II-VIII with broad median tergal separation; female IX with complete transverse sclerite. Male genitalia very long, slender; terminal semicircular sclerite of distinctive size and shape.

The highly variable appearance of the male genitalia combined with overlap in traits by previous descriptions on an assumption of host–lice specificity has led to the description of numerous taxa. Examination of additional material has shown many of these to be invalid.

Sexual dimorphism is slight among species of Physconeloides, with most differences associated with the terminalia, increased male abdominal tergal chaetotaxy, and generally smaller male dimensions. Palma (1973) provides excellent illustrations of the complete male and female of this genus.

We divide Physconeloides into 5 species groups based on the morphological differences described above.

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Figs. 1–20. *P. galapagensis*. (1) Head [arrow: interrupted temple carina]; (2) male terminal sclerite; (3) male dorsal thorax and abdomen; (4) female subgenital plate; (5) thoracic sternal sclerites; (6) male genitalia; (7) female dorsal thorax and abdomen. *P. wisemani*. (8) Male dorsal thorax and abdomen [arrow: very long outer median marginal metanotal setae]. *P. ceratoceps*. (9) Male genitalia; (10) female dorsal thorax and abdomen; (11) head; (12) female subgenital plate; (13) male terminal sclerite. *P. cubana*. (14) Female subgenital plate; (15) head; (16) male genitalia; (17) male dorsal thorax and abdomen; (18) female dorsal thorax and abdomen. *P. perjica*. (19) Head; (20) male terminal sclerite.

**galapagensis group**

Both outer and inner head projections blunt (Fig. 1). Temple carina interrupted (Fig. 1, arrow). Pronotum without protruding lateroposterior corners (Fig. 3). Thoracic sternal sclerotization similar to Fig. 5. Female subgenital plate usually with total of 4–5 long lateroposterior marginal setae (Fig. 4).

**Physconelloides galapagensis** (Kellogg & Kuwana)  
(Figs. 1–7)

Goniocotes galapagensis Kellogg & Kuwana, 1902: 481.  
Type host: Camarhynchus productus Ridgway—error.  
Male and Female. Head (Fig. 1) with inner projection 0.04–0.06 long, directed posteriorly. Male dorsal
thorax and abdomen as in Fig. 3; both setae of median marginal metanotal pair short, fine; tergal setae on II, 6–9; III–IV, 8–11; V, 7–11; VI, 7–9; short postspiracular seta on II–VI, very long on VII; genitalia (Fig. 6) with length (GNL), 0.38–0.49; temple width (TMW), 0.44–0.50; head length (HDL), 0.31–0.36; prothorax width (PXW), 0.23–0.31; metathorax width (MXW), 0.32–0.41; total length (TTL), 0.97–1.15; terminal sclerite (Fig. 2) width (TSW), 0.12–0.13. Female dorsal thorax and abdomen as in Fig. 7; inner seta of median marginal metanotal pair long; short postspiracular seta on III–V, very long on VI–VII; short median tergal seta
Physconeloides zenaidurae (McGregor)

Coniodes zenaidurae McGregor, 1917: 433. Type host: Zenaida macroura (L.).


Male and Female. As for P. galapagensis except as follows. Male tergal setae on II, 5–6; III-V, 6–7; GNL, 0.32–0.42; TMW, 0.41–0.49; PXW, 0.21–0.27; TTL, 0.89–1.06. Female inner head projection 0.05–0.07 long; TMW, 0.56–0.68; HDL, 0.40–0.46.

Discussion. The type series and other material of P. rubripes agree closely with those taken from the true host of P. zenaidurae. Carriker (1963a) claimed that P. rubripes is quite different from P. wisemani Emerson, the 3rd member of this group, especially in the dimensions. However, we do not agree with his assessment.

Tendeiro (1980) described P. rubripes longulus from a single female, basing the new subspecies primarily on size differences. We find the dimensions of this holotype to be well within the range of P. zenaidurae. Although the holotype is apparently lost, we feel certain that it is inseparable from the nominate form.

Tendeiro (1980) also described P. piotrowskii from a single female taken from the type locality of P. r. rubripes. In fact, this specimen is mounted on the same slide as a male and female of P. r. rubripes, all marked as determined by Tendeiro but without indication as to the identity of each female. Fortunately, by comparing specimens with photographs in Tendeiro (1980), we have been able to determine the holotype with certainty. All dimensions and other details are in agreement with P. zenaidurae. We can find nothing to justify the recognition of this taxon by Tendeiro (1980).

Although we could not obtain type material used by Tendeiro (1987) for P. auritas, we did study 3 females from the type locality, Santa Lucia, B.W.I., as well as a total of 2 males and 2 females from 3 other localities. We could discern no meaningful differences between these specimens and those of P. zenaidurae.

Material. 22 3 8, 19 9 9 including HOMOTYPE: 8 of G. zenaidurae ex Z. macroura, USA (18), MEXICO (1). 3 3 9, 5 5 8 including HOLOTYPE: 9, 1 9, 3 8 PARATYPES of P. rubripes ex Z. auriculata rubripes, BRITISH GUIANA (1). HOLOTYPE: 8 of P. piotrowskii ex Z. aurita rubripes, BRITISH GUIANA. 2 9 8, 5 8 9 ex Z. aurita, PUERTO RICO (2), WEST INDIES (2). 2 9 9, 4 9 9 ex Columba livia Gmelin, USA (1). 1 9, 2 9 8 ex “wild dove,” PANAMA (1).

Physconeloides wisemani Emerson
(Fig. 8)

Physconeloides wisemani Emerson, 1960: 122. Type host: Zenaida asiatica (L.).

Male and Female. As for P. galapagensis except as follows. Inner head projection 0.05–0.07 long. Male outer seta of median marginal metanotal pair very long (Fig. 8, arrow); tergal setae on II, 4–6; III, 5–6; IV, 6; V, 6–7; VI, 8–10; HDL, 0.34–0.38; TSW, 0.14–0.17.

Female HDL, 0.39–0.46.

Discussion. Emerson (1960) provided little to justify describing P. wisemani as a new species. We found P. wisemani to have small but consistent morphological differences from the other 2 species of the galapagensis group. Although we regard its status as somewhat tenuous, we have chosen to continue to recognize it as a separate species.

Material. 5 9 8, 15 8 9 including HOLOTYPE: 9, ALLOTYPE: 9, 8, 8 PARATYPES of P. wisemani ex Z. asiatica, USA (4), MEXICO (1), BAHAMA IS. (1), PERU (1).

ceratoceps group

Both outer and inner head projections usually sharply pointed (Fig. 11), inner projection occasionally with blunt tip (Fig. 19). Temple carina complete (Fig. 11). Pronotum without protruding lateroposterior corners. Thoracic sternal sclerotization much as in Fig. 5. Female subgenital plate with total of 5–9 long lateroposterior marginal setae (Fig. 12).

Physconeloides ceratoceps Ewing
(Figs. 9–13)

Physconeloides ceratoceps Ewing, 1927: 94. Type host: Leptotila verreauxi (Bonaparte).

Physconeloides recurvatus Eichler, 1949: 645. Type host: Columba picui picui (Temminck) – error. New synonymy.

*Physonellosoides montana* Carriker, 1961: 518. Type host: *Geotrygon montana montana* (L.) - error. New synonymy.

**Male and Female.** Head (Fig. 11) with inner projection 0.06–0.10 long, directed posteriorly. Male dorsal thorax and abdomen similar to Fig. 8; outer seta of median marginal metanotum pair very long (Fig. 8, arrow); inner short; fine; tergal setae on II, 2–6; III–IV, 5–8; V, 4–7; VI, 6–8; short postspiracular seta on III–IV, very long on VII; genitalia (Fig. 9) with GN, 0.45–0.52; TMW, 0.45–0.57; HDL, 0.35–0.42; PXW, 0.28–0.37; MXW, 0.37–0.49; TTL, 1.01–1.33; TSW, 0.14–0.19 (Fig. 13). Female dorsal thorax and abdomen as in Fig. 10; inner seta of median marginal metanotum pair short; short postspiracular seta on III–V, very long on VI–VII with adjacent short seta; usually short, less often long, median tergal setae on VII–VIII; TMW, 0.56–0.66; HLD, 0.42–0.49; PXW, 0.35–0.41; MXW, 0.46–0.53; TTL, 1.53–1.73; SCG 0.20–0.28 (Fig. 12).

**Discussion.** Although we were unable to study any type material of *P. ceratocoeps*, diverse collections from the type host have assured us that they represent the species Ewing (1927) described from a single male/female pair. Carriker (1963a), in his study of lice from 3 *Leptotitla* species, noted that he found them remarkably uniform and concluded that they represent the same species.

The female holotype that Eichler (1949) used to describe *P. recurvatus*, and which we have studied, agrees well with *P. ceratocoeps*. The host record is questionable because our other material from *C. picsii* is quite different from Eichler's holotype. Regardless of the host identification, *P. recurvatus* definitely is a junior synonym of *P. ceratocoeps*.

We studied the entire type series used by Carriker (1961) to describe *P. chocoensis* and are certain that these lice are conspecific with *P. ceratocoeps*. One of the female paratypes from Taraza, Antioquia, Colombia, was misidentified and is actually a specimen of *P. cubanus* Tendeiro, the next member of this species group.

Carriker (1961) described *P. montana* from a female specimen supposedly collected from *G. montana*. We have examined this holotype and find no meaningful differences between it and material representing *P. ceratocoeps*. Additionally, because this holotype is different from all other series from *G. montana*, we suspect this is an erroneous host record.

**Material.** 22 2 3 29 2 ex *L. verreauxi*, MEXICO (5), TRINIDAD (2), SALVADOR (1), BRITISH GUIANA (1), BOLIVIA (2), COLOMBIA (1), ARGENTINA (2), SOUTH AMERICA (2), 5 3 5 2 ex *L. rufa* (Richard & Bernard), BRITISH GUIANA (3), 1 3 6 9 ex *L. plumbeiceps* (Scaliter & Salvini), MEXICO (3), 3 2 3 2 3 2 ex *L. jamacaima* (L.), MEXICO (1), 10 2 ex *L. cassini* (Lawrence), COLOMBIA (3), COSTA RICA (1). HOLOTYPE: 2 of *P. recurvatus* ex *C. picus*, error, PARAGUAY. HOLOTYPE: 2, ALLOTYPE: 3, 2 PARATYPES of *P. chocoensis* ex *G. vergaensis*, COLOMBIA (1). HOLOTYPE: 2 of *P. montana* ex *G. montana*, error, COLOMBIA.

**Physonellosoides cubanus** Tendeiro

(Figs. 14–18)

**Physonellosoides cubanus** Tendeiro, 1980: 59. Type host: *Geotrygon chrysia* Bonaparte.

**Male and Female.** Similar to *P. ceratocoeps* except as follows. Head as in Fig. 15. Male dorsal thorax and abdomen as in Fig. 17; tergal setae on III, 6; IV, 4–5; V, 4–6; short postspiracular seta on VII; genitalia as in Fig. 16; TMW, 0.41–0.50; HLD, 0.33–0.38; PXW, 0.24–0.30; MXW, 0.32–0.40; TTL, 1.01–1.18. Female with dorsal thorax and abdomen as in Fig. 18; postspiracular seta absent on III–V, very long on VI–VII without adjacent seta; short to long median tergal seta on VII, very long on VIII; SCG, 0.23–0.30 (Fig. 14).

**Material.** HOLOTYPE: 3, ALLOTYPE: 1, 7 PARATYPES of *P. cubanus* ex *G. chrysia*, CUBA (1). 25 3 18 2 ex *G. montana*, MEXICO (3), PERU (7).

**Physonellosoides periae** Carriker

(Figs. 19–21)

**Physonellosoides periae** Carriker, 1961: 516. Type host: *Geotrygon linearis* (Prevost).

**Physonellosoides periae magdalena* Carriker, 1961: 517. Type host: *Geotrygon linearis infusco Bangs.*


**Male and Female.** Head (Fig. 19) with inner projection 0.05–0.08 long, with narrowed blunt tip directed medioposteriorly. Male metanotum similar to Fig. 3 with short outer seta of median marginal pair; dorsal abdomen similar to Fig. 17; tergal setae on II, 3–4; III–V, 6; VI, 8–9; with short postspiracular seta on III–VII; genitalia close to Fig. 16 with GN, 0.40–0.49; TMW, 0.50–0.55; HLD, 0.38–0.42; PXW, 0.29–0.34; MXW, 0.39–0.46; TTL, 1.02–1.21; TSW, 0.10–0.13 (Fig. 20). Female dorsal thorax and abdomen much as in Fig. 18; inner seta of median marginal metanotum pair short; without postspiracular seta on III–V, medium on VII, very long on VII (Fig. 21) without adjacent seta; short median tergal seta on VII–VIII; TMW, 0.58–0.68; HLD, 0.42–0.49; PXW, 0.33–0.42; MXW, 0.44–0.53; TTL, 1.42–1.61; SCG, 0.23–0.30.

**Discussion.** Our study of the type series used by Carriker (1961) to describe *P. periae* has convinced us of the validity of this species. We agree with Tendeiro (1980) that the type series used for *P. p. magdalena* is identical with that of the nominate form; this represents the only previously published synonymy within the genus *Physonellosoides*.

We have studied the holotype female (Tendeiro 1980) used to describe *P. silvestris*. There is nothing in the description nor from our examination of the holotype to support separation of *P. silvestris* from *P. periae*.

**Material.** 5 3 5 2 including HOLOTYPE: 2, 4 3, 4 PARATYPES of *P. periae* ex *G. linearis*, CO-

Physconelloides moyeri

Price, Clayton & Hellenthal, new species

Type host: Geotrygon linearis (Prevost).

Male and Female. As for P. perijae except as follows.

Head (Fig. 15) with inner projection of male 0.04 - 0.06
long, of female 0.08–0.10 long, pointed and directed posteriorly for both sexes. Male dorsal thorax and abdomen similar to Fig. 8; very long outer seta of median marginal metanotal pair; tergal setae on VI, 6; very long postspiracular seta on VII, GNL, 0.49–0.58; TMW, 0.54–0.58; TTL, 1.17–1.31; TSW, 0.15–0.18. Female dorsal thorax and abdomen close to Fig. 18; postspiracular seta very long on VI; long to very long median tergal seta on VII–VIII; TMW, 0.74–0.80; HDL, 0.54–0.58; PXW, 0.43–0.49; MXW, 0.59–0.65; TTL, 2.04–2.23; SGW, 0.34–0.40.

Discussion. Very large dimensions easily distinguish the female from other species in the ceratocips group. The male can be recognized by its wide terminal sclerite and very long postspiracular seta on VII.

All specimens of P. moyeri originally were labeled as P. perijae or P. p. magdalenae. These included the allotype male and a paratype female of the former and 4 male and 3 female paratypes of the latter. This is the only known instance of sympathy of 2 Physconeloides species; 5 collections contained both P. perijae and P. moyer.

Type Material. HOLOTYPE: ♀ ex G. linearis infuscus, COLOMBIA: Magdalena, Mt. San Lorenzo, 1 February 1913, M. A. Carriker, Jr. PARATYPES ex G. l. infuscus, COLOMBIA, M. A. Carriker, Jr.: 3 ♀♀♂♂, 1 ♀♀♂♀ same data as holotype except April 1945; 1 ♀♀♀♀ same data except 29 April 1945; 1 ♀♀♀♀ same data except Los Gorros, 8 May 1945; 1 ♀♀♂♀ same data except Hda. Las Vegas, 8 June 1913; 1 ♀♀♂♀ 2 ♀♀♀♀ same data except Vista Nieve, 6 October 1945; 1 ♀♀♂♀ Sta. Marta, Sierra Nevada, Pueblo Viejo, 13 March 1914. PARATYPE ♀ ex G. l. linearis, COLOMBIA: Sierra Perija, Monte Elias, 30 July 1945. M. A. Carriker, Jr. All specimens in National Museum of Natural History (Washington, DC).

Etymology. This species is named for Brett Moyer, University of Utah, in recognition of his work on ecological interactions between birds and lice.

spenceri group

Outter head projections sharply pointed, inner projections blunt (Fig. 19) to occasionally more tapered (Fig. 22). Temple carina complete (Fig. 22). Pronotum without protruding lateroposterior corners. Thoracic sternal sclerotization much as in Fig. 5. Female subgenital plate with total of 10–18 shorter lateroposterior marginal setae (Fig. 23).

Physconeloides spenceri Emerson & Ward (Figs. 22–26)

Type host: Columba fasciata Say.


Male and Female. Head (Fig. 22) with inner projection 0.05–0.07 long, directed medioposteriorly. Male dorsal thorax and abdomen as in Fig. 26; outer seta of median marginal metanotal pair long, inner seta short, fine; tergal setae on II, 2; III, 4–6; IV, 6; V, 6–8; VI, 4–8; short postspiracular seta on III–V, short to medium on VI–VII; genitalia (Fig. 19) with GNL, 0.35–0.48; TMW, 0.58–0.62; HDL, 0.40–0.44; PXW, 0.39–0.34; MXW, 0.41–0.46; TTL, 1.17–1.25; TSW, 0.14–0.16 (Fig. 24). Female dorsal thorax and abdomen similar to Fig. 27; inner seta of median marginal metanotal pair short; postspiracular seta short on III–V, very long on VI–VII with adjacent short seta; without median tergal seta; TMW, 0.66–0.74; HDL, 0.46–0.51; PXW, 0.35–0.39; MXW, 0.49–0.54; TTL, 1.51–1.65; SGW, 0.23–0.29 (Fig. 23).

Discussion. Emerson and Ward (1958) compared P. spenceri only with P. passerinae Emerson and P. zenaidae. The importance of the shape of the head projections was overlooked and the description gave little of value to separate their new species.

We examined the holotype males for P. keleri and P. branderi described by Kaddou (1973) and determined both to be identical to P. spenceri. Only minimal descriptive details and photographs were provided for these species, which were compared only with a 3rd new species described in the same publication. No attempt was made to compare them with other known Physconeloides species. The male of P. keleri was taken from the same host species as the type host of P. spenceri. The male of P. branderi was taken off Columba palumbus, a European species collected in 1894. This host is presumably in error as the distribution of known Physconeloides species is limited to columbiform hosts from the New World and Australia.


Physconeloides rufaxilla Carriker (Fig. 27)

Physconeloides rufaxilla Carriker, 1963b: 37. Type host: Leptotila rufaxilla hellmayri Chapman—error. Male and Female. As for P. spenceri except as follows. Male with outer seta of median marginal metanotal pair very long; GNL, 0.33; TMW, 0.50; HDL, 0.35; PXW, 0.29; MXW, 0.40; TTL, 1.01; TSW, 0.11. Female TMW, 0.53–0.69; HDL, 0.43–0.47; PXW, 0.33–0.39; MXW, 0.44–0.54; TTL, 1.42–1.55; SGW, 0.20–0.22.

Discussion. Carriker (1963b) described P. rufaxilla for a single female supposedly taken from L. r. hellmayri in Venezuela. We studied the holotype and found the inner head projection blunt, not pointed as illustrated by Carriker (1963b). Carriker's description gives few details of value. The abundant other Leptotila material we have examined differs from the Carriker holotype. This holotype does, however, agree well with specimens from Columba leucocephala L. Therefore, the true host of P. rufaxilla may be C. leucocephala.
Material. HOLOTYPE: ♀ of P. rufa ex L. r. helmayri – error, VENEZUELA 1 ♂, 2 ♀♀ ex C. leucocephala, USA (1), CUBA (1).

**Physconeloides ancoratus** Carriker

(Figs. 28–32)

**Physconeloides anolaimae** Carriker, 1961: 518. Type host: *Columba subrinacea* (Lawrence).


**Material.** Male and Female. As for *P. spenceri* except as follows. Head (Fig. 31) with inner projection 0.06–0.08 long, directed mediad. Male dorsal thorax and abdomen as in Fig. 32 with terminal sclerite as in Fig. 30; outer seta of median marginal metanotal pair very long, inner seta short to medium; tergal setae on II, 2–4; III, 6–7; IV, 7–10; V, 6–9; VI, 7–10; short postspicular seta on III–VI, short to medium on VII; GNL, 0.43–0.56; TMW, 0.67–0.74; HDL, 0.44–0.50; PXW, 0.40–0.45; MXW, 0.54–0.59; TTL, 1.32–1.49. Female dorsal thorax and abdomen similar to *P. anolaimae* from only a single male, providing few meaningful details. We have examined this holotype and found it to agree well with our material of *P. anolaimae*.

**Material.** 16 ♂, 4 ♀♀ including HOLOTYPE: ♀, ALLOTYPE: ♂, 6 ♂ PARATYPES of *P. anolaimae* ex *C. subrinacea*, COLOMBIA (1), COSTA RICA (1), GUYANA (1). 4 ♂ ♀ PARATYPES of *P. wolffietrichi* ex *C. p. delicata*, GUYANA (1), PERU (2), BOLIVIA (1).

**Physconeloides eurysema** Tendeiro

(Figs. 33–39)

**Physconeloides eurysema** Tendeiro, 1969: 314. Type host: *Phaps chalcoptera* (Latham).

**Material.** Male and Female. Head (Fig. 36) with outer projection sharply pointed, male with inner projection 0.02–0.04 long, female 0.04–0.06 long, directed posteriorly. Male dorsal thorax and abdomen as in Fig. 39, terminal sclerite as in Fig. 38; both setae of median marginal metanotal pair short to medium; tergal setae on II, 10–14; III, 12–18; IV, 11–16; VI, 10–12; long to very long postspicular seta on III–V, very long on VI–VII; genitalia (Fig. 34) with GNL, 0.49–0.61; TMW, 0.56–0.63; HDL, 0.36–0.40; PXW, 0.30–0.35; MXW, 0.43–0.49; TTL, 1.15–1.31; TS, 0.15–0.18. Female terminal thorax and abdomen similar to Fig. 33; inner seta of median marginal metanotal pair short; postspicular seta absent on III–IV, long to very long on V–VII without adjacent seta; short median tergal seta on VI–VIII; subgenital plate as in Fig. 37; TMW, 0.68–0.74; HDL, 0.46–0.50; PXW, 0.37–0.42; MXW, 0.52–0.58; TTL, 1.59–1.79; SGW, 0.30–0.36.

Material. 26 ♂, 47 ♀ including 10 ♂, 6 ♀ PARATYPES of *P. australiensis* ex *P. chalcoptera*, AUSTRALIA (8). 4 ♂ ♂ ex *P. elegans* (Temminck), AUSTRALIA (2). 5 ♂ ♂ ex *P. petrophassa smithii* (Jardine & Selby), AUSTRALIA (1).

**Physconeloides anolaimae** Carriker

(Figs. 40–43)

**Physconeloides anolaimae** Carriker, 1961: 143. Type host: *Phaps chalcoptera* (Latham).

**Material.** Male and Female. As for *P. australiensis* except as follows. Head (Fig. 40) with outer projection blunt, inner projection only 0.02 long, directed posteriorly. Male terminal sclerite as in Fig. 42; tergal setae on II, 10–13; III, 11–15; IV, 9–13; VI, 8–10; very long postspicular seta on III–V, genitalia (Fig. 43) with GNL, 0.37–0.41; TMW, 0.49–0.50; HDL, 0.33–0.36; PXW, 0.23–0.24; MXW, 0.35–0.36; TTL, 1.05–1.07; TS, 0.11–0.12. Female dorsal thorax and abdomen similar to Fig. 33, postspicular seta very long on V–VII; subgenital plate as in Fig. 41; TMW, 0.61–0.64; HDL, 0.42–0.45; PXW, 0.29–0.32; MXW, 0.43–0.46; TTL, 1.52–1.62; SGW, 0.30–0.32.

Material. 4 ♂ ♀, 4 ♀♀ PARATYPES of *P. anolaimae* ex *P. chalcoptera*, [South Perth Zoo] AUSTRALIA (1).

**Physconeloides eurysema** Carriker

(Figs. 44–48)

**Physconeloides eurysema** Carriker, 1961: 519. Type host: *Claravis pretiosa* (Ferrari-Perez). New synonymy.
Physconeloides talpacoti Carriker, 1963a: 479. Type host: Columbina talpacoti rufipennis (Bonaparte). New synonymy.


Male and Female. Head similar to Fig. 52 with both pairs of projections blunt, inner projection 0.05–0.08 long, directed mediodorally. Male dorsal thorax and abdomen as in Fig. 45; terminal sclerite as in Fig. 47; outer seta of median marginal metanotal pair very long; tergal setae on II, 2–4; III–VI, 4–8; medium to long postspiracular seta on III–V, very long on VI–VII; genitalia similar to Fig. 56 with CNL, 0.45–0.73; TMW, 0.57–0.72; HDL, 0.38–0.45; FWX, 0.33–0.45; MXW, 0.39–0.52; TTL, 1.23–1.53; TSW, 0.16–0.21. Female dorsal thorax and abdomen as in Fig. 44; inner seta of median marginal metanotal pair long to very long; without postspiracular seta on III–V, very long on VI–VII without adjacent seta; short median tergal seta on VII–VIII; subgenital plate (Fig. 48) with total of 12–22 marginal setae; TMW, 0.63–0.75; HDL, 0.42–0.53; FWX, 0.38–0.46; MXW, 0.40–0.56; TTL, 1.48–1.90; SGW, 0.23–0.34.

Discussion. Carriker (1903) gave Odontophorus guttatus as the type host of *P. eurysema*, but this was subsequently noted to be in error (see Hopkins and Clay 1952). The correct host is Claravis mondetouara umbrina Griscom.

Guirraeae (1936) described Coniocotocanthus matrogerssensis as the type species for a new genus. Although species in the eurysema group show consistent differences compared with those in the other 4 species groups, these differences are not sufficient in our opinion to justify recognition as a separate genus.

Emerson (1957) included in his paratype series of *P. passerinae* not only material from the type host *C. p. insularis* Ridgway, *C. p. pallescens* (Baird), and *C. p. bahamensis* (Maynard). It is risky to designate lice from such a broad spectrum of hosts as paratypes, as evidenced by the fact that the last of these actually represents a new species, which we have described below. Emerson (1957) provided minimal descriptive details and compared his species only with *P. xenadurae*, from which it is obviously quite different. Our examination of numerous specimens of *P. passerinae*, including a very long type series, has convinced us that it is synonymous with *P. eurysema*.

In establishing the subspecies *P. e. pretiosa*, Carriker (1961) recognized that it was quite similar to the nominate subspecies, but much larger in all dimensions. However, he compared only a single pair of his new taxon with a single pair of *P. eurysema*, thereby ignoring variation within each taxon. Our study of his type series failed to support it as a subspecies.

Although we agree with Carriker (1963a) that *P. talpacoti* is closest to *P. passerinae*, careful study of the type series leads us to conclude that both names are synonymous with *P. eurysema*. We have been unable to obtain type material of *P. picuii*. We have concluded that it is synonymous with *P. eurysema* after study of other specimens from the type host in the same general locality as the type material was collected. Furthermore, we find nothing in the original description of this species to distinguish it from *P. eurysema*.

Material. 5 $\delta$, 9 $\varphi$ all from type series ex *C. mondetouara*, COSTA RICA (2). 5 $\delta$, 3 $\varphi$ including 2 $\delta$ PARATYPES of *G. matrogerssensis* ex *C. minuta*, TRINIDAD (1), BRITISH GUIANA (1), VENEZUELA (1), BRAZIL (1). 46 $\delta$, 47 $\varphi$ including HOLOTYPE: $\delta$, ALLOTYPES: 15 $\delta$, 11 $\varphi$ PARATYPES of *P. passerinae* ex *C. passerina*, USA (4), MEXICO (3), SALVADOR (1), CUBA (2), GRAND CAYMAN IS. (2), COLOMBIA (1), VENEZUELA (2), CANAL ZONE (1), no data (1). 25 $\delta$, 19 $\varphi$ including HOLOTYPE: $\delta$, ALLOTYPES: 4 $\delta$, 2 $\varphi$ PARATYPES of *P. e. pretiosa* ex *C. pretiosa*, MEXICO (3), COLOMBIA (4), BRAZIL (1), PARAGUAY (1), PERU (1), VENEZUELA (1). 27 $\delta$, 38 $\varphi$ including HOLOTYPE: $\delta$, ALLOTYPES: 9 $\delta$, 5 $\varphi$ PARATYPES of *P. talpacoti* ex *C. talpacoti*, TRINIDAD (13), NICARAGUA (2), MEXICO (1), COLOMBIA (2). 4 $\delta$, 5 $\varphi$ ex *C. picuii*, BOLIVIA (1), ARGENTINA (1). 5 $\delta$, 8 $\varphi$ ex Scardafella inca (Lesson), USA (1), MEXICO (2).

Physconeloides johnsoni

Price, Clayton & Hellenthal, new species (Fig. 49)

Type host: Columbina passerina bahamensis (Maynard).

Male and Female. As for *P. eurysema* except as follows. Head projections as in Fig. 49 with outer projection tapering, inner projection 0.04–0.06 long. Male dorsal thorax and abdomen close to Fig. 50; tergal setae on II, 10–13; III, 8–12; IV, 6–10; V, 4–6; VI, 6–7; TMW, 0.55–0.60; HDL, 0.36–0.40; FWX, 0.33–0.36; MXW, 0.39–0.43; TTL, 1.22–1.35; TSW, 0.14–0.18. Female subgenital plate close to Fig. 58 with total of 25–41 marginal setae; HDL, 0.42–0.47; TTL, 1.50–1.77.

Discussion. This species is distinguished from *P. eurysema* by the narrowed outer head projection, the male with more numerous tergal setae and smaller dimensions, and the female with more marginal setae on the subgenital plate.

Type Material. HOLOTYPE: $\delta$ ex *C. p. bahamensis*, BAHAMA ISLANDS: Castle Island, 8 July 1930, H. S. Peters. PARATYPES ex *C. p. bahamensis*, BAHAMA ISLANDS, H. S. Peters: 8 $\varphi$ same data as holotype; 6 $\delta$, 1 $\varphi$, CAICOS IS.: John Cay, 24 July 1930, 2 $\delta$; GRAND CAICOS IS.: 26 July 1930, 5 $\delta$, 3 $\varphi$; ACKLIN IS., 10 July 1930, 7 $\delta$, 9 $\varphi$; RAGGED IS., 3 July 1930, 1 $\varphi$; ANGUILLA IS., 22 June 1930. Holotype and 2 $\varphi$ paratypes at Oklahoma State University (Stillwater), remainder at National Museum of Natural History (Washington, DC).

Etymology. This species is named for Kevin Johnson, University of Utah, in recognition of his work on the systematics of birds and their lice.
Physconeloides emersoni Tendeiro
(Figs. 50–55)

Male and Female. Head similar to Fig. 52 with both pairs of projections broadly blunt, inner projection 0.05–0.06 long, directed medioposteriorly. Male dorsal thorax and abdomen in Fig. 50; terminal sclerite as in Fig. 53; outer setae of median marginal metanotal pair very long; tergal setae on II, 9–12; III-V, 10–16; VI, 11–12; long postspiracular seta on II-V, very long on VI-VII; genitalia close to Fig. 55 with GLN, 0.66–0.67; TMW, 0.62–0.69; HDL, 0.43–0.50; PXW, 0.36–0.41; MXW, 0.45–0.57; TTL, 1.39–1.63; TSU, 0.15–0.16. Female dorsal thorax and abdomen as in Fig. 51; inner seta of median marginal metanotal pair medium to long, without postspiracular seta on III-V, very long on VI-VII without adjacent seta, short median tergal seta on VI-VIII; subgenital plate (Fig. 54) with total of 15–18 marginal setae; TMW, 0.78–0.81; HDL, 0.54–0.58; PXW, 0.44–0.49; MXW, 0.55–0.62; TTL, 1.76–2.05; SCW, 0.35–0.40.

Material: 3♂♀2♀♀ ex M. melanoptera, ECUADOR (1).

Physconeloides robbinsi
Price, Clayton & Hellenich, new species
(Figs. 56–58)

Type host: Metrioptila ceciliana (Lesson).

Male and Female. As for P. emersoni except as follows. Male dorsal thorax and abdomen as in Fig. 57; tergal setae on II, 6–8; III-V, 5–11; VI, 8–9; very long postspiracular seta on II-VII; genitalia close to Fig. 56. Female with short median tergal seta on VII-VIII; subgenital plate (Fig. 58) with total of 19–27 marginal setae; TMW, 0.73–0.77; HDL, 0.51–0.54.

Discussion. This species, while close to P. emersoni, is recognized by the male having a very long postspiracular seta on tergites II–VII, and an associated very long seta on several of these tergites (Fig. 57). The female of P. robbinsi has more subgenital plate setae than P. emersoni, and these are distributed evenly across the margin (Fig. 58).

Type Material. HOLOTYPE: ♂ ex M. ceciliana, PERU: Yanac, 20 March 1932, M. A. Carriker, Jr. PARATYPES: 5♂♂7♀♀ same data as holotype; 2♂♂5♀♀ ex M. c. obtecta (Zimmer), PERU: Cochabamba, 11 June 1932, M. A. Carriker, Jr. All specimens in National Museum of Natural History (Washington, DC).

Etymology. This species is named for Mark Robbins, University of Kansas, in recognition of his expansive knowledge of neotropical birds, and his assistance in collecting some of the lice studied for this article.

Discussion. Although there are undoubtedly many columbiiform hosts from which Physconeloides have yet to be collected, some interesting observations can already be made from the known host-louse records summarized in Table 1. The linear sequence of host taxa in this table follows that given by Howard and Moore (1991). Sibley and Monroe (1990) present a similar sequence.

In one observes the host distribution of the Physiology species groups, there is only a single exception to an otherwise perfect clustering of the respective species in relation to the host sequence. The galapagensis group of 3 species is restricted to the host genus Zenaida, with the exception that P. zenuaduriae also has been collected from the feral pigeon Columba livia. It would be interesting to compare the survival of P. zenuaduriae on C. livia versus Zenaida species to assess whether C. livia is truly a suitable host for this louse (Page et al. 1996).

Table 1. Host-louse list for Physconeloides from the Columbiiformes

<table>
<thead>
<tr>
<th>Host species</th>
<th>Louse species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columbia livia</td>
<td>zenuaduriae 3</td>
</tr>
<tr>
<td>leucophracta</td>
<td>rafzailli 6</td>
</tr>
<tr>
<td>speciosa</td>
<td>spenceri 4</td>
</tr>
<tr>
<td>fassula</td>
<td>fassulare 4</td>
</tr>
<tr>
<td>plumbea</td>
<td>plumbearia 4</td>
</tr>
<tr>
<td>subosacida</td>
<td>subosacida 4</td>
</tr>
<tr>
<td>Phaps chalcoperti</td>
<td>chalcoperti 3</td>
</tr>
<tr>
<td>elegans</td>
<td>elegans 4</td>
</tr>
<tr>
<td>Petrophassa smithi</td>
<td>petrophassae 4</td>
</tr>
<tr>
<td>Zenaida macroura</td>
<td>zenuaduriae 3</td>
</tr>
<tr>
<td>auricula</td>
<td>auriculo 4</td>
</tr>
<tr>
<td>auricula</td>
<td>auriculo 4</td>
</tr>
<tr>
<td>galapagensis</td>
<td>galapagensis 3</td>
</tr>
<tr>
<td>anisactis</td>
<td>anisactis 3</td>
</tr>
<tr>
<td>Columbiana passerina</td>
<td>passerina 3</td>
</tr>
<tr>
<td>minuta</td>
<td>minuta 3</td>
</tr>
<tr>
<td>tlapaconti</td>
<td>tlapaconti 3</td>
</tr>
<tr>
<td>titica</td>
<td>titica 3</td>
</tr>
<tr>
<td>Claraea pretiosa</td>
<td>Claraea 3</td>
</tr>
<tr>
<td>monsteactis</td>
<td>monsteactis 3</td>
</tr>
<tr>
<td>Metrioptila ceciliana</td>
<td>ceciliana 3</td>
</tr>
<tr>
<td>melanoptera</td>
<td>melanoptera 3</td>
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<tr>
<td>Scaphocephala lata</td>
<td>lata 3</td>
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<tr>
<td>Leptotila verrucosa</td>
<td>verrucosa 3</td>
</tr>
<tr>
<td>rafzailli</td>
<td>rafzailli 3</td>
</tr>
<tr>
<td>plumbea</td>
<td>plumbea 3</td>
</tr>
<tr>
<td>jamaicaea</td>
<td>jamaicaea 3</td>
</tr>
<tr>
<td>cassini</td>
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<tr>
<td>Geotryon verrucatus</td>
<td>verrucatus 3</td>
</tr>
<tr>
<td>linearsi</td>
<td>linearsi 3</td>
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<tr>
<td>juncifera</td>
<td>juncifera 3</td>
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<tr>
<td>frenta</td>
<td>frenta 3</td>
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<td>chrysa</td>
<td>chrysa 3</td>
</tr>
<tr>
<td>montana</td>
<td>montana 3</td>
</tr>
</tbody>
</table>

+ Louse species group: galapagensis group.
- spenceri group.
+ Type host.
+ Australiensis group.
+ Eurasia group.
+ Ceratocaps group.
found in Australia. The *eurysema* group of 4 species, which are morphologically quite distinct from species in the other 4 groups, is found only on genera of ground doves: *Columbina*, *Clarinus*, *Metriopelia*, and *Scardafella*. The distinctiveness of *eurysema* group lice is interesting in light of the fact that ground doves are far removed from all other New World Columbiformes on the basis of recent molecular genetic analyses (K. Johnson and D. H. Clayton, University of Utah, Salt Lake City, unpublished data).

**Key to Species of Physconelloides**

1. Prothorax with protruding lateroposterior corners (Fig. 45, arrow); thoracic sternal sclerites as in Fig. 46 (*eurysema* group)
   - Prothorax without protruding lateroposterior corners (Fig. 3); thoracic sternal sclerites close to Fig. 5
   1. Male
   2. Female

3. Tergum II with <5 marginal setae, III < 8
   1. Tergum II with > 5 marginal setae, III > 7

4. Tergites II–V with very long postspiracular seta (Fig. 57)
   - *robbinsi* n. sp.
   - Tergites II–V with shorter postspiracular seta (Fig. 50)

5. Terga IV–VI with >9 setae; terminal sclerite as in Fig. 53; outer head projection broadly rounded (Fig. 52)
   - *emersoni*
   - Terga IV–VI with <11 setae; terminal sclerite as in Fig. 47; outer head projection tapered to blunt point (Fig. 49)
   - *johnsoni* n. sp.

6. Subgenital plate with >18 setae distributed continuously across margin (Fig. 58)
   1. Subgenital plate with <23 marginal setae with gap in center of row (Figs. 45 and 54)
   7. TMW < 0.72; subgenital plate with >24 marginal setae; outer head projection tapered to blunt point (Fig. 49)
      - *johnsoni* n. sp.
      - TMW > 0.72; subgenital plate with < 28 marginal setae; outer head projection broadly rounded (Fig. 52)
      - *robbinsi* n. sp.

8. TMW < 0.76; HDL < 0.54; SGW < 0.35 (Fig. 48); without median tergal seta on VI (Fig. 44)
   - *eurysema*
   - TMW > 0.75; HDL > 0.53; SGW > 0.34 (Fig. 54); with short median tergal seta on VI (Fig. 51)
   - *emersoni*

9. Temple carina interrupted medially (Fig. 1, arrow)
   1. Temple carina complete (Fig. 22)

10. Male with >9 marginal tergal setae on II (Fig. 30); genitalia close to Figs. 34 or 43. Female subgenital plate with total of > 20 short to medium setae across margin (Figs. 37 and 41)
   - *australiensis* group
   - Male with < 10 marginal tergal setae on II; genitalia close to Fig. 6. Female subgenital plate with total of < 6 long lateroposterior marginal setae (Fig. 4) (*galapagensis* group)

11. Outer head projection blunt (Fig. 40)
    - Male TMW < 0.52. Female TMW < 0.65 . *strangeri*
    - Outer head projection sharply pointed (Fig. 36)
      - Male TMW > 0.54. Female TMW > 0.67 . *australiensis*

12. Male with very long outer median marginal metanotal seta on both sides (Fig. 8, arrow); TSW > 0.13 (Fig. 13). Females inseparable . *wsiemani*

At least 1 side, usually both, with male outer median marginal metanotal seta short, similar to inner (Fig. 3); TSW < 0.14 (Fig. 2)

13. Male terga III–IV each with > 7 marginal setae, V > 6 (Fig. 3)
    - Male terga III–IV each with < 8 marginal setae, V usually < 7 . *zenaiduriae*

14. Inner head projection directed posteriorly, sharply pointed, less often blunt (Figs. 11 and 15); if directed medioposteriorly, tapered and blunt (Fig. 19), then male with paired median marginal metanotal setae similar and female as follows. Female subgenital plate with total of 5–9 long marginal setae lateroposteriorly (Figs. 12 and 14) (*ceratoceps* group)

15. Inner head projection directed mediaposteriorly, broad, blunt (Figs. 22 and 31); if tapered and blunt (Fig. 19), then male with outer median marginal metanotal seta much longer than inner and female as follows. Female subgenital plate with total of >9 shorter marginal setae (Figs. 23 and 29) (*spenceri* group)

16. Male with very long postspiracular seta on tergite VII (Fig. 8). Female TMW > 0.72, PXW > 0.42, SGW > 0.33. Ex *Geotrygon* . *moyeni* n. sp.
    - Male with variable postspiracular seta on tergite VII, very long ex *Leptotila*, short ex *Geotrygon*. Female TMW < 0.68, PXW < 0.42, SGW < 0.31

17. Male with very long postspiracular seta on VII (Fig. 8). Female with short postspiracular setae on tergites III–V, very long plus adjacent setae on VI–VII (Fig. 10) . *ceratoceps*
    - Male with short postspiracular seta on VII (Fig. 17).
    - Female without postspiracular setae on III–V, only long to very long seta on VI–VII (Fig. 18)
    - *cubanus*

18. Inner head projection directed mediad (Fig. 31).
    - Male TMW > 0.65, PXW > 0.39. Female TMW > 0.75, PXW > 0.44 . *anolaimae*
Inner head projection directed more posteriorly (Fig. 22). Male TMW < 0.63, PXW < 0.36.
Female TMW < 0.75, PXW < 0.40...

19. Male TSW < 0.13, TMW < 0.55, Female SWG < 0.23; HDL < 0.48... *mali*

Male TSW > 0.13, TMW > 0.56. Female SWG > 0.22; HDL > 0.46... *spenceri*

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