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Three new species of chewing lice of the genus *Emersoniella* Tendeiro, 1965 (Insecta: Phthiraptera: Ischnocera: Philopteridae) from Papua New Guinean kingfishers and kookaburras (Aves: Coraciiformes: Alcedinidae)

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Abstract

Three new species of the ischnoceran louse genus *Emersoniella* (Phthiraptera) are described from four species of New Guinean kingfishers and kookaburras (Coraciiformes: Alcedinidae: Halcyoninae). They are: *Emersoniella crassicarina* n. sp. ex *Dacelo gaudichaud* Quoy & Gaimard (rufous-bellied kookaburra) and *Dacelo leachii intermedia* Salvadori (blue-winged kookaburra); *E. reninoda* n. sp. ex *Melidora macrorrhina macrorrhina* Lesson (hook-billed kingfisher); and *E. persei* n. sp. ex *Tanyiptera danae* Sharpe (brown-headed paradise-kingfisher). In addition, we illustrate *Emersoniella regis* Emerson & Price, *Emersoniella halcyonis* Tendeiro, and the male genitalia of *Emersoniella galateae* Emerson & Price, as well as provide a complete host-lice checklist, and an updated key to all seven species of this genus.

Key words: *Emersoniella*, Phthiraptera, Ischnocera, Philopteridae, key, Aves, Coraciiformes, Alcedinidae, Halcyoninae, new species, Papua New Guinea

Introduction

Giebel (1866: 369) first published the name “*N. bracteatus* N. Burm. II. 431”, which is now known as *Emersoniella bracteata* (Nitzsch [in Giebel], 1866), a louse from the laughing kookaburra “*Dacelo gigantea*” [= *Dacelo novaeguineae* (Hermann, 1783)]. The “N. Burm.” included by Giebel (1866) referred this species to both Nitzsch (1818) and Burmeister (1838: 431). However, Nitzsch (1818) did not mention any such species, and the only reference to it made by Burmeister (1838) is that Nitzsch had found a species of louse similar to *Nirmus marginalis* [= *Brueelia marginata* (Burmeister, 1838)] on the host “*Dacelo gigantea*”. Giebel (1866) noted that the species had no distinct characteristics, apart from the large, red-brown preantennal nodi, a character later found to be very typical in species of *Emersoniella*.

Hopkins & Clay (1952: 241) listed this species under *Nirmus*, noting that it was unique from other genera of lice known from kingfishers. No other species referable to the genus *Emersoniella* was known until Tendeiro (1965: 69) described the new genus *Emersoniella* and the new species *E. halcyonis* Tendeiro, 1965. In 1971, Clay obtained fresh material of lice from *Dacelo gigas* (= *Dacelo novaeguineae*) and formally placed *Nirmus bracteatus* in *Emersoniella*.

Two additional species have since been described: *Emersoniella galateae* Emerson & Price, 1978, and *Emersoniella regis* Emerson & Price, 1978. With only four known species, *Emersoniella* thus constitutes one of the smallest genera of Ischnocera (Price *et al.* 2003: 177). In this paper, we: (1) describe three new species of *Emersoniella*; (2) provide more detailed illustrations of *Emersoniella regis* based on paratypes; (3) illustrate *Emersoniella halcyonis* based on material from the type host; (4) include a complete host-lice checklist for the genus; and (5) provide an updated key to all seven *Emersoniella* species.

Material and methods

All examined specimens were previously prepared as microscopy slides and are deposited in the Price Institute of Parasite Research (PIPeR), Department of Biology, University of Utah, the Natural History Museum, London (NHML), and the U.S. National Museum of Natural History, Washington (USNM).

Dimensions (with mean values in parentheses) taken are: TL = total length; HL = head length (measured medianly); HW = head width; PRW = prothorax width; PTW = pterothorax width; AW = abdominal width; BW = basal plate width (measured at widest point); PL = paramere length; PW = paramere width; EL = endomere length; EW = endomere width.

Head chaetotaxy is based on Clay (1951), as modified by Mey (1994). Naming of head setae in this paper should be seen as tentative, and not as a definite statement of homology. Our interpretation of these setae is detailed in Fig. 1. The taxonomy of the hosts follows Clements *et al.* (2012).

In all species, sternal and subgenital plates are very weakly sclerotised. They often cannot be seen, and may even be missing in some specimens; we have not illustrated these in any of the figures, as it would give the misleading impression that they are present and clearly visible. We have also removed the pulvinus in all head illustrations for clarity.

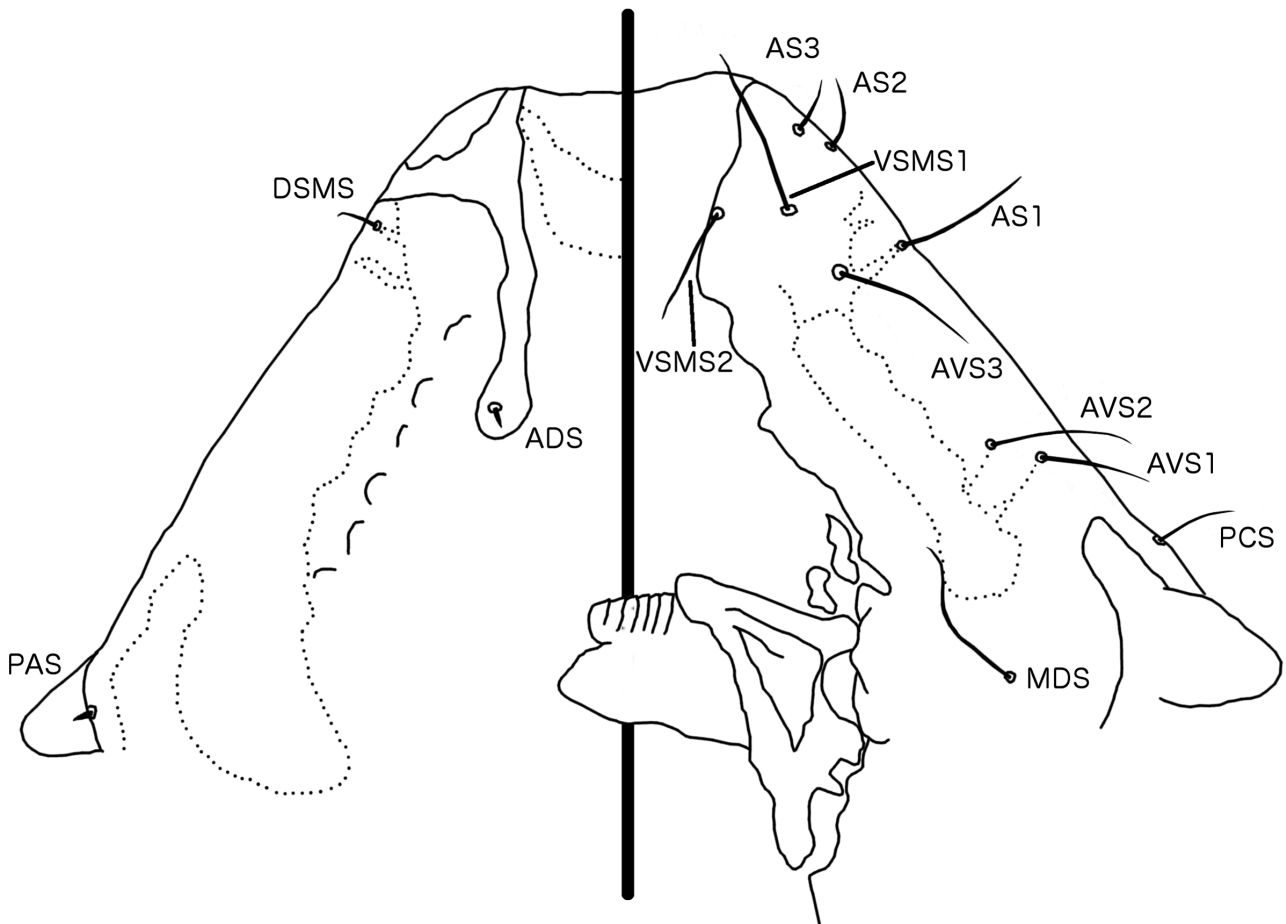


FIGURE 1. Our interpretation of the preantennal setae, illustrated on the preantennal area of *Emersoniella reninoda* n. sp. Abbreviations follow Clay (1951) and Mey (1994). PNS located posterior to preantennal nodi, but outside the illustration.

Taxonomy

Phloptoridae Burmeister, 1838

Emersoniella Tendeiro 1965

Type species: *Emersoniella halcyonis* Tendeiro, 1965: 69, by original designation.

Emersoniella crassicarina Gustafsson & Bush, new species

(Figs 2a–e)

Type host. *Dacelo gaudichaud* Quoy and Gaimard, 1824 (Coraciiformes: Alcedinidae) – rufous-bellied kookaburra.

Other host: *Dacelo leachii intermedia* Salvadori, 1876 (Coraciiformes: Alcedinidae) – blue-winged kookaburra.

Diagnosis. *Emersoniella crassicarina* n. sp. keys out as *Emersoniella regis* in the key of Emerson & Price (1978: 106), but differs from this species in the shape of the male genitalia. Pterothoracic and abdominal chaetotaxy are very similar to those of *E. regis*, which may be the closest relative to *E. crassicarina*. The host of *E. regis*, *Clytoceyx rex*, is the closest relative to *Dacelo* spp. (Moyle 2006).

No significant differences are apparent among material of *E. crassicarina* from the two host species, but tergal setae are somewhat longer in specimens from *D. leachii intermedia* than in material from the type host. Also, specimens from the type host are generally larger in all measurements, but there is considerable overlap. The only available material from *Dacelo leachii* is from the New Guinean subspecies *D. l. intermedia*, but it is presently unknown whether different Australian subspecies are also hosts to *E. crassicarina*. Based on morphology we conservatively recognize specimens from both hosts as *E. crassicarina*.

Description. Head broadly triangular (Fig. 2a), with occiput and frons both slightly concave. Marginal carina very broad laterally, with irregular median margin and several smaller carinal islands median to the marginal carina. Marginal carina uninterrupted at feeding canal, and narrowed, but not interrupted, laterally. Dorsal preantennal suture and dorsal anterior plate missing. Carina narrows to about half width at AS1; at feeding canal the carina is partially transparent and displaced posteriorly and dorsally. Anterior part of displaced marginal carina darkly pigmented; pigmented section is gently rounded. Hyaline margin broad, filling displacement. Ventral carinae more or less straight, converging, but turn to become parallel near VSMS2. DSMS and AS1-3 more or less equally lateral, with attendant canals in marginal carina. ADS short. VSMS1-2 median to marginal carina, AVS3 near these, but more lateral. AVS1-2 sublateral, with attendant canals in marginal carina. Preantennal nodi large, curved slightly medianly, intensely pigmented. Coni not larger than scapes, broadly triangular with blunt distal tip. Antennae not sexually dimorphic. Preocular nodi large, median to eye. Postocular nodi not separable from marginal temporal carina, POS thorn-like, positioned on eye. OS long, could reach across antennal socket. Marginal temporal carina continuous around postantennal head, of uneven width. MTS1 and MTS3 macrosetae, of equal or subequal length. Other MTS short, slender. PNS slightly longer than ADS. One pair of PTS visible as very short setae, postero-lateral to gular plate. Gular plate narrow, spade-shaped.

Prothorax shorter than wide, lateral sides convex. One pair of short setae on posterior margin, median to spiracle openings. Prosternum nude. Proepimera broad, with blunt median ends. Pterothorax wider than long, with diverging, flat lateral margins and slightly rounded posterior margin in male, and posterior margin that is convergent to median point in female. Mesosternum with two pairs of medium-sized setae, metasternum with three pairs of medium-sized setae on posterior margin and one pair of medium-sized setae on lateral margin (Fig. 2b).

Tergites II-VIII divided medianly, sternites II-VI transversely continuous (Fig. 2b). Pleurites very broad, anterior half reaching to, or median to, spiracle opening. Pleural heads re-entrant, well developed, and typically reach spiracle opening in preceding segment. Pleurites are wider in males than in females.

Male. 8–10 pairs of setae on posterior margin of pterothorax. Male subgenital plate consisting of sternites VII-IX, but fades at terminal segment, and may or may not reach the terminal margin of the abdomen (Fig. 2b). Abdominal chaetotaxy as in Table 1. Male genitalia (Fig. 2c): basal plate long and slender, diffusely beginning near anterior margin of segment VI, and widening to almost double size in distal half. Lateral thickenings slender, present only in distal half. Parameres fused entirely to basal plate, but lateral thickenings interrupted near fusion site, otherwise continuous around parameres. Two pairs of small setae very close to distal tip of parameres, on outer side. Basal plate medianly open to semi-oval atrium, in which the mesomere and endomere are located. Endomere

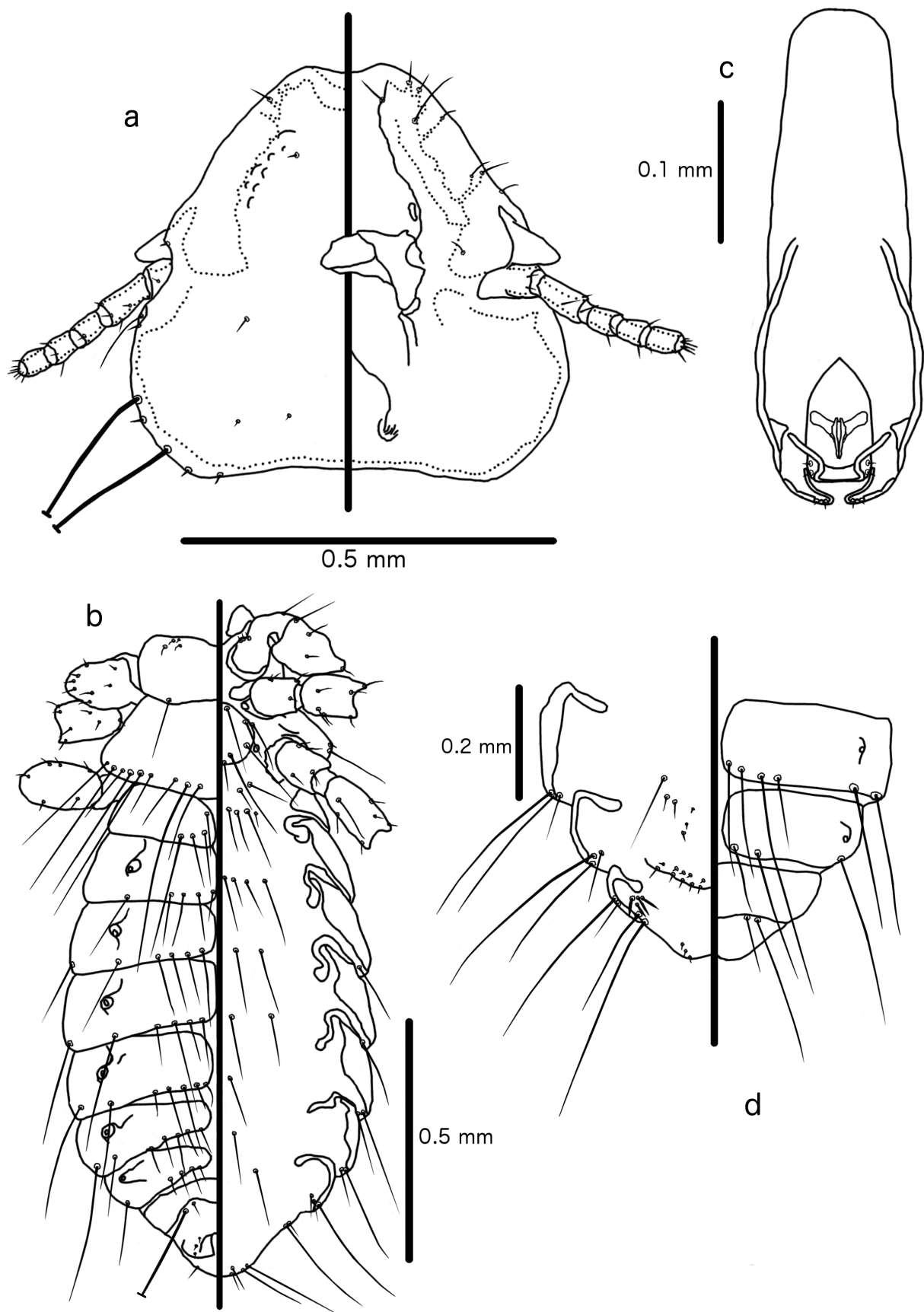


FIGURE 2. *Emersoniella crassicarina* n. sp. ex *Dacelo gaudichaud*: (a) male head, dorsal and ventral side; (b) male pterothorax and abdomen, dorsal and ventral side; (c) male genitalia; (d) female terminalia and vulval margin, dorsal and ventral side.

short, broad, and distinctly thickened on distal margin, with antero-lateral elongations that almost reach lateral margins of parameres. Mesomere small, antero-lateral sclerites about as long as central sclerites. The lateral pair of needle-like bars are about half as long as the median pair, and both have bulbous proximal ends. Measurements: *Ex Dacelo gaudichaud* (n = 15): TL: 1.68–1.91 (1.79); HL: 0.51–0.55 (0.53); HW: 0.55–0.59 (0.57); PRW: 0.30–0.33 (0.31); PTW: 0.46–0.51 (0.48); AW: 0.56–0.65 (0.61). BW: 0.11–0.12 (0.12); PML: 0.025–0.032 (0.027); PMW: 0.036–0.042 (0.039); EW: 0.033–0.044 (0.038); EL: 0.009–0.014 (0.010). *Ex Dacelo leachii intermedia* (n = 9): TL: 1.68–1.81 (1.73); HL: 0.49–0.52 (0.51); HW: 0.53–0.57 (0.55); PRW: 0.30–0.33 (0.31); PTW: 0.46–0.47 (0.47); AW: 0.58–0.65 (0.62). BW: 0.11–0.12 (0.12); PML: 0.026–0.033 (0.029); PMW: 0.032–0.041 (0.038); EW: 0.038–0.042 (0.040); EL: 0.009–0.012 (0.010).

TABLE 1. Abdominal chaetotaxy for male *Emersoniella crassicarina* n. sp. Numbers in parentheses refer to aberrant numbers of setae found in small numbers of specimens. Digits separated by a plus sign denote segments that have one set of setae (the first number) on the anterior end, and another set (second number) on the posterior end.

Segment	Tergomedian	Post-spiracular	Sternal	Postero-lateral
II	1 + 3	0	1–2 + 3–4	0
III	4	1	4	0
IV	4	1	4	2
V	4	1	2	2
VI	5	1	2	3
VII	5	1	1	3
VIII	4	0	1	4
IX	2	0	0	2
Terminal	0	0	2	3

Female. 10–11 pairs of setae on posterior margin of pterothorax, Female subgenital plate consists of tergite VII–VIII, and reaches vulval margin (Fig. 2d). Abdominal chaetotaxy as in Table 2. Vulval margin with 4–6 pairs of slender setae marginally and 3–5 pairs of thorn-like setae submarginally. Subgenital plate with 3–4 oblique pairs of short, slender setae. Three (rarely 4–5 on one side) pairs of spine-like setae postero-lateral to vulval margin (Fig. 2d). Measurements: *Ex Dacelo gaudichaud* (n = 15): TL: 1.98–2.25 (2.10); HL: 0.54–0.60 (0.56); HW: 0.58–0.65 (0.61); PRW: 0.32–0.36 (0.34); PTW: 0.50–0.54 (0.52); AW: 0.64–0.77 (0.70). *Ex Dacelo leachii intermedia* (n = 15): TL: 1.85–2.06 (1.95); HL: 0.50–0.57 (0.54); HW: 0.54–0.61 (0.59); PRW: 0.28–0.35 (0.32); PTW: 0.45–0.52 (0.49); AW: 0.64–0.73 (0.68).

TABLE 2. Abdominal chaetotaxy for female *Emersoniella crassicarina* n. sp. (see explanatory notes in Table 1).

Segment	Tergomedian	Post-spiracular	Sternal	Postero-lateral
II	1 + 3	0	1 + 3–4	0
III	3	0	3–4	0
IV	4	1	1 (2)	3
V	4	1	1 (2)	3
VI	4	1	1	4
VII	4	1	2	4
VIII	2	0	0	4
IX	2	0	0	2 + 2
Terminal	0	0	3	0

Type material. (All type material is from Northern District, Papua New Guinea). Male holotype *ex Dacelo gaudichaud*, PAPUA NEW GUINEA: Northern District, Popondetta, elev. 200 ft, 30. VIII. 1963, P.J. Shanahan, host BBM-NG-28658 (NHML). Female allotype *ex Dacelo gaudichaud*, on same slide as holotype (NHML).

Paratypes: 7 males and 2 females, same data as holotype, and 2 males and 18 females, Popondetta, Jumbora Plantation, elev. 200 ft, 25. IX. 1963, H. Clissold, host BBM-NG-29670 (NHML). 8 males and 18 females, Cape Killerton, elev. 10 ft, 19. X. 1963, H. Clissold, host BBM-NG-29250. 5 females, Popondetta, Jumbora Plantation, elev. 200 ft, 18. IX. 1963, H. Clissold, host BBM-NG-28773 (USNM). 1 male and 1 female, Cape Killerton, elev. 10 ft, 17. X. 1963, H. Clissold, host BBM-NG-29229. 2 males and 9 females, Popondetta, Jumbora Plantation, elev. 200 ft, 25. IX. 1963, H. Clissold, host BBM-NG-29674. 1 male and 2 females, Amboga River, Vicinity of Popondetta, elev. 350 ft, 20. IX. 1963, H. Clissold, host BBM-NG-28808. 4 males and 5 females, Vicinity of Popondetta, Ahola, elev. 150 ft, 8. X. 1963, H. Clissold, host BBM-NG-29896 (PIPeR).

Non-type material. *Ex Dacelo gaudichaud.* 1 Nymph (N), on same slide as holotype. 5N, same data as holotype. PAPUA NEW GUINEA: Northern District: 5N, Popondetta, Jumbora Plantation: elev. 200 ft, 25. IX. 1963, H. Clissold, host BBM-NG-29670 (NHML). 1N, Cape Killerton, elev. 10 ft, 19. X. 1963, H. Clissold, host BBM-NG-29250 (USNM). 1N, Cape Killerton, elev. 10 ft, 22. X. 1963, H. Clissold, host BBM-NG-29291. 1N, Cape Killerton, elev. 10 ft, 17. X. 1963, H. Clissold, host BBM-NG-29229. 3N, Popondetta, Jumbora Plantation, elev. 200 ft, 25. IX. 1963, H. Clissold, host BBM-NG-29674. 3N, Amboga River, Vicinity of Popondetta, elev. 350 ft, 20. IX. 1963, H. Clissold, host BBM-NG-28808. 1N, Vicinity of Popondetta, Ahola, elev. 150 ft, 8. X. 1963, H. Clissold, host BBM-NG-29896. PAPUA NEW GUINEA: Western District: 1 male, 3 females, 1 nymph, Balimo, elev. 30 ft, 14. III. 1964, H. Clissold, host BBM-NG-50209. 3 males and 9 females, Balimo, elev. 30 ft, 30. III. 1964, H. Clissold, host BBM-NG-50423. PAPUA NEW GUINEA: West Sepik District: 2 males and 2 females, May River, elev. 400 ft, 1. VI. 1963, P. Temple, host BBM-NG-22622. 1 male and 1 female, May River, elev. 400 ft, 31. V. 1963, P. Temple, host BBM-NG-22620. 1 female and 2 nymphs, Ambunti, elev. 500 ft, 2. V. 1963, P. Temple, host BBM-NG-22542. PAPUA NEW GUINEA: Morobe District: 1 male and 1 female, Finschhafen, elev. 50 ft, 13. IV. 1963, P.J. Shanahan, host BBM-NG-27663. 3 males, 2 females, 1 nymph, Finschhafen, elev. 50 ft, 12. IV. 1963, H. Clissold, host BBM-NG-27658. 9 males and 30 females, Lae-Goroka Road, 40 miles from Lae, 24. XI. 1970, A.B. Mirza, host BBM-NG-99426. 11 males, 14 females, 5 nymphs, Singakwa River, Vicinity of Lae, elev. 30 m, 4. IV. 1966, O.R. Wilkes, host BBM-NG-24713. INDONESIA: West Papua Province: 19 males, 35 females, 16 nymphs, Oransbari, elev. 10 ft, 20. I. 1963, L.P. Richards, host BBM-NG-22280 (all at PIPeR).

Ex Dacelo leachii intermedia. PAPUA NEW GUINEA: Western District: 1 male and 1 female, Oriomo River, elev. 20 ft, 14. II. 1964, H. Clissold, host BBM-NG-29518. 9 males and 19 females, Oriomo River, elev. 20 ft, 13. II. 1964, H. Clissold, host BBM-NG-29503. 4 females, Balimo, elev. 30 ft, 30. III. 1964, H. Clissold, host BBM-NG-50425 (all at PIPeR).

Etymology. The species epithet is derived from “*crassus*”, Latin for “thick”, and “*carina*”, Latin for “keel”, referring to the very broad marginal carina.

***Emersoniella reinoda* Gustafsson & Bush, new species**

(Figs 1, 3a–d)

Type host. *Melidora macrorrhina macrorrhina* Lesson, 1827 (Coraciiformes: Alcedinidae) – hook-billed kingfisher.

Diagnosis. *Emersoniella reinoda* new species keys out to couplet number 3 (*E. halcyonis* and *E. regis*) in the key of Emerson & Price (1978) but, based on the abdominal chaetotaxy, it is more similar to *E. halcyonis* than to *E. regis*, although it has even more setae on tergites VI–VII than those two species. Similar to *E. crassicarina*, but differs in abdominal chaetotaxy and the shape of the male genitalia, with the penis of *E. crassicarina* not reaching the endomeral plate, as is the case in *E. reinoda*. Further, *E. crassicarina* lacks the dorsal anterior suture of *E. reinoda*.

Description. Head roughly triangular, with rounded temples and broadly flattened frons (Figs 1, 3a). Marginal carina interrupted laterally and submedianly at feeding canal, and with several small carinal islands median to marginal carina. Posterior to lateral interruption marginal carina is broad, with irregular median margin. Premarginal carina small, triangular. At feeding canal, marginal carina is displaced deeply posteriorly and dorsally, and widened into broad arch. Frons broadly hyaline, continuous laterally with dorsal preantennal suture that arises from lateral interruptions of marginal carina, and then continues posteriorly to site of ADS, which they envelope. Sutures do not connect medianly, and dorsal anterior plate is thus not cut off from main head plate. AS2-3 on

premarginal carina, AS1 and DSMS near anterior end of postmarginal carina, each with attendant canals in marginal carina. VSMS1-2 equidistant from anterior margin of head. Ventral carinae convergent to anterior margin of pulvinus, where they turn and run in parallel, but are diffuse and not clearly connected to marginal carina anteriorly. AVS3 anterior to AS1, AVS1-2 positioned on ventral side of marginal carina, each with attendant canals in carina. Preantennal nodi large, kidney-shaped. Coni shorter than scapes, roundedly triangular (Fig. 1). PNS and one pair of PTS relatively long. Preocular nodi elongated, not very distinct. Postocular nodi not distinct from marginal temporal carina, which is narrow and continuous around post-antennal head. POS and OS both located on eye, OS long, POS spine-like. MTS1 long setae, perhaps two thirds of the length of MTS3; other MTS short and slender. Gular plate slender, spade-shaped, with concave antero-lateral margins.

Prothorax shorter than wide, with one pair of short setae on posterior margin, median to spiracle openings. Prosternum nude. Proepimera broad, with blunt median ends. Pterothorax wider than long, with divergent lateral margins and posterior margin convergent to median point. Mesosternum with two pairs of short setae. Metasternum large, more or less circular, with five pairs of short setae distributed around lateral and posterior margins (Fig. 3b). Tergites II–VIII divided medianly in both sexes (Fig. 3b).

Male. Posterior margin of pterothorax with 10–11 pairs of setae. Pleurites III–V with well-developed, hook-shaped re-entrant heads, pleurites VI–VIII with well-developed, flat heads that are not, or only barely, re-entrant. Abdominal chaetotaxy as in Table 3. Male genitalia (Fig. 3c): basal plate long, beginning in middle of segment VI, but diffuse anteriorly. Lateral margins thickened in distal half; these thickenings are continuous with lateral and median thickenings of parameres, which are fused with basal plate. Medianly basal plate open to an oval atrium, in which the mesomere and endomere are located. Endomere broader than long, with antero-lateral extensions that reach to site of parameral fusion. One pair of distinct nodi in postero-lateral corner of endomere, connected medianly by a rugose thickening. Mesomere-proper as four needle-like bars, the two lateral pairs about a fourth of the length of the median pair; does not reach or just barely reaches anterior margin of endomere. Antero-lateral sclerites broad, somewhat club-shaped, and slightly thickened anteriorly. One pair of minute setae near distal tip of parameres, and one pair of small pores lateral to this, both on outer margin. Measurements (n = 15): TL: 1.75–1.92 (1.84); HL: 0.54–0.59 (0.56); HW: 0.57–0.61 (0.59); PRW: 0.31–0.33 (0.32); PTW: 0.45–0.50 (0.47); AW: 0.61–0.67 (0.65).

TABLE 3. Male abdominal chaetotaxy for *Emersoniella reinoda* n. sp. (see explanatory notes in Table 1).

Segment	Tergomedian	Post-spiracular	Sternal	Postero-lateral
II	1 + 2	0	1 + 3	0
III	3	1	3	0
IV	5	1	2	3
V	6	1	1	3
VI	6	1	1	4
VII	5	1	1	4
VIII	3	0	1	4
IX	2	0	0	3
Terminal	0	0	2	3

Female. Posterior margin of pterothorax with 10 pairs of setae. Pleurites III–VI with well-developed, hook-shaped re-entrant heads, pleurites VII–VIII with well-developed, flat heads that are not, or only barely, re-entrant. Abdominal chaetotaxy as in Table 4. Vulval margin with 6–8 marginal pairs of long, slender setae, and seven submarginal pairs of shorter setae, which are not thorn-like. Oblique set with three pairs of slender setae, situated far from vulval margin. Three pairs of long, stout setae postero-lateral to vulval margin (Fig. 3d). Measurements (n = 15): TL: 1.92–2.17 (2.07); HL: 0.57–0.62 (0.59); HW: 0.062–0.66 (0.64); PRW: 0.33–0.36 (0.35); PTW: 0.49–0.54 (0.52); AW: 0.67–0.80 (0.72).

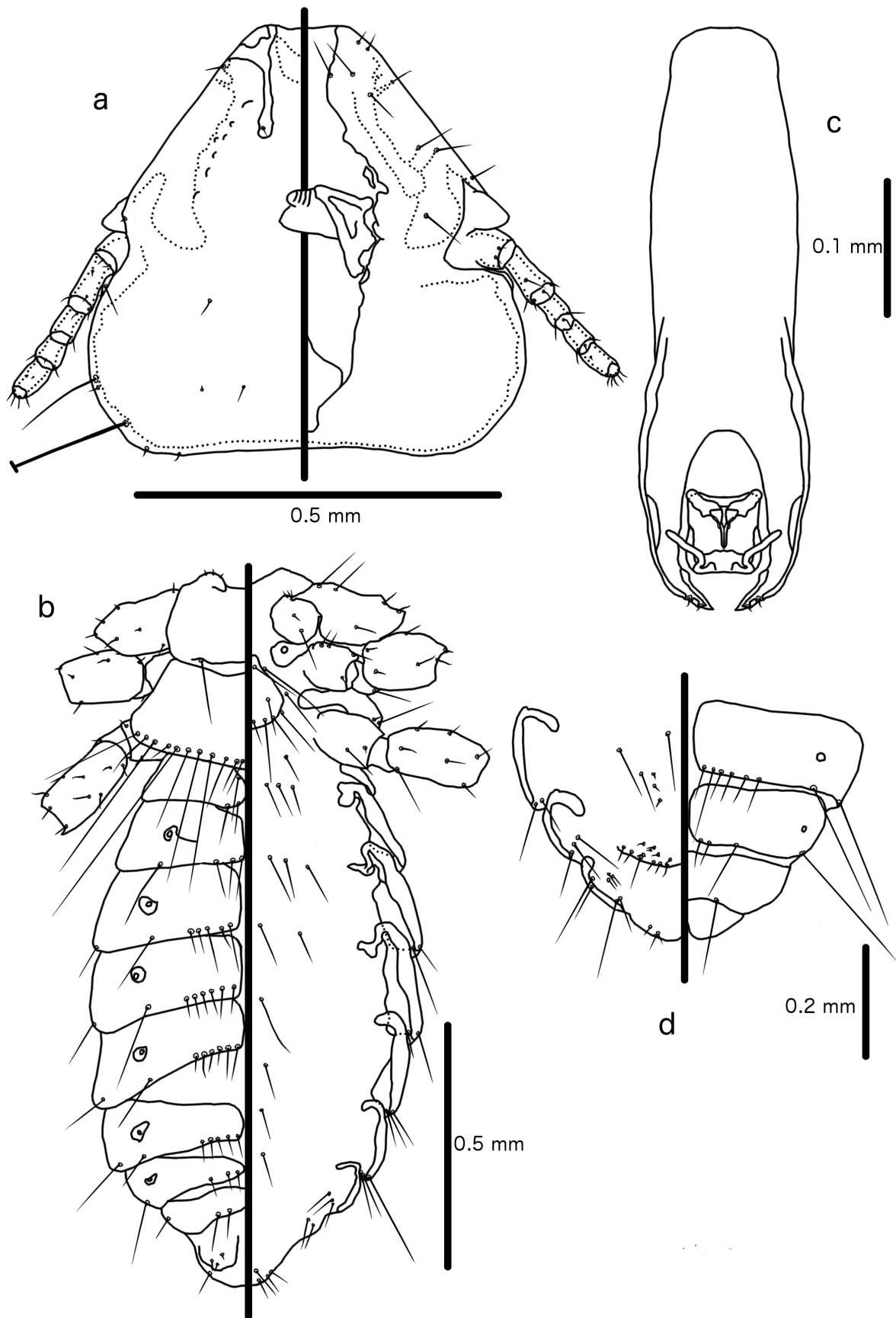


FIGURE 3. *Emersoniella reninoda* n. sp. ex *Melidora macrorrhina macrorrhina*: (a) male head, dorsal and ventral side; (b) male pterothorax and abdomen, dorsal and ventral side; (c) male genitalia; (d) female terminalia and vulval margin, dorsal and ventral side.

TABLE 4. Female abdominal chaetotaxy of *Emersoniella reninoda* n. sp. (see explanatory notes in Table 1).

Segment	Tergomedian	Post-spiracular	Sternal	Postero-lateral
II	1 + 2–3	0	1+3	0
III	3–4	1	3	0
IV	4–5	1	2	3
V	4–5 (6)	1	1	4
VI	5	1	1	4
VII	5 (6–7)	1	3	4
VIII	3	0	0	4
IX	1	0	0	2+2
Terminal	0	0	3	0

Type material. Male holotype, ex *Melidora macrorrhina macrorrhina*, PAPUA NEW GUINEA: Northern District, Popondetta, Jumbora Plantation, elev. 200 ft, 25. IX. 1963, H. Clissold, host BBM-NG-29668 (NHML). Female allotype, on same slide as holotype (NHML). Paratypes: 2 males, same data as holotype (both slides also contain female *E. crassicarina*) (NHML). 3 males and 3 females, same data as holotype (USNM). 3 males and 1 female, same data as holotype (PIPeR).

Non-type material. 1 nymph, on same slide as holotype. 2 nymphs, same data as holotype PAPUA NEW GUINEA: Morobe District: 15 males, 25 females, 4 nymphs, 10 km W of Bulolo, elev. 780 m, 13. VIII. 1967, A.B. Mirza, host BBM-NG-54237 (NHML). PAPUA NEW GUINEA: Northern District: 4 males, 4 females, 1 nymph, Cape Killerton, elev. 10 ft, 22. X. 1963, H. Clissold, host BBM-NG-29287 (USNM). 2 males and 6 females, Popondetta, Jumbora District, elev. 25 m, 2. VI. 1966, G. Lippert, host BBM-NG-25017. 23 males, 46 females, 7 nymphs, Popondetta, Jumbora Plantation, 5. V. 1966, P.J. Shanahan, host BBM-NG-24885. 2 females, Vicinity of Popondetta, Empi Lakes, elev. 300 ft, 24. X. 1963, H. Clissold, host BBM-NG-29321; two unidentified nymphs belonging to the “*Degeeriella* complex” on same slide. PAPUA NEW GUINEA: Western District: 1 nymph, Oriomo River, elev. 20 ft, 14. II. 1964, H. Clissold, host BBM-NG-29520 (all at PIPeR).

Etymology. The species epithet is formed by “*ren*”, Latin for “kidney”, and “*nodus*” for Latin “knot”, referring to the kidney-shaped preantennal nodi.

Emersoniella persei Gustafsson & Bush, new species

(Figs 4a–d)

Type host. *Tanyiptera danae* Sharpe, 1880 (Coraciiformes: Alcedinidae) – brown-headed paradise-kingfisher.

Diagnosis. This species keys out as *Emersoniella galataeae* in the key of Emerson & Price (1978), which is also from a host in the genus *Tanyiptera*. The two louse species are very similar, but differ in the abdominal chaetotaxy of both sexes, the female vulval chaetotaxy, and the shape of the head and the male genitalia.

Description. Head elongatedly triangular, with occiput and frons shallowly concave (Fig. 4a). Marginal carina interrupted laterally and submedianly, with median section displaced posteriorly forming a crescent-shaped thickening of the dorsal anterior plate. Premarginal carina comparatively long, slender. Hyaline margin broad, continuous with dorsal preantennal suture that arises from lateral interruptions of marginal carina, and then continues posterior to approach, and in some specimens reach, the ADS, but sutures do not cut off dorsal anterior plate from main head plate medianly. Ventral carinae straight and convergent, with nodi median to AS1, anterior to which they are diffuse, and not clearly continuous with premarginal carinae. AS2–3 located on posterior end of premarginal carina, AS1 and DSMS located near anterior end of postmarginal carina; all except AS2 with attendant canals in marginal carina. VSMS2 more anterior than VSMS1, both more anterior than AVS3. Preantennal nodi large, turned medianly. Coni shorter than scapes. Preocular nodi elongated, somewhat sinuous. Postocular nodi distinct, smaller than preocular. OS and POS both on eye, POS at posterior margin. One pair each of PNS and PTS, both long, stout. Marginal temporal carina generally slender, with more or less even thickness around postantennal head. MTS1 only slightly shorter than MTS3, other MTS very short setae. Gular plate slender, spade-shaped.

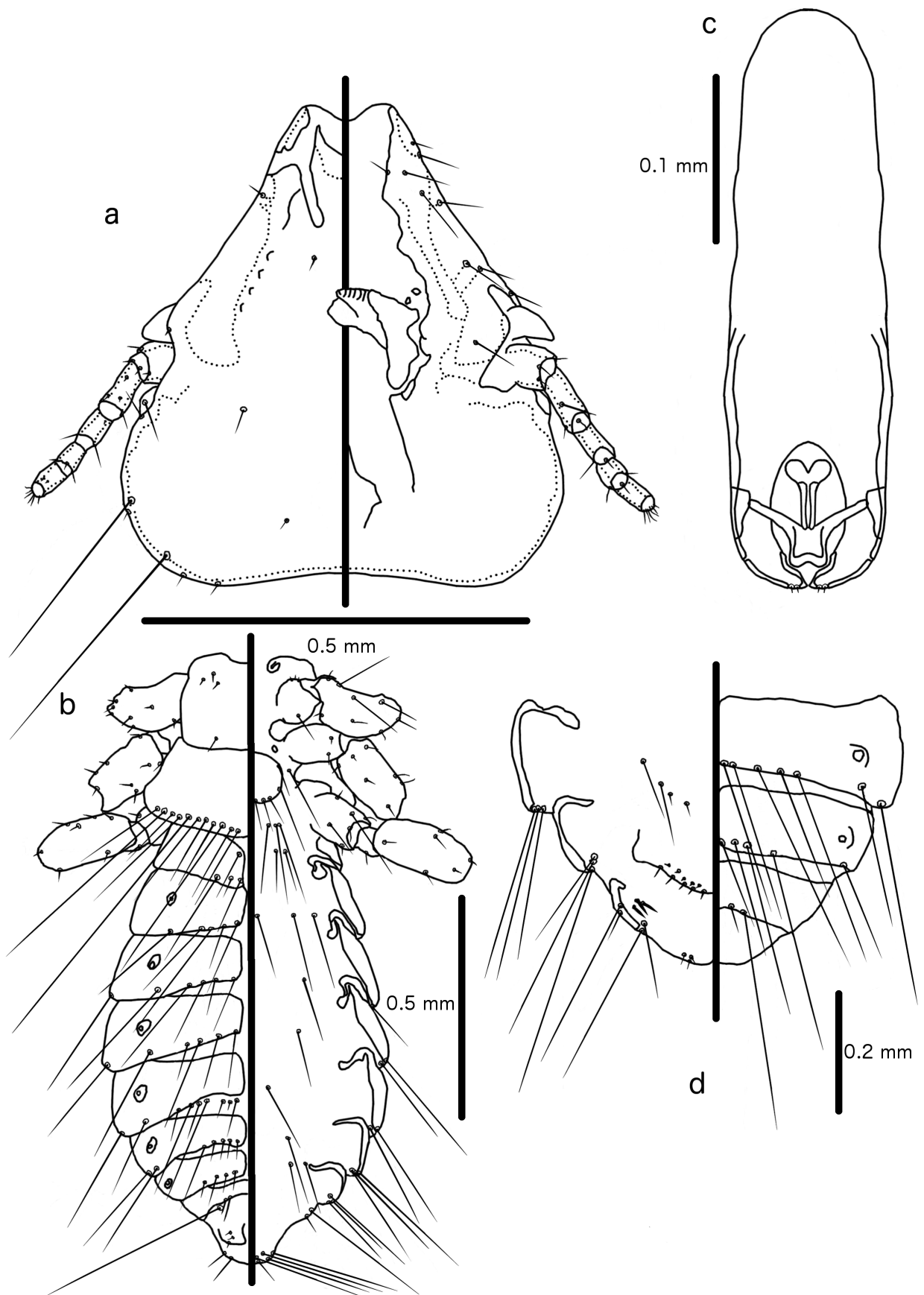


FIGURE 4. *Emersoniella persei* n. sp. ex *Tanysiptera danae*: (a) male head, dorsal and ventral side; (b) male pterothorax and abdomen, dorsal and ventral side; (c) male genitalia; (d) female terminalia and vulval margin, dorsal and ventral side.

Prothorax wider than long, with one pair of short setae on posterior margin median to spiracle openings. Prosternum nude. Proepimera broad with blunt median ends. Pterothorax broader than long, with mildly divergent lateral margins and a rounded posterior margin which may have a slight convergent median point. Mesosternum with two pairs of medium-sized setae on lateral margins, diffuse. Metasternum diffuse, with four pairs of medium-sized setae on posterior margin and 1–2 pairs of medium-sized setae on lateral margins (Fig. 4b). Possibly plates are fused, but this cannot be clearly seen in available material. Episterna short, blunt, do not reach median of coxae.

Tergites II–VIII divided medianly in both sexes. Sternites medianly continuous but diffuse. Pleurites III–V in both sexes with well-developed, pointed, re-entrant heads, pleurites VII–VIII with blunt, barely re-entrant heads; heads of pleurite V intermediate (Fig. 4b).

Male. Posterior margin of pterothorax with 11 pairs of setae. Abdominal chaetotaxy as in Table 5. Male genitalia (Fig. 4c): basal plate long, but entirely diffuse anterior to segment VII. Lateral thickenings narrow, on distal half of basal plate, and continuous with lateral thickenings of parameres, though these thickenings continue only along the distal half of the median side of parameres. Median part of basal plate open to short, oval atrium, in which mesomere and endomere are located. Endomere longer than wide, with long antero-lateral extensions that approach the fusion point between the basal plate and the parameres. Distally, endomere has W-shaped thickening that does not continue anteriorly for more than half the lateral sides. When not everted, mesomere does not overlap with endomere, though in males with partially everted genitalia, the mesomere does overlap the anterior half of the endomeres. Mesomere-proper as two parallel, needle-like bars, somewhat bulbous anteriorly. Antero-lateral sclerites short, blunt, roundly triangular, fused medianly. Measurements ($n = 8$; except for TL and AW where $n = 7$): TL: 1.75–1.89 (1.81); HL: 0.57–0.60 (0.59); HW: 0.56–0.58 (0.57); PRW: 0.29–0.31 (0.31); PTW: 0.42–0.46 (0.44); AW: 0.58–0.63 (0.61).

TABLE 5. Male abdominal chaetotaxy of *Emersoniella persei* n. sp. (see explanatory notes in Table 1).

Segment	Tergomedian	Post-spiracular	Sternal	Postero-lateral
II	1 + 3	0	3 + 2–3	0
III	4	1	3	0
IV	4	1	1	2
V	4	1	1	3
VI	7	1	1	3
VII	4–5	1	1	4
VIII	4–5	0	2	3
IX	3	0	0	2
Terminal	0	0	2	3

TABLE 6. Female abdominal chaetotaxy of *Emersoniella persei* n. sp. (see explanatory notes in Table 1).

Segment	Tergomedian	Post-spiracular	Sternal	Postero-lateral
II	1 + 3	0	2–3 + 4 (5)	0
III	5–6	1	2	0
IV	5–6	1	2	3
V	5–6 (7–8)	1	2	3
VI	5–6	1	2	4
VII	5–6	1	2	4
VIII	4	0	0	4
IX	2	0	0	2 + 2
Terminal	0	0	3	0

Female. Posterior margin of pterothorax with 9–10 pairs of setae. Abdominal chaetotaxy as in Table 6. Vulval margin with 4–5 marginal pairs of slender setae and 5–7 submarginal pairs of thorn-like setae. Oblique set with 2–4

pairs of slender setae far anterior of vulval margin. Posterior-lateral to vulval margin a cluster of usually three (rarely two or four) spine-like setae (Fig. 4d). Measurements n = 14): TL: 1.93–2.20 (2.09); HL: 0.61–0.64 (0.63); HW: 0.59–0.62 (0.61); PRW: 0.29–0.33 (0.32); PTW: 0.43–0.51 (0.48); AW: 0.62–0.73 (0.69).

Type material. Male holotype, *ex Tanysiptera danae*, PAPUA NEW GUINEA, Northern District, Popondetta, Jumbora Plantation, elev. 200 ft, 24. IX. 1963, H. Clissold, host BBM-NG-28857 (NHML). Female allotype, on same slide as holotype (NHML). Paratypes: 5 females, same data as holotype (NHML). 1 male and 1 female, same data as holotype (PIPeR).

Non-type material. PAPUA NEW GUINEA: Northern District: 2 nymphs, same data as holotype (NHML). 1 male, 3 females, 4 nymphs, Mount Lamington, Vicinity of Amboga River, elev. 500 m, 4. VII. 1966, G. Lippert, host BBM-NG-25168 (USNM). 3 nymphs, Popondetta, Jumbora Plantation, elev. 250 ft, 27. X. 1963, H. Clissold, host BBM-NG-29347 (one slide also contains an unidentified menoponid nymph). 5 males, 10 females, 5 nymphs, Popondetta, Jumbora Plantation, elev. 25 m, 2. VI. 1966, G. Lippert, host BBM-NG-25019 (all at PIPeR).

Etymology. The species epithet *persei* refers to Perseus, the only son of Danaë and Zeus (who famously impregnated her as a golden rain). Hence, the “child” of *Tanysiptera danae* is *Emersoniella persei*.

Emersoniella halcyonis Tendeiro, 1965

(Figs 5a–d)

Type host. *Actenoides hombroni* Bonaparte, 1850 (Coraciiformes: Alcedinidae) – blue-capped kingfisher

Other host: *Actenoides concretus* (Temminck, 1925) (Coraciiformes: Alcedinidae) – rufous-collared kingfisher

Measurements. Male (n = 15, except AW where n = 9): TL: 1.58–1.95 (1.72); HL: 0.50–0.56 (0.54); HW: 0.53–0.59 (0.55); PRW: 0.27–0.33 (0.30); PTW: 0.41–0.47 (0.44); AW: 0.52–0.63 (0.56). Female (n = 14): TL: 1.87–2.27 (2.03); HL: 0.56–0.61 (0.58); HW: 0.59–0.66 (0.62); PRW: 0.29–0.36 (0.32); PTW: 0.45–0.54 (0.49); AW: 0.59–0.74 (0.65).

Remarks. As the only illustrations given by Tendeiro (1965) were photos, we here illustrate this species to aid comparisons with other species treated in this paper (Figs 5a–d). While we have not seen Tendeiro's types, the material examined by us fits well with his description and measurements, except that our material has dorsal preantennal sutures (Fig. 5a), which Tendeiro (1965: 75) claim were absent in his material. The resolutions of the photographs in the original description is not sufficient for us to confirm or refute this claim.

Note that the checklist by Price *et al.* (2003: 177) also lists *Actenoides concretus* (Temminck, 1825) as a host of *Emersoniella halcyonis*. This host association is original to the checklist (Price *et al.* 2003) and is based on the examination of specimens by R.L. Palma and R.D. Price (pers. comm. 2013).

Material examined. PHILIPPINES: Mindanao: 6 males and 11 females, Davao Province, Limot Mati, Mount Mayo, 31. V. 1965, D.S. Rabor, host B7799. 4 males, 10 females, 12 nymphs, 1 unknown sex, [Davao Province,] Malit, no date or collector, host SU-BBM-1097 (one slide also contains an unidentified menoponid). 7 males and 4 females, [Surigao del Sur,] Balisong, no date or collector, host SU-BBM-1127. 3 males, 13 females, 4 nymphs, Tucany E-el, no date or collector, host SU-BBM-1511. 1 nymph, [Zamboanga del Norte Province:] Dapitan Peak, no date or collector, host BBM-534 (all at PIPeR).

Emersoniella regis Emerson & Price, 1978

(Figs 6a–d)

Type host. *Clytoceyx rex rex* Sharpe, 1880 (Coraciiformes: Alcedinidae)—shovel-billed kookaburra

Measurements. Male (n = 2): TL: 1.89–1.92 (1.91); HL: 0.57–0.58 (0.58); HW: 0.60–0.61 (0.61); PRW: 0.33–0.33 (0.33); PTW: 0.46–0.47 (0.47); AW: 0.70–0.71 (0.71). Female (n = 2): TL: 2.12–2.15 (2.14); HL: 0.61–0.61 (0.61); HW: 0.65–0.66 (0.66); PRW: 0.34–0.35 (0.34); PTW: 0.49–0.50 (0.50); AW: 0.77–0.78 (0.77).

Remarks. This species was only partially illustrated in the original description (head outline and male genitalia). Therefore, based on paratypes, we here illustrate other diagnostic features of this species to aid comparisons with other species treated in this paper (Figs 6a–d).

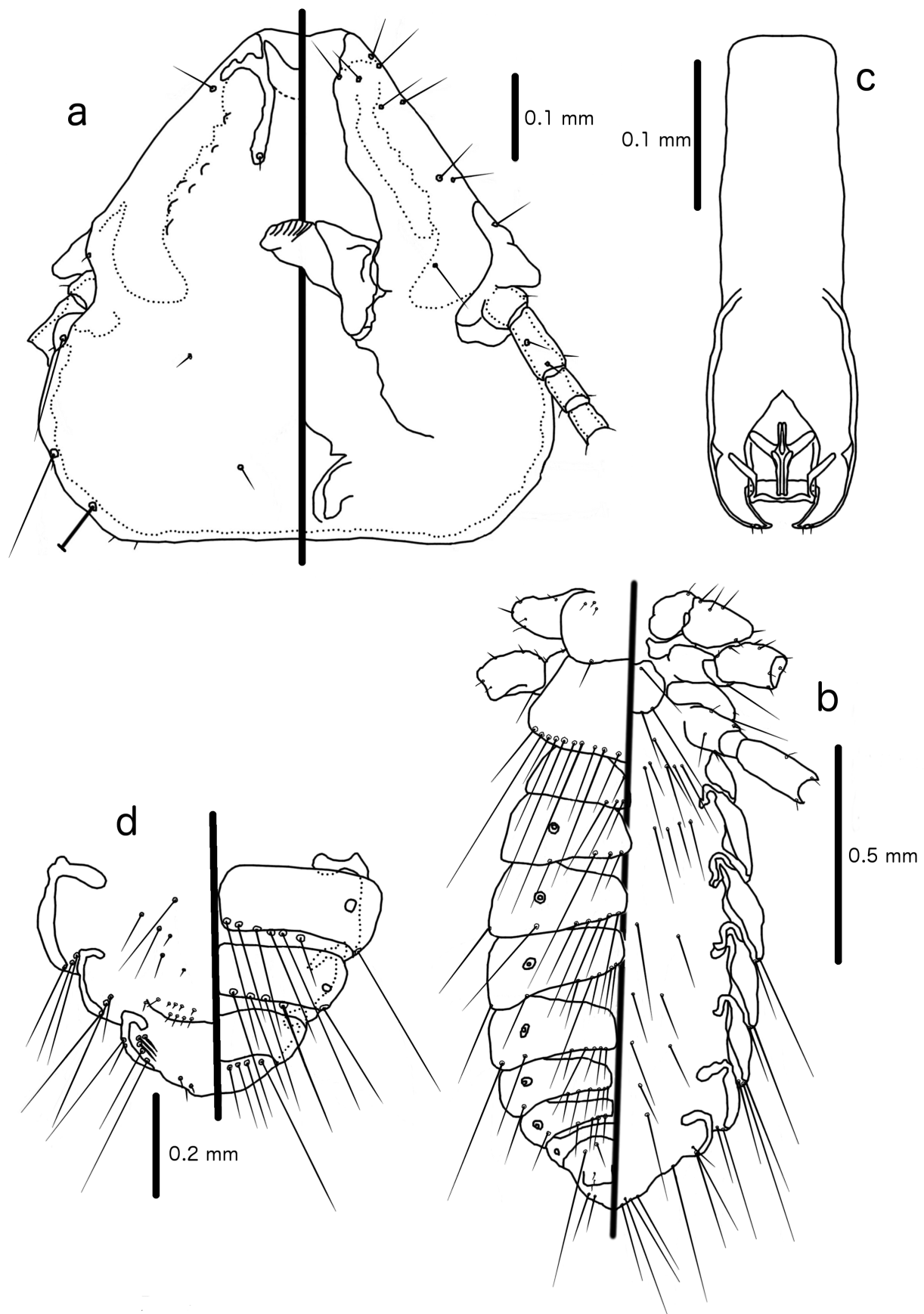


FIGURE 5. *Emersoniella halcyonis* ex *Actenoides hombroni*: (a) male head, dorsal and ventral side; (b) male pterothorax and abdomen, dorsal and ventral side; (c) male genitalia; (d) female terminalia and vulval margin, dorsal and ventral side.

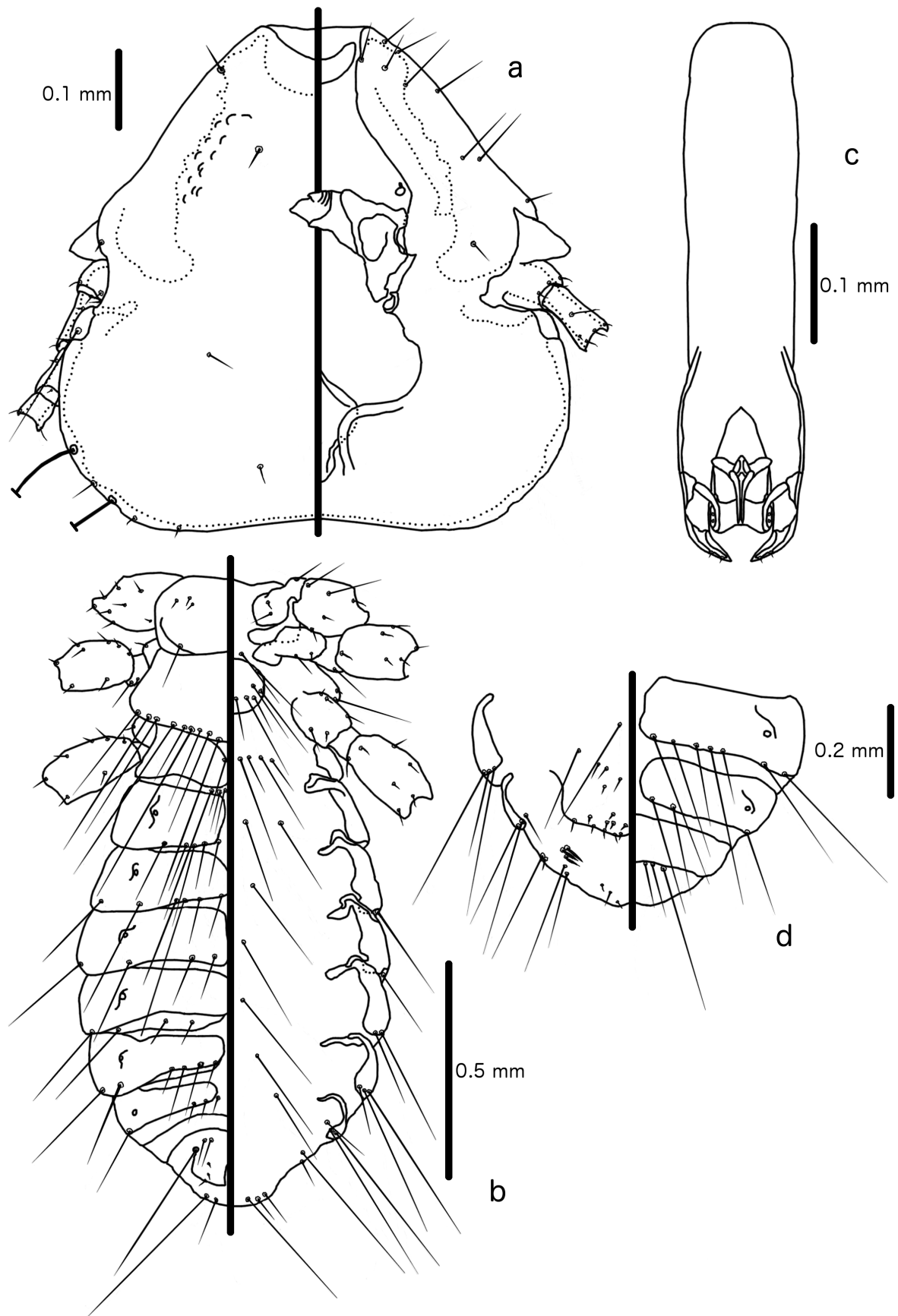


FIGURE 6. *Emersoniella regis* ex *Clytoceyx rex rex*: (a) male head, dorsal and ventral side; (b) male pterothorax and abdomen, dorsal and ventral side; (c) male genitalia; (d) female terminalia and vulval margin, dorsal and ventral side.

Material examined. Paratypes: 2 males and 2 females, PAPUA NEW GUINEA: East Sepik District, Wewak, 23. X. 1972, no collector, host 101671 (PIPeR).

***Emersoniella galatae* Emerson & Price, 1978**

(Fig. 7)

Type host. *Tanysiptera galatea meyeri* Salvadori, 1889 (Coraciiformes: Alcedinidae) – common paradise-kingfisher

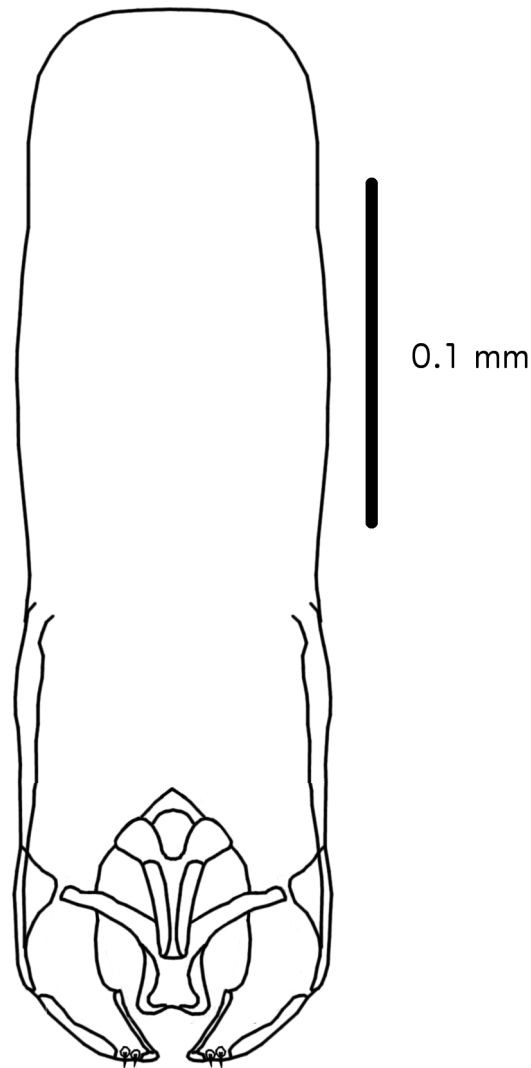


FIGURE 7. *Emersoniella galatae* ex *Tanysiptera galatea meyeri*: male genitalia.

Remarks. We include an illustration of the male genitalia of this species (Fig. 7) to facilitate comparisons with the other species treated here, especially *E. persei*. Additional measurements and illustrations of this species were provided by Emerson & Price 1978. Note, however, that in both sexes, there are 1–2 pairs of setae located between the setae of the posterior margin of the metasternum and the posterior margin of sternite II; these setae are missing in the original illustration (see Emerson & Price 1978: 107, fig. 1).

Material examined. PAPUA NEW GUINEA: Western District: 2 males and 2 females, Oriomo River, elev. 20 ft, 14. II. 1964, H. Clissold, host BBM-NG 29508. 1 male, Oransbari, elev. 10 ft, 5. II. 1963, [M.]C. Thomson, host BBM 22386. 1 female, Oransbari, elev. 10 ft, 10. XI. 1963, M.C. Thomson, host BBM-NG 22409. 1 male and 1 female, Oransbari, elev. 10 ft, 31. I. 1963, M.C. Thomson, host BBM-NG 22349. PAPUA NEW GUINEA: Northern District: 1 male, Popondetta, Jumbora Plantation, elev. 200 ft, 7. X. 1963, H. Clissold, host BBM-NG

28830. 2 females, 2 nymphs, Popondetta, Ahola, elev. 150 ft, 7. X. 1963, H. Clissold, host BBM-NG 29881. 2 females, Popondetta, Soputa River, elev. 100 ft, 5. X. 1963, H. Clissold, host BBM-NG 29851. PAPUA NEW GUINEA: West Sepik District: 1 nymph, Sepik River, “midway between Wagu and Peio”, elev. 450 ft, 16. VI. 1963, P. Temple, host BBM 22679. PAPUA NEW GUINEA: Central District: 6 males, 15 females, 6 nymphs, “43 km NW Port Moresby”, Brown River, Karema, 22. X. 1968, N. Wilson and M. Nadchatram, host BBM-NG 60160 (all at PIPeR).

Discussion

With the description of three new species in this paper – *Emersoniella crassicarina*, *E. reinoda* and *E. persei* – the total number of known species in the genus is seven. In addition to the described material, we examined material of *Emersoniella* from *Tanyiptera nympha* Gray, 1840, and *Todiramphus leucopygius* (Verreaux, 1858), but too few individuals were available to describe them at this time. All known *Emersoniella* species, including those described as new here, are found on kingfishers and kookaburras in the subfamily Halcyoninae, and all hosts are from South-east Asia and Australia. Several species of halcyonine kingfishers also occur in Africa (see Fry *et al.* 1999), though there are no records of *Emersoniella* from that continent yet. Future examinations of species of African halcyonine will therefore be instrumental in determining whether *Emersoniella* is restricted to the Halcyoninae from South-east Asia and Australia, or if it has a wider geographic distribution.

Key to the species of *Emersoniella*

[modified after Emerson & Price 1978]

Note: *Emersoniella bracteata* was not seen during this study, and its placement is as in Emerson & Price (1978), who followed Clay (1971). We were unable to find any material of this species at the NHML, despite Clay (1971) stating that several such specimens exist, and we did not examine material from other institutions as a revision of the genus was not the aim of this paper.

1. Pleurites on III–VI without well developed re-entrant heads *Emersoniella bracteata* (Nitzsch [in Giebel], 1866)
- Pleurites on III–VI with well-developed re-entrant heads 2
2. Dorsal preantennal suture clearly visible, reaching towards or to aperture of ADS. 3
- No dorsal preantennal suture visible. 6
3. Anterior head sharply angulate and elongated, generally longer than broad, male genitalia with endomeral plate longer than broad. Dorsal preantennal suture does not reach ADS. On *Tanyiptera* spp. 4
- Anterior head more rounded, generally broader than long, male genitalia with endomeral plate broader than long. Dorsal preantennal suture reaches ADS. On several genera 5
4. Female tergite IX with more than one pair of very short setae median to long setae. Head much elongated *Emersoniella galateae* Emerson & Price, 1978
- Female tergite IX with only one pair of very short setae median to long setae. Head not as elongated *Emersoniella persei* new species
5. Male abdominal setae generally short, with few tergo-central setae reaching posterior margin or following tergite. Pronotal setae long, reaching more than half of length of pteronotum. Setae of terminal abdominal segment in male short *Emersoniella reinoda* new species
- Male abdominal setae long, with tergo-central setae often reaching to or beyond posterior margin of following tergite. Pronotal setae short, not reaching more than half of length of pteronotum. Setae of terminal abdominal segment in male long *Emersoniella halcyonis* Tendeiro, 1965
6. Mesomere long and wide, reaching or overlapping with basal plate laterally and with endomere distally. Basal plate slender distally. Temporal carinae curve medianly to reach or overlap with gular plate. Female tergite IX with three pairs of tergo-central setae. *Emersoniella regis* Emerson & Price, 1978
- Mesomere small, not reaching basal plate laterally and not reaching endomere distally. Basal plate widens distinctly distally. Temporal carinae with no distinct curve. Female tergite IX with two pairs of tergo-central setae *Emersoniella crassicarina* new species

Host-louse list for *Emersoniella* Tendeiro, 1965

Host species	<i>Emersoniella</i> species
<i>Actenoides concretus</i> (Temminck, 1825)	<i>Emersoniella halcyonis</i> Tendeiro, 1965
<i>Actenoides hombroni</i> Bonaparte, 1850	<i>Emersoniella halcyonis</i> Tendeiro, 1965
<i>Clytoceyx rex rex</i> Sharpe, 1880	<i>Emersoniella regis</i> Emerson & Price, 1978
<i>Dacelo gaudichaud</i> Quoy and Gaimard, 1824	<i>Emersoniella crassicarina</i> new species
<i>Dacelo leachii intermedia</i> Salvadori, 1876	<i>Emersoniella crassicarina</i> new species
<i>Dacelo novaeguineae</i> (Hermann, 1783)	<i>Emersoniella bracteata</i> (Nitzsch [in Giebel], 1866)
<i>Melidora macrorrhina macrorrhina</i> Lesson, 1827	<i>Emersoniella reninoda</i> new species
<i>Tanysiptera danae</i> Sharpe, 1880	<i>Emersoniella persei</i> new species
<i>Tanysiptera galatea meyeri</i> Salvadori, 1889	<i>Emersoniella galateae</i> Emerson & Price, 1978
<i>Tanysiptera nympa</i> Gray, 1840	<i>Emersoniella</i> sp.
<i>Todiramphus leucopygius</i> (Verreaux, 1858)	<i>Emersoniella</i> sp.

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