Philopterus novaezealandiae, a new species of chewing louse (Phthiraptera: Philopteridae) from the kokako (Passeriformes: Callaeidae)

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The new species Philopterus novaezealandiae is described from three samples of lice collected from the two subspecies of kokako (Callaeas cinerea (Gmelin)) The possible origin of P novaezealandiae is discussed This is the first louse species to be described from an extant species of the passerine host family Callaeidae, the New Zealand wattlebirds

Keywords Phthiraptera Philopteridae Philopterus lice new species Callaeidae kokako

INTRODUCTION
Following the publication by Price & Hellenthal (1998) of a taxonomic revision of the species of Philopterus Nitzsch, 1818, parasitic on members of the passerine family Corvidae, we were able to study a series of lice collected from the two subspecies of Callaeas cinerea (Gmelin, 1788), a New Zealand wattlebird known as the kokako These lice proved to be quite close to, yet different from, certain species of Philopterus from the Corvidae In this paper we (a) describe and illustrate the new louse species from the kokako, (b) discuss its similarities and differences from morphologically close species, and (c) discuss its origin in connection with the phylogenetic and ecological relationships of its host with some corvid species

Character orientation may be found in Price & Hellenthal (1998) Numbers of marginal tergal setae include the post-spiracular setae plus those between them, i.e. the setae situated both on and between the tergites The taxonomic nomenclature of the New Zealand birds cited in this paper follows that of the Ornithological Society of New Zealand (1990) Checklist, the nomenclature of the birds found elsewhere follows that of Howard & Moore (1991)

SYSTEMATICS
Family Philopteridae Burmeister, 1838

Philopterus novaezealandiae new species
(Figs 1–4)
Type host Callaeas cinerea wilsoni (Bonaparte, 1851)

Philopterus sp. Pilgrim & Palma 1982 28 Listed only

Diagnosis Similar to P picae and P underwoodi, but differing in the following combination of characters Both sexes with head (Fig. 2) having preconal and postconal setae each 0.04–

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Fig 1–4 Philopterus novaezealandiae  1 dorsal ventral view of female thorax and abdomen  2 dorsal view of female head  3 male genitalia  4 dorsal ventral view of male abdomen
0.06 mm long, dorsal head plate shaped as in Fig 2, darkly pigmented except for median lighter area. Abdominal tergites (see Fig 1, 4) uniformly dark, except for light areas associated with spiracles and setal alveoli. Lateral sternite on segment VI 0.05–0.07 mm wide. Male abdomen (Fig 4) with marginal tergal setae on segment II, 11–14, III–VI, 14–21, VII, 14–18, VIII, 11–13, IX, 1+1 with medial division. Median sternal setae II–IV, 8–12, V, 7–11, VI, 6–9, VII, 2–3. Subgenital plate as shown. Male genitalia as in Fig 3. Female abdomen (Fig 1) with marginal tergal setae on segment II, 13–14, III, 15–21, IV–VI, 17–21, VII, 18–19, VIII, 11–13, IX, 1+1. Median sternal setae II–VI, 8–12, VII, 3–4. Subgenital plate with 15–22 submarginal setae, as shown.

Measurements (in millimetres, taken from 8 males and 8 females)

Dorsal head plate width, male 0.13–0.15, female 0.14–0.15, dorsal head plate length, male 0.23–0.27, female 0.26–0.28, conus length, male 0.11–0.13, female 0.12–0.14, lateral carina length, male 0.08–0.09, female 0.09, preconal head length, male 0.22–0.24, female 0.22–0.26, temple width, male 0.53–0.57, female 0.56–0.62, head length, male 0.55–0.62, female 0.61–0.65, prothorax width, male 0.33–0.36, female 0.36–0.40, metathorax width, male 0.45–0.50, female 0.49–0.55, abdomen width at segment V, male 0.65–0.70, female 0.73–0.83, total length, male 1.63–1.79, female 1.95–2.20, male genitalia width, 0.10–0.11, male genitalia length, 0.32–0.35, female subgenital plate width, 0.40–0.45.

Type Material

Ex Callaeas cinerea wilsoni (Bonaparte, 1851) Holotype male, Seales and Mountain Roads, Tauranga, New Zealand, September 1996, C Rogers Paratypes 3 males, 6 females, same data as holotype, 4 males, 1 female, Pipiriki, North Island, New Zealand, 17 October 1909, E F Stead

Ex Callaeas cinerea cinerea (Gmelin, 1788) 1 female, Preservation Inlet, Fiordland, New Zealand, 30 June 1902, Smyth Coll

Holotype and 13 paratypes are deposited in the Museum of New Zealand Te Papa Tongarewa, two paratypes (one male and one female) in the K C Emerson Collection at Oklahoma State University, Stillwater, Oklahoma, U S A

DISCUSSION

In the key to species published by Price & Hellenthal (1998 798), Philopterus novaezealandiae keys out to couplet 22, agreeing in four features with Philopterus picae (Denny, 1842) – found on Pica pica (Linnaeus, 1758) and Pica nuttalli (Audubon, 1837) – except for having the female abdominal tergites on segment VII closer together. In addition, the narrower dorsal head plate and the much smaller numbers of tergal setae on segments II–VII and sternal setae on II–VI, further separate the new species from P picae. Proceeding through the key to couplet 23, the new species would identify as Philopterus underwoodi (Carriker, 1903) found on Psilorhinus moro (Wagler, 1829). However, the consistently greater dorsal head plate length, lateral carina length, preconal head length, and lateral sternite width on segment VI for P underwoodi easily separate that species from P novaezealandiae. Thus, our new species has a series of characters, a portion of which agrees with P picae, while sharing another portion with P underwoodi. Philopterus novaezealandiae is, however, clearly distinguishable from both of these morphologically close taxa.

Philopterus novaezealandiae represents the first louse species to be described from an extant member of the passerine family Callaeidae, the New Zealand wattlebirds. This family comprises three species, each in its own genus (Ornithological Society of New Zealand 1990 223) The huia, Heteralocha acutirostris (Gould, 1837), is an extinct species host to Ralicola
(Huacola) extinctus (Mey, 1990), a louse morphologically quite different from Philopterus. The saddleback, Philastenus carunculatus (Gmelin, 1789), is host to a yet unidentified species of the louse genus Brueelia Keler, 1936 (Pilgrim & Palma 1982 28), and the kokako which, besides Philopterus novaezealandiae, is host to another unidentified species of Brueelia (Pilgrim & Palma 1982 28).

We did not expect to find that the new species of Philopterus, found on a member of the family Callaeidae, would be morphologically close to species parasitic on members of the family Corvidae. The Callaeidae are endemic to New Zealand and their fossil record is known from the New Zealand late Quaternary only (R Holdaway, pers. comm. 1999). Fleming (1962) concluded that they were part of the ancient avifauna of New Zealand, with an origin in the Tertiary, but the closest relationships of the family are at present unknown. It is pertinent, however, to recall that the family, as now constituted, comprises the kokako (two subspecies, which were formerly classified with the Corvidae), together with the huia plus the saddlebacks (two subspecies, all of which were formerly classified with the Sturnidae) (see Buller 1888, Hutton & Drummond 1905).

It is unlikely that the ancestor of P. novaezealandiae lived on the ancestors of the kokako. If it had, this would imply either a closer phylogenetic relationship between the Callaeidae and the Corvidae than is presently accepted, or an extremely slow rate of speciation of the lice. A more likely scenario is that the kokako acquired its Philopterus lice through the process known as host switching (see Palma & Barker 1996 82), from a corvid species which was sharing its habitat. At present only one corvid species lives in New Zealand, the rook (Corvus frugilegus Linnaeus, 1758), which in its area of origin (Eurasia) is host to Philopterus atratus Nitzsch, 1818 (Price & Hellenthal 1998 786). However, this bird can be clearly ruled out as a ‘donor’ of the Philopterus lice found on kokakos because P. atratus has not been found in New Zealand despite a great deal of searching and, even if that louse were present but still undetected, the rook was introduced by humans only about 130 years ago (Ornithological Society of New Zealand 1990), a period far too short for the speciation of P. novaezealandiae.

There are two extinct corvid species known to have lived in New Zealand, one on the main islands and the other on the Chatham Islands (Ornithological Society of New Zealand 1990 230, R. Holdaway, pers. comm. 1999), which could have been parasitised by a Philopterus species likely to be the ancestor of P. novaezealandiae. The fossil record shows that the New Zealand crows survived at least until the 14th century, and both kokako and crow remains have been found in the same deposits, for example at Kaupokonui on the south Taranaki coast in the North Island (Scarlett 1979), and at Pyramid Valley (Holdaway & Worthy 1997) and Lake Grassmere (Worthy 1998) in the South Island.

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