A NEW SPECIES OF *RALLICOLA* (INSECTA: MALLOPHAGA) FROM *NOTORNIS MANTELLI* OWEN.

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Abstract

Rallicola takahe n.sp. is described from *Notornis mantelli* Owen. It is closely related to *Rallicola lugens* (Giebel) from *Porphyrio porphyrio melanotus* Temminck. The principal differences are the much greater size, the reduction in length of the preantennary region so that the head is as wide as it is long, the compressed parameres of the male genitalia and slight variations in the chaetotaxy. Males are as large as or larger than females. It is suggested that compression of the head of *R. takahe* may be associated with the flightless condition of the host, and that *N. mantelli* and *P. porphyrio melanotus* are more closely related than at present indicated in the literature.

Introduction

Although the giant flightless rail *Notornis mantelli* Owen,* known to the Maoris as the Takahe, was described from New Zealand over a hundred years ago it is only recently that any Mallophagan parasites have been collected from it. Prior to the discovery in 1948 of a small population of these birds in Takahe Valley, Western Otago, the living bird was known only from four skins from none of which Mallophaga appear to have been collected. Sub-fossil remains of the Takahe have been found in the southern part of the North Island and in widespread localities in the South Island but the living *Notornis* is now apparently confined to a restricted area in the south-west portion of the South Island. During December, 1952, Messrs. T. Riney and K. Miers of the Department of Internal Affairs made a collection of Mallophaga from a live adult *Notornis* in Takahe Valley; the writer has been privileged to examine these specimens all of which belong to the new species described below.

*Owen's type of this species is a sub-fossil bone and the living specimens since discovered have been separated as *Notornis hochstetteri* Meyer. In this paper the author follows the decision of the Checklist Committee, Ornithological Society of New Zealand (C. A. Fleming, Convener) in Checklist of New Zealand Birds (1953) in which *Notornis mantelli* Owen is retained for living birds.

Rallicola Johnston and Harrison 1911

1911 *Proc. Linn. Soc. N.S.W.*, 36, p. 324.

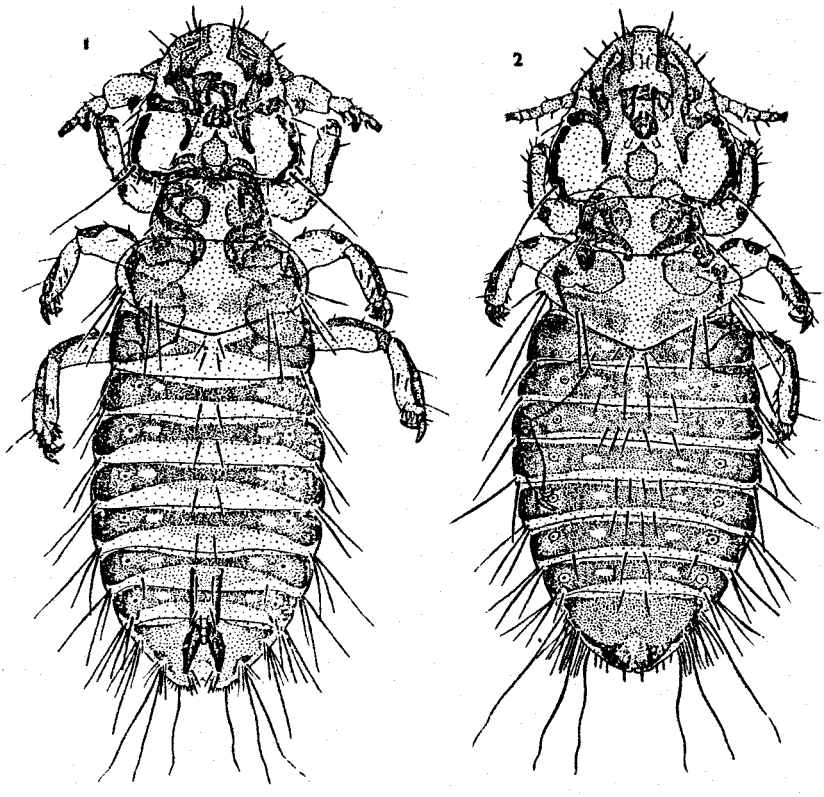
Type species: "*Oncophorus attenuatus* N." = *Nirmus attenuatus* Burmeister 1838 = *Pediculus ortygometrae* Schrank 1781.

Rallicola takahe n.sp. Figs. 1-5.

MALE

Size large (up to 2·74 mm.). Head small compared with rest of body, slightly wider than long; preantennary area short and broadly rounded; trabecular tubercles strongly developed, triangular and almost hyaline; antennal fossae deep; temporal region prominent, rounded and extending a short distance behind the occiput; occipital margin nearly transverse, slightly sinuate. Clypeal band wide, poorly pigmented and absent from front of head; clypeal signature indistinct; internal band extending from near base of mandible to connect anteriorly with

clypeal band, and bearing a small inwardly directed triangular process halfway along its length; the processes from each side widely separated and the clear area immediately in front of the mandibles approximately semi-circular. Antennal band broad, deeply pigmented, extending around the anterior margin of the antennal fossa to meet a similar band which extends from the ocular margin around the posterior edge of the fossa. Temples encircled by deeply pigmented marginal



FIGS. 1–2.—*Kallicola takahe* n.sp.: 1, Holotype male; 2, Allotype female.

bands which are serrated internally; occipital bands indistinct proximally, widening distally and curving out towards antennal fossae. Occipital signature faintly pigmented, longer than wide, with pointed distal extremity almost reaching pharyngeal sclerite. Antennae strongly dimorphic, rather long; 1st segment swollen, almost as long as remainder combined and with a deeply pigmented papilla on the posterior margin supporting a stout spine; 2nd segment short and thick, half as long as 1st; 3rd with a distal deeply pigmented hook which bears 3 minute setae at its tip and a longer seta at its base on the posterior margin; 4th small, slender, attached halfway along 3rd segment; 5th small and slender, slightly longer than 4th.

Prothorax large, wider than long, sides divergent and convex; posterior angles rounded; posterior margin slightly concave; acetabu-

lar bars and lateral bands deeply pigmented. Pterothorax wider than head, only slightly longer than prothorax; sides divergent and convex; postero-lateral angles rounded; posterior margin not greatly angulated; acetabular bars not greatly developed. Sternal thickenings absent from thorax.

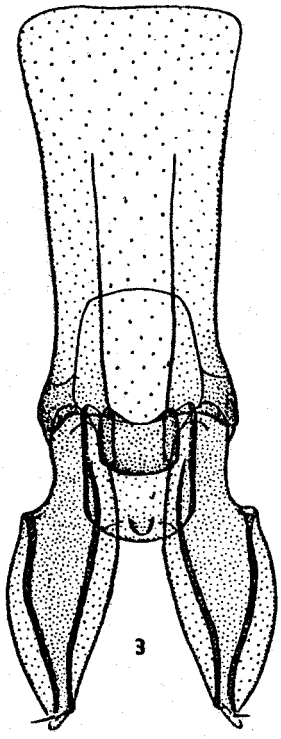
Abdomen elongated oval, segments subequal in length, the 1st segment wider than pterothorax; 8th segment with median emargination; tergal plates heavily pigmented and separated by broad hyaline bands along the sutures; 1st tergal plate interrupted medially, the remainder uninterrupted; 1st to 7th tergal plates with 2 pale elongate oval blotches lying mesad to the spiracles (spiracles absent from 1st segment); pleural plates completely fused with tergal plates but more deeply pigmented. Sternal thickenings in the form of median plates.

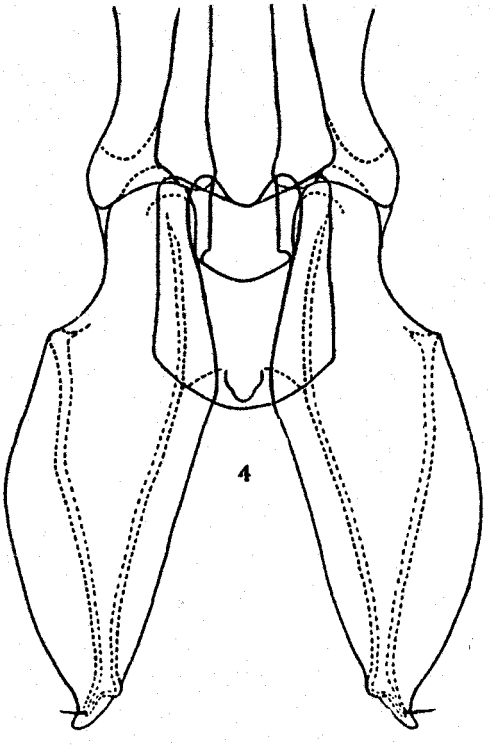
Chaetotaxy: Head with 5 small setae and 2 long setae on each side of preantennary margin; 1 short seta between clypeal and internal bands; another short hair inside antennal fossa. Eye with 1 longish seta. Temporal margin with a long pustulated seta on the postero-lateral angle and 5 or 6 short setae (Holotype has 2 pustulated setae on right temple); one short seta on either side of temporal signature and a larger seta at the base of the temporal band. Prothorax with 2 to 4 small setae on each side just behind occipital margin, and a fairly strong pustulated seta in postero-lateral angle. Pterothorax with 2 groups of 2 pustulated submarginal setae on posterior edge, and with 2 long pustulated setae, 1 short stout seta and 1 long fine seta in postero-lateral angle. Ventral surface of thorax with 4 long setae between 2nd coxae and 2 similar setae between 3rd coxae. Postero-lateral angles of 1st abdominal segment with 1 long seta; 2nd with 2 (one paratype has 3 on left side); 3rd and 4th with 2; 5th, 6th, and 7th with 3; 8th segment with 1 long coarse seta, 3 short fine setae and 1 very small fine seta near antero-lateral angle, and with 2 long coarse setae and 5 or 6 short fine setae in a submarginal position near the middle of the segment; 9 or 10 short fine marginal setae on either side of the terminal emargination of the 8th segment. Dorsally the 1st segment with 4 medium sized hairs in the middle of the segment; 2nd with 2 or 3; 3rd with 2 to 5; 4th with 2 to 4; 5th, 6th, and 7th with 2; 6th segment also with a longish seta posterior and mesad to spiracle; 7th with a similar seta posterior to spiracle; 8th with 3 short fine deeply submarginal setae on either side of terminal emargination. On the ventral surface of the abdomen 1st segment with 11 or 12 long setae on posterior margin; 2nd with 11 to 16; 3rd with 11 to 15; 4th with 10 to 13; 5th with 11 to 14; 6th with 4; 7th with 2; 8th with a group of 5 to 7 small fine setae and 1 long coarse seta on either side of the terminal emargination.

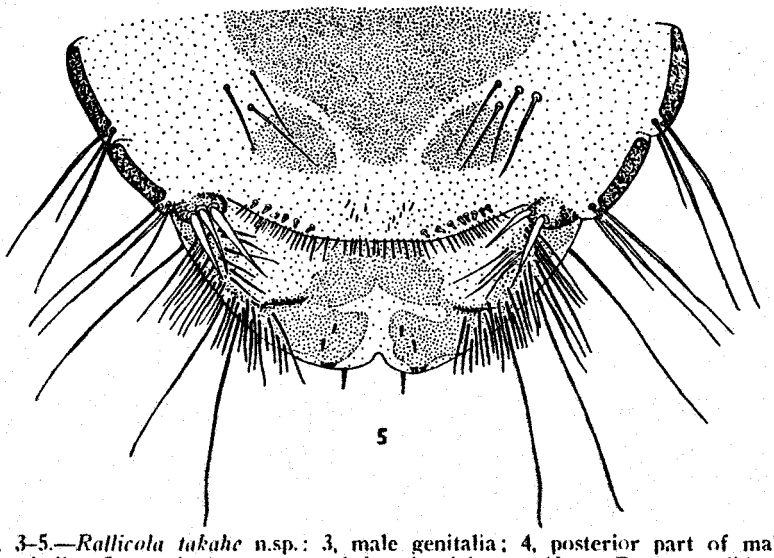
Genital armature as in Figs. 3 and 4. Parameres very short and thick, about three times as long as width at level of penis; lateral margins convex; lobes absent from the bases; tips curving outwards and bearing a very small subterminal seta; a small rounded protuberance projects medially near the level of this seta.

FEMALE

Differs little in size from the male. Head slightly larger with preantennary area more convex; trabecular tubercles less prominent; antennae simple, filiform, shorter than those of male. Prothorax as in







FIGS. 3–5.—*Rallicola takahe* n.sp.: 3, male genitalia; 4, posterior part of male genitalia; 5, terminal segments of female abdomen (from Paratype slides).

male. Pterothorax slightly longer and posterior margin more angulated. Abdomen slightly wider and generally shorter than that of male; median emargination on 8th segment shallower; 1st and 2nd tergal plates interrupted medially.

Chaetotaxy: Head, prothorax and pterothorax as in male. Ventral surface of thorax with 5 or 6 setae between 2nd coxae and 2 or

3 between 3rd coxae. Postero-lateral angles of 1st to 7th abdominal segments same as in male except that Allotype female has only 1 seta on left side of 2nd segment, and one paratype has three setae on left side of 4th segment; 8th segment with one long coarse seta and a very small fine seta in antero-lateral angle, a long coarse marginal seta near the middle of the segment, and one short marginal seta on either side of the terminal emargination. On the dorsal surface 1st and 2nd abdominal segments with 4 medium sized setae in the middle of the segment; 3rd and 4th with 4 or 5; 5th with 4; 6th and 7th with 2; 6th and 7th also with setae near spiracles as in male. On the ventral surface the setae are not readily distinguishable as they are partially obscured by the dense gut content. They appear to be numerous as in the male and the numbers distinguishable in the Allotype and two paratypes respectively are: 1st segment with 7, 11, 7; 2nd with 12, 17, 14; 3rd segment with 10, 10, 19; 4th segment with 14, 10, 18; 5th segment with 16, 6, 15; 6th segment with 9, 7, 9; 8th segment with 2 or 3 long stout spines on a papilla in each antero-lateral angle, and with a wide tract of submarginal and deeply submarginal setae of variable sizes extending posteriorly from the papilla for over half the length of the segment; 2 small deeply submarginal setae on either side of the terminal emargination.

Genital plate as in Fig. 5, flatly convex with a shallow median emargination; at least 50 rather short fine marginal setae more or less evenly spaced, and 6 to 8 very short stout submarginal spines on either side of the emargination; 6 to 10 extremely minute setae scattered over the middle of the plate.

NYMPH

The one nymph among the material has the clypeal band continuous around the front of the head. The tergal plates of the 1st to 7th abdominal segments are separated medially by a wide hyaline band and a similar band separates the pleural and tergal plates of the 2nd to 7th segments. In the 1st segment the pleural plates are partially fused with the tergal plates.

Measurements in mm.

	MALES			FEMALES		
	Holotype	Paratypes		Allotype	Paratypes	
HL	0·68	0·68	0·68	0·76	0·76	0·70
HB	0·71	0·71	0·74	0·82	0·84	0·71
PRL	0·29	0·26	0·24	0·24	0·29	0·24
PRB	0·50	0·51	0·50	0·53	0·53	0·49
PTL	0·32	0·32	0·32	0·37	0·40	0·40
PTB	0·78	0·76	0·79	0·84	0·82	0·76
AL	1·58	1·58	1·58	1·47	1·34	1·66
AB	0·97	0·92	0·95	1·05	1·08	1·08
TL	2·71	2·72	2·74	2·66	2·60	2·79
CI	1·04	1·04	1·09	1·08	1·11	1·01

Measurements taken from specimens mounted in polyvinyl alcohol. HL = length of head including temples; HB = breadth of head; PRL = length of prothorax; PRB = breadth of prothorax; PTL = length of pterothorax; PTB = breadth of pterothorax; AL = length of abdomen from anterior angles; AB = breadth of abdomen; TL = total length; CI = cephalic index (= HB/HL).

Types: Holotype male, Slide 6/11; Allotype female, Slide 6/12; Paratypes two males, two females, Slides 6/13, 6/14, 6/16, 6/17; Paratypes three males, Tube 7/9; Paratype male, Tube 7/10, and genitalia Slide 6/15; Paratype female nymph, Tube 7/11; all in the Dominion Museum Collection.

One Paratype male in the British Museum (Nat. Hist.).

All of these specimens were collected by T. Riney and K. Miers from a live adult specimen of *Notornis mantelli* Owen, Takahe Valley, Middle Arm of Lake Te Anau, New Zealand, on 30/12/1952.

The specific name is taken from the Maori name of the host.

DISCUSSION

Rallicola takahe shows close affinities with *Rallicola lugens* (Giebel) = *R. fallax* (Piaget), Clay (1953) from *Porphyrio porphyrio melanotus* Temminck. Compared with *R. lugens* the body of *R. takahe* is large but morphological features in the two species are very similar. The chaetotaxy of the head and the strong sexual dimorphism of the antennae agree with those of *R. lugens* and in both species the skeletal structures of the head are similar in form and in degree of pigmentation. However, in *R. takahe* the preantennary region is reduced so that the head is slightly wider than long and, in comparison with the rest of the body, the head is small.

The pigmentation of the abdomen and the form of the tergal and pleural plates are the same in both species, but together with the larger size of the abdomen in *R. takahe* there is an increase in the number of setae on the ventral abdominal surface. The chaetotaxy of the dorsal surface of the males of both species appears to be identical in the 1st to 7th abdominal segments and there is only slight variation in the 8th. In the female of *R. takahe* there are either 2 or 3 additional setae on the dorsal surface of all abdominal segments except the 1st, 6th, and 7th. The genital plate of the female has the same shape as that of *R. lugens* and bears the same number of submarginal spines but the number of marginal setae is doubled. In the male the genital apparatus is somewhat compressed, the parameres being about three times longer than wide in contrast to those of *R. lugens* which are about four times longer than wide. Males tend to be larger than females, which is the reverse condition to that found in *R. lugens* and most other species of *Rallicola*.

Notornis mantelli Owen is a flightless rail which, apart from its much greater body size, its softer plumage and its greatly reduced wings, is quite similar to *Porphyrio porphyrio melanotus*. Although ornithologists still classify *Notornis* in a separate genus, the extreme similarity in form and also in habits seem to indicate that this flightless bird has evolved in New Zealand from the widespread *Porphyrio* stock. Since the rediscovery of the living *Notornis* no critical study of the differences between these two genera has been published, although Fleming (1951) has discussed briefly some of the morphological features. From the close similarity of their Rallicoline parasites the relationship of the hosts would seem closer than is indicated by the present systematic classification.

The three species of *Rallicola* described by Harrison (1915) from the five living species of *Apteryx* exhibit reduction of the preantennary region of the head similar to that found in *R. takahe*, the head

being at least as wide as it is long. Since all species of *Apteryx* are flightless it would appear that compression of the head in the New Zealand species of *Rallicola* may be correlated with flightlessness of the host. Associated with the flightless condition of birds there is usually a reduction in the number of barbicels on the barbs, the plumage assuming a much softer texture, and it has been pointed out by Clay (1951) that evolution of members of a subfamily of Mallophaga may have taken place along parallel lines in response to similar feather structure.

The rather large size of *R. takahe* is not unexpected since both Harrison (1915) and Clay (1951) have shown that in general in a genus of Mallophaga distributed over a number of nearly related birds the size of the parasite is roughly proportional to that of the host. Clay has illustrated this point in certain flying birds using length of the wing as an indication of the size of the host. It is obvious that some other factor would have to be used for evaluating size in the host species under consideration and in flightless birds in general.

LITERATURE CITED

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