THE SPECIES OF *STRIGIPHILUS* (MALLOPHAGA: PHILOPTERIDAE) PARASITIC ON THE BARN OWLS *TYTO* (TYTONIDAE)

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THE SPECIES OF *STRIGIPHILUS* (MALLOPHAGA : PHILOPTERIDAE) PARASITIC ON THE BARN OWLS, *TYTO* (TYTONIDAE)

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Abstract

Strigiphilus rostratus (Burmeister) is redescribed and a new species parasitic on *Tyto alba* (Scopoli) in Trinidad is described. The known distribution of these two species is given, and there is a discussion on the possible significance of this as evidence on the dispersal and relationships of *Tyto* species and their subspecies. It is emphasised that more material is required from *Tyto* throughout its range and especially from the Oriental and Australasian Regions.

INTRODUCTION

It has always been presumed that the species of *Strigiphilus* Mjöberg parasitic on *Tyto alba* (Scopoli) throughout its range was *Strigiphilus rostratus* (Burmeister, 1838). Recently Dr. T. G. H. Aitken sent some specimens from *Tyto alba* in Trinidad which are a different species. Following this, all the un-named material from this host in the British Museum (Natural History) has been examined and specimens borrowed from as many sources as possible; this has shown that there is one species parasitic on *Tyto alba* in Europe and Africa and another in the Americas, Australia and India. It is possible that the distribution of the parasite species when fully known may give some indication of the lines of dispersal of *Tyto* and the relationships of its species and races. No attempt has been made to divide the populations within these two species statistically. This may be possible on measurements and number of setae, although there is considerable variation in these characters.

The species of *Strigiphilus* found on *Tyto* differ markedly from those parasitic on other owls in having a narrow elongate pre-antennal region and an anterior plate without a posterior pointed prolongation (Plate I). The male genitalia, although basically similar to some other species of *Strigiphilus*, are characteristic of this species group. Among other characters of taxonomic importance in *Strigiphilus*, the species from *Tyto* have the first post-spiracular seta on tergum III (second apparent segment) with associated sensilli on III-V and no pleural setae on II-III.

Strigiphilus rostratus (Burmeister 1838)
(Plates I, II; Figs. 1-4, 6, 8, 10)
Type Host: *Tyto alba guttata* (C. L. Brehm)

Docophorus rostratus Burmeister, 1838, *Handb. Ent.* **2:** 427. Host: *Strix flammea* = *Tyto alba*.
Nirmus flammineae Denny, 1852, *List Brit. Animals* in *Brit. Mus.* **11:** 10. **Nom. nov.** for *Docophorus rostratus* Burmeister.
Docophorus sulcatus Piaget, 1888, *Tidschr. Ent.* **31:** 148. Host: *Ardea minuta* ("blongios"). Error.

Male and Female.— Ocular seta long, first temporal seta (occasionally absent) in the male medium (of varying lengths), occasionally short and spine-like (Fig. 1); in the female short or medium; third temporal seta in male of medium (varying) lengths, in female short and spine-like or of medium length. Females in which the first and/or third seta is of medium length most probably belong to *rostratus* and not *aitkeni* sp. n. Male with two setae of medium length and female with one, among the minute setae on each side of dorsum of postantennal region; seta each side of central dorsal preantennal suture considerably shorter in female than in male. Pronotum partially or entirely and pteronotum entirely divided medianly. Posterior marginal spine-like seta each side of pteronotum which is usually lateral in the Philopteridae, lies on the dorsal margin in this species; it is not included in the count of the central pteronotal setae. In the male central pteronotal setae each side—8-11, total 15-21, mean (10) 17.6; ♀, 4-7 each side, total 9-12, mean (10) 10.6. Meso- and metasternum with irregular-shaped plates; central mesosternal setae—♂, 2-4, mean (10) 2.4; ♀, 2-4, mean (10) 2.8. Central metasternal setae: ♂, 4-6, mean 4.8; ♀, 5-7, mean 5.5. In the male tergites II-IX† and in female II-VIII separated medianly (Plate 1; Fig. 4). Abdomen without complicated patterns of internal pleural and tergal thickening; postero-lateral corners of tergites II-V prolonged posteriorly; tergites III-VI with progressively smaller re-entrant heads. Sterna II-VI each with a small indistinct sclerite each side; sternites of posterior seg-

*British Museum (Natural History), London.

†First apparent segment is called II, the spiracle bearing segments III-VIII; the apparent eighth segment is IX and X fused but here called IX.

ments as in Figs. 2, 3. The outline of the male genital plate shows individual variation. In the female the apparent shape of the last sternite is dependent on the amount of pigmentation; the size and shape of the other sclerites and the number and position of the setae of the genital region also show some individual variation. Male genitalia as in Plate 2 and Figs. 6, 8, 10.

Abdominal Chaetotaxy.— Tergum II with I – I long anterior setae and no post-spiracular setae but sensillus present; III-VII with post-spiracular setae of which III-V have a usually contiguous sensillus; VIII has the usual bothrotrichium. In the male terga II-V or VI have a continuous row of long stout tergocentral setae; VI or VII to IX have a central gap in the row of setae; VII-IX have shorter setae centrally (Fig. 4). The posterior margin of the last tergum has a range of 11-15 setae each side: tergocentral setae of II-IX in Table 1. In the female, tergum IX has two anterior setae, both of which (1 ♀) or one (2 ♀) may be absent; tergocentral setae of II-VIII in Table 1. Sternal setae in both sexes long and stout; range of numbers on II-VI in Table 1, posterior segments as in Figures 2, 3. In both sexes there are no pleural setae on II-III, IX has one each side; those on IV-VIII in Table 1. Measurements in Table 2.

Material examined.—32♂, 39♀ from *Tyto alba* as follows: BRITISH ISLES, 13♂, 24♀: MOROCCO, 2♂, 2♀: EGYPT, 6♂, 4♀: CAPE VERDE IS., 2♂, 2♀: W. AFRICA (London Zoo), 4♂, 4♀: SENEGAL, 4♂, 3♀: ZAMBIA, 1♂. 1♀ type of *S. sulcatus* (Piaget).

Populations from the following localities are represented by females only and probably belong to this species as some of the first and third temporal setae are of medium length: NETHERLANDS, 9♀: CRETE, 1♀: PALESTINE (no further locality), 3♀: KENYA, 3♀.

Lectotype of *Docophorus sulcatus* Piaget here designated: ♀ in Piaget Collection, slide no. 624 in Brit. Mus. (N.H.) collection.

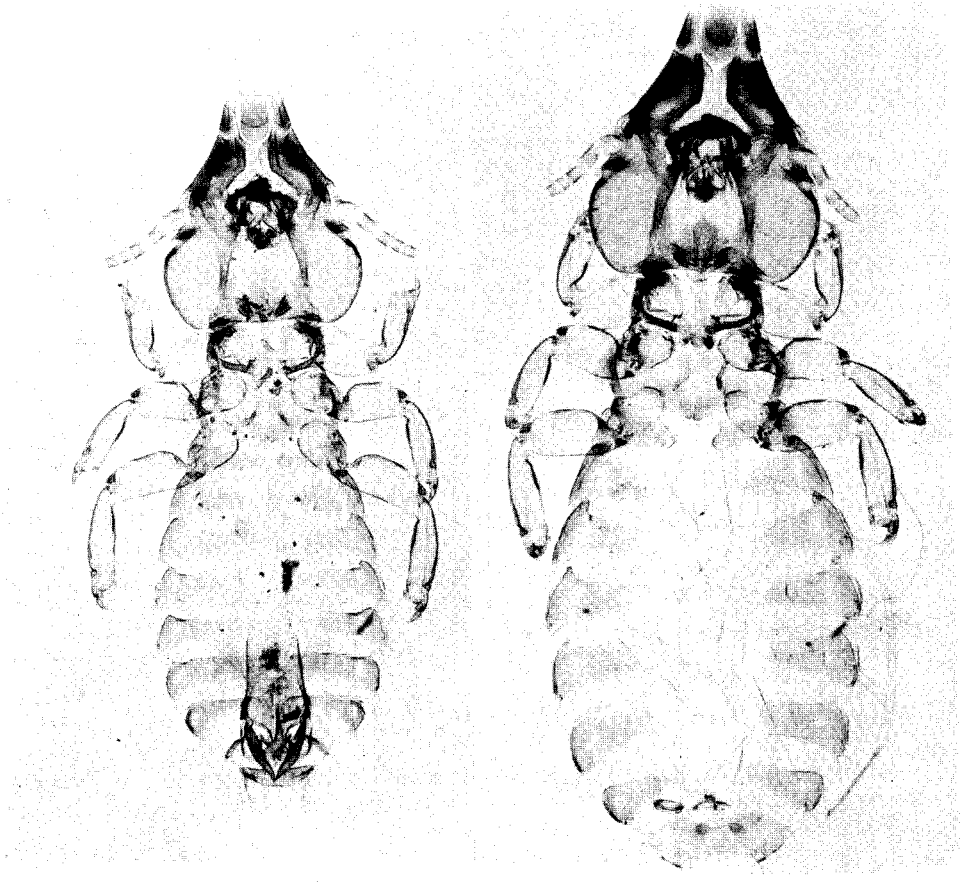


PLATE I

Strigiphilus rostratus Burmeister: left, male (B.M. 40015, J. V. Brown); right, female (B.M. 40016, J. V. Brown).

TABLE 1

THE SETAE OF *Strigiphilus rostratus* (Burmeister)

	Tergocentral Setae 10 Specimens				Sternal Setae	
	Male		Female		Male	Female
	Range	Mean	Range	Mean	Range	Range
II.	8–13	11.2	13–18	15.0	6–10	6–12
III.	12–16	14.5	15–25	19.2	14–17	17–22
IV.	13–18	15.2	17–22	19.6	12–19	17–23
V.	11–16	14.3	15–21	17.6	11–16	14–18
VI.	11–15	12.4	12–18	15.1	8–13	12–15
VII.	8–13	11.0	9–13	11.7		
VIII.	8–12	9.6	4– 9	6.8		
IX.	7–12	10.5				
XI.	11–15					

	Pleural Setae 10 Sides			
	Male		Female	
	Range	Mean	Range	Mean
IV.	1–3	2.0	2–3	2.4
V.	3–4	3.3	3–4	3.7
VI.	3–5	4.5	4–6	5.0
VII.	4–6	4.9	2–5	4.6
VIII.	2–4	3.4	3–4	3.6

TABLE 2

MEASUREMENTS OF *Strigiphilus rostratus* (Burmeister) AND *Strigiphilus aitkini* sp. n.

	S. rostratus				*S. aitkini*			
	Male		Female		Male		Female	
	Length	Breadth	Length	Breadth	Length	Breadth	Length	Breadth
Head	0.65	0.51	0.75	0.59	0.76	0.57	0.82	0.62
Prothorax	—	0.31	—	0.35	—	0.33	—	0.36
Pterothorax	—	0.44	—	0.52	—	0.50		0.55
Abdomen	—	0.60	—	0.81	—	0.56	—	0.69
Total	1.86	—	2.35	—	2.05	—	2.51	—

Head Breadth

	S. rostratus					*S. aitkini*			
	Male		Female			Male		Female	
	Range	Mean	Range	Mean		Range	Mean	Range	Mean
British Isles	0.52–0.56	0.53 (8)	0.58–0.61	0.595 (10)	N. America	0.53–0.54	0.532 (5)	0.56–0.61	0.590 (4)
Holland	—	—	0.59–0.61	0.597 (5)	Brazil	0.53–0.56	0.550 (10)	0.60–0.63	0.609 (11)
Crete	—	—	0.58	0.580 (1)	Trinidad	0.57–0.58	0.575 (2)	0.62–0.64	0.627 (3)
N. Africa	0.49–0.53	0.51 (8)	0.57–0.60	0.583 (6)	Curacao	0.05	0.500 (1)	—	—
Palestine	—		0.54–0.60	0.587 (3)	Raipur, India	0.52	0.520 (1)	—	—
C. Verde	0.51	0.51 (2)	0.59	0.590 (2)	Jamaica	—	—	0.58	0.580 (1)
W. Africa	0.53–0.55	0.54 (4)	0.59–0.60	0.595 (4)	Tenterden, Australia	0.56	0.560 (1)	0.62	0.620 (1)
Senegal	0.52–0.55	0.53 (4)	0.59–0.62	0.608 (3)	Indonesia	—	—	0.60	0.600 (1)
Kenya	—	—	0.57–0.59	0.583 (3)	Borneo	—	—	0.59–0.64	0.611 (4)
N. Rhodesia	0.50	0.50 (1)	—	—	Tasmania*	0.54–0.59	0.570 (5)	0.63–0.66	0.642 (7)

**Tyto novaehollandiae castanops*. Number of specimens in brackets.

Strigiphilus aitkeni sp. n.
(Plate II; Figs. 5, 7, 9, 11)

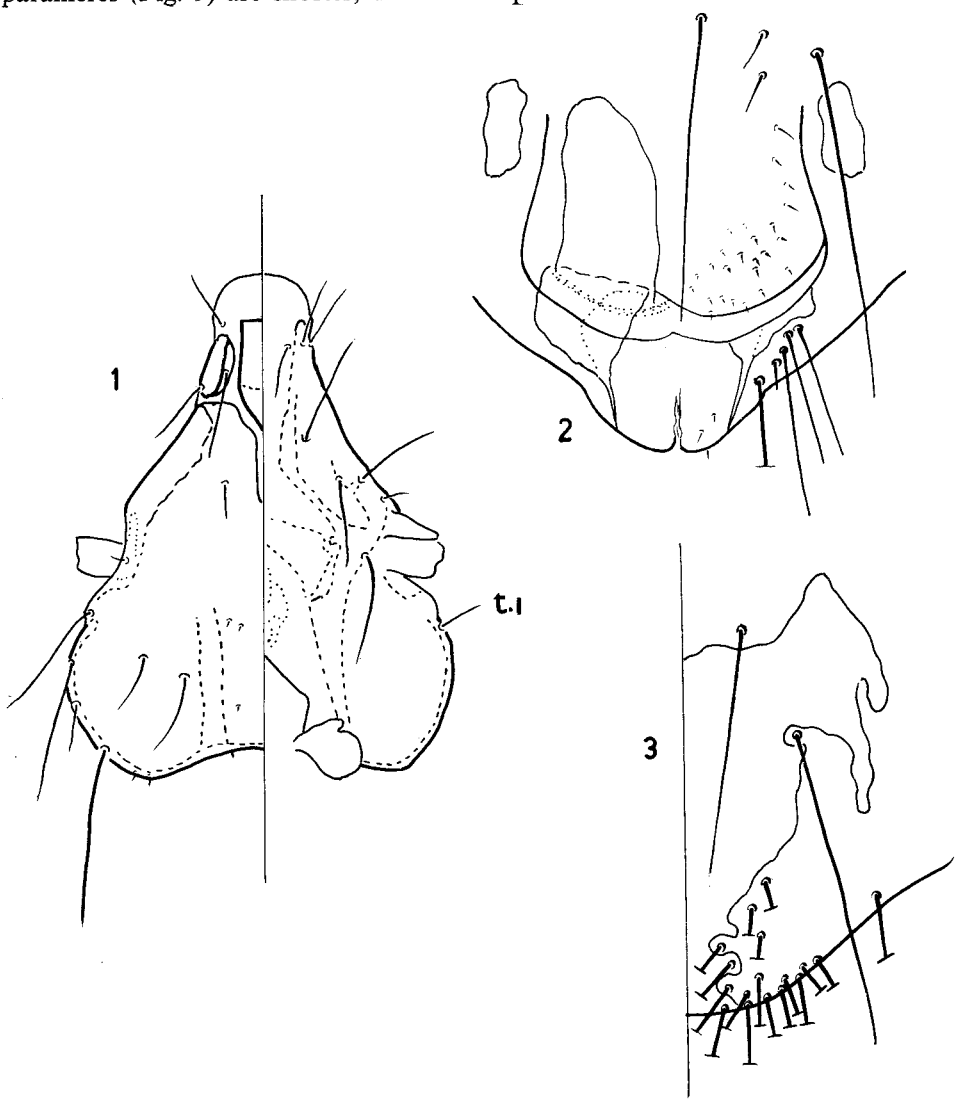
Holotype ♂*:* slide no. 688 in British Museum (Natural History) from *Tyto alba hellmayri*, TRINIDAD, West Indies, Pointe-a-Pierre, 27.i.1962 (T. G. H. Aitken, T.R.V.L. 5493). *Paratypes:* 1♂, 3♀, with the same data.

Type host: *Tyto alba hellmayri* Griscom & Greenway

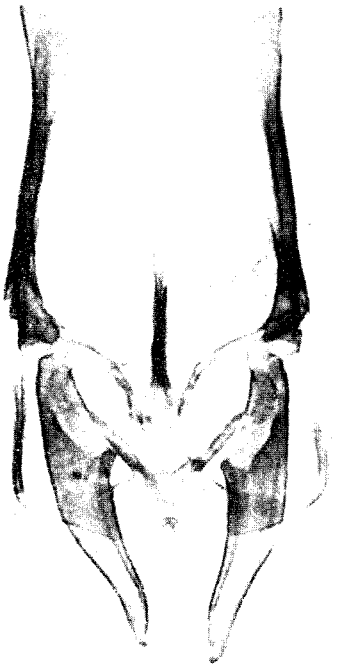
This species is similar to *rostratus* from which it differs as follows: the head in both sexes tends to be proportionally longer, but there is sufficient overlap to make it impossible to determine all individuals on this character; as in *rostratus* the ocular

seta is long, but the 1st and 3rd temporal setae are short and spine-like; the male resembles the female of this species and of *rostratus* in the short seta each side of the central dorsal preantennal suture and in having only one medium length seta each side of the dorsum of the postantennal region. The number of central pteronotal setae is similar in the male, but probably averages more in the female: range in nine females (3 Trinidad, 6 Brazil) is 11-14, mean 12.8. Central mesosternal setae: ♂ (2 Trinidad, 8 Brazil), 2-5, mean 3.6. Central metasternal setae in the 10 males: 2-7, mean 5.3; in ♀, 6-8, mean (10) 6.5. The pleural, tergocentral and sternal setae of II-VI of the Trinidad males and females fall within the range of those of *rostratus*; the means have not been considered. Setae of the last male tergum tend to be fewer in number, 5-11 each side.

The male of the new species differs from *rostratus* in the shape of tergite IX which lacks the anterior projection (Figs. 4, 5). There is some variation in number, length and thickness of setae, but in the males of this species, tergum VIII usually has an outer seta each side considerably longer and stouter than the rest. The parameres (Fig. 9) are shorter, differ in shape and in the attachment to the basal



FIGS. 1-3.—*Strigiphilus rostratus* Burmeister: (1) male head, t.1—1st temporal seta; (2) female terminal segments ventral, setae shown on one side only; (3) male subgenital plate.



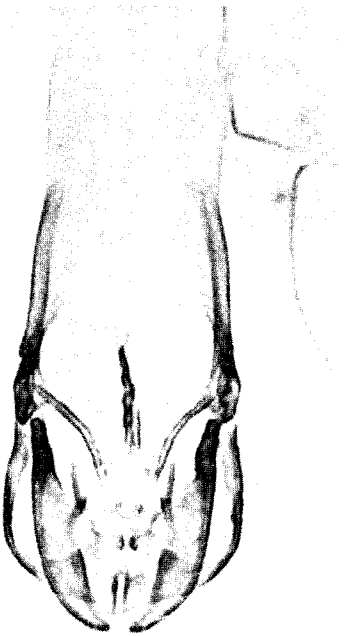
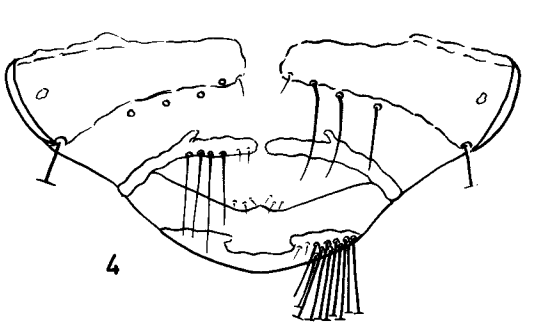
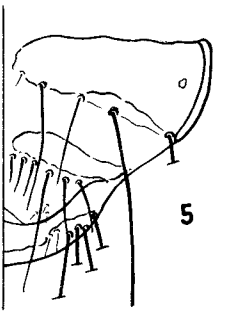
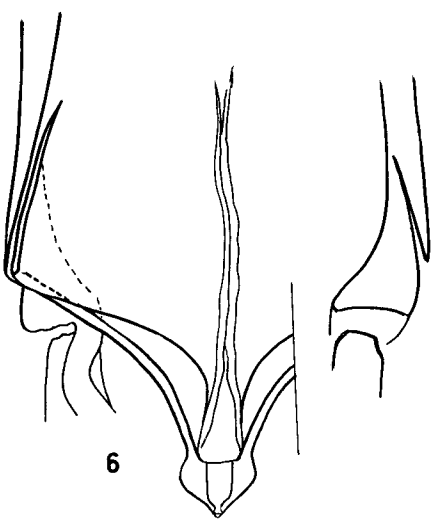
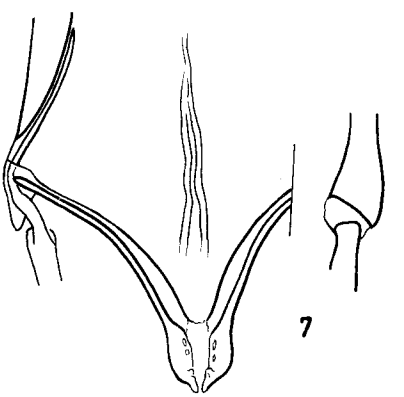


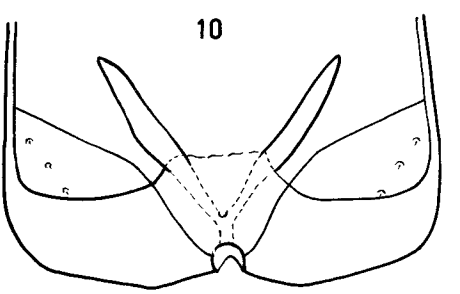
PLATE II
Top left: *Strigiphilus rostratus* Burmeister male genitalia.
Top right: *Strigiphilus aitkeni* sp. n. male genitalia
Bottom: *Strigiphilus aitkeni* male head.

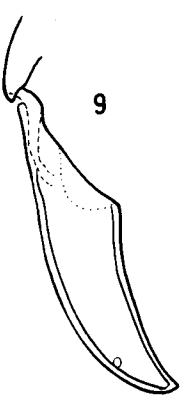


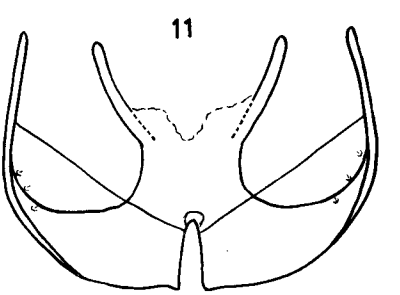












FIGS. 4-11.—(4, 5) Posterior abdominal tergites of male: (4) *S. rostratus* Burmeister, (5) *S. aitkeni* sp. n. (6, 7) Distal end of basal apodeme of male genitalia: (6) *S. rostratus*; (7) *S. aitkeni*. (8, 9) Male paramere: (8) *S. rostratus*; (9) *S. aitkeni*. (10, 11) Male mesosomal plate: (10) *S. rostratus*; (11) *S. aitkeni*.

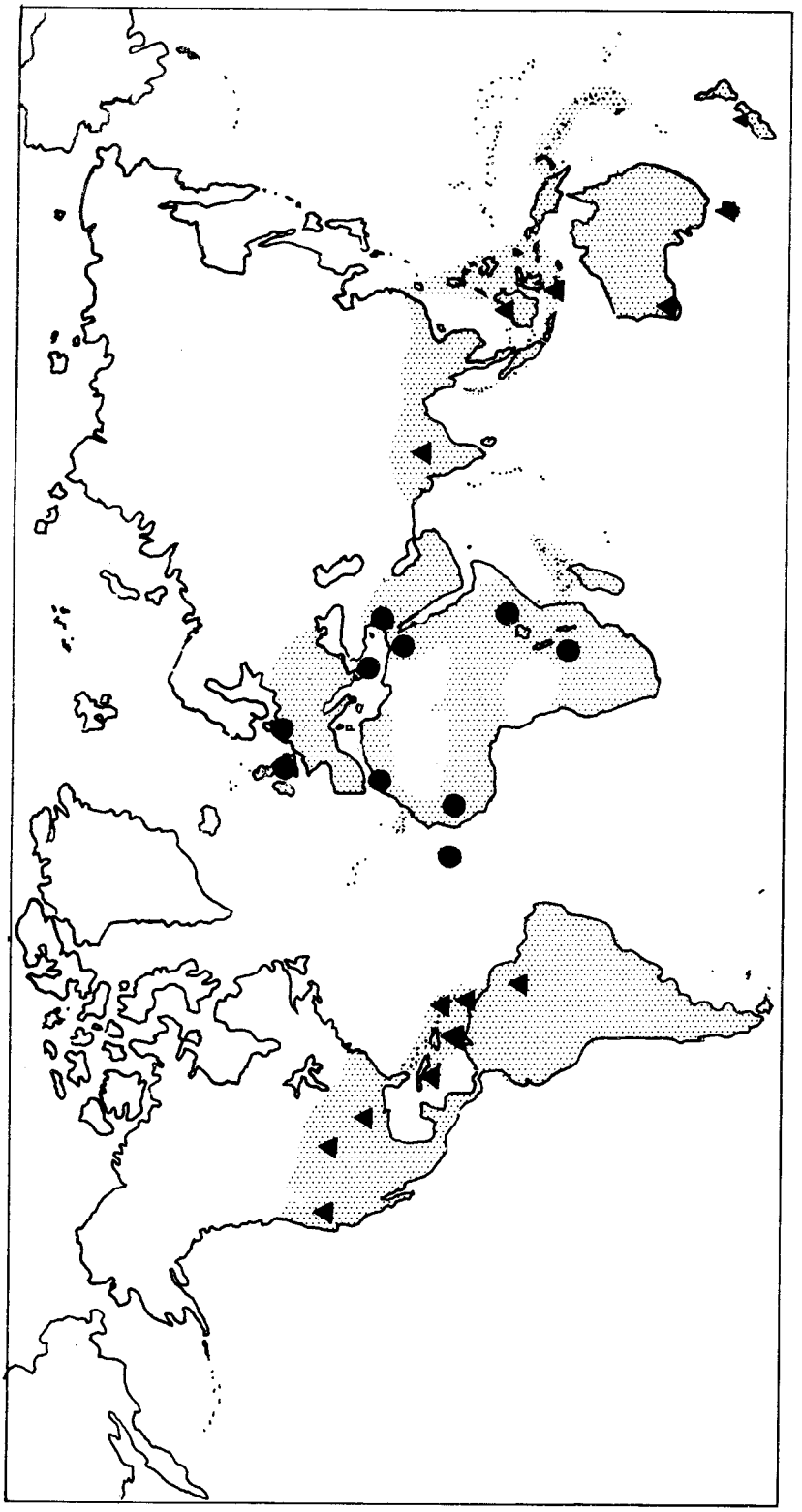


FIG. 12.—Distribution of *Tyto* and its species of Mallophaga. By C. Moreby. Shaded areas: *Tyto*, adapated from Fisher & Petersen (see Acknowledgments).
● *Strigiphilus rostratus*. ▲ *S. aitkeni*.

apodeme; the central indentation in the mesosomal plate is deeper (Fig. 11) and the median prolongation of the basal apodeme is different (Fig. 7). Comparison of the structure of the penis in the different populations from *Tyto alba* is not possible owing to frequent distortion.

One male and one female from *Tyto alba* from W. Australia and specimens from *Tyto novaehollandiae castanops* from Tasmania can be included in this species; a single male from Central Provinces, India is also included here, although the pre-antennal region appears somewhat narrower; this may be an artefact and further material is needed.

Material examined.—20♂, 20♀ from *Tyto alba* from the following localities: TRINIDAD (W. Indies): Pointe-a-Pierre, 2♂, 3♀, 27.i.1962 (T. H. G. Aitken, T.R.V.L. 5493): BRAZIL (skin, no further data): 10♂, 11♀ (R. Meinertzhagen): NETHERLANDS ANTILLES: Curacao (skin), 1♂ (K. H. Voous): JAMAICA (W. Indies): Chichona, 1♀, 11.vii.1924 (C. C. Gowdey): UNITED STATES OF AMERICA: Artesia, Mississippi, 3♂, 2♀, 20.iv.1935 (E. W. Stafford); Stillwater, Oklahoma, 1♂, 11.ix.1939 (K. C. Emerson); Chino, California, 1♂, 2♀, 10.ix.1942 (C. M. Herman): WESTERN AUSTRALIA: Tenterden, 1♂, 1♀: INDIA: Raipur, Madhya Prasesh, 1♂. 6♂, 16♀ from *Tyto novaehollandiae castanops* (Gould): TASMANIA: Jericho, 21.ii.1960; Campbell Town, 23.iv.1963; Longford, 16.ix. 1963, all collected by R. H. Green.

Females from the following localities have the first and third temporal setae short and spine-like, and therefore probably belong to this species: INDONESIA: Waingapo Is., 1♀: BORNEO: (no further data), 4♀.

I have recently seen through the kindness of Mr. R. G. Ordish of the Dominion Museum, Wellington, 2♂, 1♀ of *S. aitkeni* from *Tyto alba* from Westland, NEW ZEALAND 12.viii.1947 (J. Langridge).

This species is named in honour of Dr. T. H. G. Aitken of the Trinidad Regional Virus Laboratory, in some recognition of his work on the ectoparasites of Trinidad.

Discussion

The world distribution of *Tyto* is shown in Fig. 12. Mallophaga have been seen from only a small part of the range, but this is sufficient to suggest that there is one species of Mallophaga on *Tyto alba* ranging from Western Europe to perhaps the limit of its range in the Middle East, that is Masqat, Arabia (according to Peters, 1940, Check-list of Birds of the World, **4:** 78), and throughout Africa. The second species is perhaps found throughout the host's range in the Americas, Australia, the Far East and India. All that can be deduced from this is, that the populations of *Tyto alba* in each of these two ranges have probably been in contact with each other and separated from the populations in the other range for longer than any of the populations have been separated within either range. There are various possible explanations of the occurrence of the same species of *Strigiphilus* on *Tyto novaehollandiae* and *Tyto alba* in Australia. Modern populations of the two species may have been derived from populations infested by *S. aitkeni* after this species of louse had become separated from *rostratus*, if it was not the once universally distributed species. Or *Tyto novaehollandiae* may have acquired its lice more recently by secondary infestation from the Australian population of *Tyto alba*.

It is possible that further material from *Tyto alba* and other species of *Tyto* may enable deductions to be made on relationships and lines of distribution within the Tytonidae.

Acknowledgments

I am greatly indebted to the following persons for enabling me to see *Strigiphilus* material from *Tyto*: Dr. T. H. G. Aitken, Miss E. van den Broek, Mr. J. H. Calaby, Dr. K. C. Emerson, Dr. H. Hoogstraal, Dr. P. Morel and Professor K. H. Voous, and to the department of Entomology, Cornell University; also to others in various parts of the world who have tried but failed to get *Strigiphilus* from *Tyto*. Grateful acknowledgments are due to James Fisher, Roger Tory Peterson and Rathbone Books Ltd., for permission to copy the distribution of *Tyto* from the map on p. 195 of "The World of Birds", 1964.