

The *macrogenitalis* group of *Strigiphilus*
(Phlopteridae : Phthiraptera)

THERESA CLAY

British Museum (Natural History), London

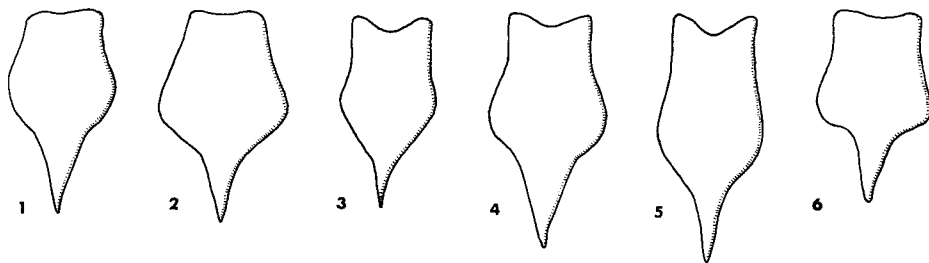
SYNOPSIS

The characters of the *macrogenitalis* group of *Strigiphilus* are reviewed. A key is given to the six species now included, three of which are described as new from the owls, *Ciccaba woodfordi*, *Scotopelia peli* and *Bubo poensis*. Notes on the three previously known species are included.

INTRODUCTION

The *macrogenitalis* group comprises: *macrogenitalis*, *heterogenitalis*, *marshalli* and the three new species described below. The characters defining this group are: terga II-III without post-spiracular setae, IV-VII with post-spiracular setae, those on IV and V with adjacent sensillus; pleurite III with a single short, spiniform seta; male terga VI-VIII or VII-VIII with two central setae separated from the rest of the row of tergo-central setae by minute or short setae. Male tergites II-V or II-VI widely separated in the mid-line as in other species of *Strigiphilus*, tergite VII, together with one or more of tergites VI, VIII and IX with thickened pigmented extension which may be continuous across the segment or narrowly separated medially, VII has this thickening in the form of a widened central plate (fig. 7) except in *S.whitei*. The male genitalia show the best characters for distinguishing this group, these include the following: basal apodeme separated from mesosome and without central prolongation; paramere elongate with large head with prolongation reaching to lateral sclerites of basal apodeme; endomere well developed reaching nearly to end of paramere and apparently formed of two sclerites (see fig. 8), one (*v*) arising ventrally near the end of the basal apodeme and fusing distally with the dorsal one (*d*), this latter being continuous with the dorsal one of the other side. There may be some distortion of the ventral sclerite in specimens mounted on slides, especially at the distal point of fusion shown in the ventral view in the text-figures. The central piece including the penis is shown in dorsal (fig. 8) and ventral view (fig. 13) and is liable to distortion making an exact representation of its characters difficult or in some specimens impossible; a large ventral posteriorly rounded plate each side (*p*) is another characteristic feature.

In addition the species have the following features in common, some of which (marked with an asterisk) are characteristic of *Strigiphilus* as a whole; these characters are not repeated under the individual descriptions: Backward projection of anterior plate narrow and pointed except in *marshalli*; head with number and position of setae as in



Figs. 1-6. *Strigiphilus* spp., outline of dorsal anterior plate: (1) *S. macrogenitalis*; (2) *S. macrogenitalis*, s.l.; (3) *S. heterogenitalis*; (4) *S. nemoralis*; (5) *S. riparius*; (6) *S. whitei*.

marshalli (Clay, 1966, fig. 6); ocular seta long; prothorax with 1 + 1 long posterior lateral setae*; pterothorax with 1 long anterior and 1 posterior spiniform lateral seta each side and 2.2 + 2.2 long pteronotal marginal setae, the two setae of the lateral pair lying close together, those of the more central pair being separated to various degrees; mesosternum with 2-3 and metasternum with 3-5 long setae. Abdomen with postero-dorsal corner of tergites (tergite + pleurite) II-IV or II-V in *marshalli*, with hook-like prolongation; pleurite VIII with thickened margin*; female tergites II-VIII widely separated, IX-V fused and continuous across the segment*; sternites in both sexes visible on most segments as small lateral sternites; last sclerite of female shows some intraspecific variation but the general shape seems to be diagnostic for the species. Pleural setae: II, 0 + 0*; III, 1 + 1; IV, 1 + 1, rarely 1 + 2 or 2 + 2; V, usually 2 + 2, but may vary intraspecifically with 3 or 4 on one side; VI-VII, usually 4 + 4, sometimes with 3 or 5 on one or both sides; VIII, usually 3 + 3, sometimes with 2 or 4 and always with the usual trichobothrium; IX, 3 + 3, one of which is considerably finer*. Male with row of submarginal setae each side of last tergum. Female with clump of long, stout setae at base of last sternite*, one of which is longer and stouter than the rest (fig. 18), the number of these varies intraspecifically and is of little taxonomic value; vulval margin without setae.

The numbers of tergo-central and sternal setae vary intraspecifically and it has not been possible to check the range of variation in all species due to the lack of a sufficient number of specimens showing the chaetotaxy clearly. The tergo-central setae of IX in the male, for instance, may vary intraspecifically from 4-9 each side, although the specimens of *heterogenitalis* examined have 5-6 each side, 8 sides with an average of 5.12; whereas in specimens of *whitei* the number was consistently higher: 7 sides having an average of 7.85. The abdominal chaetotaxy, except for that of certain segments mentioned under the species, has not been used as a specific character.

Measurements. Size may be an important character. In addition to a number of measurements (given in mm.) for a single male and female of each species, the range and mean of the head breadth is given. This is an easy and accurate measurement to take, is relative to that of the whole body in a group of species with the same shape of head, and is a more satisfactory method of comparing the relative sizes of the taxa than such measurements as the length or breadth of the body, often unreliable in mounted specimens. In the *macrogenitalis* group, with the exception of *marshalli*, the Head Index varies between 0.90 and 1.00 as a result of the similar shaped head, whereas in *marshalli* the head is narrower and longer (C.I. 0.75, ♂ and 0.60 ♀), so that the measurement of the breadth of the head cannot be used to compare the size of *marshalli* with individuals of the other taxa. The

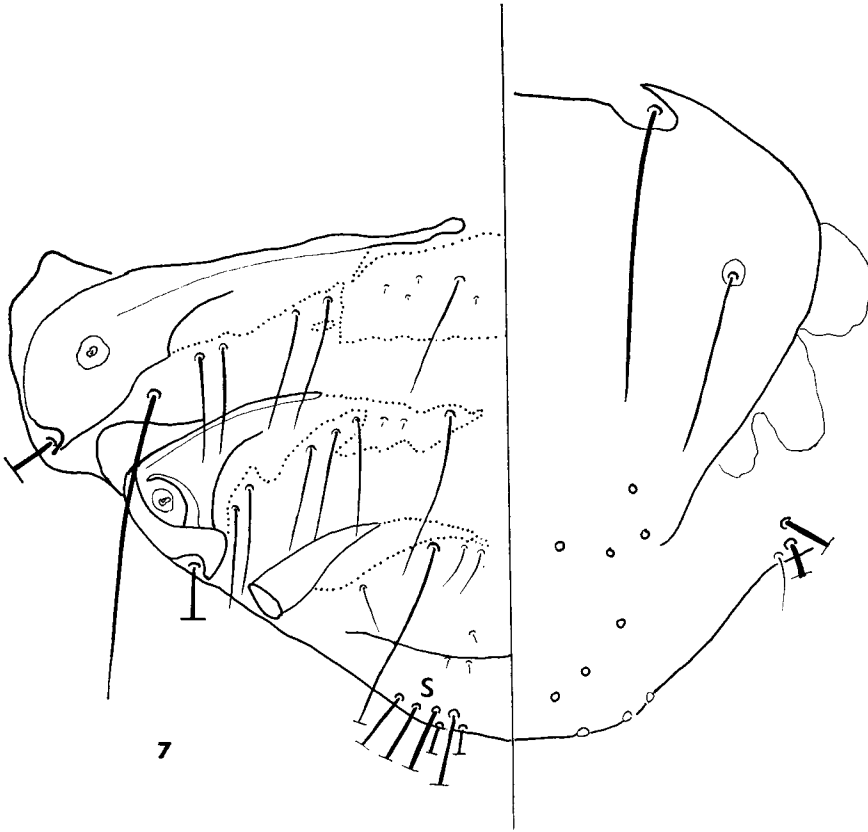


Fig. 7. *S. riparius*, male terminal segments. s, dorsal submarginal setae.

measurement of the length of the head and of total length does not include the hyaline margin, this is shrunk and distorted in various ways in some of the specimens making accurate measurements impossible. The Head Index is taken from the means only.

Species descriptions

Strigiphilus macrogenitalis Emerson & Elbel
(figs. 1, 2, 8, 13, 19)

Type-host: *Glaucidium cuculoides brugeli* (Parrot)

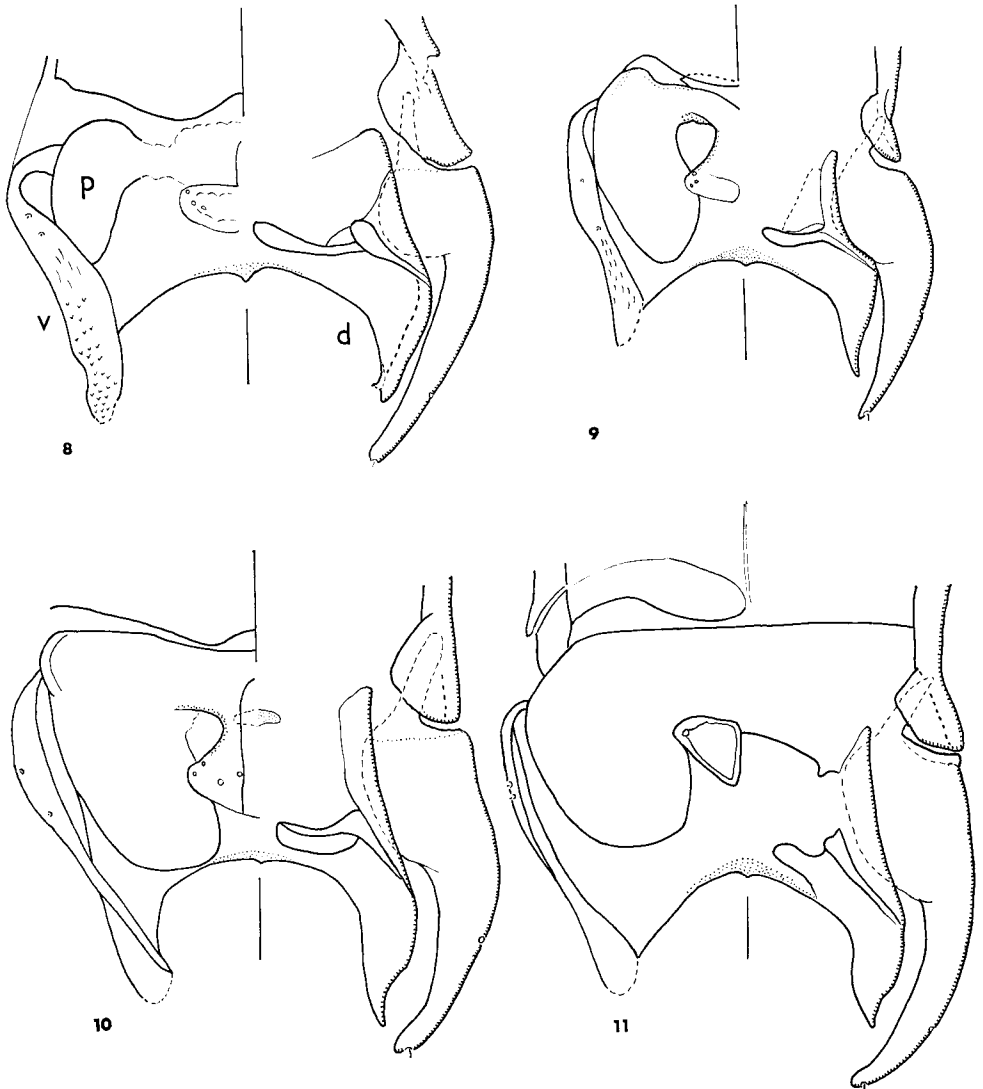
Strigiphilus macrogenitalis Emerson & Elbel, 1957 : 197, figs. 4, 9.

This species is distinguished in the male by the type of the sculpture on the ventral surface of the endomeres and the enlargement of the first antennal segment and in the female by the size and shape of the anterior plate and the terminal sternites of the abdomen (fig. 19).

Anterior plate with elongate pointed backward projection (fig. 1). Tergites VI–VIII in the male are joined in the mid-line and have the two central setae separated from the rest of the row by minute setae; submarginal line of setae on last tergum 10–14 each side; endomere with tooth-like ventral sculpturing (fig. 8).

Dimensions. Temple width, ♂ 0.48–0.56, \bar{x} 0.52 (4); ♀ 0.56–0.61, \bar{x} 0.59 (4). Prothorax width, ♂ 0.39; ♀ 0.37. Pterothorax width, ♂ 0.50; ♀ 0.59. Abdomen width, ♂ 0.79; ♀ 0.90. Head length, ♂ 0.51–0.58, \bar{x} 0.54 (4); ♀ 0.62–0.69, \bar{x} 0.66 (4). Total length, ♂ 1.80; ♀ 2.25.

This species was described from specimens taken from the type host in Thailand; 8 ♂, 7 ♀ from *Glaucidium cuculoides rufescens* from Assam were also designated as paratypes. However, the individuals from this population are on average larger and the dorsal anterior plate is relatively broader (fig. 2); the sclerites of the last sternum of the female may differ in shape but due to over-treatment with KOH this sclerite is visible on



Figs. 8–11. *Strigiphilus* spp. male genitalia, left ventral, right dorsal. central sclerites (see figs. 13–17) omitted dorsally: (8) *S. macrogenitalis*; (9) *S. heterogenitalis*; (10) *S. riparius*; (11) *S. whitei*. v, ventral sclerite; d, dorsal sclerite; p, ventral plate.

only one side of one specimen from *brugeli*. It is considered that the specimens from *rufescens* should not be given subspecific rank as there is overlap in the measurements and further intermediates may be found, there are seven subspecies of *cuculoides*, and fresh material from *brugeli* is needed for more detailed comparison. The population from *rufescens* can be called *S. macrogenitalis* sens. lat.

Dimensions of head. Width, ♂ 0.54–0.62, \bar{x} 0.58 (8); ♀ 0.62–0.67, \bar{x} 0.64 (6). Length ♂ 0.56–0.62, \bar{x} 0.58 (8); ♀ 0.66–0.70, \bar{x} 0.69 (6).

Material examined. THAILAND: 4 ♂, 4 ♀ (paratypes) from *Glaucidium cuculoides brugeli*. ASSAM: Oating, 10 ♂, 9 ♀ from *G. cuculoides rufescens*, 5.ii.1952 (*T. Clay*). SIKKIM: Dikchu, 2 ♀, from *G. c. rufescens*, 15.ii.1952 (*T. Clay*). All in BMNH.

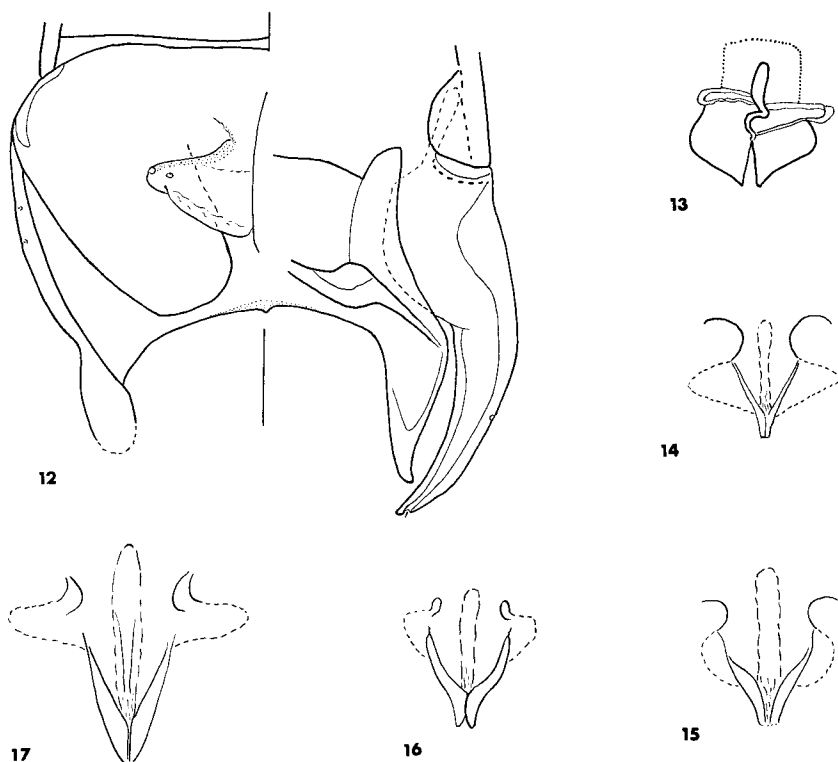
Strigiphilus heterogenitalis Emerson & Elbel

(figs. 3, 9, 14, 20)

Type-host: *Otus bakkamoena lettia* (Hodgson)

Strigiphilus heterogenitalis Emerson & Elbel, 1957: 198, figs. 5, 10.

This is the smallest member of the species group in length and apart from *marshalli*, in breadth of the head. It is distinguished from the other species by the size and shape of the anterior plate, the characters of the male genitalia and of the terminal sternites of the female abdomen (fig. 20).



Figs. 12–17. (12) *Strigiphilus nemoralis*, male genitalia: left ventral, right dorsal. (13–17) *Strigiphilus* spp. central sclerites, (13) ventral, (14–17) dorsal view: (13) *S. macrogenitalis*; (14) *S. heterogenitalis*; (15) *S. riparius*; (16) *S. whitei*; (17) *S. nemoralis*.

The anterior plate is narrowly pointed posteriorly (fig. 3); male tergites VI–VIII joined in midline with the two central setae separated from the rest of the row; last tergal submarginal setae 6–8 each side. Male genitalia as in figures 9, 14, ventral sculpture on endomere in form of striations. This species, originally found on *Otus bakkamoena lettia*, is also parasitic on *O.s.spilocephalus*.

Dimensions. Temple width, ♂ 0.48–0.50, \bar{x} 0.49 (5); ♀ 0.55–0.61, \bar{x} 0.58 (7). Prothorax width, ♂ 0.30; ♀ 0.34. Pterothorax width, ♂ 0.43; ♀ 0.52. Abdomen width, ♂ 0.56; ♀ 0.66. Head length, ♂ 0.49–0.51, \bar{x} 0.50 (5); ♀ 0.55–0.61, \bar{x} 0.58 (7). Total length, ♂ 1.40; ♀ 1.72.

Material examined. THAILAND: Kanchanaburi, 1 ♂, 1 ♀ (paratypes), from type host, 20.xi.1952 (Elbel & Deignan); 3 ♂, 11 ♀, from type host, various localities and dates (J.T.Marshall); Doi Intanon, 4 ♂, 2 ♀, from *Otus s.spilocephalus*, 2.xi.1964 (J.T.Marshall). TAIWAN: Puli, 2 ♂, 1 ♀, from *Otus bakkamoena glabripes* (Swinhow), xi–xii.1963 (T.C.Maa). All in BMNH.

Available specimens from *Otus scops* are larger, but otherwise do not seem to differ. The numbers involved are small and taking into account the number of taxa of *Otus* from which no *Strigiphilus* parasites have yet been seen, there is a likelihood of specimens of intermediate size being found. The specimens from *Otus scops* are here called *S.heterogenitalis* sens. lat.

Dimensions of head. Width, ♂ 0.53 (2); ♀ 0.60–0.65, \bar{x} 0.63 (10). Length, ♂ 0.54–0.55 (2). ♀ 0.63–0.65, \bar{x} 0.64 (10).

Material examined. THAILAND: Sambur, 2 ♂, 10 ♀ from *Otus scops* (Linn.), 14.i.1965 (J.T.Marshall).

***Strigiphilus nemoralis* sp. n.**

(figs. 4, 12, 17, 21)

Type-host: *Ciccaba woodfordi nigricantior* (Sharpe)

In size of the head this species is near *S.whitei* and the *S.macrogenitalis* population from *Glaucidium cuculoides rufescens* and is separated by the characters of the male genitalia (figs. 12, 17) and the last sternites of the female (fig. 21). Posterior projection of anterior plate elongate and narrowly pointed (fig. 4). Tergites VI–VIII in the male joined in the mid-line and the two central setae separated from the rest of the row; submarginal setae of last tergum 5–8 each side.

Dimensions. Temple width, ♂ 0.54–0.60, \bar{x} 0.58 (5); ♀ 0.64–0.71, \bar{x} 0.67. Prothorax width, ♂ 0.38; ♀ 0.43. Pterothorax width, ♂ 0.56; ♀ 0.64. Abdomen width, ♂ 0.75; ♀ 0.82. Head length, ♂ 0.57–0.62, \bar{x} 0.60 (5); ♀ 0.66–0.75, \bar{x} 0.70. Total length, ♂ 1.80; ♀ 2.17.

Holotype ♂, KENYA: Cherangani Hills, from type-host, 27.vii.1969 (R.Cheke) in BMNH, slide no. 758.

Paratypes: 2 ♂, 4 ♀, same data as holotype, in BMNH.

Other material. CAMEROUN: Yaoude, 2 ♂, 4 ♀ from *Ciccaba woodfordi nuchalis* (Sharpe), i.1959 (J.Mouchet) (BMNH).

***Strigiphilus riparius* sp. n.**

(figs. 5, 7, 10, 15, 22)

Type-host: *Scotopelia peli* (Bonaparte)

This is one of the larger species of the group (see head measurements) and is separated by

the characters of the male tergites and genitalia (figs. 10, 15) and by the last sternites in the female (fig. 22).

The anterior plate is similar to the other species of the group except the posterior projection is somewhat less pointed (fig. 5). In the single male only tergite VII is joined in the mid-line and only VII and VIII have the two central elongate setae separated from the rest of the row; submarginal setae of last tergum 4 + 4 (fig. 7).

Dimensions. Temple width, ♂ 0.63 (1); ♀ 0.72-0.73 (2). Prothorax width, ♂ 0.39; ♀ 0.45. Pterothorax width, ♂ 0.55; ♀ 0.66. Abdomen width, ♂ 0.78; ♀ 0.90. Head length, ♂ 0.67 (1); ♀ 0.75 (2). Total length, ♂ 1.87; ♀ 2.43.

Holotype ♂, CAMEROUN: Pouss, from type host, 20.iii.1938 (*J. Mouchet*), in BMNH, slide no. 759.

Paratypes: 2 ♀, same data as holotype, in BMNH.

Other material. NYASALAND, 1 ♀ from type host (skin), vii. 1896, in BMNH.

Strigiphilus whitei sp. n.

(figs. 6, 11, 16, 18)

Type-host: *Bubo poensis vosseleri* Reichenow

This species, apart from *marshalli*, is the most distinctive of the group, being separated by the characters of the anterior plate, the male tergites and genitalia (figs. 11, 16) and the terminal sternites of the female abdomen (fig. 18).

The anterior plate is rather broad and the posterior projection shorter and the point more rounded than in the previous species (fig. 6). In the male terga VI-IX with central thickening, continuous across the segment in VII, except for one specimen in which it is narrowly divided in the mid-line; it is also divided medially in VI, VIII and IX. The thickening of VII is not expanded centrally as in the other species. Terga VI-VIII have the two central setae separated from the rest of the row; the number of submarginal setae on last tergum varies from 7-9 each side.

Dimensions. Temple width, ♂ 0.56-0.59, \bar{x} 0.58 (5); ♀ 0.67-0.73, \bar{x} 0.71 (6). Prothorax width, ♂ 0.35; ♀ 0.43. Pterothorax width, ♂ 0.52; ♀ 0.65. Abdomen width, ♂ 0.74; ♀ 0.90. Head length, ♂ 0.55-0.60, \bar{x} 0.58 (5); ♀ 0.67-0.75, \bar{x} 0.71 (6). Total length, ♂ 1.65; ♀ 2.10.

The host bird was one of a pair captured as fledglings by Dr White who sent me a single female *Strigiphilus*; one living bird and the skin of the other were sent to the London Zoological Gardens in 1971; I am indebted to Mr Peter Olney for sending me further lice and allowing me to examine the skin.

Holotype ♂, TANZANIA: Amani nr Tanga, from type host, 22.xii.1970 (*G.B. White*), in BMNH, slide no. 760.

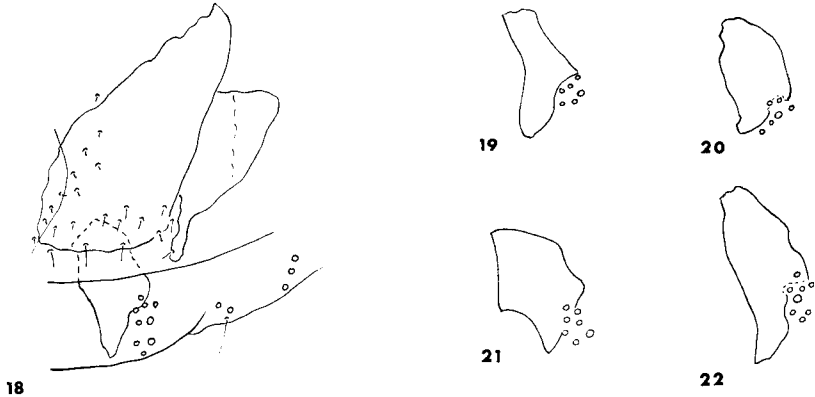
Paratypes. 4 ♂, 5 ♀, same data as holotype, in BMNH.

Strigiphilus marshalli Clay

Type-host: *Phodilus b.badius* (Horsfield)

Strigiphilus marshalli Clay, 1966 : 835, figs. 1-2, 6-12, 18, 20.

This species, collected from the type host in Malaysia and Thailand, is easily distinguished from the rest of the group by its more elongate form and by the anterior plate



Figs. 18-22. *Strigiphilus* spp., terminal sclerites of female abdomen: (18) *S. whitei*; (19) *S. macrogenitalis*; (20) *S. heterogenitalis*; (21) *S. nemoralis*; (22) *S. riparius*.

which does not have the long drawn out posterior projection. See Clay (1966) for description, figures and material.

Dimensions. Head width, ♂ 0.43-0.47, \bar{x} 0.45 (6); ♀ 0.49-0.52, \bar{x} 0.51 (5). Prothorax width, ♂ 0.28; ♀ 0.33. Pterothorax width, ♂ 0.38; ♀ 0.45. Abdomen width, ♂ 0.43; ♀ 0.54. Head length, ♂ 0.60-0.64, \bar{x} 0.61 (6); ♀ 0.68-0.73, \bar{x} 0.71 (5). Total length, ♂ 1.67; ♀ 2.20.

Key to the species of the Strigiphilus macrogenitalis group
(Based mainly on males)

- 1 Head narrow and elongate, width, ♂: 0.45-0.47 mm.; ♀: 0.49-0.52; head index under 0.80. Backward projection of anterior plate not strongly attenuated **marshalli** Clay
- Head broad, width, ♂: 0.48-0.63; ♀: 0.55-0.73; head index over 0.82. Backward projection of anterior plate elongate and pointed (figs. 1-6) 2
- 2 First antennal segment notably sexually dimorphic, considerably enlarged in male. (♀ terminal sternites as in fig. 19) **macrogenitalis** Emerson & Elbel
- First antennal segment not notably sexually dimorphic 3
- 3 Ventral plate (*p*) of male genitalia reaching to, or nearly to, edge of endomeral plate (figs. 9, 10, 12) 4
- Ventral plate not reaching to, or nearly to, endomeral plate (fig. 11). (♀ terminal sternites as in fig. 18) **whitei** sp. n.
- 4 Only tergum VII with central sclerotization (fig. 7) (♀ terminal sternites as in fig. 22) **riparius** sp. n.
- More than one tergum with central sclerotization 5
- 5 Ventral surface of endomere with striations (fig. 9) **heterogenitalis** Emerson & Elbel
- Ventral surface of endomere without striations (fig. 12) **nemoralis** sp. n.

HOST-PARASITE RELATIONSHIPS

The distribution of the *macrogenitalis* group has been discussed elsewhere (Clay, 1966) and it has been shown that it is apparently based on neither host relationships nor

geographical areas. The addition of a further species, *S.whitei* from a host genus not mentioned in 1966—*Bubo* from eastern Africa—does not in any way clarify the problem. On the present evidence there would seem to be only three alternative explanations for this distribution.

(1) The *macrogenitalis* group was once parasitic throughout the Strigiformes and since has become extinct on certain genera and now shows a discontinuous distribution.

(2) The hosts which are now parasitized by members of the group are more closely related to each other than to those parasitized by other species. This would not seem to be an acceptable theory, although there is no complete agreement on the classification of the order (see for example Voous, 1964).

(3) The *macrogenitalis* group could originally have been parasites of *Otus*, it is already known from three species of this genus, and thus been given a world-wide distribution; it could then have been acquired by various owls through secondary infestations and now shows a partly host and partly geographical distribution.

Host-Parasite Species List

(Host order as in Peters, 1940)

Host	<i>Strigiphilus</i> parasite
<i>Phodilus b.badius</i>	<i>marshalli</i> Clay
<i>Otus s.spilocephalus</i>	<i>heterogenitalis</i> Emerson & Elbel
<i>Otus scops</i>	<i>heterogenitalis</i> sens. lat.
<i>Otus bakkamoena glabripes</i>	<i>heterogenitalis</i> Emerson & Elbel
<i>Bubo poensis vosseleri</i>	<i>whitei</i> sp. n.
<i>Scotopelia peli</i>	<i>riparius</i> sp. n.
<i>Glaucidium cuculoides rufescens</i>	<i>macrogenitalis</i> sens. lat.
<i>Glaucidium cuculoides brugeli</i>	<i>macrogenitalis</i> Emerson & Elbel
<i>Ciccaba woodfordi nigrlicantior</i>	<i>nemoralis</i> sp. n.
<i>Ciccaba woodfordi nuchalis</i>	<i>nemoralis</i> sp. n.

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 VOOUS K.H. 1964. Wood owls of the genera *Strix* and *Ciccaba*. *Zool. Mededel.* **39** : 471-8.

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