A NEW SPECIES OF STRIGIPHILUS

(Philopteridae: Mallophaga)

By Theresa Clay

BRITISH MUSEUM (NAT. HIST.), LONDON

Abstract: A new species of Strigiphilus Mjöberg from Phodilus badius is described and its possible affinities and those of the host are discussed. A key to the species groups in Strigiphilus is given, together with their distribution on the Strigiformes.

Phodilus badius (Horsefield) is placed by Peters (1940: 85) with Tyto in the family Tytonidae. As Tyto is parasitized by such a distinctive species group of Strigiphilus (Clay, 1966), a comparison of this with the species on Phodilus should be of interest. This has been made possible through the work of Professor J. T. Marshall, Mr Ben King, and Dr H. E. McClure, who have collected specimens from Phodilus. These prove to belong to a new species which I have much pleasure in naming after Professor Marshall. I am greatly indebted to Dr K. C. Emerson for the loan of material and for records of distribution of Strigiphilus species from SE Asia.

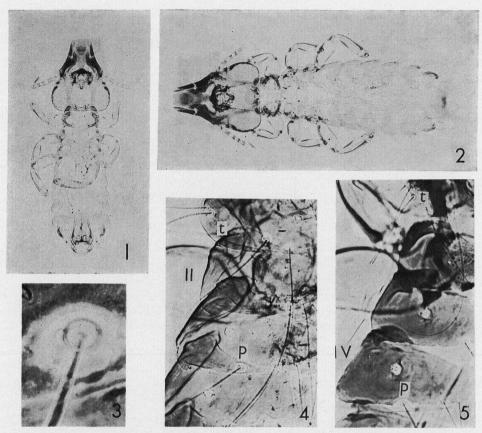
Strigiphilus marshalli Clay, n. sp. Figs. 1-2, 6-12, 18, 20.

Type host: Phodilus badius (Horsefield)

This species is distinguished from all other known species of *Strigiphilus* by the combination of the shape of the head, dorsal anterior plate and the male genitalia. It is easily distinguished from the *S. rostratus* group from *Tyto*, to which it has a superficial resemblance, by the backward prolongation of the anterior plate; other differences between this new species and those parasitic on *Tyto* are given below. The male genitalia resemble most closely those of *S. heterogenitalis*.

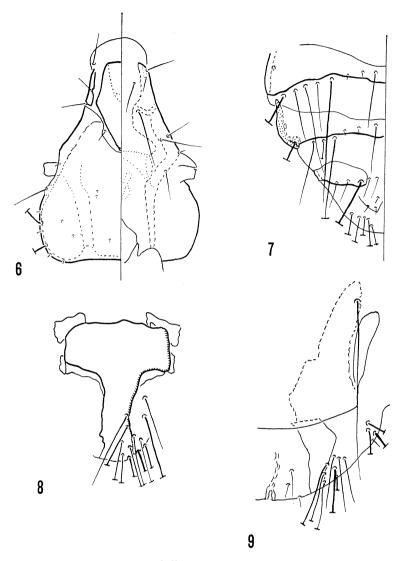
& and \mathcal{P} . Setae of preantennal region as in fig. 6; ocular seta long; 1st and 3rd temporal setae short and spine-like, 2nd and 4th long (in some specimens there may be 2 short spine-like setae between the ocular seta and the 1st long temporal seta). Central setae of pterontal margin in 6 &, and $5\mathcal{P}$: 4+4. Central mesosternal setae: &, 2-4; \mathcal{P} , 3-4; central metasternal setae; &, 3-5; \mathcal{P} , 4-6. Tergites VII-VIII of & (apparent 6th and 7th) continuous across abdomen (fig. 7); in \mathcal{P} only fused IX-X are continuous. Abdomen without complicated patterns of internal pleural and tergal thickening; posterolateral corners of tergites II-V prolonged posteriorly; pleurite VIII more highly pigmented than those of other segments. Sterna II-VI each with a small indistinct sclerite on each side; sternites of posterior segments as in figs. 8 & 9. Genitalia of & as in fig. 18 and figs. 10-12.

Abdominal Chaetotaxy: 1st post-spiracular setae on tergum IV (as in fig. 5). Tergum II (apparent 1st) with 1+1 long anterior setae. Terga II-V of δ each with an irregular



Figs. 1-5. 1, Strigiphilus marshalli n. sp. male; 2, Strigiphilus marshalli n. sp. female; 3, strigiphilus cursor (Burm.). Post-spiracular seta and sensillus; 4, Strigiphilus cursor (Burm.). Anterior abdominal tergites (II-IV) t. pterothorax; p. 1st post-spiracular seta; 5, Strigiphilus ceblebrachys (Denny). Anterior abdominal tergites.

row of long stout setae, VI-VIII with 2 long central setae with 1, 2 or more short setae between these long setae and the rest of the row of long setae on each side; IX with a long stout seta with usually 2 short, fine setae on each side of it (fig. 7). Range of \eth tergocentral setae (the number of segments on which these are countable in the available material varies): II, 8-12; III, 8-11; IV, 7-10; V, 11-12; VI, 11-14; VII, 13-16; VIII, 11-13; IX, 10; terminal, 9-10. Tergocentral setae in \diamondsuit usually long stout and of approximately the same size. Range: II, 8-12; III, 11-12; IV, 10-13; V, 9-12; VI, 9-11; VII, 5-9; VIII, 4-8; IX, 2-3. Sternal setae long and stout; in \eth : II, 8; III, 11-13; IV, 10-15; V, 11-14; VI, 9-14; VII, 2; terminal segments, 20-24. In \diamondsuit : II, 8-14; III, 15-17; IV, 15-18; V, 15-20; VI, 13-18; VII, 2; VIII, 2-3; terminal segments as in fig. 9. Pleural setae in \eth II, 0+0; III, 1+1; IV, 1+1; V, usually 2+2, occasionally 3 on one side; VI, 3+3; VII, 3+3; VIII, usually 2+2 occasionally 3 on one side; IX, 3+3 or 3+2. \diamondsuit : II-IV as in \eth : V, 3+3 or 3+2, 1 specimen with 3+1; VI, 4+4, 1 specimen with 3+4 and 1 with 4+1; VII, 4+4 or 4+3; VIII, 3+3 or 3+2; IX, 3+3 or 4+4. Single pleural setae on each side of III and IV usually short and spine-like but occasionally

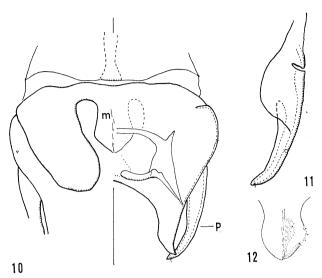


Figs. 6-9. *Strigiphilus marshalli* n. sp.: 6, male head, dorsal and ventral; 7, male posterior abdominal segments, dorsal; 8, male, subgenital plate; 9, female posterior abdominal segments, ventral.

thinner and longer; VIII, in addition to the 2 setae on each side in δ and 3 in the φ , with usual bothriotrichium found on this segment. 3 pleural setae in δ found on each side of IX comprise 2 long and 1 shorter and finer.

MATERIAL EXAMINED: 6경장, 5우우 from *Phodilus b. badius*. MALAYA: 2건강, Subang, 17. VIII.1962, H. E. McClure. THAILAND: 1강, 2우우, Khooluang, 6.VI.1965, J. T. Marshall; 3건강, 3우우, Nakonsitbumarat, 12.V.1956, B. King.

Holotype & (USNM), collected by Professor J. T. Marshall, Khooluang, Nahornsri Ta-



Figs. 10-12. Strigiphilus marshalli n. sp., male genitalia: 10, distal region. p. paramere; 11, paramere; 12, details of region m. in fig. 10.

marat, Thailand, 6.VI.1965.

MEASUREMENTS (mm.)

	10	ILASUK.	EMENIO ((111111.)	
	Male		Female		
	Length	Breadtl	1	Length	Breadth
Head	0.60	0.43		0.71	0.52
Prothorax		0.28			0.33
Pterothorax		0.38			0.45
Abdomen	0.78	0.43		1.14	0.54
Total	1.67			2.20	
			HEAD		
	♂(ਰੋ (6)		♀(5)	
	Range	Mean		Range	Mean
Head breadth	0.43-0.47	0.447		0.49-0.52	0.514
Head length	0.60-0.64	0.614		0.68-0.73	0.709

S. marshalli resembles the species of the rostratus group parasitic on Tyto, at least in the characters of the preantennal region. In these species this part of the head is narrow and elongate (figs. 1-2 & Clay 1966); the dorsal anterior plate in marshalli has the distal point slightly modified, but otherwise resembles that of the rostratus group in appearing to be an undifferentiated area of the preantennal region marked off by a suture (figs. 19 & 20). In all other species of Strigiphilus examined, this plate shows greater distal modification: in S. heterogenitalis (fig. 22) and macrogenitalis it has an elongated thickened point with a central gutter; in others the thickened point arises from the broadest part of the plate, not strongly differentiated in S. ketupae (fig. 21), but more so in species such as S. cursitans (fig. 23). Apart from the backward prolongation of the anterior plate which is slightly modified distally, marshalli also differs from the rostratus group in having no

post-spiracular seta on tergum III and in having a seta on pleurite III; the male genitalia are quite distinct and resemble closely those of heterogenitalis.

While comparing the new species from *Phodilus* it was found that the species of *Strigiphilus* could be separated into a number of groups based on chaetotaxy, form of the male tergites and genitalia. It can be seen from the key on p. 840 that marshalli agrees with the macrogenitalis group in the absence of a postspiracular seta on tergum III, the presence of a seta on pleurite III, the chaetotaxy of terga VII-VIII, in having some of the posterior tergites continuous across the male abdomen and in the characters of the male genitalia. The species of the macrogenitalis group have been taken from some of the S. E. Asian species of Otus, one of the S. E. Asian species of Glaucidium, Uroglaux from New Guinea and at least one species of owl in Africa, probably Ciccaba woodfordi, but perhaps also Scotopelia peli. It is not possible to assess the phylogenetic importance of the characters common to the macrogenitalis group, but it would seem probable that they do reflect phyletic relationships, and thus one possible explanation of the distribution of these species would be a relationship between their hosts. However, the fact that the present ranges of all the hosts of the macrogenitalis group, with the exception of the Ciccaba and Scotopelia, overlap would have made secondary infestation possible, not only of the parasites of Phodilus, but also of those of some of the other hosts. If, therefore, Phodilus is correctly placed in the Tytonidae, then it must be assumed that the Strigiphilus species on Phodilus, resembling in many characters heterogenitalis from Otus, is due to secondary infestation. The characters of the head and anterior plate of such a species secondarily established on Phodilus, might have become modified in response to a similarity of feather structure between Tyto and Phodilus, thus giving the superficial resemblance between marshalli and the rostratus group. Alternatively, if the rather unlikely assumption is made that the characters of the head are of greater phyletic importance than those of the rest of the body, then the simularities of the head of marshalli and rostratus could mean: 1), The lice and their hosts had a recent common ancestor. 2), The species parasitic on Phodilus could be intermediate between those on Tyto with the simple perhaps primitive anterior plate, and those from the Strigidae in which the anterior plate shows greater modification, and that marshalli was near the ancestral form which gave rise to heterogenitalis; from this could be deduced an intermediate position for *Phodilus* between Tyto and the Strigidae. The anterior plate and shape of the head might, of course, be an adaptation to some feature of the plumage common to Tyto and Phodilus which did not denote relationship of the hosts. It is obvious from this discussion that the characters of the species of Strigiphilus parasitic on Phodilus give no real indication of the phylogenetic position of its host.

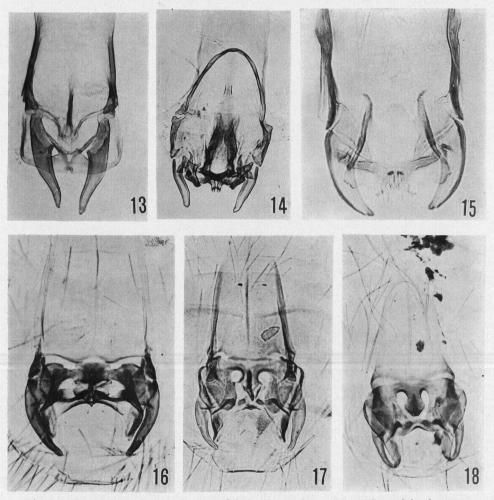
It may be interesting to see how far the distribution of the species of Strigiphilus follows the generally accepted arrangement of their hosts. Table II shows the owl species from which Strigiphilus is known and the species groups to which the parasites belong. It is possible that crenulatus should be included in the cursitans group, and that this latter group does not form a phyletic assemblage. It will be seen that species of the cursitans group occur on 12 of the 18 genera; on species of six of these genera, one or more additional species of Strigiphilus are found. It would seem that the presence or absence of a species of the cursitans group is not neccessarily significant in considering host-parasite relations. What appears to be established populations of cursor have been taken from Tyto in the Lebanon (by Dr Robert E. Lewis) and N. America. The other species suggest distinct positions for Tyto, Bubo, Ketupa, Strix and Asio. The rather strange distribution of the

macrogenitalis group has been discussed above.

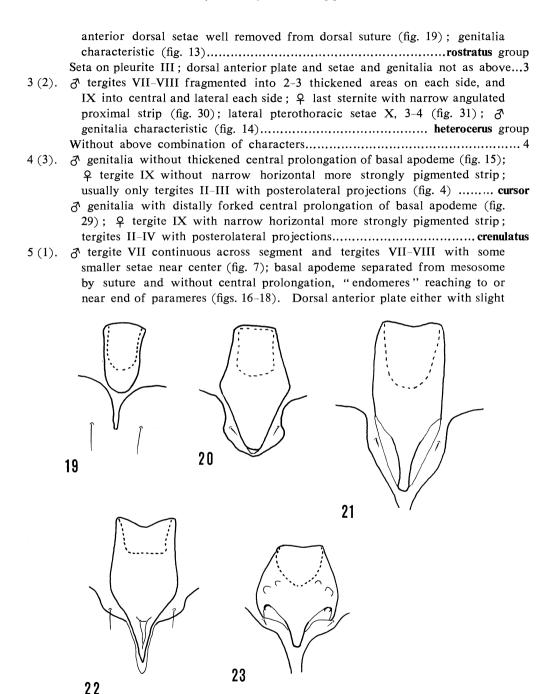
Apart from the possibility of contamination during collecting, the distribution of some of these species appear to be geographical and may be due to secondary infestations (Clay 1946). When more material is available from both the known hosts and from a wider range of hosts and regions, it may be possible to obtain a more satisfactory picture of the host-parasite relationships within the Strigiformes.

KEY TO SPECIES GROUPS OF STRIGIPHILUS

- 2(1). No seta on pleurite III; dorsal anterior plate without posterior projection and



Figs. 13-18. Male genitalia: 13, Strigiphilus rostratus (Burm.); 14, Strigiphilus heterocerus (Grube); 15, Strigiphilus cursor (Burm.); 16, Strigiphilus macrogenitalis Emerson & Elbel; 17, Strigiphilus heterogenitalis Emerson & Elbel; 18, Strigiphilus marshalli n. sp.



Figs. 19-23. Strigiphilus spp. Dorsal anterior plate and suture: 19, S. rostratus (Burm.); 20, S. marshalli n. sp.; 21, S. ketupae Emerson & Elbel; 22, S. heterogenitalis Emerson & Elbel; 23, S. cursitans (Nitzsch)

6 (5). 7 (6). 8 (5).	gate point with central gutter (fig. 22) Head elongate, C. I. under 0.80; dorsal anterior plate not as a 20) 1st antennal segment enlarged in 3	italis group) 6
9 (8).	Basal apodeme with central forked prolongation not fused to peni	
	24 25	26
	27	29

Figs. 24–29. Male genitalia: 24, Strigiphilus strigis (Pontoppidan); 25, Strigiphilus ketupae Emerson & Elbel; 26, Strigiphilus siamensis Emerson & Elbel; 27, Strigiphilus cursitans (Nitzsch); 28, Strigiphilus ceblebrachys (Denny); 29, Strigiphilus crenulatus (Giebel).

S. bramae (Qadri 1935)

S. speotyti (Osborn 1896)

		Basal apodeme without central forked	prolongation10
10	(9).		agation, posterior margin indented (fig.
	` '		strigis
			ion11
11	(10).		e fused to penis (fig. 25) ketupae
	()		ot fused to penis (fig. 26)siamensis
12	(8).		rongly thickened posterior point (fig. 21)
14	(0).	-	ketupae
12	(12)		
13	(12).		siamensis
1 /	(12)		
14	(13).		ermathecal tube as in fig. 32strigis
		Spermathecal sciente not as above	cursitans group
		Table I. Species G	coups in Strigiphilus
1.	The i	rostratus Group	
	S.	rostratus (Burmeister 1838)	Tyto alba
	+s.	aitkeni (Clay 1966)	Tyto alba
2.	The .	heterocerus Group	
		heterocerus (Grube 1851)	Strix uralensis
		laticephalus (Uchida 1949)	Strix aluco & S. uralensis
		goniodicerus Eichler 1949	Bubo bubo
2		portigi Eichler 1952	Strix aluco
3.		cursor Group	Ani - Ani
		cursor (Burmeister 1838)	Asio flammeus
4.		barbatus (Osborn 1902) crenulatus Group (?=cursitans Group)	Asio otus
т,		crenulatus (Giebel 1874)	Surnia ulula
5.		macrogenitalis Group	Dui ma maia
٠.		macrogenitalis Emerson & Elbel 1957	Glaucidium cuculoides
		heterogenitalis Emerson & Elbel 1957	Otus bakkamoena
		marshalli n. sp.	Phodilus badius
6.		strigis Group	
		strigis (Pontoppidan 1763)	Bubo budo
7.	The	siamensis Group	
	+s.	siamensis Emerson & Elbel 1957	Glaucidium brodiei
8.	The	ketupae Group	
_		ketupae Emerson & Elbel 1957	Ketupae zeylonensis
9.		cursitans Group	
		otus Emerson 1955	Otus asio
		tuleskovi Balat 1958	Otus scops
		senegalensis Tendeiro 1963	Otus senegalensis
		oculatus (Rudow 1870)	Bubo virginianus
		acutifrons Emerson 1961	Bubo virginianus Nyotaa saandiaaa
		ceblebrachys (Denny 1842) cursitans (Nitzsch 1861)	Nyctea scandiaca Athene noctua
	υ.	CM DITUIN (TYTEXCIT TOUT)	/1116/16 16OC/WW

Athene brama

Speotyto cunicularia

S. virgo (Giebel 1874)

S. syrnii (Packard 1873)

+S. varius Carriker 1958

+S. capensis Tendeiro 1963

S. pallidus (Giebel 1874)

Ciccaba virgata Strix nebulosa Strix varia Asio capensis Aegolius funereus

Explanations to markings in Table 1:

+Holotype, Neotype or Paratype seen.

? Identification uncertain; types in existence.

No mark. Specimens seen from type host and presumed to be the species.

The species of the *cursitans* group are arranged in chronological order within the host genera according to Peters, 1940.

- 1. The following species have been omitted from the list:
 - S. asionis (Eichler 1949) = S. barbatus (Osborn), see Emerson 1955: 145.
- S. boomae Ansari 1955. A female of this species from Otus bakkamoena was figured in Ansari, 1959: 58. This figure and the measurements given are not those of S. heterogenitalis from the same host; the identification of boomae must await an examination of the type specimen.

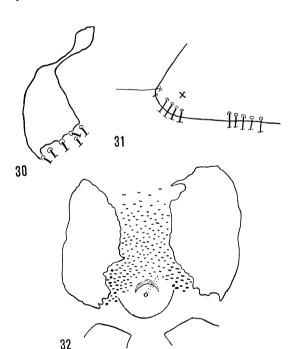


Fig. 30-32. Strigiphilus spp. 30-31, S. heterocerus (Grube 1851): 30, last abdominal sternite, female; 31, posterior margin of pterothorax, female; 32, Strigiphilus strigis (Pontoppidan), female internal genital sclerites.

- S. clypeatus (Mjöberg 1910). Probab ly=S. pallidus (Giebel) from the same host
- S. nudipes (Piaget 1880)=S. cursor (Burm.). New Synonymy.
- S. remotus (Kell. & Chapman 1899). Probably=S. syrnii (Packard) from the same host.
- S. speotyto (Eichler 1954). Unidentifiable from original description.
- S. splendens (Giebel 1874). No specimens from type host and locality.
- S. viridicus Carriker 1954.=S. virgo (Giebel). Carriker (1954: 135) considered that his specimens from Ciccaba virgata, the type host of virgo, could not be Giebel's species and named them viridicus. However, the description of virgo is sufficiently indefinite to make its application to the species of Strigiphilus found on Ciccaba virgata possible, remembering that Giebel was probably working with uncleared specimens. It seems more satisfactory to continue the use of Giebel's name, which has been listed as that of the

species from *Ciccaba virgata* since 1874, than to replace it by another name which will not necessarily be adopted by everyone.

Those names already synonymised in Hopkins & Clay, 1952, 1953 and 1955 are also omitted. No attempt has been made to check the synonymy of all the names listed and and some may prove to be synonyms.

2. S. goniodicerus Eichler 1949. This was a new name for Docophorus heteroceros Nitzsch, 1861 nec Grube 1851, type host: Bubo. b. bubo. The specimens on which Nitzsch based his description were figured in Giebel, 1874, Pl. XII, figs. 1-2. The figure of the male is not that of S. strigis the species usually found on Bubo bubo. The presence of the enlarged first antennal segment, the prolongation of the anterodistal angle of the third segment as a short process and the enlarged last abdominal segment suggest that this species is similar to heterocerus Grube and is therefore, here included in the heterocerus group.

Table II. Host-Parasite list (Hosts according to Peters, 1940)

Host	Strigiphilus Species	Geographical Region	Species Group
TYTONIDAE			
Tyto	rostratus aitkeni cursor	P. E. N. Nt. O. A. P+. N.	rostratus rostratus cursor
Phodilus	marshalli	О.	macrogenitalis
STRIGIDAE			
Otus			
asio	otus	N.	cursitans
bakkamoena	heterogenitalis	O. (6)	macrogenitalis
leucotis		E.	cursitans
scops	(tuleskovi	P. O.	cursitans
scops	\heterogenitalis	O. (4)	macrogenitalis
senegalensis	senegalensis	E.	cursitans
spilocephalus	heterogenitalis	O. (5)	macrogenitalis
Bubo			
africanus	strigis	E.	strigis
bubo	(strigis	P. O.	strigis
риро	goniodicerus	Р.	heterocerus
capensis	strigis	E.	strigis
coromandus		О.	cursitans
lacteus	strigis	E.	strigis
sumatrana	ketupae	O. (1)*	ketupae
	(acutifrons	N.	cursitans
virgi nianu s	oculatus	N.	cursitans
J	cursor	N.	cursor
Ketupa			
ketupa	ketupae	O. (2)	ketupae
•	(ketupae	O. (4)	ketupae
zeylonensis	(O.	cursitans
Scotopelia			
peli	nr. heterogenitalis	E. (1)*	macrogenitalis

⁺Lebanon.

Host	Strigiphilus species	Geographical Region	Species Group
Nytea			
scaniaca	ceblebrachys	N. P.	cursitans
Surnia			
ulula	crenulatus	N. P.	crenulatus
			?cursitans group
Glaucidium			
br asilia num		Nt.	cursitans
, ,,	(siamensis	O . (1)	siamensis
brodiei	\h _{eterogenitalis}	O. (1)*	macrogenitalis
cuculoides	macrogenitalis	O. (13)	macrogenitalis
gnoma		N.	cursitans
passerinum	splendens	Р.	?
perlatum	Appendix Annual College	E.	cursitans
radiatum		O.	cursitans
Micrathene			
whitneyi		N.	cursitans
Uroglaux			
dimorpha	heterogenitalis	A. (1)*	macrogenitalis
Ninox	,	, ,	-
novaeseelandia	'e	Α.	cursitans
Athene			
brama	bramae	О.	cursitans
noctua	cursitans	P. E.	cursitans
Speotyto			
cunicularia	speotyti	N.	cursitans
Ciccaba	-F		
virgata	virgo	Nt.	cursitans
woodfordii	nr. heterogenitalis	E. (1)*	macrogenitalis
Strix			
	(laticephalus	P.	heterocerus
aluco	heterogenitalis	O. (1)*	macrogenitalis
butleri		P.	cursitans
nebulosa	syrnii	N.	cursitans
ocellata		0.	cursitans
occidentalis	-	N.	cursitans
seloputo	ketupae	O. (3)	ketupae
varia	varius	N.	cursitans
uralensis	heterocerus	P.	heterocerus
Asio		••	
capensis	capensis	E.	cursitans
flammeus	cursor	N. P. O.	cursor
otus	barbatus	N. P.	cursor
Aegolius			
acadicus		N.	cursitaus
funereus	pallidus	Р.	cursitans
<i>y</i>	1	- ·	- ***

Geographical Regions: N. Nearctic; Nt. Neotropical; P. Palaearctic; E. Ethiopian; O. Oriental; A. Australasian.

[For certain species the number of records is given in brackets after the geographical area. *denotes that the record needs confirmation; with the others the number of records or specimens collected make contamination unlikely].

1966

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