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BIRD LICE FROM THE TINAMIDAE

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The species of Mallophaga described by Rudow from *Nothura boraquira* Spix (= *Tinnamus bannaquira* of Rudow) have caused difficulty owing to the fact that Rudow's original material has been lost and no subsequent author has examined material from the type host. In 1939, while on a visit to the United States, Colonel Meinertzhagen and I secured four species of Mallophaga from specimens of *Nothura boraquira* in the collection of Field Museum of Natural History. As a consequence, I am able, in this paper, to make some contribution to the elucidation of Rudow's species. Descriptive and synonymical notes on other Mallophaga from Tinamidae are included. Acknowledgment is due Mr. Rudyerd Boulton, Curator of Birds, for his kind co-operation in making the material available for study, and Mr. Clifford C. Gregg, Director of Field Museum, for providing publication facilities.

In considering Rudow's descriptions it must be remembered that these tend to be somewhat inaccurate, as can be shown by comparing them with the descriptions and figures made by Taschenberg (1882) from Rudow's specimens. Hopkins (1940, p. 418) has also shown that the measurements given by Rudow cannot be taken into consideration, as they seem to have little relation to reality and appear to be the "wildest of guesses." As the majority of Rudow's specimens have been lost, it is important to fix his names definitely to the species from the type hosts which follow the descriptions most closely, even though there are apparent discrepancies. It cannot be emphasized too strongly that once these names have been fixed it is in the interests of all to adopt the usage of the names even if there are differences of opinion over the interpretation of the original descriptions.

Heptapsogaster dilatatus Rudow

Gonicotes dilatatus Rudow, Zeitschr. ges. Naturwiss., 35, p. 479, 1870. Type host: *Nothura boraquira* Spix.

Goniodes dilatatus Giebel, Insecta Epizoa, p. 192, 1874. Host: as above.

Neotype from skin of *Nothura boraquira* Spix from Bolivia. Female, slide No. 12667, in the Meinertzhagen Collection.

Neallotype from skin of same host from Bolivia. Male, slide No. 12667, in the Meinertzhagen Collection.

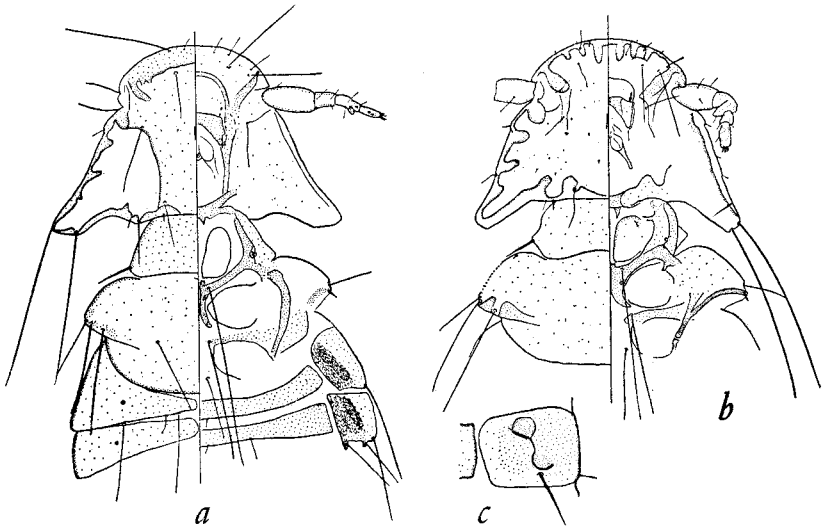


FIG. 31. a, *Heptapsogaster boultoni*, male; head. b, *H. dilatatus*, male; head. c, *H. dilatatus*, female; paratergal plate III.

Neoparatypes from skins of same host from Bolivia and Brazil. Two males, one to be deposited in the collection of Field Museum of Natural History, one, slide No. 12667, in the Meinertzhagen Collection.

Description of female.—General shape as in *H. s. stultus* Clay. Head as shown in fig. 33, a, with bands, markings and chaetotaxy as shown for male (fig. 31, b). Thorax as in male. Abdomen with first two segments modified as is typical for *Heptapsogaster* (see Kéler, 1938, p. 306). Tergal plates II–VII approximating or fusing medially; paratergal plates well marked (fig. 31, c); sternal thickening in the form of a central quadrangular plate in each segment. Tergal plate I has one hair each side of midline; plates II–III have one lateral hair and one hair each side; plates IV–V have one lateral

hair and one hair each side of midline. Paratergal plates II–VII have one marginal hair; plates III–IV have one stout ventral hair; plate V has two ventral hairs. Sternal plates II–III have two small hairs each side of midline; plates IV–V have three small hairs each side of midline. Chaetotaxy and form of terminal segments of the abdomen as shown in fig. 34, *c*.

Description of male.—Similar in general appearance to the female but the abdomen is less elongated. Head and thorax as shown in fig. 31, *b*. Abdomen with general arrangement of plates on segments I–V as in female; terminal segments of abdomen as shown in fig. 34, *d*. Tergal plates I–II with chaetotaxy as in female; plates III–VI with one lateral hair each side. Chaetotaxy of paratergal plates and sternal plates I–V as in female. Genitalia as shown in fig. 33, *e*.

MEASUREMENTS

	MALE		FEMALE	
	Length mm.	Breadth mm.	Length mm.	Breadth mm.
Head.....	0.300–0.322	0.470–0.510	0.338	0.530
Prothorax.....	0.108–0.123	0.295–0.308	0.108	0.324
Pterothorax.....	0.108–0.115	0.510–0.540	0.108	0.540
Abdomen.....	0.560–0.630	0.585–0.615	0.740	0.625
Total.....	1.08	–1.17	1.29	
C.I.....	1.53–1.66		1.57	

Remarks.—Mr. G. H. E. Hopkins (1941, p. 48) maintains that Giebel’s identification of *dilatatus* Rudow was correct, and with this I agree. Giebel’s description differs from *dilatatus* as described above in that he states there are four marginal blotches on the anterior margin, whereas in this species and others of this type of *Heptapsogaster* there are actually six. It is possible, however, that the outer blotches, which are small, were not counted by Giebel; this may also apply to the blotches on the temple margin where there are three and not two, as stated by Giebel.

Taschenberg’s statements (1882, p. 48) on this species are of little value, as he presumed that *dilatatus* was described from *Rhynchotus rufescens* and the Rudow material which he saw was all from this host. Thus his subsequent remarks concerning *dilatatus* are largely invalidated.

It is therefore proposed to apply *dilatatus* Rudow to the species described above and to consider *dilatatus* Giebel as the same. Since Rudow’s description must apply to the female, this sex has been chosen as the neotype.

This species is of the same general type as *H. s. stultus* Clay (1937, pl. 1, fig. 4), from which it is distinguished by the form of the internal thickening of the paratergal plates, the male genitalia, and the terminal segments of the female abdomen.

Heptapsogaster boraquirae sp. nov.

Holotype from skin of *Nothura boraquira* from Bolivia. Male, slide No. 12667, in the Meinertzhagen Collection.

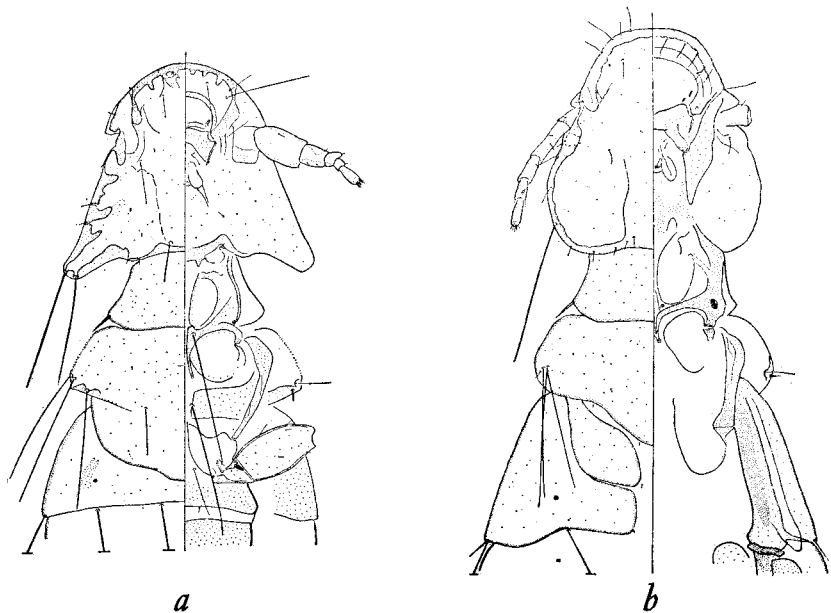


FIG. 32. a, *Heptapsogaster boraquirae*, male; head. b, *Strongylocotes tinnami*, male; head.

Paratypes, same data as the holotype. Two males and three females to be deposited in the collection of Field Museum of Natural History; four males and twelve females, slide No. 12667, in the Meinertzhagen Collection.

Description of male.—A somewhat elongated form showing surface sculpture. Head and thorax as shown in fig. 32, a. Abdomen with first segment (= true segment II) modified as in all species of *Heptapsogaster*; segment II large. Tergal plates transversely continuous; paratergal plates without distinct internal thickening. Sternal thickening in the form of central quadrangular plates, the lateral margins continuous, thickened, and somewhat raised,

forming a dark line down each side of the abdomen. Terminal segments of abdomen as shown in fig. 35, *d*. Tergal plate I with a hair each side of midline; plates II–III with one lateral, one medium-sized and one small hair each side; segments IV–V with one lateral and two small hairs each side of midline. Paratergal plates II–VII with one marginal hair each side of abdomen; plates III–IV with

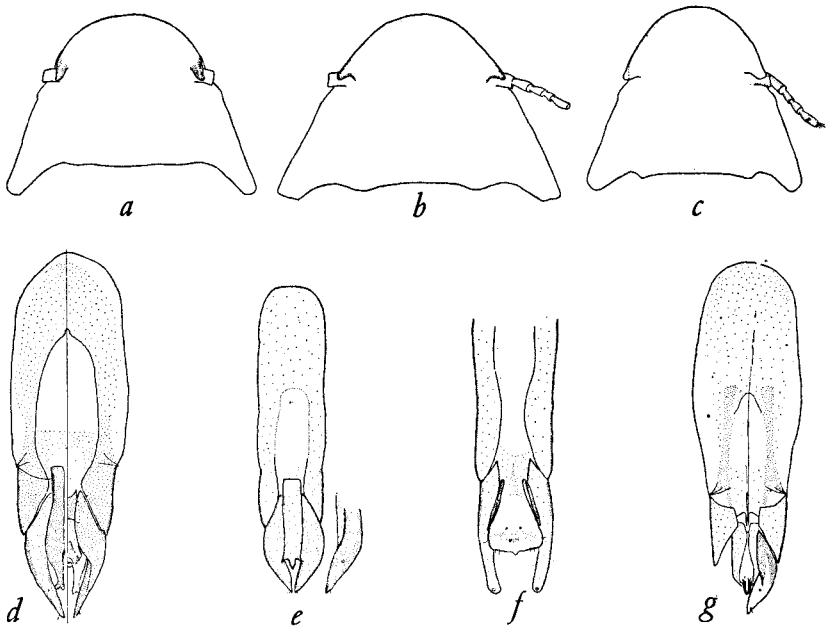


FIG. 33. a, *Heptapsogaster dilatatus*, female; head. b, *H. boultoni*, female; head. c, *H. boraquirae*, female; head. d, *H. boraquirae*, male; genitalia. e, *H. dilatatus*, male; genitalia. f, *Strongylocotes tinnami*, male; genitalia. g, *Heptapsogaster boultoni*, male; genitalia.

one ventral hair; plates V–VII with two ventral hairs. Sternal plate II with one hair on each side of midline; and plates III–V with two hairs on each side of midline. Chaetotaxy of terminal segments as shown in fig. 35, *d*. Genitalia as shown in fig. 33, *d*, and characterized by the forked endomeres.

Description of female.—Similar in general appearance to male with head as shown in fig. 33, *c*. Chaetotaxy of head and characters of thorax as in male, except that the hair each side of midline of occiput is considerably smaller. Plates on segments I–V arranged as in male. Sternal plate II with one to two hairs each side of midline; plates III–IV with two to three hairs each side; plate V with four

hairs each side of midline. Chaetotaxy of terminal segments as shown in fig. 35, *c*.

	MEASUREMENTS			
	MALE		FEMALE	
	Length mm.	Breadth mm.	Length mm.	Breadth mm.
Head.....	0.370-0.384	0.500-0.525	0.384-0.400	0.480-0.510
Prothorax.....	0.138-0.154	0.320-0.330	0.138-0.154	0.322-0.340
Pterothorax.....	0.138-0.154	0.460-0.475	0.138-0.154	0.465-0.492
Abdomen.....	0.915-0.925	0.584-0.610	1.065-1.080	0.690-0.725
Total.....	1.55-1.61		1.73-1.75	
C.I.....	1.315-1.365		1.235-1.295	

Remarks.—This species is similar to *H. testudo* Clay, and the same thickened lateral margins on the sternal plates give a characteristic appearance to the abdomen. It is distinguished from *testudo*, amongst other characters, by the shape of the head in both sexes and by the male genitalia.

Heptapsogaster boultoni sp. nov.

Holotype from a skin of *Nothura boraquira* from Bolivia. Male, slide No. 12667, in the Meinertzhagen Collection.

Paratypes, same data as the holotype. Two males and two females in the collection of Field Museum of Natural History; nine males and nine females, slide No. 12667, in the Meinertzhagen Collection.

Description of male.—Head and thorax as shown in fig. 31, *a*. Abdomen with first two segments modified as in typical *Heptapsogaster*. Tergal plates on segments II-IV separated medianly; those on segments V-VII approximating or fusing centrally. Paratergal plates with elongated internal thickening and with backwardly directed projections on the posterior margin in some of the segments. Segment II may have a small projection; segment III has two, each bearing a hair; and segments IV-V have one projection. Sternal thickening in the form of a central plate in each segment. Form and plates of terminal segments as shown in fig. 35, *b*. Tergal plate I has one hair each side of midline; plates II-III have one lateral hair and two on each side; plates IV-V have one lateral hair and one each side of midline. Paratergal plates II-VI have one marginal hair each side and plates III-V have two ventral hairs. Sternal plates I-II have one hair each side of midline; plates II-IV have three hairs each side; and plate V has five hairs each side of midline.

Chaetotaxy of terminal segments as shown in fig. 35, *b*. Genitalia of the same general type as in other *Heptapsogaster* (fig. 33, *g*).

Description of female.—Similar in general appearance to male but somewhat larger. Head as shown in fig. 33, *b*. Thorax as in male.

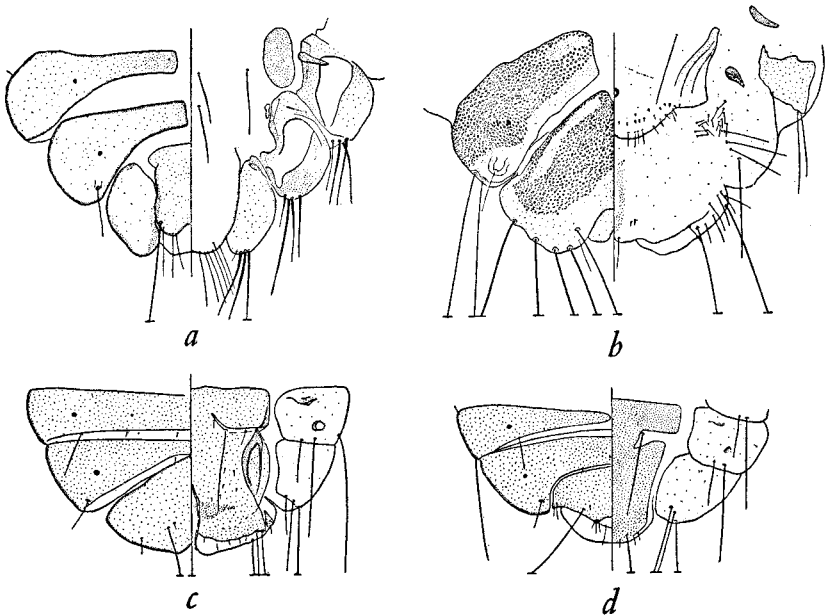


FIG. 34. *a*, *Strongylocotes tiniami*, male; terminal segments of abdomen. *b*, *S. tiniami*, female; terminal segments of abdomen. *c*, *Heptapsogaster dilatatus*, female; terminal segments of abdomen. *d*, *H. dilatatus*, male; terminal segments of abdomen.

Abdomen somewhat more elongated than in male and differing markedly in having the sternal thickening in the form of two lateral plates in each segment, not as a single continuous central plate as in the male. Tergal plates separated medianly; paratergal plates similar to those of the male but with one minute and three normal backwardly directed processes on segments III–IV and with one normal and one minute similar process on segment V. Tergal plate I has one central hair each side; plates II–IV have one lateral hair and two on each side of the midline. Paratergites with marginal hairs as in the male; paratergites III–VI with three ventral hairs. Sternal plates I–II with one hair each side of midline; plates III–V with five hairs each side of midline. Chaetotaxy of terminal segments as shown in fig. 35, *a*.

MEASUREMENTS

	MALE		FEMALE	
	Length mm.	Breadth mm.	Length mm.	Breadth mm.
Head.....	0.520-0.540	0.890-0.915	0.585-0.600	1.000-1.030
Prothorax.....	0.200-0.215	0.475-0.480	0.216-0.225	0.484-0.495
Pterothorax.....	0.214-0.225	0.780-0.795	0.220-0.230	0.830-0.846
Abdomen.....	1.015-1.080	0.940-0.970	1.285-1.295	1.100-1.118
Total.....	1.850-1.950		2.340-2.380	
C.I.....	1.685-1.740		1.67-1.72	

Remarks.—This species has been placed in *Heptapsogaster*, although it cannot be considered at all typical of the genus as now constituted. However, it is the opinion of the author that too many genera have been erected for the species from the Tinamidae and that as more species are discovered some of the genera will have to be sunk. As it is probable that *Heptapsogaster* will have to be widened to include a number of more diverse forms, it seems more satisfactory to keep this species within the genus *Heptapsogaster*, at any rate for the present. *H. boultoni* is larger than the typical members of the genus and lacks the internal projections from the clypeal band. The species is named in honor of Mr. Rudyerd Boulton.

Strongylocotes tinnami Rudow

Nirmus tinnami Rudow, Zeitschr. ges. Naturwiss., 35, p. 473, 1870. Type host: *Nothura boraquira* Spix.

Nirmus ansatus Rudow, l.c., p. 474. Type host: as above.

Neotype from skin of *Nothura boraquira* Spix from Bolivia. Male, slide No. 12667, in the Meinertzhagen Collection.

Neoparatypes, same data as the neotype. Male and female to be deposited in the collection of Field Museum of Natural History; two females, slide No. 12667, in the Meinertzhagen Collection.

Description of male.—A typical *Strongylocotes* with head and thorax as shown in fig. 32, *b*. Abdomen tapering evenly to the narrow terminal segments and with segment I (= true segment II) modified as in other species of *Strongylocotes* (see Kéler, 1938, p. 308). Tergal plates with pitted surface; plates on segments I-VII separated medianly; lateral internal thickening in the form of pillar-like structures. Sternal thickening in the form of two plates, one heavily sclerotized, narrow, and with the longest axis lying horizontal, the other two more lightly sclerotized and with the longest axis vertical.

Characters and chaetotaxy of segments I–II and VI–IX as shown in fig. 34, *a*. Tergal plates III–V have one long hair and one smaller hair at the inner margin of the plates. Paratergal plates II–IV have two marginal hairs each side; plate V has three; plate VI has four; plate VII has three to four; plate VIII has four to five. Sternites III–IV have one fine hair on each side of midline and sternite V has two hairs each side. Genitalia of the same general type as found in other species of *Strongylocotes* (fig. 33, *f*).

Description of female.—Head of same general shape as that of male but proportions somewhat different (see Table of Measurements). Chaetotaxy of head, and shape and chaetotaxy of thorax as in male. Abdomen with segments I–VI similar to those of male but with tergal plates V–VI somewhat broader and those on segments II–VI with an indentation in the posterior margin. Chaetotaxy of tergites, paratergites, and sternites I–V as in male. Chaetotaxy and characters of terminal segments as shown in fig. 34, *b*.

MEASUREMENTS

	MALE		FEMALE	
	Length mm.	Breadth mm.	Length mm.	Breadth mm.
Head.....	0.745	0.725	0.770–0.785	0.710–0.740
Prothorax.....	0.310	0.555	0.360	0.560
Pterothorax.....	0.400	0.815	0.435	0.860
Abdomen.....	1.570	1.170	1.800	1.290
Total.....	2.8		3.1	
C.I.....	0.97		0.928–0.945	

Remarks.—If it is assumed that *Nirmus crassiceps* Rudow (1870, p. 473) is *Strongylocotes lipogonus* Nitzsch, as figured by Carriker (1936, pl. 6, fig. 1), then it can be assumed that *N. tinnami* Rudow is also a *Strongylocotes*. If it is also assumed, as suggested by Carriker (1936, p. 93) that *tinnami* and *ansatus* are the two sexes of the same species, then it is necessary to find a species of *Strongylocotes* in which the hind end of the head is rounded and in which one sex has the abdomen with “dreihöckrigem Ende” and the other has the abdomen with “Enden abgerundet, dicht behaart, der vorletzte Ring ragt mit einer Spitze in den letzten über.” A species of *Strongylocotes* of the *lipogonus* group from the type host complies with these qualifications and, except for the description of the general shape of the head and some of the proportions given by Rudow, fits the descriptions of *tinnami* and *ansatus*. The heads of these specimens from *Nothura boraquira* do not appear obviously more triangular than that of

lipogonus (= *crassiceps*), but, as the other characters of these specimens agree with the description and as the head can be considered to be slightly more triangular, it seems most convenient to apply these names to the species described above.

It is not possible to state definitely which, if either, of the descriptions applies to the male, as it is not unlikely that one of the speci-

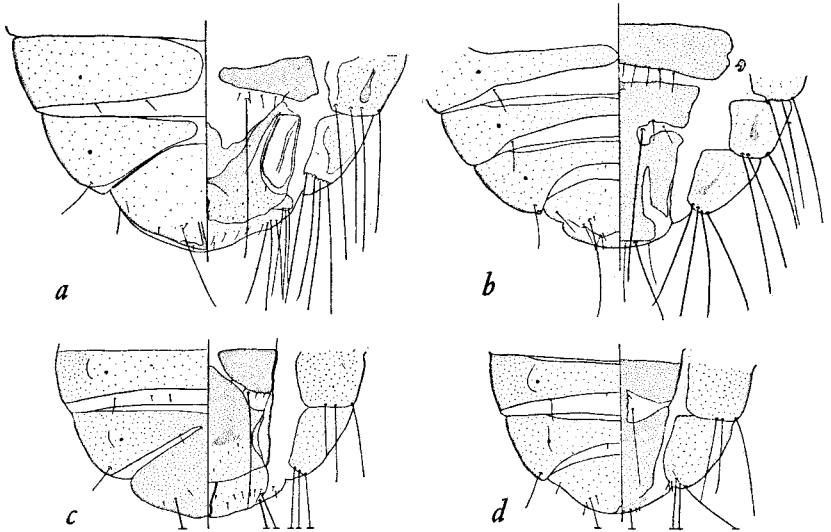


FIG. 35. a, *Heptapsogaster boultoni*, female; terminal segments of abdomen. b, *H. boultoni*, male; terminal segments of abdomen. c, *H. boraquirae*, female; terminal segments of abdomen. d, *H. boraquirae*, male; terminal segments of abdomen.

mens examined by Rudow was immature, thus emphasizing the differences between the two. However, it is stated that *ansatus* has the longer head and, as the description of the terminal segments of the abdomen can apply to either sex, it is proposed to consider *ansatus* as the female and *tinnami* as the male. This has the added advantage of making it possible to designate the male as the neotype.

This species is distinguished from *lipogonus* by the shape of the head and by the characters of the terminal segments of the abdomen in both sexes.

Strongylocotes Taschenberg

Strongylocotes Taschenberg, Nova Acta Acad. Leop.-Carol. Nat., 24, p. 54, 1882.

Nirmocotes Carriker, Proc. Acad. Nat. Sci. Phila., 88, p. 79, 1936.

Through the kindness of Mr. Carriker it has been possible to examine the specimens of *Nirmocotes nirmoides* Carriker and there appears to be little doubt that this and the other species of *Nirmocotes* are actually immature *Strongylocotes*. This being the case, it is necessary to review the synonymy of the species contained in the genera *Nirmocotes* and *Strongylocotes*.

***Strongylocotes orbicularis* Carriker**

Nirmocotes orbicularis Carriker, Proc. Acad. Nat. Sci. Phila., 88, p. 79, fig. 1, 1936 (part, male). Type host: *Crypturellus tataupa* Temminck.

The figure of the male to which the name must apply, as this sex is mentioned first, appears to represent an almost mature male of the *Strongylocotes lipogonus* type. The figure of the female (i.e., pl. 5, fig. 1, a) appears to be identical with immature specimens of *Strongylocotes paucisetosus* Kéler, i.e., *S. glabrous* Carriker (see below) from the same host, examined by the present author.

***Strongylocotes glabrous* Carriker**

Nirmocotes glabrous Carriker, Proc. Acad. Nat. Sci. Phila., 88, p. 82, pl. 5, fig. 3, 1936. Type host: *Crypturellus tataupa* Temminck.

(?) *Nirmocotes orbicularis* Carriker, l.c., p. 79, pl. 5, fig. 1, a, 1936 (part, female). Type host: *C. tataupa* Temminck.

Strongylocotes paucisetosus Kéler, Arb. Morph. Taxon. Ent., 5, p. 320, fig. 9, 1938. Type host: *C. tataupa* Temminck.

Carriker's figure of *glabrous* appears to represent a somewhat more mature specimen of the species figured as the female of *orbicularis* and appears conspecific with immature specimens of *S. paucisetosus* Kéler except for the anterior margin of the head. It is possible that the specimen of *S. glabrous* is somewhat distorted, as the clypeal band appears to be pushed out in such a manner as to give the appearance of another pair of trabeculae. *S. paucisetosus* Kéler must therefore be considered as a synonym of *S. glabrous* Carriker.

***Strongylocotes complanatus complanatus* Piaget**

Goniodes complanatus Piaget, Les Pédiculines, p. 262, pl. 21, fig. 8, 1880. Type host: *Crypturellus o. obsoletus* Temminck (= *Tinamus obsoletus*).

Nirmocotes nirmoides Carriker, Proc. Acad. Nat. Sci. Phila., 88, p. 80, pl. 4, fig. 3, 1936. Type host: *Crypturellus obsoletus punensis* Chubb.

Carriker's figure of *nirmoides* appears to represent an immature female of *Strongylocotes c. complanatus* and is identical with immature specimens of this species from the type host, *Crypturellus o. obsoletus*.

Nirmocotes nirmoides Carriker must therefore be considered as a synonym of *S. c. complanatus* Piaget.

Strongylocotes cordiceps Carriker

Nirmocotes cordiceps Carriker, Proc. Acad. Nat. Sci. Phila., **88**, p. 83, pl. 5, fig. 2, 1936. Type host: *Tinamus m. major* Gmelin.

This appears to be an immature *Strongylocotes* of the *spinosus* type. A single male specimen examined from *Tinamus major castaneiceps* Salvadori of the *spinosus* type is probably this species.

Strongylocotes wernecki Guimarães and Lane

Strongylocotes wernecki Guimarães and Lane, Rev. Mus. Paul., **23**, p. 17, pl. 5, figs. 6, 6a, and 6b, 1937. Type host: *Tinamus solitarius* Vieillot.

Strongylocotes latithorax Kéler, Arb. Morph. Taxon. Ent., **5**, p. 313, figs. 1, 6, 7, 1938. Type host: *Tinamus solitarius* Vieillot.

S. latithorax Kéler must be considered a synonym of *S. wernecki* Guimarães and Lane from the same host.

Cuclotogaster Carriker

Cuclotogaster Carriker, Proc. Acad. Nat. Sci. Phila., **88**, p. 67, 1936.

Gallipeurus Clay, Proc. Zool. Soc. Lond., (B), **108**, p. 135, 1938.

Mr. Carriker has kindly sent me the female of *Cuclotogaster laticorpus* Carriker from *Crypturellus soui modestus* Cabanis mentioned on page 68 (Carriker, 1936). Although this specimen is in poor condition, it appears to be certainly congeneric with and probably conspecific with *Gallipeurus h. heterographus* Giebel, the genotype of *Gallipeurus* Clay. Mr. Carriker has also written in a letter which he gives me permission to quote, that "I can find absolutely no difference between the two specimens (type of *Cuclotogaster* and specimen of *heterographus*) as to shape, proportions, markings and chaetotaxy. The only discrepancy I find is in the measurements, principally of the abdomen."

However, as there is considerable variation in the size of the abdomen among specimens of *heterographus*, it can be assumed that these two species are the same. Thus *Cuclotogaster laticorpus* Carriker (1936, p. 67) is a synonym of *Gallipeurus h. heterographus* Giebel and therefore necessitates the sinking of *Gallipeurus* as a synonym of *Cuclotogaster* (for further synonymy of *G. h. heterographus* see Clay, 1938, p. 136).

Discussing the occurrence of *heterographus* on *Crypturellus*, Mr. Carriker states: "It is barely possible that I might have carried a dead

chicken in my collecting bag. Also I have noted that *Crypturellus soui* does frequently inhabit the brush around small villages, in which villages domestic fowl are constantly prowling about, and they might occasionally pick up some of their parasites."

It is possible therefore that the chickens and tinamous may share dust baths and thus exchange parasites (see Hoyle, 1938, p. 379).

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