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NASAL MITES FROM MEXICAN BIRDS.
I. RHINONYSSIDAE (MESOSTIGMATA) FROM THE HOST FAMILY TYRANNIDAE.

BY

K. E. HYLAND & A. MOORHOUSE.

INTRODUCTION.

In a recent publication on the Rhinonyssidae of Trinidad, FAIN and AITKEN (1967) commented that the nasal mite fauna of Central America remains practically unexplored. Essentially this is true also for South America except for Brazil where PEREIRA, CASTRO, AMARAL, FAIN and AITKEN have contributed extensively to the literature. The most recent comprehensive work is that of FAIN and AITKEN (1968) who described eight new species in the genus *Ptilonyssus* from the region of Belem in northern Brazil. In their work on the fauna of Trinidad FAIN and AITKEN described four new genera and thirteen new species.

To our knowledge only a few avian respiratory mites have been reported from either Central America or Mexico. FAIN (1963 a) listed *Boydaia psittaci* (family Ereynetidae) from the nasal passages of *Bolborhynchus lineola* (Cassin) (family Psittacidae) from Mexico. BAKER and YUNKER (1960) described seven species of blattisociid mites from the nares of hummingbirds in Panama and Colombia. While the mites are probably not parasitic, their association with the birds is a well-established one.

The present work is the first in a series on the acarines recovered from the respiratory passages of birds collected in Veracruz, Mexico, during the summer of 1963 when the opportunity arose to study some of the birds utilized in conjunction with an investigation of encephalitis viruses. This study was carried out with the collaboration of persons from Cornell University Medical College, the Pan American Health Organization, the government of the United States of Mexico, the Instituto de Virologia de la Secretaria de Salubridad y Asistencia, and the Instituto de Salubridad y Enfermedades Tropicales of Mexico.

The area of study lies on the eastern coast of southern Mexico in the Sierra de Tuxtla, a small mountain range forming an isolated area about 90 km southeast of Veracruz City. According to ANDRELE (1967), "Within the Sierra is one of the most extensive humid tropical forest areas in Mexico". Accordingly, it supports an abundance of resident species and provides suitable ecological conditions for migrants. He records 251 resident species for this area.

1. This investigation was supported in part by a National Science Foundation Grant (GB-1295) and a U. S. Public Health Fellowship (1-F3-AL-40, 687-01) to the senior author from the National Institute of Allergy and Infectious Diseases. That part of the study conducted in Mexico was further supported by a USPHS Training Grant No. 5T1-AL-231 from NIAID and by the Surgeon General, Department of the Army under sponsorship of the Commission on Viral Infections of the Armed Forces Epidemiological Board.


*Atarologio, t. XII, fasc. 1, 1970.*
During a two month period (27 July to 20 September) a total of 590 birds was examined. They represent 120 species distributed among 38 families. Of those examined, 191 were found positive for mites, a rate of infestation of nearly 31 percent. Nearly all birds were collected with a mist net, a few were shot and a small number were taken as road kills. Usually the birds were examined shortly after capture. If examination had to be postponed they were refrigerated in plastic bags, but not frozen. Most hosts were examined by splitting the upper beak and examining the nares and turbinates. In a few instances where specimens were destined to be made into study skins, access to the passages was achieved by removing the palate bones using a curved scalpel blade. Trachea and lungs were occasionally inspected when time permitted. The washing technique described by Yunker (1962) was not utilized.

**Rhinonyssidae** Trouessart, 1895.

Genus *Ptilonyssus* Berlese and Trouessart, 1889.

*Ptilonyssus japaubensis* Castro, 1948.

We have encountered this species only once in the collections from tyrannids. This single specimen agrees well with the redescriptions given by Fain (1964) with the exception that the two large setae flanking the podosomal plate are longer (32 microns) than in the paratypes (16 to 21 microns) and the genital plate is longer (148 microns). There appears to be no significant variation in the leg setation. Brooks and Strandtmann in their paper on the tyrannids (1960) did not report finding any mites belonging to the genus *Ptilonyssus*.

*Hosts:*

*Empidonax alnoritm* Brewster — Alder flycatcher.

One female; host M63-08-23-25/2035; Sontecomapan, Veracruz, Mexico; 23 Aug. 1963; R. W. Dickerman, collector.

*Ptilonyssus camptostoma* new species.

We are grouping this species with those possessing three median dorsal plates although the pygidial plate is divided into two distinct and separate halves. In addition the opisthosomal plate is smaller than in most species and in the female is surrounded by the four zones of muscle insertions which are approximately equidistant from each other. *Ptilonyssus camptostoma* is close to *P. cacici* Fain, 1964, *P. sittae* Fain, 1965, and *P. chloropsicola* Fain, 1966, but can be separated from these three species on the basis of the divided pygidial plate and the smaller opisthosomal plate. It is closest to *P. chloropsicola* but can be distinguished further from this species in that: (1) the sternal plate is placed anteriorly and encompasses the first two pairs of sternal setae while in *P. chloropsicola* the anterior pair are free of the plate but the posterior pair are included; (2) adanal setae are located at the posterior border of the anal opening rather than at the anterior border; (3) there is a row of multiple deutosternal teeth; and, (4) there are differences in the chaetotaxy of tarsus I.
FEMALE.
(Figures 1-7).

Measurements:

Holotype, and paratype (in parentheses) — LId 673 (684) microns; WId 254 (289); LPP 206 (218); WPP 197 (185); LOP 29 (29); WOP 35 (38); LpP 19 (29); WpP 54 (43); LPer 32 (29); LAP — (—); WAP 70 (75); LG 139 (142); WG 64 (64); LP 75 (75); LCh 87 (95); LCh 7 (7); LSP 99 (96); WSP 78 (78); LGP 104 (113); WGP 73 (73).

Dorsum:

Podosomal plate well developed, pear-shaped, with prominent pattern of muscle insertions; surface uniformly punctate bearing eight pairs of short setae and one pair of pores. Opisthosomal plate reduced to a small circular punctate plate bearing one pair of setae. Areas of muscle insertion associated with this plate are four in number and widely separated. Pygidial plate separated into two small distinct portions, each bearing one small seta. Integument striated and with seven pairs of small tapered setae plus five pairs of minute pores. Stigmata at level of coxa III, with elongate peritreme.

Venter:

Sternal plate poorly defined with irregular borders. Non-striated area (which is slightly punctate) confined to an area encompassing first two pairs of sternal setae and adjoining pores. Sternal setae terminate in filamentous tips. Genital plate well defined but lacks prominent pattern. Genital setae minute, located on the plate. Anal plate with cribrum. Adanal setae located at posterior border of anal opening; median seta present. Integument striated with four pairs of finely tapered setae (8 microns long).

Gnathosoma:


Legs:

Tarsus I with sensory area with approximately seven blunt setae of varying lengths and three filamentous setae; claws modified, only slightly curved. Tarsi II to IV possess ventrally two massive spines at base of claws and another slightly smaller spine laterally. Claws well developed, strongly hooked. Coxa II with anterior projection as in P. pipromorphae Fain and Aitken, 1967.

MALE.
(Figures 8, 9).

Measurements:

Allotype — LID 460 microns; WId 218; LPP 189; WPP 177; LOP 64; WOP 58; LpP 29; WpP 35; LPer 29; LAP —; WAP 67; LG 108; WG 45; LP 64; LCH 61; LCh 21.

Dorsum

Diffsers from the female by the larger opisthosomal plate which is placed more posteriorly with respect to the four areas of muscle insertion; in addition, there is a pair of muscle insertions located more laterally and posteriorly.
Venter:

Genito-sternal shield divided. Genital orifice surrounded by a moderately heavy chitinous ring and the punctate sternal plate which extends posteriorly to the level of the second sternal setae. Limits of the plate poorly defined. Posterior plate nearly circular, with a faint pattern of punctations and bearing the minute genital setae.

Gnathosoma:

Similar to female. Chelicerae hidden and their structure not discernible.

Legs:

Basically as in female.


Types.

Holotype female, one paratype female, one allotype male and two nymphs from the nasal passages of the Northern beardless flycatcher, *Camptostoma imberbe* Sclater; host M63-09-12-41/2444; Tlacotalpan, Veracruz, Mexico; 12 Sept. 1963; R. W. DICKERMAN, collector.

The holotype, allotype and one nymph will be deposited in the U. S. National Museum, Washington, D. C. 20250; the remaining female and the nymph are in the Acarological Collection, University of Rhode Island, Kingston, Rhode Island 02881.


The genus was erected by Brooks and Strandtmann to include four new species recovered from seven species of tyrannids from Texas having the following characters: 2 or 3 dorsal plates,
stigmata located dorsally over coxae III with short peritreme, the sternal plate is lacking but the sternal area is non-striated and bears 3 pairs of setae and 2 pairs of pores in the female. Genital plate with little or no sclerotization, with a median longitudinally striated area and with genital setae near the posterior margin. The pores are located off the plate. Anal plate poorly defined and never sclerotized; it terminates in a thickly pilose cribrum and has three setae. Movable segments of the palps are longer than fused coxae and lacking the tined tarsal setae; deutosternal teeth minute and difficult to differentiate in some species; chelicerae are rather stout and attenuated very slightly if at all; chelae rather prominent forming one fifth to one tenth total cheliceral length. Located on the dorsal aspect of genu III are four blunt setae arranged in an oblique row.

Brooks and Strandtmann were able to separate this genus from its most closely related one, Paraneonyssus, in that the latter has only two dorsal plates, never three; in Tyranninyssus the chelicerae are heavier and shorter, and the chelae much longer in relation to chelicerae. Paraneonyssus possesses a sternal plate and a tined palpal seta; Tyranninyssus lacks both. The four aligned setae on genu III are lacking in Paraneonyssus. Many authors consider the genus Paraneonyssus to be synonymous with Ptilonyssus in which case it becomes more difficult to distinguish Tyranninyssus from the genus Ptilonyssus. The four aligned setae on genu III serve alone to separate the two genera.

We have had the opportunity to examine paratypes of all four species and the holotypes of both T. tyrannus (the type species) and T. tyrannisiodes plus a paratype of the recently described species of Fain and Aitken (1967), T. myiophobi, from Myiophobus fasciatus (P. L. S. Miller) in Trinidad. After a study of these types aided by the collection from Mexican hosts, it is our opinion that three of the species described by Brooks and Strandtmann are quite distinct, but that T. tyrannisiodes is, in reality, a synonym of T. tyrannus. Although the original description of T. tyrannus seemed adequate at the time, we consider it appropriate now to emend, redescribe and discuss the variation of this species. The redescription is based almost entirely on the holotype from the U. S. National Museum. A paratype from another host, Contopits sordidulus (Sclater), was also compared as were the holotype and a paratype of T. tyrannisiodes.

Tyranninyssus tyrannus Brooks and Strandtmann, 1960.


Female.
(Figures 10, 14-18).

Measurements:

Holotype — LId 826 microns; WId 459; LPP 270; WPP 270; LOP 338; WOP 133; LPer 31; LAP 130; WAP 78; LG 192; WG 122; LP 88; LCH 143; LCh 18; LSP —; WSP —; LGP 156; WGP 104.

Dorsum:

The podosomal plate nearly circular in form, punctate and with areas of muscle insertion moderately visible; seven pairs of short setae. Opisthosomal plate elongate, slightly constricted...

*Acarologia*, t. XII, fasc. 1, 1970.
medially, with areas of muscle insertion at the antero-lateral angles. In the holotype these areas are two in number; one on each angle forming an integral part of the opisthosomal plate. Four pairs of setae are found on the plate; the posterior pair (7 microns in length) are longer than the others. Plate has a tendency to fold transversely in most of the specimens seen, including the holotype, giving the impression that the plate is divided or nearly so. Integument striated and bears nine pairs of setae; the two most posterior are longer than the others. Stigmata situated dorsally at the level of coxae III; with straight peritreme.


**Venter:**

Sternal plate is reduced to a non-striated, non-punctate zone confined to the area outlined by the three pairs of sternal setae. Genital plate nearly as wide as long, punctate and carrying a pattern as illustrated. Genital setae located on the plate, pores just adjacent to it. Anal plate lightly sclerotized, anterior border imperceptable; cribrum well developed (located ven-
trally in holotype); anal setae three in number, the paired adanal ones positioned at anterior border of the anal opening. Ventral integument striated and bears seven pairs of setae varying in length from 9 to 16 microns.

**Gnathosoma:**

Base relatively wide, punctate, with four pairs of ventral setae, the basal pair much longer (11 microns) than others. Deutosternal teeth weak, barely visible in some specimens; arranged irregularly in seven to ten rows. Palps slender. Chelicerae non-bulbous and taper gradually toward the tip. Chelae with movable finger one-tenth to one-ninth the length of the chelicerae. Movable finger subtriangular with a recurved lateral tooth; fixed digit also with a minute lateral tooth.

**Legs:**

Tarsi I with sensory area bearing a series of seven blunt sensory setae of varying lengths plus three long attenuate setae, one which reaches 34 microns. Claw modified, relatively straight but with a small sharply recurved tip. Tarsus III ventrally with two large blunt setae at base of claws plus a series of smaller setae; dorsally with four simple attenuate setae. Claws well developed, hooked. Genu III bears dorsally an oblique row of four short, stout spines which are characteristic for the genus *Tyranninyssus*.

**Remarks:**

As far as we can determine the type specimens are on the slides originally prepared by Brooks and Strandtmann. While the integument is generally weak and in some instances wrinkled, we have been able to distinguish the features necessary for the redescription and have not attempted to remount the specimens. One noteworthy aspect of the holotype of *T. tyrannus* is that there is an apparent duplication of the second and third pair of sternal setae. Actually this is not a duplication but rather the result of the integument separating and lifting. One set of four appear in their normal position and appearance while the other four have shifted posteriorly and are the negative of the anterior ones. Another artifact is the apparent folding of the opisthosomal plate discussed below. We believe that these changes have been brought about by the corrosive action of the clearing agents employed.

**Discussion.**

Criteria established by Brooks and Strandtmann for separating *T. tyrannisoides* from the type species, *T. tyrannus* is that: (1) in *T. tyrannus* the large opisthosomal plate is nearly divided while in *T. tyrannisoides* this plate is more uniformly sclerotized for its entire length, and (2) *T. tyrannus* possesses a small plate (which we here term muscle insertions) at each antero-lateral angle of the opisthosomal plate while *T. tyrannisoides* possesses two such plates at each angle.

The criteria which Brooks and Strandtmann used to separate these two species do not truly set them apart. The nearly divided opisthosomal plate mentioned and figured for *T. tyrannus* appears to be the result of the plate having developed transverse folds (Fig. 10). In approximately half of our specimens from *Empidonax* spp. the plate is folded. This is due probably to the action of the clearing agent employed.

The second diagnostic feature, the number of small antero-lateral "plates", is a very variable character. While their presence or absence and general position can be of taxonomic value, their precise location in relation to the opisthosomal plate and exact number should not, in our opinion, be used as the sole criterion to separate the two species. The types of *T. tyrannisoides* possess two pairs of well-defined muscle insertions ("plates") as shown in Fig. 13. They are separated from each other and from the opisthosomal plate. In some of our material from *Empidonax* these insertions are divided definitively into two portions but yet do not appear to be completely separate from the opisthosomal plate (Figs. 11, 12). The amount of this variation, with *T. tyrannus* on one extreme and *T. tyrannisoides* on the other, with the Mexican material dispersed between them, prompts us to conclude that
this morphological feature cannot be utilized for these species. Other aspects of *T. tyrannus* and *T. tyrannisoides* are similar and we consider that the latter is a synonym of *T. tyrannus*.

The type host is *Nuttallornis borealis* (Swainson) (Oliviesid flycatcher) with paratypes coming from *Contopus sordidulus* (Slatier) (Western wood peewee); types of *T. tyrannisoides* were reported from *Sayornis sayi* (Bonaparte) (Say’s Phoebe) and *Empidonax minimus* (Baird and Baird) (Least flycatcher) — all from Texas.

We have assigned the list of specimens below to *T. tyrannus*. All hosts were collected in Veracruz, Mexico by Dr. Robert W. Dickerman.

**Hosts:**

*Empidonax traiillii* (Audubon) *—* Traill’s flycatcher.

- 2 females; host M63-08-26-9/2083; Sontecomapan, Veracruz; 26 Aug. 1963.
- 3 females, 2 nymphs; host M63-08-28-18/2124; Sontecomapan, Veracruz; 25 Aug. 1963.
- 3 females; host M63-09-11-17/2366; Tlacotalpan, Veracruz; 11 Sept. 1963.
- 2 females, 1 male; host M63-09-11-22/2371; Tlacotalpan, Veracruz; 11 Sept. 1963.
- 4 females; host M63-09-11-23/2372; Tlacotalpan, Veracruz; 11 Sept. 1963.
- 1 female; host M63-09-11-28/2377; Tlacotalpan, Veracruz; 12 Sept. 1963.
- 1 female, 1 male; host M63-09-12-18/2421; Tlacotalpan, Veracruz; 12 Sept. 1963.
- 5 females; host M63-09-12-23/2426; Tlacotalpan, Veracruz; 12 Sept. 1963.
- 2 females; host M63-09-12-24/2427; Tlacotalpan, Veracruz; 12 Sept. 1963.
- 4 females; host M63-09-12-30/2433; Tlacotalpan, Veracruz; 12 Sept. 1963.

*Empidonax alnorum* Brewster — Alder flycatcher.

- 3 females; host M63-08-23-2/2062; Sontecomapan, Veracruz; 23 Aug. 1963.
- 2 females, 1 male, 3 nymphs; host M63-08-25-3/2063; Sontecomapan, Veracruz; 25 Aug. 1963.
- 3 females; host M63-09-01-16/2197; Tlacotalpan, Veracruz; 31 Aug. 1963.
- 2 females, 1 male; host M63-09-10-12/2209; Tlacotalpan, Veracruz; 10 Sept. 1963.
- 1 nymph; host M63-09-10-17/2304; Tlacotalpan, Veracruz; 10 Sept. 1963.
- 8 females; host M63-09-10-31/2318; Tlacotalpan, Veracruz; 10 Sept. 1963.
- 2 females; host M63-09-10-36/2323; Tlacotalpan, Veracruz; 10 Sept. 1963.
- 2 females; host M63-09-12-31/2434; Tlacotalpan, Veracruz; 12 Sept. 1963.
- 9 females, 1 male; host M63-09-12-39/2442; Tlacotalpan, Veracruz; 12 Sept. 1963.

*Empidonax flaviventris* (Baird and Baird) — Yellow-bellied flycatcher.

- 1 female; host M63-09-09-20/2265; Tlacotalpan, Veracruz; 9 Sept. 1963.

*Tyrannus melancholicus* Vieillot — Tropical kingbird.

- 3 females; host M63-09-1-14/2235; Tlacotalpan, Veracruz; 1 Sept. 1963.

*Tyraminyssus spinosus* Brooks and Strandtman, 1960.

The hosts reported by Brooks and Strandtman (1960) include the type *Muscivora forficata* (Gmelin) (Scissor-tailed flycatcher) plus *Tyrannus verticalis* (Say) (Western kingbird), *Tyrannus tyrannus* (Linnaeus) (Eastern kingbird) and *Tyrannus dominicensis* (Gmelin) (Gray kingbird). We have found it in the nasal cavities of only one species. All collections are by R. W. Dickerman.

* Flycatchers in the genus *Empidonax* are listed according to the concepts of Dr. Allan Phillips of the Instituto de Biologia Universidad Nacional Autonoma de Mexico. In the past and in most current literature *E. alnorum* is included with *E. traiillii*. Here they are considered distinct, *traiillii* being used for populations having the “fee-bee-o” song type and *alnorum* for those exhibiting the “fitz-bew song type”.
Hosts:

*Tyrannus melancholicus* Vieillot — Tropical kingbird.

9 females, 1 male, 4 nymphs; host M63-09-14-3; Tlacotalpan, Veracruz; 14 Sept. 1963.
1 female; host M63-09-10-19/2306; Tlacotalpan, Veracruz; 10 Sept. 1963.
1 female; host M63-09-10-24/2311; Tlacotalpan, Veracruz; 10 Sept. 1963.
2 females; host M63-09-1-14/2235; Tlacotalpan, Veracruz; 1 Sept. 1963.
2 females; host M63-09-9-18/2263; Tlacotalpan, Veracruz; 9 Sept. 1963.

*Tyranninyssus callinectoides* Brooks and Strandtmann, 1960.

To our knowledge this species has been reported only from the type host *Myiarchus cinerascens* (Lawrence) (Ash-throated flycatcher). We have taken a single female as follows:

Hosts:

*Myiarchus tyrannulus* (Müller) — Wied or Brown-crested flycatcher.

1 female; host M63-09-10-63/2349; Tlacotalpan, Veracruz; 10 Sept. 1963; R. W. Dickerman, collector.

Genus *Neotyranninyssus* Fain and Aitken, 1967.

This monotypic genus was described from *Fluvicola pica* (Boddaert) taken in Trinidad. It is similar to the genus *Tyranninyssus* but lacks the characteristic oblique row of four spines on genu III. It possesses chelae which are slightly more than one-fifth the length of the chelicerae and have a fixed digit which is almost entirely membranous.

*Neotyranninyssus fluvicola* Fain and Aitken, 1967.

In the collections from Mexico the sternal and ventral opisthosomal setae are shorter than in the types and there are slight differences in the dimensions of both the podosomal and opisthosomal plates.

<table>
<thead>
<tr>
<th></th>
<th>LPP</th>
<th>WPP</th>
<th>LOP</th>
<th>WOP</th>
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<tr>
<td>Holotype</td>
<td>228 µ</td>
<td>246 µ</td>
<td>246 µ</td>
<td>195 µ</td>
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<td>Paratype</td>
<td>220 µ</td>
<td>238 µ</td>
<td>237 µ</td>
<td>192 µ</td>
</tr>
<tr>
<td><em>Pyrocephalus</em> I</td>
<td>180 µ</td>
<td>238 µ</td>
<td>232 µ</td>
<td>171 µ</td>
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<tr>
<td><em>Pyrocephalus</em> II</td>
<td>192 µ</td>
<td>235 µ</td>
<td>216 µ</td>
<td>168 µ</td>
</tr>
</tbody>
</table>

We do not consider the differences significant. Our collection includes only one host record.

Hosts:

*Pyrocephalus rubinus* (Boddaert) — Vermilion flycatcher.

5 females; host M63-09-11-54/2403; Tlacotalpan, Veracruz; 11 Sept. 1963; R. W. Dickerman, collector.

Genus *Tinaminyssus* Strandtmann and Wharton, 1958.

The genus was erected by Strandtmann and Wharton (1958) for two species described from South American tinamiform hosts. Except for the presence of three dorsal shields and the length of the chelicerae the genus lacks precise limits and the advisability of accepting the generic designation has been questioned by Fain (1963 b). Although it might be proper to include these
species in the genus *Mesonyssus* as FAIN suggests, most workers have continued to recognize the genus as a distinct one. It now includes five species. Although originally limited to the family Tinamidae; the list of families has now been enlarged to include Tinamidae, Corvidae and Trochilidae. To our knowledge it has not been reported previously from the family Tyrannidae.

*Tinaminyssus chiarelli* Amaral and Baquer, 1963.  
(Figures 19-24).

This species was described from *Cyanocorax chrysops chrysops* (family Corvidae) from Brazil. Our material, collected from a single host, *Pitangus sulphuratus* (Linnaeus), although collected from another family, is deemed conspecific with that from Brazil. We have had the opportunity to study a paratype of this species through the courtesy of Dr. V. DO AMARAL. The paratype has apparently been remounted. It is extremely flat, the podosomal, opisthosomal and genital plates are broken, and the gnathosoma is twisted and poorly oriented. We consider it appropriate to add certain points to their original description and to figure in part the paratype which we studied.

**Measurements:**

AMARAL and BAQUER gave some measurements of the holotype recommended by FAIN and HYLAND (1962) as follows: LId 630 microns; Wid 440; LPP 240; WPP 340; LOP 176; WOP 148; LpP 78; WpP 84; LAp 144; WAP 112; WG 104; LCh 84; LCh 16; WGP 116.

In the interest of making this description more complete the measurements of the paratype which we examined are: LId 1008 microns; Wid 566; LPP 307; WPP 408; LOP 204; WOP 202; LpP 98; WpP 101; LPer 43; Lap 142; WAP 108; LG 144; WG 108; LP 79; LCH 84; LCh 16; LGP 187; WGP 120.

**Dorsum:**

Podosomal plate well developed, nearly elliptical, with seven pairs of minute setae, one median pair of which is displaced toward the lateral border; areas of muscle insertion forming a pattern as illustrated. Opisthosomal plate triangular, with a large area of muscle insertion at each antero-lateral angle, and with two pairs of small setae. Pygidial plate small, pear-shaped, less well sclerotized, and with one pair of setae. General body integument striated and bears eight pairs of small setae. Stigmata located in area of coxae III and IV and with straight, elongate peritreme.

**Venter:**

Sternal plate very poorly sclerotized, limits poorly defined but extending posteriorly to beyond the second pair of sternal setae. Sternal setae prominent, elongate, attenuate. Genital plate well developed, punctate and with an overlying pattern of longitudinal striations. Genital setae located at edge of plate; pores just off the plate. Anal plate well developed with prominent cribrum; adanal setae long, attenuate; post anal setae smaller and arising from within the limits of the cribrum. Integument striated with four pairs of tapered setae. Remnant of tritosternum visible between the first coxae.
Gnathosoma:

The gnathosoma of the paratype studied is distorted and difficult to figure; therefore we have drawn the gnathosoma including the chelicerae (Figs. 23, 24) from a specimen from our Mexican collection. It agrees well with the original description and with the paratype.

Relatively short and wide with four pairs of cylindrical ventral setae, the anterior pair being longer and more prominent than the others. Chelicerae straight with relatively large chelae
(approximately one-fifth the total length). Fixed digit with subapical lateral tooth. Palps robust, heavily armed with setae. Six or seven deutosternal teeth in an irregular row.

**Legs:**

Coxa only moderately sclerotized. An abnormality noted in the paratype is the presence of three setae on the left coxa III (as figured) rather than the usual two. Tarsus I with sensory area bearing seven cylindrical and attenuate setae. Claws slightly curved with recurved tips. Tarsi II to IV with three large conical setae apically. Claws well developed and strongly curved.

**Hosts:**

*Pitangus sulphuratus* (Linnaeus) — Great kiskadee.

- 5 females, 1 male, 1 nymph; host M63-08-17-1; Catemco, Veracruz; 17 Sept. 1963; R. W. Dickerman, collector. (Only one of seven birds of this species examined was infested).

**Genus Sternostoma** Berlese and Trouessart, 1889.

*Sternostoma tracheacolum* Lawrence, 1948.

Although this species was described originally from the lungs and trachea of canaries in South Africa, it has been subsequently reported from a great variety of hosts from different families in Africa, Europe, North and South America. Fain and Hyland (1962) list eleven families for this species. The present listing is the first for the family Tyrannidae.

**Hosts:**

*Tyrannus melancholicus* Vieillot — Tropical kingbird.

- 1 female; host M63-08-31-15/2196; Tlacotalpan, Veracruz; 31 Aug. 1963; R. W. Dickerman, collector.
- 1 female; host M63-09-10-19/2306; Tlacotalpan, Veracruz; 10 Sept. 1963; R. W. Dickerman, collector.

**Sternostoma longisetosa** Hyland, 1961.

Two species have been described from tyrannid hosts: *Sternostoma tyrannus* Brooks and Strandtmann, 1960, and *S. longisetosa*. The Mexican material agrees more closely with the latter from *Tyrannus tyrannus*, particularly in the shape of the opisthosomal and sternal plates, and the chaetotaxy of both palps and tarsus I.

All of the hosts below are attributed to Robert W. Dickerman as collector.

**Hosts:**

*Empidonax traillii* (Audubon) — Traill's flycatcher.

- 6 females; host M63-08-26-12/2086; Sontecomapan, Veracruz; 26 Aug. 1963.
- 11 females, 1 nymph; host M63-09-12-23/2426; Tlacotalpan, Veracruz; 12 Sept. 1963.

*Empidonax alnorum* Brewster — Alder flycatcher.

- 12 females, 4 males; host M63-08-25-3/2063; Sontecomapan, Veracruz; 25 Aug. 1963.
- 15 females, 1 male; host M63-08-23-2/2062; Sontecomapan, Veracruz; 23 Aug. 1963.
3 females; host M63-09-10-36/2323; Tlacotalpan, Veracruz; 10 Sept. 1963.

*Empidonax virescens* (Vieillot) — Acadian flycatcher.

4 females; host M63-09-10-35/2322; Tlacotalpan, Veracruz; 10 Sept. 1963.

*Muscivora tyrannus* (Linnaeus) — Fork-tailed flycatcher.

1 female; host M63-09-11-6/2355; Tlacotalpan, Veracruz; 11 Sept. 1963.

*Pyrocephalus rubinus* (Boddaert) — Vermilion flycatcher.

12 females; host M63-09-11-54/2403; Tlacotalpan, Veracruz; 11 Sept. 1963.

**Remarks.**

Other birds belonging to the family Tyrannidae which were found negative for rhinonyssids include: *Tyrannus tyrannus* (3 specimens); *Elaenia flavogaster* (5 specimens); *Myioborus similis* (2 specimens); *Todirostrum cinereum* (2 specimens); *Rynchoclystis brevirostris* (1 specimen); *Myiarchus tyrannulus* (1 specimen); *Muscivora forficata* (1 specimen); and *Myiodynastes luteiventris* (1 specimen).

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