THE PTERODECTINE FEATHER MITES OF HUMMINGBIRDS: THE GENUS *TOXERODECTES* PARK AND ATYEO (THE *LECROYAE* AND *GLADIGER* GROUPS)[1]

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ABSTRACT

The remaining species of the genus *Toxerodectes* are (re)described. These include *T. gladiger* (Trouessart) and the following new species: *T. attenuatus* from *Florisuga m. mellivora,* Mexico; *T. grandissimus* from *Campylopterus h. hemileucurus,* Mexico, Nicaragua;; *T. heliomasteris* from *Heliomaster longirostris pallidiceps,* Mexico, *H. c. constantii,* Nicaragua, *H. c. leocadiae,* Mexico; *T. lecroyae* from *Lampornis clemenciae bessophilus,* Mexico, *L. c. clemenciae,* Texas, *L. a. amethystinus,* Mexico, *L. viridipallens ovandensis,* Mexico, *Lamprolaima r. rhami,* Mexico; *T. parallelus* from *Eupetomena m. macroura,* Brazil; *T. subulatus* from *Colibri serrirostris,* Brazil; *T. zusii* from *Urosticte b. benjamini,* Ecuador, *U. rufricrissa,* Colombia.

The genus *Toxerodectes* is divided into three species groups as defined in Park and Atyeo (1973). The cited paper, in addition to defining the groups, included a key to the species and (re)described the seven species of the *hastifolia* group. The present paper includes the three species of the *gladiger* group and the five species of the *lecroyae* group.

THE *GLADIGER* GROUP

Toxerodectes attenuatus, new species

MALE (holotype). Length, 352μ; width, 110μ. Propodosomal shield 108μ in length, 90μ in width; external scapular setae separated by 43μ, internal scapular setae by 32μ. Scapular shields absent. Hysterosomal shield 214μ in length, 87μ in width; terminal cleft 27μ in length. Ventral idiosoma with coxal fields I-IV open; genital organ 56μ in length, extended to level of midway between *c 2* and adanal discs; adanal discs 18μ in diameter, separated center-to-center by 45μ; anal shields present. Setae: *sh,* 16μ x 3μ, bladelike; *d 5,* 40μ in length, lanceolate; *d 2 and d 4* in trapezoidal arrangement; *d 4* at level of *l 3.* Tarsi IV not extended to level of *pae;* solenidion Φ on tibia IV subequal to Φ on tibia III: σ *l* shorter than Φ on leg III.

FEMALE (paratype). Length, excluding hysterosomal appendages, 596μ; width, 160μ. Propodosomal shield 148μ in length, 120μ in width; external scapular setae separated by 61μ, internal scapular setae by 44μ. Scapular shields absent. Hysterosomal shield 392μ in length, 105μ in width; terminal cleft narrowly U-shaped, 120μ in length; hysterosomal appendages arising lateral to apices of lobes. Setae: *sh,* 24μ x 4μ, bladelike; *d 5,* 5μ in length; *l 5,* 135μ in length, basally dilated; *d 2* and *d 4* in trapezoidal arrangement; *pai* inserted anterior to the level of *l 5;* Φ on tibia IV shorter than Φ on leg III; σ *l* shorter than Φ on leg III.

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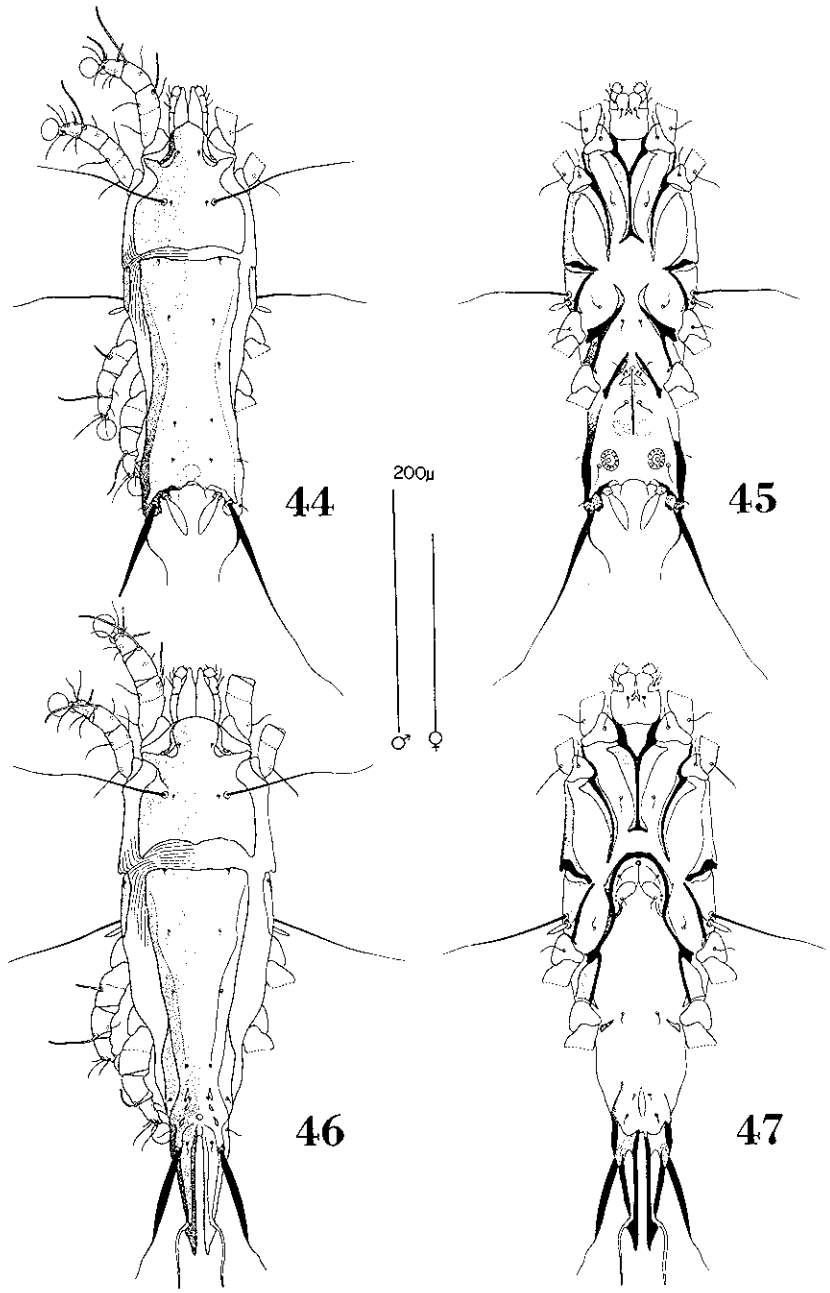


Figs. 44-47. *Toxerodectes attenuatus*, n. sp.: dorsal and ventral aspects of male (44, 45) and female (46, 47).

TYPE DATA. From *Florisuga m. mellivora:* ♂ holotype, 3 ♂♂, 9 ♀♀ paratypes, Vallee Nacional, Oaxaca, Mexico, March 9, 1961, L. L. Wolf; 3 ♀♀ paratypes, Escuilapa, Oaxaca, Mexico, April 9, 1939, M. del Toro Aviles; 2 ♀♀ paratypes, Futla, Oaxaca, Mexico, June 22, 1939, M. del Toro Aviles; 1 ♀ paratype, Escuilapa, Oaxaca, Mexico, April 17, 1939, M. del Toro Aviles. The holotype and paratypes and deposited in the University of Georgia; paratypes deposited: GAUD, NMNH.

REMARKS. This is one of two cases in which the type series of two *Toxerodectes* species were collected from the same study skin: *T. attenuatus* and *T. florisugae* from *Florisuga mellivora* and *T. grandissimus* and *T. kangi* from *Campylopterus hemileucurus.* Each double infestation occurred in Oaxaca and it is probable that contamination has resulted in questionable host associations for one of each pair of *Toxerodectes* species.

Toxerodectes gladiger (Trouessart)

Proctophyllodes (Pterodectes) gladiger Trouessart, 1885: 82-83.
Pterodectes gladiger: Poppe, 1888: 224.—Canestrini and Kramer, 1899: 127.—Radford, 1953: 214; 1958: 142, 143.
Toxerodectes gladiger: Park and Atyeo, 1971*a*: 78.

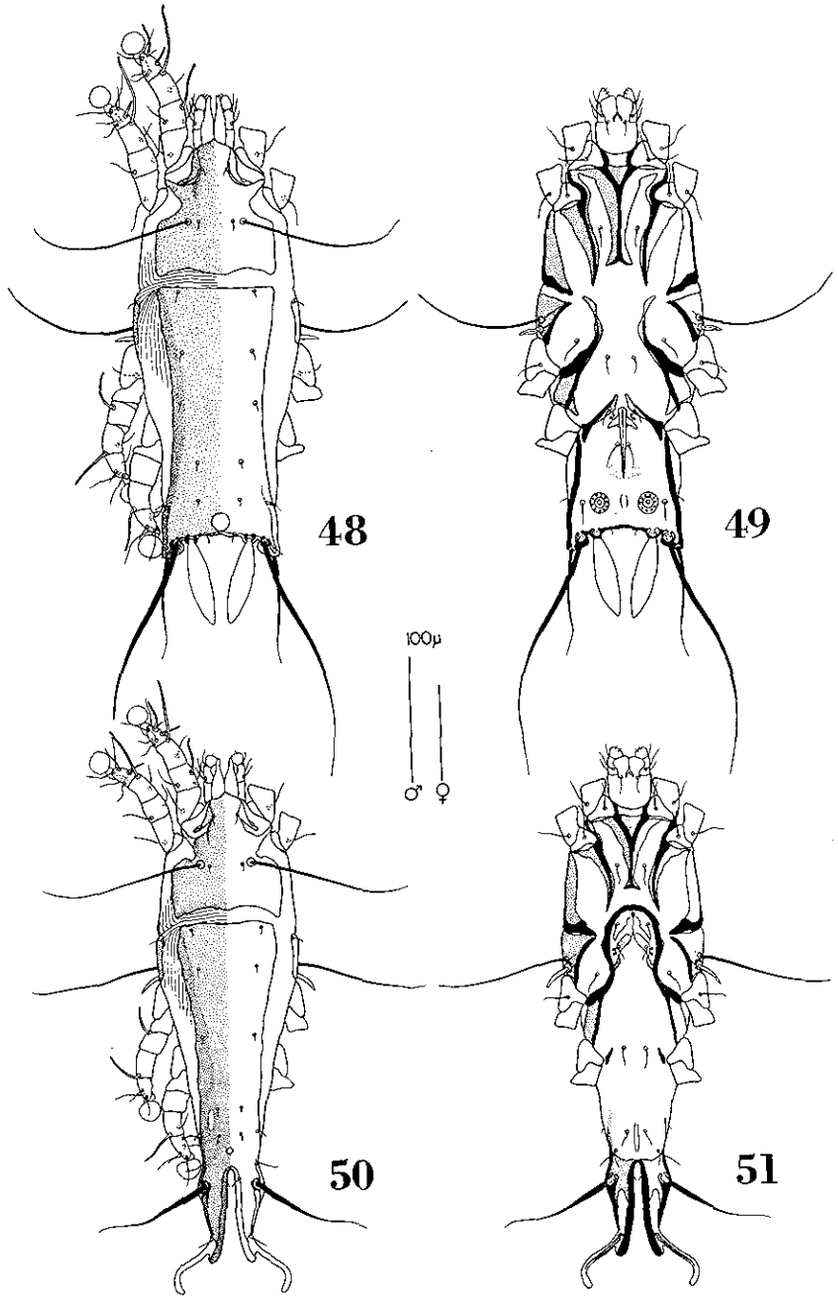
MALE (lectotype). Length, 389μ; width, 148μ. Propodosomal shield 114μ in length, 106μ in width; external scapular setae separated by 48μ, internal scapular setae by 31μ. Scapular shields absent. Hysterosomal shield 226μ in length, 103μ in width; terminal cleft indistinct. Ventral idiosoma with coxal fields I-IV open; genital organ 57μ in length, extended midway between *c 2* and adanal discs; adanal discs 18μ in diameter, separated center-to-center by 42μ; anal shields present. Setae: *sh,* 18μ x 3μ, bladelike; *d 5,* 75μ in length, lanceolate; *d 2* and *d 4* in trapezoidal arrangement; *d 4* at level of *l 3*. Tarsi IV not extended to level of setae *pae;* solenidion Φ on tibia IV subequal to Φ on tibia III; σ *l* subequal to Φ on leg III.

FEMALE (paralectotype). Length, excluding hysterosomal appendages, 526μ; width, 156μ. Propodosomal shield 127μ in length, 122μ in width; external scapular setae separated by 56μ, internal scapular setae by 36μ. Scapular shields absent. Hysterosomal shield 358μ in length, 112μ in width; terminal cleft narrow, V-shaped, 104μ in length; hysterosomal appendages arising lateral to apices of the lobes. Setae: *sh,* 28μ x 5μ, bladelike; *d 5,* 8μ in length; *l 5,* 107μ in length, basally dilated; *d 2* and *d 4* in trapezoidal arrangement; *pai* inserted at level posterior to *l 5;* Φ on tibia IV subequal to Φ on tibia III; σ *l* subequal to Φ on leg III.

TYPE DATA. From *Chrysolampis mosquitus:* ♂ lectotype, 2 ♂♂, 12 ♀♀ paralectotypes, "Guyanes, Equateur", other data unknown; 7 ♂♂, 17 ♀♀ paralectotypes, "Guyanes", other data unknown. The types are in the Trouessart Collections.

ADDITIONAL MATERIAL. From *Chrysolampis mosquitus:* 10 ♂♂, 23 ♀♀, South America, no other data; 1 ♂, Vega de Oropouche, Trinidad, British West Indies, February 2, 1960, T. H. G. Aitkin; 1 ♂, 2 ♀♀, Colombia, no other data.

REMARKS. *Chrysolampis mosquitus* appears to be the only host of *Toxerodectes gladiger.* However, there are numerous forms similar to *T. gladiger* from birds mentioned by Trouessart (1885) and in our collections.



Figs. 48-51. *Toxerodectes gladiger* (Trouessart): dorsal and ventral aspects of male (48, 49) and female (50, 51).

These are: *Anthracothorax viridis* (=*Lampornis viridis*), Puerto Rico; *Aphantochroa cirrochloris,* Brazil; *Chrysuronia oenone,* Ecuador; *Eulampis jugularis,* West Indies; *Lepidopyga coeruleogularis,* Panama; *Leucippus fallax,* Venezuela; and *Phaeochroa cuvieri,* Costa Rica.

Toxerodectes parallelus, new species

MALE (holotype). Length, 403μ; width, 162μ. Propodosomal shield 114μ in length, 133μ in width; without lacunae; external scapular setae separated by 56μ, internal scapular setae by 39μ. Scapular shields absent. Hysterosomal shield 230μ in length, 130μ in width; without lacunae; terminal cleft 30μ in length. Ventral idiosoma with coxal fields I-IV open; genital organ 63μ in length, extended to level of anal shields; adanal discs 20μ in diameter, separated center-to-center by 40μ; anal shields present. Setae: *sh,* 22μ x 3μ, bladelike; *d 5,* 45μ in length, leaflike; *d 2* and *d 4* in rectangular arrangement; *d 4* anterior to level of *l 3*. Tarsi IV not extended to level of setae *pae;* solenidion Φ on tibia IV slightly longer than Φ on tibia III; σ *l* slightly shorter than Φ on leg III.

FEMALE (paratype.) Length, excluding hysterosomal appendages, 584μ; width, 182μ. Propodosomal shield 137μ in length, 150μ in width; without lacunae; external scapular setae separated by 65μ, internal scapular setae by 43μ. Scapular shields absent. Hysterosomal shield 370μ in length, 142μ in width; without lacunae; terminal cleft U-shaped, 103μ in length; hysterosomal appendages arising lateral to apices of lobes. Setae: *sh,* 30μ x 4μ, bladelike; *d 5,* 15μ in length, *l 5,* 120μ in length, basally not dilated; *d 2* and *d 4* in a rectangular arrangement; *pai* inserted at the level of *l 5;* Φ on tibia IV subequal to Φ on tibia III; σ *l* slightly shorter than Φ on leg III.

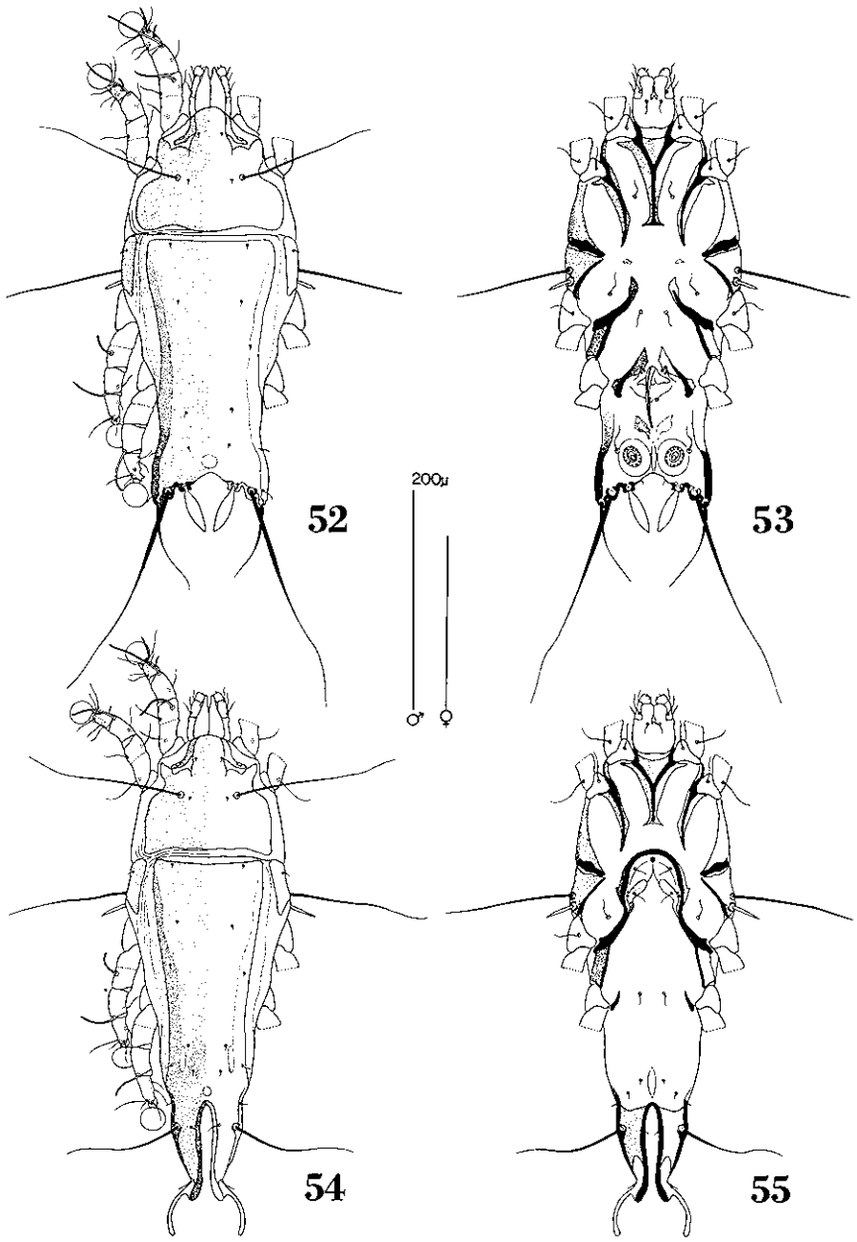
TYPE DATA. From *Eupetomena m. macroura:* ♂ holotype, 2 ♂♂, 2 ♀♀ paratypes, Mato Grosso, Brazil, September, 1882, collector unknown; 1 ♂, 2 ♀♀ paratypes, Mato Grosso, Brazil, [*circa* 1885], H. H. Smith; 2 ♂♂, 1 ♀ paratypes, Mato Grosso, Brazil, August 13, 1885, H. H. Smith; 2 ♀♀ paratypes, Rio Maderia, Brazil, 1906, W. Hoffmanns. The holotype and paratypes are deposited in the American Museum of Natural History; paratypes deposited in the University of Georgia.

REMARKS. This species, apparently restricted to birds of the genus *Eupetomena,* is closely related to *T. gladiger* and *T. attenuatus,* but is separated by the male being larger and having setae *d 5* more or less lonceolate rather than spatula-shaped, and by the female having the terminal cleft parallel-sided with setae *pai* positioned at the level of *l 5*. The name *parallelus* refers to the condition of the terminal cleft in the female.

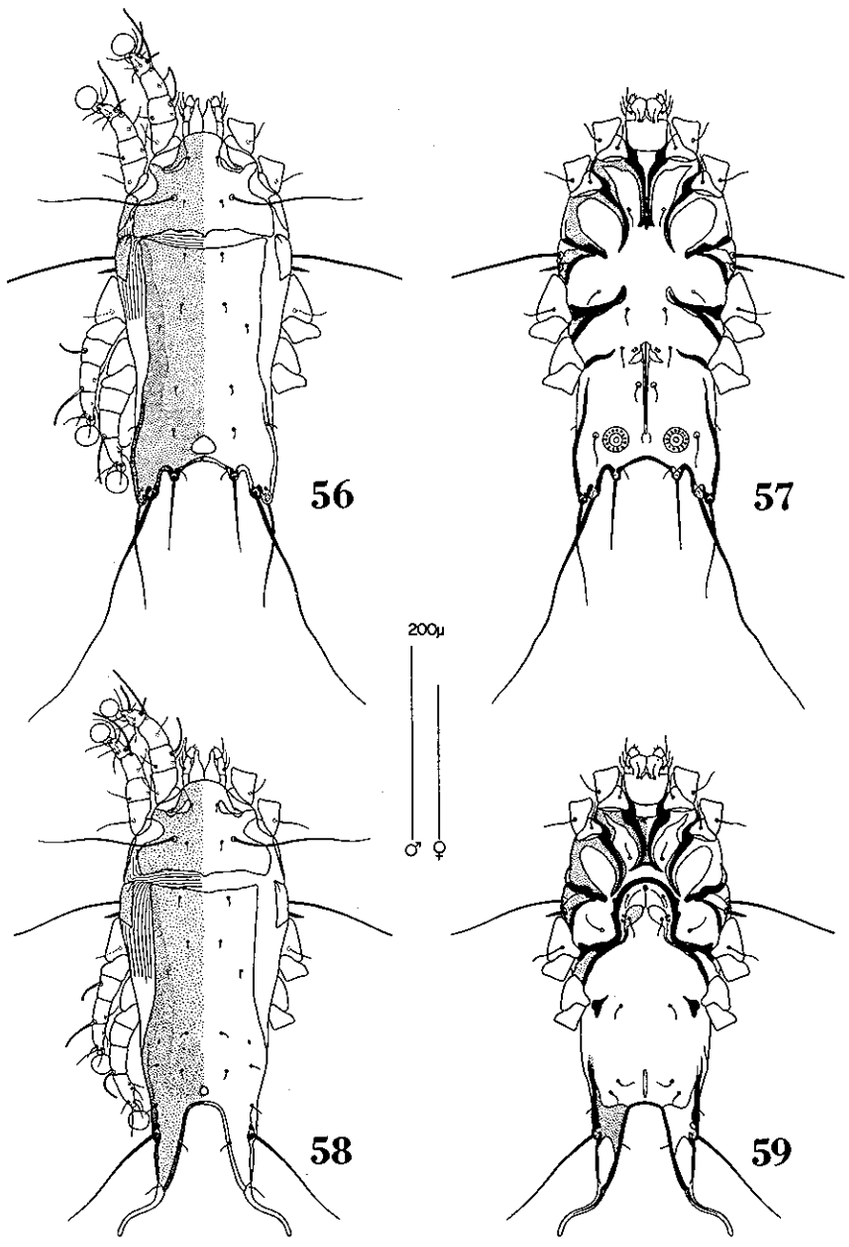
THE *LECROYAE* GROUP

Toxerodectes grandissimus, new species

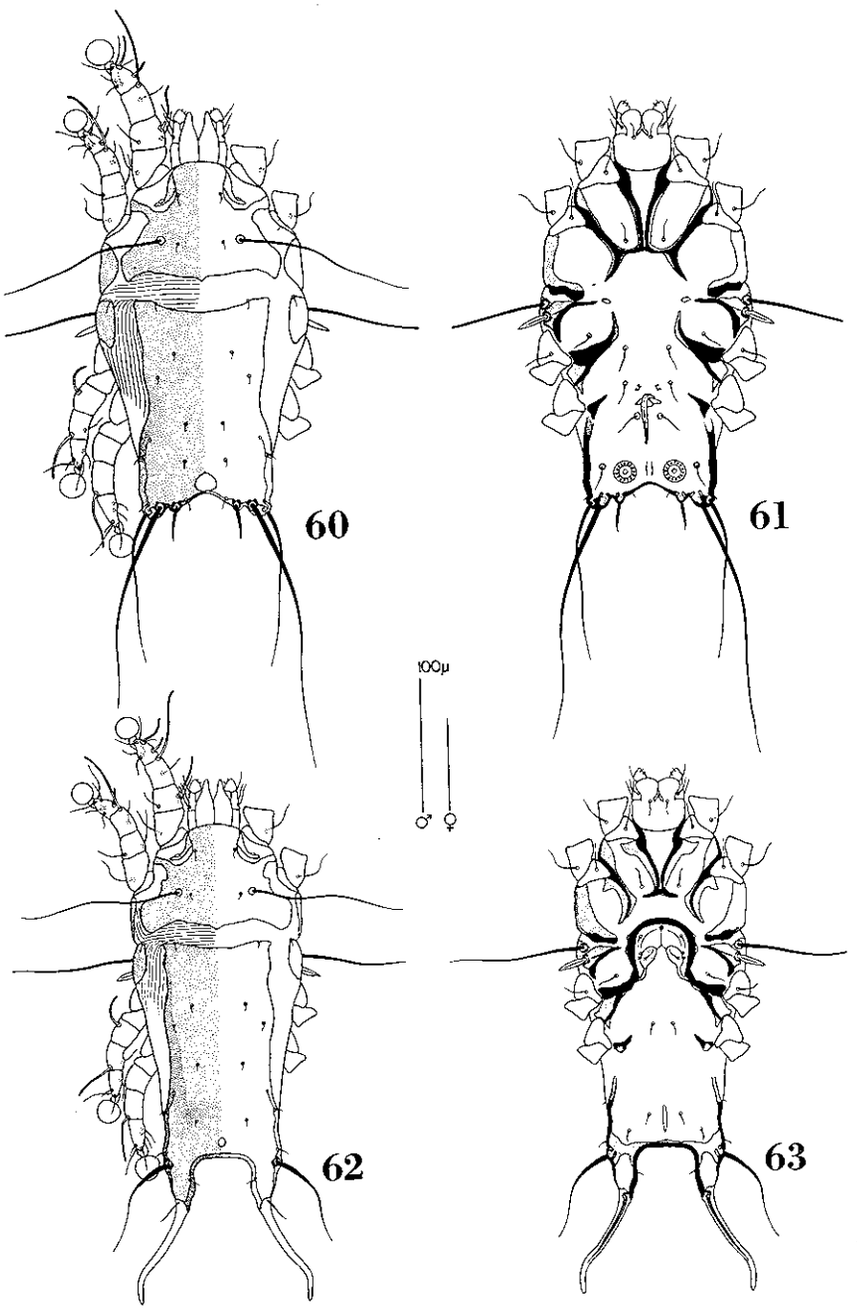
MALE (holotype). Length, 448μ; width, 195μ. Propodosomal shield 109μ in length, 150μ in width; external scapular setae separated by 62μ, internal scapular setae by 42μ. Scapular shields present. Hysterosomal shield 284μ in length, 156μ in width; terminal cleft 52μ in length. Ventral idiosoma with coxal fields I-IV open; genital organ 96μ in length, extended to level of adanal discs; adanal discs 26μ in diameter, separated center-to-center by 65μ; anal shields absent. Setae: *sh,* 23μ x 2μ, spiculiform;



Figs. 52-55. *Toxerodectes parallelus*, n. sp.: dorsal and ventral aspects of male (52, 53) and female (54, 55).



Figs. 56-59. *Toxerodectes grandissimus,* n. sp.: dorsal and ventral aspects of male (56, 57) and female (58, 59).



Figs. 60-63. *Toxerodectes heliomasteris,* n. sp.: dorsal and ventral aspects of male (60, 61) and female (62, 63).

d 5, 70μ in length, spiculiform; *d 2* and *d 4* in trapezoidal arrangement; *d 4* at level of *l 3*. Tarsi IV not extended to level of setae *pae;* solenidion Φ on tibia IV subequal to Φ on tibia III; σ *l* shorter than Φ on leg III.

FEMALE (paratype). Length, excluding hysterosomal appendages, 616μ; width, 233μ. Propodosomal shield 130μ in length, 173μ in width; external scapular setae separated by 78μ, internal scapular setae by 48μ. Scapular shields present. Hysterosomal shield 430μ in length, 161μ in width; terminal cleft broad, U-shaped, 122μ in length; hysterosomal appendages arising from apices of lobes. Setae: *sh*, 23μ x 2μ, spiculiform; *d 5*, 8μ in length; *l 5*, 156μ in length, setiform; *d 2* and *d 4* in trapezoidal arrangement; *pai* inserted midlength of cleft; Φ on tibia IV subequal to Φ on leg III; σ *l* shorter than Φ on leg III.

TYPE DATA. From *Campylopterus h. hemileucurus:* ♂ holotype, 1 ♂, 4 ♀ ♀ paratypes, Escuilapa, Oaxaca, Mexico, April 12, 1939, M. del Toro Aviles; 1 ♂, 1 ♀ paratypes, Vallee Nacional, Oaxaca, Mexico, April 22, 1961, L. L. Wolf; 1 ♀ paratype, Soyaltepec, Oaxaca, Mexico, November 10, 1943, M. del Toro Aviles; 3 ♀ ♀ paratypes, San Rafael del Norte, Jinotega, Nicaragua, March 29, 1917, collector unknown. The holotype and paratypes are deposited in the University of Georgia; paratypes deposited: AMNH, NMNH.

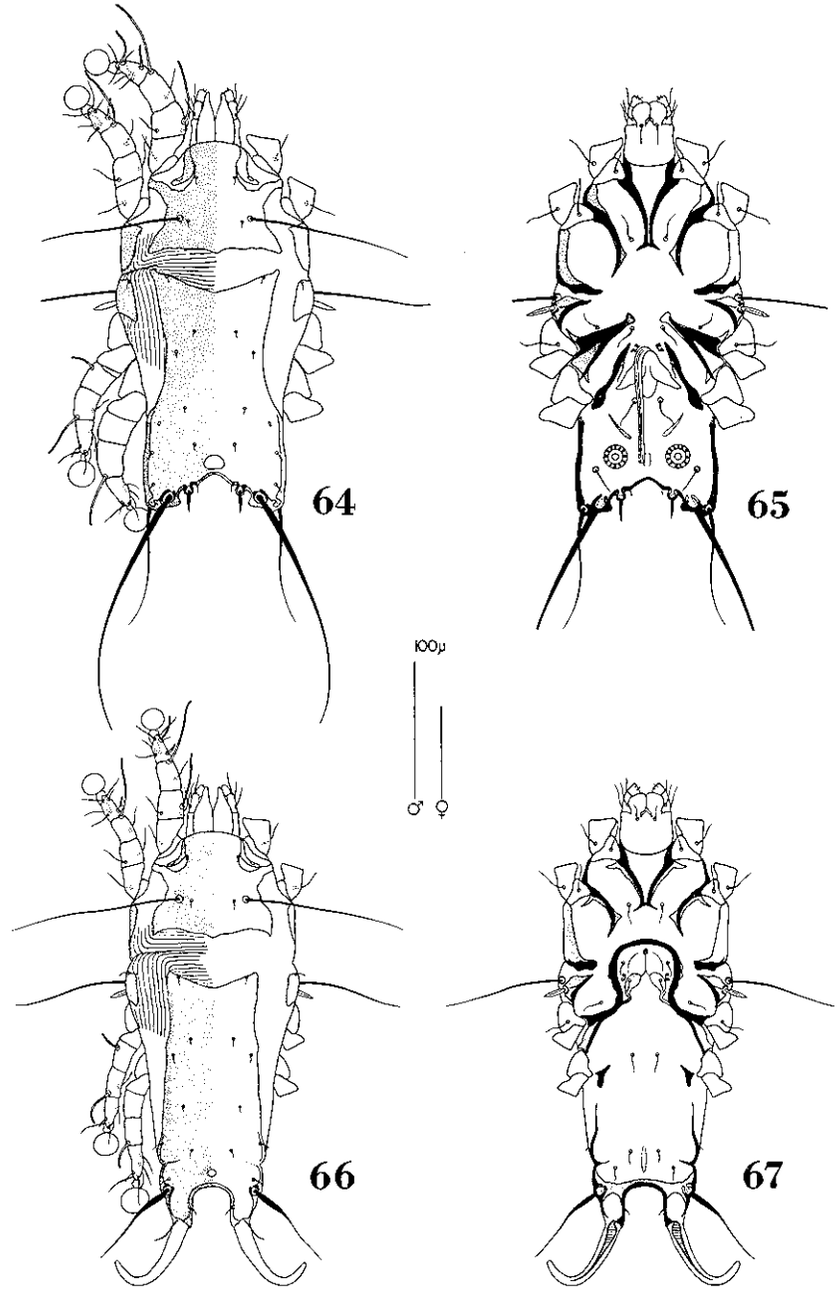
REMARKS. This taxon is readily separated from all the other species of *Toxerodectes* by its body size, and by the male having long, needle-like *d 5*. The name *grandissimus* refers to the large body size of both sexes.

Toxerodectes heliomasteris, new species

MALE (holotype). Length, 316μ; width, 169μ. Propodosomal shield 96μ in length, 125μ in width; external scapular setae separated by 65μ, internal scapular setae by 39μ. Scapular shields present. Hysterosomal shield 166μ in length, 104μ in width; terminal cleft 18μ in length. Ventral idiosoma with coxal fields I closed, II-IV open; genital organ 36μ in length, extended to midway between *c 2* and adanal discs; adanal discs 17μ in diameter, separated center-to-center by 39μ; anal shields absent. Setae: *sh*, 29μ x 5μ, bladelike; *d 5*, 25μ in length, spiculiform; *d 2* and *d 4* in trapezoidal arrangement; *d 4* near level of *l 3*. Tarsi IV extended to level of setae *pae;* solenidion Φ on tibia IV longer than Φ on tibia III; σ *l* shorter than Φ on leg III.

FEMALE (paratype). Length, excluding hysterosomal appendages, 492μ; width, 197μ. Propodosomal shield 117μ in length, 169μ in width; external scapular setae separated by 80μ, internal scapular setae by 49μ. Scapular shields present. Hysterosomal shield 295μ in length, 132μ in width; terminal cleft broad, U-shaped, 62μ in length; hysterosomal appendages arising from apices of lobes. Setae: *sh*, 32μ x 6μ, bladelike; *d 5*, 21μ in length; *l 5*, 86μ in length, basally dilated; *d 2* and *d 4* in rectangular arrangements; *pai* inserted midlength of cleft; Φ on tibia IV subequal to Φ on leg III; σ *l* shorter than Φ on leg III.

TYPE DATA. From *Heliomaster longirostris pallidiceps:* ♂ holotype, 4 ♂ ♂, 5 ♀ ♀ paratypes, Presidio, Veracruz, Mexico, January 23, 1943, A. Ramirez; 4 ♂ ♂, 5 ♀ ♀ paratypes, Rancho Cacahuatl, Chiapas,



Figs. 64-67. *Toxerodectes lecroyae*, n. sp.: dorsal and ventral aspects of male (64, 65) and female (66, 67).

Mexico, March 18, 1954, C. C. Lamb; 3 ♂♂, 4 ♀♀ paratypes, Puerta Vallarta, Jalisco, Mexico, June 26, 1950, C. C. Lamb; 3 ♂♂, 4 ♀♀ paratypes, 15 miles northeast Tapanatepec, Oaxaca, Mexico, January 8, 1947, C. C. Lamb. The holotype and paratypes are deposited in the University of Georgia; paratypes deposited: AMNH, BMNH, CAS, GAUD, LAS, NMNH, ZSZM.

ADDITIONAL MATERIAL. From *Heliomaster c. constantii:* 32 ♂♂. 21 ♀♀, Mataglapa, Nicaragua (3 collections). From *H. c. leocadiae:* 8 ♂♂, 7 ♀♀, Sinaloa, Mexico (2 collections).

Toxerodectes lecroyae, new species

MALE (holotype). Length, 318μ; width, 156μ. Propodosomal shield 83μ in length, 104μ in width; external scapular setae separated by 53μ, internal scapular setae by 40μ. Scapular shields present. Hysterosomal shield 182μ in length, 109μ in width; terminal cleft 28μ in length. Ventral idiosoma with coxal fields I-IV open; genital organ 89μ in length, extended to level of adanal discs; adanal discs 18μ in diameter, separated center-to-center by 48μ; anal shields present. Setae: *sh,* 21μ x 4μ, bladelike; *d 5,* 16μ in length, spiculiform; *d 2* and *d 4* in rectangular arrangement; *d 4* at level of *l 3.* Tarsi IV extended to level of setae *pae;* solenidion Φ on tibia IV subequal to Φ on tibia III; σ *1* shorter than Φ on leg III.

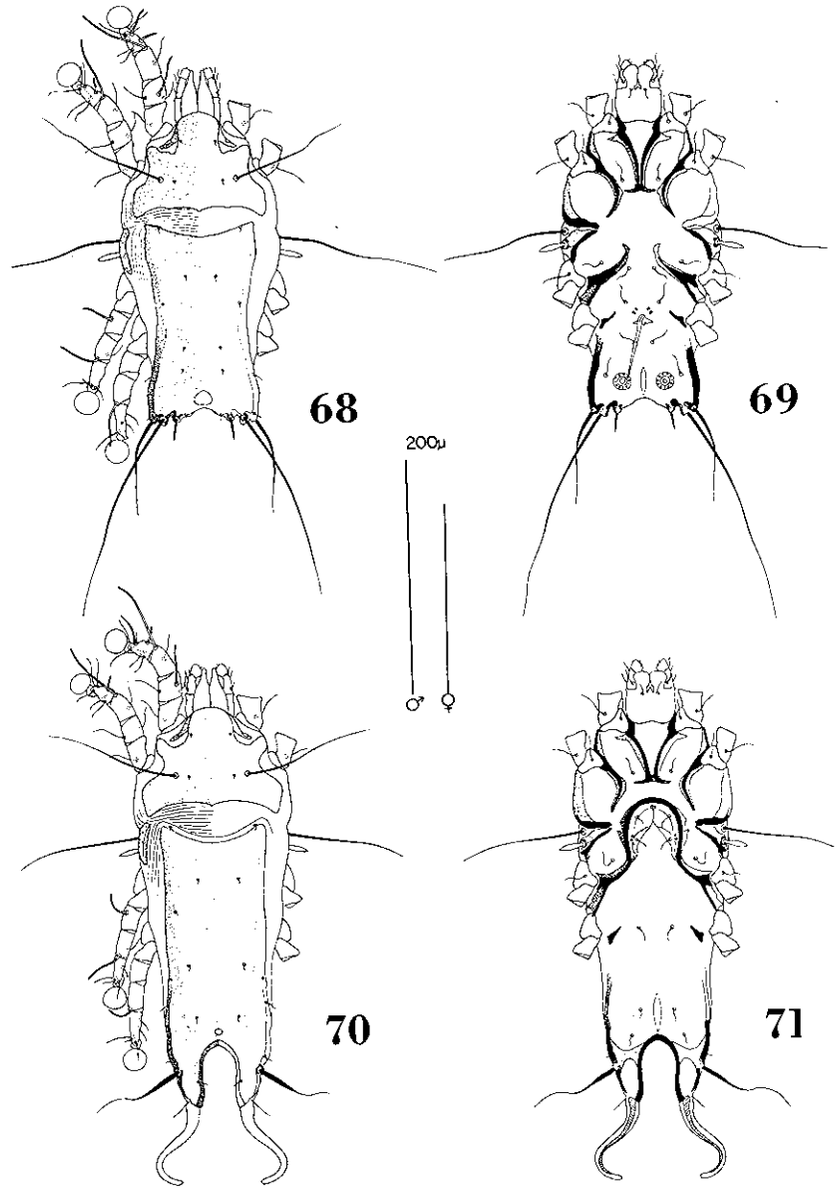
FEMALE (paratype). Length, excluding hysterosomal appendages, 482μ; width, 192μ. Propodosomal shield 112μ in length, 143μ in width; external scapular setae separated by 76μ, internal scapular setae by 53μ. Scapular shields present. Hysterosomal shield 282μ in length, 130μ in width; terminal cleft U-shaped, 47μ in length; hysterosomal appendages arising from apices of lobes. Setae: *sh,* 27μ x 5μ, bladelike; *d 5,* 34μ in length; *l 5,* 104μ in length, basally dilated; *d 2* and *d 4* in rectangular arrangement; *pai* inserted midlength of cleft; Φ on tibia IV shorter than Φ on leg III; σ *1* shorter than Φ on leg III.

TYPE DATA. From *Lampornis clemenciae bessophilus:* ♂ holotype, 1 ♂, 1 ♀ paratypes, Santa Lucia, Sinaloa, Mexico, October 26, 1934, C. C. Lamb; 1 ♂, 2 ♀♀ paratypes, same data as holotype except November 1, 1934; 4 ♂♂ paratypes, May 19, 1937 and 3 ♂♂ paratypes, May 16, 1937, Mt. Mahinora, Chihuahua, Mexico, R. T. Moore. The holotype and paratypes are deposited in the University of Georgia; paratypes deposited: GAUD, NMNH.

ADDITIONAL MATERIAL. From *Lampornis a. amethystinus:* 2 ♂♂, 3 ♀♀, Oaxaca, Puebla, Mexico (2 collections). From *L. c. clemenciae*: 5 ♂♂, 3 ♀♀, Texas. From *L. viridipallens*: 8 ♂♂, 5 ♀♀, Chiapas, Mexico (4 collections). From *Lamprolaima rhami*: 19 ♂♂, 14 ♀♀, Guerrero, Mexico (4 collections).

REMARKS. There is a smaller version of *Toxerodectes lecroyae* from *Amazilia beryllina,* Sinaloa, Mexico which we prefer to retain in a *T. lecroyae* complex rather than establish a new species for a form that may display geographical variation.

This new species is named for Mary LeCroy of the American Museum of Natural History. Mrs. LeCroy has given us invaluable assistance in establishing host synonymies and determining accurate collecting data, especially of localities in New Guinea.



Figs. 68-71. *Toxerodectes subulatus,* n. sp.: dorsal and ventral aspects of male (68, 69) and female (70, 71).

Toxerodectes subulatus, new species

MALE (holotype). Length, 302μ; width, 145μ. Propodosomal shield 90μ in length, 112μ in width; without lacunae; external scapular setae separated by 60μ, internal scapular setae by 40μ. Scapular shields absent. Hysterosomal shield 170μ in length, 100μ in width; without lacunae; terminal cleft 16μ in length. Ventral idiosoma with coxal fields I nearly closed; genital organ 50μ in length, extended beyond the level of midway between *c 2* and adanal discs; adanal discs 15μ in diameter, separated center-to-center by 35μ; anal shields absent. Setae: *sh,* 22μ x 5μ, bladelike; *d 5,* 20μ in length, spikelike; *d 2* and *d 4* in rectangular arrangement; *d 4* anterior to level of *l 3*. Tarsi IV extended beyond level of setae *pae;* solenidion Φ on tibia IV slightly longer than Φ on tibia III; σ *1* slightly shorter than Φ on leg III.

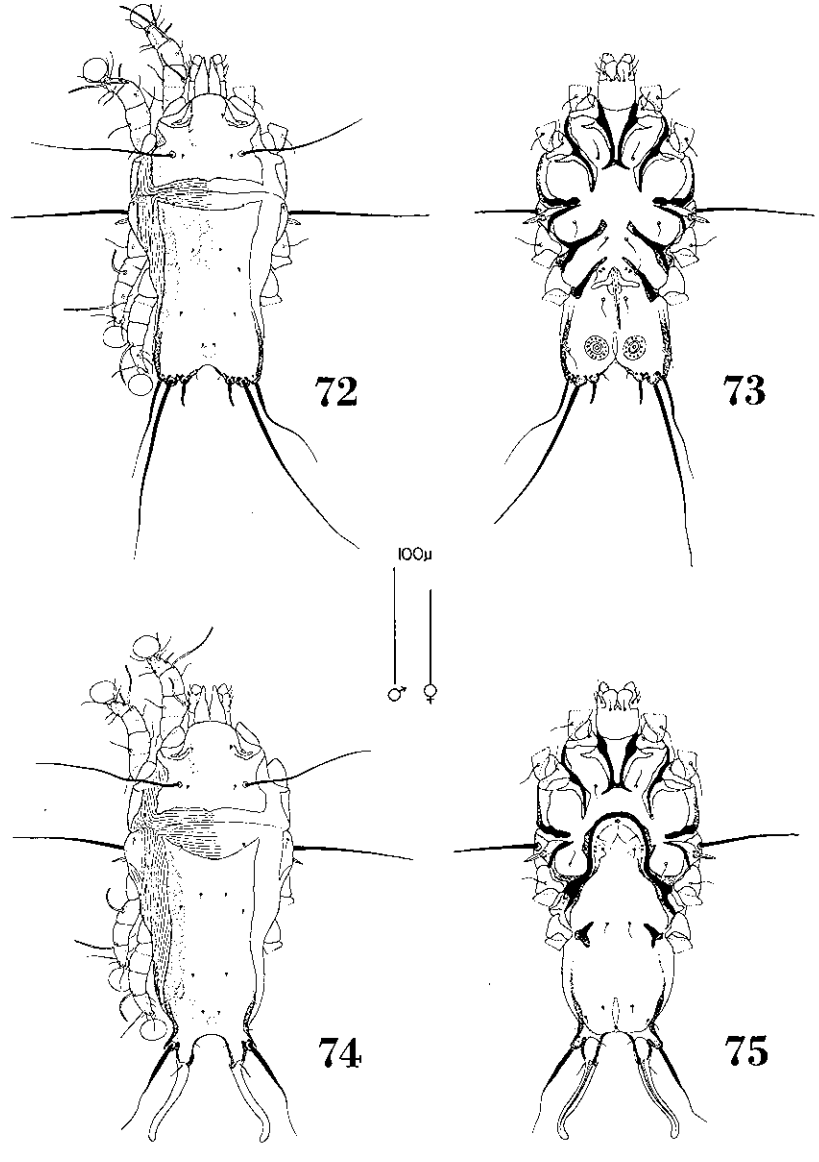
FEMALE (paratype). Length, excluding hysterosomal appendages, 46μ; width, 171μ. Propodosomal shield 113μ in length, 145μ in width; without lacunae; external scapular setae separated by 75μ, internal scapular setae by 47μ. Scapular shields absent. Hysterosomal shield 290μ in length, 120μ in width; without lacunae; terminal cleft U-shaped, 62μ in length; hysterosomal appendages arising from the apices of lobes. Setae: *sh,* 25μ x 6μ, bladelike; *d 5,* 36μ in length; *l 5,* 135μ in length, basally dilated; *d 2* and *d 4* in rectangular arrangement; *pai* inserted at the level posterior to *l 5;* Φ on tibia IV slightly shorter than Φ on tibia III; σ *1* slightly shorter than Φ on leg III.

TYPE DATA. From *Colibri serrirostris:* ♂ holotype, 7 ♀♀ paratypes, Mato Grosso, Brazil, July, 1883, collector unknown; 4 ♂♂, 4 ♀♀ paratypes, São Paulo, Brazil, March 14, 1965, Weiner; 6 ♂♂, 1 ♀ paratypes, São Benedicto, Minas Gerais, Brazil, January 19, 1930, E. Kaempfer; 8 ♂♂, 5 ♀♀ paratypes, Mato Grosso, Brazil, July 8, 1883, collector unknown. The holotype and paratypes are deposited in the American Museum of Natural History; paratypes deposited: GAUD, LAS, NMNH, NU, UGA.

REMARKS. This species is closely related to *T. heliomasteris,* but is readily separated by the male having a small genital arch and awl-shaped setae *d 5,* and by the female having the terminal cleft longer than wide. This taxon is restricted to birds of *Colibri* in Brazil; the name *subulatus* refers to the condition of setae *d 5* in the male.

Toxerodectes zusii, new species

MALE (holotype). Length, 282μ; width, 135μ. Propodosomal shield 78μ in length, 95μ in width; external scapular setae separated by 58μ, internal scapular setae by 40μ. Scapular shields present. Hysterosomal shield 150μ in length, 90μ in width; terminal cleft 18μ in length. Ventral idiosoma with coxal fields I-IV open; genital organ 51μ in length, extended to level of anterior end of anus; adanal discs 18μ in diameter, separated center-to-center by 33μ; anal shields present. Setae: *sh,* 17μ x 3μ, bladelike; *d 5,* 23μ in length, spiculiform; *d 2* and *d 4* in trapezoidal arrangement; *d 4* posterior to level of *l 3*. Tarsi IV not extended to level of setae *pae;* solenidion Φ on tibia IV subequal to Φ on tibia III; σ *1* shorter than Φ on leg III.



Figs. 72-75. *Toxerodectes zusii*, n. sp.: dorsal and ventral aspects of male (72, 73) and female (74, 75).

FEMALE (paratype). Length, excluding hysterosomal appendages, 408μ; width, 108μ. Propodosomal shield 94μ in length, 120μ in width; external scapular setae separated by 70μ, internal scapular seta by 50μ. Scapular shields present. Hysterosomal shield 238μ in length, 100μ in width; terminal cleft wide, U-shaped, 37μ in length, 41μ in width; hysterosomal appendages arising at apices of lobes. Setae: *sh,* 24μ x 4μ, bladelike; *d 5,* 23μ in length; *l 5,* 103μ in length, basally dilated; *d 2* and *d 4* in trapezoidal arrangement; *pai* positioned anterior to level of terminal cleft midlength; solenidion Φ on tibia IV shorter than Φ on tibia III; σ *1* shorter than Φ on leg III.

TYPE DATA. From *Urosticte b. benjamini:* ♂ holotype, 4 ♂♂, 8 ♀♀ paratypes, August, 1898 and 2 ♂♂, 4 ♀♀ paratypes, July, 1898, Qualea, Esmeraldas prov., Ecuador, Goodfellow and Hamilton. The holotype and paratypes are deposited in the National Museum of Natural History; paratypes deposited: AMNH, GAUD, UGA.

ADDITIONAL MATERIAL. From *Urosticte b. benjamini:* 4 ♂♂, 13 ♀♀, Pichincha and Esmeraldas provinces, Ecuador (3 collections with incomplete data). From *U. rufricrissa:* 1 ♂, 1 ♀, Huíla dept., Colombia.

REMARKS. This species appears to be restricted to birds of the genus *Urosticte;* it can be easily distinguished from related species by the male having the genital organ extending to the anterior end of the anal slit, and by the female having the terminal cleft wider than long and the terminal lobes with lateral protuberances at the level of setae *l 5*. The taxon is named for Dr. Richard L. Zusi, Curator, Division of Birds, National Museum of Natural History — Smithsonian Institution, who has rendered invaluable cooperation during the course of the present study.

LITERATURE CITED

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SOIL-WASHING APPARATUS FOR RECOVERY OF TABANID LARVAE AND OTHER INVERTEBRATES[1]

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ABSTRACT

A description and illustrations are provided for construction of a portable rack for washing salt marsh soil and vegetation to recover invertebrates. A portable gasoline-powered pump is used to wash the samples through two sizes of wire mesh with the water being sprayed from above and below the sample.

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