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A REDESCRIPTION OF *PTERONYSSOIDES TYRRELLI*
 (CANESTRINI, 1899)
 A FEATHER MITE FROM THE TREE SWALLOW¹
 (ACARI — ACARIFORMES)

BY

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Pteronyssoides tyrrelli was originally described, as *Pteronyssus fuscus*, by TYRRELL (1882). TYRRELL's material was from *Tachycineta bicolor* (Vieillot, 1808), but no type locality was designated. Subsequently, CANESTRINI (1899, in CANESTRINI and KRAMER) pointed out the homonymy of *Pteronyssus fuscus* (Nitzsch, 1818) and *Pteronyssus fuscus* Tyrrell, 1882, proposed *Pteronyssus tyrrelli* as a new name for the latter species, and designated Canada as the type locality.

HULL (1931) restricted the genus *Pteronyssus*, with *Acarus gracilis* Nitzsch, 1818 (? = *Dermaelichus picinus* Koch, 1841) as type, to those species in which the coxal apodemes I are fused. For the species formerly included in *Pteronyssus* in which the coxal apodemes I are separated, HULL proposed the genus *Pteronyssoides* with *Pteronyssus striatus* Robin, 1877 as the type species. TROUESSART (1915), however, gave the type species of *Pteronyssus* as *Pteronyssus striatus* Robin, 1877. BAKER and WHARTON (1952), DUBININ (1953), and GAUD (1953) do not refer at all to the work of HULL (1931, 1934) and list *Pteronyssus striatus* Robin, 1877 as the type species of *Pteronyssus*. GAUD and MOUCHET (1959) pointed out the initial mistake of Trouessart and redefined the genera *Pteronyssus* and *Pteronyssoides*.

The genus *Pteronyssoides* may be distinguished from other genera in the *Pteronyssus* complex (*Pteronyssus* Robin, 1868, *Hyonyssus* Gaud and Mouchet, 1959, *Mouchetia* Gaud, 1961, and certain undescribed forms) by the following combination of characters: unpaired vertical seta present; scapular setae borne on prodorsal

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sclerite ; coxal apodemes I separated. In the male leg III greatly hypertrophied ; adanal discs circular in outline ; pregenital sclerite large, fused with coxal sclerite III and IV. Female with pregenital sclerite crescent-shaped, expanding at tips, and extending to second pair of genital papillae ; coxal apodemes III and IV approximate.

MATERIALS AND METHODS.

This study is based on specimens taken from museum study skins and from swallows collected in the field. The museum material was obtained at the following ornithological collections : American Museum of Natural History, New York City ; Cleveland Museum of Natural History, Cleveland ; and the Ohio State Museum, Columbus. The largest part of the material, and that best suited for study, was collected at the Ohio Agricultural Research and Development Center, North Central Sub-station, Vickery, Ohio. Collection data for birds taken in the field and for bird skins in the above mentioned museum collections are given in Table I.

TABLE I.

Source of material	Collection Data	Number of <i>P. tyrrelli</i> examined
Field	3-ix-64. North Central Farm, OARDC, Vickery, Erie Co., Ohio. D. E. Johnston and W. A. Bruce colls. (7 birds)	15 Male 13 Female
Field	4-ix-64. North Central Farm, OARDC, Vickery, Erie Co., Ohio. D. E. Johnston and W. A. Bruce colls. (2 birds)	34 Male 31 Female
American Museum Natural History	AMNH No. 371135. 23-vii-1894. Fairview, N. J. J. Dwight, Jr. coll.	7 Male 19 Female
Cleveland Museum Natural History	CMNH No. 26878. 18-iv-1930. Aurora Pond, Portage Co., Ohio. J. S. Alrich coll.	18 Male 13 Female
Ohio State Museum	OSM No. 5379. 19-iv-1904. W. F. Henninger collection Ottawa, Ontario.	7 Male 19 Female
	OSM No. 4511. 28-xi-1881. W. F. Henninger collection. W. Bridge, Mass. E. J. Shores coll.	1 Male 5 Female
	OSM No. 4655. 28-xi-1881. W. F. Henninger collection. W. Bridgewater, Mass. E. J. Shores coll.	1 Male 4 Female
	OSM No. 3413. 18-xii-1920. Wilson, Florida. W. W. Worthington coll.	4 Male 4 Female
	OSM No. 3412. 18-xii-1920. Wilson, Florida. W. W. Worthington coll.	1 Male 2 Female
	OSM No. 6735. 1-vii-1934. Lucas Co., Ohio. L. W. Campbell coll.	2 Male 4 Female
	OSM No. 3411. 18-xii-1920. Wilson, Florida. W. W. Worthington coll.	0 Male 2 Female
	OSM No. 4765. 15-x-1894. Shelter Is., N. Y. (Collector not indicated)	2 Male 4 Female

This table includes only the number of *Pteronyssoides tyrrelli* (Canestrini, 1899) examined and does not indicate the actual number of specimens collected. In addition to the material from *Tachycineta bicolor* mentioned above, *Pteronyssoides* spp. from the following American and European Hirundinidae were studied: *Delichon urbica urbica* (L., 1758); *Tachycineta thalassina lepida* Mearns, 1902; *Progne subis subis* (L., 1758); *Stelgidopteryx ruficollis serripennis* (Audubon, 1838); *Riparia riparia riparia* (L., 1758); *Hirundo rustica erythrogaster* Boddaert, 1783; *Hirundo rustica rustica* (L., 1758); *Petrochelidon pyrrhonota pyrrhonota* (Vieillot, 1817); and *Petrochelidon fulva pallida* Nelson, 1902.

Measurements were made with the aid of an ocular micrometer and were taken whenever feasible. Descriptive statistics are presented in the following manner: $X \pm S.E.$ (range) (C.V.) (n). In cases where the data were insufficient for analysis, the individual measurements are given in parentheses.

Signatures of the dorsal and ventral idiosomal and leg chaetotaxy are those of Atyeo and Gaud (1967) (cf. Grandjean, 1939; Knülle, 1959; Fain, 1963); and gnathosomal structures that of Johnston (1965).

Genus *Pteronyssoides* Hull.

Pteronyssoides Hull, 1931. *The Vasculum*. 17 (4) : 145. Type, by monotypy and original designation, *Pteronyssus striatus* Robin, 1877.

Pteronyssus Robin, 1868 (in part), *Comptes Rendus Acad. Sci.* 66 : 786-787.

Pteronyssoides tyrrelli (Canestrini).

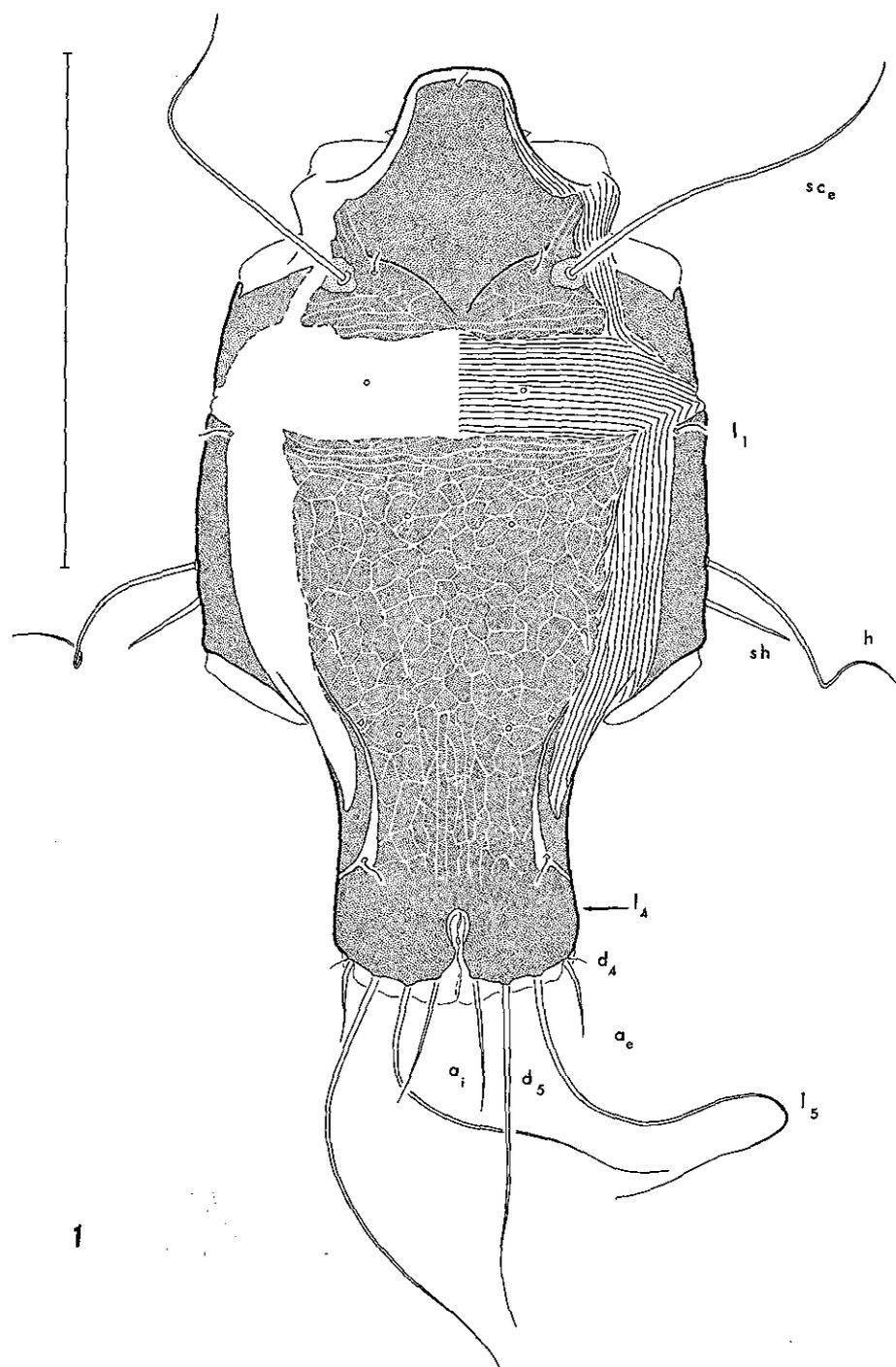
Pteronyssus fuscus Tyrrell, 1882 [*nec* (Nitzsch, 1818)]. *Ottawa Field Nat. Club., Trans.* 3 : 48.

Pteronyssus tyrrelli Canestrini, 1899. In Canestrini and Kramer, *Das Tierreich*. 7 : 79.

Redescription.

MALE. Idiosoma elongate oval, tapering posteriorly and with posterolateral margins concave; length $361.2 \text{ u} \pm 1.7$; (340.0 — 390.0 u); (2.8); width $206.9 \text{ u} \pm 1.7$; (185.0 — 232.5 u); (5.1); (35).

Dorsum (Figure 1) bearing triangular prodorsal and long, tapering opisthonotal sclerites. Prodorsal sclerite reticulate at posterior and lateral margins; pattern weak anteriorly. Sclerite with internal vertical (V_i) seta short, unpaired. External vertical (V_e) setae absent. Scapular setae (Sc) borne on posterolateral margins of prodorsal sclerite. External scapulars (Sc_e) long, tapering; situated on small, weakly sclerotized portion of sclerite. Internal scapulars (Sc_i) short; placed just anterior to Sc_e . Prolateral sclerite small, triangular; extending from base of leg II to level of dorsal seta d_1 .



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FIG. 1 : Mâle ; dorsal aspect ; scale equals 200 μ .

Opisthonotal sclerite 142.0 ± 1.1 ; (25.0 — 55.0); (16.1); (35) at anterior margin. Anterior and lateral margins irregular; frequently situated beneath striations. Sclerite tapering laterally to level of leg IV; expanding to width of opisthosoma posterior to leg IV. Sclerite narrowly concave posteriorly. Opisthosomal setae d_1, d_2, d_3 vestigial; only setal bases present. Dorsal seta d_1 located on soft cuticle midway between prodorsal and opisthonotal sclerite. d_2, d_3 situated on opisthonotal sclerite. Lateral setae l_1 small; borne on anterolateral margin of coxa III sclerite. Lateral setae l_3 somewhat longer than l_2 ; lying in weakly sclerotized area of opisthonotal sclerite. Opisthosomal gland opening at anterior margin of small sclerite; anterior to d_3 . Notogaster bordered ventrally by a hyaline membrane. Opisthosoma slightly bilobed; each lobe bearing 5 terminal setae. Setal designations from midline to lateral margin are: $a_1, d_5, l_5, a_6, d_4, a_1$ long; tapering evenly. d_5 approximately 2.5 X length of a_1 . l_5 long; 1.3 X length of d_5 . a_6 thick at base and tapering rapidly; approximately 0.5 X length of a_1 . d_4 small, situated dorsolaterally to a_6 . l_4 absent; position represented by vestigial base similar to that of V_e .

Venter (Figure 2) with cuticle unsclerotized except for coxal sclerites I-IV, pregenital, genital, and preanal sclerites. Coxal apodemes I not fused. Coxal apodemes II free; widely separated. Coxal apodemes III large; extending to about midpoint of idiosoma and turning acutely inward. Sclerite of coxa III covering portion of dorsal and ventral surface. Sub-humeral setae (sh) dagger-like (32, 29, 34, 33, 32, 32, 30, 35 u); on ridge posteroventral to humeral setae (h). Sclerite of coxa IV fused with pregenital sclerite. Coxal setae (s) and (c_3) of medium length; subequal. cx_3 of coxa III slightly longer, pregenital sclerite concave at anterior margin; with finger-like processes extending laterally to posterior margin of genital sclerite. Anterior genital setae (c_1) of medium length; on pregenital sclerite. Genital sclerite long, narrow; with lateral margins irregular. Posterior genital setae (c_2) short; on posterior end of genital sclerite. Aedeagus small; curved and tapered evenly distally. Preanal sclerite small; anterior portion beneath soft cuticle; all margins irregular. Anal setae (a) posterior to preanal sclerite; borne on small sclerotized area surrounding setal base; of medium length; somewhat thickened toward base. Adanal discs circular in outline; with hyaline membrane surrounding each disc.

Chelicerae (Figure 4) normal; chelate-dentate. Movable digit with 2 teeth. Fixed digit with 6 teeth; paraxial and antiaxial teeth adjacent, forming double row; tooth at paraxial surface larger; all teeth pointed apically. Cheliceral apophysis ($ch\ aps$) at ventral paraxial surface; directed anteroventrally. Cheliceral seta of medium length; blunt apically and expanding at base. Cheliceral hood ($ch\ hd$) present; covering cheliceral seta and base of movable digit. Cheliceral spurs absent.

Subcapitulum (Figure 3). Subcapitular setae present; normal. Supracoxal setae short; expanded slightly at base. Labrum short, blunt. Pseudorutellar

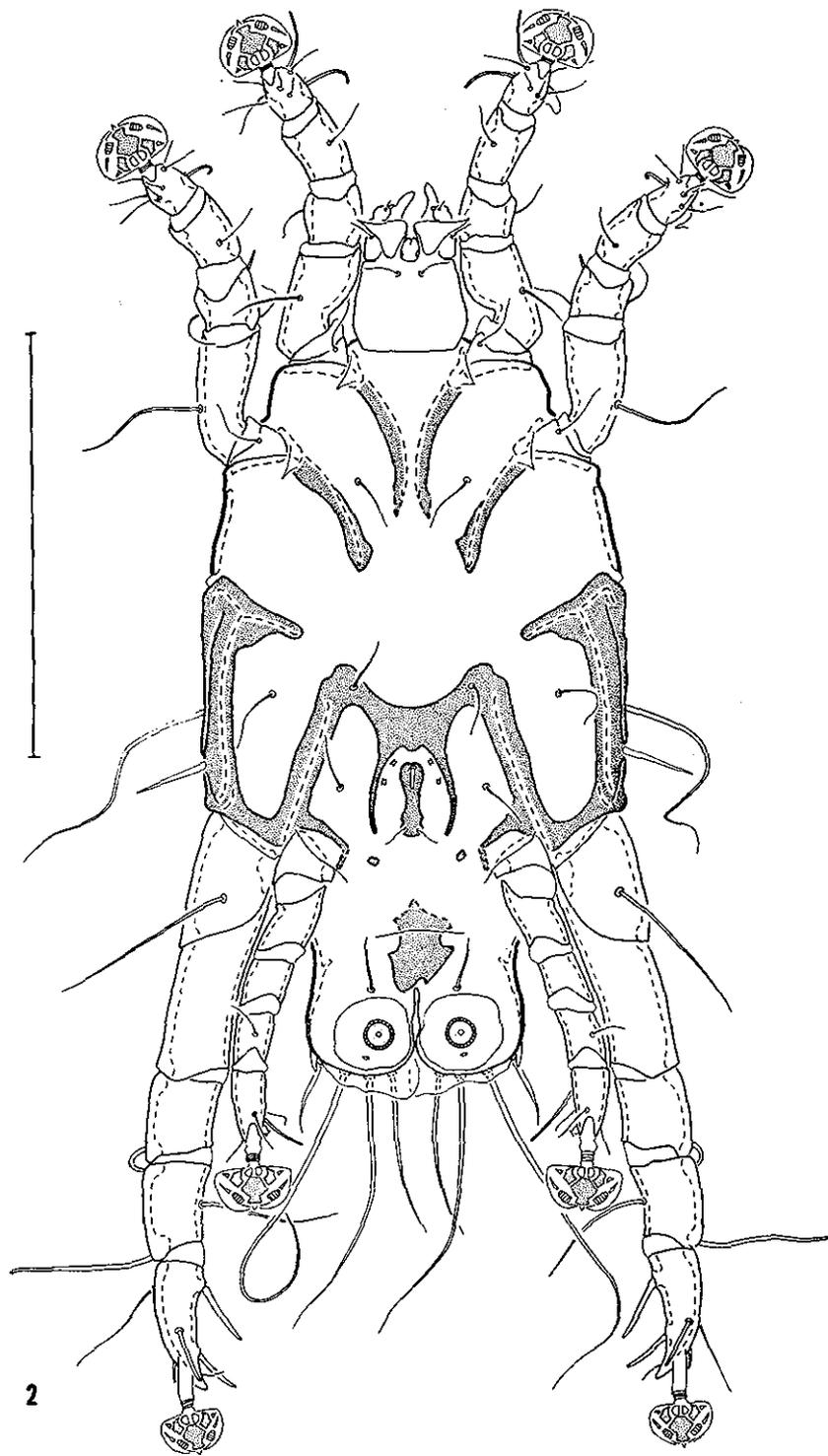


FIG. 2 : Male ; ventral aspect ; scale equals 200 μ .

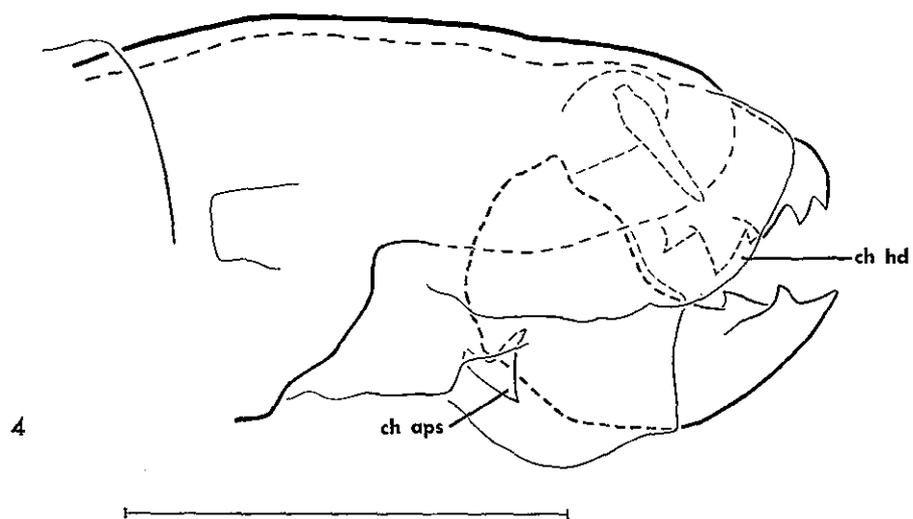
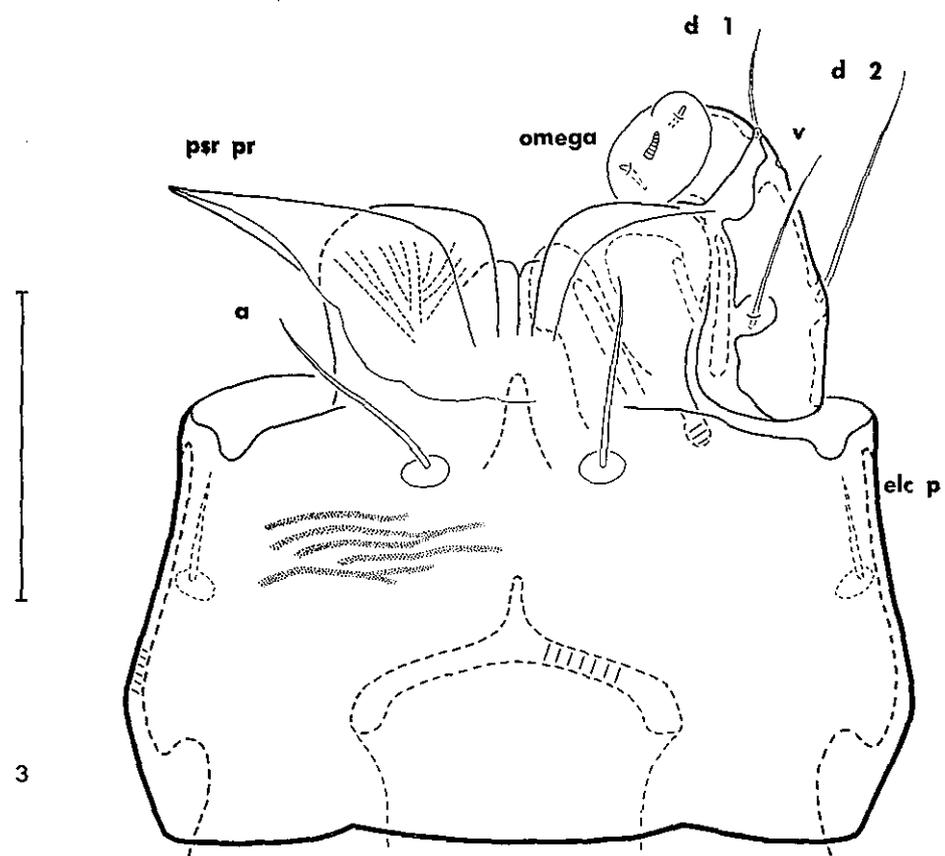


FIG. 3 : Male ; subcapitulum ; ventral aspect ; scale equals 27 μ .

FIG. 4 : Male ; chelicera ; paraxial aspect ; scale equals 27 μ .

processes with longitudinal striae; with hyaline flap folded ventrally. Palps normal, with 2 podomeres. Basal podomere with dorsal d_2 and ventral v setae long, whip-like. Distally, dorsal surface with lyrifissure and hyaline, hood-like apophysis. Terminal podomere with seta d_1 proximal; solenidion and 2 eupathidia distally.

Legs. I-II similar, normal. Leg III greatly hypertrophied; extending beyond posterior end of idiosoma. Leg IV small; tarsus not extending beyond end of idiosoma. Leg chaetotaxy: I-I-2-I-8, I-I-2-I-8, 0-0-0-I-6, 0-0-0-I-5. Solenidialtaxy: 2-I-2, I-I-I, I-I-0, 0-I-0.

Leg I (Figures 5, 6, 7, 10). Seta pR of trochanter setiform; directed anteroventrally. Femur large; with vF directed posteroventrally. Genu with cG dorsal, at proximal end of segment. mG slightly longer, stouter than cG ; arising from posterolateral surface. Solenidion ($sigma''$) long, setiform. $Sigma'$ extremely small, peglike (Figures 6,7). Tibia with gT equal in length to cG . Solenidion (phi) longer, thicker than $sigma''$ (I). Tarsus (Figure 10) short; lyrifissure present, normal; hyaline, pouch-like membrane along distal, ventral border. Ambulacrum present; of usual analgesoid type. $Omega_1$ of medium length. $Omega_3$ somewhat longer; distal to $omega_1$. ba minute. d small; contiguous proximally with $omega_3$. aa absent. $Omega_1$, ba , d , and $omega_3$ in line. e and f dorsolateral and opposite in position to la and ra . Subunquinal seta (s) small, ventral. Unquinal (v , u) and proral (q , p) setae absent.

Leg II (Figures 8,9). Leg segments similar to leg I, except femur II not as convex along dorsal surface as femur I. Setae pR , cG , gT similar to leg I. pR approximately $1-1/2$ X length of pR (I); mG slightly longer than mG (I). $Sigma$ short, 9.5 ± 0.1 ; $9.2 - 10.8$; 4.4 ; 14 peg-like. Phi long; not as thick at base as Phi (I). Tarsus (Figure 9) short; lyrifissure similar to that of tarsus I; pouch-like membrane absent. d of medium length; in line with $omega$ and ba . Setae e , f , wa , ra , and la similar, although somewhat shorter than those of tarsus I. ra more lateral than ra (I). s approximately 2 X length of s (I).

Leg III (Figures 11,16). sR greater in length than pR (II). Femur equal to combined lengths of genu and tibia. Genu with cG and nG absent. $Sigma$ long; usually curving posteriorly. kT long, arising ventrally. Phi longer than $sigma$; appearing to arise along anterodorsal surface. Tarsus (Figure 16) coneshaped; curved distally. Ambulacrum borne on long stalk arising from anterior surface. d thick at base; tapering rapidly distally; on proximal end of segment. r and w (32, 29, 34, 33, 32, 30, 35 u) narrowly spatulate distally. e and f dissimilar. e short, setiform; f similar in shape to la .

Leg IV (Figures 12, 15). Trochanter, femur, and genu lacking setae and solenidia. Tibia with kT of medium length; ventral. Phi of medium length. Tarsus (Figure 15) with setae la and s absent. d and e represented by small sucker-like structures. f normal. Setae r and w similar in length and shape.

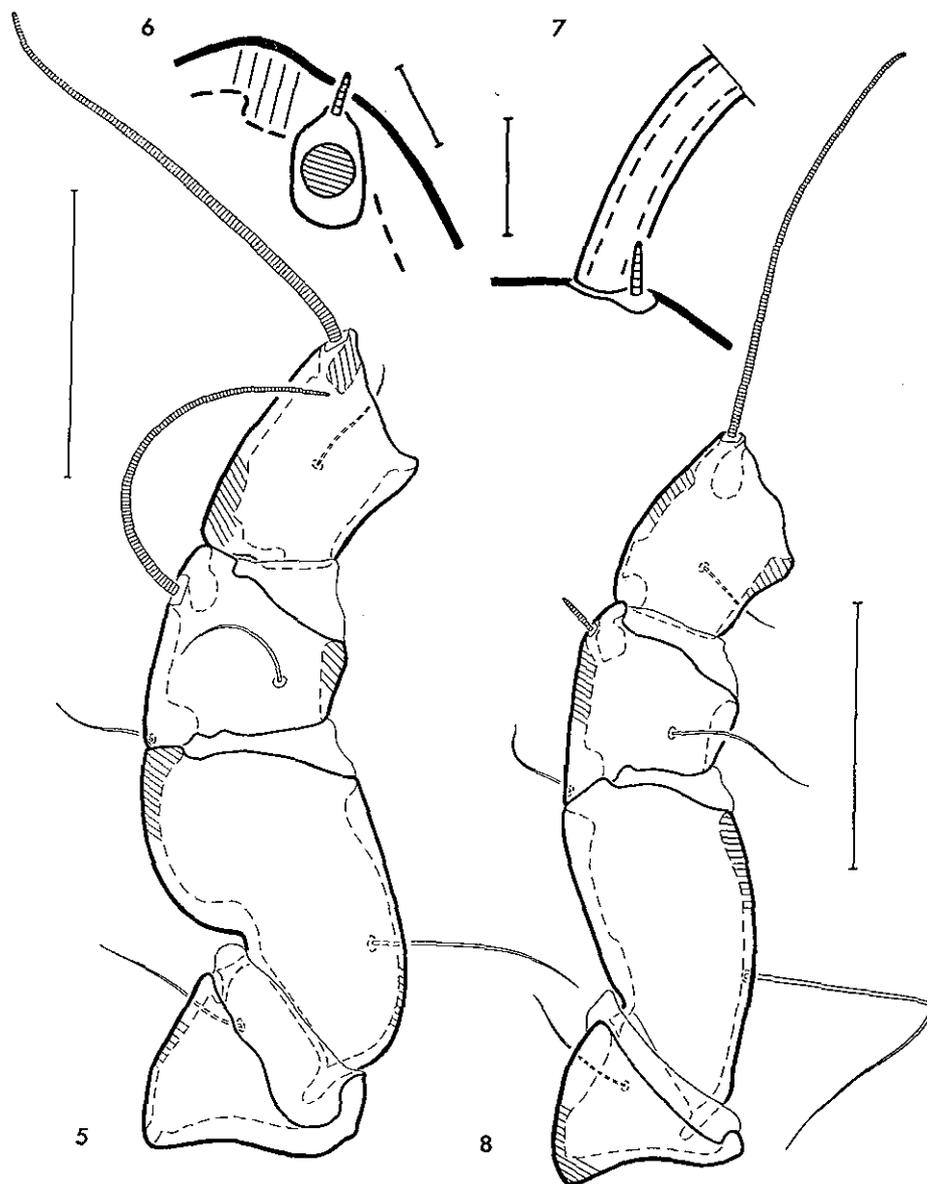


FIG. 5 : Male ; leg I ; posterior aspect ; scale equals 50 μ .

FIG. 6 : Male ; sigma' ; dorsal aspect ; scale equals 5 μ .

FIG. 7 : Male ; sigma' ; anterior aspect ; scale equals 5 μ .

FIG. 8 : Male ; leg II ; posterior aspect ; scale equals 50 μ .

FEMALE. Idiosoma elongate, oval in outline; length 420.1 ± 1.4 ; (400.0 — 435.0); (1.9); (35); width 201.5 ± 1.4 ; (185.0 — 215.0); (4.1); (35).

Dorsum (Figure 19). Dorsum with prodorsal sclerite and setation similar to male. Opisthodorsal sclerite large, rectangular; posterior margin bilobed, appearing "M" shaped. Reticulate pattern of sclerite larger than that of male. Setation of sclerite similar to male. Sclerite of coxa III small; l_1 not borne on sclerite. Opisthosoma with paired lateral and terminal opisthotal sclerites. Lateral sclerites with opisthosomal gland opening anteriorly; l_3 medio-lateral. a_6 small, dorsal; borne on terminal sclerite. d_5 approximately $2/3$ X length of idiosoma. l_5 somewhat shorter. d_4 small, fine. a_6 small, ventral; lying between setae d_5 and l_5 .

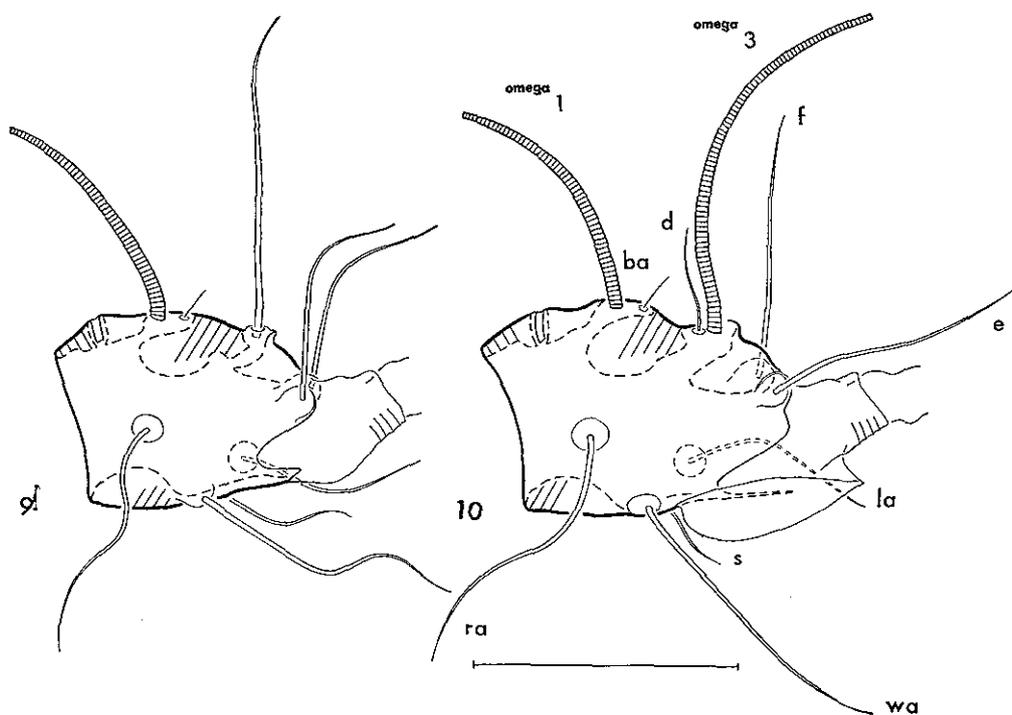


FIG. 9 : Male; tarsus II; posterior aspect; scale equals 27 μ .

FIG. 10 : Male; tarsus I; posterior aspect; scale equals 27 μ .

Venter (Figure 20). Cuticle unsclerotized except for coxal sclerites I-IV and pregenital sclerite. Coxal apodemes I and II similar to male. Coxal apodeme IV "T" shaped; not fused with coxa III. Sclerite of coxa III bearing sh and h ; setae in closer proximity than in male. Coxal setae s , c , and posterior genital setae c_2 of medium length; subequal. Coxal III seta (cx_3) slightly longer. Anterior genital setae (c_1) small; posterior to pregenital sclerite. Pregenital sclerite narrow,

crescent-shaped ; with tips pointed. Sclerite not extending beyond first pair of genital papillae. Genital aperture normal, inverted "V" shaped. Genital apodemes well developed. Anal aperture slitlike ; flanked laterally by long anal seta (a).

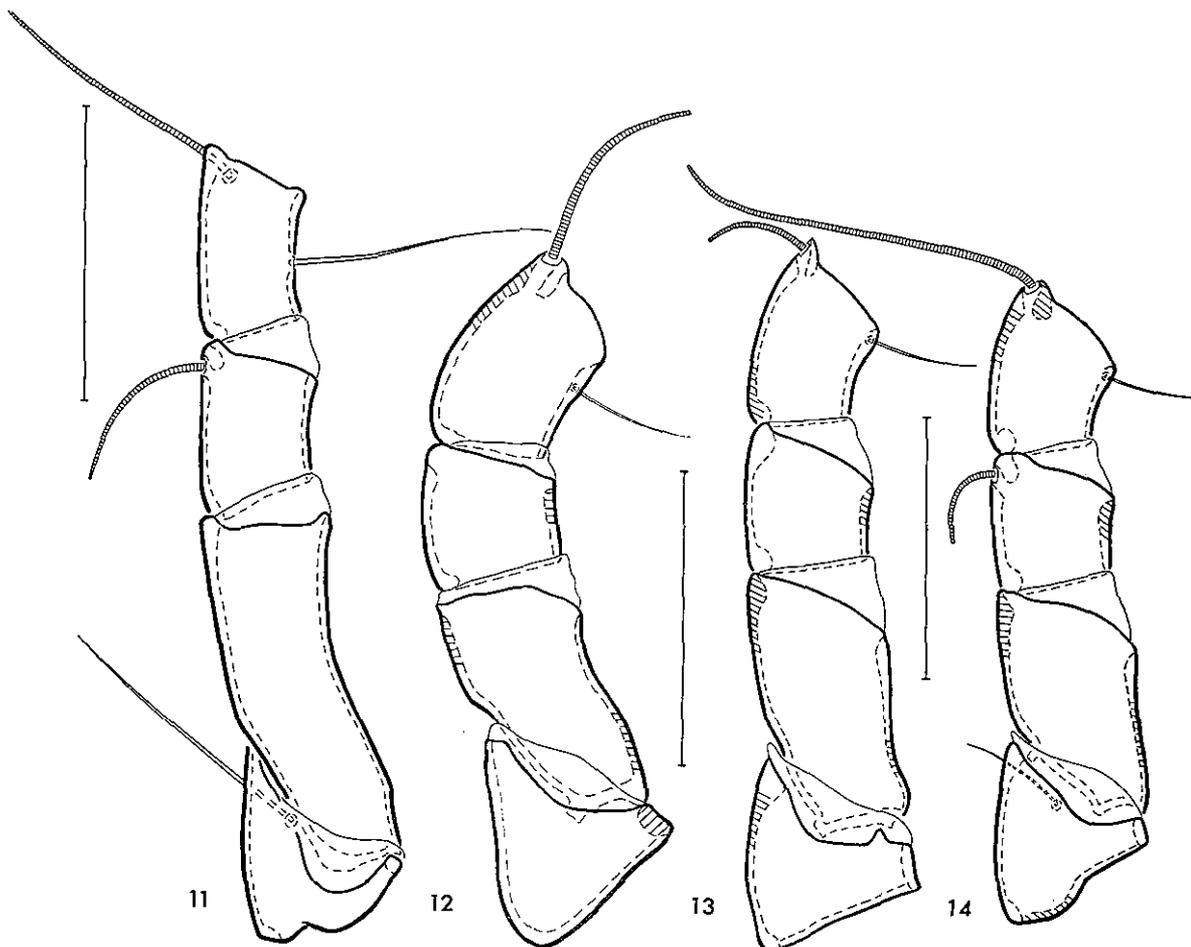


FIG. 11 : Male ; leg III ; posterior aspect ; scale equals 75 μ .

FIG. 12 : Male ; leg IV ; posterior aspect ; scale equals 50 μ .

FIG. 13 : Female ; leg IV ; posterior aspect ; scale equals 50 μ .

FIG. 14 : Female ; leg III ; posterior aspect ; scale equals 50 μ .

Gnathosoma. Chelicerae and subcapitulum similar to male.

Legs. Legs I and II similar to male. Legs III and IV normal, similar to one another. Leg III (Figures 14, 17) (excluding ambulacrum) extending to middle of genu IV. *sR* present, normal. *Sigma* short ; usually curving anteriorly. *kT* of medium length ; arising ventrally. *Phi* long. Tarsus (Figure 17) with *d*, *e*,

and *f* similar. *r* similar and adjacent to *w*. *la* anterior and in line with *w*. Leg IV (Figures 13, 18) (excluding ambulacrum) not extending beyond posterior end of body. Trochanter, femur, and gnu lacking setae. *Sigma* absent. *kT* similar to *kT* (III). *Phi* similar to *sigma* of genu III. Tarsus (Figure 18) with *d*, *e*, and *f* similar. *r* shorter than *w*; arising from posteroventral surface. *w* longest seta present; adjacent to *r*. *la* absent.

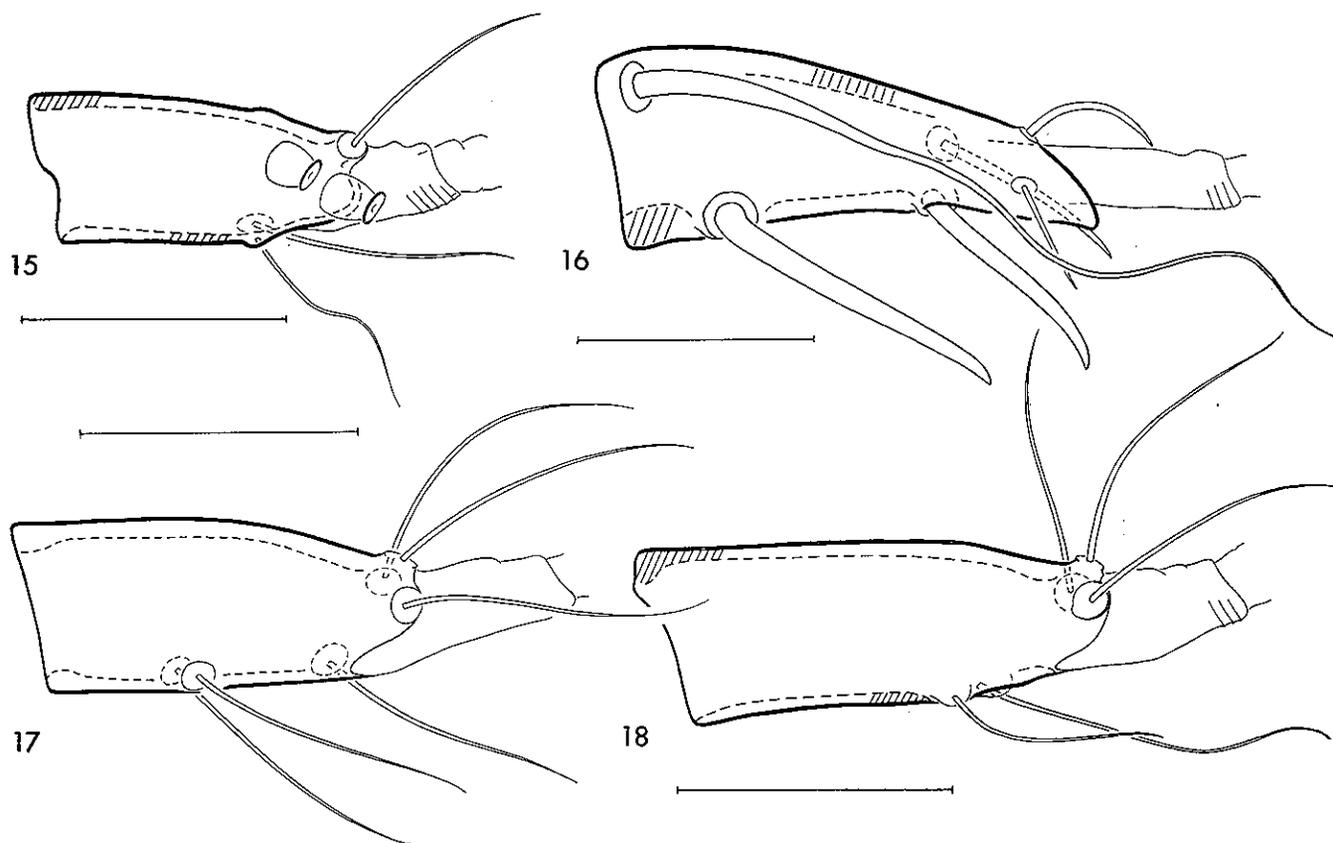
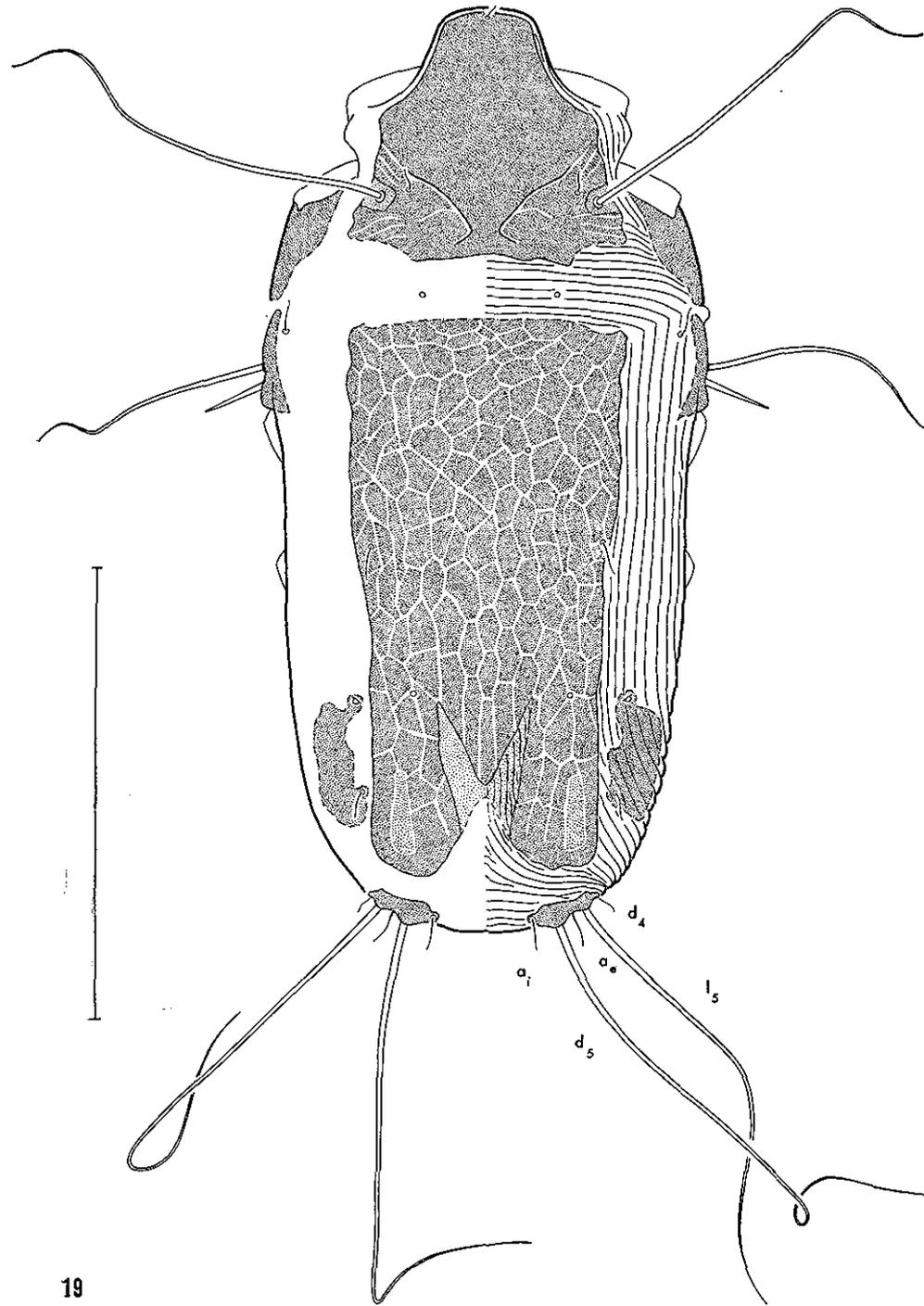


FIG. 15 : Male ; tarsus IV ; dorsal aspect ; scale equals 27 μ .
FIG. 16 : Male ; tarsus III ; posterior aspect ; scale equals 27 μ .
FIG. 17 : Female ; tarsus III ; posterior aspect ; scale equals 27 μ .
FIG. 18 : Female ; tarsus IV ; posterior aspect ; scale equals 27 μ .

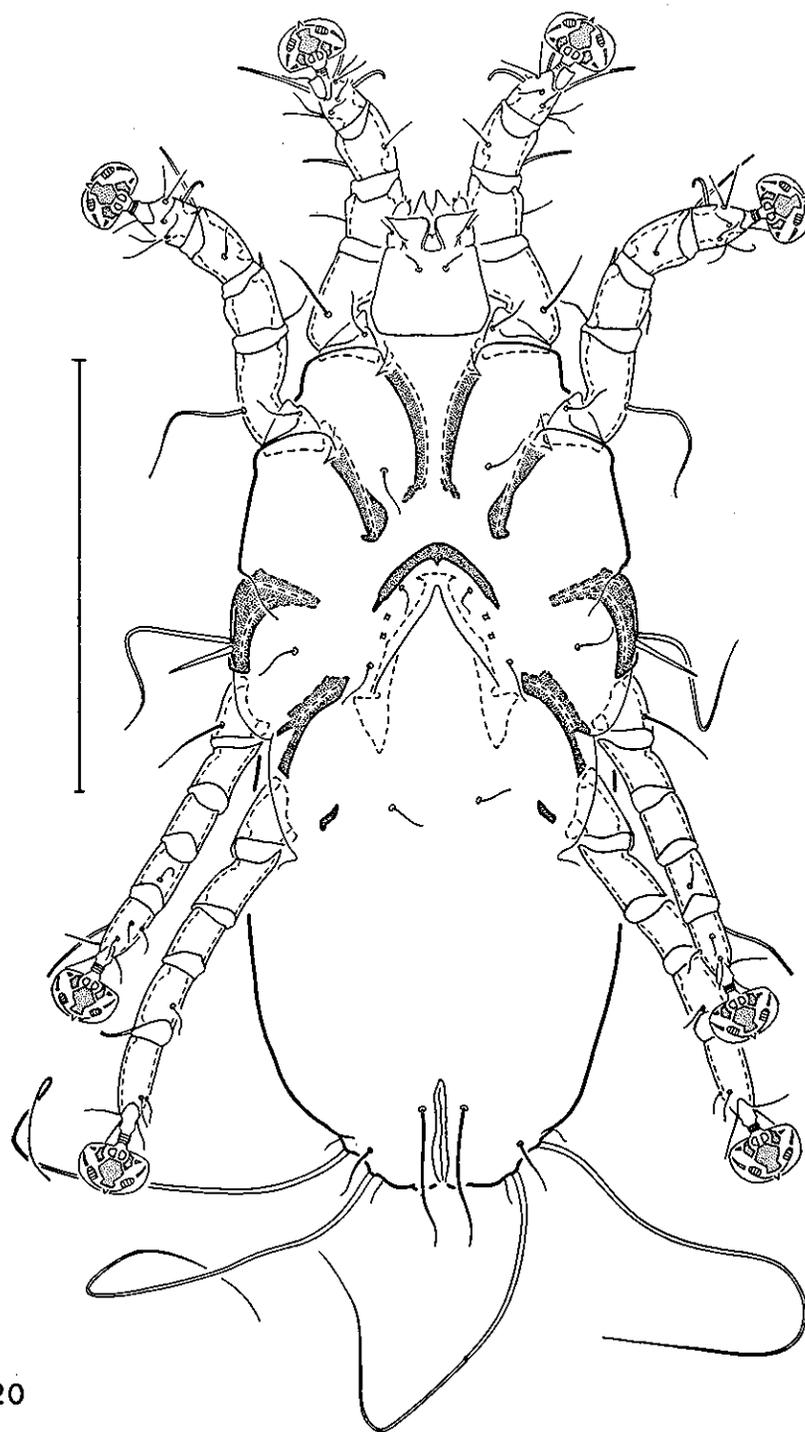
DISCUSSION.

This species differs from its congeners in the following combination of characters of the adult male : scapular setae borne on prodorsal sclerite ; prodorsal sclerite not fused with prolatateral sclerite ; d_1 situated on soft cuticle between prodorsal and opisthosomal sclerites ; opisthosomal sclerite reticulate ; anterior margin of



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FIG. 19 : Female ; dorsal aspect ; scale equals 200 μ .



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FIG. 20 : Female ; ventral aspect ; scale equals 200 μ .

pregenital sclerite concave; *sh* dagger-like; *ai* lanceolate; and on tarsus III *r* and *w* large, narrowly spatulate distally. In the adult female: scapular setae borne on prodorsal sclerite; prodorsal sclerite not fused with prolateral sclerite; opisthosomal sclerite extending beyond level of l_1 , with reticulate pattern; *sh* dagger-like. Associated in all stases with the tree swallow, *Tachycineta bicolor* (Vieillot, 1808).

Since type specimens from TYRRELL's collection are believed to be lost, the identification of specimens in this study is based on the original description by TYRRELL (1882). The diagnosis given by CANESTRINI and KRAMER (1899) agrees with that of TYRRELL (1882), but no information was presented as to whether or not specimens were available to them for study. It is assumed, therefore, that their diagnosis is based on that given by TYRRELL (1882). The description by TYRRELL supports the identification of the specimens used in this study by the following combination of characters: scapular setae (*Sc*) on prodorsal sclerite; shape and size of prodorsal and opisthonotal sclerites; coxal apodemes I free; tarsus III cone-shaped, with *r* and *w* large; and host, *Tachycineta bicolor* (Vieillot, 1808). From preliminary studies of American and European swallows, mentioned previously, specimens identified as *Pteronyssoides tyrrelli* have been observed to occur only on *Tachycineta bicolor*.

Because of the small sample size and the lack of sufficient geographical representatives, no attempt has been made in this study to examine variation in specimens of *Pteronyssoides tyrrelli* throughout the geographical range of its host. (*T. bicolor* is considered to be Nearctic in distribution (PETERS, 1960).) However, individual variation in certain structural features was noted in the specimens studied. In the males the posterolateral border of the opisthonotal sclerite (Figure 1) was usually observed to be weakly sclerotized, but frequently appears to be free of sclerotization. The finger-like processes of the pregenital sclerite show a great deal of variation at the tips. This area may be straight, pointed and turned mediad, or slightly irregular in outline. The size and shape of the preanal sclerite is extremely variable, although the posterior margin is always concave or inverted "V" shaped.

In the female the greatest variation was observed in the opisthodorsal and opistholateral sclerites (Figure 19). As stated in the redescription, the posterior margin of the opisthosomal sclerite is normally "M" shaped, but the median process was frequently noted to be long and broad or reduced and rather irregular along the margins. The sclerotized area beneath the dorsal striae, in the same region, may be more reduced than illustrated (Figure 19) or so extensive as to extend to the terminal opisthonotal sclerite. The opistholateral sclerites are very irregular marginally, but always narrowed anteriorly.

The chaetotactic system used herein is, for the most part, consistent with that given by ATYEO and GAUD (1967). However, the signatures of the posterior anal setae (pa_1 , pa_6) have been changed to a_1 and a_6 respectively to agree in part with FAIN (1963). No explanation will be presented at this time as to the criteria used

in determining the chaetotactic relationships of various opisthosomal setae but a discussion of the dorsal chaetotaxy peculiar to feather mites and related groups will be the subject of a subsequent paper. In regard to the leg chaetotaxy a point of clarification should also be made concerning the solenidion *sigma'* of genu I. *Sigma'* is situated anterolaterally to *sigma''* (Figures 6, 7), is very small, and because of its thin walled construction and proximity to *sigma''*, is extremely difficult to observe. It is best seen in dorsal aspect and is visible in lateral aspect only with difficulty. Reexamination of our material has shown *sigma'* to occur on all American species of swallow-associated *Pteronyssoides* available for study.

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