

THREE NEW SPECIES OF *FAINALGES* GAUD AND BERLA (ANALGOIDEA : XOLALGIDAE) WITH DESCRIPTIONS OF THEIR DEVELOPMENTAL SERIES ¹

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TAXONOMY
FEATHER
MITES,
CENTRAL
AMERICA,
MEXICO,
JAMAICA

ABSTRACT : Three new species of *Fainalges* Gaud and Berla (Analgoidea, Xolalgidae) and their developmental series are described : *F. longissimus*, *F. brevissimus*, and *F. apicosetiger*. All occur on *Aratinga canicularis* (L.) and *A. nana* (Vigors) in Mexico, Central America and Jamaica.

TAXONOMIE
SARCOPTIDES
PLUMICOLES,
AMÉRIQUE
CENTRALE,
MEXIQUE,
JAMAÏQUE

RÉSUMÉ : Trois espèces nouvelles de *Fainalges* Gaud et Berla (Analgoidea, Xolalgidae) et leurs stases ontogénétiques sont décrites : *F. longissimus*, *F. brevissimus* et *F. apicosetiger*. Toutes se manifestent sur *Aratinga canicularis* (L.) et *A. nana* (Vigors) au Mexique, en Amérique Centrale et à la Jamaïque.

INTRODUCTION

Three named species of feather mites have been assigned to the genus *Fainalges* Gaud and Berla 1964 : *F. trichocheylus* Gaud and Berla 1964 (the type-species) from an unknown host species, *F. annulifer* (Trouessart 1899) from *Derotypus accipitrinus* (L.), and *F. intermedius* (Trouessart 1899) from *Aratinga solstitialis* (L.). These and many undescribed species are restricted to New World

parrots (Aves : Psittacidae) and all are believed to inhabit the plumulaceous barbules of the body feathers and the smaller feathers of the wings and tail (PÉREZ and ATYEO 1984).

Field studies of feather mite species associated with Mexican parrots have been underway since 1980. Work has been concentrated on the acarofaunas of *Aratinga canicularis* (L.), the Orange-Fronted Conure along the western coast of Mexico ; *A. nana* (Vigors), the Olive-Throated Conure on eastern coast, and *A. holochlora* (Sclater), the

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Green Conure, which is widely distributed in the central portion of Mexico and is sympatric with *nana* and *canicularis* in parts of its range.

Many specimens of *Fainalges* have been collected from the three mentioned host species. *A. canicularis* and *A. nana* each harbor the same three new species and each mite species represents a distinct morphotype. *A. holochlora* also has three species of *Fainalges*; each is a new species and each represents a different morphotype, of which two are similar to those of *canicularis*.

We will describe the new species from *A. canicularis* and *A. nana* and briefly describe the developmental series for each. Each morphotype has distinctive life stages, thus for the first time, identification of all instars of congeners occurring on one host can be made. The signatures for chaetotaxy follow ATYEO and GAUD (1966) for the idiosoma and GRANDJEAN (1939) for the legs, measurements are in micrometres, and parrot systematics follow FORSHAW (1978). Abbreviations used in the type data sections and/or to identify slides in the study collection are accession numbers of: American Museum of Natural History (AMNH), Field Museum of Natural History (FMNH), U.S. National Museum of Natural History (NMNH), University of Georgia (UGA), Universidad Nacional Autónoma de México (UNAM), and field collected specimens used for observations (TMP).

DEVELOPMENTAL CHAETOTAXY AND SOLENIDIOTAXY

The idiosomal chaetome of *Fainalges* lacks the vertical setae (*ve*, *vi*) of the prodorsal shield and the dorsal pair of setae in the first four rows of hysterosomal setae (*d* 1-4) (compare Figs. 2, 4, 6; 8, 10, 12). To attain the adult complement of setae, certain are added ontogenetically. The protonymph adds *d* 5 and *l* 4-5 dorsally, and the postanal (*pae*, *pai*), anals (*a*), and posterior genitals (*gp*) ventrally. The total complement is reached in the tritonymph to which is added the anterior genitals (*ga*) and coxal IV setae (*cx* 4).

Leg solenidia and setae are also added ontogenetically. The following table indicates these structures

for the larva with only additions indicated for the later instars.

TABLE 1: Ontogenetic additions in the developmental series of *Fainalges*.
Tr = trochanter, Fe/Ge = fused femur and genu.

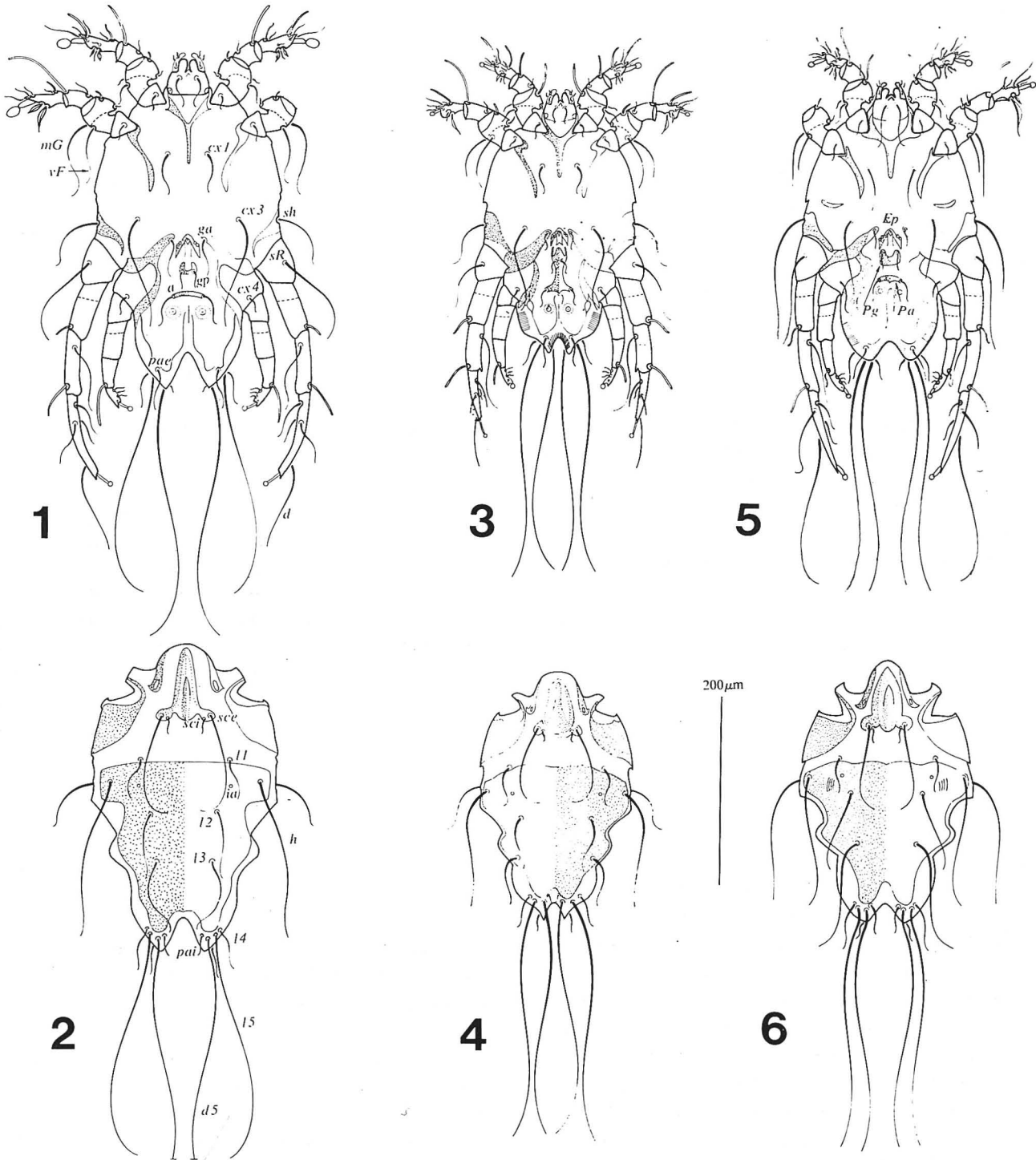
	Tr	Fe/Ge	Tibia	Tarsus
Larva				
I	—	vF, mG cG, σ1	gT, φ	ba, la, ra, wa, d, e, f, s, ω1
II	—	vF, mG cG, σ1	gT, φ	ba, wa, d, e, f, s, ω1
III	—	—	kT, φ	w, d, e, f
Protonymph				
III	—	σ1	—	—
IV	—	—	—	r, w, d
Tritonymph				
I	pR	—	—	ω3
II	pR	—	—	—
III	sR	—	—	—
IV	—	—	φ	e, f

The ontogenetic additions of the setae and solenidia are the same as in most astigmatic mites with one exception. Solenidion sigma one on genu III, which is an internal part of the larval chaetome, is not added until the protonymphal instar.

Other differences between feather mites and free-living astigmatids concern the cupules and opisthonotal glands. In *Acarus siro*, for example, there are four pairs of cupules or lyrifissures in the larva with additional cupules added ontogenetically. In feather mites (and other psoroptides), cupules are not added in postlarval instars. In *Fainalges*, cupules *ia* are observed in males; all other cupules in all life stages appear to be suppressed. Opisthonotal glands, often well developed in feather mites, are absent in all life stages of *Fainalges*.

THE THREE MORPHOTYPES OF *FAINALGES*

Sexual dimorphism in *Fainalges* is expressed in the hysterosomata (compare Figs. 1, 2 with 7, 8). Adults of the same species have similar development of the proterosoma, especially of the prodorsal shields and legs I and II (compare Figs. 1, 2 with 7, 8). Correlation of the instars is facilitated by



FIGS. 1-6 : Ventral and dorsal aspects of males : *Fainalges longissimus*, n. sp. (1-2), *F. brevissimus*, n. sp. (3-4), *F. apicosetiger*, n. sp. (5-6). Abbreviations, setae : a, anals ; cx 1, 3-4, coxals ; d 5, l 1-5, dorsal and lateral hysterosomals ; ga, gp, anterior and posterior genitals ; h, humerals ; mG, genuals ; pae, pai, external and internal postanals ; sce, sci, external and internal scapulars ; sh, subhumeral ; sR, trochanterals ; vF, femorals. Structures : Ep, epiandrum ; ia, cupule ; Pa, preanal sclerite ; Pg, postgenital sclerite.

observing the ventral setae of tarsi I and II. Interspecific differences are most evident in legs III and IV of the females and immatures, especially the development of the pretarsi and terminal setae, and the relative lengths of the dorsal and ventral idiosomal setae.

The females of *F. brevissimus*, n. sp., have the pretarsal stalks and ambulacra (*sensu* ATYEO 1979) of legs III and IV short and relatively well developed when compared to the same structures of the anterior legs (e.g., Figs. 9, 10). The other new species have slender pretarsi III and IV, each is as long or longer than the corresponding tarsus and the ambulacral discs are atrophied. In *F. longissimus*, most setae of the posterior tarsi are spinelike, however, seta *d* is apicodorsal and is about two times the length of pretarsus (Figs. 7, 8). The third new species, *F. apicosetiger*, has setae of tarsi III and IV long and flexible with setae *d* extremely long and inserted on the tarsal apices (Figs. 11, 12). The relative development of other setae of the legs and idiosoma can be seen in the illustrations.

SPECIES ABUNDANCE

PÉREZ and ATYEO (1984) established the sites of these three new species of *Fainalges* on *Aratinga canicularis* in western Mexico; all were found to inhabit the plumulaceous barbs of non-flight and tail feathers. *Fainalges brevissimus* occurs on all regions of the body, including the smaller feathers of the wing; *F. apicosetiger* co-exists with *brevissimus* on the feathers of the body (and possibly the wing bases); and *F. longissimus* is restricted to the smaller feathers of the tail region where it co-exists with the other two species. As would be expected, the relative abundance of these species in the collections are reflected in the size of the regions they occupy. This correlation is also true for collections from museum study skins, but as the mites live in protected areas (*sensu* PÉREZ and ATYEO 1984), the numbers of mites taken were so small that the relative abundances of the three species was not apparent.

SPECIES DESCRIPTIONS

The prodorsal shield consists of three elements, a central shield and two posterolateral platelets which bear the scapular setae. In immatures, these elements are independent, but in adults they are fused into characteristically shaped shields (Figs. 2, 4, 6). Measurements of the prodorsal shield are given as the widest portion of the central element, total length, and distances between the scapular setae.

The male hysterosoma is bilobed with each lobe surrounded by a lobar membrane. Terminal setae are inserted on the lobes with *pae* ventral and *pai*, *d* 5 and *l* 4-5 dorsal. Depending on the configuration of the lobes, the setae of each side may be widely separated from their homologs (Figs. 1, 5) or approximate (Fig. 3). As in other stadia, dorsal and ventral setae display differences in relative lengths and positions. Ventrally, the small shields subtending the genital region may be independent or fused.

Male tarsus IV is reduced; five tarsal setae are present, but of these, *d* and *e* are short pegs and inserted on the paraxial surface of the tarsal claw. Because of their size and the heavy sclerotization of the tarsal apex, it is rare that both setae can be observed with light microscopy.

The posterior idiosoma of *Fainalges* females have two basic forms. The simplest is a rounded terminus on which the setae are positioned on the idiosoma proper. A second configuration, not observed in taxa described in this paper, is an idiosoma with two heavily sclerotized lobes, each bearing two long setae (*d* 5, *l* 5) and two minute setae (*pai*, *l* 4).

Larvae and nymphs of each species will be briefly described primarily by measurements, relative lengths of setae presented as a series, and morphologies of the posterior legs.

Measurements are given in micrometres. Specific measurements include: total length, from the apices of the palpi to the insertions of setae *d* 5; width, at level of setae *h*; and distances between setal pairs (center-to-center) and between rows of setae (distances at midline).

In the "Additional Materials" sections, only the host subspecies, general localities and the numbers

of specimens examined are given. As will be seen, each mite species occurs over a wide geographical range. As most information is based on museum collections, we can not be certain if all individual birds harbored all taxa of *Fainalges* to be described.

We believe that many New World parrot species have a triad of *Fainalges* species, and that each species of the triad may represent a different morphotype. The keys are for *Fainalges* from *Aratinga canicularis* and *A. nana*, but possibly they can be useful in separating species groups that will be encountered on other New World parrots.

KEY TO MALES

1. Terminal lobes well developed ; distance between setae *pai* greater than distance between setae *pai* and *l 4* of one side..... 2
Terminal lobes weakly developed ; distance between setae *pai* less than distance between setae *pai* and *l 4* of one side..... *brevissimus*, n. sp.
2. Tarsus II with seta *s* bladelike, distal to *wa* ; *wa* shorter than tarsus..... *longissimus*, n. sp.
Tarsus II with seta *s* spinelike, approximate to *wa* ; *wa* longer than tarsus..... *apicosetiger*, n. sp.

KEY TO FEMALES

1. Pretarsi III, IV slender, subequal in length to corresponding tarsus 2
Pretarsi III, IV short, well developed.....
brevissimus, n. sp.
2. Tarsi III, IV with setae *d* about twice length of tarsi, inserted apicodorsally *longissimus* n. sp.
Tarsi III, IV with setae *d* about 3 times length of tarsi, inserted apically *apicosetiger*, n. sp.

KEY TO IMMATURES

1. Pretarsi III, IV slender, subequal in length to corresponding tarsi *or* absent..... 2
Pretarsi III, IV short, well developed.....
brevissimus, n. sp.
2. Pretarsi III, IV long, slender.....
longissimus, n. sp.
Pretarsi III, IV absent (or vestigial in related species)
apicosetiger, n. sp.

SPECIES-TYPE OF *FAINALGES*

GAUD and BERLA (1964) described *Fainalges trichocheylus*, n. g., n. sp. for one male and one female collected by H. F. BERLA from a woodpecker (Picidae), *Melanerpes flavifrons* (Vieillot) (= *Trip-siurus flavifrons*), in Brazil. Not only is the host association incorrect, but the male and female are different species (not an uncommon happening with BERLA collected materials, personal comm., W. T. ATYEO). Recognizing that the male and female are not correctly correlated and that the host association is wrong is "after the fact" ; we now know that *Fainalges* is restricted to Psittacidae and we know how to recognize all life stages of *Fainalges* species.

The holotype male of *F. trichocheylus* is similar to *F. apicosetiger* in that the subcapitular setae are extremely long, epimerites I are relatively thick, and the terminal lobes are similar. *F. trichocheylus* differs from *F. apicosetiger* by having seta *s* on tarsus II setiform (or spiculiform), having the terminal portions of the lobar membranes notched, and having only one small sclerite immediately anterior to the anus, that is, the postgenital sclerite is wanting.

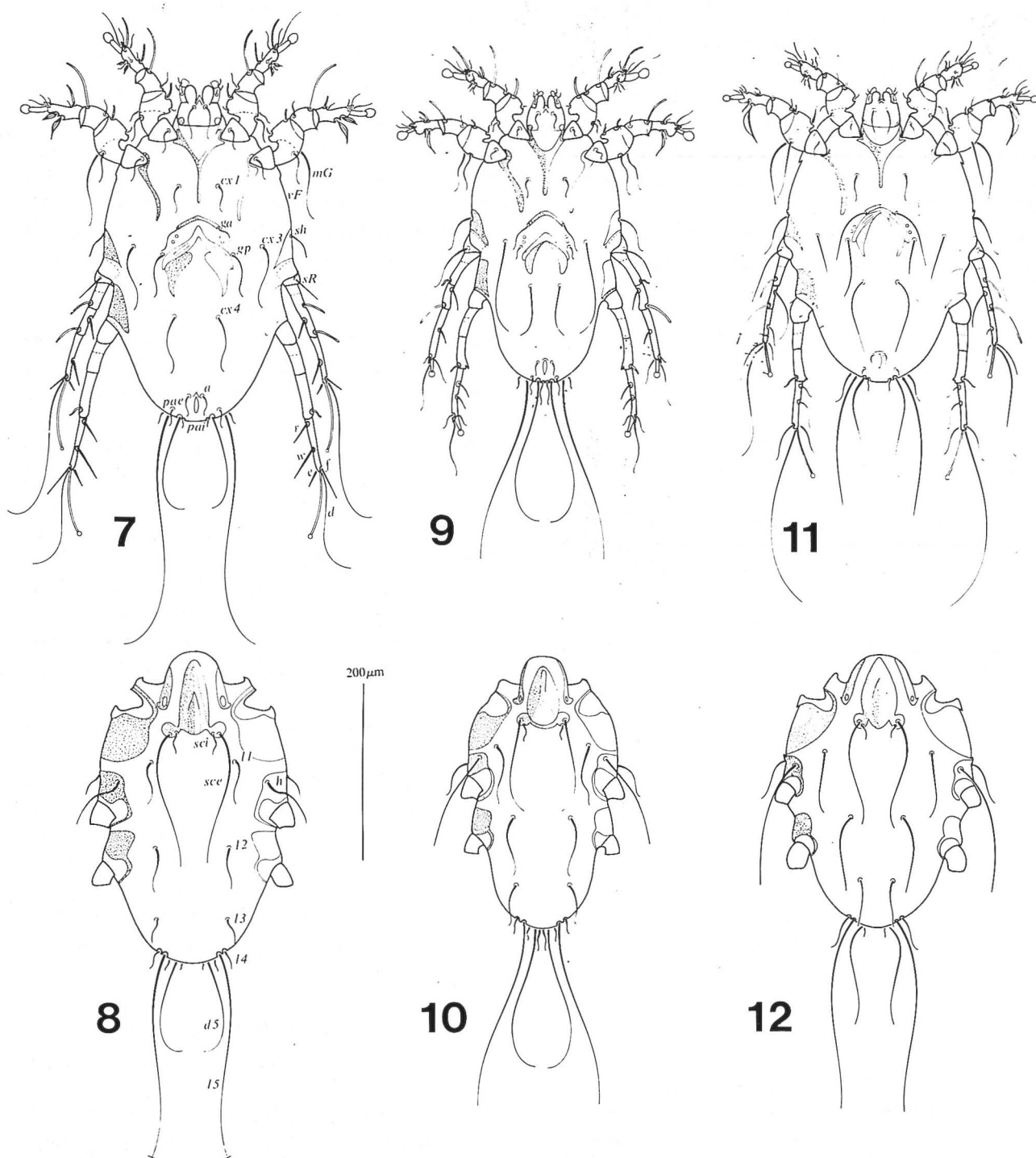
The paratype female of *F. trichocheylus* has character states of both *F. longissimus* and *F. apicosetiger*. The paratype has legs III and IV with long pretarsi and most setae are spinelike as in *longissimus* ; epimerites I and the setae on the fused genua and femora of legs II are similar to those of *apicosetiger*. This female is unique among the species being described in that setae *l 5* are basally expanded and the subcapitular setae are minute.

Fainalges longissimus, new species

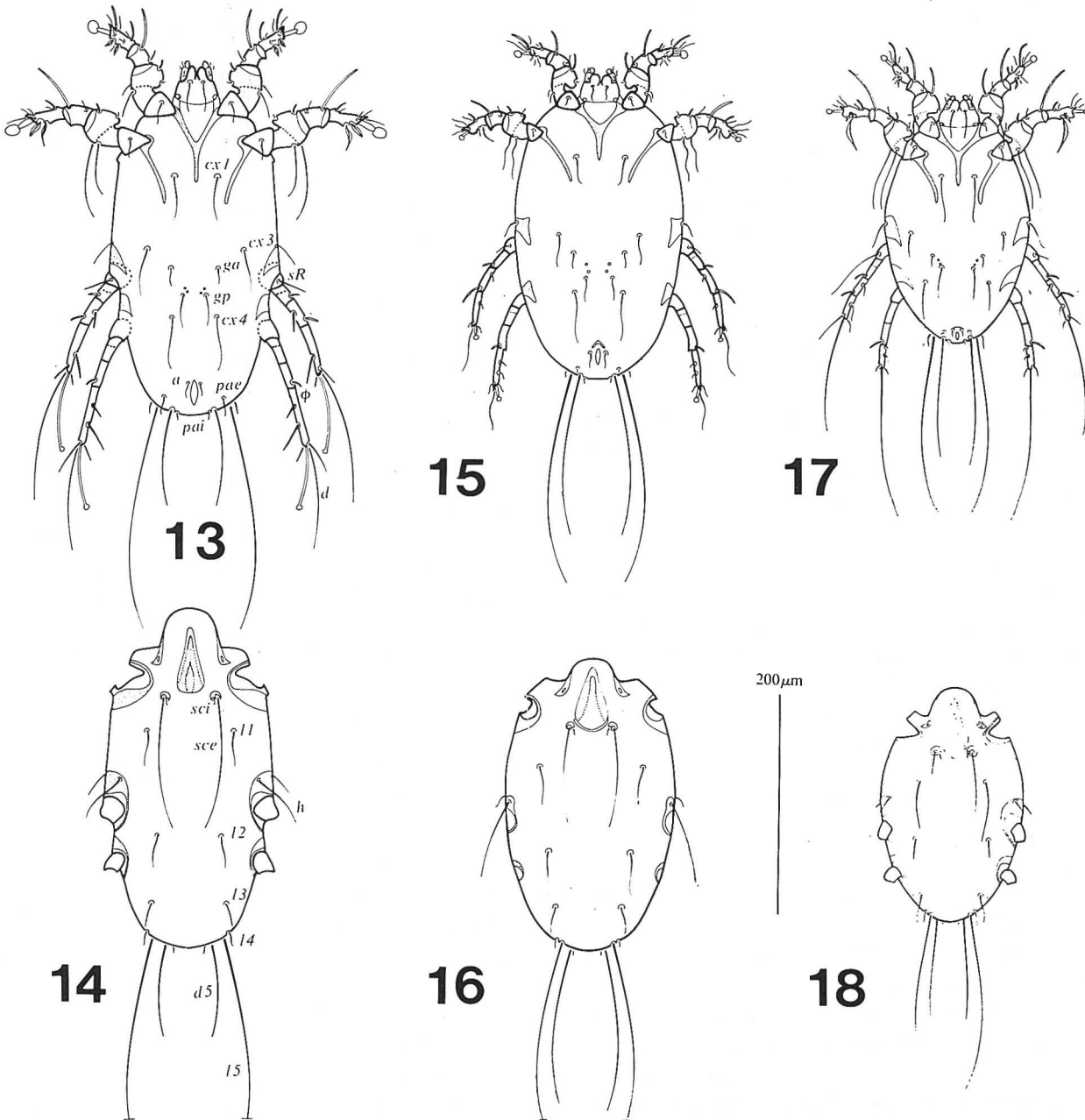
Figs. 1, 2, 7, 8, 13, 14, 19, 20, 25, 26, 31, 32

FEMALES (holotype, Figs. 7, 8). Length 397, width 210. Proterosoma and legs I, II similar to male.

Dorsal idiosoma. Prodorsal shield 85 × 42, *sci* 16, *sce* : *sce* 59. Hysterosoma with setae *l 1-3* short, *l 1* not extending to midlength of *l 1-l 2* interspace ; *l 2* extending slightly beyond midlength of *l 2-l 3*



FIGS. 7-12 : Ventral and dorsal aspects of females : *Fainalges longissimus*, n. sp. (7-8), *F. brevissimus*, n. sp. (9-10), *F. apicosetiger*, n. sp. (11-12). Abbreviations, setae : a, anals ; cx 1, 3-4, coxals ; d, e, f., tarsals ; d 5, l 1-5, dorsal and lateral hysterosomals ; ga, gp, anterior and posterior genitals ; h, humerals ; pae, pai, external and internal postanals ; r, w tarsal IVs ; sce, sci, external and internal scapulars ; sh, subhumeral ; sR, trochanterals ; vF, femorals.



FIGS. 3-18 : Ventral and dorsal aspects of tritonymphs : *Fainalgae longissimus*, n. sp. (13-14), *F. brevissimus*, n. sp. (15-16), *F. apicosetiger*, n. sp. (17-18). Abbreviations, setae : *a*, anals ; *cx 1*, 3-4 ; *d*, tarsals ; *d 5*, *l 1-5*, dorsal and lateral hysterosomals ; *ga*, *gp*, anterior and posterior genitals ; *h*, humerals ; *pae*, *pai*, external and internal postanals ; *phi*, tibial solenidia ; *sce*, *sci*, external and internal scapulars ; *sh*, subhumeral ; *sR*, trochanterals.

interspace; h two times sh . *Ventral idiosoma*. Genital setae short, $gp > ga$; coxal setae subequal, $cx\ 3$ not extending to level of $cx\ 4$. *Legs*. Leg I with $\sigma\ 1\ 19$; leg II with setae $mG > vF$; legs III, IV with setae rigid, spinelike (except d); setae d long, flexible, inserted apicodorsal; setae $d\ III > d\ IV$; pretarsi long, slender; ambulacra minute. Legs III with setae sR slightly longer than kT . Measurements fused femur/genu, tibia, tarsus, pretarsus: III, 31, 29, 57, 77; IV, 36, 44, 62, 77.

MÂLE (paratype, Figs. 1, 2). Length 345, width 206. *Gnathosoma*. 41×40 , subcapitular setae extending midway to fork of epimerites I.

Dorsal idiosoma. Prodorsal shield 75×27 , $sci\ 13$, $sce : sce\ 52$. Hysterosomal shield 156×181 ; with broad, widely separated terminal lobes; lobar membrane rounded posteriorly; distance between setal pairs $l\ 1-3$ decreasing toward posterior; setae $l\ 3$ extending slightly beyond level of setae $l\ 4$; setae $l\ 3 > l\ 2 > l\ 1$; setae h more than 2 times length of setae sh ; measurements: $h : h\ 161$, $l\ 1 : l\ 1\ 103$, $l\ 2 : l\ 2\ 69$, $l\ 3\ 46$.

Ventral idiosoma. Y-shaped epimerites I narrow; without remnant of posterior epimerites II; epianthrium, postgenital, preanal sclerites independent; setae gp equidistant from ga , a ; adanal discs near apex of median sclerotization originating at terminal cleft apex. *Legs*. Leg I with $\sigma\ 1\ 13$; leg II with $mG > vF$; leg III with seta kT extending slightly beyond tarsal base; pretarsal stalks I-IV 16, 15, 15, 13; ambulacra I-II more than two times diameter of ambulacra III-IV. Measurements trochanter, fused femur/genu, tibia, tarsus: III, 42, 58, 62, 96; IV, 23, 40, 33, 18.

TRITONYMPH (Figs. 13, 14). Length 263, width 130; similar to female in form.

Dorsal idiosoma. Prodorsum with triangular central shield 57×24 , scapular setae on platelets distant from central shield, $sce : sce\ 48$, $sci\ 10$. Hysterosoma with setae $l\ 1-3$ short, setae $l\ 5$ about 2 times $d\ 5$, h more than 2 times length of sh .

Ventral idiosoma. Setae ga equidistant from gp , $cx\ 3$; $cx\ 4 = cx\ 3 > gp > ga$; $cx\ 3$ extends beyond gp . *Legs*. Legs III, IV with most setae rigid, setae $d\ III > d\ IV$, $sR > sh$, pretarsi equal to or longer than corresponding tarsi.

PROTONYMPH (Figs. 19, 20). Length 206, width

98. Similar to tritonymph except smaller and setal complement of legs IV incomplete.

Dorsal idiosoma. Prodorsum with triangular central shield 44×18 , scapular setae on platelets distant from central shield, $sce : sce\ 33$. Hysterosoma with setae $l\ 1-3$ short; setae $l\ 5$ about 2 times $d\ 5$; h short, more than 2 times length of sh ; $l\ 1$ extending midlength of interspace $l\ 1-l\ 2$; $l\ 2$ not extending to $l\ 3$. *Ventral idiosoma*. Setae $cx\ 3$ extending slightly beyond insertions of short gp . *Legs*. Legs III, IV with most setae rigid, setae $d\ III > d\ IV$, pretarsi equal to or longer than corresponding tarsi.

LARVA (Figs. 25, 26). Length 187, width 74. Similar to protonymph except legs IV absent.

Dorsal idiosoma. Prodorsum with central sclerite as narrow triangle 37×11 , $sce : sce\ 27$. Hysterosoma with setae $l\ 1-3$ short; h , sh small; $l\ 2$ not extending to $l\ 3$.

Ventral idiosoma. Setae $cx\ 3$ extending slightly beyond insertions of trochanters III. *Legs*. Legs III with most setae rigid, pretarsi longer than tarsi, setae $d\ 3$ times length of corresponding tarsi.

HOLOTYPE. From *Aratinga canicularis clarae* Moore (Psittacidae): Female, MEXICO: Sinaloa: Piaxtla, December 12, 1981, T. M. PÉREZ & W. T. ATYEO (TMP 23).

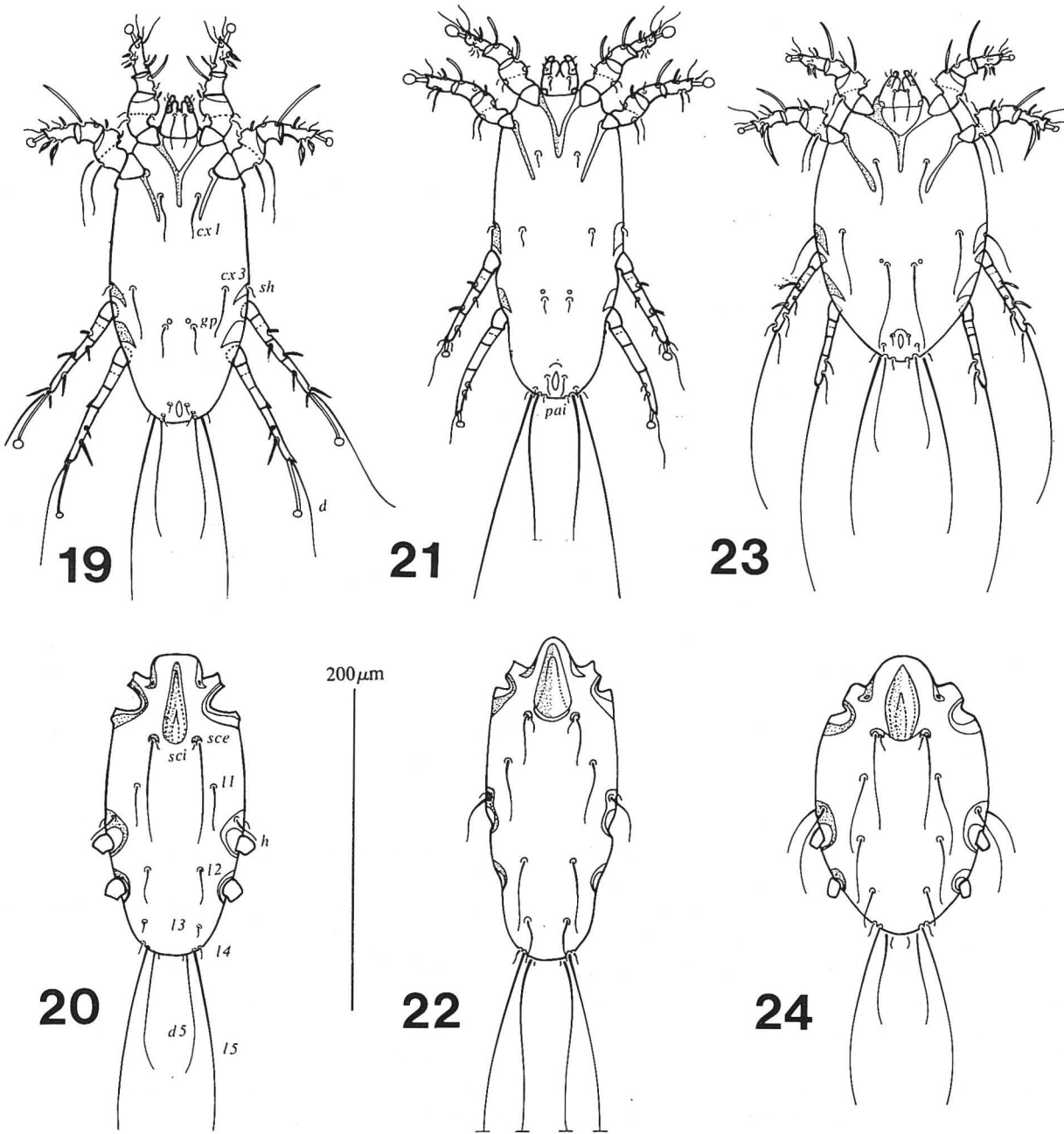
PARATYPES (adults only). From *A. canicularis clarae*: MEXICO: Sinaloa: 3 ♂♂, 3 ♀♀, 1 TN, 2 PNN, 1 L, same data as holotype (TMP 23); 1 ♀, Esquinapa, November 15, 1995, J. H. BATTY (UGA 11, 238); Nayarit: 2 ♂♂, 4 ♀♀, 2 TNN, Camino Real, January 22, 1982 (UNAM 61).

ADDITIONAL MATERIAL. From *A. c. clarae*: MEXICO: Sinaloa: 1 ♂, 1 ♀, 1 TN. From *A. c. canicularis*: GUATEMALA: 2 ♀♀. From *A. nana astec* (Souancé): MEXICO: Veracruz: 3 ♂♂, 2 ♀♀; Oaxaca 1 ♀; Chiapas: 1 ♂. GUATEMALA: 1 ♂. COSTA RICA: 2 ♂♂.

LOCATIONS OF TYPES. Holotype deposited in NMNH, paratypes in NMNH, FMNH, UGA, UNAM.

ETYMOLOGY. The specific epithet refers to the very long pretarsi of the posterior legs of females.

REMARKS. This species occurs in the tail region, primarily on the plumulaceous barbs of the coverts where it co-exists with the following new species (PÉREZ & ATYEO 1984). The restricted microhabitat



FIGS. 19-24 : Ventral and dorsal aspects of protonymphs : *Fainalgae longissimus*, n. sp. (19-20), *F. brevissimus*, n. sp. (21-22), *F. apicosetiger*, n. sp. (23-24). Abbreviations, setae : *cx 1, 3*, coxals; *d*, tarsals; *d 5, l 1-5*, dorsal and lateral hysterosomae; *gp*, posterior genitalia; *h*, humeralae; *pai*, internal postanal; *sce, sci*, external and internal scapulae; *sh*, subhumeralae.

in essence means only a relatively few specimens on each bird specimen. Of 77 collections taken from museum study skins, only 12 collections contained limited numbers of the species, specifically 21 individuals.

Fainalges brevissimus, new species

Figs. 3, 4, 9, 10, 15, 16, 21, 22, 27, 28, 33, 34

FEMALE (holotype, Figs. 9, 10). Length 279, width 172. Proterosoma and legs I, II similar to male.

Dorsal idiosoma. Prodorsal shield 35×34 , *sci* 12, *sce* : *sce* 45. Hysterosoma with setae *l* 1-3 long, *l* 1 extending almost to *l* 2, *l* 2 extending to *l* 3, *h* two times *sh*.

Ventral idiosoma. Genital setae short, *gp* < *ga*; *cx* III > *cx* IV, both extending to level of tibial IV apices. **Legs.** Leg I with σ 1 28; leg II with setae *mG* = *vF*; legs III, IV with setae short, flexible (except *d*); setae *d* long, flexible, inserted apicodorsally; setae *d* III = *d* IV; pretarsi short, well developed; ambulacra I-IV well developed with I, II > III, IV. Legs III with setae *sR* two times longer than *kT*. Measurements fused femur/genu, tibia, tarsus : III, 39, 24, 62; IV, 33, 25, 62.

MALE (paratype, Figs. 3, 4). Length 265, width 176. **Gnathosoma.** 32×29 , subcapitular setae extending to base of subcapitulum.

Dorsal idiosoma. Prodorsal shield 67×37 , *sci* 7, *sce* : *sce* 44. Hysterosomal shield 149×158 ; with approximate terminal lobes; lobar membrane attenuated posteriorly; distance between setal pair *l* 2 less than between *l* 1, *l* 3; setae *l* 3 extending slightly beyond level setae *l* 4; setae *l* 3 = *l* 2 > *l* 1; setae *h* more than 2 times length of setae *sh*; measurements : *h* : *h* 160, *l* 1 : *l* 1 100, *l* 2 : *l* 2 69, *l* 3 : *l* 3 64.

Ventral idiosoma. Y-shaped epimerites I broad; without remnant of posterior epimerites II; epiantrum, postgenital, preanal sclerites connected; setae *gp* nearer to *ga* than to *a*; adanal discs lateral to sclerotization originating at terminal cleft apex. **Legs.** Leg I with σ 1 34; leg II with *mG* = *vF*; leg III with seta *kT* extending to tarsal apex; pretarsal stalks I-IV, 10, 10, 14, 9; ambulacra I-IV small,

subequal. Measurements trochanter, fused femur/genu, tibia, tarsus : III, 36, 40, 54, 62; IV, 14, 33, 27, 19.

TRITONYMPH (Figs. 15, 16). Length 284, width 153; similar to female in form.

Dorsal idiosoma. Prodorsum with triangular central shield 57×30 , scapular setae on platelets approximate to central shield, *sce* : *sce* 45, *sci* 7. Hysterosoma with setae *l* 1-3 short, setae *l* 5 subequal to *d* 5, *h* more than 4 times length of *sh*.

Ventral idiosoma. Setae *ga* nearer to *cx* 3 than to *gp*, *cx* 4 > *cx* 3 = *gp* > *ga*, *cx* 3 does not extend to *gp*. **Legs.** Legs III, IV with setae flexible, setae *d* III = *d* IV, *sR* subequal to *sh*, pretarsi about 1/3 length of corresponding tarsi.

PROTONYMPH (Figs. 21, 22). Length 197, width 60. Similar to tritonymph except smaller and setal complement of legs IV incomplete.

Dorsal idiosoma. Prodorsum with triangular central shield 41×29 , scapular setae on platelets approximate to central shield, *sce* : *sce* 32. Hysterosoma with setae *l* 1-3 short; setae *l* 5 subequal to *d* 5; *h* short, more than 4 times length of *sh*; *l* 1 extending to 2/3 interspace to *l* 2; *l* 2 extending beyond *l* 3.

Ventral idiosoma. Setae *cx* 3 short, not extending to level of short *gp*. **Legs.** Legs III, IV with setae flexible; setae *d* III > *d* IV; pretarsi short, well developed.

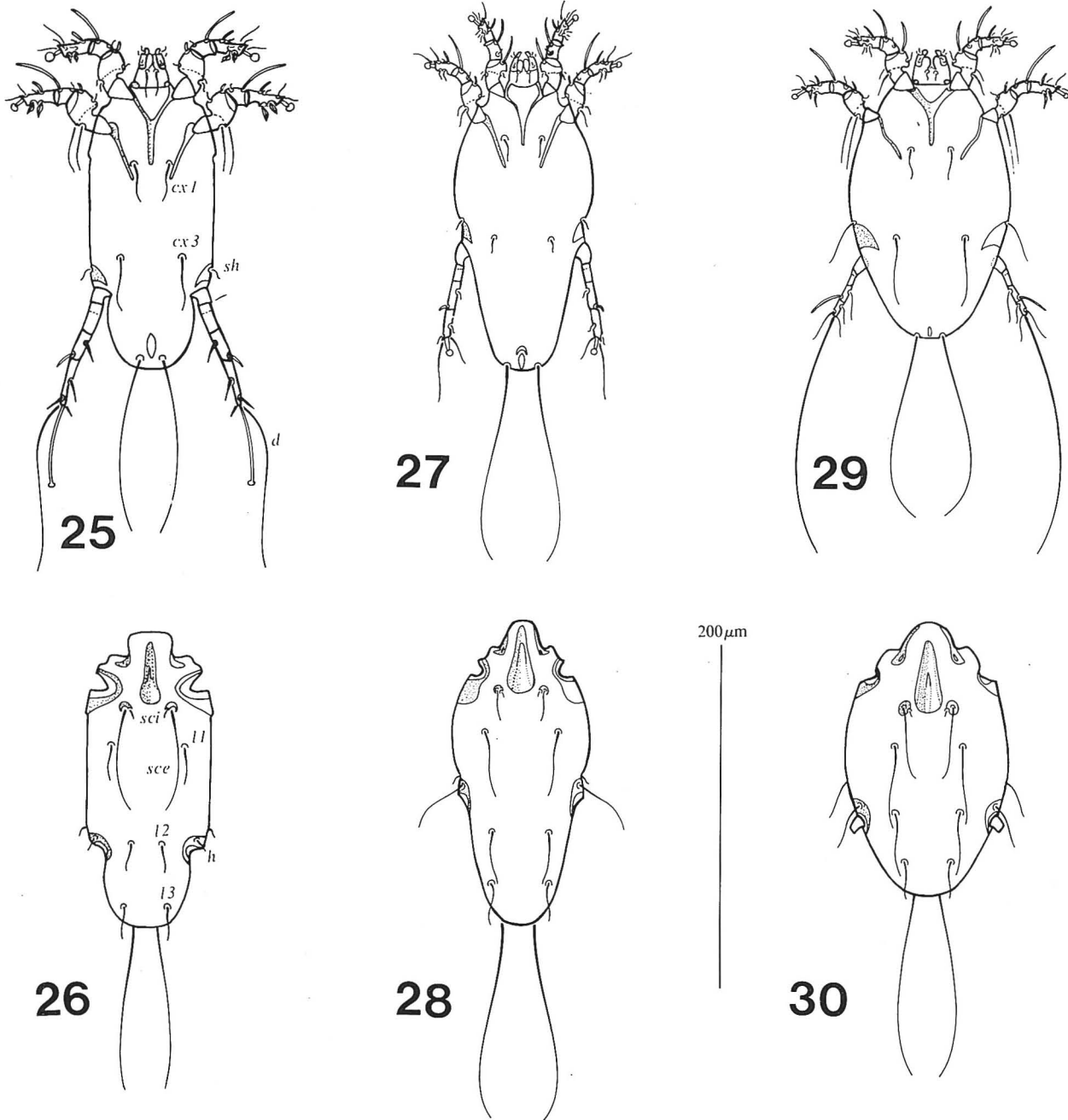
LARVA (Figs. 27, 28). Length 191, width 76. Similar to protonymph except legs IV absent.

Dorsal idiosoma. Prodorsum with central sclerite as broad triangle 39×17 , *sce* : *sce* 27. Hysterosoma with setae *l* 1-3 long, *sh* minute, *l* 2 extending to *l* 3.

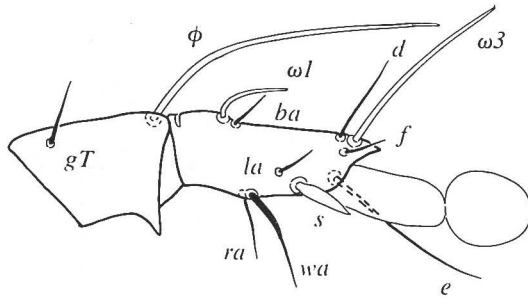
Ventral idiosoma. Setae *cx* 3 minute. **Legs.** Legs III with setae flexible, pretarsi short, seta *d* more than 2 times length of tarsus.

HOLOTYPE. From *Aratinga canicularis clarae* Moore (Psittacidae) : female, MEXICO : Sinaloa : Piaxtla, December 12, 1981, T. M. PÉREZ & W. T. ATYEO (TMP 23).

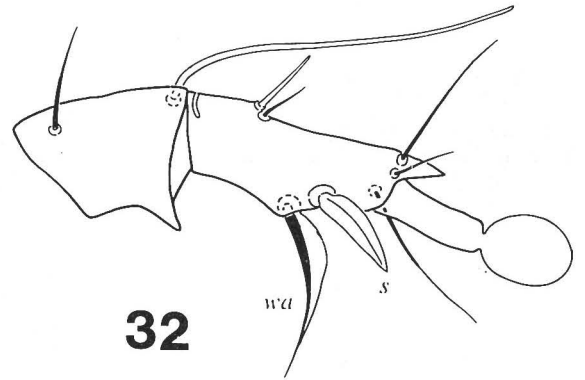
PARATYPES (adults only). From *A. canicularis clarae* : MEXICO : Sinaloa : 8 ♂♂, 12 ♀♀, 10 TNN, 16 PNN, 42 LL, same data as holotype (TMP 23); 6 ♂♂, 2 ♀♀, Cosalá, November 30, 1903, M. S. GOODNIGHT (AMNH 91214, UGA 10423). Nayarit :



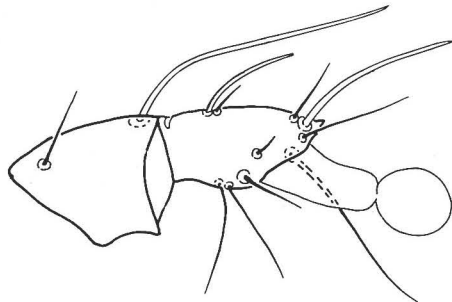
FIGS. 25-30 : Ventral and dorsal aspects of larvae : *Fainalges longissimus*, n. sp. (25-26), *F. brevissimus*, n. sp. (27-28), *F. apicosetiger*, n. sp. (29-30). Abbreviations, setae : *cx* 1, 3, coxals ; *d*, tarsals ; *l* 1-3, lateral hysterosomals ; *h*, humerals ; *sce*, *sci*, external and internal scapulars ; *sh*, subhumeral.



31

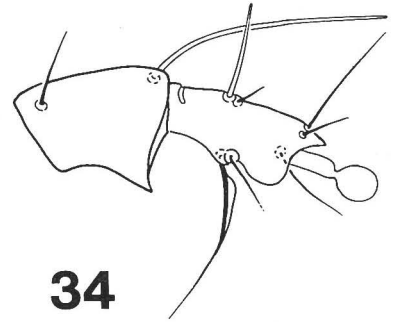


32

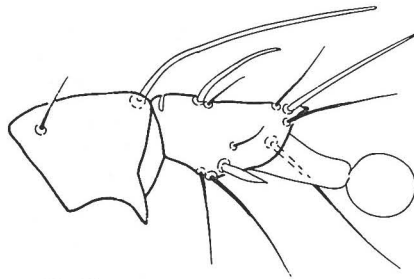


33

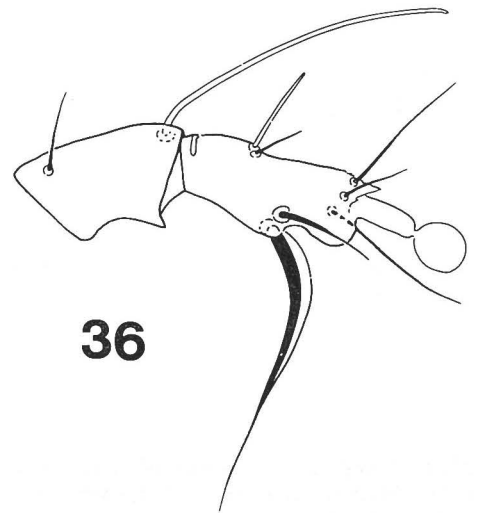
50 μm



34



35



36

FIGS. 31-36 : Paraxial aspects of tibiae, tarsi of legs I and II : *Fainalges longissimus*, n. sp. (31-32), *F. brevissimus*, n. sp. (33-34), *F. apicosetiger*, n. sp. (35-36). Signatures for setae and solenidia are the Grandjean system as used by Griffiths (1964) for *Acarus siro*.

7 ♀♀, 1 PN, Camino Real, January 22, 1982 (UNAM 61, 69); 2 ♂♂, 7 ♀♀, La Yerba, October 16, 1981 (UNAM 59, 60, 67).

ADDITIONAL MATERIAL. From *A. canicularis clarae*: MEXICO: Sinaloa: 5 ♂♂, 14 ♀♀, 1 TN; Nayarit: 5 ♂♂, 4 ♀♀, 1 PN; Jalisco, 3 ♀♀; Michoacan, 1 ♀. From *A. c. eburnirostrum* (Lesson): MEXICO: Guerrero, 2 ♂♂, 4 ♀♀, 2 PNN; Oaxaca 2 ♂♂, 4 ♀♀. From *A. c. canicularis*: GUATEMALA: 1 ♂, 7 ♀♀, 2 PNN. HONDURAS: 4 ♀♀. COSTA RICA: 1 ♂, 1 ♀. From *A. nana vicinalis* (Bangs and Panard): MEXICO: Tamaulipas: 3 ♂♂, 5 ♀♀, 1 TN, 3 PNN. From *A. n. astec*: MEXICO: Veracruz: 21 ♂♂, 37 ♀♀, 5 TNN, 7 PNN; Oaxaca, 5 ♂♂, 3 ♀♀, 1 TN; Chiapas, 2 ♀♀; Tabasco, 5 ♂♂, 10 ♀♀, 13 TNN, 14 PNN, 16 LL; Yucatan, 14 ♂♂, 7 ♀♀, 2 TNN, 3 PNN. HONDURAS: 10 ♀♀, 1 TN. GUATEMALA: 1 ♂, 4 ♀♀. COSTA RICA: 2 ♂♂. From *A. n. nana* (Vigors): JAMAICA: 1 ♂, 4 ♀♀, 1 TN.

LOCATIONS OF TYPES. Holotype deposited in NMNH, paratypes in NMNH, FMNH, UGA, UNAM.

ETYMOLOGY. The specific epithet refers to the short, well-developed pretarsi of the posterior legs of females.

REMARKS. This species occurs on small feathers of the body, tail coverts and wings. From museum study skins, we recovered individuals of this species from 60 of the 77 collections.

Fainalges apicosetiger, new species

Figs. 5, 6, 11, 12, 17, 18, 23, 24, 29, 30, 35, 36

FEMALE (holotype, Figs. 11, 12). Length 333, width 212. Proterosoma and legs I, II similar to male.

Dorsal idiosoma. Prodorsal shield 75×35 , *sci* 12, *sce*: *sce* 46. Hysterosoma with setae *l* 1-3 long, *l* 1 extending to *l* 2; *l* 2 extending to *l* 3; *h* more than two times *sh*.

Ventral idiosoma. Genital setae long, *gp* = *ga*; coxal setae long, subequal, *cx* 3 extending beyond *cx* 4. *Legs*. Leg I with α 1 33; leg II with setae *mG* > *vF*; legs III, IV with setae long, flexible (except *d*); setae *d* very long, inserted apically;

d III > *d* IV; pretarsi long, slender; ambulacra minute. Legs III with setae *sR* long; *kT* > *sR*. Measurements fused femur/genu, tibia, tarsus, pretarsus: III, 37, 24, 39, 42; IV, 29, 32, 40, 54.

MALE (paratype, Figs. 5, 6). Length 275, width 196. *Gnathosoma*. 32×31 , subcapitular setae extending beyond branching of epimerites I.

Dorsal idiosoma. Prodorsal shield 66×33 , *sci* 23, *sce*: *sce* 43. Hysterosomal shield 149×173 ; with short terminal lobes; lobar membrane rounded posteriorly; distance between setal pairs *l* 1-3 decreasing posteriorly; setae *l* 2 extending beyond insertions of setae *l* 3; setae *l* 3 extending beyond lobe apices; setae *l* 3 > *l* 2 > *l* 1; setae *h* long, subequal to *sh*; measurements: *h*: *h* 168, *l* 1: *l* 1 108, *l* 2: *l* 2 79; *l* 3: *l* 3 73.

Ventral idiosoma. Y-shaped epimerites I broad, with remnant of posterior epimerites II; epandrium postgenital, preanal sclerites independent; setae *gp* nearer to *ga* than to *a*; adanal discs near apex of sclerotization originating at terminal cleft apex. *Legs*. Leg I with σ 1 33; leg II with *mG* > *vF*; leg III with seta *kT* extending beyond tarsal base; pretarsal stalks, ambulacra I-IV subequal. Measurements trochanter, fused femur/genu, tibia, tarsus: III, 42, 47, 59, 91; IV, 25, 37, 38, 19.

TRITONYMPH (Figs. 17, 18). Length 225, width 122; similar to female in form.

Dorsal idiosoma. Prodorsum with triangular central shield 59×28 , scapular setae on platelets approximate to central shield, *sce*: *sce* 33, *sci* 15. Hysterosoma with setae *l* 1-3 long, setae *l* 5 about 2 times length *d* 5, *h* less than 2 times length of *sh*.

Ventral idiosoma. Setae *ga* approximate to *gp*; *cx* 4 = *cx* 3 = *gp* > *ga*; *cx* 3 extends beyond insertions of *cx* 4. *Legs*. Legs III, IV with setae flexible; setae *d* very long, inserted apically; setae *d* III < *d* IV; *sR* > *sh*; pretarsi absent.

PROTONYMPH (Figs. 23, 24). Length 157, width 93. Similar to tritonymph except smaller and setal complement of legs IV incomplete.

Dorsal idiosoma. Prodorsum with triangular central shield 42×22 , scapular setae on platelets approximate to central shield, *sce*: *sce* 29. Hysterosoma with setae *l* 1-3 long; setae *l* 5 about 2 times *d* 5; *h* long, more than 2 times length of *sh*; *l* 1 extends beyond *l* 2; *l* 2 not extending beyond *l* 3.

Ventral idiosoma. Setae *cx* 3 extending well beyond insertions of long *gp*. Legs. Legs III, IV with setae flexible; setae *d* long, inserted apically; setae *d* III < *d* IV; pretarsi absent.

LARVA (Figs. 29, 30). Length 147, width 69. Similar to protonymph except legs IV absent.

Dorsal idiosoma. Prodorsum with central sclerite as relatively broad triangle 31×12 , *sce* : *sce* 27. Hysterosoma with setae *l* 1-3 long, *sh* minute, *l* 2 extending to *l* 3.

Ventral idiosoma. Setae *cx* 3 long, extending beyond idiosomal terminus. Legs. Legs III with setae flexible, seta *d* more than 5 times length of tarsus, pretarsus absent.

HOLOTYPE. From *Aratinga canicularis clarae* Moore (Psittacidae): female, MEXICO : Sinaloa : Piaxtla, December 12, 1981, T. M. PÉREZ & W. T. ATYEO (TMP 23).

PARATYPES (adults only). From *A. canicularis clarae* : MEXICO : Sinaloa : 2 ♂♂, 6 ♀♀, 1 TN, 3 PNN, 1 L, same data as holotype (TMP 23); 5 ♂♂, 5 ♀♀, 2 TNN, Elota, December 13, 1900, M. S. GOODNIGHT (AMNH 91216, UGA 11236); Nayarit : 2 ♂♂, 4 ♀♀, Camino Real, January 22, 1982 (UNAM 61, 69); 4 ♂♂, 6 ♀♀, 1 TN, La Yerba, October 16, 1981 (UNAM 57, 60, 67).

ADDITIONAL MATERIAL. From *A. canicularis clarae* : MEXICO : Nayarit : 2 ♂♂, 2 ♀♀, 1 TN. From *A. c. aburnirostrum* : MEXICO : Guerrero : 1 ♂, 1 ♀; Oaxaca, 2 ♂♂, 4 ♀♀. From *A. c. canicularis* : MEXICO : Chiapas : 1 ♂. GUATEMALA : 7 ♂♂, 12 ♀♀, 2 TNN. HONDURAS : 2 ♂♂, 1 ♀. COSTA RICA : 1 ♂. From *A. nana vicinalis* : MEXICO : Tamaulipas : 1 ♂, 4 ♀♀. From *A. n. astec* : MEXICO : Veracruz : 11 ♂♂, 34 ♀♀, 2 PNN; Oaxaca, 1 ♂, 2 ♀♀; Tabasco, 4 ♂♂, 1 ♀, 1 PN; Yucatan, 3 ♂♂, 7 ♀♀. GUATEMALA : 1 ♀; HONDURAS : 2 ♂♂, 3 ♀♀. NICARAGUA : 2 ♀♀. From *A. n. nana* : JAMAICA : 1 ♂, 3 ♀♀.

LOCATIONS OF TYPES. Holotype deposited in NMNH, paratypes in NMNH, FMNH, UGA, UNAM.

ETYMOLOGY. The specific epithet refers to the apical insertions of setae *d* on legs III and IV of the females and immatures.

REMARKS. This species is known to occur on the body, tail coverts and small feathers at the wing bases (PÉREZ and ATYEO 1984). Seventy-two specimens have been taken from 51 of 77 collections from museum study skins.

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