ECTOPARASITIC ACARINA (ANALGOIDEA) FROM THE OLIVE-THROATED CONURE (AVES: PSITTACIFORMES)

by

James E. McCloskey

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Paul C Peterson — 5/31/85
Adviser — Date

Sally M. Hotchkiss — June 6,
Dean of the Graduate School — Date

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ABSTRACT

ECTOPARASITIC ACARINA (ANALGOIDEA) FROM THE OLIVE-THROATED CONURE (AVES: PSITTACIFORMES)

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Feather mites from the olive-throated conure, Aratinga nana astec (Souance) (Psittacidae) were examined. Twelve new species are described and illustrated. One named species is redescribed. All species were obtained from field collected birds in Mexico or from museum specimens. The new species belong to the genera Aralichus Gaud (3 sp.), Protolichus Trouessart (1 sp.), Rhytidelasma Gaud (1 sp.), Eurydiscalges Faccini, Gaud and Atyeo (2 sp.), Chiasmalges Gaud and Atyeo (1 sp.), Protonysus Trouessart (1 sp.), and Fainalges Gaud and Berla (3 sp.). The named species is Echinofemur venustissimus (Trouessart).

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INTRODUCTION

The arthropod class Arachnida includes many common and familiar organisms such as spiders, scorpions, ticks and mites. The earliest arachnids date back to the Silurian period (Barnes, 1973) and the physical appearance of the majority of species has changed little during the past 250 million years (Lindquist, 1975). Of the eleven extant groups of Arachnida, all except the Acari and Opiliones are completely carnivorous (Krantz, 1978).

The Acari have shown significant evolutionary success rivaling that of insects with respect to number of species, diversity of habits, and variety of ecological niches (Lindquist, 1975). They are so morphologically diverse that acarologists consider the group to be polyphyletic, having arisen from at least two different ancestral arachnids (Woolley, 1961; Barnes, 1973). The earliest known mite fossil, Protocarus crani Hirst, dates back to the mid-Paleozoic era (Krantz, 1978). Beginning in the late Mesozoic and early Cenozoic periods, the Acari have repeatedly and independently broken away from a predatory existence, evolving as plant feeders, fungus feeders, micro-organism filter feeders, scavengers, external and internal parasites, and commensals of invertebrates and vertebrates (Lindquist, 1975). This adaptation to a non-predatory existence permitted greater

niche expansion and the development of significant morphological diversity (Krantz, 1978).

A remarkable group within the Acari that have evolved rapidly with an exuberance of diverse morphological characteristics are the feather mites. These mites are obligatory commensals on every avian order except the Sphenisciformes (penguins), Rheiformes (Rheas) and Casuariiformes (cassowaries and emus) (Atyeo and Gaud, 1979). The majority of species are confined to the feather surface while a few inhabit the hollow quill space, skin, or respiratory system.

The nutritional requirements of feather mites are believed to consist of feather fragments, desquamated skin cells, oily secretions, fungal spores and diatoms. Although these mites are considered to be commensals, feather damage from a couple of groups has been observed. Species of the quill mite Cystoidosoma feed on the medulla creating a cavity from the quill to the tip of the rachis (Perez and Atyeo, 1984). The medulla consists of dermal cells and a rich supply of blood vessels which provide nourishment for the growing feather but does not contribute to its strength (Welty, 1968). Destruction of the medulla of young feathers may adversely affect feather growth and development. Nymphs of the genus Chiasmalges penetrate the dorsal surface of the rachis near the superior umbilicus and make a channel through the medulla to the quill. Individual mites have been observed to enter and exit the quill through the superior umbilicus (Perez and Atyeo, 1984). Large populations of these mites may damage

the integrity of the flight feathers adversely affecting the aerodynamics of flight.

Past studies utilizing museum skins and field collections have demonstrated 1-4 feather mite species per bird, however, birds inhabiting the warmer climates have been shown to harbor a greater number of species (Dubinin, 1951). For example, a previous study conducted by Perez and Atyeo (1984) recorded 16 species of feather mites and 3 species of quill mites from Mexican parrots currently assigned to the genus Aratinga Spix. These species belong to the families Pterolichidae, Psorotoididae, Xolalgidae and Syringobiidae. In this study, 13 species of feather mites obtained from the Olive-throated Conure, Aratinga nana astec (Souance), are described or redescribed. These mite species are assigned to the families Pterolichidae, Psorotoididae and Xolalgidae. Whether such a large number of species is common throughout this genus or the Psittacidae as a group remains to be determined. Perhaps avian groups in general harbor greater numbers of species than previously thought but due to inadequate collection techniques or other variables, they were not collected-and identified. With approximately 1600 described feather mite species and 8600 avian species worldwide (Atyeo, 1979), the study of feather mite systematics is still in its infancy. In determining host-parasite specificity patterns, it will be necessary to clearly identify the feather mite fauna within specific avian groups. It is hoped this study will be useful in the further identification of the feather mite populations on the Psittacidae.

HISTORICAL ACCOUNT

The study of feather mites dates back over 300 years when Redi in 1608 described three mite species from birds of Italy. However, information on the systematics of these acari remained sparse until the late 19th century when Trouessart and Megnin in 1883 devised the first classification. In 1916 Trouessart published a major revision of the group. V.B. Dubinin, a Russian parasitologist, conducted extensive research during a 20-year period and published major taxonomic revisions in 1953 and 1956.

An increase in interest coupled with improved and profitable collection techniques has resulted in major taxonomic reclassification. Peterson (1975), utilizing conventional and numerical taxonomy, suggested that there were at least 3 major suprafamilial groupings in the superfamily Analgoidea. These groups were tentatively designated as familial complexes: the Analgoid complex, the Freyanid complex and the Pterolichoid complex. Gaud and Atyeo (1978) elevated these familial complexes into the superfamilies Analgoidea, Freyanidea, and Pterolichoidea, based upon tarsal and pretarsal characteristics. The foilowing table lists the known superfamilies and families of feather mites.

TABLE 1

Major Groupings of Feather Mites

Analgoidea	Pterolichoidea	Freyanoidea
Alloptidae	Cheylabiidae	Caudiferidae
Analgidae	Crypturoptidae	Freyanidae
Apionacaridae	Eustathiidae	Vexillariidae
Avenzoariidae	Falculiferidae	
Dermoglyphidae	Gabuciniidae	
Epidermoptidae	Kramerellidae	
Proctophylloididae	Ochrolichidae	
Psoroptoididae	Pterolichidae	
Trouessartiidae	Rectijanuidae	
Turbinoptidae	Syringoibiidae	
Xolalgidae	Thoracosathesidae	

MORPHOLOGICAL CHARACTERISTICS

The feather mites and acari in general have a loss of body segmentation that is characteristic throughout the Arthropoda. However, remnants of this lost segmentation is evident in the distribution of dorsal idiosomal setae in rows, the distribution of dorsal shields, the separation of the propodosoma and hysterosoma by a transverse furrow, and more distinct segmentation during the pre-adult stages of some species. In addition, there is a lack of division between the opisthosoma and metapodosoma (segment containing legs III and IV) but a remnant of this subdivision, a sharp narrowing of the opisthosoma, remains in the Allopes, Zachvatkinia and Trouessartia (Dubinin, 1951).

Due to the apparent lack of segmentation, the body of a typical feather mite is divided into two basic morphological regions: the gnathosoma consisting primarily of the subcapitulum, chelicerae and pedipalps and the idiosoma encompassing the body proper. Dorsally the idiosoma is usually divided by a transverse furrow (sejugal suture) into the anterior propodosoma and the posterior hysterosoma.

The gnathosoma of most groups is relatively small, compact and freely protrudes forward from the apex of the propodosoma. In a few groups, for example, Falculifer and Bdellorhynchus, the chelicerae can be hypertrophied, extending up to one-third the length of the body.

The propodosoma of most feather mites is tapered or rounded anteriorly. A chitinous covering known as the propodosomal shield may extend over the dorsal surface of this section. This shield, with regard to shape, size, presence of ornamentation, and degree of sclerotization, varies greatly among genera. Two pairs of setae, the external (sce) and internal (sci) scapular setae, form a transverse row near the posterior margin. At the apex there may be two, one or no internal vertical setae (vi). Posterolateral to setae vi and inserted in or near the edge of the shield may be the external vertical setae (ve). Smaller scapular shields may also be present on either side of the medial propodosomal shield.

The hysterosoma generally displays pronounced sexual dimorphism. The female opisthosoma (region posterior to legs IV) may be rounded with a small medial groove, or bifurcated and divided by a wide cleft. The majority of males have a bifurcated opisthosoma divided by a wide medial groove. Membraneous extensions of various shapes (lamellae) may extend from the lateral and posterior nargins or be absent (fig. 29, 37). A chitinous dorsal hysterosomal shield of varying shape, size, degree of sclerotization and ornamentation and a pair of humeral shields along the lateral margins may also be present. There are maximally five horizontal or curved rows of setae each consisting of an internal pair (d) and an external pair (l) positioned from the anterior shield margin to the terminal lobes. Setal locations are

relatively constant between males and females within genera that lack strong sexual dimorphism. Along the anterolateral margins positioned either dorsally or ventrally are two pairs of setae, the humeral (h) and the subhumeral (sh). Two pairs of additional setae are found on the terminus, the internal postanals (pai) and the external postanals (pae). In males, setae pai are generally positioned ventral to setae 14 while in the female they are positioned on the ventral idiosoma on a line extending from the terminal portion of the anus to setae 14. Setae pai are positioned mesal or anteromesal to setae d5.

The ventral idiosoma contains the male genital organ and the female oviporous. The characteristics of these and their associated structures as the pregenital apodeme, lateral sclerites and two pairs of genital discs will vary markedly (figs. 12, 14, 50, 52). The female oviporous is not a copulative organ but an opening for the release of eggs. The copulative opening, the bursa copulatrix, is located posterior to the anal opening usually on the dorsal surface and leads to a small sperm collecting chamber, the spermatheca. In males, a pair of adanal discs flank the anus. These structures assist the male in adhering tightly to the female during copulation.

The ventral idiosomal chaetotaxy, excluding setae pae and pai, maximally contain 6 pairs of setae: the sternal setae (s) on coxae I, the coxal setae (cx3) associated with coxae III, the central setae (c1, c2, c3) surrounding

the genital structures, and the anal setae which are positioned lateral, posterolater, anteroilateral or medial to the adanal discs (Atyeo and Gaud, 1966).

Theoretically, the legs consist of 7 segments: coxa, trochanter, femur, genu, tibia, tarsus and a disc-like pretarsus called an ambulacra. The coxae are greatly reduced and incorporated into the ventral or ventrolateral surface of the idiosoma, the remnants of which form the epimerites whcih delineate the coxal fields. The epimerites are strongly chitinous structures partially depressed into the ventral idiosoma to which are attached the leg muscles. Some feather mites have 6 leg segments, with the fenur and genu partially or totally fused. The legs may have various degrees of shielding or chitinous extensions. Significant sexual dimorphism in regards to leg development is noted in some groups. The males may have one or both pairs of posterior legs hypertrophied or atrophied in relation to legs I and II. The leg chaetotaxy is fairly uniform throughout the entire group, but variation among genera may occur (Dubinin, 1951).

LIFE STAGES

Six ontogenetic life stages are common to this group: egg, prelarva, hexapod larva, protonymph, tritonymph, and adult. All feather mites as a rule are oviparous. The eggs, covered by a thick shell, are quite large, approximately 2/3 the length and 1/4 to 1/3 the width of the idiosoma. They are laid along the barbs and barbules and tightly fastened to the ventral surface of particular feathers by a jelly-like coating on their front pole. Some eggs have a single hook or rows of hooks which interlock with the feather barbules providing a secure attachment to the feather. Some species of the genera Freyana, Zachvatkinia, Avenzoaria, Gabucinia may be faculatively ovoviviparous and oviparous depending upon the season of the year. In the spring and summer, the eggs are covered by a thin shell from which the larvae emerge either directly in the cavity of the uterus or soon after laying, while in the autumn the laid eggs have a thick shell and embryonic development ceases until the spring when development is completed and the larvae are hatched. The embryos of most species undergo one embryonic molt to the prelarva stage (Dubinin, 1951).

The hexapod larva is oval and usually unsclerotized with the exception of a small propodosomal shield. There is complete absence of external genital organs. Setal pairs are absent and their arrangement will vary during the different

life stages. The protonymph contains the maximal number of well-developed legs and the majority of setal pairs. There is no copulative opening and only one pair of genital discs. The tritonymph closely resembles the adult with respect to having all setal pairs present. An additional pair of genital discs is added during this stage. Sexual dimorphism remains weakly pronounced with no external genital organs present. However, the female has a subterminal copulative opening on the dorsal side used for sperm transfer. It is during this stage that females will mate once with adult males. Upon reaching the adult stage, the mites have a full complement of setae, full sclerotization, and often greatly pronounced sexual dimorphism (Dubinin, 1951).

In order to insure the proper alignment of the male and female copulative structures, a number of morphological adaptations have evolved: an elaboration of the convex-concave male terminus with terminal lobes, lamellae, broadened setae or any combination of the three; the adanal discs; and the ventral and terminal setae. These modifications, in conjunction with the less prominent modifications of the female terminus, permit successful copulation (Atyeo and Gaud, 1979).

HOST AND MICROHABITAT

In any parasitic mode of existence, the host plays an integral part in the development of host-parasite associations. The biological and ecological forces affecting the host will in turn affect the distribution and morphological adaptations of the commensals. In examining feather mite-bird associations, knowledge of the host's ecology and biology in relation to the physical parameters of a mite's microhabitat must be obtained to better understand the speciation and evolutionary relationships between these two groups (Peterson, 1975).

The species Aratinga nana astec belongs to the large avian order Psittaciformes. The Psittaciformes, whose origin dates back to the Oligocene period (Forshaw, 1978), are a very distinct group with no close relatives; although pigeons are thought to be distantly related (Feduccia, 1980). Despite variations in size, shape, and color among species, the parrots are a very homogeneous group making systematic classifications difficult and arbitrary (Forshaw, 1978). Dubinin (1958) came to the same conclusion while examining species of the feather mite genus Protolichus in which he noted that the feather mite fauna from parrots of the ancient subfamilies Strigopinae and Nestorinae were relatively similar to those from the younger subfamily Psittacinae.

Dubinin (1958) considered the continent of Australia to be the central region of origin of these birds. In the process of further resettlement during the Eocene and Miocene periods, the subfamilies Strigopinae and Nestorinae appeared in New Zealand while some of the Psittacinae migrated across Antartica to South America and the islands of Madagascar. There are presently 332 extant species of parrots distributed mainly in the tropical regions throughout the Southern Hemisphere, with the largest number of species found in the New World. The following list (Forshaw, 1978) illustrates the pattern of distribution within this order:

Australia	52 species
New Guinea	46 "
Phillipines	11 "
Central Africa	14 "
Southern Africa	10 "
India	10 "
Brazil	10 "
Columbia	49 "
Venezuela	48 "
Argentina	25 "
Mexico	18 "

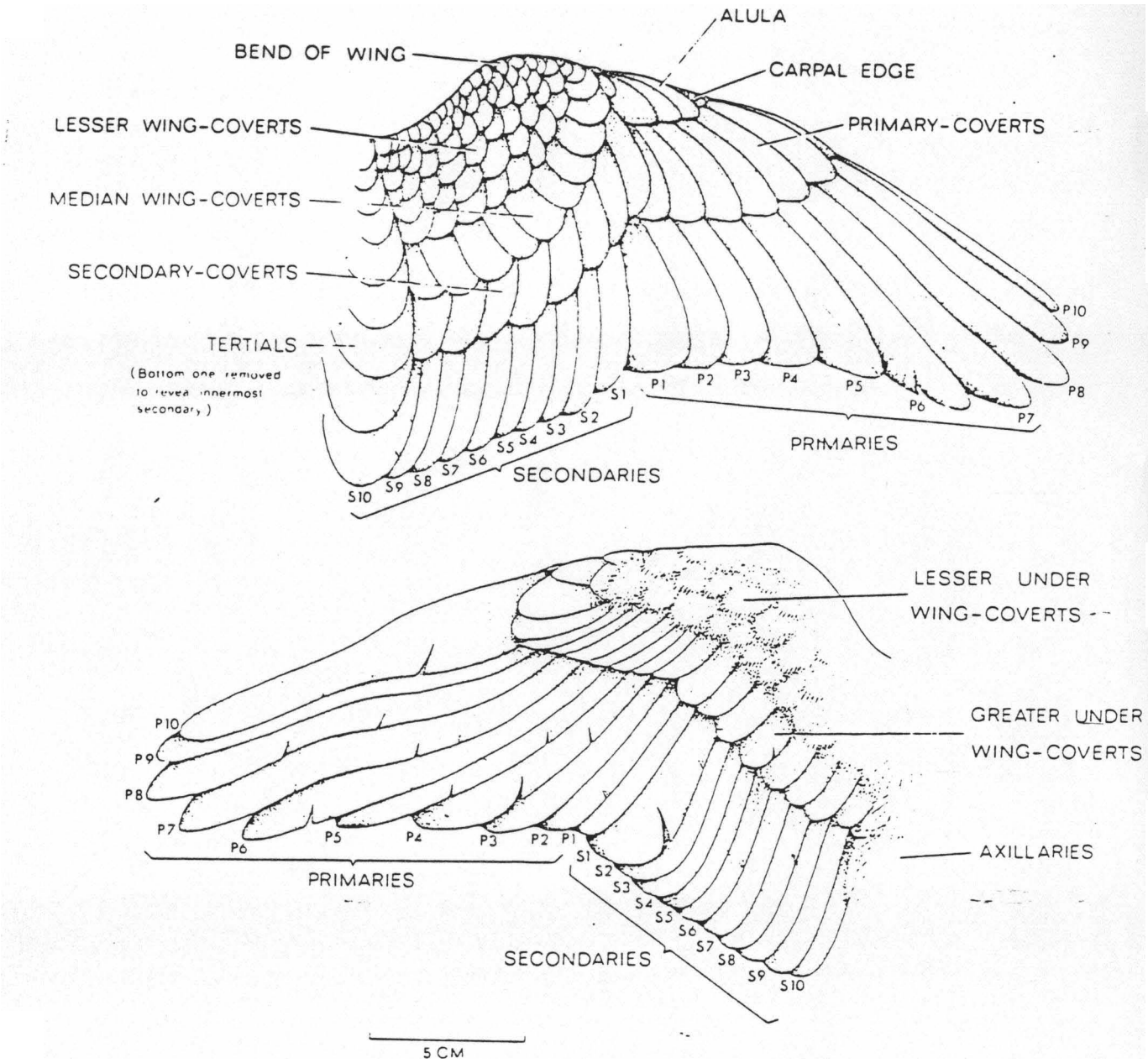
The Psittaciformes are easily recognized by their short, blunt rounded bill with the curved upper mandible fitting neatly over the lower. The foot is zygodactyl, with two toes pointing forward and two turned backwards. Other characteristics include the large, broad head, the short

neck, the nostrils which are set in a bare of feathered fleshy cere at the base of the upper mandibles, and the plumage which is brightly colored. The flight patterns are swift and direct, but sustained flight is possible. Nutritional requirements consist of fruit, seeds, and insects.

Species of New World parrots assigned to the genus Aratinga are small to medium size with long gradated tails and proportionately broad heavy bills. They have prominent naked or partly-feathered periophthalmic rings, but the lores and upper cheeks are fully feathered. The cere can be naked or hidden by feathers. The sexes are alike and immatures generally resemble adults. Aratinga nana astec is green of general plumage and paler, more yellowish on the underparts. The throat, breast and abdomen are a pale brown in color. It has a smaller bill than any other species in the genus. Their diet consists of seeds, fruits, berries, blossoms and vegetable matter. They are seen in pairs or flocks of from 5 to 30 individuals. The habitat ranges from Veracruz, Mexico, south to the Almirante Bay region of Western Panama (Forshaw, 1978).

The plumage consists of five feather types: vaned or contour feathers, down, powder down, semiplume and filiplume. In parrots the contour, down, and powder down are the most prominent feathers.

For birds in general, the contour feathers form the visible plumage and give the bird its streamlined appearance and flight capability. Those attached to the wing (fig. 1)


ALULA
BEND OF WING
CARPAL EDGE
LESSER WING-COVERTS
PRIMARY-COVERTS
MEDIAN WING-COVERTS
SECONDARY-COVERTS
TERTIALS
(Bottom one removed to reveal innermost secondary.)
P10
P9
P8
P7
P6
P5
P4
P3
P2
P1
PRIMARIES
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
SECONDARIES
LESSER UNDER WING-COVERTS
GREATER UNDER WING-COVERTS
AXILLARIES
5 CM

are the remiges; the distal remiges attached to the hand are the primaries; those on the forearm (ulna) are the secondaries; and those attached to the humerus are the tertiaries. The smaller coverts cover the quill bases of the large remiges. The large tail feathers or rectrices are inserted into the rump. The contour feathers grow from definite tracts of skin called pterylae, while the area between tracts are called apteria. The apteria are bare or covered with down, but are overlapped by the contour feathers (Welty, 1968). The pterylae in parrots are sparsely distributed while the apteria are very prominent (Forshaw, 1978).

The typical contour feather on Aratinga and other avian species consists of a short bare circular calamus (quill) and the long rachis (stem) which is grooved on its inner surface and flattened on its side. The calamus has a small opening at its base called the inferior umbilicus through which the growing feather receives nourishment. Extending bilaterally outward from the flattened side of the rachis are parallel rows of barbs. These barbs are held in the classic flattened position by means of numerous, tiny, paralei barbules. At the base of the vane, some of the barbs are free producing a fluffy appearance. The fluffiness may be enhanced by aftershafts which are often well developed on the smaller feathers of the body, wing and tail (Welty, 1968).

There are two types of barbules, the distal barbules bearing numerous microscopic hooklets on their underside which branch out from the side of the barb toward the feather

tip, and the smooth proximal barbules which extend toward the feather base in a diagonal direction. The distal barbules overlap the flanged edge of the proximal barbules from an adjoining barb. These interlocking barbules produce a structurally sound mechanism for the maintenance of feather integrity during flight (fig. 2) (Welty, 1968).

The down feathers are short and fluffy, lacking barbules and rachis. These feathers form an undercoat and are generally not visible. They grow from all parts of the skin except on the neck, where in many species the apteria are bare. In parrots and a few other bird groups, a modified type of down feather called powder down is found. The powder down grows throughout the life of the bird. The barbs continually disintegrate into a fine, talc-like powder which is used for cleaning and waterproofing the feather and giving the plumage a characteristic metallic luster (Welty, 1968).

The two additional feather types of lesser prominence are the semiplume and filiplume. The semiplumes are similar to the contour feathers except the barbs lack hooks and flanges. The filiplumes have the shape of a long whip 1/2 to 3/4 the length of the contour feather, with a weak, distal tuft of barbs and hookless barbules (Welty, 1968).

During flight, feathers and parts of feathers are subjected to aerodynamic forces which divide a feather into two separate zones, exposed and protected (figs. 3 and 4) (Dubinin, 1951). For birds in general, the exposed zones are the distal ends of the primary feathers removed from the

Figure 2

A schematic diagram of 4 barbs of a vaned feather, showing the hooking mechanism of the overlapping barbules (after Welty, 1968).

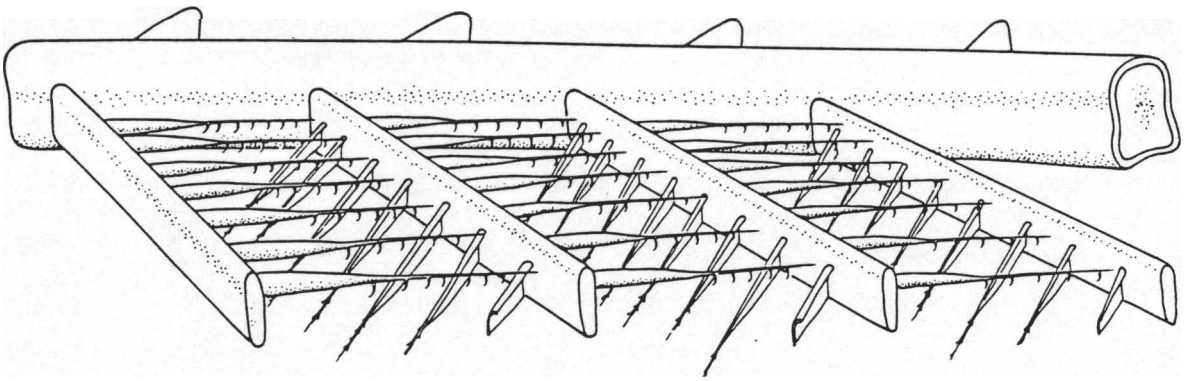


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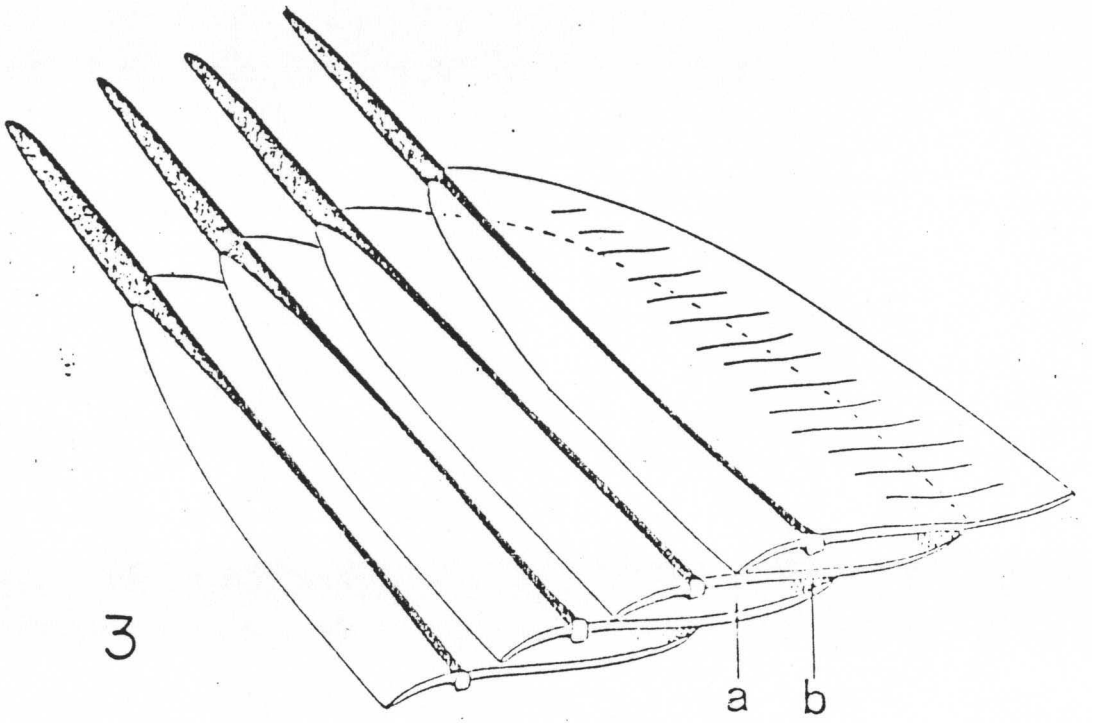
Figure 3

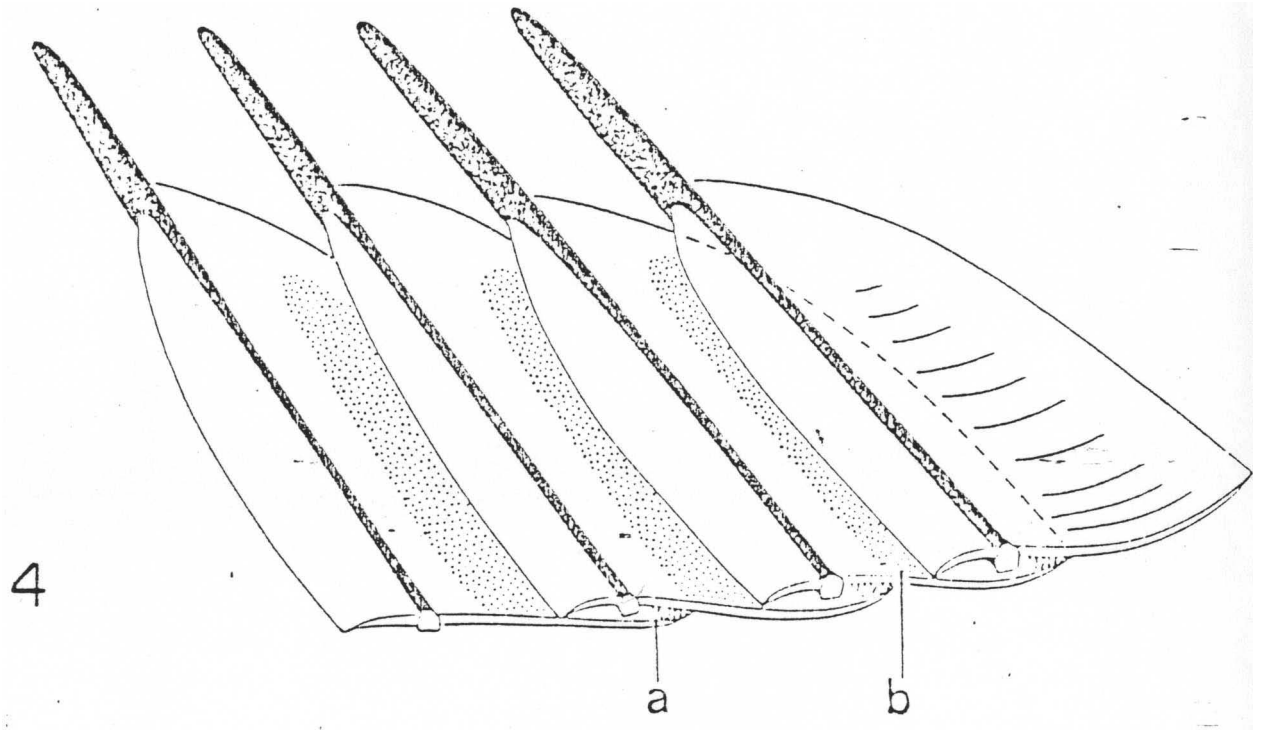
Flight feathers in relaxed position showing zones of overlap: (a) protected area; (b) unprotected area.

Figure 4

Flight feathers in flight position showing zones of overlap: (a) protected area; (b) exposed area.

(after Dubinin, 1951)


3
a
b


4
a
b

area of overlap while the protected zones include the coverts, secondaries, contour feathers and the quills (Peterson, 1975). The majority of feather mites are confined to the ventral surfaces of the remiges and rectrices. The dorsal surfaces of the secondary, tertiary and rectrices are inhabited by a few species of the genus Trouessartia (Dubinin, 1951). Perez and Atyeo (1954) discovered many feather mites inhabiting the protected regions of the body, tail and wing from species of Mexican parrots.

The morphological characteristics of a mite species often correlate to a specific zone. In the exposed regions, significant air turbulence would be encountered. Mites located in those regions have better developed muscular systems as evidenced by large body dimensions, heavy sclerotization, enlarged epimera and greatly enlarged legs III and/or IV in males. These adaptations enable the males to tightly grasp the female during copulation. There is reduction of dorsal chaetotaxy size, idiosomal height and the posterior legs are directed laterally instead of ventrally for the specific purpose of reducing air resistance. Other commonly encountered adaptations include the development of spines, apophyses, and spine-like setae on legs I and II, broadened idiosomal outline by chitinious expansions or expanded setae and greatly enlarged terminal setae for the purpose of maintaining feather position (Atyeo and Gaud, 1971, 1979). Although sexual dimorphism exists, many of these characteristics are common to both sexes.

In contrast, mites confined to the protected regions are smaller and more delicate in body structure. Less integumental chitinization, increased length of dorsal setae and the general lack of special appendages utilized for feather attachment characterize the mites from these regions (Atyeo, 1979).

The distribution of the mites on a bird may be determined by feather type and morphological adaptations to the exposed or protected zones. In regards to the species Aratinga nana astec and Aratinga Canicularis (L.) (Orange-fronted Conure), the exposed surfaces are the distal ends of flight feathers, tail feathers and the greater underwing coverts while the protected regions are those formed by all overlapping feathers. The relationship of the barbs to one another along with the overlapping of feathers produces spaces where the mites can fit.

The upper and lower tail coverts cover the bases of the tail feathers and these in turn are covered by smaller coverts. The aftershaft along with the majority of the barbs of each covert is plumulaceous while the rectrices have only limited plumulaceous areas. The relationship of these feathers to each other creates a three-dimensional protected space with many free barbs surrounding the bases of the tail feathers and coverts. Three species of Fainalges Gaud and Berla were located in the plumulaceous barbs of these feathers and moved to oviposit on adjacent pennaceous portions of the coverts. A species of Chiasmalges Gaud and Atyeo was

located within this base but on the exposed quills and around the superior umbilicus (Perez and Atyeo, 1984).

A single species of Protonysus Trouessart [n. sp. near P. larva (~rouessart)] was located on the protected areas of the primary and secondary coverts, the median wing coverts and the alula. The largest concentration of adults was found on the distal portion of the wing. The majority of larvae and numphs were found on the basal portions of the flight feathers where the grooves between adjacent barbs are extremely narrow. The eggs were deposited on the dorsal and ventral surfaces of the greater underwing coverts (Perez and Atyeo, 1984).

A single species of Protolichus Trouessart [n. sp. near P. eurycnemis (Trouessart)] was confined to the exposed ventral surfaces of primaries 3-10 with the majority of individuals on the outer primaries. One species of Rhytidelasma Gaud [n. sp. near R. ulocercus (Trouessart)] was located on the exposed vanes of the tail feathers. Echinofemur venustissimus (Trouessart) [n.g. for this species Pterolichus (P.) venustissimus (Trouessart)] was found on the protected vanes of the secondary coverts, tertiaries and axillaries (Perez and Atyeo, 1984).

Two new species of Aralichus Gaud were restricted to separate areas. The first species [near A. cribriformes (Megnin and ~rouessart)] was located on the exposed vanes of the secondaries. The second species [near A. porrectus (Megnin and ~rouessart)] was located on the exposed surfaces of the tail feathers.

Two species of Eurydiscalges Faccini, Gaud and Atyeo were found in a small overlapping area of the remiges. One species was found on the ventral surface of the alula and primary coverts (intermixed with Protonysus) and on the exposed surfaces of the primaries (intermixed with Protolichus). The second species was found on the exposed vanes of the secondaries and axillaries.

Although a large number of feather mite species were found on Aratinga n. astec and A. canicularis, there was rarely an intermingling of more than two species in the same site. Upon gross examination, a given topographical region was found to contain several mite species; however, closer examination showed that each region had been partitioned by individual species (Perez and Atyeo, 1984).

HOST-PARASITE ASSOCIATIONS

The feather mites probably evolved from the nidicolus tyroglyphodidae (Dubinin, 1951) which are free living mites that feed on decaying organic matter. Their ontogenetic stages are similar to the feather mites with the exception of an additional hypopus nymph. The hypopus is adapted to phoresy by an arthropod carrier for the purpose of niche expansion (Rothschild, 1952). The development and independence of the feather mites from the Tyroglyphodidae probably began during the Cretaceous Period with intensive evolution occurring since the Oligocene (Cerny, 1971). As the mites slowly evolved to life on a feather, their tyroglyphoidian characters were lost, irreversibly relegating them to an ectoparasitic existence. A few of the most primitive species of the genera Pterolichus Robin and Xoloptes Canestrinii still retain soime tyroglyphoidian characters (Dubinin, 1951).

It is thought the earliest feather mites were able to utilize a wide variety of avian hosts. As tine progressed and the ecological specialization of the hosts evolved, the mites became more closely associated with particular bird groups. The identification of these host-parasite associations may provide a useful tool in the understanding of avian phylogenies and systematics. However, the significance of these relationships and their application in ornithophylogenic studies will depend upon which model of host-parasite

evolution is more pertinent, resource tracking (Kethley and Johnston, 1975) or coevolution (Atyeo and Gaud, 1979).

The successful transfer of parasites from one host to another is governed by two major factors. First, the environmental parameters of the host must be within the limits of the environmental tolerances of the parasite. Second, there must be an opportunity for the transfer to occur. Once transfer has occurred and the parasite is able to adapt to its new environment it can begin to exploit it and through isolation may undergo speciation (Kudon, 1982). Kethley and Johnston (1975) concluded that selective pressures force an ectoparasite to conform to any topographical region where the host's defenses can be avoided. This results in parasitic transfer to hosts with similar topographic features. In other words, the parasite tracks a resource independent of the host's evolution. The net effect is non-congruent relationships and the phylogenies of the two animals may be unrelated. This phenomenon in feather mites is observed in two large families of the Analgoidea, the Analgidae and Xolalgidae (Atyeo and Gaud, 1979).

Contrasting resource tracking is coevolution which states that congruent host-parasite relationships are the norm. That is, the phylogenies of the feather mites can be superimposed over the phylogenies of the birds. Since the mites have associated with birds since the Cretaceous Period, they would have had almost limitless opportunities to form close associations. The more primitive or generalized

mites should associate mainly with the non-passerine bird groups instead of higher bird taxa. This is the case as the older mite groups, Pterolichoidea and Freyanoidea are almost totally confined to the non-passerine groups. When the Passeriformes appeared, host specificity patterns of the older mite groups were fixed and they were unable to colonize the new niches. These niches were exploited by more recent mite groups belonging to the Analgoidea (Atyeo and Gaud, 1979).

The host-parasite relationships of the hoatzin provide an excellent example for the application of this model. Opisthocomus hoazin, a member of the Galliformes, is associated with two bizarre looking feather mite species, Stakyonemus hystrix (Trouessart) and Opisthocomacarus umbellifer (Trouessart). Both species have a wide idiosoma, similarity in leg development and the same setae highly modified. S. hystrix has coarsely branched setae, while O. umbellifer has setae with fine to coarse serations along the edges and minute spicules on their ventral surfaces. The setae of O. umbellifer are flattened and ventrally located around the perimeter of the mite, creating a very streamlined outline. The morphology of these two mites show significant adaptation for life in a turbulent environment. Yet the South American hoatzin as we know it today is a weak flyer, having poorly developed flying muscles. Its flying habits do not create the significant turbulence to which the mites are adapted. How then is this apparent dichotomy resolved?

After a period of time, an ectoparasite will become adapted to a specific microhabitat. If, however, the environment changes or the parasite moves to a different location, the previous modifications can be retained if there are no selection pressures against them. This appears to be the case with the hoatzin. The two mite species have similar adaptations and they occupy the same niche in two different microhabitats on the same feather. Since there are no feather mite species with similar modifications, these two mite taxa probably represent relic species. Although the origin of both host and parasite cannot be inferred, the morphology of the mites suggests that the hoatzin was a very vigorous flyer in the past (Atyeo and Gaud, 1971).

Both evolutionary models have apparent applications in the elaboration of feather mite-bird associations. However, despite the lack of fossil evidence, Atyeo and Gaud (1979) considered coevolution to be the norm for these two groups. Avian social habits preclude the easy transfer of feather mites between dissimilar bird groups. Different species of birds generally do not come in contact with each other (Forshaw, 1978); consequently, there should be little chance for the interchange of feather mite populations. Unfortunately, avian phylogeny has not been adequately established and feather mite interrelationships remain poorly understood (Atyeo and Gaud, 1979). However, host-parasite

associations between the Mallophaga (feather lice) and birds can serve as a useful example.

The Mallophaga became parasitic on the class Aves at an early stage in the evolution of that class (Forshaw, 1978). Each order of birds is parasitized by one or more mallophagan genera, and the relationship between the species of these genera generally reflects the relationship between the hosts within the order (Welty, 1968). Each parrot family, Lorriidae, Cacatuidae and Psittacidae, has a specific mallophagan genus restricted to it. Yet there are no significant anatomical differences distinguishing these families.

No doubt, numerous opportunities for the formation of host-parasite associations between feather mites and birds have existed throughout time. Yet when the opportunity is available, recent evidence suggests that for extant species, it is very difficult for a feather mite to become associated with a host different from those to which it is adapted (Atyeo and Gaud, 1979).

Host to host transfer of feather mites usually occurs while the chicks are confined to the nest. The parasitic cuckoos are raised by passeriform foster parents, yet none of the passeriform feather mites are transferred to the cuckoos (Atyeo and Gaud, 1983). In fact, the young cuckoos harbor practically no feather mites until they attain sexual maturity when they are acquired during mating. Also, passeriform mites are never established on the Falconiformes (hawks and falcons) and Strigifornes (owls) (Atyeo and Gaud, 1979).

For the present, there are only a few specific feather mite-bird associations that have been firmly established. These include a few relic avian species (hoatzin) and those birds that are distinct enough to be the bases of monobasic families or subfamilies (magpie goose) (Atyeo and Gaud, 1979). The enormous number of feather mite species presents a formidable task in their identification and the formulation of host-parasite associations. The vast morphological diversity found in this group implies exposure to numerous environmental stresses throughout their evolutionary history. Species identification along with a thorough understanding of the physical parameters of a mite's microhabitat will be needed for understanding these relationships.

MATERIALS AND METHODS

Specimens for this study were obtained by the examination of museum study skins and from field collected birds in Mexico. Specimens were rehydrated in 70% ethyl alcohol and transferred to lactophenol for clearing at 93°C for 15 minutes. The specimens were mounted in Hoyer's medium and placed in a drying oven at 50°C for three days after which the cover slips were sealed with a commercial ringing compound. A Wild-Heerbrugg phase-contrast microscope equipped with a drawing tube was utilized for the sketches. Measurements were taken with an ocular micrometer; all measurements were in microns.

DESCRIPTIVE TERMINOLOGY

Male

Length --- Distance between apices of pedipalps and the posterior margin of the hysterosomal lobes or terminal lamellae if present.

Width --- Widest portion of the idiosoma, at the level of the humeral setaa.

Length, propodosomal shield --- Anterior margin to posterior margin, medially.

Width, propodosomal shield --- Distance across the widest portion, usually the posterior margin, including the projections around setae sce.

Distance between external scapular setae --- Measured center-to-center.

Distance between internal scapular setae --- Measured center-to-center.

Setae type --- Setiform: long or short hair-like; lanceolate: saber or spear shaped; scpiuliform: slender, needlelike.

Terminal cleft --- Groove separating hysterosomal lobes, measured from anterior margin of cleft to posterior margin of hysterosomal lobes.

Coxal fields --- Closed: completely surrounded by epimerites; open: epimerites end freely.

Female

Length --- Distance between apices of pedipalps and hysterosomal terminus.

Width --- Widest portion of idiosoma.

Remaining terminology similar to male when relevant.

FAMILY PTEROLICHIDAE

Aralichus Gaud, 1966

Aralichus Gaud, 1966. Nouvelle definition de la famille des Pterolichidae, Megnin and Trouessart et creation de genres nouveaux appartenant a cette famille. Acarologia 8:115-128. (type-species: Pterolichus (P.) canestrini Trouessart, 1885).

The genus Aralichus exhibits numerous characteristics of the subfamily Pterolichinae: sub-apical setae p and q are present on tarsi I-IV, the pregenital apodeme is crescent shaped in the female, and in both sexes the posterior legs are inserted more laterally than ventrally. Both sexes of the genus have the following distinguishing characteristics:-- the gnathosoma is wider at the base than it is long, short maxillary palps, the lateral and proximal regions of the subcapitulum and the lateral margins of the propodosoma are strongly chitinized, the subhumeral setae are setiform, the hysterosomal shield is continuous with no transverse interruption, and legs III and IV are less developed than legs I and II. Males of this genus have a bilobed opisthosorna and large strongly chitinized adanal discs containing numerous teeth. The genital organ and the genital discs are surrounded by three pairs of central setae: setae c1 anterior, setae c2 lateral and setae c3 posterior. Females of the genus have a round opisthosoma. The pregenital apodeme is brief (Gaud,

1966). Posterior to the pregenital apodeme, the genital opening appears as an inverted Y. A pair of small sclerites supports the exterior integumental folds.

Aralichus n. sp.

(figs. 5-12)

The ventral surfaces of femora I and II in both sexes are expanded. The distal edges of these expansions are rounded and serrate. In addition, the dorsal surfaces of femora III are slightly expanded and serrate. The males have numerous short thorn-like apophyses extending from the dorsolateral surfaces of the hysterosoma from the level of setae d2 to setae 13. Ventrally, the genital organ is flanked by weakly chitinized sclerites which incorporate the two pairs of genital discs. The females have numerous short thorn-like apophyses extending from the lateral margins of the hysterosomal shield fromthelevelof setae d3 to setae 14.

Male (holotype). Length, 331u; width, 175u. Dorsal idiosoma: Propodosomal shield well developed, 79u in length, 72u in width. Setae vi setiform, 48u in length, extending beyond distal ends of chelicerae. Setae sce and sci short setiform; distance between sci:sci 27, sce:sce 57u. Setae sh 10u in length, positioned anteroventral to setae h; setae l1 bifurcate near base, anterior to setae dl and positioned near anteromedial margin of humeral shields. Hysterosomal shield well developed, not fused with humeral shields, hysterosomal shield with numerous lacunae in region of setaa dl and

and d2. Hysterosomal lobes weakly developed, separated by 55u; lobes with setae d5, 15, l4, pae and pai; terminal cleft 24u in height. Lateral margins of hysterosoma from level of setae 13 to d2 with numerous small thorn-like apophyses. Setae 12 setiform, 7u length, posterior to setae d2; setae 13 bifurcate near base, posterior half setiform, anterior half lanceolate; setae 13 anterior to d3; setae d4 absent; setae 14 lanceolate, 59u in length; setae 15 lanceolate, 139u in length, setae 15 anterior to d5; setae d5 lanceolate, 115u in length; setae pai membranous and expanded, with distal ends truncate. Legs I and II with long spinous apophyses extending from ventral surfaces of genua and tibiae; femora I and II with ventral surfaces expanded, distal edges rounded and serrate; femora III with dorsal surfaces slightly expanded and serrate; legs I and II with setae mG lanceolate. Ventral idiosoma: Epimerites I free; coxal fields I-IV open. Genital organ 7u in length, flanked by weakly chitinized sclerites incorporating two pairs of genital discs. Adanal discs well developed, flanked by small strongly chitinized sclerites extending from lateral margins of opisthosoma at level of setae 13. All ventral setae present; setae cx3 posterior to setae cl; setae c2 anterolateral to genital arch; setae c3 posterior to genital arch.

Female. Length, 384u; width, 180u. Dorsal idiosoma: Propodosomal shield well developed, 82u in length, 79u in width. Setae vi setiform, 46u in length, extending beyond distal ends of chelicerae. Setae sce setiform 12u in length;

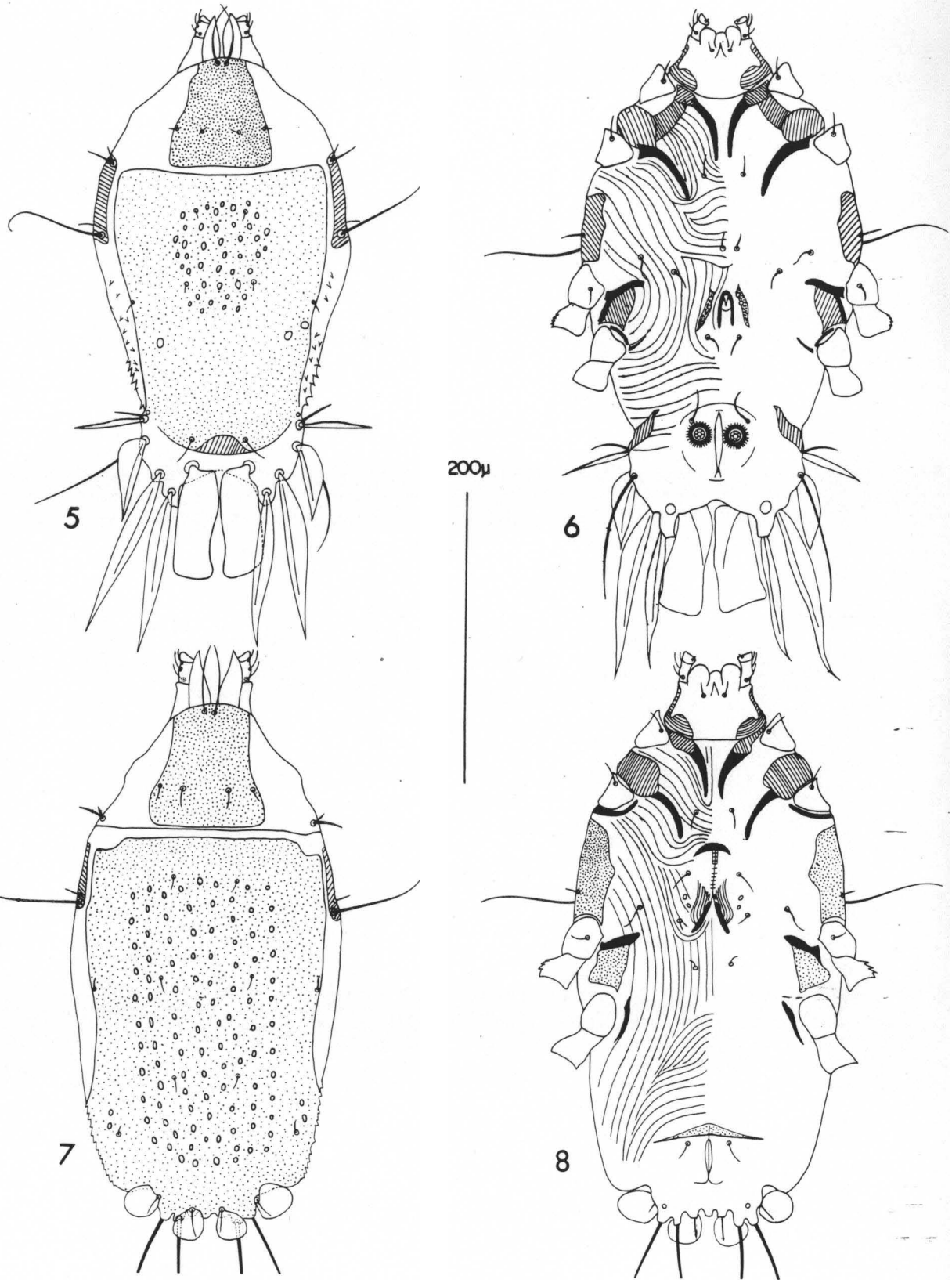
setae sci spiculiform, 15u in length; distance between sci: sci 31u, sce:sce 63u. Setae sh 9u in length, positioned anteroventral to setae h; setae 11 bifurcate near base, not enclosed by humeral shields, positioned anterior to setae dl. Hysterosomal shield well developed, with numerous lacunae; hysterosomal shield with numerous short thorn-like apophyses extending from Lateral margins from level of setae d3 and 14. Setae dl, d2, d3, 12 and 13, short setiform; setae d4 absent; setae 12 slightly posterior to d2; setae 13 posterior to d3; setae 14 and pai membranous and rounded; setae 15 and d5 long setiform, with setae 15 slightly anterior to d5. Ventral idiosoma: Epimerites I free; coxal fields I-IV open. Pre-genital apodeme crescent shaped and brief; two pairs of genital discs anteromedial to setae c2. All ventral setae present; setae pae setiform, extending slightly beyond pos- -- terior margin of opisthosona. Preanal apodeme broadly flattened in an inverted V and weakly chitinized.

Type material. From Aratinga nana astec (Souance) (Psittacidae): holotype male (FMNH 120898, UGA 12196), 6 male, 23 female paratypes, December 22, 1939, Matamoros, Campeche, Mexico, M. Traylor, Jr.; Paratypes: 5 males, 10 females, November 1, 1939, Chichen-Itza, Yucatan, Mexico, M. Trayor, Jr.; 1 male, 2 females, August 14, 1937, Chichen-Itza, Yucatan, Mexico, M. Traylor, Jr.; 1 male, July 8, 1941, Puente Nacional, Veracruz, Mexico, J.H. Shary; 3 females, 1886, Yucatan, Mexico, collector uknown; 1 male, February 25, 1905, Izabal, Guatemala, Heller and Barber; 1 male, 3 females,

January 30, 1906, Los Amates, Izabal, Guatemala, N. Dearborn; 1 male, 6 females, November 1, 1939, Chichen-Itza, Yucatan, Mexico, M. Trayor, Jr.

Figures 5-8

Aralichus n., sp. 5, male, dorsal aspect. 6, male, ventral aspect. 7, female, dorsal aspect. 8, female, ventral aspect.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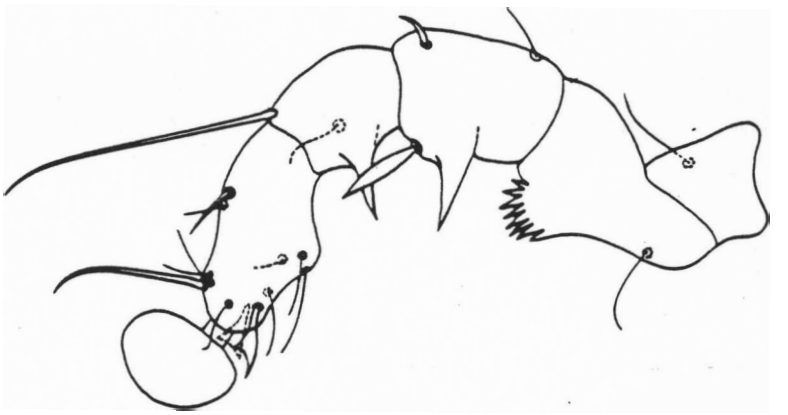
Figures 9-12

Aralichus n. sp. male, antiaxial aspects of legs. 9, leg I. 10, leg II. 11, leg III. 12, leg IV.



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I

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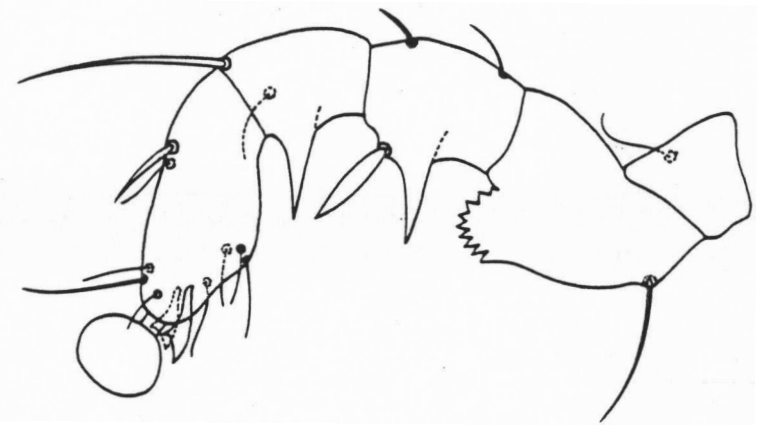

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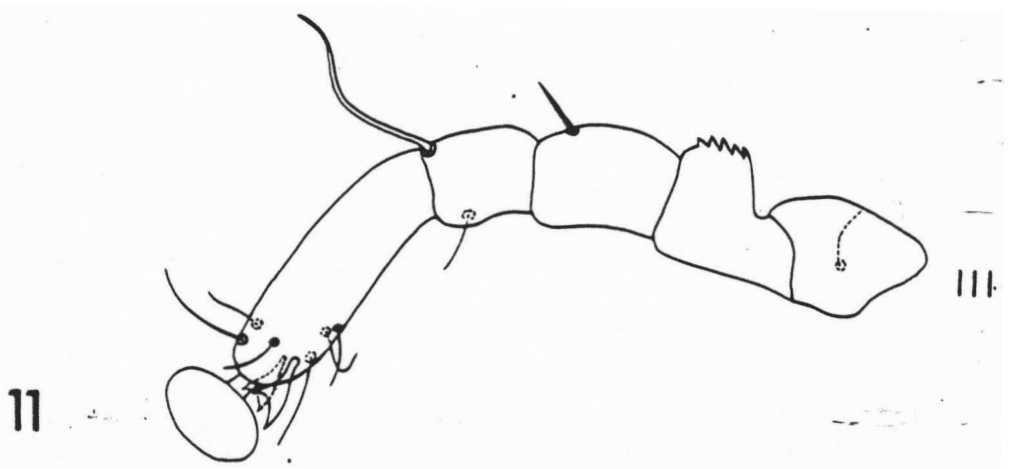
II



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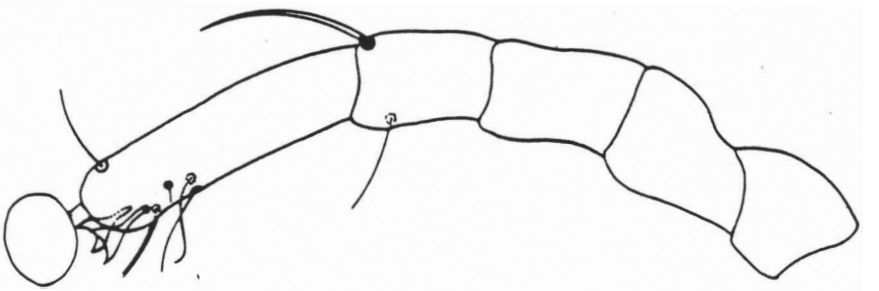
III



12

IV

Aralichus n. sp.

(figs. 13-20)

The femora of legs I and II in both sexes, have knife-like andncoarsely serrated chitinous apophyses extending from the ventral surfaces. The terminal lobes in the males are more elo gated and slender than those in the other two species described. In addition, setae pai is membranous and expanded with the distal end tapered. In the females, the preanal apodeme is absent.

Male (holotype). Length, 446u; width, 233u. Dorsal idiosoma: Propodosomal shield well developed with narrow transverse section containing setae sci and sce less chitinized; shield 101u in length, 84u in width. Setae vi setiform, 40u in length, extending beyond distal ends of chelicerae. Setae sci and sce short setiform; distance between sci:sci 14u, sce:sce 65u. Setae sh 16u in length, positioned anterolateral to setae h; setae 11 bifurcate near base, anterior to setae d5, positioned near anterolateral margin of humeral shield. Hysterosomal shield well developed, not fused with humeral shields; hysterosomal shield with numerous lacunae. Hysterosomal lobes weakly developed, separated by 55u; lobes with setae 14, 15, d5, pae and pai; terminal cleft 55u in height. Setae 12 setiform, 12u in length, slightly posterior to setae d2; setae 13 bifurcate near base, both branches setiform, setae 13 slightly anterior to d3; setae 14 lanceolate, 55u in length; setae d4 absent;

setae 15 elongated lanceolate, 278u in length, setae 15 anterior to d5; setae d5 lanceolate, 97u in length; setae psi membranous and expanded, with distal ends tapered. Legs I and II with long spinous apophyses extending from ventral surfaces of genua andtibiae; femora I and II with ventral surfaces expanded, distal edges knife-like and coarsely serrate extending approximately to mid level of genua; legs I and II with setae mG spiculiform. Ventral idiosoma: Epimerites I free; coxal fields I-IV open. Genital organ 7u in length flanked by two pairs of genital discs. Adanal discs well developed, flanked by well developed sclerites extending from lateral margins of opisthosorna to level of setae pae. All ventral setae present; setae cx3 anterior to setae cl; setae c2 at same level as setae cl.

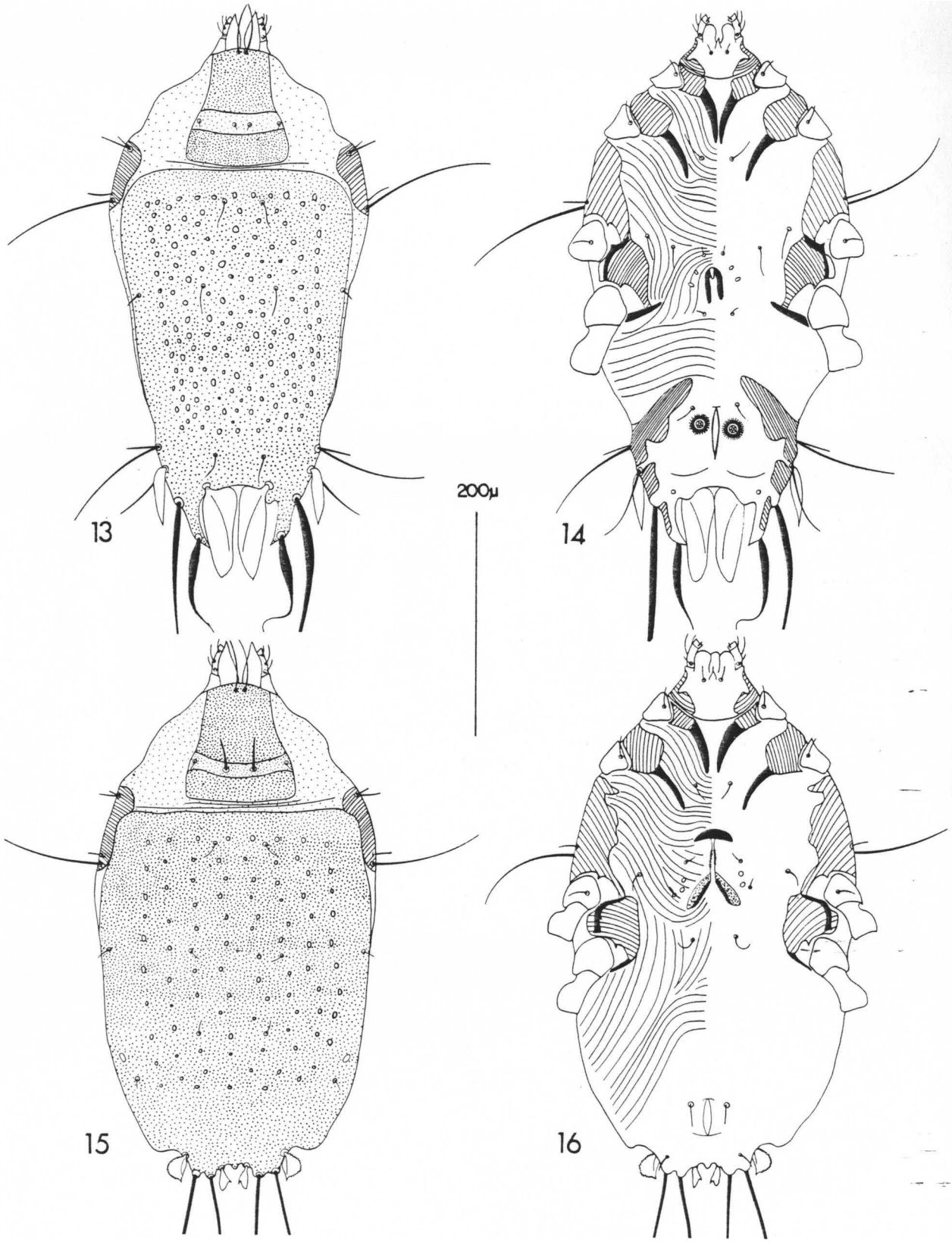
Female. Length, 460u; width, 240u. Dorsal idiosoma: Propodosomal shield well developed with narrow transverse section containing setae sci and sce less chitinized; shield 103u in length, 100u in width. Setae vi setiform, 44u in length, extending beyond distal ends of chelicerae. Setae sce setiform, 7u in length; setae sci spiculiforrn, 29u in length; distance between sci:sci 24u, sce:sce 81u. Setae sh 15u in length, positioned anteroventral to setae h: setae 11 bifurcate near base, anterior to setae dl, positioned near anterolateral margin of humeral shields. Hysterosomal shield well developed, adjacent to but not fused with humeral shields, hysterosomal shield with numerous lacunae. Setae dl, d2, d3,

l2 and l3 short setiform; setae d4 absent; setae l2 slightly anterior to d2; setae l3 posterior to d3; setae l4 and pai leaf-shaped; l4 slightly larger than pai with lateral margins finely serrate; setae l5 and d5 long, setiform, with l5 slightly anterior to d5. Ventral idiosoma: Epimerites I free; coxal fields I-IV open. Pregenital apodeme crescent shaped and brief; two pairs of genital discs slightly antero-medial to setae c2. Preanal apodeme absent. All ventral setae present; setae pae setiform extending slightly beyond posterior margin of opisthosoma.

Type material. From Aratinga nana astec (Souance) (Psittacidae): holotype male (FMNH 122791, UGA 12195), 3 female paratypes, July 8, 1941, Puente Nacional, Veracruz, Mexico, J.H. Shary; Paratypes: 9 females, November 1, 1939, Chichen-Itza, Yucatan, Mexico, M. Trayor, Jr.; 1 male, 1 female, December 22, 1939, Matamoros, Campeche, Mexico, M. Traylor, Jr.; 1 male, 3 females, January 30, 1906, Los Amates, Izabal, Guatemala, N. Dearborn; 1 male, November 1, 1939, Chichen-Itza, Yucatan, Mexico, M. Trayor, Jr.

Figures 13-16

Aralichus n. sp. 13, male, dorsal aspect. 14, male, ventral aspect. 15, female, dorsal aspect. 16, female, ventral aspect.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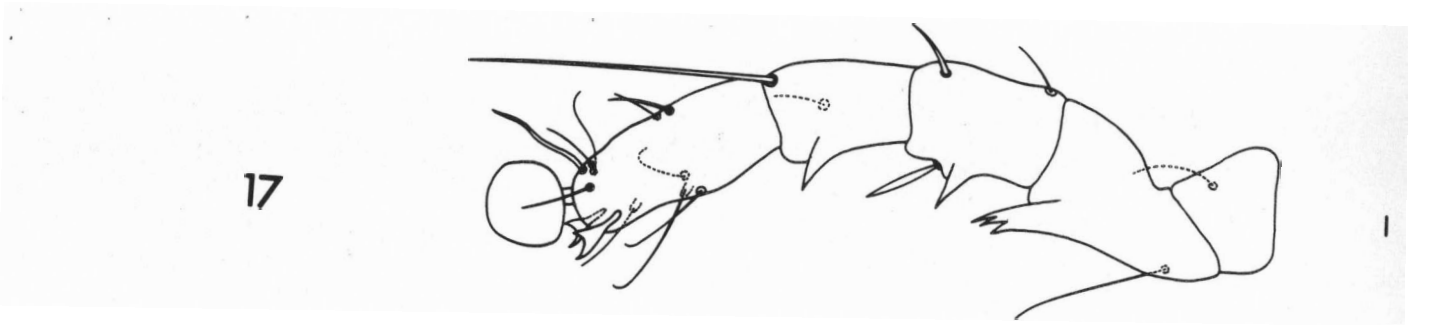
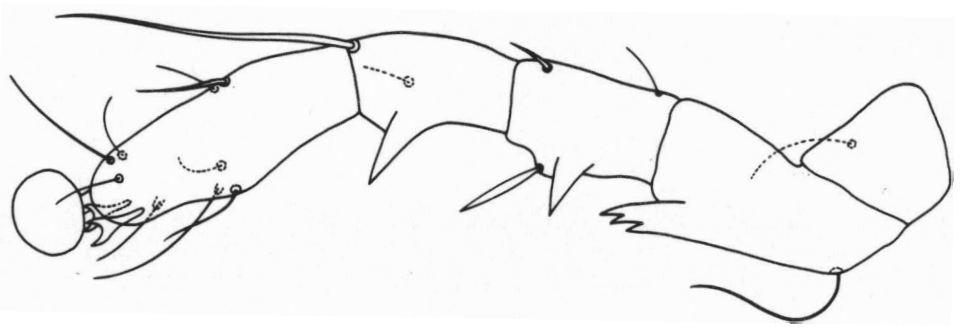
Figures 17-20

Aralichus n. sp., male, antiaxial aspects of legs. 17, leg I. 18, leg II. 19, leg III. 20, leg IV.





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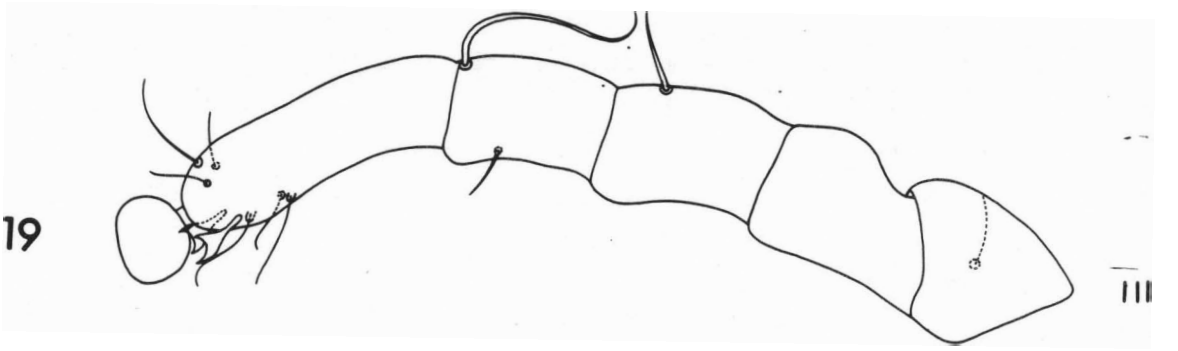
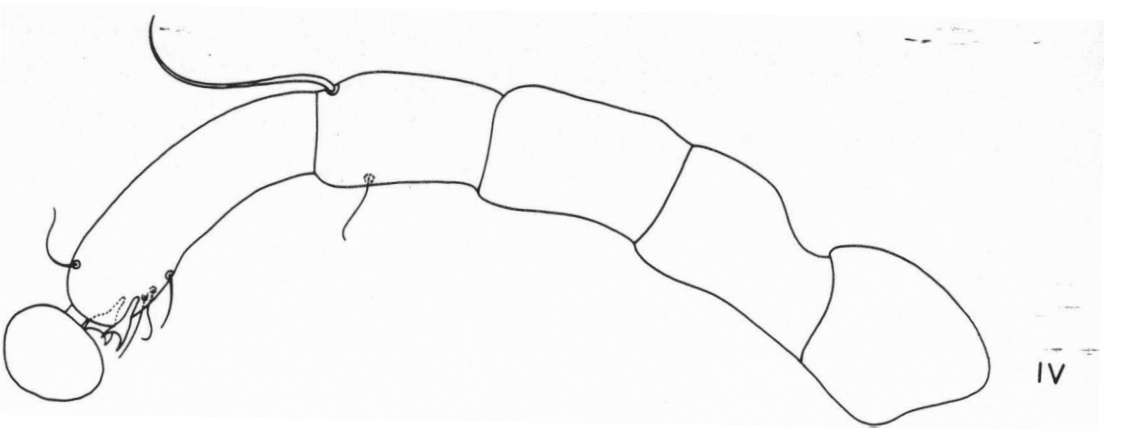




Aralichus n. sp.

(figs. 21-28)

Setae 11 in both sexes are spiculiform and not bifurcate as in the other two species. In males, the terminal lobes are separated by a much greater distance. Setae sci, sce and sh are longer and setae sci is spiculiform. In the females, setae 13 are long and spiculiform and setae 14 and psi are small and shaped as coarsely serrated leaves.

Male (holotype). Length, 427u; width, 250u. Dorsal idiosoma: Propodosomal shield well developed with narrow transverse section containing setae sci and sce less chitinized; shield 99u in length, 108u in width. Setae vi setiform, 27u in length, not extending to distal ends of chelicerae. Setae sce setiform, 16u in length; setae sci spiculiform, 29u in length; distance between sci:sci 29u, sce:sce 72u. Setae sh 36u in length, positioned anteroventral to setae h; setate 11 setiform, anterior to setae dl, positioned near anteromedial margin of humeral shields. Hysterosomal shield well developed, not fused with humeral shields, hysterosomal shield with numerous lacunae. Hysterosomal lobes weakly developed-, separated by 116u; lobes with setae 14, 15, d5 and pai; terminal cleft 48u in height. Setae 12 setiform 14u in length slightly anterior to setae d2; setae 13 bifurcate near base, anterior branch setiform and posterior branch spiculiform, setae 13 slightly anterior to setae d3; setae 14 lanceolate, 62u in length; setae d4 absent; setae 15 long setiform, 225u in length, anterior to setae d5; setae d5 with proximal

one-third expanded then narrowing to setiforn, 96u in length; setae pai membranous and expanded, with distal ends truncate, 60u in length. Legs I and 11 with short spinous apophyses extending from ventral surfaces of the genua and tibiae; femora of legs I and II with ventral surfaces slightly expanded, withdistal ends coarsely serrated. Ventral idiosoma: Epimerites I free; coxal fields I-IV open. Genital organ flanked by two pair of genital discs. Adanal discs well developed flanked by well developed sclerites extending from lateral margins of opisthosoma at level of setae pae. All ventral setae present; setae cx3 anterior to c1; setae c2 slightly posterior to cl.

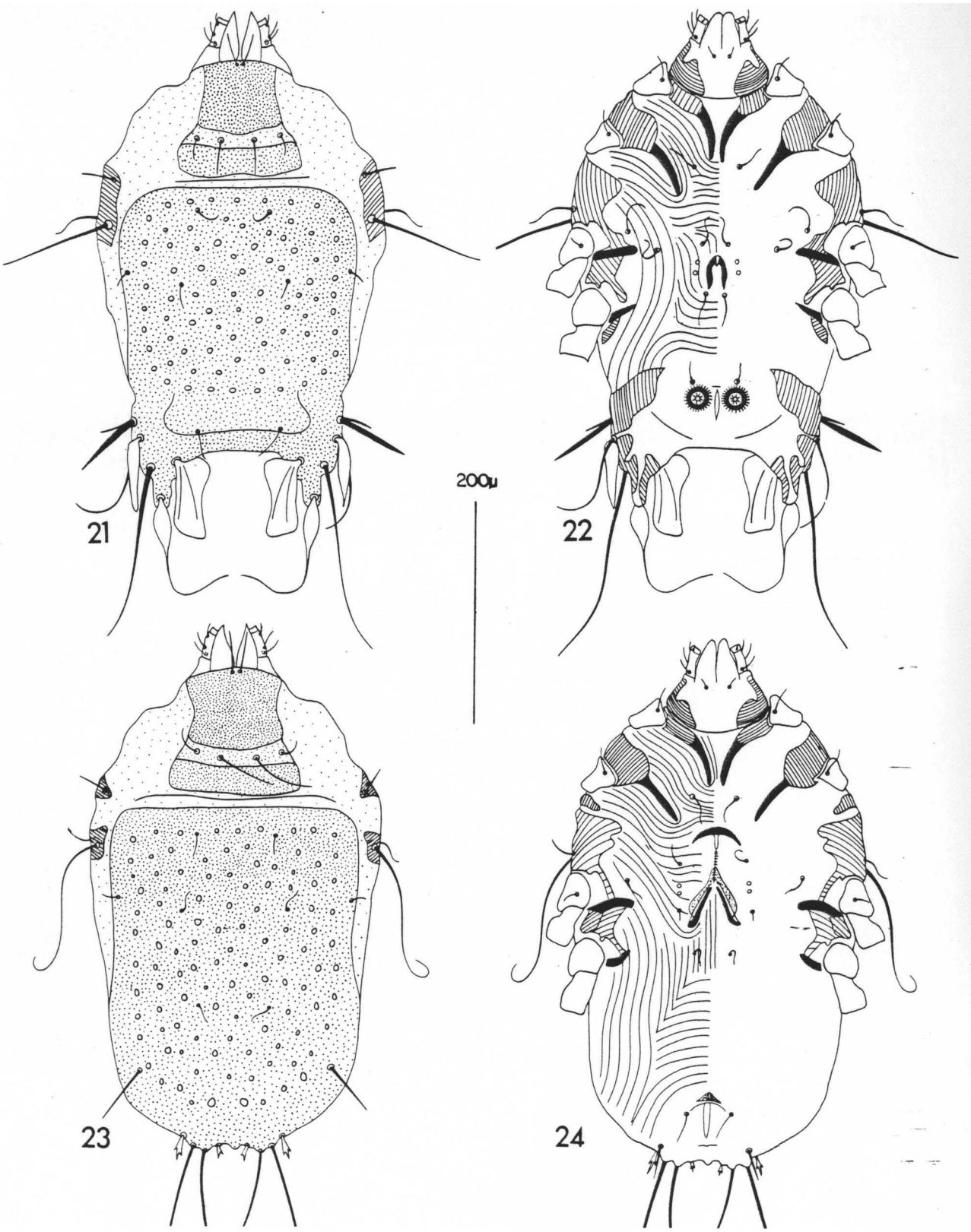
Female. Length, 446u; width, 248u. Dorsal idiosoma: Propodosomal shield well developed with narrow transverse section containing setae sci and sce less chitinized; shield-- 67u in length, 112u in width. Setae vi setiform, 24u in length, not extending to distal ends of chelicerae. Setae — sce setiform 17u in length; setae sci setiform 72u in length; distance between sci:sci 32u, sce:sce 72u. Setae sh 17u in length positioned anteroventral to setae h; setae 11 setiform anterior to dl not enclosed by humeralshields.. Hysterosomal shield well developed, not fused with humeral shields, hysterosomal shield with numerous lacunae. Setae dl, d2, d3 and 12 short setiform; setae d4 absent; setae 12 slightly anterior to setae d2; setae 13 spiculiform, 28u in length-, posterior to d3; setae 14 and pai small, shaped as coarsely serrated leaves; setae 15 and d5 long setiform, with 15

slightly anterior to d5. Ventral idiosoma: Epimerites I free; coxal fields open. Pregenital apodeme crescent shaped and brief; two pairs of genital discs anterior to setae c2. Preanal apodeme weakly chitinized and triangular in shape. All ventral setae present; setae pae spiculiform, 29u in length, extending beyond posterior margin of opisthosoma.

Type material. From Aratinga nana astec (Souance) (Psittacidae): holotype male (FMNH 22427, UGA 12200), 4 male, 12 female paratypes, January 30, 1906, Los Amates, Izabal, Guatemala, N. Dearborn; Paratypes: 2 males, 2 females, February 25, 1905, Izabal, Guatemala, Heller and Barber; 3 males, 1 female, August 14, 1937, Chichen-Itza, Yucatan, Mexico, M. Traylor, Jr.; 1 female, December 22, 1939, Mata-moros, Campeche, Mexico, M. Traylor, Jr.; 2 males, 1 female, 1886, Yucatan, Mexico, collector unknown; 2 females, November-1, 1939, Chichen-Itza, Yucatan, Mexico, M. Trayor, Jr.

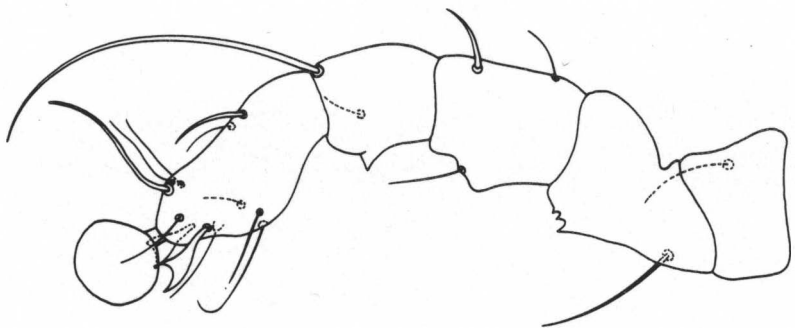
Figures 21-24

Aralichus n. sp. 21, male, dorsal aspect. 22, male, ventral aspect. 23, female, dorsal aspect. 24, female, ventral aspect.


21
22
200µ
23
24

Figures 25-28

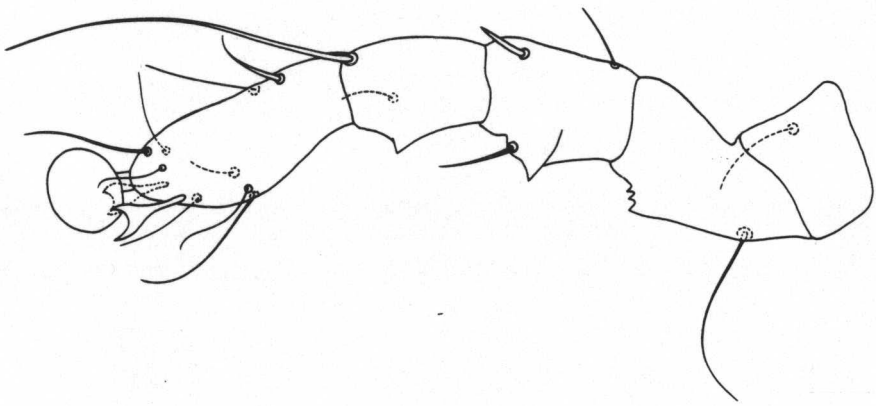
Aralichus n. sp. male, antiaxial aspects of legs. 25, leg I. 26, leg II. 27, leg III. 28, leg IV.



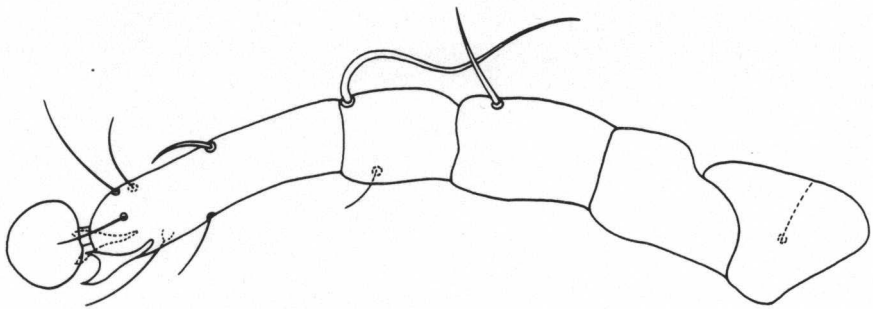
25

I

100µ

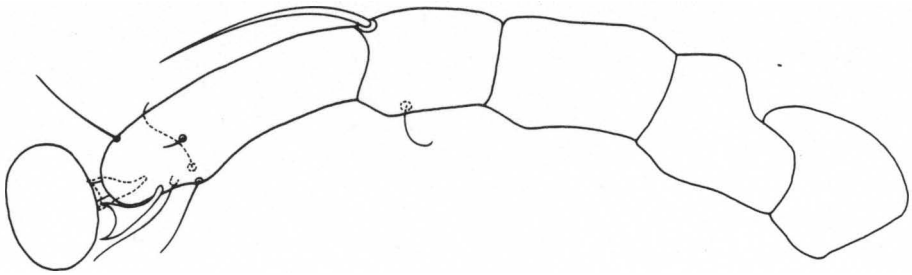


26



27

III



28

IV

Protolichus Trouessart, 1884

Pterolichus (Protolichus) Trouessart, 1884. Less Sarcoptides plumicoles. J. Microgr. 8:527-532, 572-579. (type-species: Pterolichus (Protolichus) brachiatus Trouessart, 1834, by subsequent designation, Trouessart 1899).

Pterolichus (Protolichus), Megnin and Trouessart, 1824. Les Sarcoptdes plumicoles. J. Microgr. 8:92-101, 150-157, 211-219, 257-266, 380-385, 428-436.

Protolichus, Trouessart, 1899. Diagnoses preliminaires d'especes nouvelles d'Acariens plumicoles. Additions et corrections a la sousfamille des Analgesinae. Bull. Soc. Etud. scient. Angers 28:1-62.

Protolichus, Favette and Trouessart, 1904. Monographie du -- genre Protolichus (trt) et revision des Sarcoptides plumicoles (Analgesinae) qui vivent sur les perroquets. Me. Soc. zool. Fr. 17:120-166 + pls. V-XV.

Protolichus, Trouessart, 1915. Revision des genres de la sousfamille des Analgesinae, ou Sarcoptides plumicoles. Bull. Soc. zool. Fr. 40:207-223.

Protolichus, Dubinin, 1956. Feather mites (Analgesoidea). Part III. Family Pterolichidae. Fauana SSSR, Paukoobraznye 6(7): 1-813. [In Russian]

Protolichus, Gaud and Mouchet, 1959. Acariens plumicoles des oiseaux du Cameroun. V. Pterolichidae. Annls. Parasit. hum. comp. 34:493-545, 631-675.

Protolichus, Gaud and Till, 1961. Suborder Sarcoptiformes. In Zumpt, F. (ed). The arthropod parasites of vertibratic in Africa south of the Sahara (Ethiopian Region). Publs. S. Afr. Inst. med. Res. 11 (L): 180-352.

Protolichus, Gaud, 1980. Acariens Sarcoptiformes plumicoles parasites sur les oiseaux Psittaciformes, Strigiformes et Caprimulgiformes en Afrique. Annls. Mus. r. Afr. cent., Ser. in - 8°, Zool. (230): 1-106.

Sexual dimorphism among the members of this genus is well pronounced. In both sexes the lateral and proximal regions of the subcapitulum are strongly chitinized; the propodosomal shield is small, strongly chitinized and does not enclose the internal and external scapular setae; the hysterosomal shield is continuous with no transverse interruption; the internal vertical setae are present; the subhumeral setae are setiform; and the subapical setae p and q are fan shaped and present on tarsi I-IV. In males the hysterosomal lobes are well developed. The posterior legs are hypertrophied, and the adanal discs are strongly chitinized. The females have a round opisthosoma. The pregenital apodeme is brief. Posterior to the pregenital apodeme the genital opening appears as an inverted Y. A pair of small sclerites supports the exterior integumental folds.

Protolichus n. sp.

(figs. 29-32)

In both sexes setae vi are setiform and extend to the distal ends of the chelicerae. Setae sce are long setiform and setae sci are spiculiform. The hysterosomal shield is strongly chitinized with numerous lacunae. Setae 11 are setiform and positioned anterolateral to the hysterosomal shield. In males, setae pai are expanded and rounded. Ventrally, well developed bilateral sclerites extend from the terminus of the hysterosomal lobes to the levelofsetae c2. Two pair of genital discs are positioned on the medial margin of these sclerites. In females, the genital discs are at the level of setae cx3. Setae a are setiform and extend beyond the terminus of the opisthosoma.

Male (holotype). Length, 576u; width, 338u. Dorsal idiosoma: Propodosomal shield small but strongly chitinized, 96u in length, 60u in width. Setae vi setiform, 48u in length, extending to distal ends of chelicerae. Setae sci and sce not enclosed by propodosomal shield; setae sce long, setiform, 196u in length; setae sci spiculiform, 62u in length; distance between sci:sci 29u, sce:sce 62u. Setae sh setiform, 43u in length, positioned ventral to setae h; setae h long setiform, 125u in length; setae 11 setiform, 29u in length, anterior to setae dl, setae 11 not enclosed by hysterosomal shield. Hysterosomal shield well developed, with numerous lacunae in region posterior to setae dl and anterior to setae d3. Hysterosonal lobes well developed with

setae d3, l3, pae, l4, l5, d5 and pai; narrow interlobar lamellae present; terminal cleft, 87u in height. Setae d2 short, setiform anterior to l2; setae l3 spiculiform, 67u in length, slightly posterior to d3; setae d4 absent; setae l4 membranous and elongate, 43u in length; setae l5 long setiform; setae d5 long setiform, posteroventral to setae l5; setae pai expanded and rounded. Ventral idiosoma: Epimerites I free; all coxal fields open. Genital organ 12u in length; flanked by well developed sclerites extending to terminus of opisthosoma; two pairs of genital discs on medial margins of sclerites. Adanal discs well developed. All ventral setae present; setae cx3 anterior to cl; setae c2 anterior to genital organ; setae cl lateral and slightly anterior to setae c2; setae c3 directly posterior to genital organ.

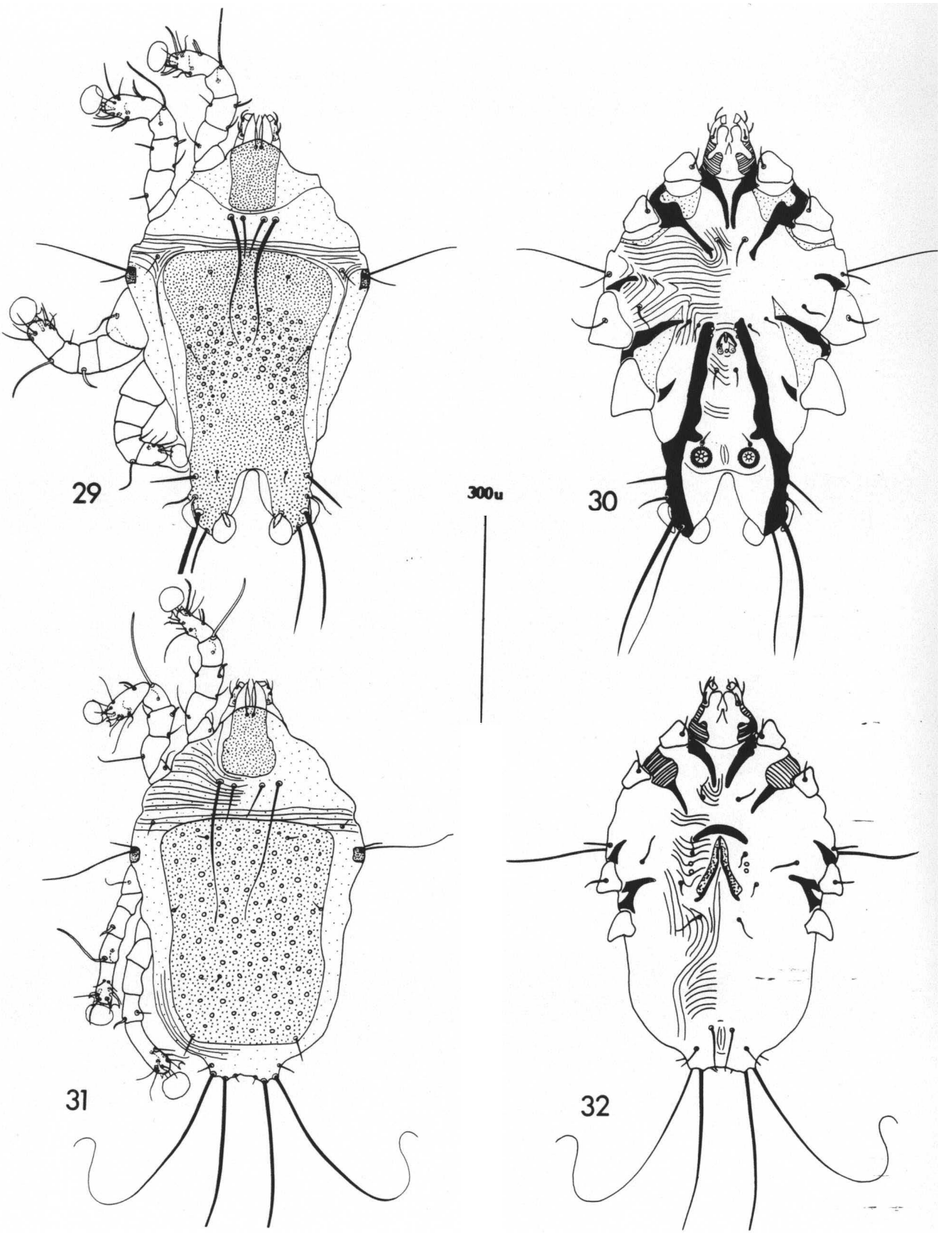
Female. Length, 553u; width, 321u. Dorsal idiosoma:- Propodosomal shield small but strongly chitinized, 96u in length, 67u in width. Setae vi setiform, 42u in length, extending to distal ends of chelicerae. Setae ~~sci~~ and ~~sce~~ not enclosed by propodosomal shield; setae sce long setiform, 192u in length; setae sci spiculiform, 53u length; distance between sci:sci 40u, sce:sce 79u. Setae sh setiform, 27u in length, positioned ventral to setae h; setae h long setiform, 122u in length; setae l1 setiform, 19u in length, anterior to dl, setae l1 not enclosed by hysterosomal shield. Hysterosomal shield well developed with numerous lacunae, not extending to lateral and posterior margins of hysterosoma. Setae dl, d2, d3, l2 short setiform; setate l2 slightly posterior to

d2; setae 13 spiculiform, 24u in length, posterior to d3, setae 13 positioned near posterolateral margins of hysterosomal shield; setae d4 absent; setae 14 short setiform, 19u in length; setae 15 and d5 long setiform, setae 15 anterior to d5. Ventral idiosoma: Epimerites I free; epimerites IV and IIIa fused; all coxal fields open. Pregenital apodeme crescent shaped and brief; two pairs of genital discs posterior to setae c1 at level of setae cx3. All ventral setae present; setae cx3 posterior to c1; setae a long setiform, 57u in length, extending beyond posterior margin of opisthosoma; setae pae setiform, 31u in length, extending beyond posterior margin of opisthosoma.

Type material. From Aratinga nana astec (Souance) (Psittacidae): holotype male (FMNH 19687, UGA 12199), 7 male, 10 female paratypes, February 25, 1904, Izabal, Guatemala, Heller and Barber; Paratypes: 2 males, August 14, 1937, Chichen-Itza, Yucatan, Mexico, M. Traylor, Jr.

Figures 29-32

Protolichus n. sp. 29, male, dorsal aspect. 30, male, ventral aspect. 31, female, dorsal aspect. 32, female, ventral aspect.


29
300u
30
31
32

Echinofenur n.g.

Pterolichus (Pterolichus) venustissimus, Trouessart, 1899. Diagnosis preliminaires d'espices nouvelles de Sarcoptodes plumicoles (Acar.). Bull. Soc. ent. Fr. 3:289-292, 319-322.

Pterolichus (Eupterolichus) venustissimus, Canestrini and Kramer, 1899. Demodicidae and Sarcoptidae. Tierreich 7:1-193.

Pterolichus venustissimus, Favette and Trouessart, 1904. Monographie du genre Protolichus (Trt) et revision des Sarcoptides plumicoles (Analgesinae) qui vivent sur les perroquets. Mem. Soc. zool. Fr. 17:120-126 + pls. V-XV.

Protolichus venustissimus, Dubinin, 1956. Feather mites (Analgesoidea). Part III. Family Pterolichidae. Fauna SSSR, Paukoobraznye 6(7):1-813. [In Russian].

The genus Echinofemur exhibits numerous similarities to the genus Aralichus: subapical setae p and q are fan-shaped and present on tarsi I-IV, presence of long internal vertical setae, gnathosoma is wider at the base than it is long, the lateral and proximal regions of the subcapitulum are strongly chitinized, long spinous apophyses extending from the ventral surfaces of the genua and tibiae of legs I and II, and the subhumeral setae are setiform. The hysterosomal lobes in males are weakly developed. In the females the pregenital apodeme is brief. Posterior to the pregenital

apodeme, the genital opening appears as an inverted Y and the sclerites supporting the exterior integumental folds are weakly chitinized. Both sexes have the following distinguishing characteristics: long maxillary palps, the lateral margins of the ventral idiosoma anterior to trochanter IV are strongly chitinized, the posterior legs are inserted ventrally, and femora III and IV have numerous long and slender spinous apophyses extending from the dorsal surfaces. In the females, the posterolateral margins of the opisthosoma are dilated and rounded.

Echinofemur venustissimus (Trt. 1899)

(figs. 33-36)

Both sexes have setae vi setiform which extend beyond the distal ends of the chelicerae. Setae 11 are bifurcate with the anterior branch spiculiform and the posterior branch membranous. The lateral margins are elongate and finely serrate. The posterior margin of the propodosomal shield is convex. In males, setae 13 are greatly expanded and membranous whereas the outer margins are coarsely serrate. In females, the lateral margins of the hysterosomal shield at the level of setae 13 and 14 are finely serrate. Setae 14 and pai are membranous, expanded and rounded with the outer margins coarsely serrate. Ventrally, the exterior integumental sclerites of the oviporous incorporate two pairs of genital discs.

Male. Length, 384u; width, 156u. Dorsal idiosoma: Propodosomal shield well developed, with posterior margin

convex, 80u in length, 120u in width. Setae vi lanceolate, 36u in length, extending beyond distal ends of chelicerae. Setae sce setiform, 8u in length; setae sce short setiform, 2u in length; distance between sci:sci 24u, sce:sce 64u. Setae sh setiform, 12u in length, positioned anteroventral to setae h. Setae 11 bifurcate near base, anterior to setae dl, setae 11 positioned on anterior ends of humeral shields. Hysterosomal shield well developed, not fused with humeral shields, posterior and lateral margins of hysterosomal shield distal to legs IV strongly chitinized. Hysterosornal lobes weakly developed, separated by 81u; lobes with setae 14, 15, d5, pae and pai; terminal cleft 38u in height. Setae dl, d2, d3 and 12 short setiform; setae 12 slightly posterior to d2; setae 13 membranous and expanded with outer margins coarsely serrated, setae 13 anterior to d3; setae d4 absent; setae 14 membranous and expanded, 72u in length; setae 15 membranous and lanceolate, 168u in length, setae 15 anterior to d5; setae d5 lanceolate, 156u in length; setae pai membranous and expanded, with distal ends truncate. Legs III with long spinous apophyses extending from ventral surfaces of genua and tibiae; femora II with ventral surfaces expanded and extending distally to midlength of genua. Femora III and IV with four long slender spinous apophyses extending from dorsal surfaces. Ventral idiosoma: Epimerites I free; epimerites IIIa and IV fused; all coxal fields open. Genital organ, 24u in length, extending beyond posterior margins of brief

genital arch; two pairs of genital discs at level of genital arch. Adanal discs well developed; subanal apodeme crescent shaped and weakly chitinized. All ventral setae present; setae c1 anterolateral to c2; setae c2 anterior to genital arch; setae c3 posterior to genital organ; setae cx3 anterolateral to c1.

Female. Length, 432u; width, 178u. Dorsal idiosoma: Propodosomal shield well developed, with posterior margin convex, 82u in length, 115u in width. Setae vi lanceolate, 41u in length, extending to distal ends of chelicerae. Setae sce setiform, 9u in Length; setae sci short setiform, 2u in length; distance between sci:sci 24u, sce:sce 64u. Setae sh setiform, 10u in length, positioned anteroventral to setae h; setae h lanceolate, 44u in length; setae 11 bifurcate near base, anterior to setae d1, setae 11 positioned on anterior ends of humeral shields. Hysterosomal shield well developed with numerous lacunae; lateral margins of shield between levels setae d3 and 14 finely serrate. Opisthosoma dilated and rounded with medial portion extending posteriorly. Setae d1, d2, d3, 12 and 13 short setiform; setae d4 absent; setae 12 slightly posterior to d2; setae 13 posterior to d3; setae 14 and pai membranous and expanded, with outer margins coarsely serrate, setae pai smaller than 14; setae 15 and d5 lanceolate with distal ends narrowing to setiform, setae 15 anterior to d5; legs I and II with spinous apophyses extending from ventral surfaces of genua and tibiae; femora I and II with ventral surfaces expanded and extending distally to

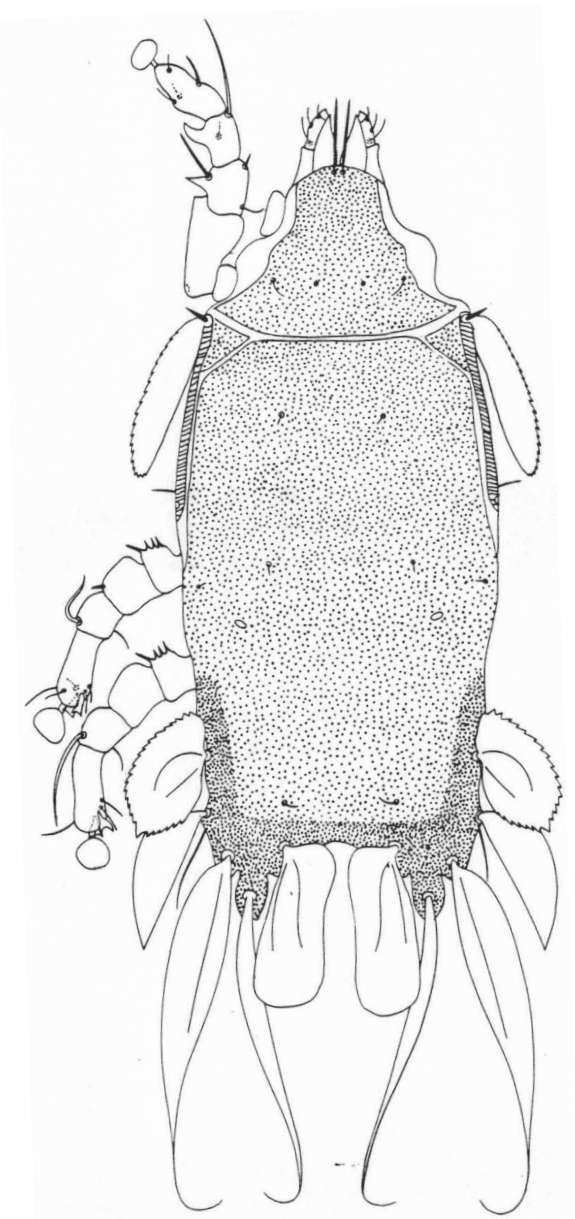
midlength of genua; femora III and IV with four long slender spinous apophyses extending from dorsal surfaces. Ventral idiosoma: Epimerites I free; epinerites IIIa and IV fused; all coxal fields open. Pregenital apodeme crescent shaped and brief. Subanal apodeme crescent shaped and weakly chitinized. All ventral setae present; setae cl posterior to pregenital apodeme; setae c2 slightly posterior to integumental sclerites of oviporous; setae cx3 posterior to cl.

Material examined. From Aratinga nana astec (Souance) (Psittacidae): holotype male (FMNH 19687, UGA 12199), 1 female paratype, February 25, 1905, Izabal, Guatemala, Heller and Barber; Paratypes; 1 male, 1 female, November 1, 1939, Chichen-Itza, Yucatan, Mexico, M. Trayor, Jr.; 1 male, 1 female, December 22, 1939, Matamoros, Campeche, Mexico, M. Traylor, Jr.

Figures 33-34

Echinofemur venustissimus (Trt. 1899). 33, male, dorsal aspect. 34, male, ventral aspect.

150u



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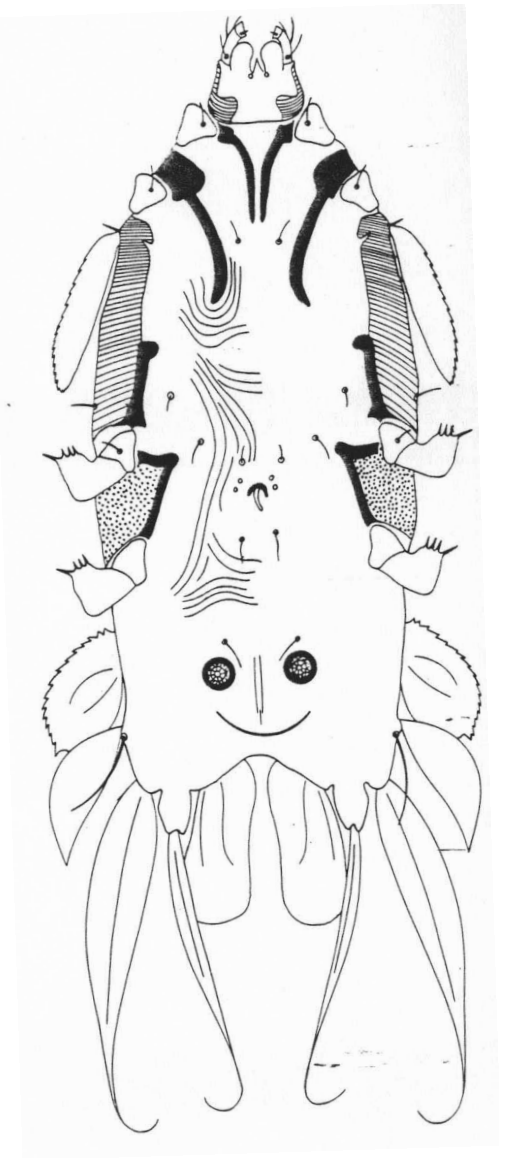
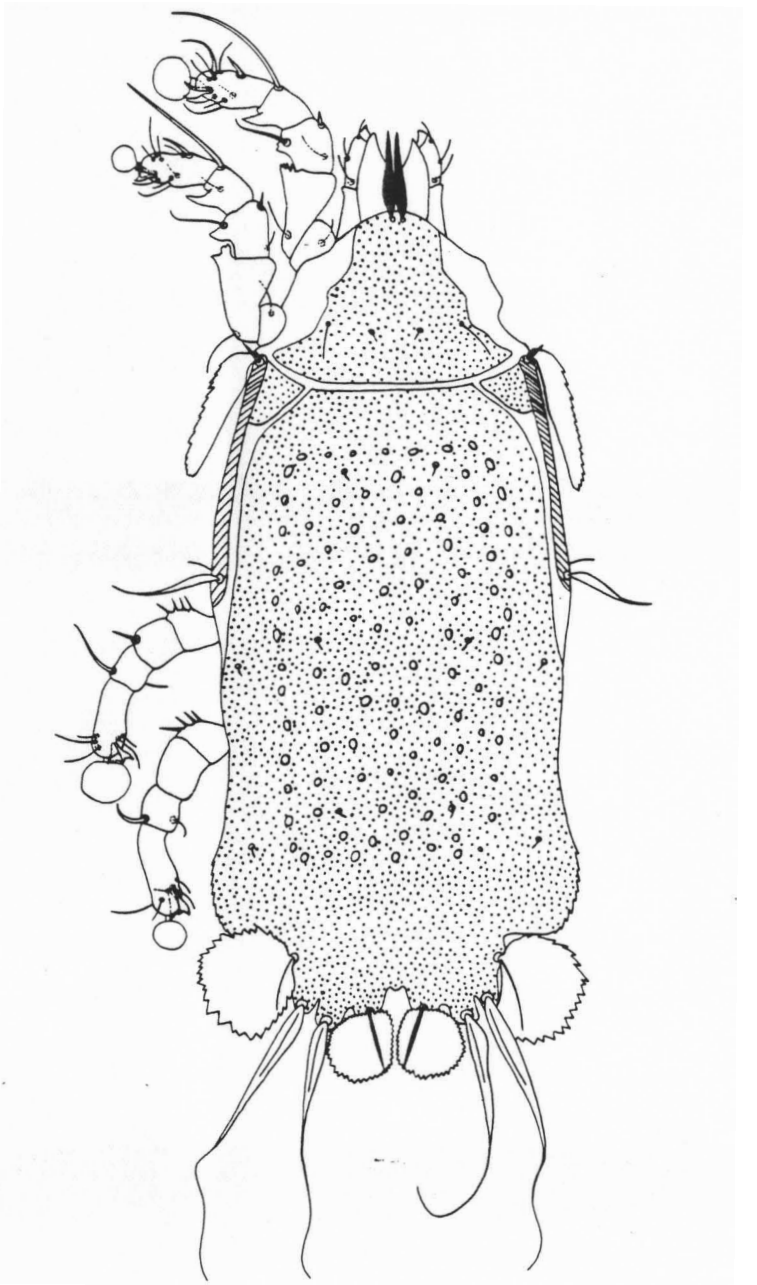


34

Figures 35-36

Echinofemur venustissimus (Trt. 1899) 35, female, dorsal aspect, 36, female, ventral aspect.

150u



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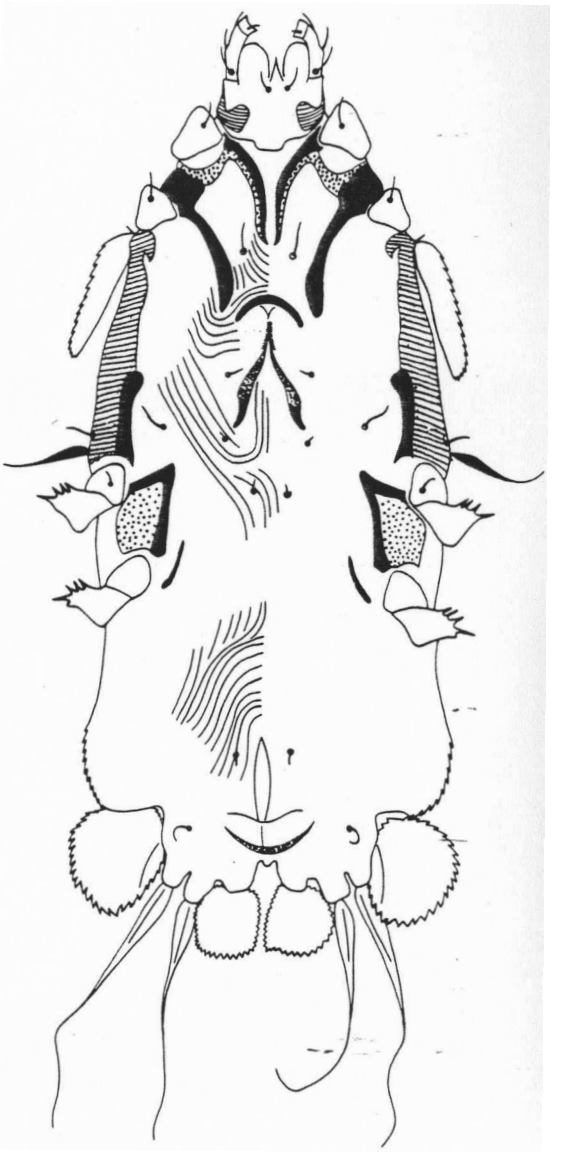


36

Rhytidelasma Gaud, 1966

Rhytidelasma Gaud, 1966. Nouvelle definition de la famille des Pterolichidae, Megnin and Trouessart et creation de genres nouveaux appartenant a cetta famille. Acarologia 8:115-128. (type-species: Pseudallaptinus grammophyllus Gaud and Mouchet, 1959).

Rhytidelasma Gaud, 1980. Acariens Sarcoptiformes plumicoles parasites sur les oiseaux Psittaciformes, Strigiformes et Caprimulgifcormes en Afrique. Annls. Mus.r. Afr. cent., Ser. in - 8°, Zool. (230): 1-106.

Males and females of the genus Rhytidelasma exhibit the following characteristics: the gnathosoma is longer than it is wide, the lateral margins of the propodosoma are weakly chitinized, the hysterosomal shield is continuous with no -- transverse interruption, the vertical setae are absent, the subhumeral setae are spiculiform, epimerites I are fused in- the sternum, and the subapical setae p and q are fan shaped and present on tarsi I-IV. Males of this genus have a bi-lobed opisthosoma with terminal lamellae extending from each lobe; the lamellae contain transverse furrows. Legs IV are slightly hypertrophied. Adanal discs are small and weakly chitinized and the genital organ and discs are positioned between the central setae cl and c3. In females, the opis-thosoma is whole with the terminal setae d5 and 15 closely positioned to one another (Gaud, 1966). The pregenital apodeme is crescent shaped, partially circumscribing the

oviporous. Posterior to the pregenital apodeme, the genital opening appears as an inverted V. A pair of sclerites supporting the exterior integumental folds are weakly chitinized.

Rhytidelasma n. sp.

(figs. 37-40)

Setae 11 in both sexesarepositioned on the antero-lateral margin of the hysterosomal shield. The males have club-shaped lamellae extending from the hysterosomal lobes. Setae 11 and dl are at the same transverse level onthe hysterosomal shield. In females, setae d4 and 14 are posterior to the hysterosomal shield, with setae 14 slightly anterior to setae d4.

Male (holotype).. Length, 307u; widht, 132u. Dorsal idiosoma: Propodosomal shield well developed, extending to lateral margins of propodosoma between legs I and II, 65u in length, 79u in width. Setae sci short setiform, 4u in length; setae sce long setiform, 56u in length; distance between sci:sci 41u, sce:sce 53u. Scapular shields rounded, moderately developed. Setae sh spiculiform, 7u in length, positioned anteroventral to setae h. Hysterosomal shield well developed extending to lateral margins of hysterosoma between legs III and IV; terminus of shield bi-lobed, separated by deep cleft, 41u in height. Hysterosoma tapering towards terminus with opisthosoma concave; terminal lamellae expanded and club-shaped with transverse furrows. Setae 11, 13, dl-d4 and pai short setiform; setae

11 at same level as dl; setae 12 posterior and slightly lateral to d2; setae 13 posterior to d3; setae 14 absent; setae 15 long setiform, positioned slightly anterior to d5; setae d5 long setiform, posterior to terminal margin of hysterosomal shield. Ventral idiosoma: Epimerites I fused in a V; all coxal fields open; epimerites IIIa and IV fused; well developed sclerites extending from epimerites IVa to level of genital discs. Genital arch flanked by two pairs of genital discs. Adanal discs weakly chitinized. All ventral setae present; setae c1 anterior to setae cx3; setae c2 anterior to genital arch; setae c3 at level of posterior end of genital arch.

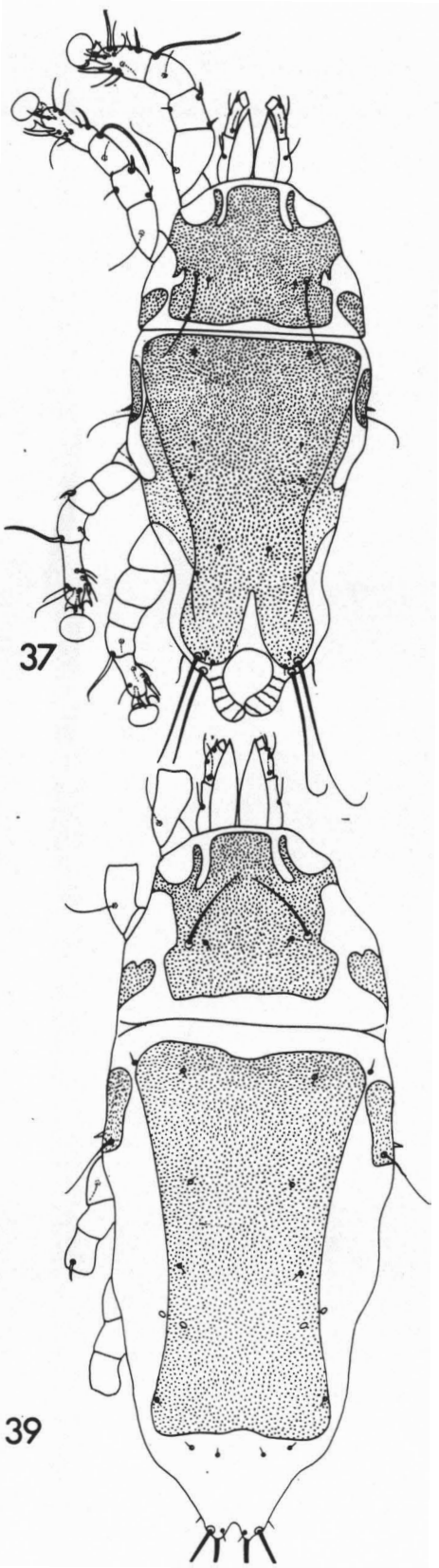
Female. Length, 490u; width, 184u. Dorsal idiosoma: Propodosomal shield well developed, extending to lateral margins of propodosoma between legs I and II, 98u in length, 100u in width. Setae sci short setiform, 8u in length; setae sce long setiform, 65u in length; distance between sci:sci 53u, sce:sce 72u. Scapular shields rounded and moderately developed. Setae sh spiculiform, 9u in length, positioned anteroventral to setae h. Hysterosomal shield well developed, not extending to lateral or posterior margins of hysterosoma. Opisthosoma tapered towards terminus. Setae 11-14, dl, d2 and d4 short setiform; setae d3 absent; setae 11 slightly anterior to dl; setae 12 posterior to d2, setae 14 slightly anterior to d4; setae 15 and d5 long setiform, with setae 15 slightly anterior to d5. Ventral idiosoma: Epimerites I fused in a Y with short stem; all coxal fields open; surface fields epimerites I-IV weakly developed. Pregenital apodeme

crescent shaped, partially circumscribing oviporous; two pairs of genital discs positioned slightly anterior to posterior ends of integumental sclerites of oviporous. All ventral setae present. Setae cl slightly anterior to genital discs; setae c2 posterior to c1; setae cx3 posterior to cl; setae pae and pai short setiforn, extending beyond posterior margin of opisthosorna.

Type material. From Aratinga nana astec (Souance) (Psittacidae): holotype male (FMNH 120897, UGA 12193), 20 male, 19 female paratypes, November 1, 1939, Chichen-Itza, Yucatan, Mexico, M. Trayor, Jr.; Paratypes: 7 males, 26 females, December 22, 1939, Matamoros, Campeche, Mexico, M. Traylor, Jr.; 1 male, 4 females,July 8, 1941, Puente Nacional, Veracruz, Mexico, J.H. Shary; 3 females, January 30, 1906, Los Amates, Izabal, Guatemala, N. Dearborn; 4 males, -- 4 females, November 1, 1939, Chichen-Itza, Yucatan, Mexico, M. Trayor, Jr.

Figures 37-40

Rhytidelasma n. sp. 37, male, dorsal aspect. 38, male, ventral aspect. 39, female, dorsal aspect. 40, female, ventral aspect.



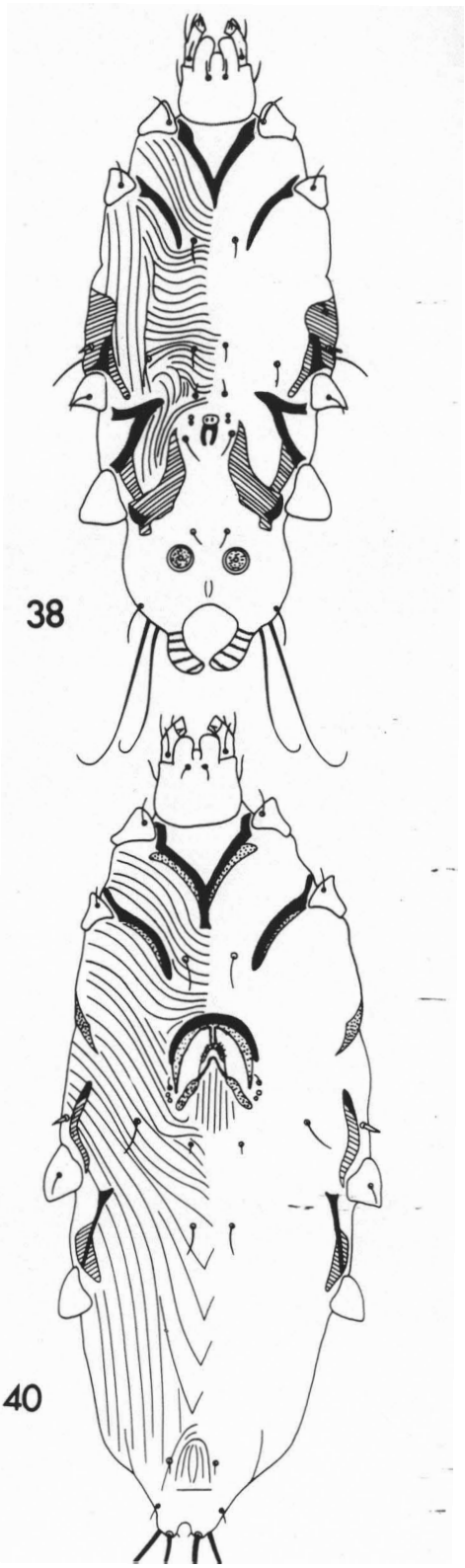
37

39

200µ

♂

♀



38

40

FAMILY PSOROPTOIDIDAE

Eurydiscalges Faccini, Gaud and Atyeo, 1976

Eurydiscalges Faccini, Gaud and Atyeo, 1976. Descricao de Eurydiscalges g. n. (Analgidae, Sarcoptiformes), con quatro especies novas parasitas de Psittacidae (Aves, provenientes da America do Sul. Revta bras. biol. 36:701-707. (type-species: Eurydiscalges opistoproctus Faccini, Gaud and Atyeo, 1976, by original designation).

The genus Eurydiscalges belongs to the subfamily Analginae. The following characteristics are common throughout this subfamily: the absence of subapical setae p and q, the presence of at least 3 ventral setae on tarsus IV, setae-ht present on tibiae IV, solenidia ω_1 is present on genua III, sucker-like ambulacral discs and chitinous apical apophyses on tarsi I-IV, the posterior legs are inserted laterally in the idiosoma, and epimerites I are fused in a Y. The distinguishing characteristics in both sexes of this genus include the absence of internal vertical setae and the presence of relatively large ambulacral discs. In males, legs II are hypertrophied and legs IV are atrophied. Setae 11 are setiform and relatively short. The pregenital apodeme is positioned between the insertions of legs III and IV in the middle of the idiosoma; it is strongly chitinized and totally surrounds the genital organ. The pregenital apodeme in

females is in an inverted U shape and totally flanks the oviporous (Faccini, Gaud and Atyeo, 1976). Posterior to the pregenital apodeme, the genital opening appears as an inverted U. A pair of long and moderately chitinized sclerites supports the exterior integumental folds.

Eurydiscalges n. sp.

(figs. 41-44)

In overall body size, males and females of this species are smaller than in the other species described. In males, the pregenital apodeme is horseshoe-shaped and greatly reduced. Two pairs of genital discs flank the pregenital apodeme. In females, the posterior margin of the hysterosomal shield has a shallow medial cleft. Setae cx3 and c3 are long setiform.

Male (holotype). Length, 410u; width, 204u. Dorsal idiosona: Propodosonal shield well developed, moderately chitinized, 110u in length, 103u in width. Setae sce long setiform, 156u in length; setae sci setiform, 15u in length; distance between sci:sci 73u, sce:sce 87u. Scapular shields well developed, moderately chitinized, extending to lateral margins of propodosoma between legs I and II. Setae sh long setiform, 116u in length, positioned anteroventral to setae h; setae h long setiform, 103u in length; setae 11 short setiform, 20u in length, positioned near anteromedial margin within well developed humeral shields. Hysterosomal shield well developed moderately chitinized. Hysterosomal lobes well developed; each lobe subdivided into smaller lobules; setae

14, pae and d5 inserted into lobules; setae 15 inserted in depressions between setae pae and 14; setae pai inserted on inner face of each lobe; terminal cleft 52u in height. Setae 12 short setiform, 20u in length; setae dl-d4 absent; setae 13 long setiform, 65u in length; remaining setae long setiform; setae 15 anterior to d5. Legs I and II with spinous apophyses extending from ventral surfaces of tibiae; tarsi I-IV with curved dorso-apical spines; tibiae III with dorsal and ventral apical spines. Setae cG legs 1-11 with basal half expanded; setae sR legs III long setiform, 164u in length. Ventral idiosoma: Epimerites I fused in a Y; all coxal fields open, but coxal fields II nearly closed; surface fields epimerites I-IV weakly developed. Pregenital apodeme horseshoe-shaped, greatly reduced, flanked by two pairs of genital discs. Adanal discs flanked by elongated narrow sclerites obliquely positioned. All ventral setae present; setae s and cx3 long setiform; setae c1 anterior to pregenital apodeme, positioned on anterior ends of surface fields epimerites IV; setae c2 slightly anterior to c3; setae c3 directly posterior to pregenital apodeme.

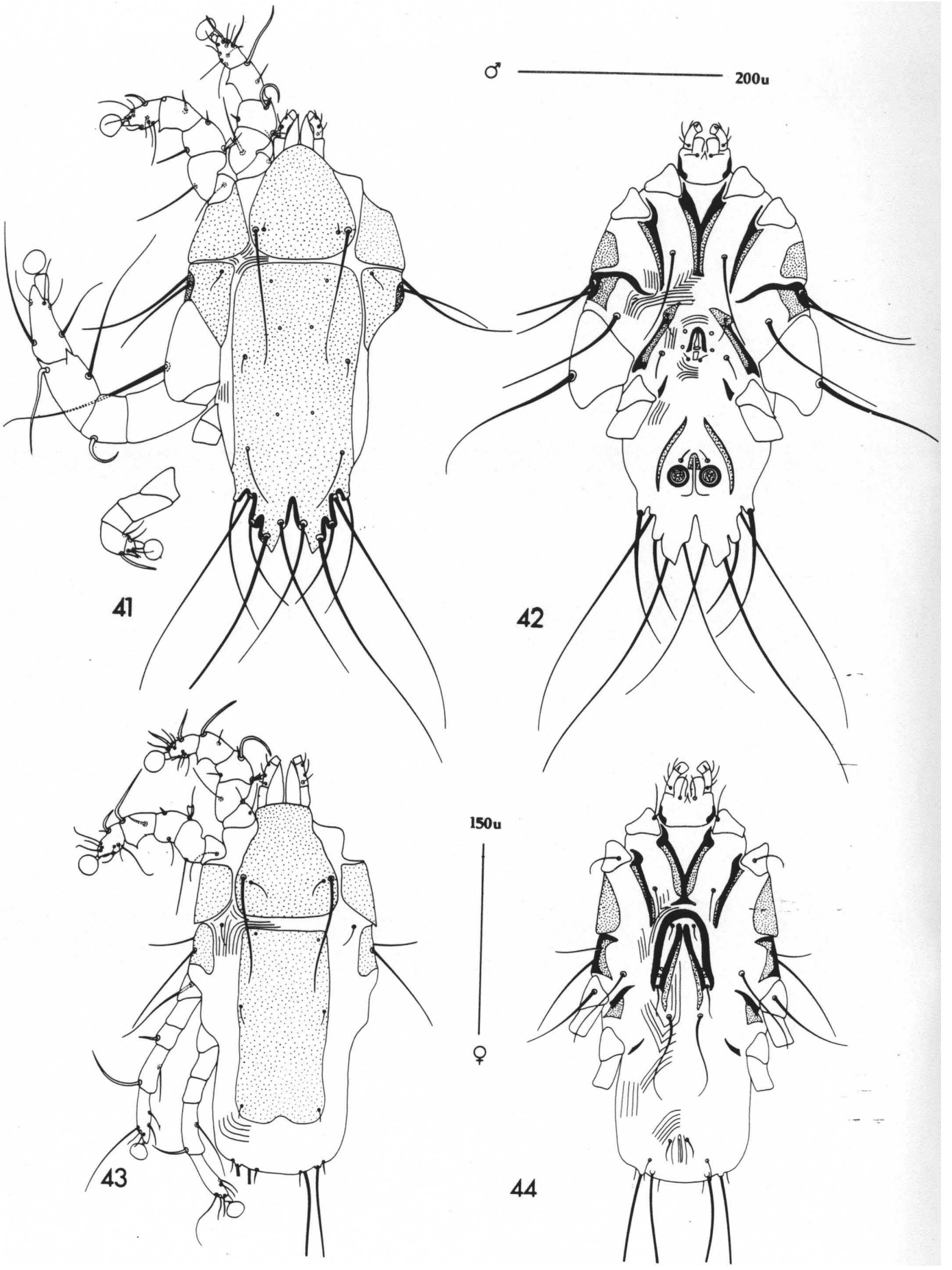
Female. Length, 326u; width, 150u. Dorsal idiosoma: Propodosomal shield well developed, moderately chitinized, 91u in length, 79u width. Setae sce long setiform, 96u in length; setae sci setiform, 19u in length; distance between sci:sci 58u, sce:sce 69u. Scapular shields well developed, moderately chitinized. Setae sh setiform, 31u in length, positioned anteroventral to setae h; setae h long setiform, 75u in length; setae 11 setiform, 14u in length;

setae 15 and d5 long setiform, with setae d5 posteroventral to 15. Legs I and II with short spinous apophyses extending from lateral margins of tibiae; setae cG legs I and II with basal half expanded. Setae sR legs III setiform, 36u in length. Ventral idiosoma: Epimierites I fused in a Y with short stem and base slightly expanded; epimerites IIIa and IV fused; surface fields epimerites I-IV weakly developed; all coxal fields open. Pregenital apodeme in an inverted U, extending to posterior margins of integumental sclerites of oviporous; two pairs of genital discs positioned between inner margins of pregenital apodeme and lateral margins of integumental sclerites of oviporous. All ventral setae present; setae c1 short setiform, 9u in length, directly posterior to apex of pregenital apodeme; setae c2 at posterior ends of pregenital apodeme, positioned between boundaries of pregenital-apodeme and integumental sclerites of oviporous; setae cx3 anterior to c2; setae a short setiform, 8u in length, not extending to posterior margin of opisthosoma.

Type material. From Aratinga nana astec (Souance) (Psittacidae): holotype male (FMNH 22427, UGA 12200), 3 female paratypes, January 30, 1906, Los Amates, Izabal, Guatamela, N. Dearborn; Paratypes: 2 females, February 25, 1905, Izabal, Guatemala, Heller and Barber.

Figures 41-44

Eurydiscalges n. sp. 41, male, dorsal aspect. 42, male, ventral aspect. 43, female, dorsal aspect. 44, female, ventral aspect.


♂
200u
41
42
150u
♀
43
44

Eurydiscalges n. sp.

(figs. 45-48)

In males, the humeral shields are smaller in this species than in the other species described. Setae 11 are positioned on the anteromedial margins of these shields. In females, the apex of the propodosomal shield is narrower than in the other species and the scapular shields are smaller.

Male (holotype). Length, 446u; width, 250u. Dorsal idiosoma: Propodosomal shield well developed, moderately chitinized, 110u in length, 115u in width. Setae sce long setiform, 163u in length; setae sci setiform, 24u in length; distance between sci:sci 82u, sce:sce 99u. Scapular shields well developed, moderately chitinized. Setae sh long setiform, 120u in length, positioned anteroventral to setae h; setae h long setiform, 113u in length; setae 11 setiform, 33u in length. Hysterosomal shield well developed, moderately chitinized. Hysterosomal lobes well developed; each lobe subdivided into smaller lobules; setae 14, pae and d5 inserted into lobules; setae 15 inserted in depressions-between setae pae and 14; setae pai inserted on inner face of each lobe; terminal cleft 52u in height. Setae 12 setiform, 33u in length; setae d1-d4 absent; setae 13 long setiform, 89u in length; remaining setae long setiform; setae 15 anterior to d5. Legs I and II with spinous apophyses extending from ventral surfaces of tibiae; tarsi I-IV with curved dorsoapical spines; tibiae III with dorsal and ventral apical

spines; setae cG legs II with basal half expanded; setae sR legs III long setiform, 185u in length. Ventral idiosoma: Epimerites I fused in a Y; coxal fields open, but coxal fields II nearly closed; epimerites IVa and IV fused. Pregenital apodeme horseshoe-shaped and elongate; genital organ 12u in length, extending to posterior end of genital arch; two pairs of genital discs positioned on lateral margins of pregenital apodeme. Adanal discs flanked by elongated narrow sclerites, obliquely positioned, All ventral setae present; setae s and cx3 long setiform; setae cl anterior to pregenital apodeme, positioned on anterior ends of surface fields epimerites IV; setae cx3 anterior to cl; setae c2 flank pregenital apodeme at same level as setae c3; setae c3 directly posterior to genital arch enclosed within boundary of pregenital apodeme.

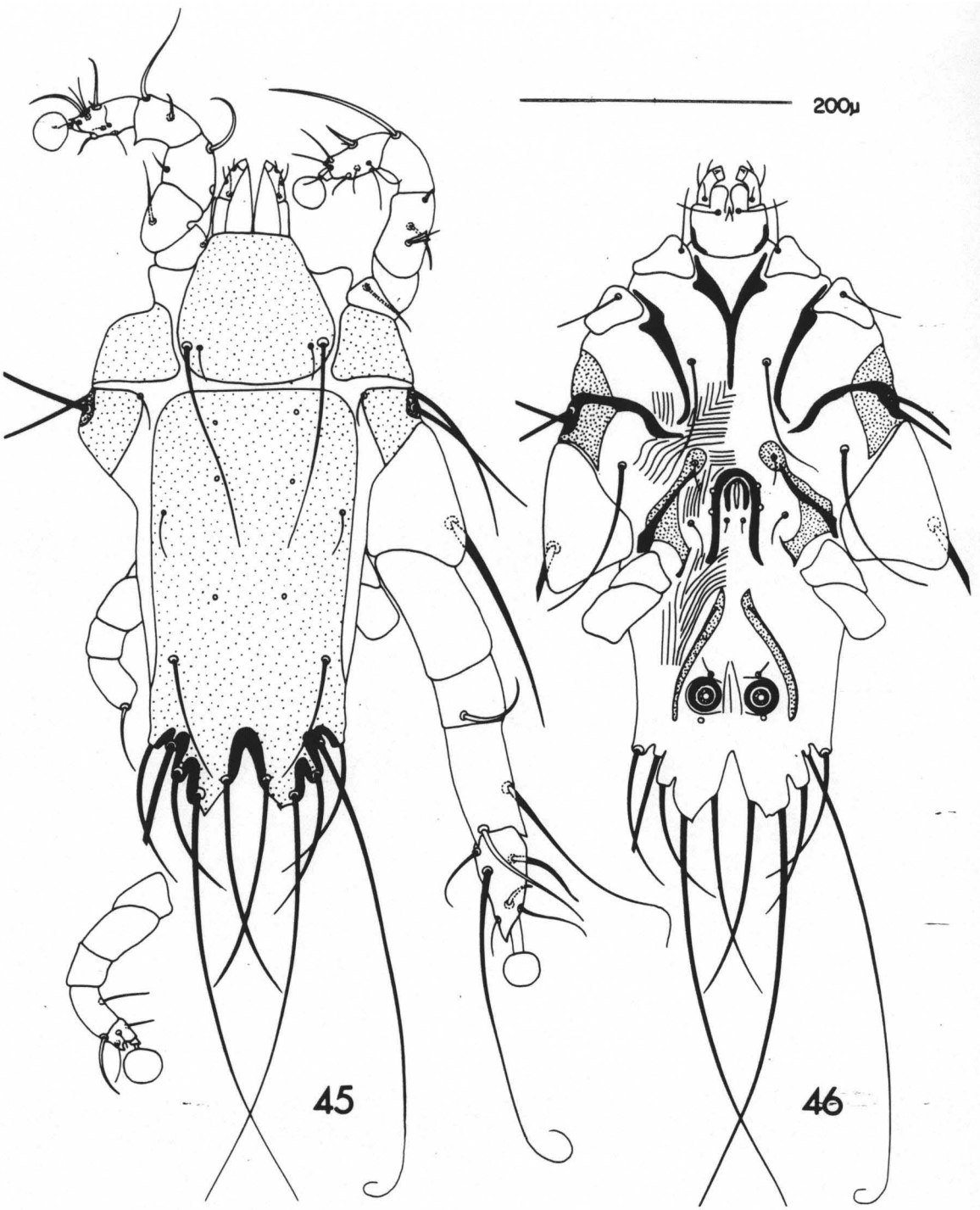
Female. Length, 455u; width, 223u. Dorsal idiosoma: Propodosomal shield well developed, moderately chitinized, 125u in length, 117u in width. Setae sce long setiform, 173u in length; setae sci setiform, 15u in length; distance between sci:sci 82u; sce:sce 103u. Scapular shields well developed, moderately chitinized. Setae sh setiform, 29u in length, positioned anteroventral to setae h; setae h long setiform, 103u in length; setae 11 setiform, 19u in length, not enclosed by hysterosomal shield. Hysterosomal shield. moderately chitinized, rectangular in shape, not extending to posterior or lateral margins of hysterosoma. Opisthosoma rounded. Setae dl-d4 absent; setae 14 and pai short setiform;

setae 15 and d5 long setiform, setae d5 posteroventral to 15. Legs I and II with short spinous apophyses extending from ventral surfaces of tibiae; setae cG legs I and II similar to male; setae sR legs III long setiforn, 65u in length. Ventral idiosoma: Epimerites I fused in a Y; surface fields epimerites I-IV weakly developed; coxal fields I-IV open. Pregenital apodeme in an inverted U; exterior integumental sclerites of oviporous extending beyond posterior ends of pregenital apodeme; apex of pregenital apodeme between posterior ends of epimerites II; two pairs of genital discs positioned between inner margins of pregenital apodeme and lateral margins of integumental sclerites of oviporous. All ventral setae present; setae c1 short setiform, 12u in length, directly posterior to apex of pregenital apodeme; setae c2 positioned at posterior ends of pregenital apodeme on lateral margins of integumental sclerites of oviporous; setae c3 Long setiform, 73u in length posterior to setae c2; setae cx3 long setiforn, 67u in length, anterior to setae c2; setae pae short setiform, 12u in length, not extending to posterior margin of opisthosoma.

Type material. From Aratinga nana astec (Souance) (~sittacidae): holotype male (FMNH 110228, UGA 12194) 1 female paratype, August 14, 1937, Chichen-Itza, Yucatan, Mexico, M. Trayor, Jr.; Paratypes: 1 female, February 25, 1905, Izabal, Guatemala, Heller and Barber; 3 females, January 30, 1906, Los Amates, Izabal, Guatemala, N. Dearborn.

Figures 45-46

Eurydiscalges n. sp. 45, male, dorsal aspect. 46, male, ventral aspect.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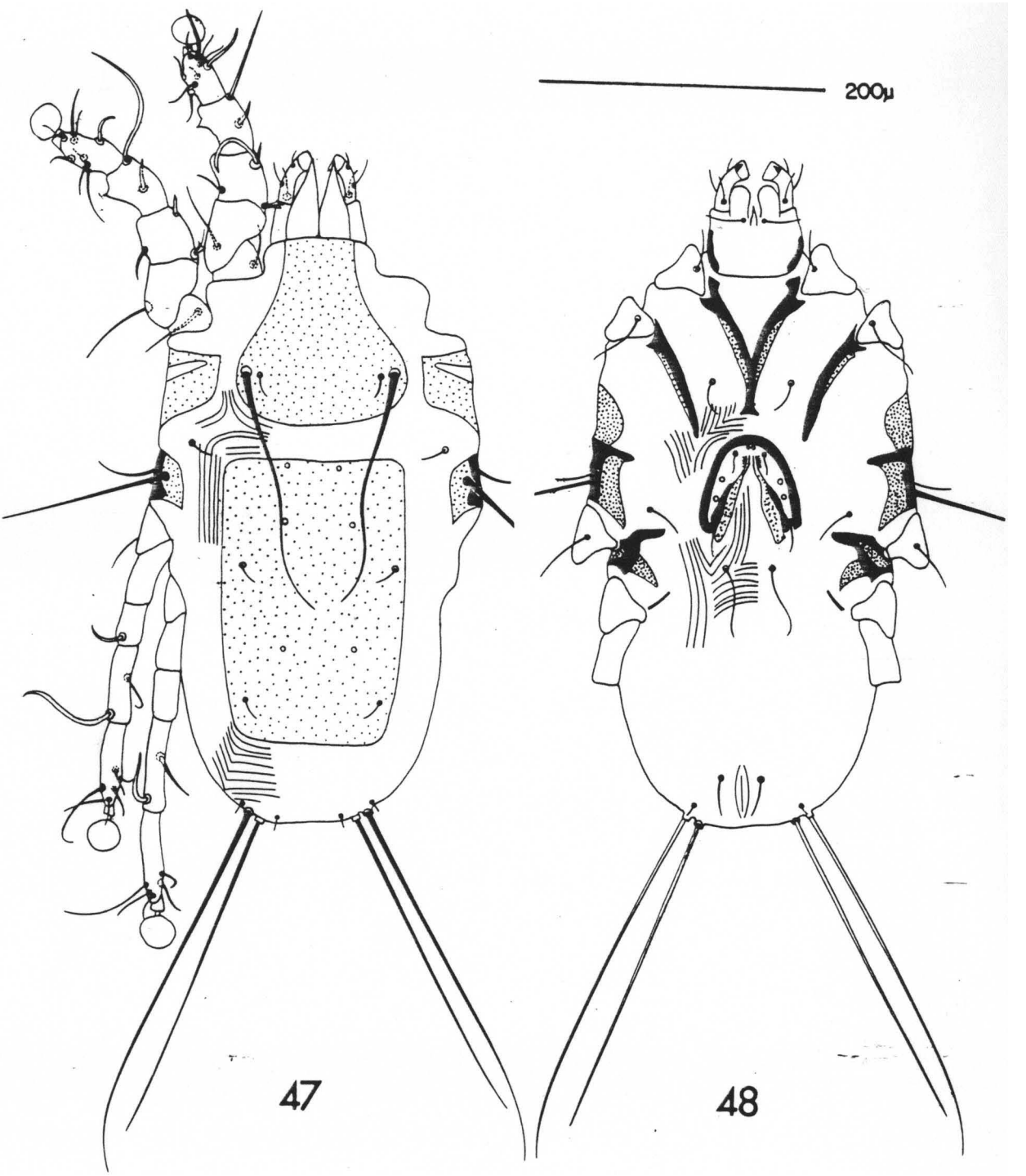
45
46

Figures 47-48

Eurydiscalges n. sp. 47, female, dorsal aspect. 48, female, ventral aspect.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47
48

Chiasmalges Guad and Atyeo, 1967

Chiasmalges Gaud and Atyeo, 1967. Genres nouveaux de la famille Analgidae, Trouessart & Megnin. Acarologia 9:447-464. (type-species Chiasmalges polyplectrus Gaud and Atyeo, 1967, by original designation).

Males and females of this genus exhibit the following characteristics: the internal vertical setae are present, the subhumeral setae are setiform, legs I-II are equal in development, tarsi I-II are short, and dorso-apical spinous apophyses are present on tarsi I-IV. In males the opisthosoma is moderately bilobed. Legs 111 are hypertrophied and legs IV are atrophied. Epimerites I are fused in a Y. In females the opisthosoma is round, the posterior legs are thin, and epimerites I are fused in an X with the posterior arms short (Gaud and Atyeo, 1967). The pregenital apodeme is in an inverted U and totally flanks the oviporous. Posterior to the pregenital apodeme, the genital opening appears in an inverted V. A pair of moderately chitinized sclerites supports the external integumental folds,

Chiasnlages n. sp. near C. polyplectrus (Gaud and Atyeo)

(figs. 49-52)

In overall body size, the males of this species are very similar to those of C. polyplectrus. However, the females of this species are significantly smaller. In males, setae s and cl are longer whereas setae c3 and c2 are shorter. The narrow sclerites flanking the adanal discs are

joined by a weakly chitinized surface field anteriorally. In females, the surface fields of epimerites IV are greatly reduced and setae s are shorter. The subcapitular setae of both sexes are longer in this species.

Male. Length, 590u; width, 317u. Dorsal idiosoma: Propodosomal shield well developed, moderately chitinized, 140u in length, 168u in width. Setae vi 3u in length. Setae see long setiform, 274u in length, slightly anterior to sci; setae sci setiform, 58u in length; distance between sci:sci 142u, sce:sce 156u. Scapular shields well developed, moderately chitinized. Setae sh long setiform, 307u in length, positioned anteroventral to setae h: setae h long setiform, 163u in length; setae 11 long setiform, 163u in length, and enclosed by well developed and moderately chitinized humeral shields. Hysterosomal shield well developed, moderately chitinized; small oval opening present posteriorly, outer margins of oval strongly chitinized. Hysterosornal lobes well developed; each lobe subdivided into small narrow lobules; setae 14, 15, pae and d5 inserted into lobules; setae pai inserted on inner face of each lobe. Setae d1-d4 absent; setae 12 short setiform; setae 13 long setiform; remaining setae long, dilated, setiform. Setae 15 anterior to d5. Legs I-II with spinous apophyses extending from ventral surfaces of tibiae; tarsi I-II with dorso-apical spines; tibiae III with dorsal and ventral apical spines; setae cG legs I-II with basal half expanded; setae sR legs III long setiform; 287u in length; setae kT legs III, exceptionally long. Ventral idiosoma: Epimerites I fused in a Y;

epimerites III-IV fused enclosing coxal fields III; surface fields of epimerites I-IV well developed. Pregenital apodeme horseshoe-shaped, strongly chitinized; genital organ long and slender, extending beyond posterior ends of pregenital apodeme; two pairs of genital discs flank pregenital apodeme at level between setae c1 and c2. Adanal discs flanked by narrow sclerites, obliquely positioned; sclerites joined by weak surface field anteriorly. All ventral setae present; setae s, c1, cx3 are long setiform; setae c1 positioned on anterior end of surface fields of epinerites IV; setae cx3 same level as c1, positioned on posterornedial margins of surface fields III; setae c2 setiform, 48u in length and pos terior to setae c1; setae c3 short setiform, 14u in length, within boundaries of pregenital apodeme, setae c3 posterior to c2.

Female. Length, 370u; width, 235u. Dorsal idiosoma: Propodosomai shield well developed, moderately chitinized, — 115u in length, 132u in width. Setae vi 2u in length. Setae sce long setiform, 168u in length, slightly anterior to setae sci; setae sci setiforn, 26u in length; distance between sci:sci 108u, sce:sce 122u. Setae sh setiform, 53u in length, positioned anteroventral to setae h; setae h setiform 92u in length; setae 11 setiform, 26u in length, not enclosed by hysterosomal or humeral shields. Humeral shields greatly reduced. Hysterosomal shield moderately chitinized, not extending to lateral or posterior margins of hysterosoma; posterior margin of hysterosomal shield concave. Opisthosoma

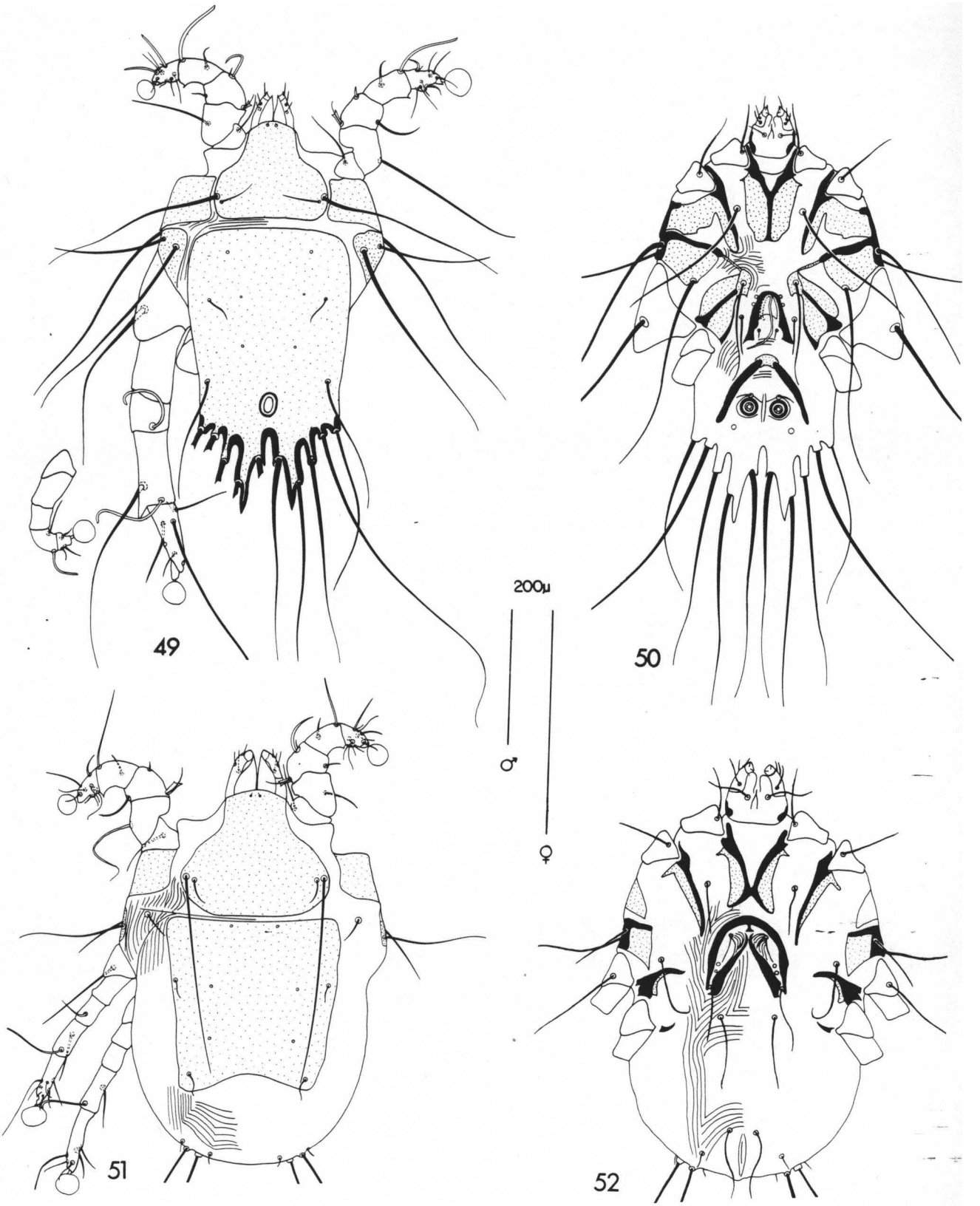
rounded. Setae dl-d4 absent; setae 14 short, setiform, 9u in length; setae pai short setiform, 7u in length; setae 15 and d5 long setiforn; setae d5 posteroventral to 15. Legs I-II similar to male but slightly smaller; posterior legs long and thin; tarsi I-IV with dorso-apical spines; Legs I-II with spinous apophyses extending from ventral surfaces of tibiae; setae cG legs I-II similar to male; setae sR legs III setiform, 91u in length. Ventral idiosoma: Epimerites I fused in an X with posterior arms short; surface fields epimerites I-III moderately developed; surface fields epimerites IV weakly developed; all coxal fields open. Pregenital apodeme in an inverted U; two pairs of genital discs positioned between medial margins of pregenital apodeme and lateral margins of integumental sclerites of oviporous at level between setae el and e2. All ventral setae present; setae c1 directly posterior to apex of pregenital apodeme; setae c2 positioned between posterior ends of pregenital apodeme and posterolateral margins of integumental sclerites of oviporous; setae cx3 anterior to c2; setae a setiform, 43u in Length, extending beyond posterior margin of opisthosoma; setae pae setiform, 12u in length, extending to posterior margin of opisthosoma.

Type material. From Aratinga nana astec (Souance) (Psittacidae): holotype male (FMNH 120398, UGA 12196), 3 female paratypes, December 22, 1939, Matamoros, Campeche, Mexico, M. Traylor, Jr.; Paratypes: 1 male, 2 females, January 30, 1906, Los Anates, Izabal, Guatemala, N. Dearborn;

1 female, November 1, 1939, Chichen-Itza, Yucatan, Mexico,
M. Trayor, Jr.

Figures 49-52

Chiasmalges n. sp. 49, male, dorsal aspect. 50, male, ventral aspect. 51, female, dorsal aspect. 52, female, ventral aspect.


49
50
200µ
♂
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51
52

FAMILY XOLALGIDAE

Protonyssus Trouessart, 1915

Protonyssus Favette and Trouessart, 1904. Monographie du genre Protolichus (Trt) et revision des Sarcoptides plumicoles (Analgesinae) qui vivent sur les perroquets. Mem. Soc. zool. Fr. 17:120-166 + pls. V-CV (nom. nud.)

Protonyssus Trouessart, 1915. Revision des genres de la sousfamille des Analgesinae, ou Sarcoptides plumicoles. Bull. Soc. zool. Fr. 40:207-223. (type-species: Protalges larva Trouessart, 1885, by original designation).

Protonyssus Gaud, 1980. Acariens Sarcoptiformes plumicoles parasites sur les oiseaux Psittaciformes, Strigiformes et Caprimulgiformes en Afrique. Anns. Mus. r. Afr. cent., Ser. in -8°, Zool. (230):1-106.

Males and females of this genus exhibit the following characteristics: setae vi are absent, the propodosomal shield is small and does not enclose scapular setae, the hysterosomal shield is continuous with no transverse interruption, the subhumeral setae are setiform, and epimerites I are fused in the sternum. The males have a bilobed opisthosoma. The scapular setae are enclosed by the hysterosomal shield. Legs III and IV are hypertrophied, with leg III much longer than leg IV. Femora I and II are greatly reduced while the femora and genua of legs III and IV are fused. In females, the scapular setae are not enclosed by the hysterosomal shield. The

pregenital apodeme is in an inverted U and circumscribes the oviporous. The apex of the pregenital apodeme is thinner than its sides. Posterior to the pregenital apodeme the genital opening appears as an inverted V. A pair of sclerites supporting the integumental folds are moderately chitinized and extend beyond the posterior margins of the pregenital apodeme. Femora I-IV are greatly reduced. The posterior Pegs are long and thin with tibiae IV longer than tibiae III.

Protonyssus n. sp. near P. larva (Trouessart)

(figs. 53-56)

In males, the anterior margin of the hysterosomal shield abuts the posterior margin of the propodosomal shield. Setae sci and sce are positioned near the anterior margin of the hysterosomal shield. The posterior ends of the genital arch are directed medially; two pairs of genital discs are incorporated into the genital arch. Adanal discs are heavily chitinized and completely circumbscribed by a preanal apodeme. In females, setae 11 are short setiform, positioned lateral to the hysterosomal shield. Setae 12 and 14 are bifurcate near their bases and spiculiform. Two pairs of genital discs are incorporated into the pregenital apodeme. The preanal apodeme is weakly chitinized in an inverted V.

Male (holotype). Length, 416u; width, 205u. Dorsal idiosoma: Propodosomal shield small and strongly chitinized, 72u in length, 69u in width; propodosomal shield contiguous with hysterosomal shield. Setae sh setiform, 29u in length, positioned to setae h; setae h membranous and elongated,

144u in length. Mysterosomal lobes moderately developed, with continuous interlobar lamellae extending slightly beyond terminus; terminal cleft including lamellae, 48u in height; lobes bearing setae 14, 15, pae, d5 and pai. Hysterosomal shield well developed. Setae sce and sci positioned near anterior margin of hysterosornal shield; setae sce setiform, 15u in length; setae sci short setiform, 3u in length; distance between sci:sci 67u, sce:sce 84u. Setae dl-d4 absent; setae 15 and d5 long dilated setiform with setae 15 slightly anterior to d5. Curved dorso-apical spines on tarsi I-IV; legs I with short spinous apophyses extending from ventral surfaces of tibiae; tibiae III with dorso-apical spines; setae cG legs I and II setiform and slightly bifurcate near base; setae mG legs II membranous and elongated, 55u in length; setae sR legs III lanceolate and bifurcate near base, 110u in length. Ventral idiosorna: Epimerites I fused in a V; epimerites IIIa flank genital arch and nearly fused anteriorly; epimerites IVa extend to posterior end of genital arch; surface fields epimerites II and IVa weakly developed, surface field IIIa well developed; all coxal fields open. Genital organ short. Adanal discs well developed, circumscribed by preanal apodeme, with posterior margin straight. All ventral setae present; setae cl enclosed within surface fields of epimerites IIIa, setae c1 anterior to genital arch; setae c2 short setiform, positioned between posteromedial margins of genital arch; setae c3 positioned near posterior margins of coxal fields IV; setae a positioned on apex of preanal apodeme.

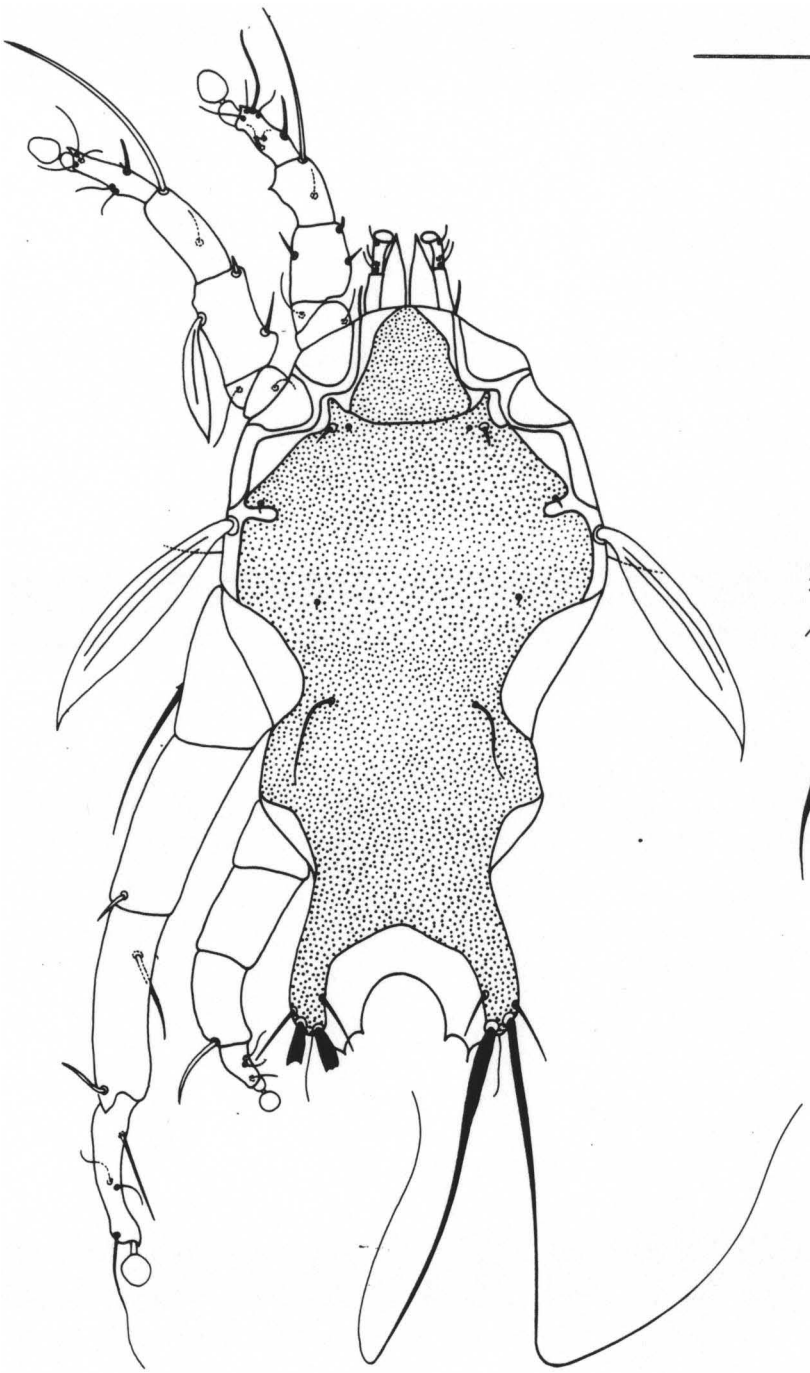
Female. Length, 427u; width, 164u. Dorsal idiosoma: Propodosomal shield small, but strongly chitinized, 64u in length, 76u in width; posterior margin convex. Setae sce and sci posterior to propodosomal shield; setae sce setiform, 14u in length; setae sci short setiform, 4u in length; distance between sci:sci 62u, sce:sce 68u. Lateral margins of hysterosoma between legs II and III strongly chitinized. Setae sh setiform, 31u in length, positioned posteroventral to setae h; setae h lanceolate, 187u in length. Opisthosoma truncate. Hysterosomal shield moderately developed and strongly chitinized, not extending to lateral or posterior margins of hysterosoma; central portion of shield more chitinous with anterior section forked and posterior portion open in an inverted heart-shape. Setae d1-d4 absent; setae 11 short setiform, not enclosed by hysterosomal shield; setae 12 spiculiform and bifurcate near base, 86u in length, setae 12 positioned on lateral margins of hysterosomal shield; setae 13 spiculiform and bifurcate near base, 36u in length, setae 12 positioned posterior to hysterosomal shield; setae 14 spiculiform and bifurcate near base, 29u in length; setae 15 and d5 long, dilated setiform, at sane level; setae pai spiculiform, 31u in length. Tarsi I-IV with dorso-apical spines; setae mG legs II similar to male; setae sR legs III similar to male but shorter, 48u in length. Ventral idiosoma: Epimerites I fused in a V; all coxal fields open. Pregenital-apodeme in an inverted U, extending to integumental sclerites of oviporous. All ventral setae present; setae cl short

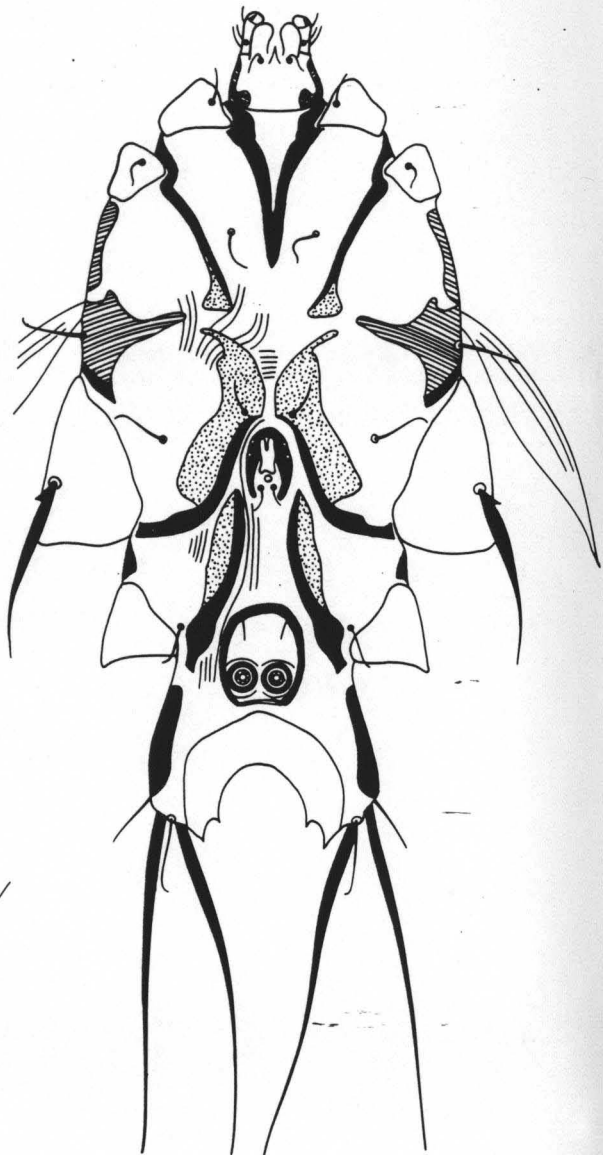
setiform, positioned on apex of pregenital apodeme; setae c2 setiform, positioned on posterior margins of pregenital apodeme; setae cx3 posterior to c2; setae c3 greatly posterior to c2; setae pae spiculiform extending beyond posterior margin of opisthosoma. Preanal apodeme weakly chitinized in an inverted V.

Type material. From Aratinga nana astec (Souance) (Psittacidae): holotype male (FMNH 120898, UGA 12196), 1 male, 7 female paratypes, December 22, 1939, Matamoros, Campeche, Mexico, M. Traylor, Jr.; Paratypes: 3 males, 3 females, November 1, 1939, Chichen-Itza, Yucatan, Mexico, M. Trayor, Jr.; 2 females, 1886, Yucatan, Mexico, collector unknown; 1 male, February 25, 1905, Izabal, Guatemala, Heller and Barber.

Figures 53-54

Protonyssus n. sp. 53, male, dorsal aspect. 54, male, ventral aspect.



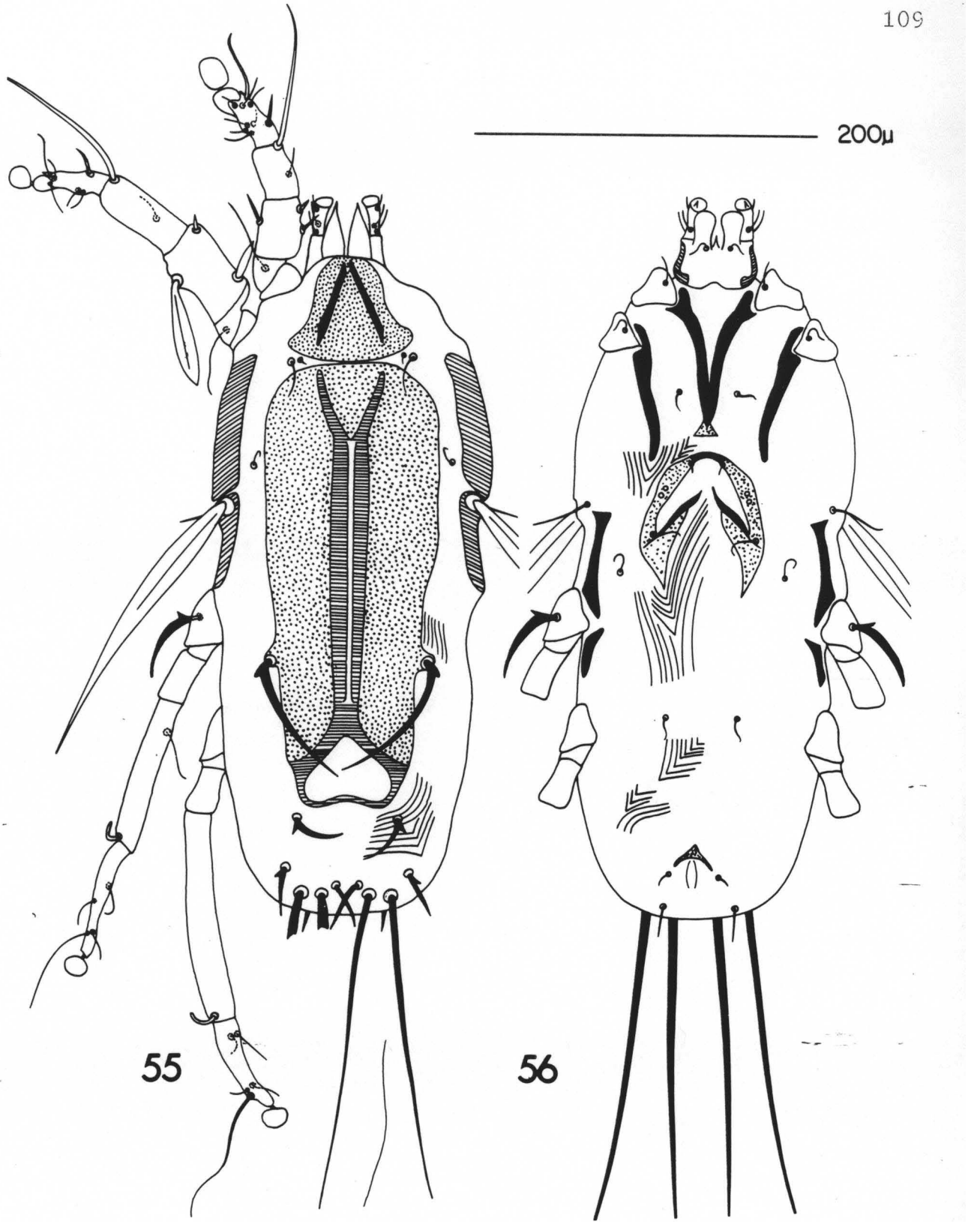


53

54

Figures 55-56

Protonyssus n. sp. 55, female, dorsal aspect. 56, female, ventral aspect.


200µ
55
56

Fainalges Gaud and Berla, 1964

Fainalges Guad and Berla, 1964. Fainalges trichocheylus n.g., n. sp., curieux representant de la famille des Analgidae. Acarologia 6:690-693. (type-species: Fainalges trichocheylus Gaud and Berla, 1964 - from Picidae - by original designation).

Fainalges, Gaud, 1980. Acariens Sarcoptiformes plumicoles parasites sur les oiseaux Psittaciformes, Strigiformes et Caprirnulgiformes en Afrique. Annls. Mus. r. Afr. cent., Sr. in - 8°, Zool. (230):1-106.

In both sexes of this genus the vertical setae are absent and epimerites I are fused in a Y. The subhumeral setae are setiform. Legs III-IV are inserted dorsolaterally and the genu and femur of legs I-IV are fused. Tibiae I-II have spinous apophyses extending from their ventral surfaces. In males the chelicerae are small, the opisthosoma is weakly bilobed, legs III are hypertrophied, and there is a reduction without atrophy of tarsi IV. In females the hysterosomal shield is absent and the opisthosoma is round. The pre-genital apodeme is crescent shaped. Posterior to the pre-genital apodeme, the genital opening appears as an inverted V. A pair of moderately chitinized sclerites supports the exterior integumental folds. The posterior ends of the sclerites are expanded.

Fainalges n. sp.

(figs. 57-60)

Males have a wider idiosoma than in the other two species described. The genital organ extends to the posteriar ends of the genital arch. Setae mG legs II, setae d legs III and setae sh are longer than in the other two species. Setae cx3 are positioned anterior to setae c1. The females are clearly distinguished by their long and slender pretarsal stock extending from the apex of tarsi III-IV.

Male. Length, 228u; width, 220u. Dorsal idiosoma: Propodosomal shield small, moderately chitinized, 69u in length, 52u in width; the posterolateral margins of shield expanded, encompassing setae sce and sci. Setae sce long setiforrn, 105u in length; setae sci setiform, 26u in length; distance between sci:sci 33u, sce:sce 43u. Scapular shields well developed and moderately chitinized. Setae sh long setiform, 129u in length, positioned anteroventral to setae h; setae h long setiform, 204u in length. Hysterosomal shield well developed, moderately chitinized. Hysterosomal lobes weakly developed with continuous interlobar and extralobar lamellae extending slightly beyond terminus; terminal cleft including lamellae 22u in height; lobes with setae l4, l5, pae, d5 and pai. Setae dl-d4 absent; setae l1 setiforn, 44u in length, positioned on anterior margin of hysterosomal shield; setae l2 and l3 long setiform; setae l5 and d5 exceptionally long setiform, with seate d5 slightly posterior to l5. Legs I and II with short spinous apophyses extending

from ventral surfaces of tibiae; dorso-apical spines present on tarsi I-IV and tibiae III-IV; setae d2 legs III exceptionally long setiform. Ventral idiosoma: Epimerites I fused in a Y with arms thick; all coxal fields open; weak chitinous bands extending posteriorly from epimerites IIIa along lateral margins of opisthosoma. Genital organ extends to posterior ends of genital arch; two pairs of genital discs incorporated on lateral margins of genital arch. Adanal discs well developed; preanal apodeme crescent shaped, incorporating setae a. All ventral setae present; setae cl anterior to genital arch, setae cl positioned on anterior margins of surface fields of epimerites IIIa; setae cx3 long setiform, 151u in length, setae cx3 anterior to cl; setae c2 posterior to genital arch; setae c3 near posterior margins of coxal fields IV.

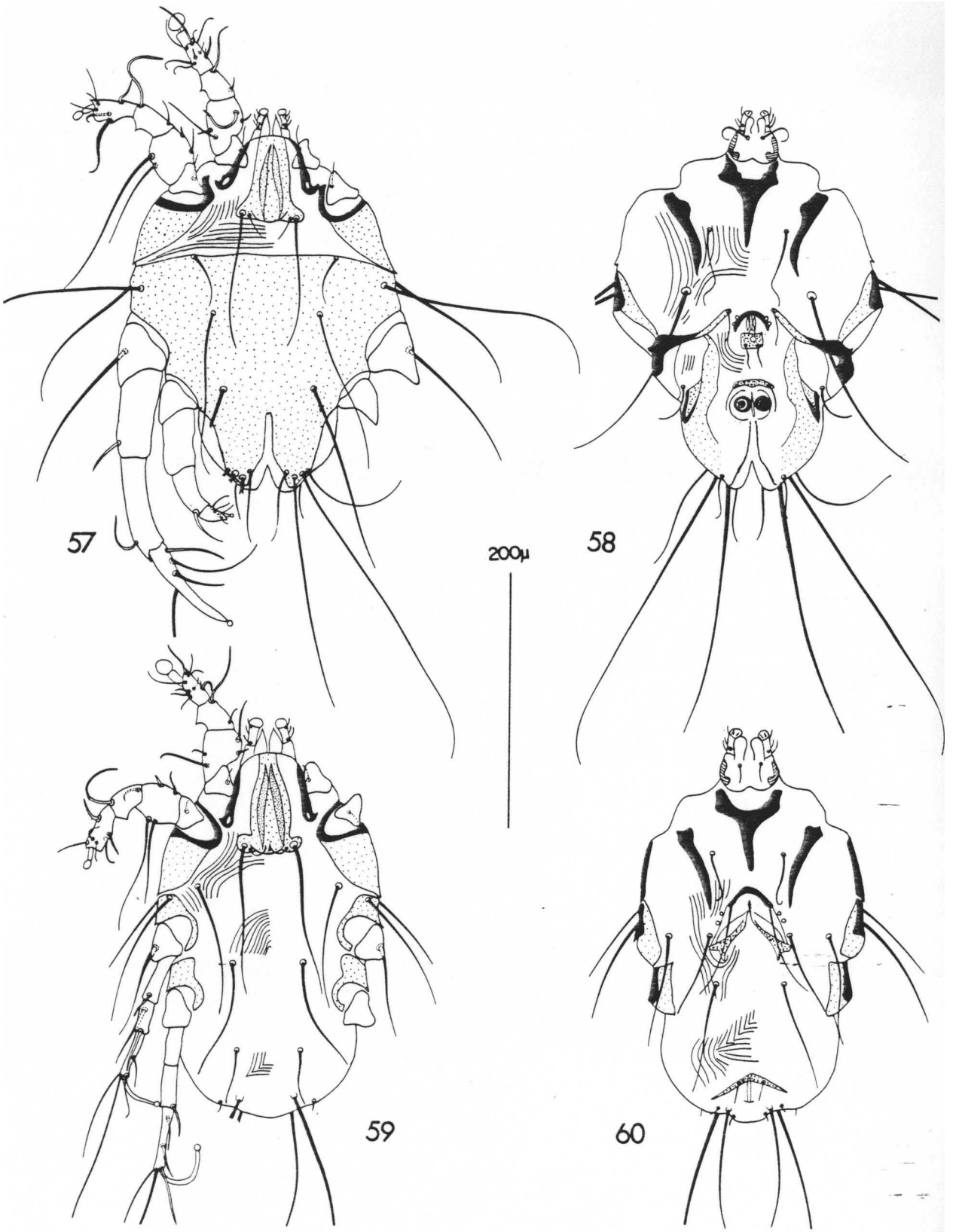
Female. Length, 305u; width, 178u. Dorsal idiosoma: Propodosomal shield small, moderately chitinized, 81u in length, 41u in width; posterolateral margins of shield expanded, encompassing setae sce and sci. Setae sce long setiform, 120u in length; setae sci setiform, 24u in length; distance between sci:sci 28u, sce:sce 39u. Scapular shields well developed, moderately chitinized. Opisthosoma rounded; hysterosomal shield absent. Setae sh long setiform, 70u in length, positioned anteroventral to setae h; setae h long setiform, 108u in length. Setae d1-d4 absent; setae 14 short setiform, 9u in length; setae d5 and 15 long setiform; setae d5 positioned posteroventral to 15. Legs I-II with short spinous apophyses extending from ventral surfaces of tibiae; tarsi

I-II with dorso-apical spines; legs III-IV with long slender pretarsal stocks bearing small ambulacrae; setae d on tarsi III-IV exceptionally long setiform. Ventral idiosoma: Epimerites I fused in a Y; all coxal fields open. Pregenital apodeme crescent shaped, positioned between posterior ends of epimerites II; genital discs positioned between setae c1 and c2. All ventral setae present; setae s, c1, c2, c3 and cx3 long setiform; setae c1 positioned on posterior margins of pregenital apodeme; setae c2 anterior to posterior ends of integumental sclerites of oviporous; setae cx3 at same level as c2; setae pae and pai short, setiform. Preanal apodeme in an inverted V, incorporating setae a.

Type material. From Aratinga nana astec (Souance) (~sittacidae): holotype male (FMNH 120898, UGA 12196), 2 female paratypes, December 22, 1939, Matamoros, Campeche, -- Mexico, M. Traylor, Jr.; Paratypes: 1 male, 1 female, February 25, 1905, Izabal, Guatemala, Heller and Barber; 1 — male, November 1, 1979, Chichen-Itza, Yucatan, Mexico, M. Trayor, Jr.; 1 female, July 8, 1941, Puente Nacional, Veracruz, Mexico, H.H. Shary; 1 female, November 1, 1939, Chichen-Itza, Yucatan, Mexico, M. Trayor, Jr.

Figures 57-60

Fainalges n. sp. 57, male, dorsal aspect. 58, male, ventral aspect. 59, female, dorsal aspect. 60, female, ventral aspect.


57
200µ
58
59
60

Fainalges n. sp.

(figs. 61-62)

In males, the genital arch is narrow. The genital organ does not extend to the posterior ends of the genital arch. A narrow sclerite is fused with the apex of the preanal apodeme and extends to the level of the medial coxal-trochanteral articulations of legs IV, where it expands into an oval shape incorporating setae c2.

Male. Length, 259u; width, 146u. Dorsal idiosoma: Proposodomal shield small, moderately chitinized, 62u in length, 53u in width; posterolateral margins expanded, encompassing setae sce and sci. Setae sce long setiform, 96u in length; setae sci short setiform, 9u in length; distance between sci:sci 36u, sce:sce 43u. Scapular shields well developed, moderately chitinized. Setae sh setiform, 67u in length, positioned anteroventral to setae h; setae h long setiform, 144u in length. Hysterosomal shield well developed, moderately chitinized. Hysterosomal lobes weakly developed with continuous interlobar and extralobar lamellae extending slightly beyond terminus; terminal cleft including lamellae 22u in height; lobes with setae l4, l5, pae, d5 and pai. Setae dl-d4 absent; setae l1 setiform, 29u in length, positioned on anterior margin of hysterosomal shield; setae l2 and l3 long setiform; setae l5 and d5 exceptionally long setiform, with setae d5 slightly posterior to l5. Legs I and II with short spinous apophyses extending from ventral surfaces of tibiae; dorso-apical spines on tarsi

I-IV and tibiae III-IV. Ventral idiosoma: Epimerites I fused in Y; all coxal fields open; weak chitinous bands extending posteriorly from epimerites IIIa along lateral margins of opisthosoma. Genital arch narrowed, flanked by two pairs of genital discs; genital discs posterior to setae cl. Adanal discs well developed; preanal apodeme crescent shaped and thick, incorporating setae a. All ventral setae present; setae cl anteiror to genital arch, setae c1 positioned on anterior margins of surface fields of epimerites IIIa; setae c2 posterior to genital arch; setae cx3 long setiform, 134u in length, positioned posterior to setae cl; setae c3 near posterior margins of coxal fields IV.

Female. Unknown.

Type material. From Aratinga nana astec (Souance) (Psittacidae): holotype male (FMNH 129898, UGA 12196), December 22, 1939, Matamoros, Campeche, Mexico, M. Traylor, Jr.; Paratypes: 1 male, January 30, 1906, Los Amates, Izabal, Guatemala, N. Dearborn.

Fainalges n. sp.

(figs. 63-64)

In males, setae 11, sh and h are shorter than in the other two species. The genital arch is brief, incorporating two pairs of genital discs on the lateral margins. The genital organ extends beyond the posterior margins of the genital arch. The preanal apodeme is horseshoe-shaped, almost completely circumscribing the adanal discs.

Male. Length, 320u; withd, 166u. Dorsal idiosoma: Propodosomal shield small, moderately chitinized, 72u in length, 62u in width; posterolateral margins of shield expanded, encompassing setae sce and sci. Setae sce long setiform, 120u in length; setae sci setiforn, 19u in length; distance between sci:sci 43u, sce:sce 53u. Scapular shields well developed, moderately chitinized. Setae sh setiform, 48u in length, positioned anteroventral to setae h; setae h long setiform, 245u in length. Hysterosomal shield well developed, moderately chitinized. Hysterosomal lobes weakly developed with continuous interlobar and extralobar lamellae extending slightly beyond terminus; terminal cleft including lamellae 25u in height; lobes with setae 14, 15, pae, d5 and pai. Setae d1-d4 absent; setae 11 short setiform, 12u in length, setae 11 positioned on anterior margin of hysterosomal shield; setae 15 and d5 exceptionally long setiform, with setae d5 slightly posterior to 15. Legs I-II with short spinous apophyses extedning from ventral surfaces of tibiae;

dorso-apical spines on tarsi I-IV and tibiae III-IV. Ventral idiosoma: Epimerites I fused in a Y; all coxal fields open; weak chitinous bands extending posteriorly from epimerites IIIa along lateral margins of opisthosoma. Genital arch brief. Adanal discs well developed; preanal apodeme incorporating setae a on apex. All ventral setae present; setae c1 anterior to the genital arch, positioned on anterior margins of surface fields of epimerites IIIa; setae c2 posterior to genital Arch; setae cx3 long setiform, 160u in length, positioned posterior to setae c1; setae c3 near posterior margins of coxal fields IV.

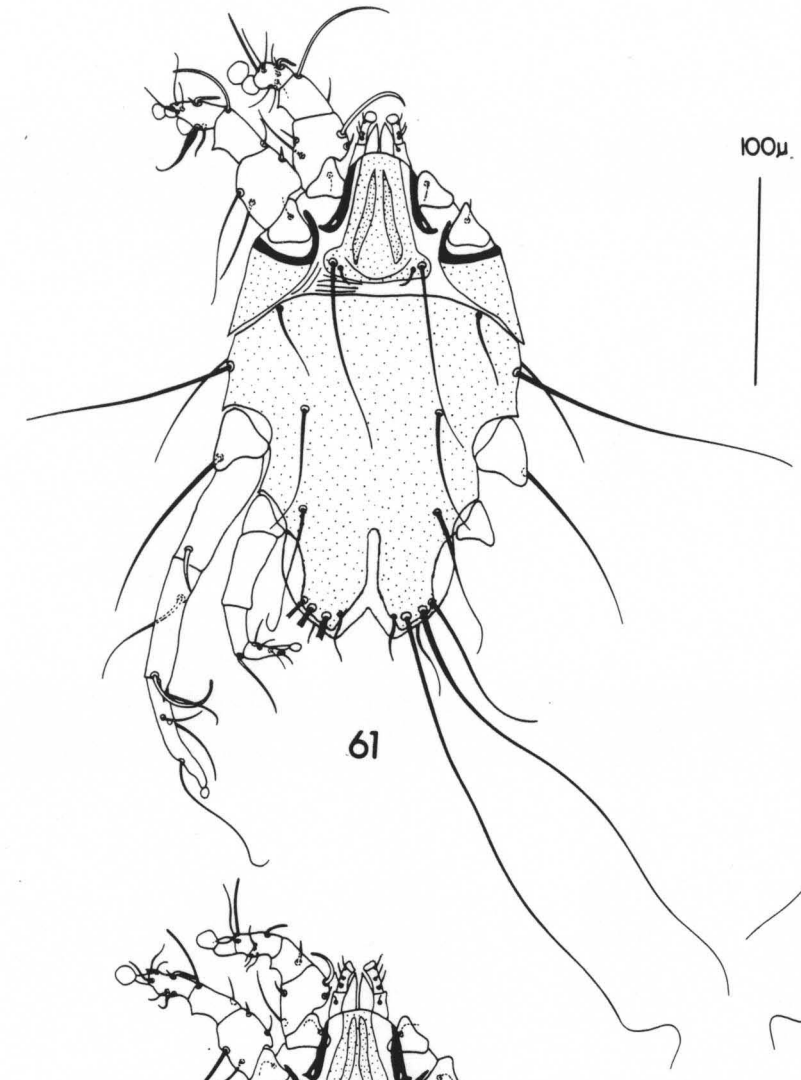
Type material. From Aratinga nana astec (Souance) (Psittacidae): holotype male (FMNH 120898, UGA 12196), December 22, 1939, Matamoros, Campeche, Mexico, M. Traylor, Jr.; Paratypes: 1 male, November 1, 1939, Chichen-Itza, Yucatan, Mexico, M. Trayor, Jr.

Figures 61-62

Fainalges n. sp. 61, male, dorsal aspect. 62, male, ventral aspect.

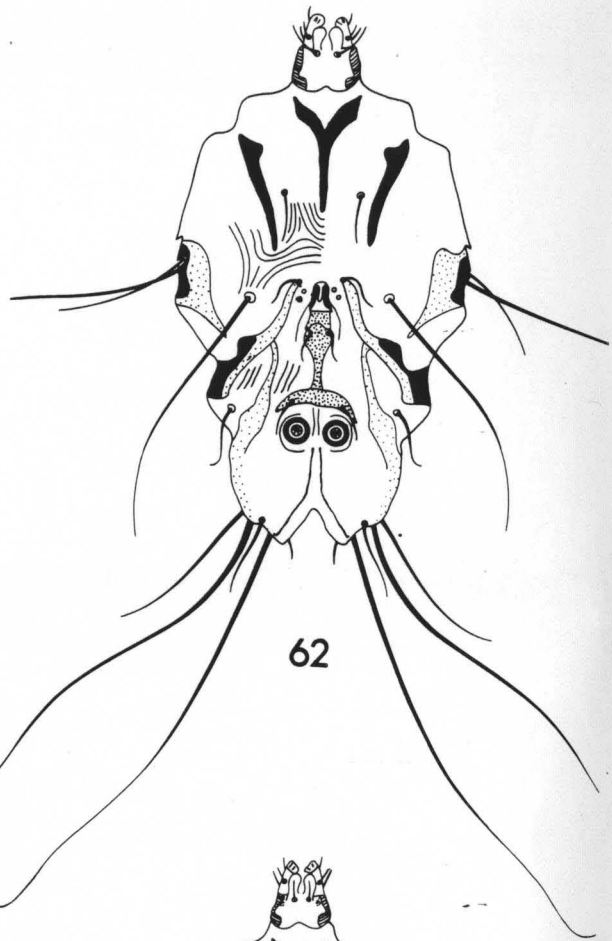
Figures 63-64

Fainalges n. sp. 63, male, dorsal aspect. 64, male, ventral aspect.

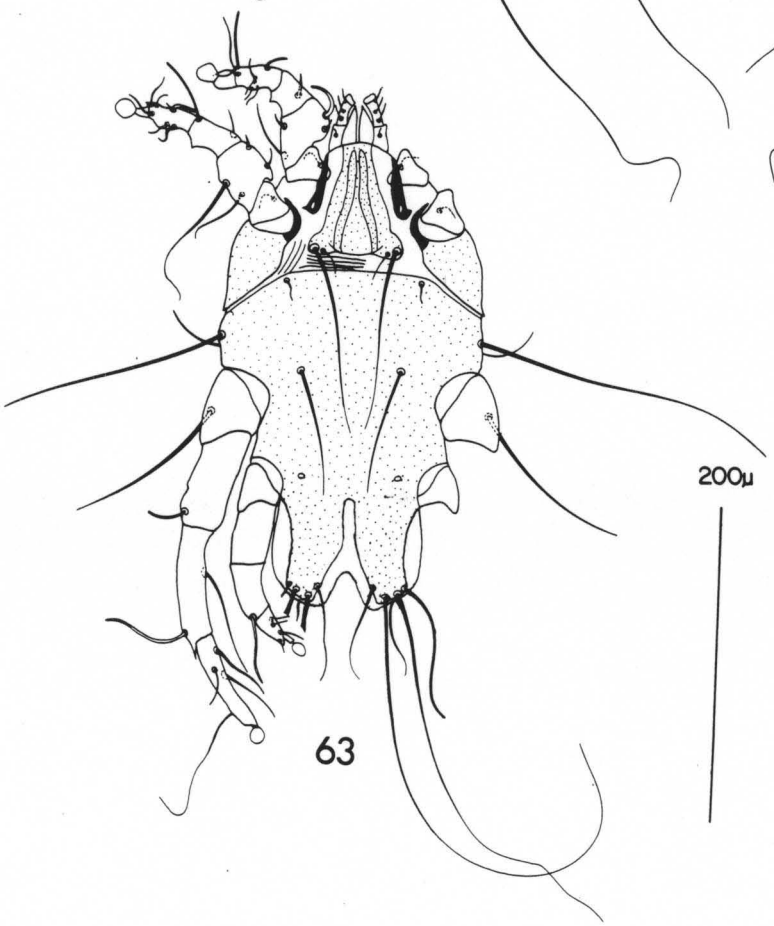


61

100µ

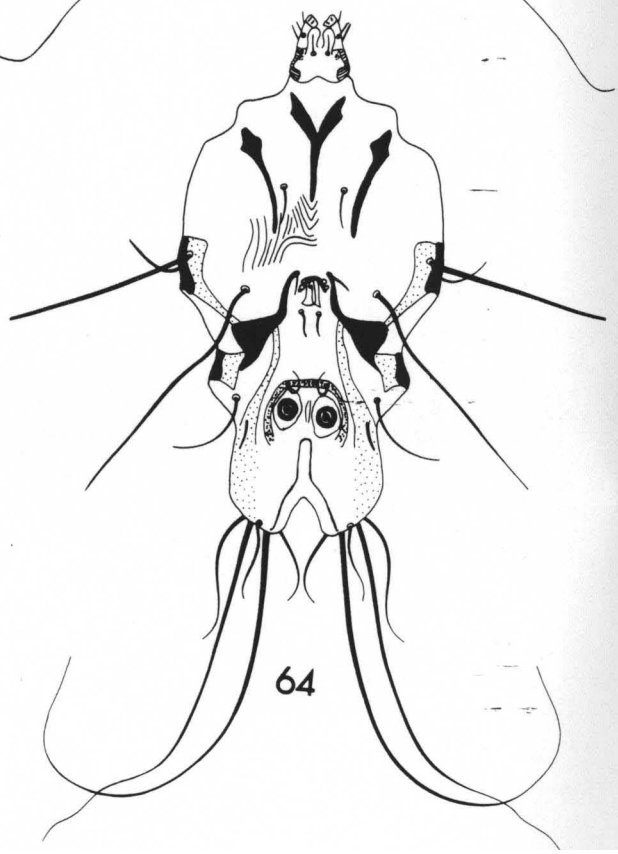


62



63

200µ



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BIBLIOGRAPHY

Atyeo, W.T., and J. Gaud. 1966. The chaetotaxy of sarcoptiform feather mites (Acarina: Analgoidea). J. Kans. Ent. Soc. 39:337-346.

_____. 1971. Feather mites (Analgoidea: Pterolichidae) of the hoatzin (Aves: Galliformes). Am.Midl.Nat. 86:152-159.

_____. 1979. Feather mites and their hosts. Recent Advances in Acarology. Academic Press, 2:355-361.

_____. 1983. Feather mites of obligate brood parasites. J.Parsit. 69:455-458.

Barnes, Robert D. 1980. Invertebrate Zoology, 4th Edition. Saunders College/Holt, Rinehart and Winston, Philadelphia: 1-1089 pp.

Canestrini, G., and P. Kramer. 1899. Demodicidae und Sarcoptidae. Tierreich 7:1-193.

Cerny, V. 1971. Parasite-host relationships in feather mites. Proc. 3rd. Intl. Congr. Acarology: 761-764.

Dubinin, V.B. 1951. Feather mites (Analgeosoidea). Part I. Introduction to their study. Fauna SSSR, Paukoobraznye 6(5):1-363. [In Russian].

_____. 1956. Feather mites (Analgesoidea). Part III. Family Pterolichidae. FAuna SSSR, Paukoobraznye 6(7): 1-813. [In Russian].

Faccini, J.L.H., J. Gaud, and W.T. Atyeo. 1976. Descricao de Eurydiscalges g.n. (Analgidae, Sarcoptifoirmes), com quatro especies novas parasitas de Psittacidae (Aves), provenientes da America do Sul. Revta bras. biol. 36:701-707.

Favette, J., and E.L. Trouessart. 1904. Monographie du genre Protolichus (Trt) et revision des Sarcoptides plumicoles (Analgesinae) qui vivent sur les perroquets. Mem. Soc. zool. Fr. 17:120-166 + pls. V-XV.

Feduccia, Alan. 1980. The Age of Birds. Harvard University Press. Cambridge, Mass. and London, England. 196pp.

Forshaw, J.M. 1978. Parrots of the World, 2nd ed. Lansdowne Editions, Melbourne. 607pp.

Gaud, J. 1966. Nouvelle definition'.de la famille des Pterolichidae, Megnin & Trouessart et creation de genres nouveaux appartenant à cette famille. Acarologia 8:115-128.

_____. 1980. Acariens Sarcoptiformes plumicoles parasites sur les oiseaux Psittaciformes, Strigiformes et Caprirnulgiformes en Afrique. Annls. Mus. r. Afr. cent., Ser. in-8°, Zool. (230):1-106.

Gaud, J., and W.T. Atyeo. 1967. Genres nouveaux de la famille Analgidae, Trouessart & Megnin. Acarologia 9:447-464.

_____. 1978. Nouvelles superfamilles pour less Acariens astigmates parasites d'oiseax. Acarologia 19:678-685.

Gaud, J., and H.F. Berla. 1964. Fainalges trichocheylus n.g., n.sp., curieux representant de law famille des Analgidae. Acarologia 6:690-693.

Gaud, J., and J. Mouchet. 1959. Acariens plurnicoles des oiseax du Cameroun. V. Pterolichidae. Annls. Parasit. hum. comp. 34:493-545, 631-675.

Gaud, J. and W.N. Till. 1961. Suborder Sarcoptiformes. In Zumpt, F. (ed.). The arthropod parasites of vertebrates in Africa south of the Sahara (Ethiopian Region). Publs. S. Afr. Inst. med. Res. 11(L): 180-352.

Kethley, J.B. and D.E. Johnston. 1975. Resource tracking patterns in bird and mammal ectoparasites. Misc. publs. ent. Soc. Am. 9:231-236.

Krantz, G.W. 1978. A Manual of Acarology, 2nd. ed. Oregon State University Book Stores, Inc., Corvallis. 509pp.

Kudon, L.H. 1982. Host relationships of the feather mite genus Platyacarus Kudon (Acarina: Proctophyllodidae) with a key to the species. J. Ga. ent. Soc. 17:545-552.

Lindquist, E.E. 1975. Associates between mites and other Arthropods in forest floor habitats. Can. Ent. 107:425-437.

Megnin, P., and E.L. Trouessart. 1884. Les Sarcoptides plumicoles. J. Microgr. 8:92-101, 150-157, 211-219, 257-266, 331-338, 380-385, 428-436.

Perez, T.M., and W.T. Atyeo. 1984. Site selection of feather and quill mites of Mexican parrots. Proc. 6th. Intl. Congr. Acarology.

Peterson, P.C. 1975. An Analysis of host-parasite associations among feather mites (Acari: Analgoidea). Misc. Publs. ent. Soc. Am. 9:237-242.

Rothschild, M., and T. Clay. 1952. Fleas, flukes and cuckoos. A study of bird parasites. Philosophical Library. New York. 304 pp.

Trouessart, E.L. 1884. Les Sarcoptides plumicoles. J. Microgr. 8:527-579.

_____. (1898) 1899. Diagnoses preliminaires d'especes nouvelles de Sarcoptides plumicoles (Acar.). Bull. Soc. ent. Fr. 3:289-292, 319-322.

_____. (1915) 1916. Revision des genres de la sous-famille des Analgesinae, ou Sarcoptides plumicoles. Bull. Soc. zool. Fr. 40:207-223.

Welty, J.C. 1968. The Life of Birds. W.B. Saunders Co., Philadelphia and London. 546pp.

Wooley, T.A. 1961. A review of the phylogeny of mites. Ann. rev. Ent. 6:263-284.