A NEW GENUS AND SPECIES OF HYPODERIDAE (ACARI : ASTIGMATA) FROM THE NEST OF AN OWL (AVES : STRIGIFORMES)

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SYSTEMATIC
ENDOPARASITIC
HYPOPI

SUMMARY : A new genus, *Neotytodectes*, is proposed for a new species, *N. mexicanus*, a hypoderid mite collected from an owl's nest in southern Mexico. A revised diagnosis is given for the Hypoderidae (= Hypodectidae), and the nomenclature and systematic position of the family are discussed. The Hypoderidae is more closely related to the Acaridae than to the Glycyphagidae as previously thought.

SYSTÉMATIQUE
HYPOPES
ENDOPARASITES

RÉSUMÉ : Un nouveau genre, *Neotytodectes*, est proposé pour une nouvelle espèce, *N. mexicanus*, récoltée dans un nid d'une chouette du Mexique. Une diagnose révisée est donnée pour la famille Hypoderidae (= Hypodectidae) et la nomenclature et la position systématique de cette famille sont discutées.

For many years, endoparasitic deutonymphs (hypopi) now referred to the family Hypoderidae were thought to be immature stages of ectoparasitic feather mites. FAIN and BAFORT (1966) first showed that the post-deutonymphal instars of these mites are free-living nest inhabitants unrelated to ectoparasitic feather mites. Of approximately 50 described species of Hypoderidae, only two are known from the adult instar. Adult males and females of *Hypodectes* (*Hypodectoides*) *propus* (Nitzsch, 1861) were described by FAIN and BAFORT (1967), and the adult male of *Neottialges* (*Pelecanectes*) *evansi* Fain, 1966, was described by FAIN and BEAUCOURNU (1972). In addition, my own observations on the life-cycles of several species of Hypoderidae associated with North American birds, to be published in a subsequent paper, indicate that the specimen described by FAIN and BAFORT (1966, 1967) as the " male homeomorphe " of *Hypodectes propus* probably represents the adult male of *Neottialges* (*Neottialges*) *eurafer* Fain, 1966. On account of this limited knowledge of adult Hypoderidae, the systematic position of the family is very difficult to assess. With this in mind, description of a new taxon of Hypoderidae based upon a single adult female specimen seems justified. This also provides an opportunity to present a revised diagnosis for the family, as the previous definition (FAIN and BAFORT, 1966) was based upon a single highly specialized species.

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FAMILY HYPODERIDAE MURRAY, 1877
(= Hypodectidae Fain and Bafort, 1966)

■ *Adults.* Astigmatid mites with ambulacral stalk well developed, empodial claw and condylophores absent ; ventral tarsal seta *s* displaced proximally on all tarsi ; dorso-lateral tarsal seta *f* displaced proximally on tarsi III-IV ; solenidion ω2 of tarsus I elongate, situated on distal half of tarsus ; cuticle membranous or well-sclerotized ; sejugal furrow present or absent ; genital acetabula small, 1-segmented. Female oviporus shaped like an inverted V ; epigynium present or absent ; external bursa copulatrix absent. Male with para-anal suckers ; setae *d* and *e* of tarsus IV of male modified into suckers and displaced proximally.

Deutonymph. Gnathosoma with 0-2 pairs of setae ; solenidion α absent ; coxal setae I, III, IV absent ; without any remnant of anal setae or organs of attachment ; empodial claw present or absent ; leg chaetotaxy not strongly reduced. Endoparasitic in subcutaneous or visceral tissues of birds and mammals.

Neotytodectes new genus

■ *Adult.* Body well sclerotized, cuticle punctate ; sejugal furrow present ; a set of cuticular grooves on anterior opisthosoma ; coxal apodemes well developed, epimerites II and III present ; chelicerae well developed, dentate ; anus well developed ; body setae simple, short (except l_5), setae *ve* absent ; female with 4 pairs of anal setae ; seta *s* of tarsi I-IV large, spine-like.

Type-species : *Neotytodectes mexicanus* n. sp.

The generic name is derived from *Tytodectes*, a genus known only from deutonymphs parasitizing owls. Its gender is masculine.

Neotytodectes mexicanus n. sp.

■ *Female adult* (Holotype) : Idiosomal length 440, width 250 μm ; body slightly bilobed posteriorly ; a pair of longitudinal grooves dorsally extending from just posterior to sejugal furrow to level half-way between bases of setae d_2 and l_2, each groove with a lateral branch extending to anterior lyrifissure *ia* ; a second pair of grooves extends from sejugal furrow laterally and ventrally to junction of epimerites II and epimeres III. All dorsal setae short, simple, lengths 20-30, except seta l_5 elongate, length 130 ; setae *ve, scx* absent (Fig. 1). Epimeres I fused to form sternum ; epimeres II large, flattened ; epimerites II thin, weakly sclerotized, fused distally with epimeres III ; epimerites III short, fused medially with epimeres IV ; epigynium ovoid, weakly sclerotized ; oviporus length 83, basal width 70 ; copulatory opening small, situated directly behind well developed anus ; ventral setae filiform, lengths : *cxl* - 33 ; *cx3* - 26 ; *cx4* - 26 ; *gl* - 20 ; *g2* 20 ; *al* - 18 ; *a2* - 27 ; *a3* - 40 ; *a4* - 45 (Fig. 2). Legs relatively short, tarsal lengths (excluding pretarsi) : I - 50 ; II - 50 ; III - 75 ; IV - 90 ; leg chaetotaxy : trochanters 1-1-1-0 ; femora 1-1-0-1 ; genua 2-2-1-0 (in the holotype seta *nGIII* is missing on both sides, however, the presence of well developed setal alveoli in this position indicates the seta is normally present) ; tibiae 2-2-1-0 ; tarsi 11-10-8-8 ; solenidiotaxy : genua 2-1-1-0 ; tibiae 1-1-1-1 ; tarsi 3-1-0-0 ; tarsal setae *s*, *p* and *q* in the form of strong spines, other leg setae simple, filiform ; solenidion ω1 of tarsus I distinctly clubbed ; ω of tarsus II tapered apically ; ω2 and ω3 situated in apical third of tarsus 1 ; σ of genu III very short (Fig. 3-6).

Holotype female from the nest of a pigmy owl (*Glaucidium* sp.) (Aves : Strigiformes) ; MEXICO : Chiapas, 6 miles east of San Cristobal de Las Casas, 19 May 1969, J. E. H. MARTIN and E. E. LINDQUIST collectors. Holotype deposited in the Canadian National Collection, Ottawa.

DISCUSSION. Representatives of *Neotytodectes* differ from those of *Hypodectes*, the only other genus with described adult females, in the presence of a sejugal furrow, epimerites II and III, an epigynium, normally formed chelicerae

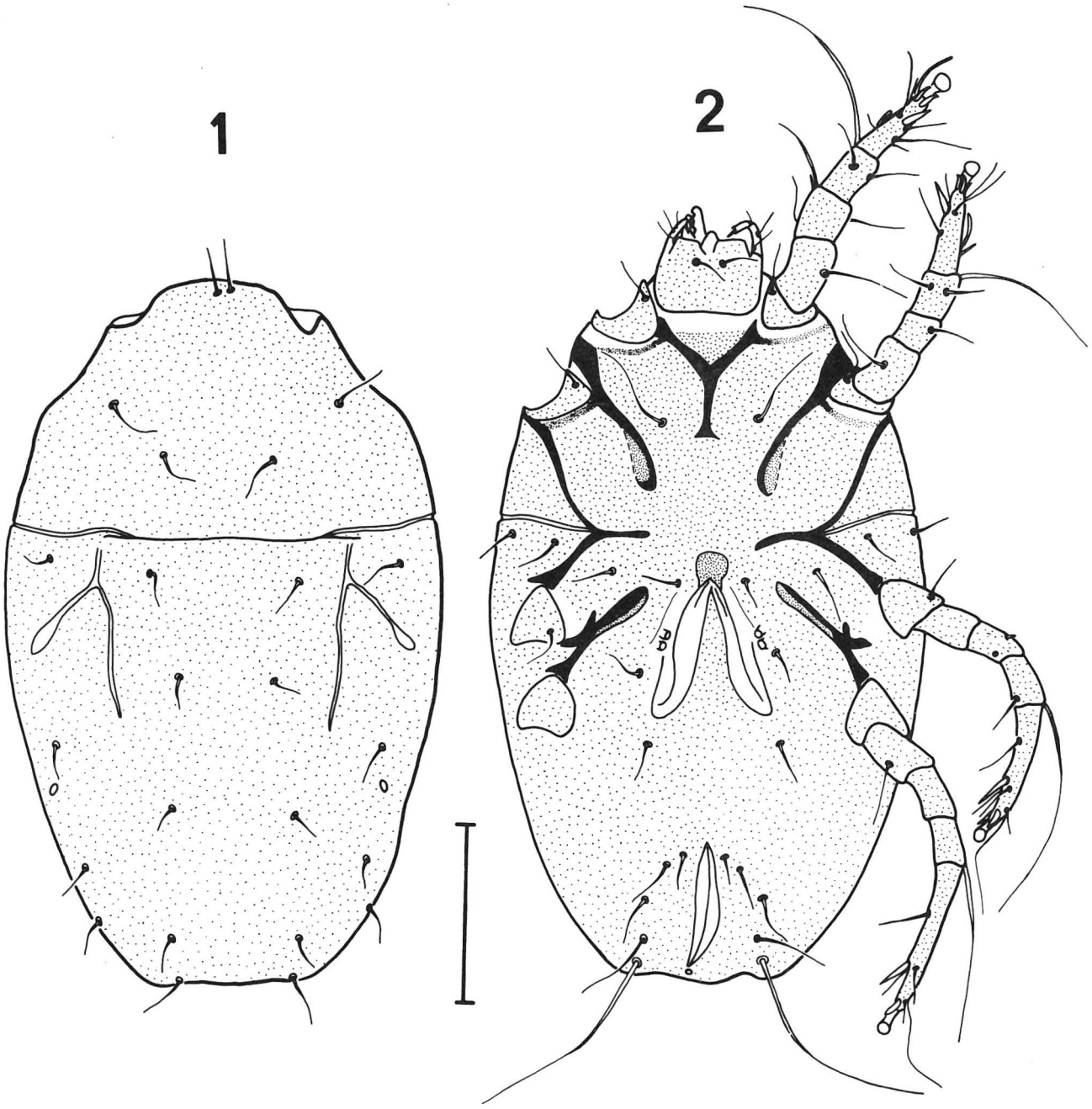

FIG. 1-2 : *Neotytodectes mexicanus* n. sp. female.
1. — Dorsum. 2. — Venter. Scale = 100 μm.

and a well developed anus, all plesiomorphic character states lost in the highly derived *Hypodectes*. Apomorphic character states present in *Neotytodectes* include the strong sclerotization of the cuticle, fusion of ventral apodemes and presence of cuticular grooves on the dorsum, states not present in *Hypodectes* or males of *Neottialges*.

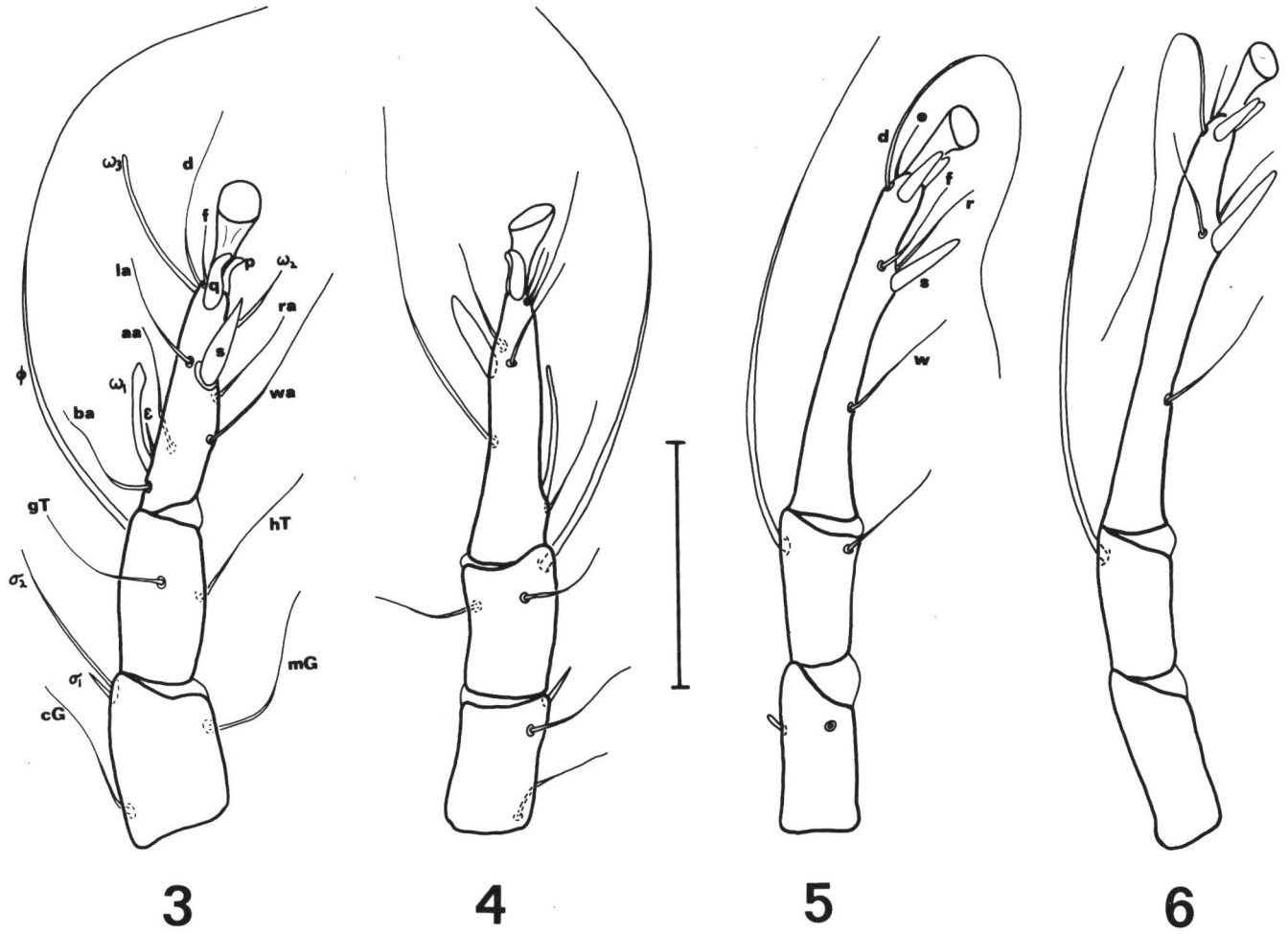

FIG. 3-6 : *Neotytodectes mexicanus* n. sp. female.
3. — Leg I. 4. — Leg II. 5. — Leg III. 6. — Leg IV. Scale = 50 µm.

Most genera of Hypoderidae show some degree of host specificity, with subgenera of mites often restricted to a single order of birds and species often restricted to a single family or group of host genera (FAIN, 1967 ; FAIN and BEAUCOURNU, 1972). The order Strigiformes (Owls) is host to only one subgenus of Hypoderidae, *Tytodectes* (*Tytodectes*). As the female described here as *Neotytodectes mexicanus* was collected from the nest of a strigiform bird, *Glaucidium* sp., this mite may represent the adult of a species of *Tytodectes* (s.s.), possibly *T.* (*T.*) ***glaucidii*** Černý, **1969**, which was described from deutonymphs collected from *Glaucidium siju* from Cuba. The heavy sclerotization of the cuticle in adult *Neotytodectes* is also present in deutonymphs assigned to *Tytodectes* (s.s.). However, in the interest of expanding knowledge of adult Hypoderidae, and in the absence of positively associated deutonymphs, I prefer to propose the new genus pending the rearing of species of *Tytodectes*.

There has been some recent confusion in the nomenclature and systematic position of the family Hypoderidae. The family was originally proposed by MURRAY (1877) as a subfamily of the Acaridae, with *Hypoderas* Nitzsch, 1861, as type-genus. *Hypoderas* Nitzsch is a junior objective synonym of *Hypodectes* Fillipi, 1861, as both are based upon the same type-species (FAIN, 1967). Unaware of the earlier designation of MURRAY, FAIN and BAFORT (1966) created the family Hypodectidae with *Hypodectes* Filippi as type-genus. FAIN (1968) noted this oversight and placed the family Hypodectidae Fain and Bafort as a junior objective synonym of Hypoderidae Murray. Other subsequent workers (ČERNÝ, 1969 ; PENCE, 1972) have recognized the validity of this synonymy. Recently, however, KRANTZ (1978) has revived the name Hypodectidae noting that it was equivalent in usage with the name Hypoderidae (*sensu* FAIN, 1969). This usage is a clear violation of the Law of Priority, as the name Hypodectidae was only in use for two years before the synonymy was noted, thus there does not seem to be any case for conserving Hypodectidae Fain and Bafort over Hypoderidae Murray.

The systematic position of the Hypoderidae is difficult to determine due to the few species known from adults and the strongly specialized deutonymphs. FAIN and BAFORT (1966) based their definition of the family upon *Hypodectes* (*Hypodectoides*) *propus* only, and did not compare it with any other family. The probable confusion of two species under this single species name by FAIN and BAFORT (1966, 1967) as indicated in the introduction, has added to the confusion concerning characteristics of the family.

FAIN and BAFORT (1967) compared *H. propus* with *Falculifer rostratus* (Buchholz) (Falculiferidae), a feather mite with which *H. propus* had been long confused. They noted numerous similarities between representatives of *H. propus* and free-living Acaridiae, notably the greater number of leg setae and solenidia, which were not present in *F. rostratus*. However, no specific comparison of *H. propus* with any family of free-living Acaridiae was made.

In the first attempt to show the systematic relationships of the Hypoderidae, KRANTZ (1978) included the family as a subfamily within a very wide and obviously polyphyletic concept of the Glycyphagidae. As KRANTZ did not note any specific morphological similarities between these two groups, this inclusion appears to be based primarily upon the subcutaneous habitat of the deutonymphs which is somewhat similar to the endofollicular habitats of certain mammal associated Glycyphagidae. However, when the character states of the adult mites are compared, it becomes apparent that the two are not closely related in a phylogenetic sense, and that similarities in the deutonymphs are a result of convergence due to similar parasitic adaptations. In particular, members of all true glycyphagid taxa share the following apomorphic character states not shared with members of the Hypoderidae : loss of para-anal suckers in the male ; loss of tarsal seta *aaI* ; and parallel mating orientation. Members of the Hypoderidae, on the other hand, possess modified tarsal suckers in the male, a derived character state shared with several other families of the Acaridiae, notably the Acaridae. This character state is also found in the family Glycacaridae, a monobasic family known only from the nests of procellariiform birds. *Glycacarus* also shares with the hypoderid genus *Neottialges* the derived character state of divided propodosomal sclerite in the males. I believe, however, that *Glycacarus* is probably not related to the Hypoderidae due to the retention of a number of plesiomorphic character states such as the presence of empodial claws and condylophores, and more importantly, the presence of certain derived character states such as the modification of tarsal seta *e* into a spine, a character state found only among the higher acarine and rhizoglyphine Acaridae. GRIFFITHS (1977) in erecting the family Glycacaridae, believed this group to be intermediate between the Acaridae and Glycyphagidae. Examination of his list of ancestral and derived character states, however, indicates that of the derived states listed for the Glycyphagidae and shared with *Glycacarus*, all can be found

in some genus of Acaridae. However, the derived states shared between *Glycacarus* and the Acaridae are all unique and cannot be found anywhere in the Glycyphagidae. This indicates that a more proper position for *Glycacarus* would be within the family Acaridae.

Of the two subfamilies of Hypoderidae, the Muridectinae, whose members are associated with desert-dwelling rodents and are not yet known as adults, show certain more primitive character states than mites of the bird-associated Hypoderinae. These states include presence of setae *ve*, retention of two pairs of gnathosomal setae, and retention of empodial claws on at least some pretarsi. These character states suggest the possibility that the bird-associated Hypoderinae are derived from ancestors which were mammalian parasites. On the other hand, the restriction of almost all Hypoderinae to non-passeriform bird hosts suggests a very early radiation of this group, indicating the possibility that the divergence of the Hypoderinae and Muridectinae occurred in the Mesozoic era between parasites of early mammals or their therapsid ancestors and early birds or their nest-building archosaurian ancestors. In conclusion, although it is not yet possible to provide even a comprehensive definition of the family Hypoderidae, let alone determine sister-group relationships between the subfamilies and genera, it is evident that the affinities of the Hypoderidae lie not with the Glycyphagidae as proposed by KRANTZ (1978), but elsewhere within the Acaroidea. *Glycacarus*, while sharing the same nidicolous habitat and certain morphological characters with the Hypoderidae, is also probably not closely related.

ACKNOWLEDGMENTS

This study was financed in part by a grant from the CanaColl Foundation, Ottawa, Canada. I thank Dr. Evert E. LINDQUIST, Biosystematics Research Institute, Agriculture Canada, Ottawa, for making this material available to me and for reviewing the manuscript.

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Paru en octobre 1981.