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

BY BARRY M. OCONNOR

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) eurajer 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 $\omega 2$ 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 of tarsus IV of male modified into suckers and displaced proximally.

Deutonymph. Gnathosoma with 0-2 pairs of setae; solenidion $\alpha$ 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 Tytodeetes, a genus known only from deutonymphs parasitizing owls. Its gender is masculine.

Neotytodectes mexicanus n. sp.

• Female adult (Holotype): Idiosomal length 440, width 250 $\mu$m; 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 $l_5$, each groove with a lateral extension 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 $l_1$, elongate, length 130; setae $ve$, $vex$ 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: $cx d - 33$; $cx 3 - 26$; $cx 4 - 26$; $gl - 20$; $g2 20$; $a1 - 18$; $a2 - 27$; $a3 - 40$; $ad - 45$ (Fig. 2). Legs relatively short, tarsal lengths (excluding pre-tarsi): I - 50; II - 50; III - 75; IV - 90; leg chaetotaxy: trochanter 1-1-1-0; femora 1-1-0-1; genua 2-2-1-0 (in the holotype seta $nG III$ 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; tarsi 3-1-0-0; tarsal setae s, $p$ and q in the form of strong spines, other leg setae simple, filiform; solenidion $\omega 1$ of tarsus I distinctly clubbed; $\omega$ of tarsus II tapered apically; $\omega 2$ and $\omega 3$ situated in apical third of tarsus 1; $\sigma$ 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: Neotyloctes 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*. Apomorophic character states present in *Neotytodectes* include the strong scler-
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 Fillippi, 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 Acaridae, 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 Acaridae 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 aal; 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 Acaridae, 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 Glycacaridae, 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.

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