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ASTIGMATIC MITES FROM NESTS OF BIRDS OF PREY IN U.S.A. I. DESCRIPTION OF FOUR NEW SPECIES OF GLYCYPHAGIDAE

A. Fain¹ and J. R. Philips²

----- **ABSTRACT** —Four new species and two new genera of Glycyphagidae (Acarina: Astigmata) are described and illustrated. These are *Dermacarus pilitarsus* sp. n., *Neoxenoryctes reticulatus* g. n. & sp. n., *Euglycyphagus intercalatus* g. n. & sp. n. and *Echimyopus orphanus* sp. n. All these new species were found in the nests of two birds of prey, *Falco sparverius* and *Otus asio*, both from Syracuse, N. Y., U. S. A. The genus *Euglycyphagus* forms a new subfamily Euglycyphaginae. -----

The mites described herein have been found by the junior author in the nests of the American Kestrel, *Falco sparverius* (Falconiformes) and the Screech Owl, *Otus asio* (Strigiformes), both from New York State. The mites were collected by means of a Berlese funnel. In all, two nests were examined, one from the Kestrel (24 June 1976) and ~~two~~^{one} from the Owl (3 March and 16 June 1976).

In the present paper we describe four new species of Astigmata which present a heteromorphic deutonymph (hypopus) in their life-cycle. Three of these species are represented only by the hypopi. The fourth species is represented by both adults and immatures including hypopial nymphs.

Amongst the four hypopi that we describe here, three are of the pilicolous-type. The hypopi of this type live normally in phoretic association with mammals, especially rodents. It is highly probable that they have been introduced in the nests with their mammalian-host, as the latter is normally a prey for the bird.

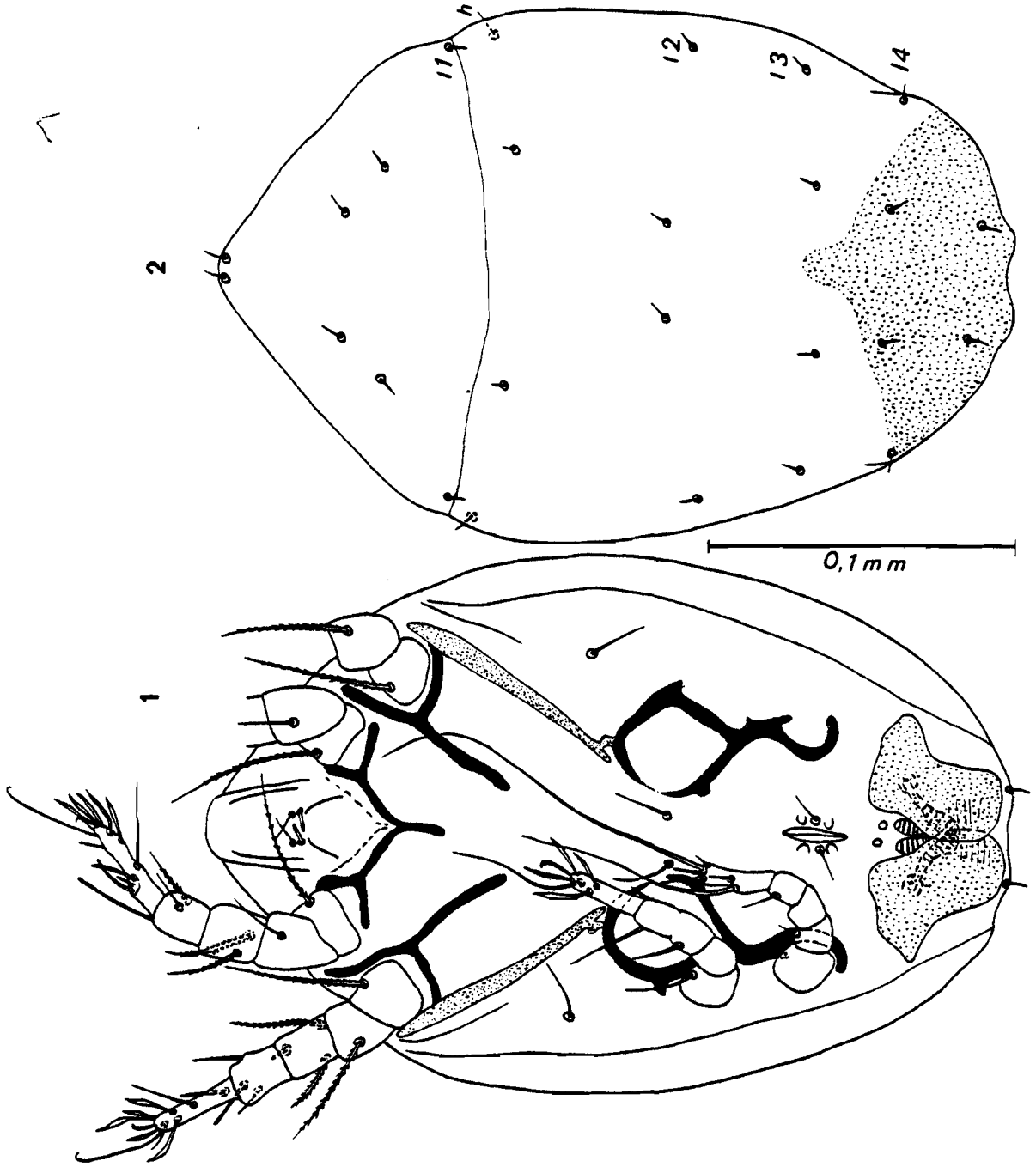
The holotypes of the new species have been deposited in the U. S. National Museum, Washington.

Family GLYCYPHAGIDAE Berlese, 1887
Subfamily GLYCYPHAGINAE Berlese, 1887
Genus *Dermacarus* Haller, 1878
Dermacarus pilitarsus spec. nov.

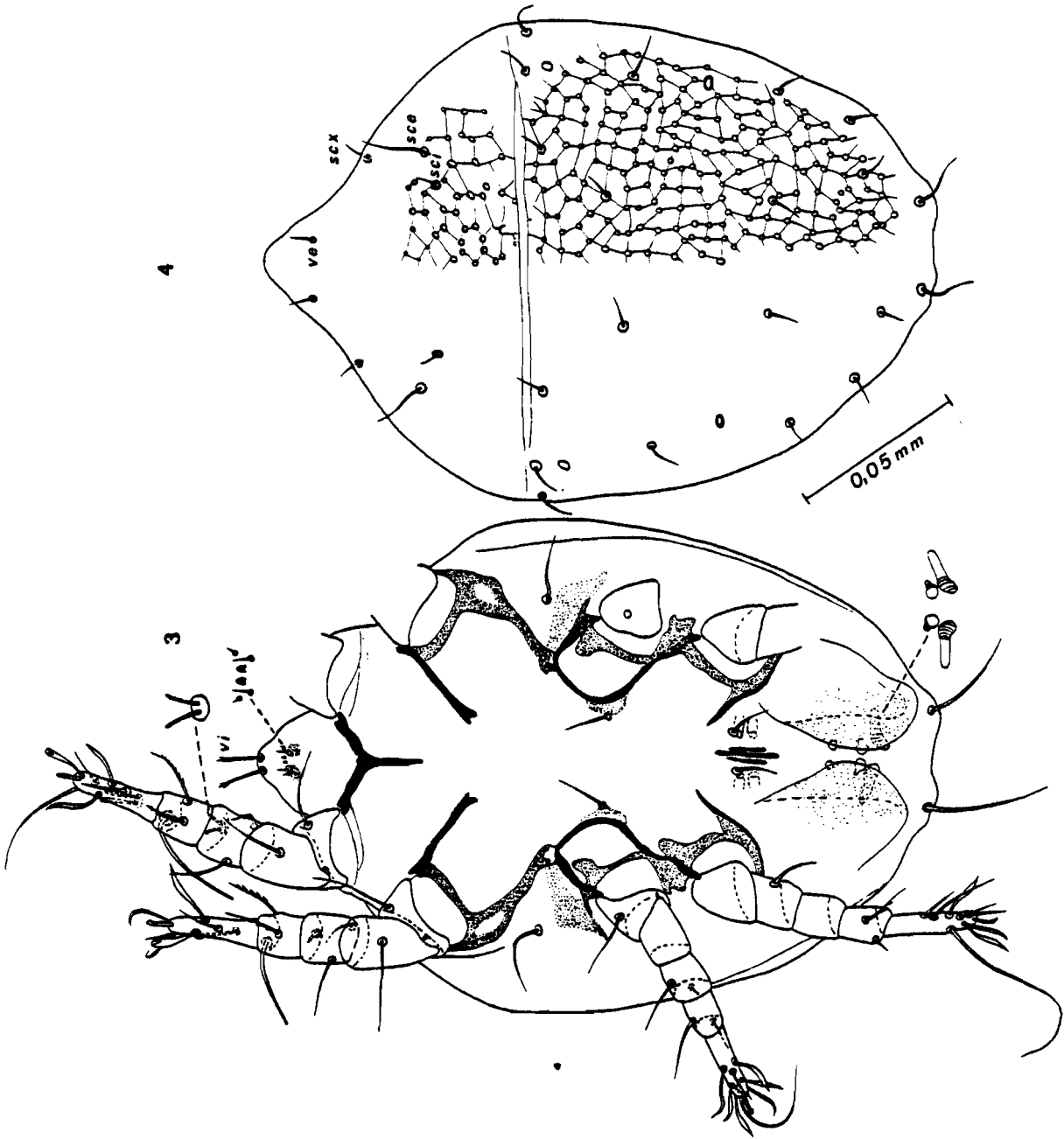
In this species the preapical dorsal seta of tarsi I-II is very thin, the solenidia ω_1 and ω_3 are situated in the basal third of the tarsus I, and the seta of femur I is bare and shorter than the seta of femur II which is barbed. It belongs to a small group containing two other species *D. ornatus* Fain, 1967 and *D. sylvilagi* Fain, 1969. It is clearly distinguished from these species by the great length of some tarsal setae and especially the apical and the basal setae of tarsus IV.

HYPOPUS (Fig. 1, 2, 21, 22) - Idiosoma 270 μ long and 180 μ wide. DORSUM- Cuticle poorly sclerotized and apparently without pattern except in its posterior part where a punctate area is visible. Dorsal setae short. Sejugal furrow poorly developed. VENTER- Epimerae I fused into an Y, other epimerae free. Clasping organ short, produced laterally. Internal claspers longer (12 μ) than wide (6 μ) with 5-6 ridges, external claspers with 7 ridges. Palposomal pair of setae and solenidia alpha relatively short. Tarsi I-IV 34 μ - 31 μ - 25 μ and 25 μ long. Tarsi I and

1. Institut de Médecine Tropicale, Nationalestraat 155, B-2000 Antwerpen, Belgium
2. State University of New York, Syracuse Campus



Figs. 1-2: *Dermacarus pilitarsus* sp. n. (Hypopus :Holotype)- 1. venter; 2. dorsum.



Figs. 3-4: *Neoxenonyctes reticulatus* sp. n. (Hypopus: Holotype)-3, venter; 4, dorsum.

with 8 setae. We have seen 6 setae on tarsus IV and 5 on tarsus III. The preapical setae of tarsi I- II are as long as the tarsi. On tarsi IV the apical seta is 120 μ long and the basal setae (situated in basal third) is 65 μ long. The seta of femur I is bare and 20 μ long, the seta of femur II is 35- 40 μ long and barbed. SOLENIDIA- Tarsus I with ω_1 slightly longer than ω_3 , both in basal half of tarsus.

HABITAT - Holotype and one paratype hypopus from the nest of a Kestrel, *Falco sparverius* Jamesville, N. Y., U. S. A., 24. VI 1976.

Subfamily LOPHUROMYOPINAE

Fain, 1967

Genus *Neoxenoryctes* gen. nov.

DEFINITION — This new genus known only from the hypopus is distinguished from *Xenoryctes* Zachvatkin, 1941 by the great reduction of the internal and the external claspers and the presence of only 6 setae on tarsi I and II. Other characters as in *Xenoryctes*.

TYPE SPECIES — *Neoxenoryctes reticulatus* sp. n.

Neoxenoryctes reticulatus spec. nov.

HYPOPUS (Fig. 3, 4, 15-17) — Idiosoma of the holotype 195 μ long and 140 μ wide. DORSUM - Sejugal furrow well developed; most of the dorsum covered by numerous small pits connected by lines and forming a network. Setae v *i* terminal, 12 μ long, setae v *e* and s *cx* less than 10 μ long. Setae s *e* longer than s *i*. Other setae thin and relatively short. VENTER - Epimerae I fused and Y-shaped. Epimerae III and IV fused. Clasping lobes poorly developed, the claspers are very small, almost vestigial, especially the inner claspers. Two pairs of very short and unequal palposomal setae and one pair of very short alpha solenidia. Legs I-IV well developed, with subequal claws. Chaetotaxy of legs (I-IV): Tarsi 6-6-8-8; Tibia 2-2-1-1; Genua 2-2-1-0; Femora 1-1-0-1. Solenidia of tarsi 2-1-0-0, of genua 2-1-1-0. Solenidia ω_1 and ω_3 on tarsus I situated in basal half of tarsus.

HABITAT — Holotype and 15 paratypes, all hypopi, from the nest of *Otus asio* of Syracuse, New York, U. S. A., 12. III 1976.

In the nest of this bird we also found several protonymphs, tritonymphs and adults which resemble the nymphs and adults of *Xenoryctes krameri* (Michael) (see Fain, 1969b) and which might belong to *Neoxenoryctes reticulatus*. We have, unfortunately, not found the molting stages which could enable us to describe the entire life-cycle of this species. In spite of the analogies existing in the adults, there are enough differences between the two species which warrant their separation into distinct genera. These adults will be described in a further paper.

Subfamily EUGLYCYPHAGINAE Subfam. nov.

DEFINITION — The adults are glycyphagid by most of the characters: the cuticle presents numerous and very small spinelet-like elevations, the dorsal setae are long and barbed and in the male there are no tarsal nor adanal suckers. However, the tarsi are not elongate and there are well developed tarsal claws carried by a short pretarsus and articulated by means of two very distinct tendons. The claw is almost completely enveloped by a large sucker. Such kind of ambulacrum is typically 'acarid-like'. Another character which does not correspond with either the Glycyphagidae or the Acaridae is the very anterior situation of the anus, close to the genital region. In the larva the Claparède organ is long. The hypopial deutonymph is of the entomophilic (acarid) type, with a large suctorial plate bearing 2 pairs of suckers.

TYPE GENUS — *Euglycyphagus* g. n.

SYSTEMATIC POSITION OF THE SUBFAMILY EUGLYCYPHAGINAE

The genus *Euglycyphagus* combines the characters of both families Glycyphagidae and Acaridae. However, we think that it is closer to Glycyphagidae. We propose, therefore, to place it in a new subfamily in the Glycyphagidae. It constitutes a link between these two families.

Genus *Euglycyphagus* gen. nov.
(From the Greek *Eu* = primitive, and *Glycyphagus*)

DEFINITION — With the characters of the subfamily.

TYPE SPECIES — *Euglycyphagus intercalatus* spec. nov.

Euglycyphagus intercalatus spec. nov.

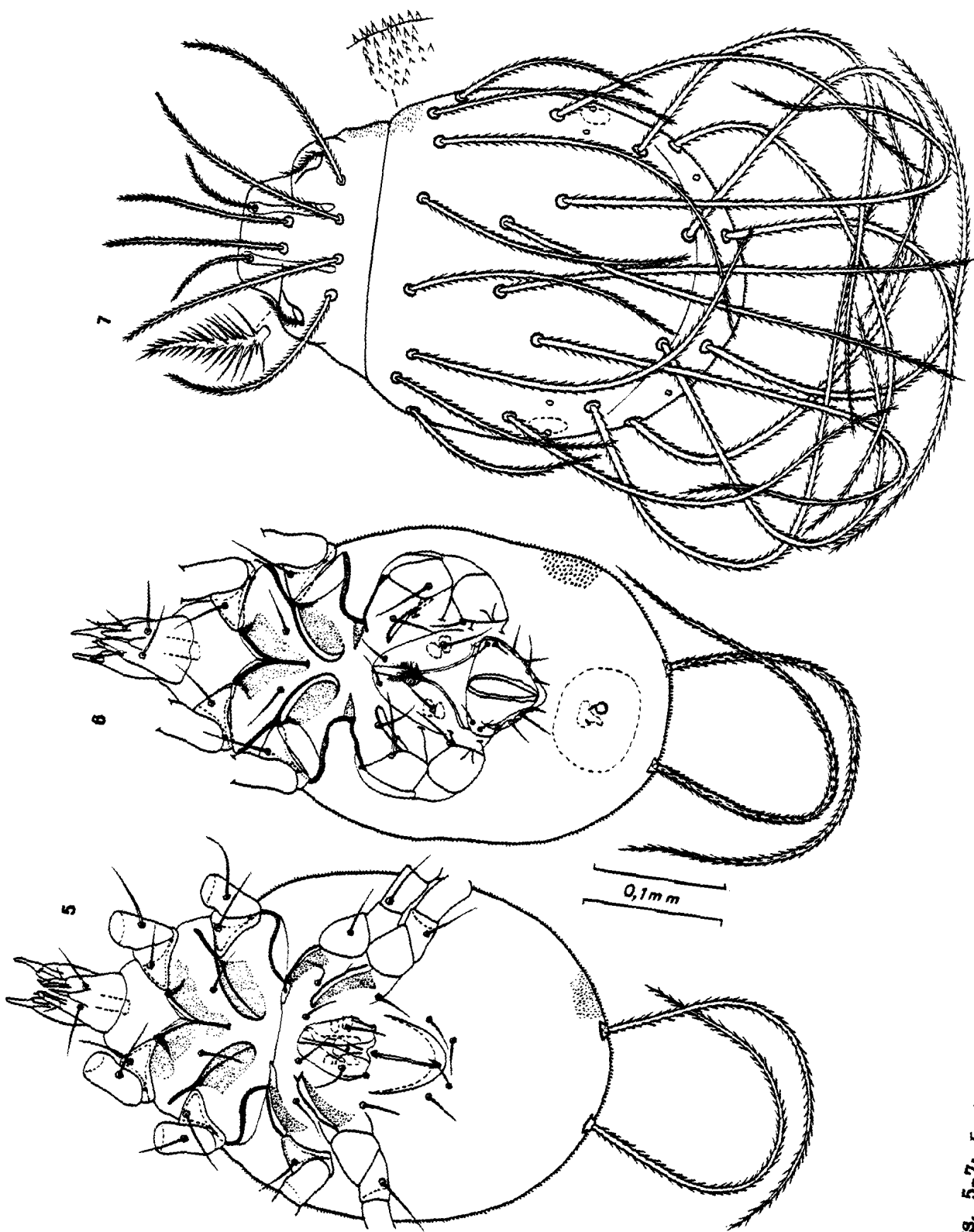
MALE (Fig. 5, 7-11) — The holotype 345 μ long and 259 μ wide (idiosoma). **DORSUM**-Cuticle with numerous cuticular and pointed elevations; the dorsal setae are long and densely barbed. The *v e* are situated on the anterior border of idiosoma and not far from the *v i* which are more posterior. Most of the dorsal setae are strongly recurved forwards. The longest setae (*d 3* and *l 3*) are approximately 450 μ long. The supracoxal seta is richly barbulate but not branched. **VENTER**- Epimera I fused into a Y; epimera II and IV free; epimerites II fused with the epimerae III. Genital organ situated at the level of the coxa IV, it is short and slightly recurved. Genital suckers well developed. The anal slit opens immediately behind the genital organ, it is surrounded posteriorly by a concave fold. There are 3 pairs of genital and 3 pairs of anal setae. Legs "acarid-like", the tarsi (I to IV) are 58 μ - 57 μ - 70 μ and 81 μ long respectively. Tarsal claws well developed, approximately 9 μ long and articulated with two tendons 7 μ long. A short fleshy pretarsus is present, apically it is folded into a sucker which envelops almost completely the claw. Adanal and tarsal suckers absent. Gnathosoma narrow, attenuated apically. Palps long and narrow. Chelicerae with long and narrow digits bearing a few poorly developed teeth only in their basal half. **CHAETOTAXY OF THE LEGS**- Tarsi I to IV with 10-10-8-8 setae; on tarsi I and II there are 3 very small apical or preapicoventral spines, 3 thin and short preapical setae and 4 thin and a little longer median setae. Tibiae 2-2-1-1. Genua 2-2-1-0. Femora 1-1-0-1. **SOLENIOTAXY**- Tarsus I with relatively short $\omega 1$ and $\omega 2$ situated approximately at the same distance from the base of the segment; $\omega 3$ apical. Tarsus II with a short $\omega 1$. Tibiae 1-1-1-1, all long. Genua 1-1-1-0.

FEMALE (Fig. 6)- Allotype 375 μ long (idiosoma) and 240 μ wide. **DORSUM**- As in the male. **VENTER**- Epimerae as in the male. Vulva in an inverted Y. Epigynium absent. The bursa is short and opens at half distance between anus and posterior extremity. Anus as in the male, immediately behind the genital slit. Gnathosoma and legs as in the male.

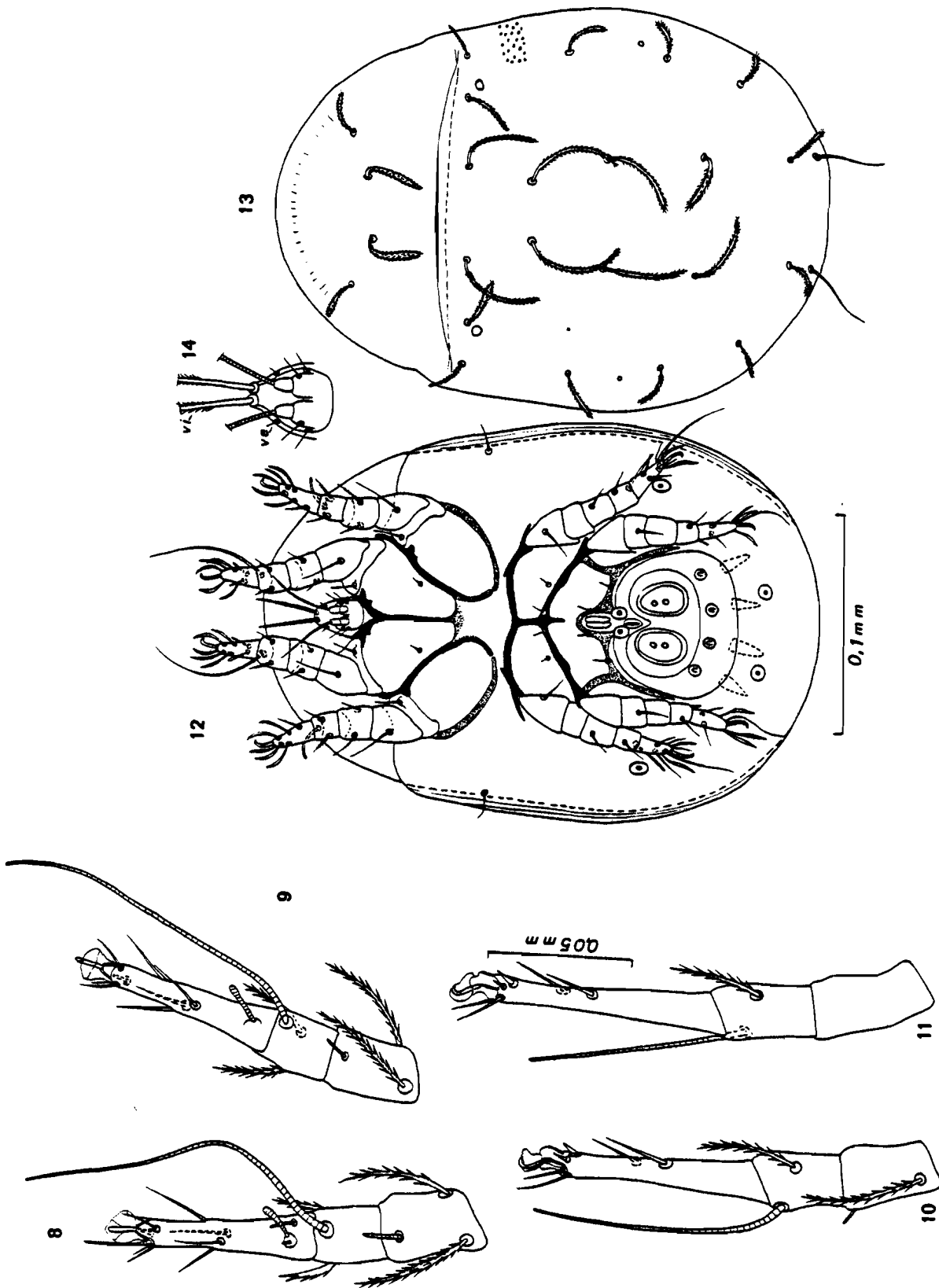
TRITONYMPH - Not observed.

PROTONYMPH - As in the female, but there are only two genital suckers, the chaetotaxy is less developed and the sexual organ are lacking. One of these protonymphs contains a well-developed heteromorphic deutonymph identical with that we describe hereunder. One of these protonymphs is 230 μ long and 150 μ wide (idiosoma).

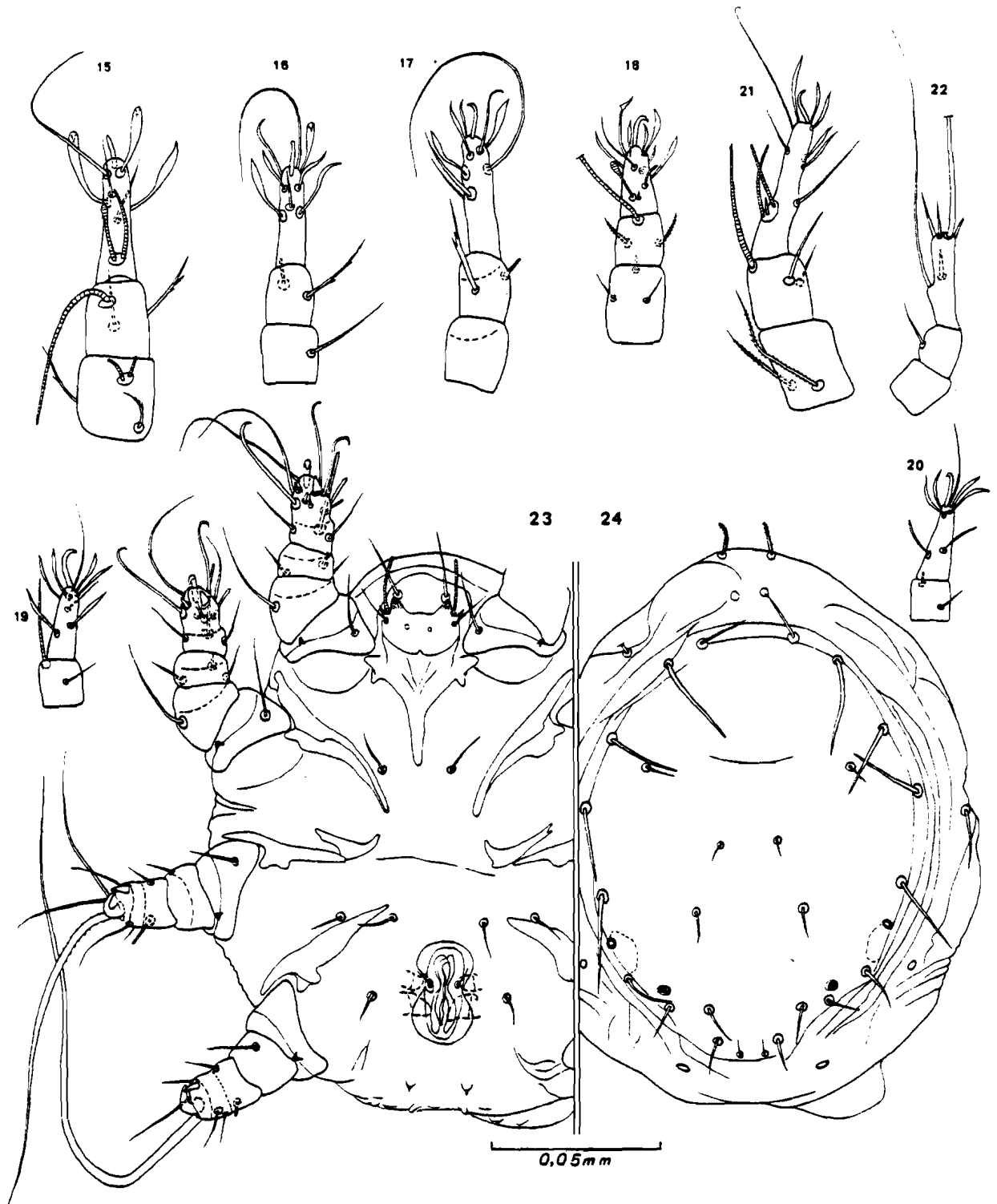
LARVA - One larva is 160 μ long (idiosoma) and 93 μ wide. Cuticular elevating very numerous but shorter than in the adults and rounded. Dorsal setae barbed but much shorter than in the adults and in the nymphs. Organs of Claperède long and cylindrical. Anus ventral, closer to the coxae III than to the posterior border of body.



Figs. 5-7: *Euglycyphagus intercalatus* sp. n. - 5, Holotype male, dorsum; 6, Allotype female, venter; 7, Holotype male, venter.



Figs. 8-14: *Euglycyphagus intercalatus* sp. n. -8, leg I; 9, leg II; 10, leg III; 11, leg IV (male); hypopus-12, venter; 13, dorsum; 14, palposoma and sclerite bearing the v i and v e.



Figs. 15-17: *Neoxenoryctes reticulatus* sp. n.-Apical segments of legs: 15, leg I; 16, leg III; 17, leg IV; Figs. 18-20: *Euglycyphagus intercalatus* sp. n.-Apical segments of legs: 18, leg I; 19, leg III; 20, leg IV; Figs. 21-22: *Dermacarus pilitarsus* sp. n.-Apical segments of legs: 21, leg I; 22, leg IV; Figs. 23-24: *Echimyopus orphanus* sp. n.-Holotype hypopus: 23, venter; 24, dorsum (Figs. 15-22: hypopus).

HYPOPUS (Heteromorphic deutonymph) (Fig. 12-14, 18-20)—Numerous hypopi are present in our collection, all identical with the hypopus contained in one of our protonymphs. By the shape of the body this hypopus recalls at first aspect *Ellipsopus ornatus* Fain and Ide, 1976, described from a beetle in U. S. A. However it is clearly distinct from it by the following characters: different structure of palposoma, presence of a sclerite bearing the $v\delta$ and $v\epsilon$ setae and situated close to the palposoma, different type of chaetotaxy on the dorsum (barbed - setae) and on the tarsi (foliate setae), oval shape of the body, narrow shape of legs and claws.

The length and width of the body in 4 paratypes are (in microns): 260 x 186; 255 x 180; 246 x 174; 240 x 180 respectively. Body broadly oval. Idiosoma prolonged forwards and covering the palposoma and the legs I-II except the tarsi. DORSUM- with poorly distinct punctation. Dorsal setae rather long and thick and barbulate except the h setae which is thinner and the $\ell 5$ which are bare. VENTER- Epimerae I fused in Y, the sternum is loosely connected with epimerae II. Epimerae and epimerites II fused. Epimerae III and IV fused forming coxal III fields wider than long. Epimerites IV less sclerotized than epimerae and fused in the midline in front of the genital orifice. Suctorial plate broad bearing a pair of very large and oval suckers and 4 posterior conoids disposed along a curved line. The anterior pair of suckers is very small and situated in front of the vestigial anus. Palposoma with a small base incompletely divided by a median incision, and presenting two small lobes bearing each a long solenidion alpha. The base bears two pairs of very small setae. Immediately in front of palposoma and in more dorsal position, there is a curved sclerite bearing the $v\delta$ and the $v\epsilon$. Legs relatively narrow, ending into a relatively long but narrow claw. Chaetotaxy of legs (I-IV): Tarsi 8-8-8-7, most of these setae are foliate. Tibiae 2-2-1-1. Solenidia: $\omega 1$ and $\omega 3$ situated in the basal half of tarsus I.

HABITAT - Holotype and 3 male paratypes, allotype and 1 female paratype, 20 hypopi, 25 protonymphs, 2 larvae, all paratypes, in the nest of *Otus asio*, Syracuse, New York, U. S. A. 12. III. 1976.

Additional paratypes (2 males, 41 protonymphs, 5 larvae) from the same nest.

Subfamily ECHIMYOPINAE

Fain, 1967

Genus *Echimyopus* Fain, 1967

Echimyopus orphanus spec. nov.

The subfamily Echimyopinae is represented so far by 2 genera and 7 species, all known only from the hypopial nymph and from Neotropical rodents (Echimyidae and Cricetidae) or Edentata (Dasypodidae).

The new species that we describe here has been found in the nest of a bird of prey. The true host is therefore not known but it may be surmized that it is rodent.

This new species belongs to the genus *Echimyopus*. It is clearly distinct from the other species of the genus by the great size of the dorsal shield extending until the posterior region of the body. In addition it is distinguished from *E. nyctomys* Fain by the much greater length of most of the setae of legs III.

HYPOPUS- (Fig. 23-24) — Length 165 μ , width 134 μ (idiosoma). DORSUM- With a large-shield, very poorly sclerotized, bearing unequal setae not barbed or with indistinct barbs. VENTER - as in *E. nyctomys* but the posterior pair of genital suckers is much larger than the anterior pair, and the setae $cx III$ and $g m$ are very thin (they are inflated in *E. nyctomys*). Legs as in *E. nyctomys* but the tibio-tarsi I-II are distinctly shorter and thicker and the long whip-like apical seta of tarsus IV is not barbed. Palposoma as in *E. nyctomys* but relatively wider and with two antero-lateral projections less divergent.

HABITAT - Holotype hypopus and two paratypes from a nest of *Otus asio*, Syracuse, 12 March, 1976.

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ADDENDUM: Phoretic relationships between *Euglycyphagus intercalatus* sp. n. and beetles of the genus *Trox*.

A total of 115 hypopi of *E. intercalatus* were found on elytra, abdomen and pronotum of a specimen of *Trox variolatus* (Trogidae) from the Screech owl nest. In addition, we found 12 specimens with these mites on several *Trox* spp. (*Trox aequalis* from Kansas; *Trox loxus* from Mexico; *Trox monachus* from Missouri; *Trox scaber* from Brookline, Mass. squirrel nest; *Trox tytus* from Broomhall, Penn., Barn owl nest, and Baragua, Cuba). All these specimens of *Trox* spp. that we have examined (2328 specimens) belong to the collection of the Museum of Comparative Zoology at Harvard. Infestations of these specimens ranged from 1 to 27 hypopi, mainly on the abdominal segments, elytra and pronotum. The Trogidae, or skin beetles, are very commonly found in bird and mammal nests, on owl pellets, and on carcasses (Vaurie, 1955: Bull. Am. Mus. Nat. Hist., 106:1-89.).
