# A NEW *MACRONYSSUS* SPECIES, PARASITIC ON THE SILVER-HAIRED BAT IN NORTH AMERICA [1]

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The species of Macronyssidae described here was first available to us in a collection of females and a nymph. We hesitated to describe it from that material because only the appearance of the sternal glands consistently distinguishes the female from the range of populations included in *Macronyssus crosbyi*. Males and additional females and protonymphs were collected subsequently. The unusual nature of the spermatodactyl of the males confirms the distinctness of this form from all described species of *Macronyssus*.

We are grateful to the Field Museum of Natural History and to Dr. E. W. JAMESON, Jr., of the University of California at Davis, for providing the initial collection.

Superfamily Dermanyssoidea Kolenati.
Family Macronyssidae Oudemans.
Genus *Macronyssus* Kolenati.

**Macronyssus macrodactylus** sp. nov.

*Diagnosis* : In female, the pair of sternal glands with finely granular surface and each contained within closed cells formed by anterolateral sculpturing of sternal plate.

In male, spermatodactyl greatly hypertrophied ; measured from base of chelae, about 70 μ or more in length, longer than second cheliceral segment, and nearly three times as long as dorsal arm of movable chela or fixed chela.

Female dorsal plate with 28 setal pairs. Sc-$D_3$ ratio, 2-2.5 : 1. Unarmed opisthosomal venter of female with some 50-70 setae on each side. Ventral setae uninflated. Caudal setae of female subequal and largest about 30 μ. Fixed chela of female with 2 ventral spines. Female, male, and protonymph with ventral ridges distinct on coxae II and III.

1. This study was supported in part by Research Grant AI-07337 from the National Institute of Allergy and Infectious Diseases, U. S. Public Health Service, by Research Grant GB 020087 from the National Science Foundation (to F. J. R.), and by Terminal Predoctoral Fellowship 1-FI-GM-23, 471-01 (to A.J.B.) from the National Institute of General Medical Sciences, U. S. Public Health Service.

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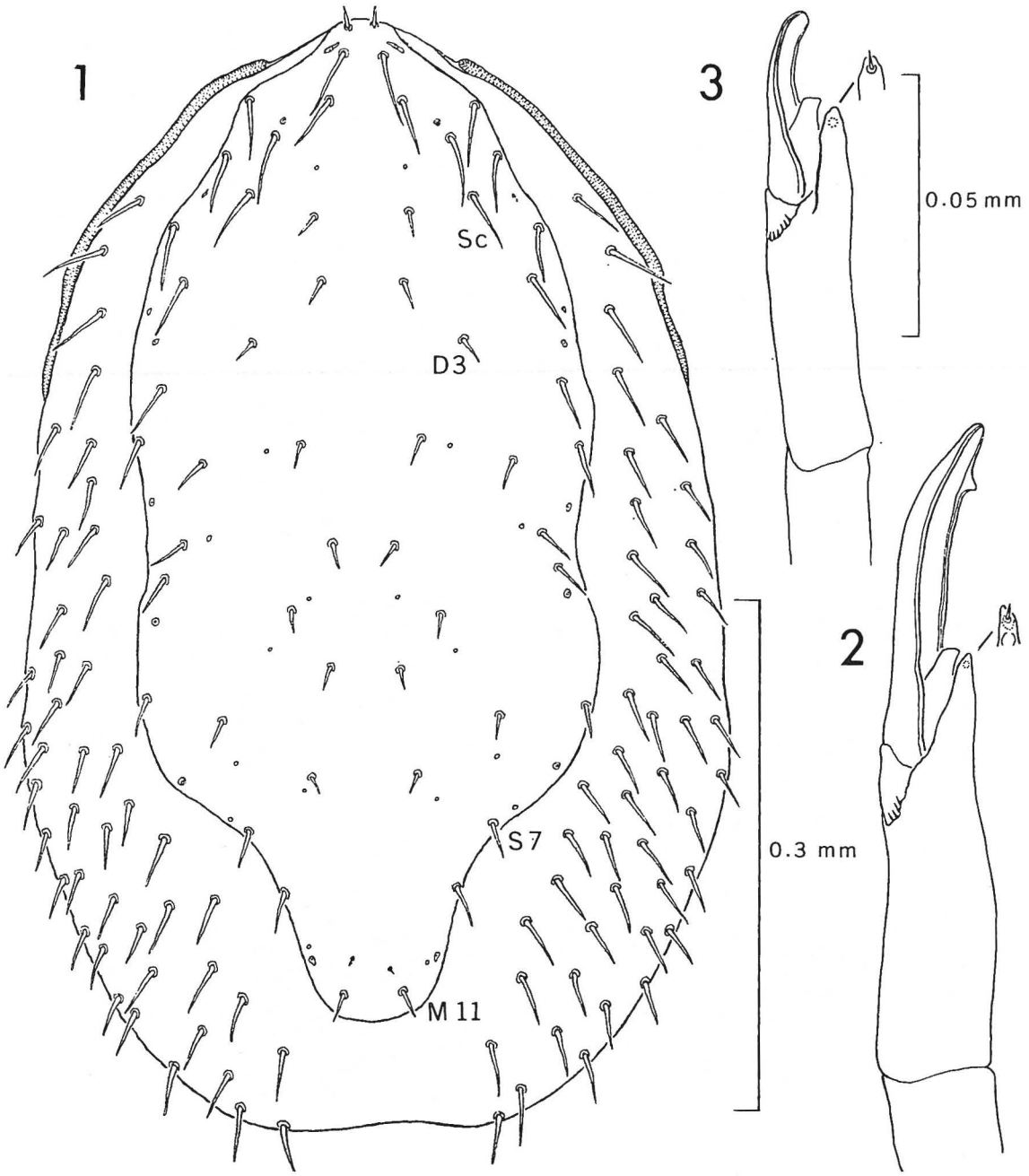
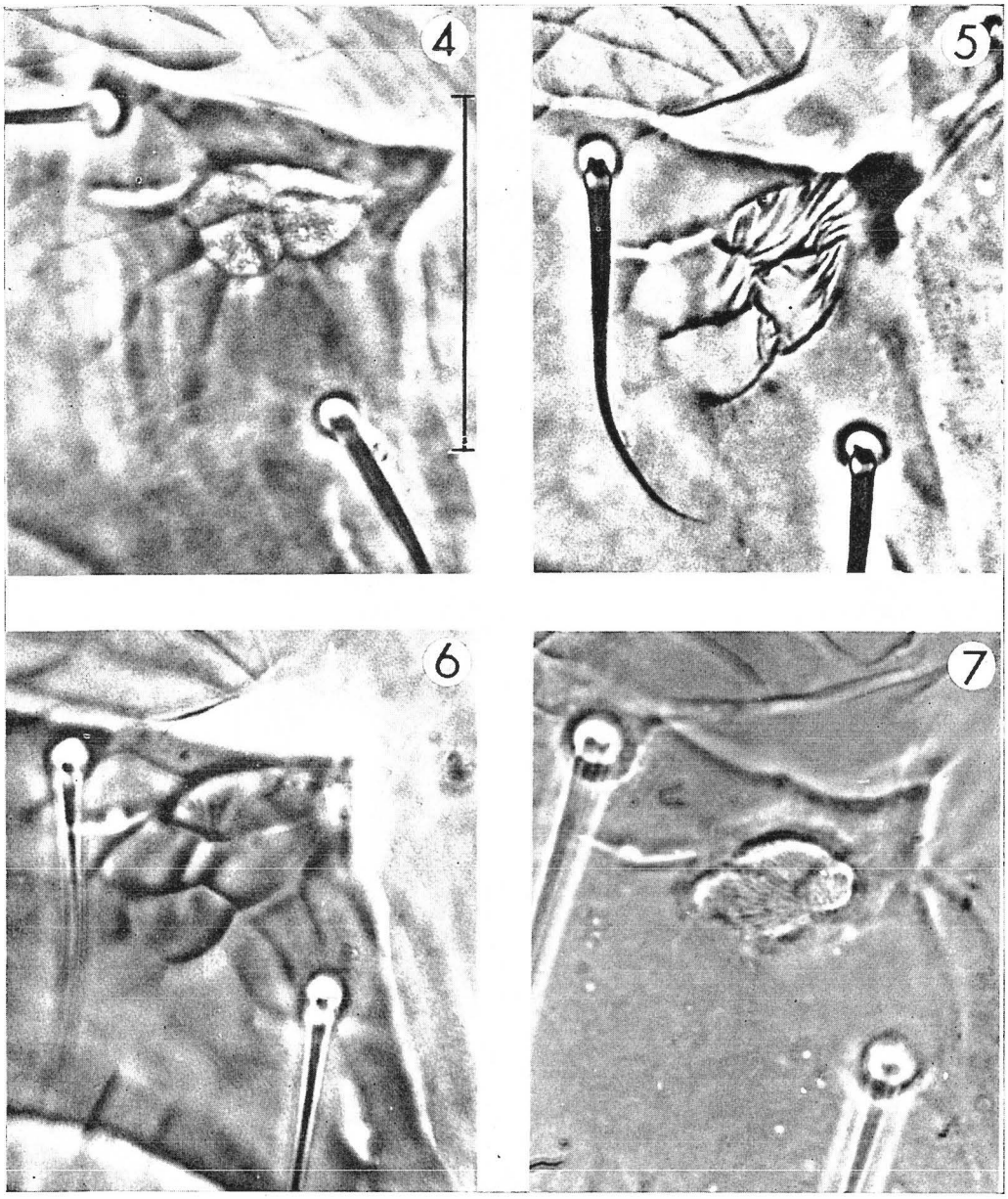



FIG. 1 : *Macronyssus macrodactylus*, sp. n., dorsum of female idiosoma.

FIG 2 : *M. macrodactylus*, male chelicera, dorsolateral view (same scale as Fig. 3).

FIG. 3 : *M. crosbyi* Ewing and Stover, same.




FIGS. 4-7 : Anterolateral portion of female sternal plate with sternal gland, micrographs with phase contrast. (Scale on Fig. 4 equals 50 μ ; other figures to roughly the same scale.)

4. — *Macronyssus macrodactylus*, sp. n. 5. — *M. crosbyi* Ewing and Stover, southern type from Panama.
6. — *M. crosbyi*, northern type from California (fewer striae on folds in sternal gland than typical).
7. — *M. diversipilis* Vitzthum.

*Female* : Dorsal plate (Fig. 1) with 28 setal pairs, including minute $S_8$ (clunals) ; ratio of setae Sc to setae $D_3$, 2-2.5 : 1 ; marginal setae near posterior end of plate in order from longest — $M_{10}$, $S_7$, $M_{11}$ ($S_7$ occasionally subequal to $M_{11}$ or even smaller). Sternal plate with sculpturing restricted to anterior lateral regions and forming approximately 4 closed cells on each side ; these cells, with a uniform finely granular surface, comprise the sternal glands (periphery of gland more pronounced than internal margins of cells) (Fig. 4). Setae of pair $St_1$ extend to moderately arched posterior margin of sternal plate. Epigynial plate with scale-like anterior sculpturing moderately distinct ; in addition to usual pair of genital setae, with 2 paired setae and one unpaired seta associated with weakly sclerotized margin around posterior tip of plate. Anal plate with anterior margin moderately rounded. Adanal and postanal setae subequal in length but postanal stouter. Unarmed venter with some 50-70 setae on each side. All ventral setae without basal inflation. Caudal setae subequal, distinctly shorter than ventral setae. Peritreme terminating over coxa I. Ventral ridge of coxa II with lateral arm forming right or acute angle with transverse arm ; latter weakly or moderately curved. Ridges on coxae II and III with hyaline margin narrow or imperceptible.

Tibia I length-width ratio less than 1.5 : 1. Leg chaetotaxy normal for genus ; segments through tibiae holotrichous, except for extra seta on tibia IV making total of 10 setae on this segment (setation of each segment through tibiae of legs I-IV : coxa — 2, 2, 2, 1 ; trochanter — 6, 5, 5, 5 ; femur — 13, 11, 6, 6 ; genu — 13, 11, 9, 10 ; tibia — 13, 10, 8, 10) ; tarsi II-IV each normally with 18 setae, but one or the other of the fine distal dorsal setae (ad1 and pd1) may be hidden by ambulacrum or even absent in some specimens. Sensory area of tarsus I with setal form and proportions typical of *M. crosbyi* group (e. g., *M. crosbyi* or *M. longisetosus*).

Deutosternal groove with about 7-10 teeth in single file. Internal transverse ridges of hypostome weak but evident. Palpal trochanter with distal seta only slightly smaller than proximal seta. Fixed chela with 2 ventral spines about equally developed. Movable chela with tip narrowly truncate and notched ; dorsal ridge moderately produced into spine-like process.

Measurements (11 specimens) : Dorsal plate L., 610 (580-635). Sc, 38 (31-41). $D_3$, 17 (15-19). $M_{11}$, 22 (18-28). $St_1$, 50 (45-55). Anal plate L., 135 (124-145). Anal plate L. to postanal seta, 85 (78-92). Anal plate W., 82 (80-86). Longest caudal setae, 31 (29-33). Tarsus I L., 83 (80-91).

*Male* : Without any unusually long setae on idiosoma or legs. Dorsal plate with 29 setal pairs (including $M_1$ on anterolateral margins of plate and other setae as in female) ; Sc-$D_3$ratio, 2.1-2.4 : 1 ; tip of plate weakly projecting over unarmed integument ; of 3 pairs of marginal setae near tip of plate, $M_{10}$ longest, $S_7$ intermediate, and $M_{11}$ shortest. Ventral armature entire (not interrupted by striate integument) but more weakly sclerotized between genital and ventral regions. Sternogenital region not joined to endopodal plate in region of coxae III and IV ; 3 anterior pairs of sternal setae each extending to level of trichopores of following setae. Ventral region of plate only slightly dilated, bearing about 20-24 setae ; very weak constriction between ventral and anal regions. About 24-30 setae on each side of unarmed opisthosoma (not including those on caudal margin). Caudal setae approximately equal to longest ventral setae in length, stiff and needlelike ; more median setae on margin generally a little longer than lateral setae. Peritreme ending over coxa II anterior margin ; peritremal plate joined to dorsal plate about level of $ET_2$. Ventral ridges on coxae II and III ; ridge on coxa II with lateral and transverse arms forming acute angle. Leg setation as in female. Spermatodactyl (Fig. 2) enlarged, while fixed chela and dorsal arm of movable chela are similar in size and form to other *M. crosbyi* group species ; spermatodactyl longer than second cheliceral segment and nearly 3 times as long as fixed

chela or dorsal arm of movable chela (when each is measured from base of movable digit), weakly curved with curvature increasing in distal third, with blunt process on margin of dorsal groove near tip ; dorsal arm of movable chela with slight hook at tip.

Measurements (3 specimens) : Dorsal plate L., 470 (455-480). Sc, 36 (33-38). $D_3$, 16 (14-18). $S_7$, 29 (26-33). $M_{10}$, 35 (32-37). $M_{11}$, 21 (16-27). Longest caudal setae, 32 (31-33). Tarsus I L., 70 (69-72). Cheliceral L., from base of second segment to tip of spermatodactyl, 130 (129-132). Spermatodactyl L., from base of movable chela, 72 (71-73).

*Protonymph* : Idiosoma with 38.5 setal pairs (formula [1] : *10*, 7, 12, *3*, *1.5*, 4, 1), short or moderate in length. Podosomal plate without reticulate sculpturing but with areolate pattern ; Sc-$D_3$ ratio, 2.3-2.7 : 1. Pygidial plate with distinct anterior protrusion ; not sculptured ; $D_7$ and $D_8$ minute, no longer than $S_8$ ; surface of sternal plate with reticulate sculpturing, distinctly seen under phase contrast but only faintly with bright field illumination. Peritreme constricted near tip. Ventral ridges on coxae II and III ; lateral arm relatively broad and ending well back of ventral articulating process of coxa. Chelicera as in female.

Measurements of the 4 available specimens fall into 2 groups, 1 larger (presumably female) and 3 smaller (presumably male) ; measurements are given for the larger individual first, followed by a range for the 3 others : podosomal plate L., 212, 187-190. $F_3$, 28, 26-28. T, 34, 32-36. Sc, 31, 27-29. $D_3$, 13, 10-12. Pygidial plate W., 103, 90-94. $D_{7-8}$, 2-4. $M_{11}$, 37, 28-30. $St_1$, 42, 32-37. Adanal setae, 20, 16-17. Postanal seta, 26, 20-22. Stigma and peritreme L., 49, 41-46, except one compressed about 50. Caudal setae, 28, 21-25. Tarsus I L., 55, 50-51. Leg I L., 255, 225-235.

*Type series.* Holotype female, allotype male, and 3 female, 2 male, and 2 protonymphal paratypes ex *Lasionycteus noctivagans*, Davis, Yolo County, California, 21 September 1964, A. J. Beck ; 4 female paratypes and 1 protonymphal paratype (with large measurements) from a separate host with same data as type ; 3 female paratypes and 1 protonymphal partype ex *L. noctivagans*, Chicago, Illinois, 20 August 1946, E. S. Abbey.

The holotype, allotype, and 2 females, 1 male, and 3 protonymphs from the paratypes are deposited in the U. S. National Museum. Other paratypes are in the collections of the Field Museum of Natural History, Dr. E. W. Jameson, and the authors.

The species name, *macrodactylus*, refers to the enlarged spermatodactyl.

## Discussion :

*M. macrodactylus* belongs to the largely Holarctic *M. crosbyi* group of species (Radovsky, 1967), and is perhaps closest to the American *M. crosbyi* (Ewing and Stover). The latter species has been collected from Alaska to southern Brazil, and the morphological variation found within this range suggests a species complex. *M. macrodactylus* is most similar to the more northern populations of *M. crosbyi* (represented by the type series from Missouri and other material from Pennsylvania to California and northward into Canada and Alaska), e. g., with respect to absolute and relative lengths of setae, number of ventral opisthosomal setae, and fusion of male ventral armature. The female dorsal plate length of the new species (580-635) is greater than that of

1. The formula gives setal pairs as follows (with those on plates italicized) : podosomal plate, pygidial plate, unarmed dorsum, sternal plate, anal plate, unarmed venter (except near caudal margin), caudal margin of venter.

nearly all material included in *M. crosbyi* (505-595). Both female and male are easily distinguished from *M. crosbyi*, by the sternal glands and the spermatodactyl respectively (Figs. 2-6). No reliable features were found to differentiate the protonymphs of the two species.

*M. diversipilis* Vitzthum found in Europe is the only species with sternal glands (Fig. 7) similar in appearance to those in *M. macrodactylus*. This resemblance may be superficial, since extremely fine striae are often detectable on the surface of the glands in *M. diversipilis*. All stages of this species differ from *M. macrodactylus* in the absence of setal pair $D_8$ (27 pairs on female dorsal plate, 28 pairs on male dorsal plate, and 6 pairs on protonymphal pygidial plate). *M. ellipticus* Kolenati, also from Europe, is the only other *Macronyssus* species in which development of the spermatodactyl is greatly exagerated ; in fact, the structure is remarkably similar in the 2 species. *M. ellipticus* is dissimilar in many respects to *M. macrodactylus*, e.g., multiple teeth at a number of levels of the deutosternum, reduction in setae of the dorsal plate, and termination of the peritreme over coxa II. Undoubtedly the similar chelicerae in the males are due to parallel or convergent development.

The collection of this species from *Lasionycteris noctivagans* at sites nearly 2,000 miles apart suggests a high level of specificity for this host. Some frequently collected forms in the *M. crosbyi* group are known to be species specific, e. g., *M. jonesi* White [1] on *Myotis grisescens* and *M. flavus* Kolenati on *Nyctalus noctula*. The silverhaired bat, *L. noctivagans*, lives in wooded areas and roosts in tree holes. They are occasionally found roosting in caves in close proximity to species of *Myotis*. While the degree of contact with *Myotis* spp. has not been determined, parasite interchange has never been reported. The roosting habits of *L. noctivagans*, usually away from other bat species, might allow for parasite speciation by ecological isolation.

## LITERATURE CITED

RADOVSKY (F. J.), 1967. — The Macronyssidae and Laelapidae (Acarina : Mesostigmata) parasitic on bats. — Univ. Calif. Publ. Ent., **46** : 1-288.

WHITE (J. S.), 1966. — *Ichoronyssus jonesi* n. sp. (Acarina : Dermanyssidae) from the cave-dwelling bat, *Myotis grisescens* Howell. — Acarologia, **8** : 566-575.

1. *Macronyssus jonesi*, new combination for *Ichoronyssus jonesi* White, 1966 (= *Macronyssus*, n. sp A of RADOVSKY, 1967).