NYCTERIGLYPHUS BIFOLIUM n. sp., A NEW CAVERNICOLOUS MITE ASSOCIATED WITH BATS (CHIROPTERA) (ACARINA : GLYCYPHAGIDAE) [1]

BY

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Dr. Denny CONSTANTINE, of the Southwest Rabies Investigation Station, University Park, New Mexico, recently sent the writer a very large series of a tyroglyphid mite from Frio Cave, a well known bat cave in South central Texas. As far as the writer has been able to determine, the mite is new and is accordingly described below.

My sincere thanks to Dr. CONSTANTINE for sending me this distinctive mite for determination.

Nycteriglyphus bifolium n. sp.

Figs. 1-15.

Approximately 340 microns long ; sexual dimorphism slight ; dorsal setae flattened and with three to four serrations ; ventral setae smooth, whiplike. All stages are scaly ; on the dorsal side this extends from the propodosomal shield posteriorly and on the ventral side only on each side of the anal region. Genu I has dorsally two solenidia and one branched seta ; the genua of all legs have two sclerotized spots on dorsal apex ; each tarsus has three apical spurs ventrally and a very long, smooth, whiplike seta dorso-apically. The male genitalia lies between coxae IV ; female genitalia between coxae II and III ; protonymph and deutonymph genitaliae between coxae III and IV. Female with a *bursa copulatrix* ending in a spine that curves ventrally. Nympha I has one pair of genital suckers ; nympha II, male and female have two pairs. Male lacks anal and tarsal suckers. All stages, including the hexapod larva, have a pair of smooth posterior setae which are whiplike and as long as, or longer than, the body. Apodemes I join to form a distinct sternum. The propodosomal shield is distinct and obscurely pentagonal ; the lightly plumed setae *v e* are on the anterolateral margins (Fig. 11) ;

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the large, flattened, sparsely serrated setae *v i* are distinctly posterior to *v e* except in the larva, where they are nearly in a straight line.

The supra coxal seta is two-tined and smooth ; trochanters I and II of the male, female, and nympha II each with a plumed seta on inner margin ; this seta lacking in nympha I and larva.

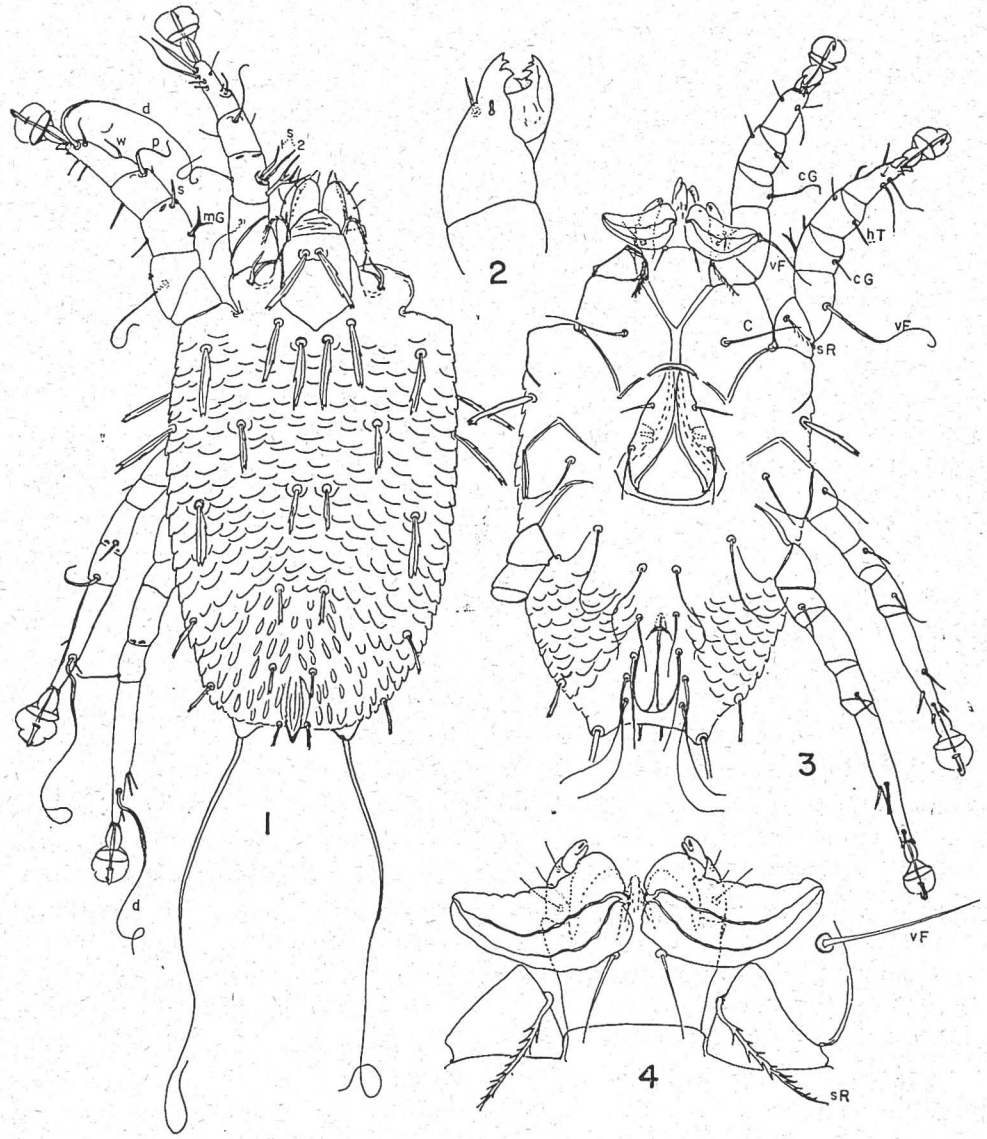

FIG. 1. Dorsal view of female. — FIG. 2. Chelicera. — FIG. 3. Ventral view of female. — FIG. 4. Ventral view of gnathosoma, showing the trochanters. C = coxal seta ; *c*G = ventral seta of the genu ; *d* = dorsal apical seta of the tarsus ; *h*T = ventral seta of the tibia ; *p* (phi) = solenidion of the tibia ; *s* (sigma) = solenidion of the tarsus ; *s*R = pectinate seta of trochanter ; *v*F = ventral seta of femur ; *w* = solenidion of tarsus.

Gnathosoma (Figs. 4, 11). The pedipalp has three movable segments, the middle segment bears two dorsal and one ventral hair-like setae, and the apical segment has an indistinct thumb-claw apparatus. The chelicerae (Fig. 2) are three segmented and stout, with a hair-like mandibular spine (seta). Both arms of the chela are strongly toothed. Ventrally the gnathosoma has a pair of medial hair-like setae and *a pair of very large, leaf-like somewhat fleshy, two-veined setae.* Under the best optical conditions, these enlarged setae appear to be finely and closely cross-striated.

Female (Figs. 1-4, 10, 10 *a*, 15). About 330 microns long. Two pairs of genital setae ; genital folds distinct. Apodemes I join to form a sternum, which joins the transverse epigynium ; apodemes II bend sharply forward and almost connect with the epyginium. Four pairs of anal setae, of which all but the anterior pair extend beyond the margin of the body. The *bursa copulatrix* is tubular and curves ventrad. (Figs. 10, 10 *a*).

Chaetotaxy of the legs (Figs. 1, 3). Leg I. Tarsus I (see also Fig. 15) : famulus and solenidion 1 near base ; solenidion 1 somewhat curved and much shorter than the straight solenidion 3 ; seta *d* long and whiplike ; ventrally, two large apical and one smaller subapical claws. Tibia I : solenidion apical, whiplike ; one ventral and one marginal seta. Genu I (see also Fig. 11) : two sclerotized spots on dorsal apex, of which the inner is larger and kidney shaped ; solenidion 1 shorter than 2 and both near the middle of the segment ; seta *m*G is branched ; ventral seta *c*G is smooth and flexible : Femur I (see also Fig. 4), has only one seta, *v*F, which is smooth, long, and flexible. Trochanter I (see Fig. 4), has a pectinate seta, *s*R. Coxa I ; the ventral coxal seta is smooth, long, slender and straight ; the supra coxal seta (Fig. 11) is two-tined, with the tines of equal length.

Leg II. Tarsus II : seta *d* whiplike, about as long as the apical three segments of the leg ; solenidion basal, bent ; apical claws as on leg I. Tibia II : solenidion whiplike, longer than the genu but much shorter than seta *d* of tarsus II ; ventral seta *h*T straight, heavier than ventral seta *c*G. Genu II : two apical sclerotic spots, with a straight, short solenidion between them ; seta *m*G branched, but with fewer branches than *m*G of leg I. Femur II : seta *v*F smooth, whiplike, longer than genu and femur combined. Trochanter II : seta *s*R pectinate. No coxal seta.

Leg III. Tarsus III : with three very small apical spurs ; seta *d* very long and whiplike. Tibia III : solenidion not much longer than the tibia ; one ventral seta. Genu III : with two sclerotic spots separated by a straight, short solenidion ; one mid ventral seta. Femur without a seta. Trochanter with a smooth, slender seta. Coxal seta smooth, about as long as the epimeron.

Leg IV. Tarsus IV : with three spurs as in leg III ; seta *d* very long and slender two straight mid ventral setae. Tibia IV : solenidion whiplike, a bit longer than the tibia ; one ventral seta. Genu IV : two apical, sclerotic spots but no solenidion ;

one ventral seta. Femur with a smooth ventral seta. Trochanter without setae. Coxal seta smooth, longer than basal three segments of the leg.

Male (Figs. 5, 6, 7, 11). About 350 microns long. Apodemes I join to form a long sternum ; apodemes II expanded internally but not connecting with sternum.

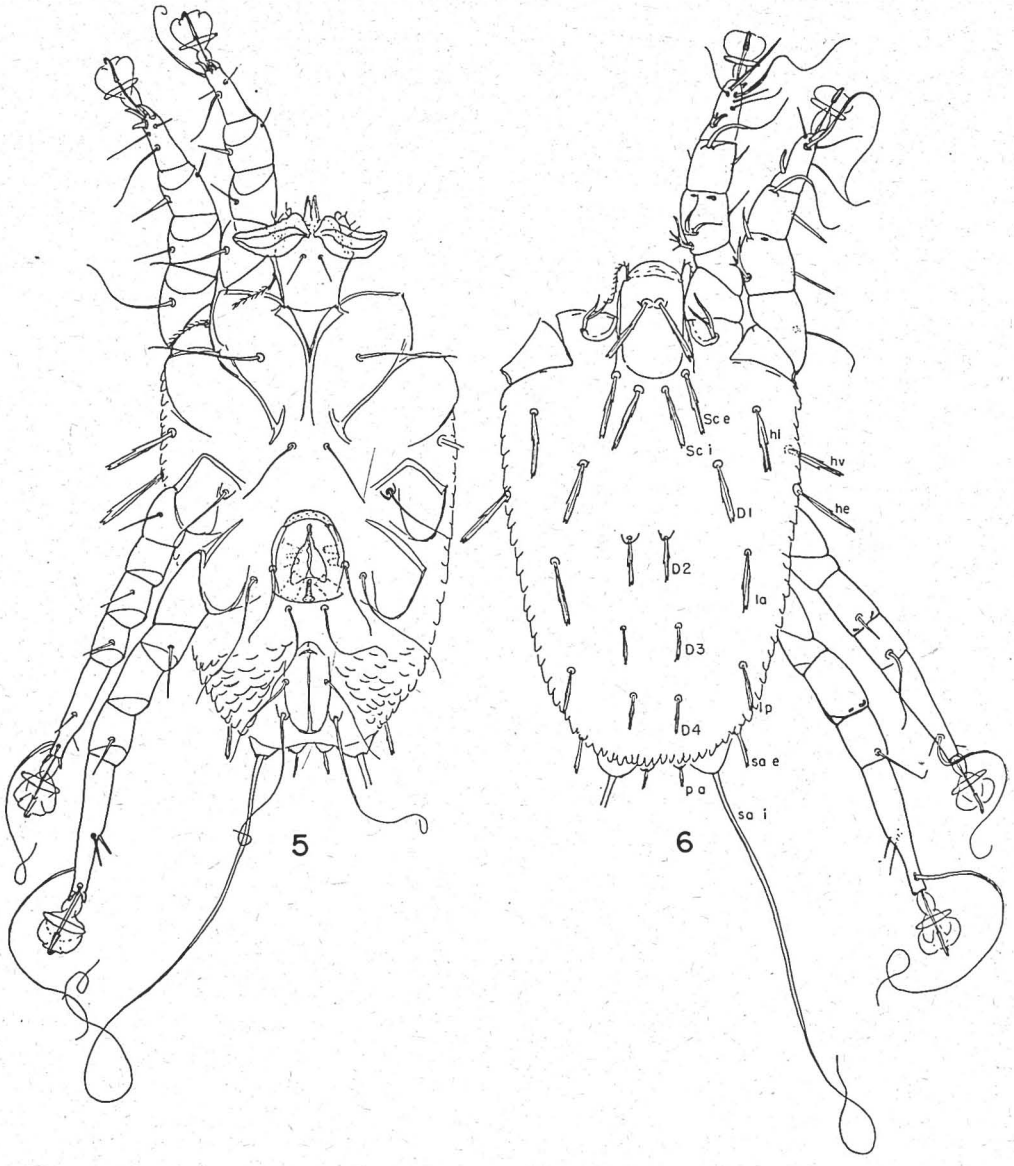

FIG. 5. Ventral view of male ; FIG. 6. Dorsal view of male. $D_{1...4}$ = dorsal seta 1 to dorsal seta 4 ; *he*, *hi*, *hv*, = external, internal, and ventral humeral setae respectively ; *la*, *lp* = anterior and posterior lateral respectively ; *pa* = postanal seta ; *sa e*, *sa i* = external and internal sacral setae ; *sc e* and *sc i* = external and internal scapular setae respectively.

Genitalia (Fig. 7) with one pair of genital setae and two pairs of genital suckers. Penis supported by a complex of struts. Two pairs of anal setae, which both extend considerably beyond the margin of the body.

Nympha II (Fig. 8). About 250 microns long, ranging from 230-290. Apodemes I uniting to form a sternum, apodemes II, III and IV free. Genitalia (Fig. 8)

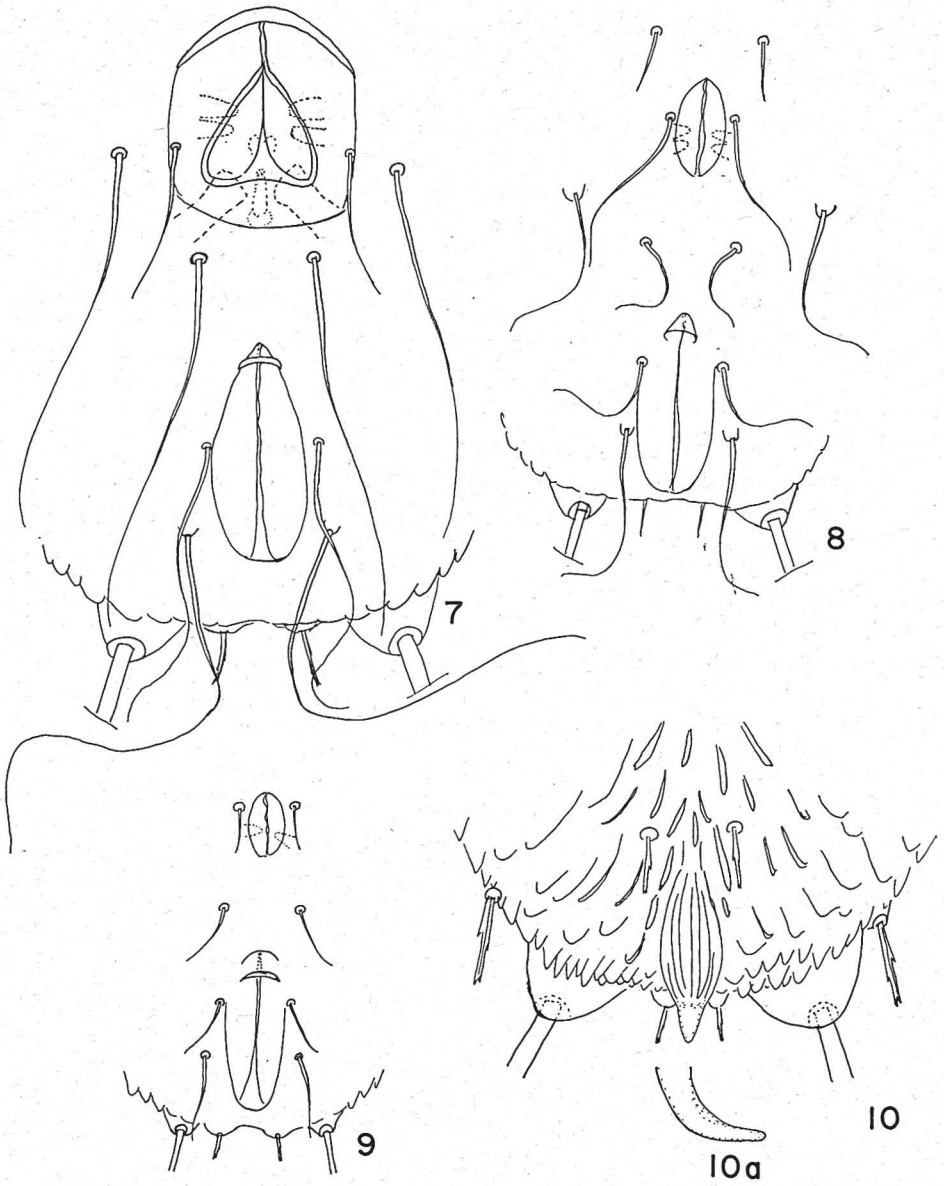

FIG. 7. Genital and anal regions of male. — FIG. 8. Genital and anal regions of deutonymph (Tritonymph of authors). — FIG. 9. Genital and anal regions of protonymph. — FIG. 10. Bursa copulatrix of female. — FIG. 10*a*. Side view of the tubular portion of the bursa copulatrix.

between coxae III and IV, with two pairs of suckers, one pair of setae, two lateral folds, and no transverse epigynium. Leg chaetotaxy as in the female. Dorsal and ventral chaetotaxy as in the female except in the genital and anal regions. Two pairs of anal setae, the anterior pair not extending beyond the body.

Nympha I (Fig. 9). About 200 microns long, varying from 175-210. Apodemes I uniting to form a short sternum. Genitalia (Fig. 9) between coxae III and IV, lacking an epigynium ; with one pair of short genital setae, two genital folds, and one pair of genital suckers which are generally staggered ; Anal area with two pairs of setae, the anterior failing by its own length of reaching the posterior margins, the posterior anal seta longer but still not as long as the anal slit. Leg chaetotaxy : the solenidion of tibia I a bit longer than seta *d* of tarsus I ; trochanters I and II lack the feathered seta ; femur III, and femur IV and tibia IV all without setae ; otherwise as in female. Seta Sc *e* is opposite the posterior lateral angle of the podosomal plate, well forward of Sc *i* and much as in the larva (see Fig. 12). Setae D_1, D_2, D_3, D_4 and *pa*, are present but the body of the protonymph is so foreshortened that seta D_4 is on the posterior margin.

Larva (Figs. 12, 13, 14). About 160 microns long. Apodemes I uniting to form a short sternum. No genitalia and no genital setae ; one pair of anal setae. On genu I, the two solenidia are farther forward than they are in the other life stages. Setae D_4, *pa*, and *sa e* are lacking.

Types : Designated as holotype is a female with the data : *ex Tadarida brasiliensis* ; Frio Cave, Uvalde county, Texas (U.S.A.) 18.VII.1961 ; Denny CONSTANTINE, collector. Paratypes, all bearing the same data as the holotype, include males, deutonymphs ; protonymphs and larvae. The holotype and several paratype are in the U. S. National Museum, Washington 25, D. C. Paratypes have also been sent to : Dr. Denny CONSTANTINE Communicable Disease Center, Southwest Rabies Investigation Station, University Park, New Mexico ; The Institute of Acarology, Wooster, Ohio ; Dr. Alex FAIN, Institut de Médecine Tropicale, Anvers, Belgique ; Dr. Jean COOREMAN, Musée Royal d'Histoire Naturelle de Belgique, Section d'Entomologie, Bruxelles, Belgium ; Dr. Nina BREGETOVA, Zoological Institute of the Academy of Sciences, Leningrad, U.S.S.R. ; Dr. Deane P. FURMAN, Division of Entomology and Parasitology, University of California, Berkeley, California and some have been retained in the mite collection at Texas Technolocal College.

Type Locality : Frio Cave, Uvalde Co., Texas. Frio cave annually harbors millions of free-tailed bats, *Tadarida braziliensis*.

Remarks : Dr. CONSTANTINE states that these mites were so abundant that the walls of the cave were white because of them and that the dermestid beetle larvae (which abound on the floor of Frio Cave especially during the time that young bats are being produced) bear a dense coat of these mites along the mid dorsal line.

I have seen what I believe to be this mite, very abundant on the bats themselves,

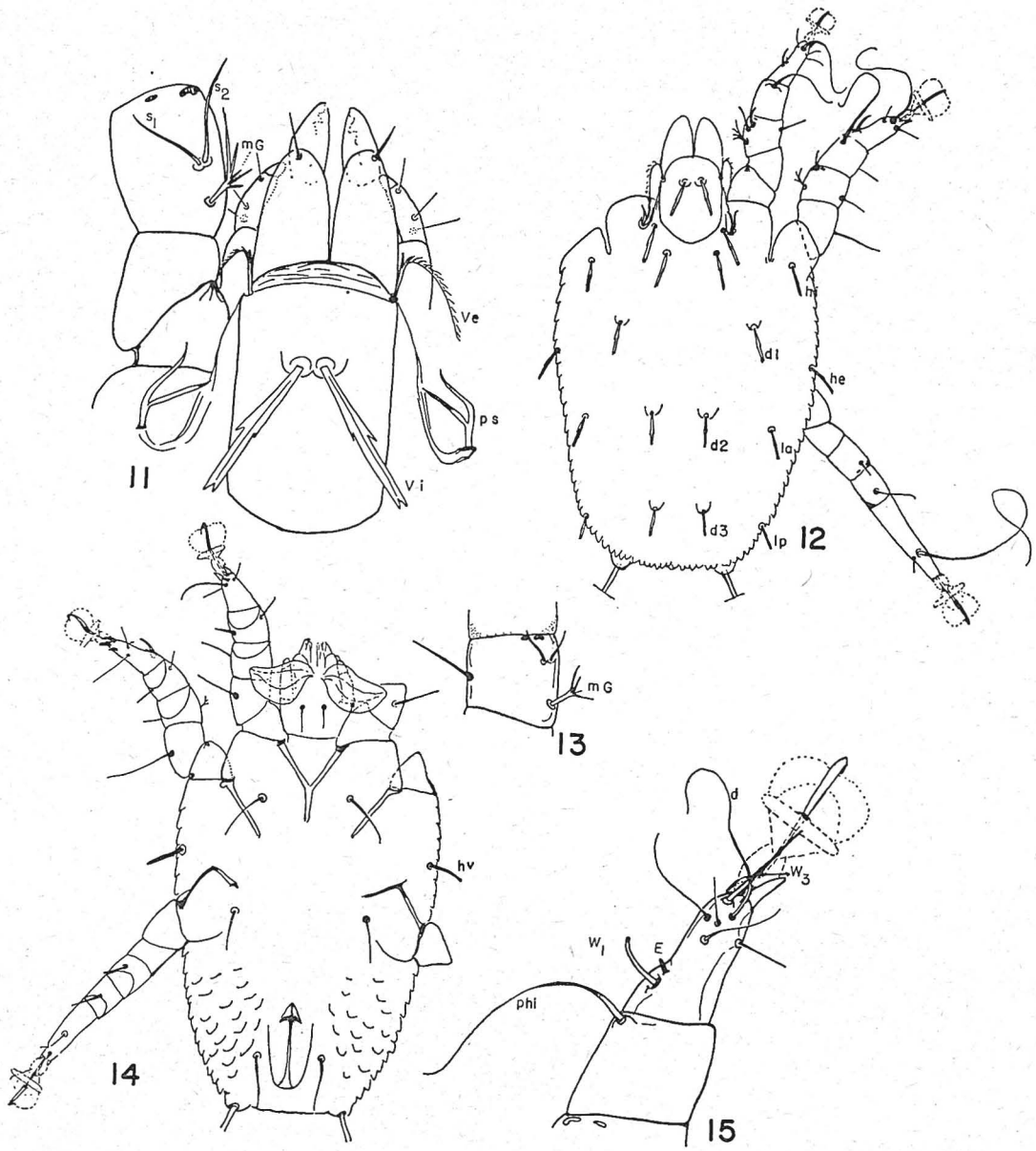

FIG. 11. Dorsal view of proposodomal shield, gnathosoma and basal segments of left leg of male. — FIG. 12. Dorsal view of larva. — FIG. 13. Genu I of larva. — FIG. 14. Ventral view of larva. — FIG. 15. Dorsal view of right tarsus I of female. *d* = apical dorsal seta of tarsus ; d_1, d_2, d_3 = dorsal setae ; E = famulus ; *hv* = ventral humeral seta ; *la*, *lp* = anterior and posterior lateral setae ; *m*G = posterior dorsal seta of genu ; *phi* = solenidion of tibia ; *ps* = supra coxal seta ; s_1, s_2 = solenidia of the genu ; *v e*, *v i* = external and internal vertical setae ; w_1, w_2 = solenidia of the tarsus.

especially the very young bats, and althought they undoubtedly cause harm when in astronomical numbers, they probably should not be considered parasites.

The genus *Nycteriglyphus* was erected by ZACHVATKIN in 1914 for the reception of *Glycyphagus pterophorus* Berlese 1892, a mite found on the bat *Nyctalus nactula* in Padua, Italy. In 1957, TURK and TURK created a new genus and species, *Coproglyphus stammeri*, for a mite found in great numbers on bat guano in a cave near Erlangen, Germany. *C. stammeri* is obviously unlike *N. pterophorus* but the two share several characteristics in common. At least to the extent that A. M. HUGHES (1961) synonymized *Coproglyphus* with *Nycteriglyphus*, and at the same time refined the description of *stammeri* from specimens found in bat roosts near Slough, Buchamshire, England. The present species, *N. bifolium*, keys without difficulty to this genus and I see no reason not to include *bifolium* in *Nycteriglyphus*, although it necessitates a slight revision of the generic description, at least as modified by HUGHES. The description of ZACHVATKIN is general enough to include the present species, except that *sc i* rather than *sc e* is long and hairlike.

The generic description of TURK and TURK states that apodemes III and IV are united; this is not true of *bifolium*. Also the genital opening of the male is between coxae IV in *bifolium* and between coxae III and IV in *stammeri*. HUGHES states in the generic diagnosis that, "... only one seta—*g*T—is present on tibae I and II. Only one solenidion—sigma—arises from the dorsal end of genu I...". *N. bifolium* has two setae on tibiae I and II — *h*T and *g*T —, and genu II has two solenidia on the dorsal middle.

The genus may be redefined as follows : apodemes I united; body covered with scale-like wrinkles; no transverse groove dividing the propodosoma from the hysterosoma; dorsal setae flattened and serrated or fringed; tarsi without keels; genu I with one or two solenidia; podosomal shield present and distinct; seta *v e* arise from the anterior angles of the plate, are serrated, curved downward, and hard to find; setae *v i* are similar to setae *sc i* and on the same transverse line as *v i* or posterior to them. Male without copulatory anal or tarsal suckers. Female genitalia between coxae II and III; male genitalia between coxae IV or III and IV; protonymph and deutonymph with genitalia between coxae III and IV. Apparently no hypopus stages.

The three species may be separated by the following key :

1. (2) Marginal setae six in number; large, broad, leaf-like, with deeply serrated outer edges, *pterophorus* (Berlese).
2. (1) Fewer than six marginal setae, and these neither excessively broad nor deeply serrated.
3. (4) Dorsal setae with fringed or finely serrated margins; supra coxal seta simple; genu I with a single solenidion; seta sa i not as long as the body and with a few small pectinations at the base; all tarsal setae *d* shorter than the tarsus from which they arise; seta *m*G I and II lightly feathered; average size about 230 microns, *stammeri* (Turk and Turk).

4. (3) Dorsal setae with four or five serrations ; supracoxal seta two-tined ; genu I with paired solenidia ; setae *sa i* perfectly smooth and as long as the body ; tarsal seta *d*, except on leg I, longer than the tarsus ; seta *m*G I and II, brached ; average size of adults, 330 microns, *bifolium* n. sp.

Summary.

Nycteriglyphus bifolium a new species of glycyphagid mite from a cave inhabited by large numbers of free-tailed bats, *Tadarida braziliensis*, is described. It is characterized by a pair of exceedingly large, foliacous, gnathosomal setae. The larva, protonymph, deutonymph (tritonymph of authors), male, and female are described. There was no hypopus.

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