

NEOGUANOLICHUS PANAMENSIS, A NEW SPECIES OF GUANOLICHIDAE  
FROM BAT CAVES IN PANAMA (ACARINA : SARCOPTIFORMES) <sup>1</sup>

BY

Norman J. FASHING \*

ABSTRACT

A new species of Guanolichidae (*Neoguanolichus panamensis*) is established based on specimens collected in bat guano in Panama. The morphology of the guanolichids suggests that they burrow in bat guano and feed on particulate matter in the guano.

ZUSAMMENFASSUNG

Eine neue Art von Guanolichidae Milben (*Neoguanolichus panamensis*) aus Fledermausguano von Panama wird beschrieben. Die Morphologie der Guanolichiden deutet an daß sie im Fledermausguano wühlen und Partikeln im Guano fressen.

In 1968 FAIN described a new family of sarcoptiform mites, the Guanolichidae, collected from bat guano in caves in Gabon. His description was based on one species, *Guanolichus gabonensis*. This remained the only species in the family until 1979, when FAIN described two new species : *Guanolichoides lukoschusi* and *Neoguanolichus mexicanus*. The present paper describes a new species of *Neoguanolichus* collected from bat guano in caves in Panama (Cocle # 1 Cave, 0.8 miles North of Penonomé). In the interest of brevity, many features that are clearly illustrated in the figures are not included in written descriptions. The general characteristics of the family are given by FAIN (1968).

FAIN (1979) based his description of *Neoguanolichus* on a single female specimen taken from a bat, *Natalus stramineus ventanus*, which had been collected in Durango, Mexico. Since the specimen was in poor condition and since FAIN had no males, I have included a more complete generic description.

\* Department of Biology, College of William and Mary, Williamsburg, Virginia 23185

1. Supported in part by a Busch Summer Grant awarded by the College of William and Mary.

*Acarologia*, t. XXI, fasc. 1, 1979.

*Neoguanolichus* Fain 1979

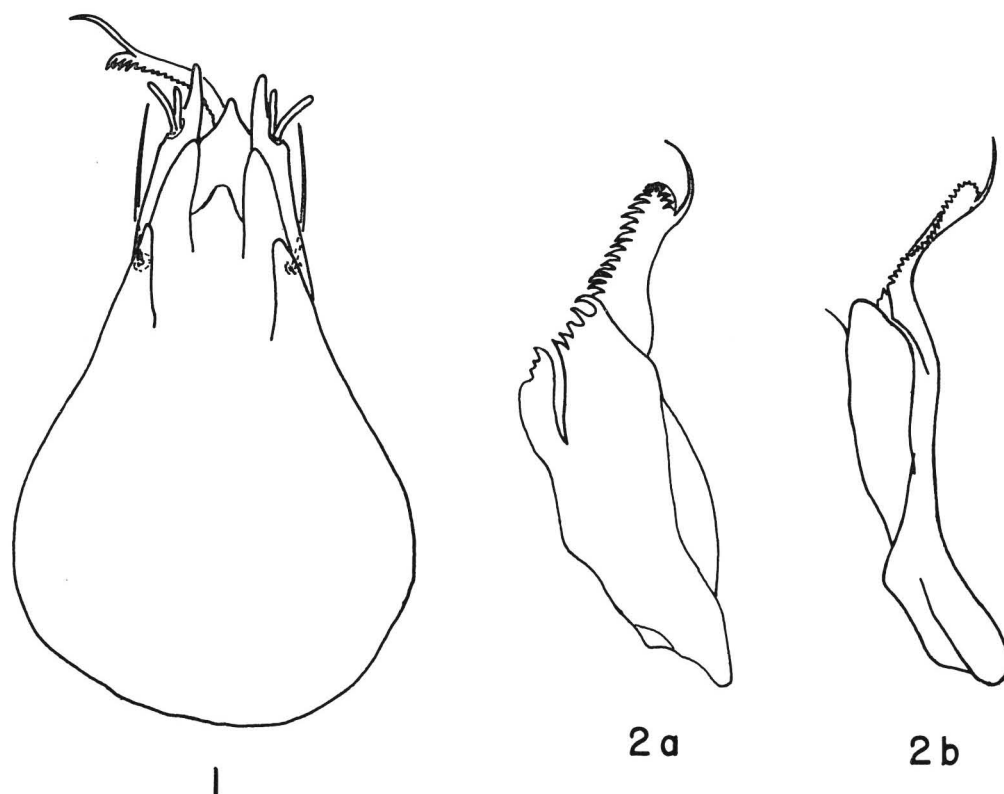
Small oval mites which inhabit bat guano. Genital apparatus of female consisting of a bilobed flap, each side of flap appearing as an inverted "V" and with the inner sides of the two "V's" overlapping. Epigynum absent. Copulatory opening of female located ventrally, just posteriad anus. Anus present in male and "coupled" to genital apparatus. Epimeres I of both sexes joined at midline, forming a Y-shaped sternum in some species. Genua and femora of legs I and II each with a mesial apical projection. Genu II, and in some species tibia III, bearing a solenidion.

***Neoguanolichus panamensis*, new species**

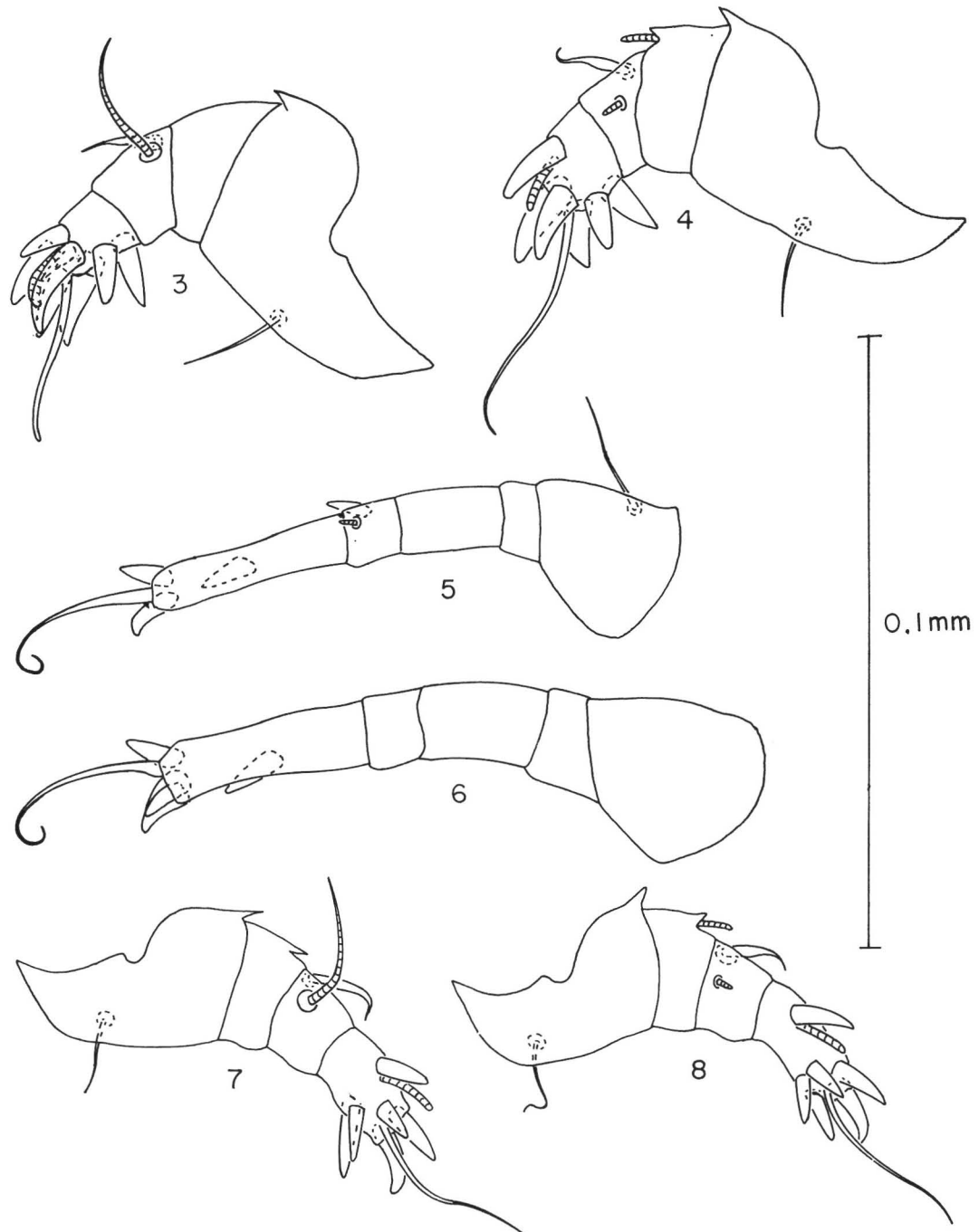
The specific name refers to the country of Panama, the locality from which the mite was collected.

*Features relative to both sexes*

Relative position, shape and size of setae and other structures as indicated in figures. Idiosoma oval, flattened ventrally and arched dorsally (somewhat resembling the shell of a turtle). Cuticle uniformly sclerotized and finely sculptured. Bases of trochanters I and II and base of gnathosoma articulate in recesses (cavities) in idiosoma. Sejugal furrow, circular pores and latero-abdominal glands (oil glands) not apparent.



FIGS. 1-2B. — *Neoguanolichus panamensis*.  
1) dorsal view of gnathosoma ; 2a) preaxial view of chelicera ; 2b) ventral view of chelicera.



FIGS. 3-8. — *Neoguanolichus panamensis*, dorsal view of legs.  
3) male, leg I ; 4) male, leg II ; 5) male, leg III ; 6) male, leg IV ; 7) female, leg I ; 8) female, leg II.

Legs situated more or less marginally and greatly modified. Similar to *Guanolichus* (Fain, 1968) in that femurs I and II are more or less "twisted", causing that portion of the legs which is dorsal in most other mites to be preaxial.

*Chaetotaxy of Idiosoma.* Dorsal surface of both sexes bearing ten pairs of hairlike setae — v.i., sc.i., sc.e., d<sub>2</sub>, d<sub>3</sub>, d<sub>4</sub>, h, 1<sub>1</sub>, 1<sub>2</sub>, 1<sub>4</sub>. Setae d<sub>1</sub>, 1<sub>3</sub>, v.e., and supracoxal setae absent. Ventral surface of both sexes bearing two pairs of stout coxal setae (cx I and cx III) located on coxal fields I and III respectively; a pair of stout setae, sh, on coxal field III, and a pair of longer hairlike setae, d<sub>5</sub>, situated on posterior margin of the idiosoma. In addition, the male has three pairs of short genital setae (ga, gm, and gp). Setae 1<sub>5</sub> absent.

*Mouthparts.* Gnathosoma (fig. 1) conical, narrowing toward apex, and bearing a pair of setae on lateral margins of ventral side approximately one third of the way down from apex. Palps pointed at apex, bearing two stout setae on postaxial margin a short distance below apex. Chelicerae (figs. 2a and 2b) compressed laterally, composed of two fixed digits and bearing a seta-like projection on dorsal margin slightly posteriad apex. Ventral margin of distal portion bearing recurved teeth, with teeth extending dorsally around apex to base of seta-like projection. Toothed portion arched laterally and mesially. Ventral border of the chelicerae bears a small projection possessing a few teeth.

*Leg Chaetotaxy.* Male (figs. 3, 4, 5, and 6), female (figs. 7 and 8). Tarsi (I to IV) with 8-7-4-5 in male and 7-7-4-5 in female. On tarsus I, seven of these setae in the case of the male and six in the case of the female are strong spines, and one is long and whiplike. Tibiae 1-1-1-0. Genua 0-0-0-0. Femora 1-1-0-0. Trochanters 0-0-1-0.

*Solenidiotaxy.* Tarsae (I to IV) 1-1-0-0. Tibiae 1-1-1-0. Genua 0-1-0-0. Femora 0-0-0-0.

*Description of Male* (figs. 9 and 10).

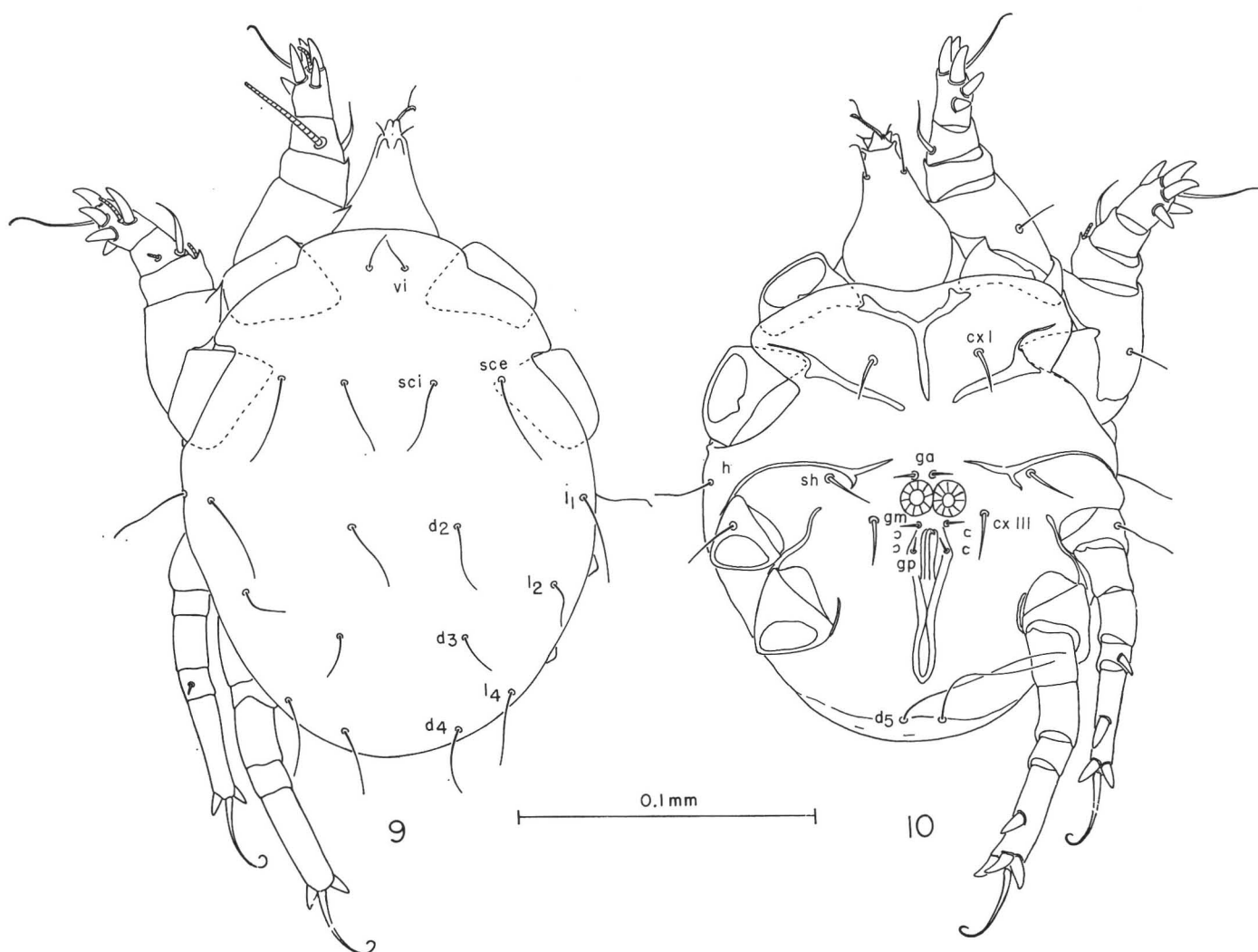
Mean length of idiosoma of eight males 184  $\mu$  (166-209); width at widest point 145  $\mu$  (132-156). Idiosoma broadly oval and widest at level of seta h.

*Ventral Surface.* Genital aperture located between coxae IV. Penis slender and curved ventrally at distal end. Anus "coupled" to posterior end of genital apparatus. Two pair of small genital suckers located laterad genital opening. Two large, contiguous copulatory suckers located antieriad genital opening and between coxae III. Three pair of short, stout genital setae — ga located just antieriad copulatory suckers, and gm and gp located laterad the genital opening. Apodemes of legs I fused at midline to form a Y-shaped sternum; apodemes of legs II, III and IV free.

*Description of Female* (figs. 11 and 12).

Mean length of idiosoma of twenty females 191  $\mu$  (175-207); width at widest point 150  $\mu$  (132-167).

*Ventral Surface.* Genital aperture complex, consisting of a bilobed flap opening anteriorly at the level of coxae I and II. Each side of flap appearing as an inverted "V", but with the inner sides of the two "V's" overlapping. Two pairs of small genital suckers located at the lateral-posterior margin of the genital aperture. Anus a circular opening near the posterior margin of the idiosoma, and the copulatory opening (bursa copulatrix) located just posterior to the anus. Apodemes of legs I unite to form a sternum. Apodemes of legs II and III unite to form a strengthening ridge for the genital apparatus. Apodemes of legs IV free.

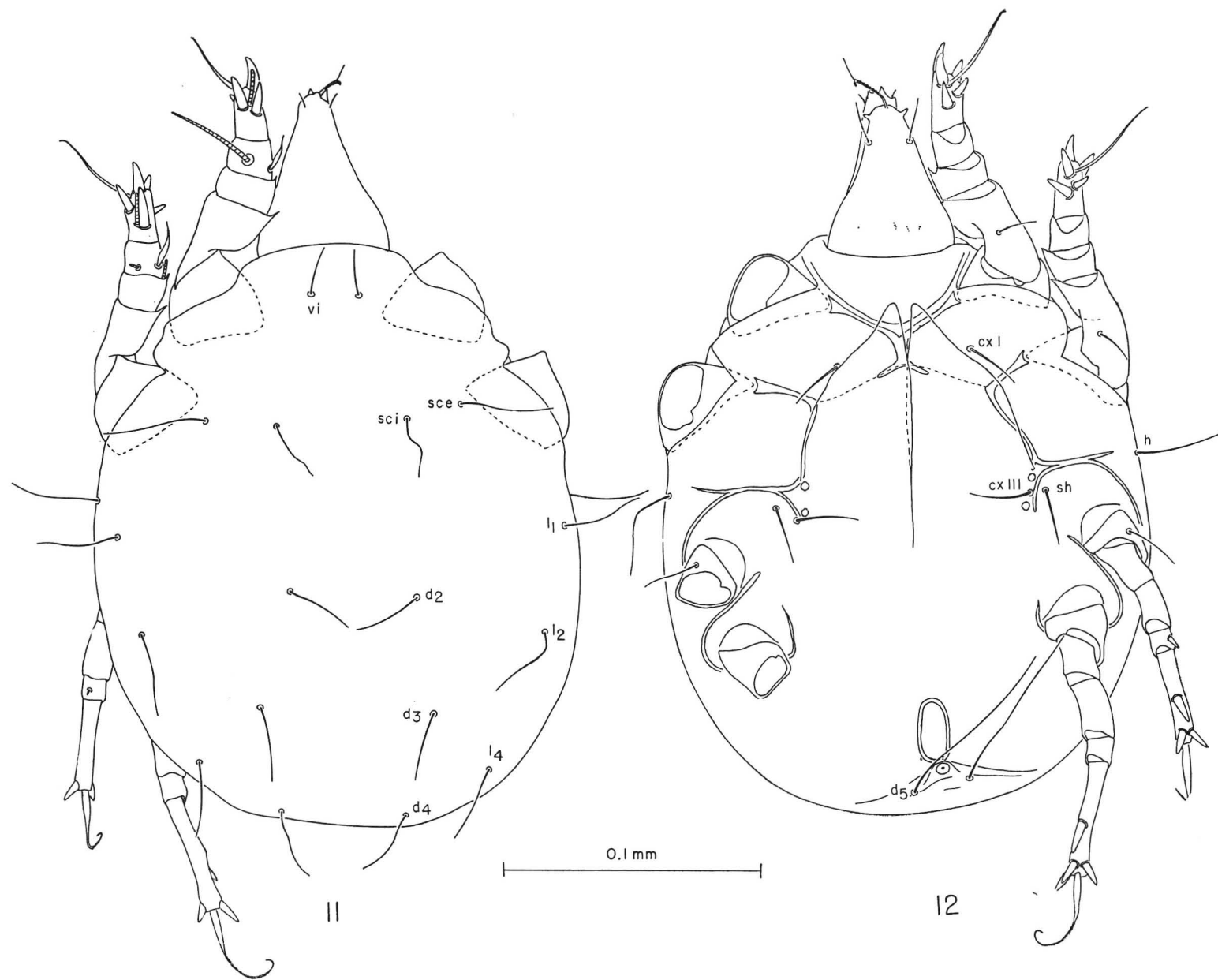


FIGS. 9-10. — *Neoguanolichus panamensis*.  
9) dorsal view of male ; 10) ventral view of male.

#### SYSTEMATIC POSITION

*Neoguanolichus panamensis* shares many characteristics with *N. mexicanus* and obviously belongs in the same genus. In fact, they differ by only a few characters. In *N. mexicanus* the apodemes of legs I just touch at the midline and the epiginal flaps are rounded at the anterior end. In *N. panamensis* the apodemes of legs I join to form a distinct Y-shaped sternum and the epiginal flaps are pointed at the apex. Also, the solenidion found on tibia III of *N. panamensis* could not be found on the single specimen of *N. mexicanus*. Other less important differences found in *N. mexicanus* include the following : femoral and genual projections of legs I and II more pronounced, dorsal seta v.i. longer, and the most posterior ventral seta on tarsus I longer and less spinelike.

As stated earlier, *N. mexicanus* was described from a single specimen that is in somewhat poor condition (Fain, 1979). Fain therefore had difficulty observing certain characters. I



FIGS. 11-12. — *Neoguanolichus panamensis*.  
11) dorsal view of female ; 12) ventral view of female.

have observed the specimen of *N. mexicanus*, and with the past experience of studying many specimens of *N. panamensis*, could determine that setae  $1_2$  are present, there are six spinelike setae on tarsi I and II, and that the tibial chaetotaxy is 1-1-1-0 (not 1-2-0-0). The spinelike seta on genu II and the small seta on genu IV indicated in Fain's drawings are not present. Also, there is only one solenidion on genu II, not two as indicated in Fain's drawings. These characters are consistent with those found on *N. panamensis*.

*Guanolichoides lukoschusi* is known from a single male specimen which is in bad condition, making many characters difficult or impossible to observe. In fact, many setae are entirely broken off. It is therefore difficult to compare *N. panamensis* with *G. lukoschusi*. However it is apparent that the copulatory suckers are separated in *G. lukoschusi*, and that the anus is not "coupled" to the posterior end of the genital apparatus. Also, the apodemes of *G. lukoschusi* are but lightly sclerotized, and the apodemes of legs III and IV are absent.

*Neoguanolichus panamensis* and *Guanolichus gabonensis* are known from a number of specimens, both male and female. They can be distinguished from one and other by the characters given in Table 1.

Table 1. -- Characters which distinguish *Guanolichus gabonensis* from *Neoguanolichus panamensis*.

<u>G. gabonensis</u>	<u>N. panamensis</u>
Epimeres I free	Epimeres I joined to form a Y-shaped sternum
Vulva of female transverse	Vulva of female a bilobed flap, each side of flap appearing as an inverted "v"
Copulatory opening of female dorsal, between setae $d_3$	Copulatory opening of female ventral, between setae $d_5$
Anus present only in female	Anus present in both sexes
Penis located between copulatory suckers at level of coxae III	Penis located below copulatory suckers, at level of coxae IV; copulatory suckers contiguous and at level of coxae III
Setae $1_3$ and $1_5$ present	Setae $1_3$ and $1_5$ absent
Setae cx III absent in female	Setae cx III present in female
Tarsal chaetotaxy of both sexes 12-10-8-10	Tarsal chaetotaxy of male 8-7-4-5 and female 7-7-4-5
Tibial chaetotaxy 1-1-0-0	Tibial chaetotaxy 1-1-1-0
GenuaI chaetotaxy 1-1-0-0	GenuaI chaetotaxy 0-0-0-0
Solenidion absent on tibia III and genua II	Solenidion present on tibia III and genua II

Since FAIN (1968) based his description of the family Guanolichidae on a single species (*Guanolichus gabonensis*), his familial description needs modification to include the new genera. His description should be modified to include the following : Epimeres I fused or free, anus present or absent in male, shape of vulva of female variable, copulatory opening of female either dorsal or ventral, idiosomal setae  $1_3$  and  $1_5$  present or absent, seta cx III present or absent in female, leg chaetotaxy and solenidiotaxy variable.

#### DISCUSSION

The family Guanolichidae appears to be a highly specialized group of mites. Although nothing is known about their biology, certain inferences can be drawn from their morphology. The structure and position of legs I and II strongly suggest that they move laterally, and are used to burrow in a substrate. A similar adaptation in the insects is found in the mole crickets (*Gryllotalpidae*). The stout, spinelike setae are positioned on the tarsi in a manner which would aid in this burrowing behavior. Such legs, however, would be inefficient for normal walking or for running. The relatively long, slender hind legs could be used to push from behind as the animal burrows. The heavily sclerotized idiosoma would also be adaptive to a burrowing animal.

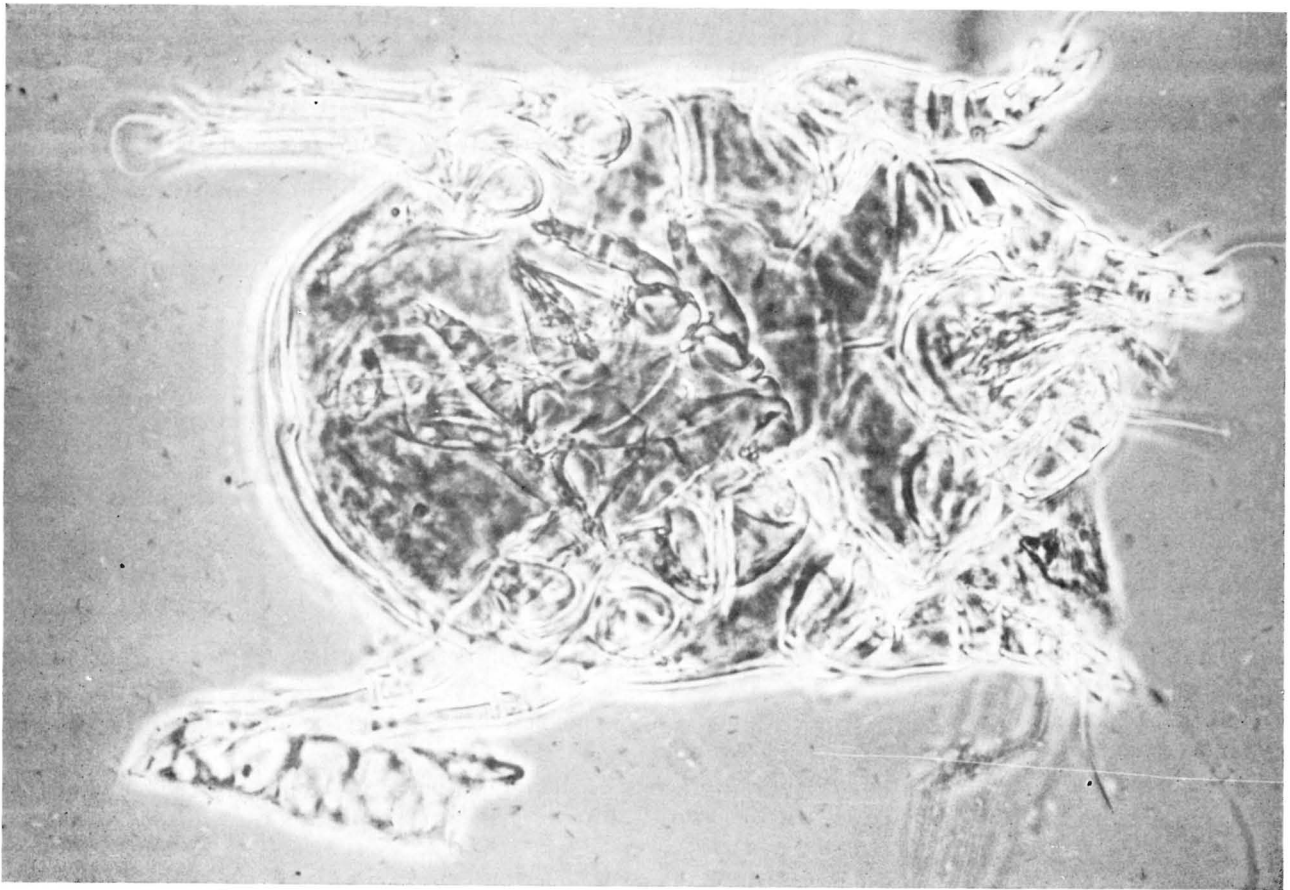


FIG. 13. — Photomicrograph of *Neoguanolichus panamensis* female illustrating hatched larva in reproductive tract.



FAIN (1968) states that the sclerotized idiosoma suggests that the guanolichids are free living, but that other characteristics suggest a parasitic existence. These characteristics, a reduction of the chaetotaxy of the body and legs and the loss of ambulacra, however, would be equally adaptive to a burrowing organism, since setae and ambulacra would interfere with burrowing. Also negating a parasitic existence are the chelicerae which are formed as a rake, not as structures for piercing a host and feeding on its fluids. In fact, the rakelike chelicerae of guanolichids are reminiscent of those found in the Anoetidae (KRANTZ, 1978). By alternate movements of the chelicerae, members of the Anoetidae "rake" particulate matter into the preoral trough (HUGHES, 1953). The chelicerae of the Guanolichidae are probably used in a similar manner to collect food (e.g., arthropod eggs, fungal spores, etc.) as they burrow through the guano. FAIN (1968) also suggest that guanolichids might be predators of insects; however, their fossorial body plan and raking mouthparts make this seem unlikely. They might rake in eggs of insects or other arthropods, but would be too slow to hunt down active prey.

As a final observation, one female was noted to contain a fully developed larva inside her reproductive tract (fig. 13). This suggests that guanolichids might be larviparous. The larva was also quite large (140  $\mu$  total length as compared to an idiosomal length of 190  $\mu$  for the female), suggesting that few larvae are probably developing at any one time, and that the reproductive rate is relatively slow.

#### LOCATION OF TYPES

Holotype male, allotype female, and male and female paratypes will be deposited in the acarine collection of the U. S. National Museum, Washington, D.C. Paratypes will be deposited with the following : Institute of Acarology, Ohio State University, Columbus ; Canadian National Collection, Ottawa ; British Museum (Natural History), London ; and the Laboratoire de Zoologie Médicale, Institut de Médecine Tropicale, Anvers, Belgium.

#### ACKNOWLEDGEMENTS

I am indebted to Drs. W. L. OVERAL and G. W. BYERS, University of Kansas, Lawrence, for collection of the specimens ; and to my wife, Dr. Gisela K. FASHING, for her critical reading of the manuscript and preparation of the German abstract. I am especially grateful to Dr. Alex FAIN, Institut de Médecine Tropicale, Anvers, Belgium, for providing me with space and equipment in his laboratory to observe the holotypes of *Guanolichoides lukoschusi* and *Neoguanolichus mexicanus*.

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*Paru en Janvier 1980.*