

NEW OBSERVATIONS ON THE GENUS *GEOMYLICHUS* FAIN, 1970 (ACARI, LISTROPHORIDAE) WITH DESCRIPTION OF FOUR NEW SPECIES AND A NEW SUBGENUS

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ABSTRACT — Four new species of *Geomylichus* Fain, 1970 (Acari, Listrophoridae) are described from North American heteromyid rodents: *Geomylichus* (*G.*) *microdipodops* sp.n. from *Microdipodops megacephala*, *G.* (*G.*) *formosus* sp.n. from *Perognathus formosus*, *G.* (*G.*) *utahensis* sp.n. from *Dipodomys microps* and *G.* (*Whitakerobius*) *deserti* sp.n. from *Dipodomys deserti*. The female of *G.* (*G.*) *dipodomys* (Radford) is redepicted and figures of *G.* (*Ageomylichus*) *mexicanus* Fain and *G.* (*Neogeomylichus* subg.n.) *postscutatus* Fain are given for the first time. A key to the known species of the genus is provided.

INTRODUCTION

The genus *Geomylichus* Fain, 1970, including the 4 new species described herein, is now represented by 17 species, all from North America (including Mexico) except one, *G. neacomys* described from *Neacomys tenuipes* from Colombia. All these species were found on rodents except one (*G. sylvilagus*) described from a hare. The exact status of *G. klebergi* (McDaniel, 1965) is not clear; unfortunately the types of this species are probably lost.

In this paper we describe 4 new species and 1 new subgenus in the genus *Geomylichus*. A key is given to all the known species. The measurements are in microns. The holotypes of the new species are deposited in the U.S. National Museum, Washington, DC. The genus *Geomylichus* now comprises 4 subgenera:

1. *Geomylichus* s.str. Fain, 1970 - Striated clasping membranes of coxae I and II not serrate, the membranes of coxae II relatively short (length 30 to 70). Prescapular shield generally longer than postscapular shield. Male with *d5* broadly foliate bearing

a triangular membrane, hysteronotal shield short not reaching setae *d2* forwards. Female without a shield on the hysteronotum.

Type species - *Listrophorus dipodomys* Radford, 1953.

Other species - *G. klebergi* (McDaniel, 1965), *G. texanus* Fain et al., 1978, *G. brevispinosus* Fain et al. 1978, *G. inaequalis* Fain et al. 1978, *G. thomomys* Fain et al. 1978, *G. perognathi* Fain and Whitaker, 1980, *G. utahensis* sp.n., *G. formosus* sp.n., and *G. microdipodops* sp.n.

2. *Whitakerobius* Fain, 1981 - Striated clasping membranes of coxae I and II not serrate, the membranes of coxae II relatively short (50 to 70). Male with *d5* broadly foliate bearing a triangular membrane, hysteronotal shield long extending forwards beyond the setae *d2*. Female with a median shield on hysteronotum.

Type species - *Listrophorus floridanus* Radford, 1949.

Other species - *G.* (*W.*) *deserti* sp.n.

3. *Ageomylichus* Fain, 1981 - Clasping striated membranes of coxae I and II with serrated edges, membranes of coxae II relatively long (105 to 110). Prescapular shield

shorter than postscapular shield. Male with *d5* narrowly foliate, hysteronotal shield short, not reaching *d2* forwards. Females without a hysteronotal shield.

Type species - *Geomylichus nectomys* Fain et al. 1978.

Other species - *G. (A.) sylvilagus* Fain, 1973, *G. (A.) neacomys* Fain et al. 1978, and *G. (A.) mexicanus* Fain, 1976.

4. *Neogeomylichus* subg.n. - In both sexes: Striated clasping membranes of coxae I and II with serrated edges, membranes of coxae II relatively long (90 in female), ventral surface with very thick longitudinal striations or folds located on propodosoma in male and on propodosoma and hysterosoma in female. Prescapular shield much shorter than postscapular shield (in both sexes). Male with *d5* broadly membranous, hysteronotal shield long extending forwards beyond setae *d2*. Female with a median opisthonotal shield.

Type species - *Geomylichus postscutatus* Fain, 1976.

Key to the Genus *Geomylichus*

-Females-

(The female of *G. sylvilagus* is unknown)

1. Striated membranes of coxae I-II with serrated edges, the membranes of coxae II are 90 to 110 long..... 2
- Striated membranes of coxae I-II not serrate, the membranes of coxae II shorter (35 to 70 long)..... 5
2. Hysteronotum bearing a medium shield. Striated membranes of coxae II 90 long. Median region of ventral surface of body with very thick striations or folds. From *Dipodomys* sp. and *Liomys irrortatus*..... Subgenus *Neogeomylichus* subg.n. (One species: *G. (N.) postscutatus* Fain, 1976)
- Hysteronotum without a shield, striated membranes of coxae II 105 to 110 long. Absence of thick striations or folds on venter...Subgenus *Ageomylichus* Fain, 1981..... 3
3. Posterior extremity with 2 pairs of long and thick setae (*l4* 170, *l5* 200 long). From *Nectomys* sp. *G. (A.) nectomys* Fain et al. 1978

- Posterior extremity with two pairs of very unequal setae, one (*l5*) thick and long (250-300), the other (*l4*) thin and much shorter (60-70 long).....4
- 4. Posterior region of opisthonotum with a globulous striated cuticular formation projecting dorsally. Cuticle immediately behind setae *gp* striated transversely. About 10 transverse striations between dorsal shield and setae *d2*. From *Neacomys tenuipes* *G. (A.) neacomys* Fain et al. 1978
- Posterior region of opisthonotum flat, without cuticular projection. Cuticle behind setae *gp* striated longitudinally. About 20 transverse striations between the dorsal shield and setae *d2*. From *Teanopus phenax* *G. (A.) mexicanus* Fain, 1976
- 5. Hysteronotum with a median shield Subgenus *Whitakerobius* Fain, 19816
- Hysteronotum without a shield.....Subgenus *Geomylichus* Fain, 1970.....7
- 6. The median two-thirds of hysteronotum bearing a poorly sclerotized shield with indistinct striations. Postscapular shield not striated. Setae *l5* thin, 50-60 long. From *Dipodomys deserti*..... *G. (W.) deserti* sp.n.
- The anterior quarter or fifth of hysteronotum with a well sclerotized and striated shield. Postscapular shield completely striated. Setae *l5* strong, 200 long. From *Geomys* spp. *G. (W.) floridanus* (Radford, 1959) [= *G. (W.) geomydis* Coffman & McDaniel, 1975]
- 7. Posterior extremity with only very thin and short setae (*l5* not longer than 35). Anterior half or three-fifths of hysteronotum bearing 10 to 20 transverse striations; behind this region the striations are very oblique or longitudinal. From *Dipodomys* spp.8
- Setae *l5* from 80 to 275 long. The anterior transversely striated part of hysteronotum is relatively much longer..... 10
- 8. Prescapular and postscapular shields subequal in length, the latter with transverse striations partly or completely interrupted in 5 longitudinal depressed areas (one median and 4 lateral). About

- 20-25 striations in the lateral parts of the shields. Hysteronotum with 10 to 18 transverse widely separated striations in midline, followed by very oblique or longitudinal median or paramedian striations. Striated membranes of coxae II 58 to 63 long..... 9
- Prescapular shield distinctly longer than postscapular shield (ratio 1.15 to 1.3:1), the latter completely striated with 29-34 striations counted laterally along a line joining *sc i* to *d1*. Hysteronotum with 16-20 transverse striations in midline. Striated membranes of coxae II 48 long.....
-*G. (G.) *texanus* Fain et al. 1978.
9. Prescapular shield slightly longer than postscapular shield. Hysteronotum with 4-5 transverse striations close together followed by about 10 poorly developed transverse striations widely spaced. Posterior half of hysteronotum with 8 to 10 incomplete and poorly developed longitudinal or oblique striations. From *Dipodomys spectabilis* and *D. philippsi*.....
-*G. (G.) dipodomius* (Radford, 1953).
- Prescapular shield either equal to or slightly shorter than postscapular shield. Hysteronotum with 4 to 5 striations very close together, followed by 14 to 17 more widely spaced and well-formed striations. Posterior half of hysteronotum with 18 to 25 well-formed and regular longitudinal or oblique, median or paramedian striations. From *Dipodomys microps*.....
-*G. (G.) utahensis* sp.n.
10. Opisthogaster transversely striated..... 11
- Opisthogaster longitudinally striated.. 12
11. Postscapular shield completely striated, with 25 striations along a line joining setae *sc i* and *d1*. Hysteronotum with 42-50 transverse striations. Setae *sc e* expanded in their basal part. From *Thomomys* spp.
-*G. (G.) thomomys* Fain et al. 1978
- Postscapular shield without striations. Setae *sc e* expanded in their apical part ("peg-like") (from original description and drawings). From *Sigmodon hispidus texanus*.....
- *G. (G.) klebergi* (McDaniel, 1965)
12. Lateral borders of postscapular shield irregular, with a punctate lobe being sometimes narrowly pedunculate or separated from the shield; this shield striated only in its anterior half or two-thirds. Setae *l5* strong, 225-275 long... 13
- Lateral borders of postscapular shield rounded, this shield completely striated with 18-30 well-formed striations along a line joining setae *sc i* and *d1*. Setae *l5* thin, 80 to 130 long. Prescapular shield longer (117-120) than postscapular (106-109)..... 15
13. Setae *sc e* 13-16 long, 3-4 wide. Striated membranes of coxae II narrow, 30-35 long. Prescapular shield 116 long, postscapular shield 105 long, the latter striated only in the anterior half of its median part. Hysteronotum with striations poorly developed. Idiosoma 510 long. From *Perognathus penicillatus*.....
-*G. (G.) brevispinosus* Fain et al. 1978
- Setae *sc e* 27-30 long and 4-7 wide. Striated membranes of coxae II 55-60 long. Prescapular and postscapular shields longer. Hysteronotum with about 35-40 well developed striations in midline..... 14
14. Prescapular and postscapular shields 142 and 135 long, respectively, the latter striated in its anterior half or two-thirds medially and laterally. Setae *l5* 300 long. Idiosoma 600 long. From *Perognathus hispidus*.....
- *G. (G.) inaequalis* Fain et al. 1978
- Prescapular and postscapular shields 150 and 120 long, respectively, the latter with striations only in the median part of the anterior two-thirds of the shield. Setae *l5* 230 long. From *Perognathus formosus*.....
-*G. (G.) formosus* sp.n.
15. Setae *l5* 130 long. Postscapular shield with 18-19 well separated striations along a line joining setae *sc i* and *d1*. Hysteronotum with about 70 transverse striations. Opisthosoma 210 long. From *Perognathus* spp.....
-*G. (G.) perognathi* Fain & Whitaker, 1980
- Setae *l5* very thin and 70-80 long. Postscapular shield with 30 very thin striations, close together, along a line joining setae *sc i* and *d1*. Hysteronotum with

45 transverse striations. Opisthosoma 230-250 long. From *Microdipodops megacephalus* *G. (G.) microdipodops* sp.n.

-Males-

(The males of *G. mexicanus* and *G. sylvilagus* are unknown)

1. Striated claspings membranes of coxae I and II with serrate edges; the membranes of coxae II 83 to 110 long 2
- Striated claspings membranes of coxae I and II not serrate; membranes of coxae II 38 to 67 long 4
2. Hysteronotum with broad well sclerotized median shield extending forwards far beyond setae *d2*. Median region of venter with very thick striations or folds. Setae *d5* bearing a large triangular internal membrane. Epimerites III short, not fused in midline
.... Subgenus *Neogeomylichus* subg.n. [One species: *G. (N.) postscutatus* Fain, 1976]
- Hysteronotum with a short median shield completely situated behind setae *d2*. Venter without very thick median striations or folds. Setae *d5* with narrow internal membrane. Epimerites III strong and fused in the midline... Subgenus. *Ageomylichus* Fain, 1981 3
3. Setae *sc e* 12 long and 5-6 wide. Opisthosoma 140 long and 75 wide at its base. Postscapular shield with about 50-60 indistinct transverse striations (along a line joining *sc i* and *d1*)
..... *G. (A.) nectomys* Fain et al. 1978
- Setae *sc e* 20 long and 5.5 wide. Opisthosoma 120 long and 90 wide at its base. Postscapular shield with 50-55 distinct striations between *sc i* and *d1*
..... *G. (A.) neacomys* Fain et al., 1978
4. Hysteronotum with long shield extending forwards far beyond setae *d2*... Subgenus *Whitakerobius* Fain, 1981 5
- Hysteronotum with a short shield completely situated behind setae *d2*... Subgroup *Geomylichus* Fain, 1970 6
5. Hysteronotal shield poorly sclerotized and bearing in its antero-median part inconspicuous interrupted striations. Postscapular shield well sclerotized, not striated. Claspings membranes of coxae II 45 long *G. (W.) deserti* sp.n.
- Hysteronotal and postscapular shields well sclerotized and completely and regularly striated. Claspings membranes of coxae II 67 long
G. (W.) floridanus Radford, 1949 [= *G. geomydis* Coffman & McDaniel, 1975]
6. Setae *sc e* expanded in their apical part. Setae *l5* only slightly longer than foliate setae *d5* (from original description and figures of McDaniel)
..... *G. (G.) klebergi* (McDaniel, 1965)
- Setae *sc e* expanded in their basal half. Setae *l5* much longer than foliate setae *d5* 7
7. Lateral borders of postscapular shield very irregular, generally forming a punctate lobe which is sometimes pedunculate or separated from the shield. Hysteronotal shield close to the setae *d2* (distance 12-15) and with lateral margins reinforced by a strongly sclerotized strip reaching the anterior corners of the shield. Pregenital sclerite prolonged anteriorly by a narrow longitudinal sclerite 30-45 long, shaped in an inverted 'T' 8
- Lateral borders of postscapular shield either slightly incised (*G. thomomys*) or rounded without lobes (other species). Hysteronotal shield either close to setae *d2* (15 to 18) or far from it (35 to 42 in *G. thomomys*), its lateral borders weakly punctate or slightly sclerotized but not forming sclerotized strips. Pregenital sclerite short, either prolonged anteriorly by a short and narrow median longitudinal sclerite 8 to 10 long or without prolongation 10
8. Setae *sc e* 13 to 18 long and 3 to 4.5 thick. Inflated base of setae *l5* 75 long. Striated membranes of coxae II 25-30 long. Prescapular shield slightly longer than postscapular shield (100-120 and 90-108, respectively). Postscapular shield with indistinct or without striations
..... *G. (G.) brevispinosus* Fain et al., 1978
- Setae *sc e* 27 to 30 long and 4 to 6 wide. Inflated base of setae *l5* 90 to 120 long. Striated membranes of coxae II 44 to 50 long. Prescapular shield longer than postscapular shield, the latter with striations either well or very poorly developed in its anterior half or two-thirds 9
9. Postscapular shield with well-developed

- striations in the anterior two-thirds of the shield, and indistinct striations in the posterior third. Prescapular and postscapular shields 134 and 120 long, respectively. Setae *sc e* 30 x 6.....
*G. (G.) inaequalis* Fain et al., 1978
- Postscapular shield not striated. Prescapular and postscapular shields 123 to 139 and 108 to 116 long, respectively. Setae *sc e* 30 x 4.5.....*G. (G.) formosus* sp.n.
10. Postscapular shield with striations partly or completely interrupted in 5 longitudinal depressed areas (1 median and 4 lateral). Hysteronotal shield variable..... 11
- Postscapular and hysteronotal shield completely and regularly striated..... 12
11. Hysteronotal shield with very poorly developed transverse striations confined to the lateral areas of the shield. Prescapular and postscapular shields 117-120 and 110-115 long, respectively. Postscapular shield separated from hysteronotal shield by 3-4 anterior striations close together followed by 5 striations far apart.....
*G. (G.) dipodomius* (Radford, 1953)
- Hysteronotal shield completely striated. Prescapular and postscapular shields 110 and 102 long, respectively. Behind postscapular shield there are 3-5 striations close together followed by 9-10 farther apart.....*G. (G.) utahensis* sp.n.
12. Hysteronotal shield short, beginning at 39-42 behind setae *d2*. Striated membranes of coxae II 69 long. Foliate setae *d5* 25 wide, overlapping in midline. Inflated basal part of setae *l5* 100 long. Genital sclerite without an anteromedian prolongation. Prescapular shield shorter than postscapular shield (90-115 and 102-109). Setae *sc e* 21 x 4.....
*G. (G.) thomomys* Fain et al., 1978
- Hysteronotal shield longer, beginning at 10-18 behind setae *d2*. Striated membranes of coxae II 40-54 long. Membranous setae *d5* narrower (maximum 15 wide). Pregenital sclerite with a short anteromedian prolongation 9 to 20 long. Prescapular shield either longer than postscapular shield or these shields subequal..... 13
13. Prescapular shield longer (120-129) than postscapular shield (100-105), the latter with 23 striations along a line joining *d1* and *sc i*; in the midline these striations are less distinct. Hysteronotal shield regularly striated. Soft skin between this shield and the postscapular shield with 11 to 13 striations.....
*G. (G.) texanus* Fain et al., 1978
- Prescapular and postscapular shields equal or subequal in length (105 and 108)..... 14
14. Postscapular shield with 30 striations (along a line joining *sc i* and *d1*). Inflated base of *l5* 75 long.....
*G. (G.) microdipodops* sp.n.
- Postscapular shield with 19 striations (along a line joining *sc i* and *d1*). Inflated base of *l5* 60 long.....
 ..*G. (G.) perognathi* Fain & Whitaker, 1980

DESCRIPTION OF THE SPECIES

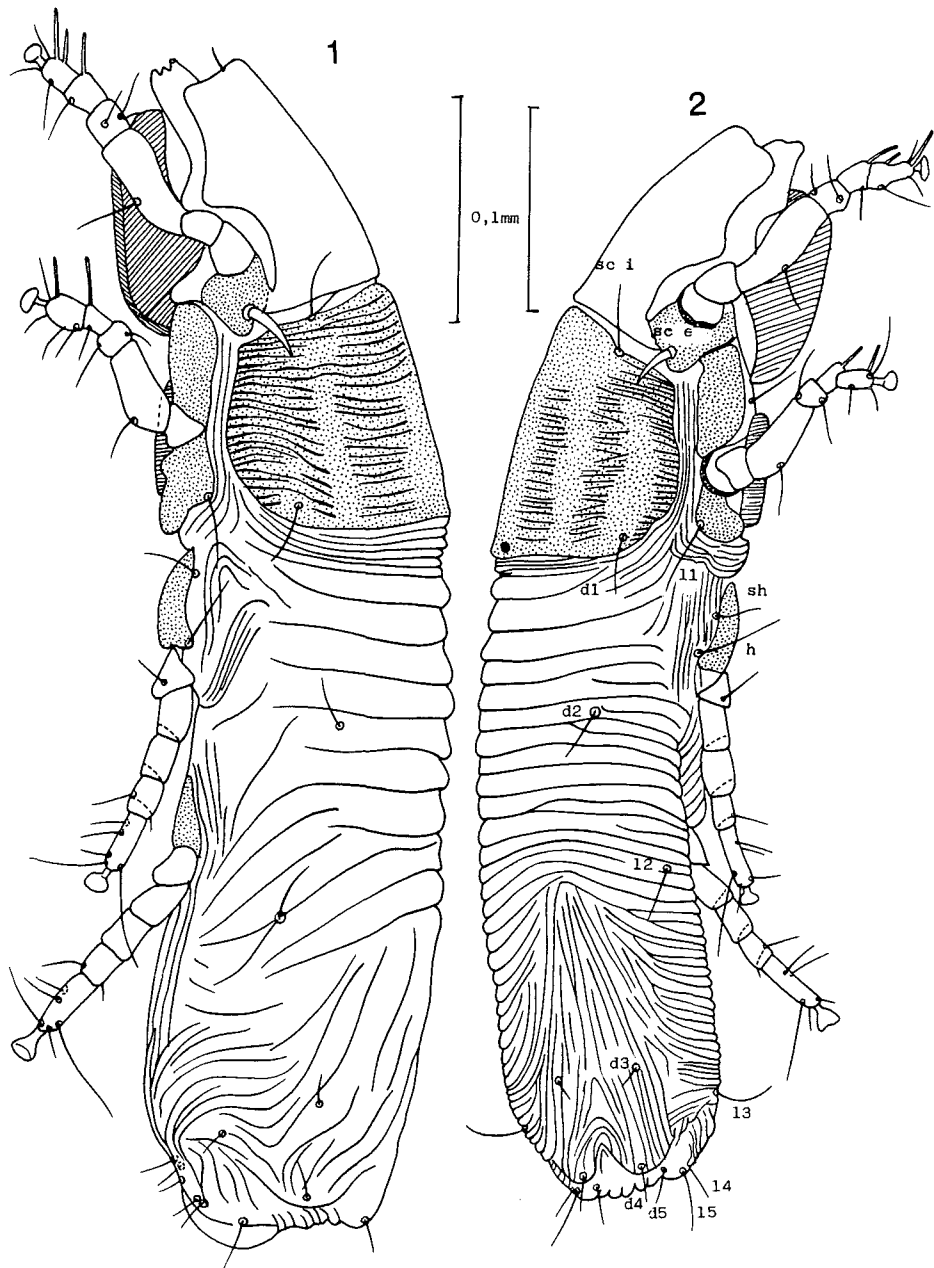
1. *Geomylichus (Geomylichus) dipodomius* (Radford, 1953)

This species was described from *Dipodomys spectabilis* from Santa Fe, New Mexico.

Fain and Hyland (1974) reduplicated the type female and gave a figure of a male found in the type locality but from *Dipodomys ordii*.

Fain et al. (1978) designated this female as the lectotype of *G. dipodomius*. They also gave a figure of a paralectotype male from the type series. This specimen resembled more closely the lectotype female than the male from *Dipodomys ordii* depicted previously by Fain and Hyland. The latter was recognized by these authors as belonging in fact to a new species, *G. texanus*.

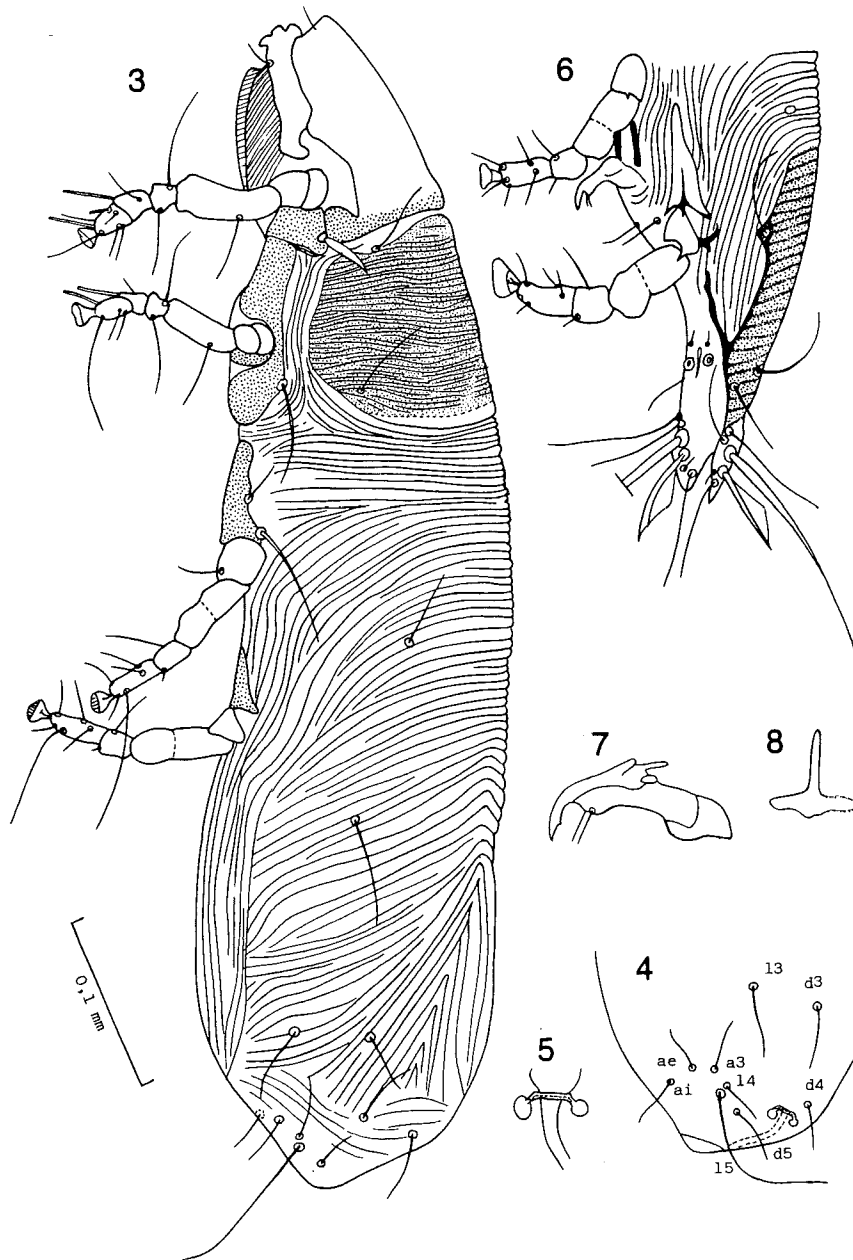
The cuticle of *G. dipodomius* is very soft, and the dorsal striations of the soft cuticle are often difficult to observe in some specimens not perfectly preserved as was the case for the material that we examined so far. Recently we obtained a small series of very good specimens collected from the typical host and locality. We think it is useful to give a short description of these specimens and a figure of a female.



Figs. 1-2. 1. *Geomylichus (G.) dipodomius* (Radford). Female in lateral view (specimen from typical host near Santa Fe); 2. *Geomylichus (G.) utahensis* sp.n. Holotype female in dorsolateral view.

FEMALE (Fig. 1) — Length and width of 3 specimens: 565 x 150, 549 x 135, 535 x 130 (all in lateral view). Prescapular shield slightly longer (126 to 129) than postscapular shield (117-118). Postscapular shield with transverse striations interrupted (partly or completely) in 5 longitudinal depressed ares (one median and 4 lateral). Opisthos-

oma 180-190 long. Hysteronotum with striations poorly developed and superficial, 4-5 anterior striations close together followed by 8 to 10 striations farther apart. These transverse striations followed by 8 to 10 incomplete and poorly developed longitudinal or oblique striations. Opisthogaster striated longitudinally. Posterior extremity



Figs. 3-8. *Geomylichus (G.) microdipodops* sp.n.: 3. Female: Holotype in lateral view (the cuticle of posterior extremity was slightly folded in holotype and setae are not in normal position); 4. Posterior extremity of a paratype with setae in correct position; 5. Sclerite at base of spermatheca; 6. Male: Hysterosoma in lateral view; 7. Penis; and 8. Sclerite.

ending in 3 large lobes, a ventral, median one very large and protruding, and two smaller dorsolateral ones bearing setae *d4*. All setae of the posterior extremity very thin and short. Leg IV 104 long (from base of

femur to tip of tarsus). Setae *sc e* 30 x 5.

MALE — Length and width of 2 specimens (in lateral view): 526 x 130 and 540 x 125. Membranes of coxae II 55 long. Pre-scapular shield slightly longer (117) than

postscapular (110), the latter with striations as in female. 4-5 striations, far apart, behind the postscapular shield. Hysteronotal shield with a few transverse striations poorly developed and confined to the lateral parts of the shield. Setae *sc e* 30 x 4. Setae *d5* with a triangular internal membrane. Setae *l5* 140 long with a basal dilated part 75 long.

Hosts and Localities — 1. The lectotype female was collected from *Dipodomys spectabilis*, Santa Fe, New Mexico. A paralectotype male with same data. From the same host near Santa Fe, Valencia Co. (4 rodents): TLB 10673 and 10674 (both males) 1.3 Km S, 14.5 Km E junction Highway 6 and 47, 22 Aug. 1985 (5 males and 9 females); TLB 10682 and 10683 (both females) 1.5 Km S and 13 Km E Highways 6 and 47, 7 Sept. 1985 (13 males and 15 females (rates collected by Troy L. Best). 2. From *Dipodomys philippsi*, Catorce, San Luis Potosi, Mexico (2 females and 1 nymph) (Fain et al., 1978).

2. *Geomylichus (Geomylichus) utahensis*
spec. nov.

FEMALE (Fig. 2) — Holotype 549 long and 130 wide (in oblique view). Length and width in 3 paratypes: 596 x 140, 570 x 138, 555 x 129 (in lateral view). Opisthosoma 170 long. Prescapular and postscapular shields 120 long in midline, the latter with transverse striations interrupted in 5 longitudinal depressed areas, one median and 4 lateral, as in *G. dipodomius*, but the striations are less marked. Hysteronotum bearing 3-4 striations close together followed by 14 to 17 striations farther apart. Posterior half of hysteronotum with 18 to 25 well-developed and regular longitudinal or oblique striations. Opisthogaster striated longitudinally. Coxal membranes II 58 long. Posterior extremity with 3 lobes as in *G. dipodomius*. Setae *l5* thin, 40 long. Other setae of posterior extremity very thin and short (12 to 35 long). Legs IV 95 long (from base of femur to apex of tarsus). Opening of the bursa terminal, close to anus, without a papilla.

MALE — Length and width (in lateral view) of 3 paratypes: 545 x 120, 540 x 123, 522 x 118. Prescapular and postscapular shields subequal (in 1 paratype 110 and 102,

respectively). Striations or postscapular shield as in female, 27-29 striations along its lateral margin. Coxal II membranes 55 long. Soft part of hysteronotum with 3-4 striations close together followed by 9 to 10 farther apart. Hysteronotal shield well sclerotized, not reaching setae *d2* forwards and strongly striated transversely. Setae *d5* membranous, 13 wide. Setae *l5* 120 long, its inflated basal part 55 long. Setae *sc e* 28 x 4.5.

Host and locality — *Holotype* from *Dipodomys microps*, JOW 11530, Simpson Springs, Juab Co., Utah, USA, 20 June 1982. *Paratypes*: 5 females, 2 males and 3 nymphs with the same data as holotype; 2 females, 3 males and 4 nymphs from the same host as holotype but from 2 mi. N. of Fallon at Soda Lake, Churchill Co., Nevada, USA, 23 June 1984 (JOW 12258).

Remarks — This species is closest to *G. dipodomius*. It differs from it in both sexes by the greater number of transverse striations behind the postscapular shield and of longitudinal or oblique striations in the posterior half of the dorsum in the female. In the male the striations on the hysteronotal shield are much more developed.

3. *Geomylichus (Geomylichus) microdipodops*
spec. nov.

FEMALE (Figs. 3-5) — Holotype 645 long and 150 wide (in lateral view). Length and width in 3 paratypes: 675 x 155, 640 x 151 and 615 x 140. Opisthosoma 250 long. Prescapular and postscapular shield 123 and 102 long, respectively (in midline), the latter completely and finely striated with 33 striations close to midline and 30 striations along a line joining setae *sc i* and *d1*. Hysteronotum bearing about 45 transverse striations in midline. This transversely striated region is about 200 long and is followed by an area of about the same length where the striations are strongly oblique or longitudinal. Setae *sc e* 30 long and 6 thick. Opisthogaster longitudinally striated. Coxal membranes II 48 long. Posterior extremity with a pair of very thin and relatively long setae *l5* (69 in type, 70 to 80 in 2 paratypes). Other setae of idiosoma relatively



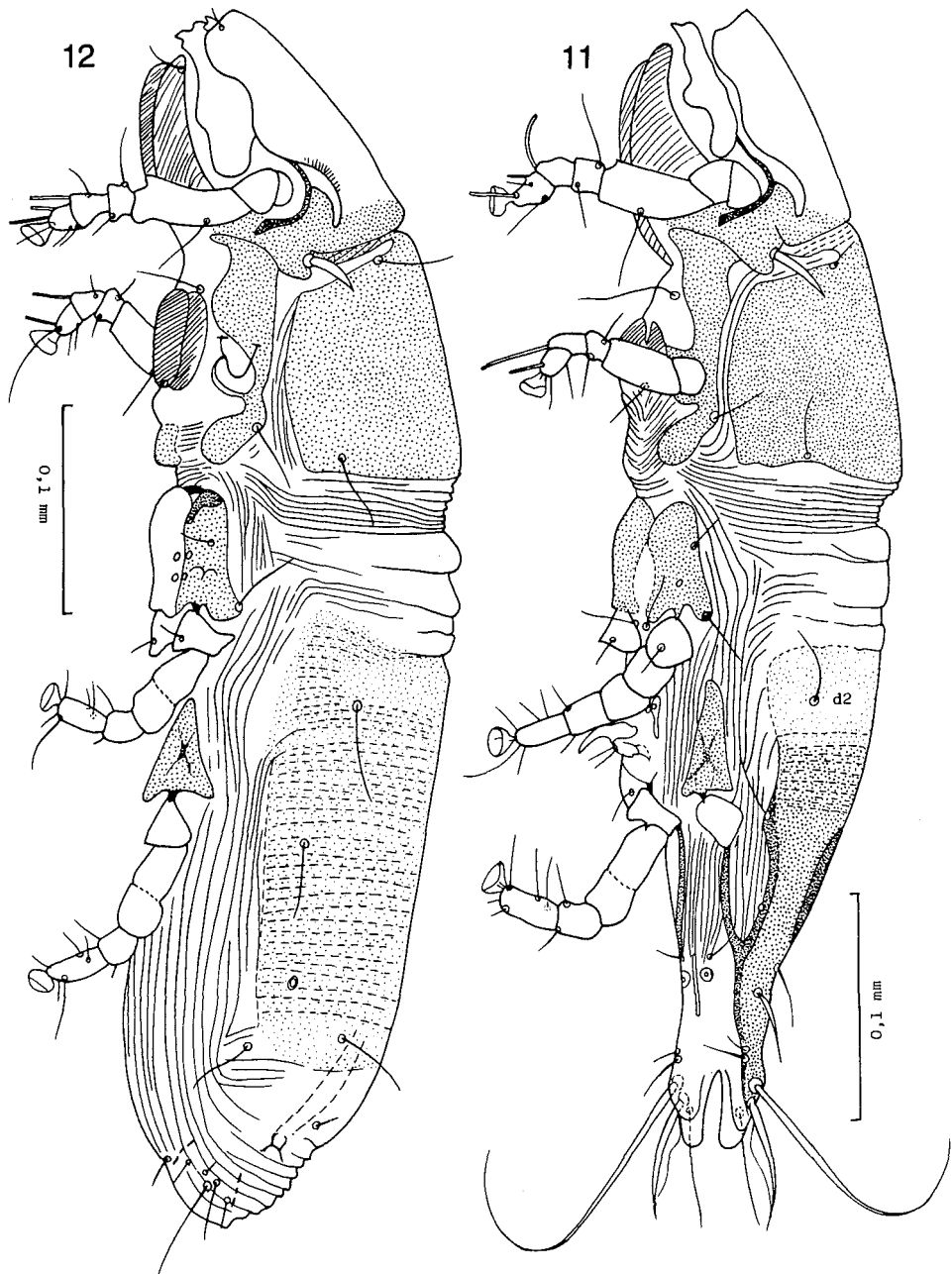
Figs. 9-10. *Geomylichus (G.) formosus* sp.n.: 9. Female in lateral view; 10. Male in lateral view.

long (*d2* and *d3* 39 long; *12* and *13* 42 and 40 long). Legs IV 96 long (from tip of tarsus to base of femur).

MALE (Figs 6-8) — 540 long and 129 wide in lateral view. Length and width in 2 paratypes 558 x 135 and 534 x 129. Pre-scapular and postscapular shields 108 and 105 long, respectively, postscapular shield completely and very finely striated as in female and bearing 30 striations along a

line joining setae *sci* and *d1*. Adanal suckers small. *Sc e* 30 x 4.5. Hysteronotal shield with lateral margins slightly sclerotized. Inflated base of seta *15* 75 long. Seta *d5* foliate (10-11 wide).

Type specimens — Holotype: Female collected from *Microdipodops megacephala* by J. W., 22 June 1984, below Hickison Summit, Lander Co., Nevada, USA (JOW 12249). Paratypes: 4 females, 5 males and 5 nymphs with



Figs. 11-12. *Geomylichus (Whitakerobius) deserti* sp.n.: 11. Male in lateral view; 12. Female in lateral view.

same data as for holotype. One female and one male (JOW 11483) from the same host, 19 June 1984, S. Desert Research Station, Beaver Co., Utah.

REMARKS — This species is closest to *G. perognathi*. It differs from it, in the female by the smaller length of setae *l5*, the greater length of setae *d2*, *d3*, *l2* and *l3*, the

greater number of striations on the post-scapular shield (30 instead of 19 in *G. perognathi*, counted between setae *sc i* and *d1*), the smaller number of striations on hysteronotum. The male differs from that of *G. perognathi* mostly by the greater number of striations on postscapular shield (see key).

4. *Geomylichus (Geomylichus) formosus*
spec. nov.

FEMALE (Fig. 9) — Holotype 579 long and 148 wide (in lateral view). Length and width in 3 paratypes: 540 x 140, 588 x 160 and 555 x 162. Opisthosoma 198 long. Pre-scapular and postscapular shields 150 and 120 long, respectively (in midline), the latter with transverse striations in the anterior two-thirds of the median part of the shield. The lateral borders of this shield are irregular and prolonged laterally by a narrowly pedunculate punctate lobe. Hysteronotum with 35-40 transverse striations in midline. Setae *sc e* 27 x 4. Striated membranes of coxae II 55 long. Setae *l5* strong and 230 long. Legs IV (from tip of tarsus to base of femur) 100 long.

MALE (Fig. 10) — 582 long and 151 wide in lateral view. Length and width in 3 paratypes 530 x 138, 543 x 140 and 558 x 141. Prescapular and postscapular shields 129 and 116 long, respectively (in midline), in 2 paratypes 126 and 114, 123 and 108. Postscapular shield without striations, its lateral borders very irregular and prolonged by a small pedunculate lobe. Hysteronotal shield with indistinct striations, its lateral margins forming well-sclerotized strips reaching the anterior corners of the shield. Adanal suckers small. Striated membranes of coxae II 44 long. The pregenital sclerite is prolonged anteriorly by a median longitudinal sclerite 36 long. Setae *sc e* 27-28 x 4-4.5. Setae *l5* with basal inflated part 90-100 long. Setae *d5* foliate 15 wide.

Type specimens — Holotype: Female collected from *Perognathus formosus* by J.W., 20 June 1982, Simpson Springs, Juab Co., Utah, USA (JOW 11529). Paratypes: One female and one male with same data as holotype; one female and 2 males with data as holotype but from JOW 11528 and 11522; 5 females, 2 males and one nymph with data as holotype but JOW 11525.

REMARKS — This species has some characters of both *G. brevispinosus* and *G. inaequalis*, i.e., in both sexes the lobate aspect of the internal margins of postscapular shield and in the male the heavy sclerotization of the lateral margins of hysteronotal shield and the great length of the

anterior prolongation of pregenital sclerite. It differs from *G. brevispinosus*, in both sexes, by the greater size of setae *sc e*, the greater length of the striated membranes of coxae II, and in the male by the greater length of the dilated base of setae 5. The female differs by the more numerous striations on the hysteronotum.

5. *Geomylichus (Geomylichus) inaequalis*
Fain et al. 1978

This species was known only from the typical host *Perognathus hispidus*, from Texas. We have now found it from *Perognathus* sp. TLB 10220 (2 males and 3 females), TLB 10215 (2 males, 2 females and 1 nymph), TLB 10216 (3 males and 2 females, TLB 10078 (2 males and 1 female), all from San Benito Co., 5 mi. E. Panoche, and TLB 10195 (3 females) from Fresno Co., 12 mi. E. Panoche, California.

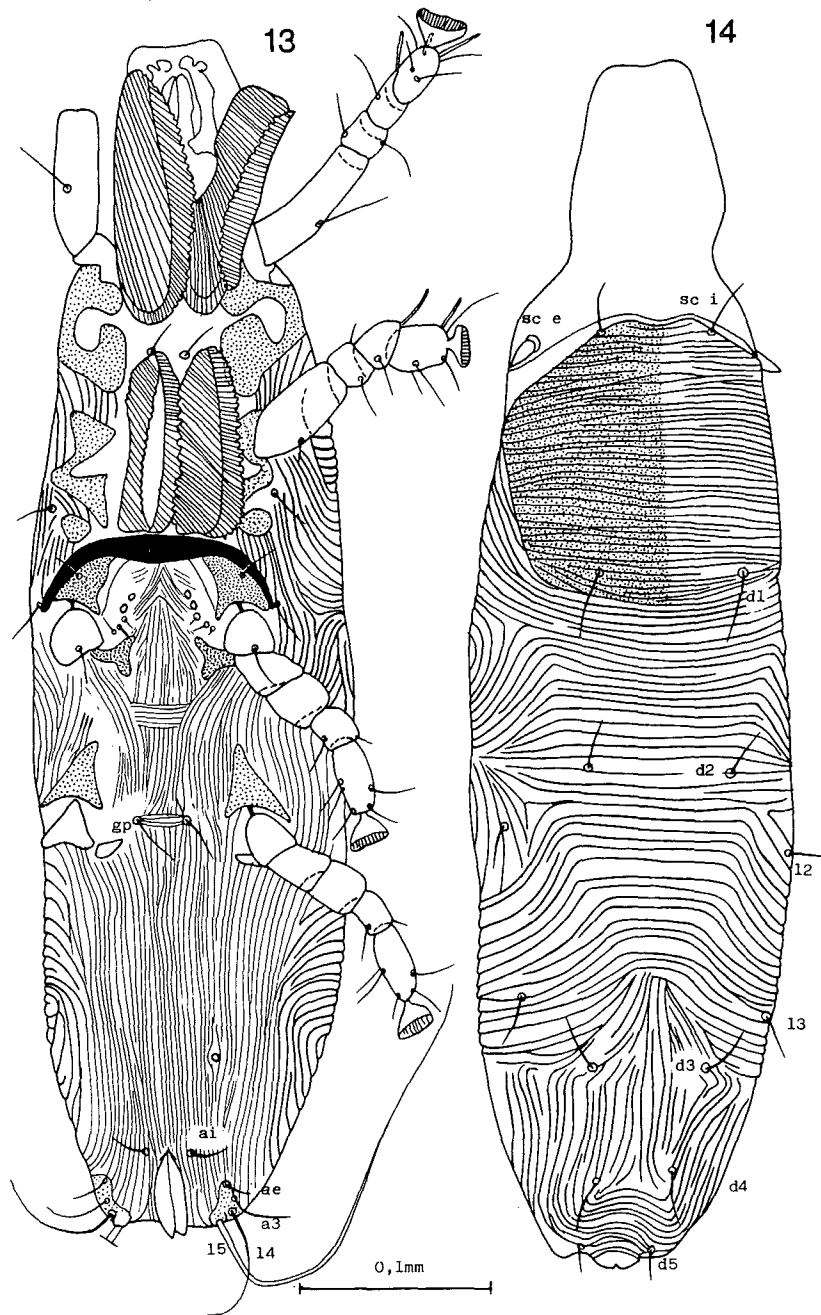
6. *Geomylichus (Geomylichus) perognathi*
Fain and Whitaker, 1980

This species was known from *Perognathus parvus* (typical host), Oregon, and from *Perognathus fasciatus*, Montana, USA. We have seen 8 new specimens of this species; 5 from *Perognathus parvus*, from Lander Co., Nevada (4 females and 1 male), and 3 from *Perognathus longimembris* from Beaver Co., Utah (1 females and 1 male).

7. *Geomylichus (Whitakerobius) deserti*
spec. nov.

MALE (Fig. 11) — Holotype 504 long and 122 wide in lateral view. In 3 paratypes (length x width) 519 x 129, 543 x 132 and 566 x 135. Prescapular and postscapular shields 105 and 112 long, respectively, the latter without striations. Hysteronotal shield very poorly sclerotized in its anterior half and bearing indistinct and incomplete striations, its posterior half with a median part more sclerotized and with denticulated margins. Adanal suckers small. Setae *sc e* 30 x 5. Setae *l5* progressively attenuated apically. Setae *d5* with rather narrow membranes (8 wide).

FEMALE (Fig. 12) — 585 long and 146

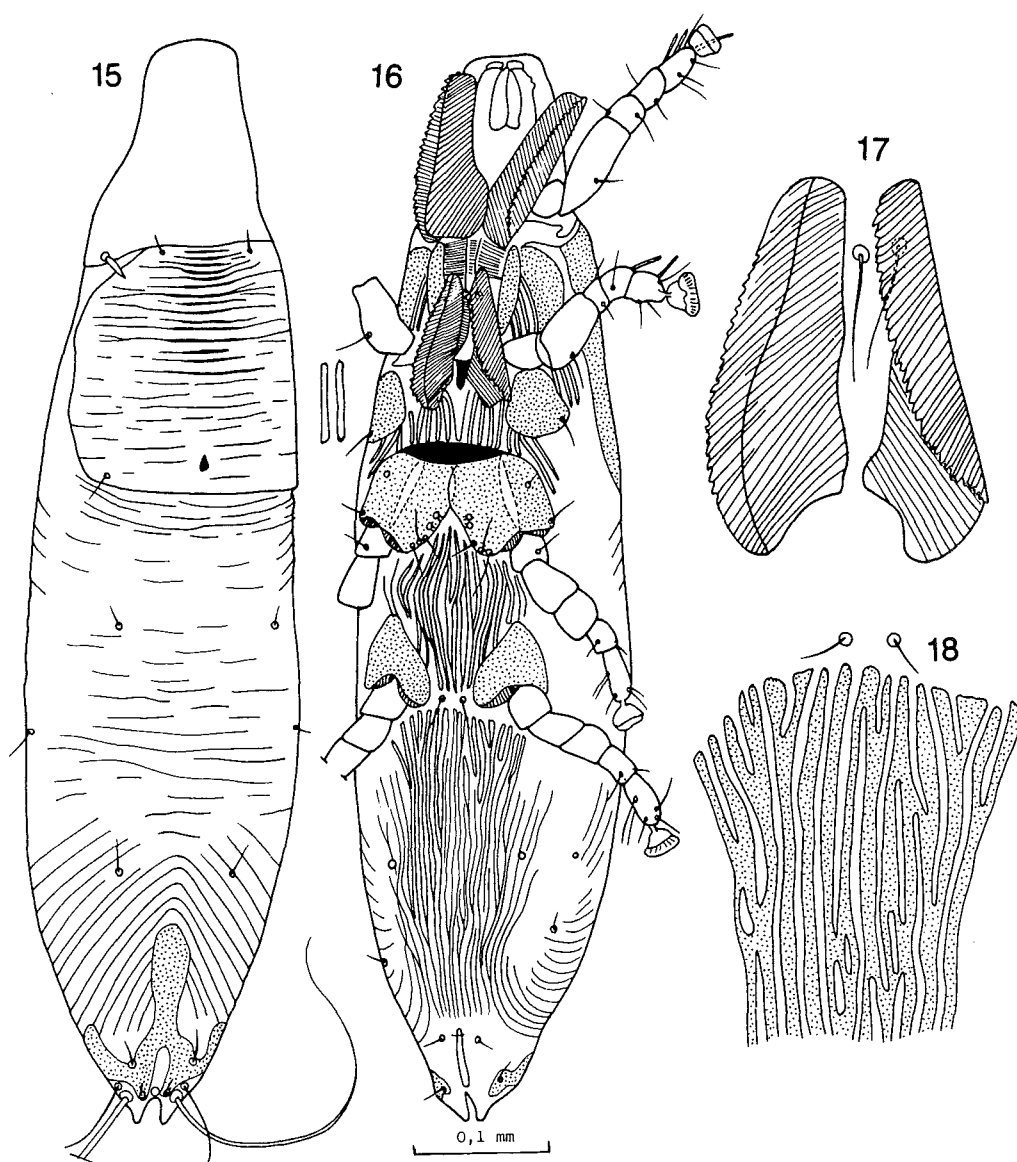


Figs. 13-14. *Geomylichus (Ageomylichus) mexicanus* Fain. Holotype female: 13. ventral view; and 14. dorsal view.

wide in lateral view. In 3 paratypes (length x width) 570 x 138, 568 x 135 and 561 x 141. Opisthosoma 180 long. Prescapular and post-scapular shields 120 and 122 long, respectively, the latter not striated. Striated membranes of coxae II 50-55 long. Hysteronotum with a large poorly sclerotized median shield about 220-240 long and bearing setae

d2, *d3*, *12* and *13*; this shield bears numerous inconspicuous transverse striations. Opisthogaster with longitudinal striations. Setae *sc e* 26-27 x 5-6; setae *15* thin 50-60 long.

Type specimens: Holotype: Male, from *Dipodomys deserti*, 2 mi. N. of Fallon at Soda Lake, Churchill Co., Nevada, 23 June 1984 (JOW 12260). Paratypes: 11 males and



Figs. 15-18. *Geomylichus (Neogeomylichus) postscutatus* Fain. Holotype female: 15. dorsal view; 16. ventral view; 17. clamping membranes of coxae II; 18. thick striations of opisthogaster.

19 females with the same data as holotype.

REMARKS — This species is clearly distinguished from the two other species in the subgenus, in the female by the large size and the poorly sclerotized aspect of the hysteronotal shield and by the absence of striations on the postscapular shield. The male differs from these species by the complete absence of striations on the postscapular shield.

8. *Geomylichus (Ageomylichus) mexicanus*
Fain, 1976

We give herein the first figure of the holotype (and only known specimen) of that species (Figs. 13, 14). The clamping membranes are distinctly serrate along their edges. Ventral surface of hystergaster longitudinally striated except in two very small areas with transverse striations. Hys-

teronotum with distinct transverse striations except in its posterior third where the striations are longitudinal. Orifice of bursa ventral, at 100 in front of posterior extremity. Setae *sc e* 21 x 6.

9. *Geomylichus* (*Neogeomylichus*) *postscutatus*
Fain, 1976

This species was, until now, included in the nominate subgenus. A new examination of the holotype female has shown that the clasping membranes of coxae I and II are distinctly serrate along their edges, thus could belong to the subgenus *Ageomylichus*. It is, however, clearly distinct from this subgenus by several important characters that we summarize as follows: female with hysteronotal shield, male with a very long and strongly sclerotized hysteronotal shield almost reaching the anterior margin of hysteronotum; in both sexes the ventral surface of the body bears very thick striations resembling longitudinal folds. We think that these characters are sufficient for separating this species in a new subgenus (Figs. 15-18). Female with setae *15* thick, 250 long, setae *14* very thin, 40 long, setae *sc e* 17 x 5.5. Male with a very long sclerotized hysteronotal shield (reaching almost to the postscapular shield) bearing in its anterior half about 20-23 short striations distinct only in the median area of shield. Penis about 25 long, flanked by a pair of chitinous processes 80 long directed backwards and strongly attenuated in their posterior half.

REFERENCES

- Coffman, C.C. and B. McDaniel. 1975. The description of a new species of *Geomylichus* Fain, 1970 and rates of infestations on one of its hosts *Geomys bursarius* in South Dakota. *Acarologia* 17: 183-184.
- Fain, A. 1970. Diagnoses de nouveaux *Lobalgides* et *Listrophorides* (Acarina, Sarcoptiformes). *Rev. Zool. Bot. Afr.* 81: 271-300.
- Fain, A. 1973. Diagnoses d'acariens nouveaux (Listrophoridae et Myobiidae). *Rev. Zool. Bot. Afr.* 87: 330-332.
- Fain, A. 1976. Nouveaux acariens parasites de la superfamille Listrophoridae (Astigmata). *Acta Zool. Pathol. Antverp.* 64: 37-67.
- Fain, A. 1981. Notes sur les Listrophoridae (Acari, Astigmata) I. Distribution géographique, caracteres morphologiques et cle des genres. *Acarologia* 22: 305-312.
- Fain, A. and K. Hyland. 1974. The Listrophoroid mites in North America II. The family Listrophoridae. *Bull. Instr. r Sci. Nat. Belg.* 50(1): 1-69.
- Fain, A. and J. O. Whitaker, Jr. 1980. *Geomylichus perognathi* sp.n. (Acari, Listrophoridae) from *Perognathus* spp. in the United States. *J. Parasitol.* 66: 839-840.
- Fain, A., J. O. Whitaker, Jr., T. G. Schwan and F. S. Lukoschus. 1978. Notes on the genus *Geomylichus* Fain, 1970 (Astigmata, Listrophoridae) and description of six new species. *Internat. J. Acarol.* 4: 101-114.
- McDaniel, B. 1965. The subfamily Listrophoridae Gunther with description of a new species of the genus *Listrophorus* Pagenstecher from Texas (Acarina, Listrophoridae). *Acarologia* 7: 704-712.
- Radford, C. 1949. New parasitic mites (Acarina: Myalgidae and Listrophoridae). *Proc. Zool. Soc. London* 118: 933-937.
- Radford, C. 1953. Four new species of "harvest mite" or "chigger" and a new fur mite. *Parasitology* 43: 210-214.