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TWO NEW SPECIES OF FLEAS OF THE GENUS *MERINGIS* (SIPHONAPTERA: HYSTRICHOPSYLLIDAE)

Richard B. Eads¹

ABSTRACT.— Two new species of *Meringis* are described. *Meringis disparalis*, n. sp., has been most commonly taken from *Dipodomys merriami* but has also been taken from *D. ordii* and *Onychomys leucogaster*. Collection localities include the counties of Dona Ana, Eddy, and Luna in southern New Mexico. *Meringis facilis*, n. sp., has been taken from *D. ordii*, several other rodents, and *Sylvilagus audubonii*. Collection localities include Crowley County, Colorado, and Bernalillo, Chaves, and Valencia counties in New Mexico. A key to the species of ♂ *Meringis* is given.

Numerous fleas in the collection of the New Mexico Health and Social Services Department and this facility labeled *Meringis dipodomys* from New Mexico and Colorado were studied. It is believed that two previously undescribed species are present. True *M. dipodomys* have not been seen east of Arizona. Holotypes and allotypes of the new species are in the National Museum of Natural History, Washington, D.C. Paratypes are in the collections of this laboratory and the New Mexico Health and Social Services Department, Santa Fe.

In addition to these 2 *Meringis* species, the other 15 species in this genus which I consider valid are: *M. agilis* Eads 1960, *M. altipectin* Traub and Hoff 1951, *M. arachis* Jordan 1929, *M. bilsingi* Eads and Menzies 1949, *M. deserti* Augustson 1953, *M. dipodomys* Kohls 1938, *M. nidi* Williams and Hoff 1951, *M. rectus* Moreland 1953, *M. vitabilis* Eads 1960, *M. californicus* Augustson 1953, *M. cummingi* Fox 1926, *M. hubbardi* Kohls 1938, *M. jamesoni* Hubbard 1943, *M. parkeri* Jordon 1937, and *M. shannoni* Jordan 1929.

Meringis disparalis, n. sp.
Figs. 1-5

DIAGNOSIS.— In the male an apical sinus divides the immovable process of the clas-

per into two equal lobes in *disparalis*; in *dipodomys* these lobes are markedly unequal. The *arachis*-group of *Meringis* is unique in that the posterior margin of the caudal process of sternum 9 is truncate, forming almost 90 degree angles at the juncture with the dorsal and ventral margins. The caudal process is short in *disparalis*, not reaching subapical spiniform bristles of distal arm of sternum 9; in *dipodomys*, the caudal process usually extends beyond the subapical spiniform bristles of sternum 9. *Meringis disparalis* females have a sinus on the caudal margin of sternum 7 that is shallow relative to that of *dipodomys*, but a definite dorsal lobe is usually present.

MALE.— *Head:* Frontoclypeal margin evenly rounded. Micropunctations or pores scattered from first row of bristles to margin of head. Preantennal region with three large dermal pores along cephalic margin and three smaller pores along ventral margin. First preantennal row of three thin bristles, caudal or ocular row of four larger bristles; a few microsetae interspersed between bristles in each row; ventrad of reduced, lightly pigmented eye an irregular row of about five microsetae. Genal process bluntly acuminate, apex barely visible beyond genal comb which arises ventrad of eye; outer spine superimposed on basal

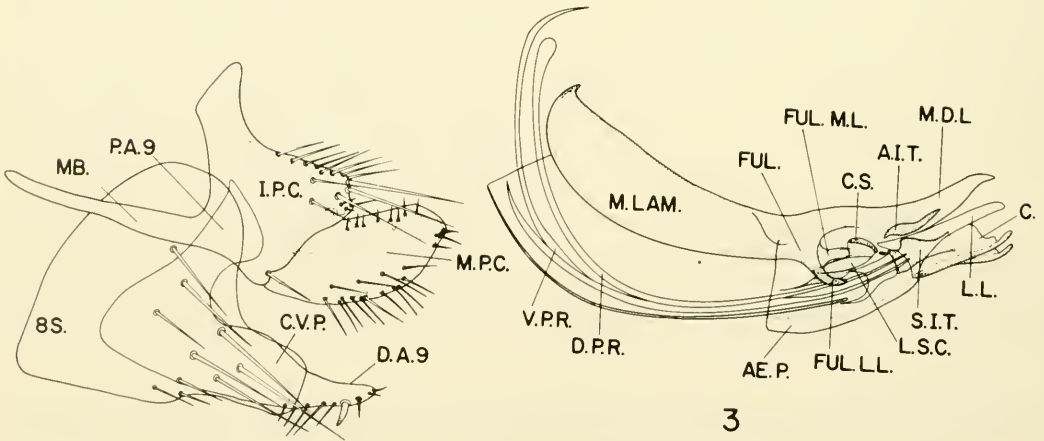
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three-fourths of narrower but longer inner spine; inner spine more acuminate at apex than outer spine. Three short, stout setae at oral angle of head at base of 4-segmented maxillary palp. Acuminate maxillary lobe extending almost to apex of segment 3 of 5-segmented labial palp. Labial palp longer

than maxillary palp, reaching about three-fourths length of fore coxae. Scape of antenna with three tiny bristles at base and four somewhat larger median ones; second antennal segment with apical fringe of short bristles not extending beyond segment 1 of club. A row of fine hairs along the dorsal



1



2

3

Figs. 1-3. *Meringis disparalis*: (1) ♂ head, pro- and mesothorax; (2) ♂ modified abdominal segments; (3) aedeagus.

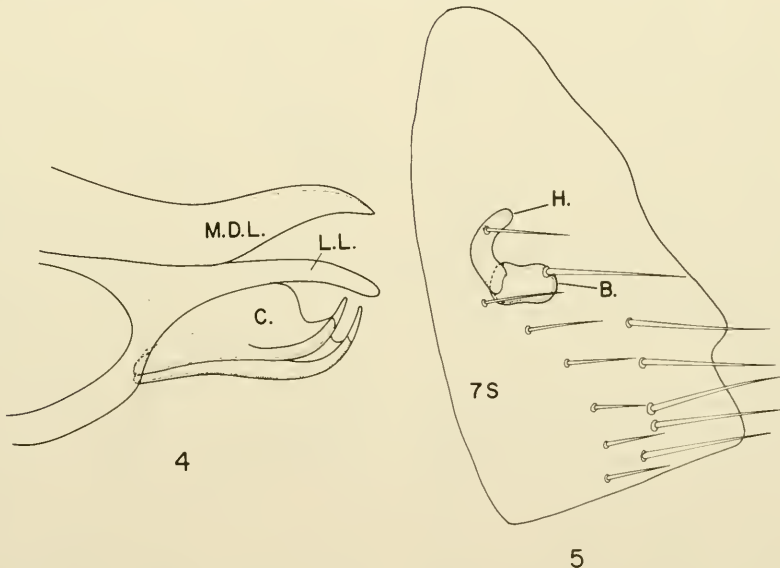
margin of antennal fossa, caudal two longest. Three rows of postantennal bristles arranged about 3:5:5, ventrad bristle longest in each row.

Thorax: Pronotal comb of seven spines per side, preceded by a row of seven large bristles with fine intercalary bristles. Anterior and posterior margins of pronotum almost straight, about same width throughout. Mesonotal flange with four pseudosetae per side. Mesepisternum with one median bristle along pleural rod preceded by a smaller one; mesepimeron with four cephalic bristles in an irregular row and a caudal row of two larger ones. Metanotum with a short row of three or four bristles, followed by a row of seven or eight medium-sized bristles and a row of about six longer bristles alternating with small ones. Lateral metanotal area well defined, with an oblique row of four bristles (dorsal bristle large, next one medium size, next one large, ventrad bristle medium sized). Pleural arch well developed, strongly convex.

Legs: Procoxa with numerous bristles scattered over entire segment, ventromarginal bristles extending beyond trochanter. Mesocoxa with bristles limited to anterior marginal area; metacoxa with bristles on an-

terior margin and about 13 submarginal bristles on distal half; metacoxa with an oblique row of five or six spiniforms beginning at anterior margin on apical one-fifth. Profemora each with 8 to 10 thin lateral and submarginal bristles. All femora with two ventromarginal subapical bristles, both long in femur 1, markedly unequal in length in femora 2 and 3. Femora with two long, unequal, ventromarginal, subapical bristles strongly arched toward tibia. Hind tibia with about 16 lateral and sublateral bristles; six lateral notches of caudal margin with unequal spines in ratio 2:2:2:3:3:3 (base to apex); distal margin of hind tibia with a row of 3 long, 2 small, and 3 long bristles; hind tibial tooth well developed.

Abdomen: Tergum 1 with three or four scattered small bristles followed by a row of five or six larger bristles and a second row of a similar number of still larger bristles with fine intercalary bristles. Terga 2-6 typically with two rows of about eight bristles each, caudal row of large bristles and five or six small intercalaries; tergum 7 with both rows of bristles reduced in number. Sternum of abdominal segment 2 with one bristle on ventral margin; sterna 3-6 each with a row of three bristles frequently pre-



Figs. 4-5. *Meringis disparalis*: (4) apical third of aedeagus; (5) ♀ sternum 7 and spermatheca.

ceded by a single bristle; sternum 7 with a row of about four bristles preceded by two bristles. Three antepygial bristles present; middle bristle over twice as long as upper one; ventral bristle longer than dorsal one.

Modified abdominal segments: Tergum 8 reduced in size, narrow dorsally between antepygial bristles and sensillum, expanding ventrad to below apex of proximal arm of sternum 4; with a mesal row of eight or nine thin bristles on dorsal half. Sternum 8 large, extending dorsad to near apex of proximal arm of sternum 9 and caudad about half length of distal arm; with an irregular row of five or six median small bristles followed by a row of about five larger bristles; ventrocaudal margins of sternum 8 produced into a process which is truncate at apex. Distal arm of sternum 9 tapering to a narrow tip, but not as narrow as *bilsingi*; subapical spiniform bristle always present; usually a second distal spiniform present which is smaller and less darkly pigmented.

Immovable process of clasper comparatively slender, apical portion not as wide as movable finger; divided into two lobes of approximately same height at apex by a shallow sinus; single acetabular bristle inserted near ventrocaudal margin (bristle over twice as long as this distance). Movable process of clasper roughly rectangular in shape, with broadly rounded (almost truncate) dorsal margin; over one-third of its height extends distad of the immovable process. Cephalic margin almost straight and caudal margin gently concave; a row of 10-12 microsetae along or near cephalic margin; several thin bristles scattered over movable process; about 15 marginal and four submarginal bristles of approximately the same size along caudal margin. Manubrium about eight times as long as basal width; beyond basal third sides parallel; tip directed dorsad.

Aedeagus (Fig. 3) comparatively long and slender; median lamina over three times as long as wide, about same width throughout except for a slight constriction immediately anterior to fulcrum. Fulcrum with a curved fulcral latero-ventral lobe and a thicker, straight fulcrual medial lobe. Two strong proximally directed lateral shafts of capsule pass under medial lobes of fulcrum. Cres-

cent sclerite well sclerotized. Armature of inner tube prominent, longer than crescent sclerite, lying above sclerotized inner tube. Median dorsal lobe, bifid, narrowing apically to ventrad-directed, subacuate apex. Lateral lobes long, narrow projections of pouch wall, broadest at base, tapering gently to bluntly rounded ventrad-directed apex. Crochet well developed, much wider than lateral lobes.

FEMALE.—Outline of sternum 7 variable. Sinus shallow, but usually with a small, dorsal lobe bluntly produced; anterior row of about six bristles, posterior row of about six longer bristles present. Anal stylet about 3.5 times as long as broad, with one long apical bristle and two very small, subapical ones. Bulga of spermatheca cylindrical, both ends of approximately equal width, ventral margin almost straight and dorsal margin concave; hilla appreciably longer than bulga, about one-half as wide, sharply upturned and caudad-directed; sternum 8 reduced, three to five bristles at tapered apex. Tergum 8 large, two or three bristles near dorsal margin just posterior to three antepygial bristles; two mesal rows of unequal bristles present, posterior row complete from dorsal to ventral margins; anterior row only on lower half; caudal margin with an irregular row of heavy bristles.

Type specimens were all collected by field personnel of the Plague Branch in New Mexico.

HOLOTYPE ♂.—Ex *Dipodomys merriami*, Dona Ana Co., 13-XII-1951.

ALLOTYPE ♀.—Ex *D. merriami*, Dona Ana Co., 12-XII-1951.

PARATYPES.—3 ♂♂, 4 ♀♀ ex *D. merriami*, Dona Ana Co., 12-XII-1951; 2 ♂♂ ex *Onychomys leucogaster*, Dona Ana Co., 12-XII-1951; 1 ♀ ex *D. merriami*, Eddy Co., 6-III-1952; 1 ♂ ex *D. merriami*, Luna Co., 4-V-1939; 1 ♂ ex *D. merriami*, Luna Co., 19-XII-1950; 1 ♂ ex *O. leucogaster*, Luna Co., 5-V-1939; 1 ♂ ex *O. leucogaster*, Dona Ana Co., 14-IV-1939; 2 ♂♂ ex *D. merriami* Dona Ana Co., 11-XII-1951; 1 ♂ ex *D. merriami*, Luna Co., 19-XII-1950; 2 ♀♀ ex *D. merriami*, Dona Ana Co., 13-XII-1951; 1 ♂ ex *D. ordii*, Dona Ana Co., 13-IV-1939; 1 ♂ ex *D. merriami*, Dona Ana Co., 15-I-1952.

COMMENT.— This species has been most commonly taken from the kangaroo rat, *Dipodomys merriami*, in the New Mexico counties of Dona Ana, Eddy, and Luna. It has also been taken from *D. ordii* and *Onychomys leucogaster*.

Meringis facilis, n. sp.

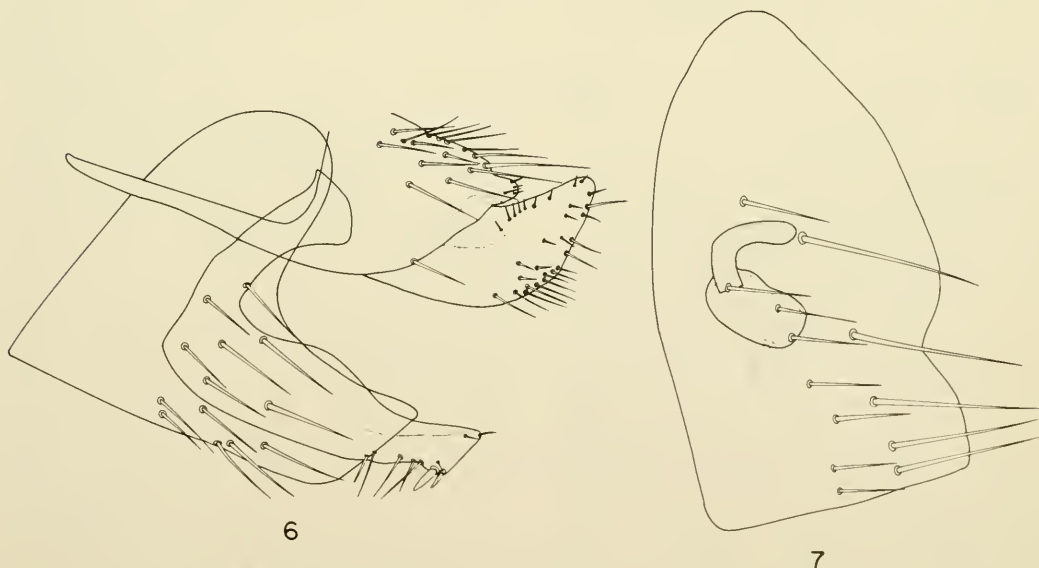
Figs. 6-9

DIAGNOSIS.— In the male, apical sinus divides the immovable process of the clasper into two markedly unequal lobes as in *M. dipodomys* and *M. bilsingi*. The short, thick (at midpoint) movable finger of the clasper (height only slightly more than twice its width) tapers to an evenly rounded, subacute apex, not at all tending to be rectangular in shape as with *M. dipodomys* and *M. disparalis*. The process of the ventro-caudal margin of sternum 8 much wider distally than in related species, wider than movable process of clasper. The distal arm of male sternum 9 extends a very short distance beyond the insertions of the two spiniform bristles, the second and smaller of the two is on the truncate, caudal margin. In *M. bilsingi* the distal arm of sternum 9 tapers to a very narrow tip. Females are difficult to identify in the absence of males. The

sinus of sternum 7 is shallow but has a definite dorsal lobe which tends to be sharply produced.

MALE.— *Head*: Frontoclypeal margin evenly rounded, with micropunctations scattered from first row of bristles to margin of head. Preantennal region with row of three thin bristles, followed by four larger bristles (dorsal bristle extends beyond inner tooth of genal comb) and an irregular row of about three microsetae. Postantennal region with micropunctations scattered anteriorly to first row of bristles; three large dermal pores and two smaller pores present; three rows of bristles arranged about 4:5:5, with ventral bristle in each row much longer; a row of about 10 fine hairs along dorsal margin of antennal fossa.

Thorax: Pronotal comb of seven large spines per side, preceded by row of six large bristles with fine intercalary bristles. Mesonotum with two rows of bristles, larger second row with fine intercalary bristles, preceded by numerous scattered small bristles; mesonotal flange with 2-4 pseudosetae per side. Mesepisternum with three unequal bristles in irregular row along pleural rod. Mesepimeron with two rows of bristles, three in first and two larger ones in second. Lateral metanotal area with irregu-



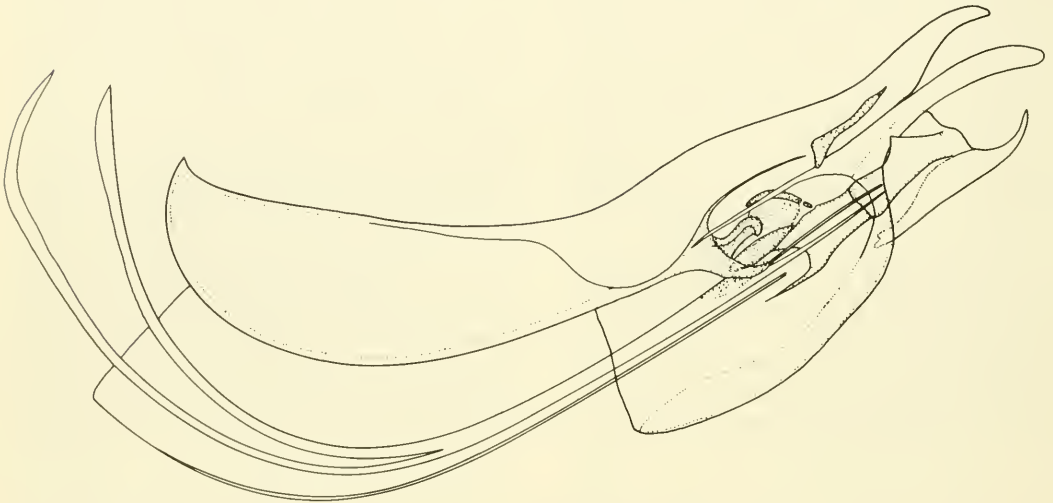
Figs. 6-7. *Meringis facilis*: (6) ♂ modified abdominal segments; (7) ♀ sternum 7 and spermatheca.

lar row of two large bristles and a small ventral bristle; metanotum with short first row of small bristles and second larger row of larger bristles; metepimeron with three rows of bristles arranged 2:3:2, last two bristles near caudal margin and much larger than others. Pleural arch well developed, strongly convex.

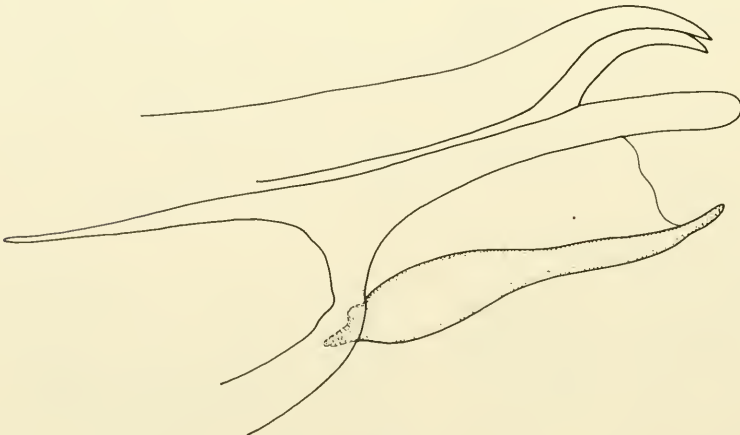
Abdomen: Tergum 1 with irregular row of about three small bristles, followed by row of five larger bristles and third row of five still larger ones with five intercalary bristles. Terga 2-6 typically with two rows

of seven or eight bristles frequently preceded by two or three irregularly spaced bristles on cephalic segments. Abdominal sternum 2 with one bristle on ventral margin; setation of sterna 3-6 variable, typically 3-6 with row of three bristles preceded by a single bristle, sternum 7 with a row of four bristles preceded by one or two bristles. Three antepygial bristles present.

Modified abdominal segments: Tergum 8 reduced in size, mesal row of four or five bristles, sometimes preceded by one or two bristles on dorsal third. Sternum 8 large, ex-



8



9

Figs. 8-9. *Meringis facilis*: (8) aedeagus; (9) apical third of aedeagus.

tending dorsad to apex (or beyond) of proximal arm of sternum 9 and caudad to near apex of distal arm; dorsal half narrow, about one-half width of expanded ventral half; ventrocaudal portion with patch of 13-14 unequal bristles; process of ventrocaudal margins much wider than in related species (wider than movable finger of clasper and over three times as wide as distal arm of sternum 9).

Immovable process of clasper not large, apical half about same size as movable process; divided at apex by shallow sinus into two markedly unequal lobes; large, caudal lobe with three fine bristles toward apex; small lobe with very long bristle, another ventrad of it, followed by a somewhat smaller bristle and a decidedly smaller one; dorsomarginal row of about six bristles, four submarginal ones in two irregular rows. Movable finger of clasper about 2.5 times as high as wide at midpoint, extending one-third of its length beyond immovable process of clasper; basal third of anterior margin concave, remainder fairly straight; posterior margin with apical half straight, basal half convex; anterior margin with irregular row of seven or eight submarginal setae, posterior margin with one long and three short bristles toward apex, followed by about 10 long marginal bristles; two or three long, submarginal bristles at about middle of movable finger smaller at base than marginal bristles.

Manubrium long and thin, about nine times as long as basal width, dorsal margin fairly straight, ventral margins sinuous, tapering somewhat to subacute, dorsad-directed tip. Sternum 9 with proximal arm much shorter and thinner than distal arm, widest toward somewhat swollen, evenly convex apex, dorsocephalic margins forming a beak; distal arm with sinuous, dorsal margin, ventral margin rather straight with shallow concavity toward apex; one large subapical spiniform on ventral margin, usually a smaller, lighter spiniform on caudal margin; distal arm distinctively broad and truncate at apex (only *deserti* shares this character).

Aedeagus (Figs. 8-9) with sclerotized inner tube long and slender (length three times basal width) and with little flaring at

apex; conspicuous spur of dorsal margin at about midpoint rather than usual basal one-fifth to one-third; in *facilis* resulting shallow sinus almost one-half length of tube; lateral lobe long and slender (length five times basal width) extending beyond tips of median dorsal lobe and crochets, subacute at ventrad-directed tip; at base dorsal arm exceptionally long, proximal extension beyond fulcral-ventral lobe.

FEMALE.—Outline of sternum 7 variable. Shallow sinus produces a large, evenly rounded dorsal lobe; anterior row of seven to nine bristles in an irregular row occasionally preceded by one or two bristles, and a posterior row of five or six large bristles. Anal stylet short, 2.5 times as long as basal width, with a long apical and two very small subapical bristles. Spermatheca noticeably larger than is usual in *arachis*-group; bulga cylindrical, ventral margin fairly straight, dorsal margin concave, about twice as wide as hilla; hilla about same length as bulga, sharply upturned and directed caudad.

HOLOTYPE ♂ AND ALLOTYPE ♀.—Ex *Dipodomys ordii*, Chaves Co., New Mexico, 14-XII-1966, J. Wheeler.

PARATYPES.—Colorado: 1 ♂ ex *D. ordii*, Crowley Co., 23-V-1970, E.G. Campos. New Mexico: 3 ♂♂ ex *Onychomys leucogaster*, Chaves Co., 20-XI-1968, J. Wheeler; 2 ♂♂ ex *Neotoma micropus*, Chaves Co., 6-XII-1967, J. Wheeler; 2 ♂♂ ex *Perognathus flavus*, Chaves Co., 23-III-1967, J. Wheeler; 1 ♂ ex *O. leucogaster*, Chaves Co., 8-XI-1968, J. Wheeler; 3 ♂♂, 2 ♀♀ ex *O. leucogaster*, Chaves Co., 6-XII-1967, J. Wheeler; 1 ♂ ex *O. leucogaster*, Bernalillo Co., 8-XI-1950, Frank Prince; 1 ♂ ex *O. leucogaster*, Valencia Co., 26-IV-1939, Frank Prince; 1 ♂, 1 ♀ ex *D. ordii*, Chaves Co., 14-XII-1966, J. Wheeler.

COMMENT.—This species was most commonly taken from the kangaroo rat, *Dipodomys ordii*; it has also been taken from a variety of rodents, and one species of rabbit (*Sylvilagus audubonii*) associated with *D. ordii*. It is prevalent on *Onychomys leucogaster*. Specimens were found in the southeastern Colorado county of Crowley and the New Mexico counties of Bernalillo, Chaves, and Valencia.

Key to *Meringis* Males

1. Distal arm of sternum 9 bilobed, each lobe bearing apical bristle usually strongly spiniform; membranous flap projecting beyond margin of sternum 9 between two lobes 2
- Distal arm of sternum 9 not bilobed, ventral lobe lacking; no membranous flap projecting from ventral margin of sternum 9 6
- 2(1). With three antepygidial bristles 3
- With two antepygidial bristles 4
- 3(2). Lower lobe of each arm of median dorsal process of phallosome truncate at apex, apical width of lobe about one-third basal width (widely distributed in western states) *parkeri*
- Lower lobe of each arm of median dorsal process of phallosome evenly rounded at apex, apical width more than half basal width (recorded from California and Nevada) *californicus*
- 4(2). Subapical spiniform bristle of sternum 9 accompanied by two subspiniform bristles (Washington, Oregon, British Columbia) *shannonii*
- Subapical spiniform bristle of sternum 9 not accompanied by bristles with tendency to be spiniform 5
- 5(4). Subapical spiniform bristle of sternum 9 short, less than one-third length of adjacent bristle *hubbardi*
- Subapical spiniform bristles of sternum 9 over one-third length of adjacent bristles *jamesoni*
- 6(1). Pronotum about twice as wide dorsally as ventrally, comb strongly curved ... *altipectin*
- Pronotum about equal width dorsally and ventrally, comb straight 7
- 7(6). Distal arm of sternum 9 regularly tapered to a very narrow tip; usually with only 1 subapical spiniform bristle, three or four bristles on lateral surface of movable finger of clasper larger in basal diameter than marginal bristles ... *bilisingi*
- Distal arm of sternum 9 sharply angled or broadly rounded at tip; usually with two subapical spiniform bristles; if lateral bristles present on movable finger of clasper, then bristles not larger in basal diameter than those at margin 8
- 8(7). Anterior margin of movable process of clasper concave preapically *nidi*
- Anterior margin of movable process of clasper straight preapically 9
- 9(8). Process of ventrocaudal margin of sternum 8 produced at an acute angle, toward apex not as wide as distal arm of sternum 4 *deserti*
- Process of ventrocaudal margin of sternum 8 not acuminate, toward apex as wide or wider than distal arm of sternum 9 10
- 10(9). Movable process of clasper slender throughout, over three times as high as wide *cummingsi*
- Movable process of clasper less than 3 times as high as wide 11
- 11(10). Process of ventrocaudal margin of sternum 8 distally wider than movable process of clasper *facilis*
- Process of ventrocaudal margin of sternum 8 distally less than half width of movable process of clasper 12

- 12(11). Distal arm of sternum 9 broader than movable process of clasper 13
- Distal arm of sternum 9 not more than half as wide as movable process of clasper 14
- 13(12). Crochet with dorsal margin distinctly concave, apex acute and slightly upturned *arachis*
- Crochet with dorsal margin straight or slightly convex blunt and not slightly upturned *rectus*
- 14(12). Movable process of clasper about twice as high as greatest width *vitabilis*
- Movable process of clasper more than twice as high as greatest width 15
- 15(14). Apical sinus divides immovable process of clasper into two markedly subequal lobes *dipodomys*
- Apical sinus divides immovable process of clasper into two lobes of about equal height 16
- 16(15). Process of ventrocaudal margin of sternum 8 evenly rounded at apex *agilis*
- Process of ventrocaudal margin of sternum 8 truncate at apex *disparalis*

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ABBREVIATIONS

- A.E.P. Aedeagal pouch
- A.I.T. Armature of inner tube of aedeagus
- B. Bulga (head) of spermatheca
- COX. 1 Procoxa
- COX. 2 Mesocoxa

- CR. Crochet
- C.S. Crescent sclerite of aedeagus
- C.V.P. Caudoventral process
- D.A. 9 Distal arm of sternum 9
- D.P.R. Dorsal penis rod
- FUL. Fulcrum of aedeagus
- FUL. L.L. Fulcral lateroventral lobe of aedeagus
- FUL. M.L. Fulcral medial lobe of aedeagus
- H. Hilla (tail) of spermatheca
- I.P.C. Immovable process of clasper
- L.L. Lateral lobe of aedeagus
- L.S.C. Lateral shaft of capsule of aedeagus
- M.D.L. Median dorsal lobe of aedeagus
- M. LAM. Middle lamina of aedeagal apodeme
- M.P.C. Movable process of clasper
- P.A. 9 Proximal arm of sternum 9
- SAT. S. Satellite sclerite of aedeagus
- S.I.T. Sclerotized inner tube of aedeagus
- V.P.R. Ventral penis rod
- 7 S. Sternum 7
- 8 S. Sternum 8
- 9 S. Sternum 9