

# *Geomydoecus* (Mallophaga: Trichodectidae) from *Pappogeomys* and *Zygogeomys* Pocket Gophers (Rodentia: Geomyidae) in Central Mexico

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**ABSTRACT** Descriptions and illustrations are given for 13 previously described species and subspecies of *Geomydoecus* and four new subspecies: *G. mexicanus* Price and Emerson (type host: *Pappogeomys merriami saccharalis* (Nelson and Goldman)), *G. perotensis perotensis* Price and Emerson (type host: *P. m. estor* (Merriam)), *G. p. irolonis* Price and Emerson (type host: *P. m. irolonis* (Nelson and Goldman)), *G. traubi* Price and Emerson (type host: *P. m. merriami* (Thomas)), *G. fulvescens* Price and Emerson (type host: *P. m. fulvescens* (Merriam)), *G. coronadoi coronadoi* Barrera, n. status (type host: *P. m. estor*), *G. c. submerriami*, n. ssp. (type host: *P. m. merriami*), *G. c. saccharalis*, n. ssp. (type host: *P. m. saccharalis*), *G. merriami* Price and Emerson (type host: *P. tylorhinus planiceps* (Merriam)), *G. veracruzensis* Price and Emerson (type host: *P. m. fulvescens*), *G. polydentatus polydentatus* Price and Emerson, n. status (type host: *P. zinseri* (Goldman)), *G. p. angustirostris*, n. ssp. (type host: *P. t. angustirostris* (Merriam)), *G. mcgregori* Price and Emerson (type host: *P. fumosus* (Merriam)), *G. wernecki wernecki* Price and Emerson, n. status (type host: *P. zinseri*), *G. w. planiceps*, n. ssp. (type host: *P. t. planiceps*), *G. alcorni* Price and Emerson (type host: *P. alcorni* Russell), and *G. trichopi* Price and Emerson (type host: *Zygogeomys trichopus trichopus* Merriam).

**KEY WORDS** Insecta, Mallophaga, *Geomydoecus*, pocket gophers

FOLLOWING THE Price & Emerson (1971) publication, Price and co-workers published a series of papers treating complexes of pocket gopher lice of the genera *Geomydoecus* Ewing and *Thomomydoecus* Price and Emerson. These papers included descriptions of 105 species and subspecies of lice from pocket gophers. The only previously described taxa that were not treated in these publications are 13 *Geomydoecus* from pocket gophers of the genera *Pappogeomys* and *Zygogeomys* occurring in central Mexico. Although these louse species and subspecies were treated in Price & Emerson (1971), the procurement of much additional *Geomydoecus* material and the substantial expansion of what we regard as necessary descriptive details since the completion of that work make a taxonomic review of these taxa now appropriate. By presenting redescriptions of these 13 louse taxa along with descriptions of four new subspecies, we here complete our taxonomic treatment of the pocket gopher lice. We provide no key for the identification of these taxa because all species described here are keyed in Price & Emerson (1971), and separation of the new subspecies is based solely on quantitative data as presented in the respective "Remarks" sections.

Quantitative data for the lice considered in this paper combined with host and locality information form part of a computerized pocket gopher-lice data base maintained at the University of Notre Dame. Counted or measured characters in the descriptions are followed by the minimal and maximal observed values and parenthetically by the sample size, mean, and standard deviation. All measurements are in millimeters. For brevity, abbreviations used for dimensional data in the descriptions are—TW, temple width; HL, head length; SL, antennal scape length; SMW, antennal scape medial width; SDW, antennal scape distal width; PW, prothorax width; TL, total length; PAW, male genitalic parameral arch width; EPW, male genitalic endomeral plate width; EPL, male genitalic endomeral plate length; GSW, female genital sac width; and GSL, female genital sac length.

In evaluating the usefulness of characters for specific discrimination, critical values for each character were calculated at the point where the likelihood of single character misidentification of the two compared taxa was equal, given normality and equal variance, and ignoring the probability of collection. For characters offering moderately good discriminating ability, these critical values and the corresponding probabilities of misidentification are given. In an abbreviated comparative description of a species or subspecies, quantitative data are given only for those characters whose means

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differ at a significance level of  $P \leq 0.01$ . Detailed descriptions of the characters and quantitative procedures used for *Geomydoecus* are included in Helleenthal & Price (1980).

In the "Material Examined" sections, a number in parentheses following a locality represents the total number of gophers from which lice were taken. Original locality data expressed in miles are followed parenthetically by the metric equivalent to 0.1 km; the English figure, rather than the metric, expresses the precision of the location estimate. In some cases, we have changed the original host identifications to reflect the current classification of the Geomyidae as given by Hall (1981). As specimen numbers permit, paratypes will be distributed among the Field Museum of Natural History, Chicago; National Museum of Natural History, Washington, D.C.; University of Minnesota, St. Paul; University of Kansas, Lawrence; and Oklahoma State University, Stillwater.

#### *Geomydoecus mexicanus* Complex

The five taxa of this complex are found on six of the seven subspecies of Merriam's pocket gopher, *Pappogeomys merriami* (Thomas), and two of the six subspecies of the naked-nosed pocket gopher, *P. tylosinus* (Merriam), recognized by Hall (1981).

The features shared by members of the *G. mexicanus* complex are for the male—(1) the temple margin with both inner and outer setae short, spiniform (Fig. 2); (2) the antennal scape without a process on the posterior margin (Fig. 1); and (3) a unique combination of genitalic features involving the shape of the endomerale plate and parameral arch, as well as a lightly spiculate sac either without or with only two prominent spines (Fig. 6, 11, 12, and 16); for the female—(1) a short outer dorsal head seta (Fig. 5); (2) the metanotum with 1 + 1, 1 + 2, or 2 + 2 very long median setae (Fig. 5); (3) only moderately long mediadorsal pair of setae on pleuron III (Fig. 5); (4) four taxa with last tergite having inner seta displaced toward midline (Fig. 10 and 14), other taxon with the three setae close together on each side (Fig. 4); (5) subgenital plate lobate (Fig. 5 and 14); and (6) genital sac small, without loops, with only anteriorly directed lines (Fig. 7); and for both sexes the submarginal temple seta inserted between marginal setae (Fig. 2 and 3).

#### *Geomydoecus mexicanus* Price and Emerson (Fig. 1-8)

*Geomydoecus mexicanus* Price and Emerson 1971: 256. Type host: *Pappogeomys merriami saccharalis* (Nelson and Goldman).

**Male.** As in Fig. 1. TW 0.420–0.460 (9: 0.437 ± 0.017); HL 0.295–0.330 (9: 0.319 ± 0.0122); sub-

marginal and inner marginal temple setae 0.065–0.075 (9: 0.074 ± 0.0036) and 0.025–0.030 (9: 0.027 ± 0.0026) long, respectively. Antenna with SL 0.160–0.180 (9: 0.174 ± 0.0061), SMW 0.105–0.120 (9: 0.114 ± 0.0051), SDW 0.110–0.125 (9: 0.118 ± 0.0044). PW 0.305–0.325 (9: 0.312 ± 0.0078). Abdominal tergal setae: I, 2; II, 8–11 (9: 8.9 ± 0.93); III, 17–20 (9: 18.1 ± 0.93); IV, 20–24 (9: 21.4 ± 1.33); V, 17–24 (8: 19.2 ± 2.19); VI, 13–16 (8: 14.0 ± 1.31); tergal and pleural setae on VII, 14–19 (8: 16.1 ± 2.10). Abdominal sternal setae: II, 4–7 (9: 5.7 ± 0.87); III, 8–12 (8: 9.9 ± 1.36); IV, 13–14 (8: 13.4 ± 0.52); V, 11–15 (8: 13.1 ± 1.36); VI, 8–11 (8: 9.2 ± 1.16); VII, 7–10 (8: 8.6 ± 0.92); VIII, 6–11 (8: 8.6 ± 1.60). TL 1.050–1.170 (9: 1.126 ± 0.0394). Terminalia as in Fig. 8. Genitalia as in Fig. 6; parameral arch evenly rounded, PAW 0.105–0.115 (9: 0.112 ± 0.0030); endomerale plate oblong, with attenuate ends, EPW 0.045–0.050 (9: 0.047 ± 0.0030), EPL 0.085–0.110 (9: 0.100 ± 0.0077); sac without large spines.

**Female.** As in Fig. 5. TW 0.480–0.510 (9: 0.497 ± 0.0109); HL 0.320–0.350 (9: 0.334 ± 0.0093); submarginal and inner marginal temple setae 0.075–0.105 (7: 0.088 ± 0.0095) and 0.025–0.030 (9: 0.028 ± 0.0026) long, respectively. PW 0.335–0.360 (9: 0.346 ± 0.0099). Abdominal tergal setae: I, 2; II, 8–15 (9: 10.4 ± 2.13); III, 18–23 (9: 20.3 ± 1.73); IV, 22–27 (8: 24.2 ± 1.83); V, 21–24 (9: 22.1 ± 1.27); VI, 19–24 (8: 20.9 ± 1.73); tergal and pleural setae on VII, 24–30 (9: 27.3 ± 2.12). Longest seta of medial 10 on tergite VI, 0.050–0.065 (9: 0.056 ± 0.0056); on tergite VII, 0.080–0.095 (9: 0.088 ± 0.0050), with none of these longer than 0.100. Longer seta of medial pair on tergite VIII, 0.040–0.060 (8: 0.052 ± 0.0061). Each side of last tergite with 3 setae close together (Fig. 4), with outer seta 0.125–0.180 (8: 0.145 ± 0.0185), middle seta 0.125–0.180 (9: 0.150 ± 0.0196), inner seta 0.065–0.115 (9: 0.087 ± 0.0187) long. Abdominal sternal setae: II, 4–6 (8: 5.0 ± 0.93); III, 8–11 (8: 9.2 ± 1.04); IV, 13–16 (9: 14.6 ± 0.88); V, 12–16 (9: 14.8 ± 1.20); VI, 12–15 (9: 13.6 ± 0.88); VII, 9–14 (9: 11.6 ± 1.74). Subgenital plate with 31–42 (9: 37.9 ± 2.98) setae. TL 1.215–1.385 (9: 1.302 ± 0.0584). Genital sac with GSW 0.140–0.200 (9: 0.171 ± 0.0173), GSL 0.070–0.090 (9: 0.080 ± 0.0065).

**Material Examined.** 31 ♂♂, 44 ♀♀, ex *P. m. saccharalis*. MEXICO: Puebla: 2 mi (3.2 km) SW (1), 2 mi (3.2 km) S (3), and at (3) Atlxco.

**Remarks.** Both sexes of *G. mexicanus* are morphologically closest to *G. perotensis* Price and Emerson. The male of the former has longer median abdominal tergal setae (Fig. 1 versus Fig. 9) and a tendency for a less attenuate anterior portion of the genitalic endomerale plate (Fig. 6 versus Fig. 11). This is the only species of this complex with the female having the three setae on each side of the last tergite grouped closely together (Fig. 4 versus Fig. 10). Quantitative features further supporting this separation will be discussed under each of the following species.

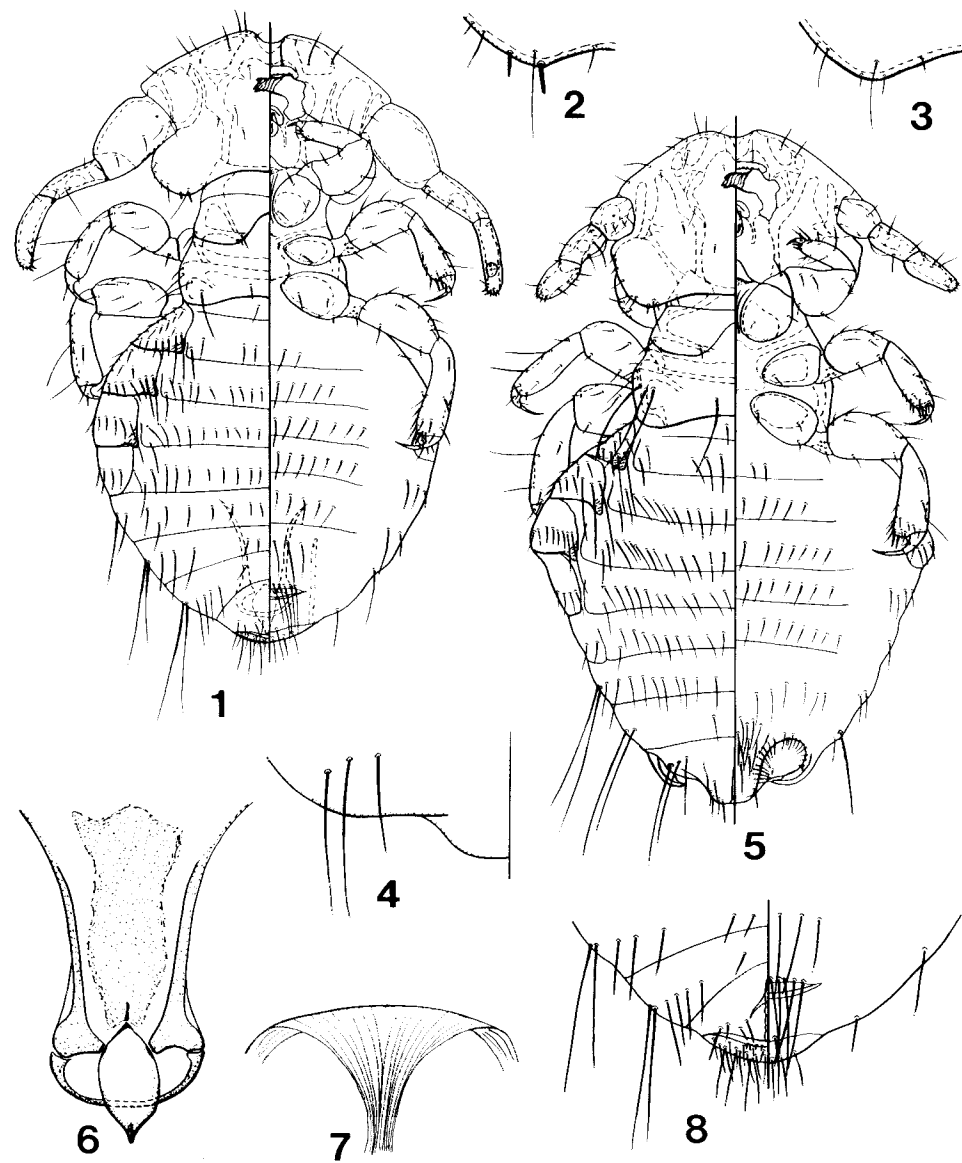


Fig. 1-8. *Geomydoecus mexicanus*. (1) Male, dorsal-ventral view. (2) Male, left temple. (3) Female, left temple. (4) Female, terminal tergite. (5) Female, dorsal-ventral view. (6) Male, genitalia. (7) Female, genital sac. (8) Male terminalia, dorsal-ventral view.

#### *Geomydoecus perotensis* Price and Emerson (Fig. 9-11)

**Male.** Grossly as for *G. mexicanus* (Fig. 1), except dorsal abdomen as in Fig. 9 and as follows:

TW 0.405–0.480 (47: 0.440 ± 0.0217); HL 0.300–0.360 (48: 0.324 ± 0.0157); submarginal and inner marginal temple setae 0.045–0.070 (41: 0.058 ± 0.0050) and 0.020–0.025 (16: 0.027 ± 0.0021) long,

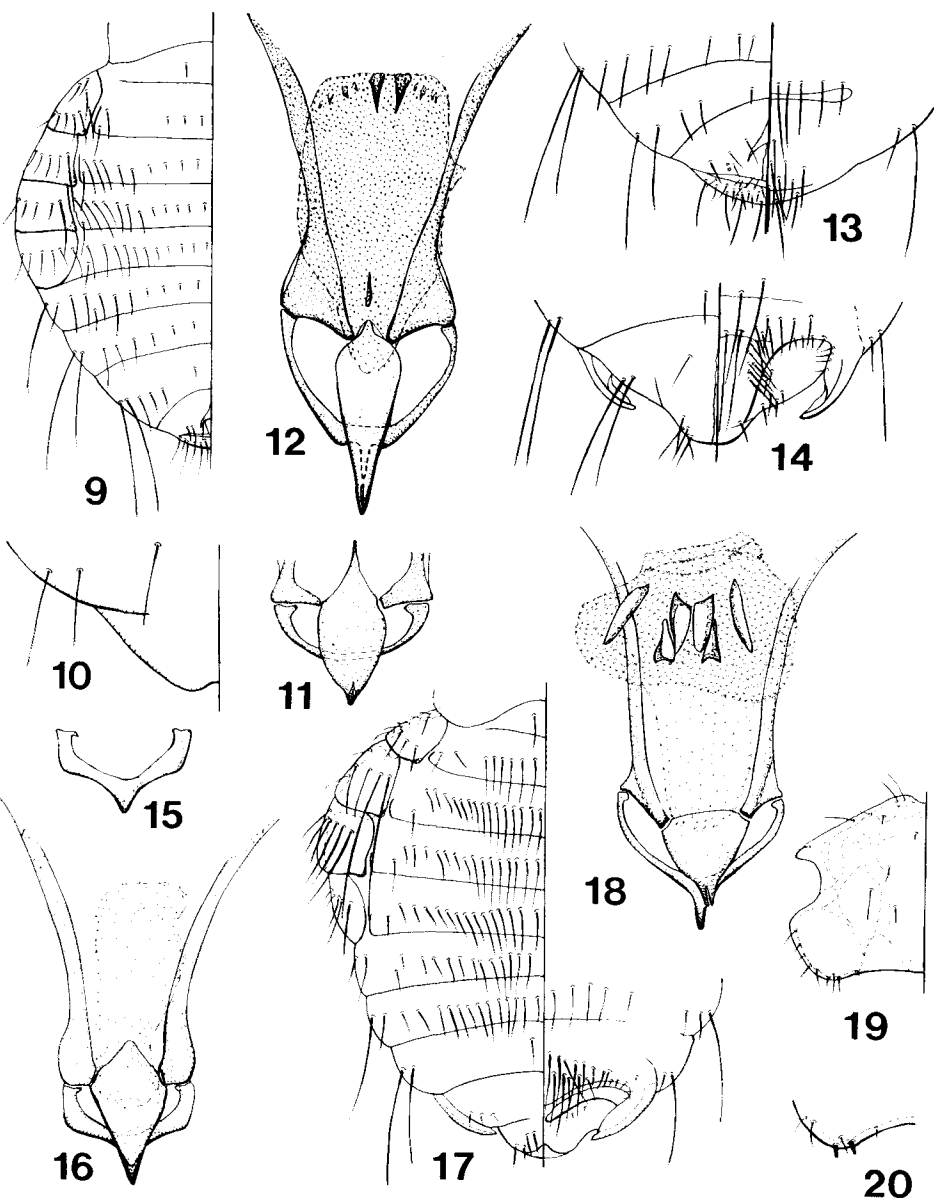


Fig. 9-20. (9-11) *Geomydoecus perotensis perotensis*. (9) Male abdomen, dorsal view. (10) Female, terminalia, dorsal-ventral view. (11) Male, apical genitalia. (12-14) *G. traubi*. (12) Male, genitalia. (13) Male terminalia, dorsal-ventral view. (14) Female terminalia, dorsal-ventral view. (15-16) *G. fulvescens*. (15) Male, genitalia parameral arch. (16) Male, genitalia. (17-20) *G. coronadoi coronadoi*. (17) Female abdomen, dorsal-ventral view. (18) Male, genitalia. (19) Female, head, dorsal view. (20) Male, left temple.

respectively. Antenna with SL 0.145-0.190 (48:  $0.168 \pm 0.0100$ ), SMW 0.095-0.135 (48:  $0.108 \pm 0.0082$ ), SDW 0.100-0.135 (48:  $0.113 \pm 0.0076$ ), PW 0.280-0.355 (48:  $0.313 \pm 0.0168$ ). Abdominal tergal setae: II, 8-15 (48:  $10.6 \pm 1.33$ ); III, 18-23 (47:  $20.4 \pm 1.42$ ); IV, 19-27 (49:  $23.4 \pm 1.75$ ); V, 18-25 (49:  $21.7 \pm 1.65$ ); VI, 12-19 (49:  $15.8 \pm 1.59$ ); tergal and pleural setae on VII, 16-23 (48:  $19.2 \pm 1.79$ ). Abdominal sternal setae: II, 6-11 (49:  $8.5 \pm 1.21$ ); III, 7-15 (46:  $10.5 \pm 1.67$ ); IV, 10-17 (48:  $14.0 \pm 1.72$ ); V, 9-17 (48:  $13.4 \pm 1.77$ ); VI, 7-14 (48:  $10.5 \pm 1.81$ ); VII, 6-11 (48:  $9.0 \pm 0.92$ ); VIII, 6-13 (48:  $9.4 \pm 1.41$ ). TL 0.995-1.315 (46:  $1.175 \pm 0.0768$ ). Genitalia with PAW 0.090-0.105 (48:  $0.098 \pm 0.0039$ ); endomeral plate often with greatly attenuate anterior end (Fig. 11), EPW 0.035-0.050 (47:  $0.042 \pm 0.0031$ ), EPL 0.070-0.100 (37:  $0.085 \pm 0.0099$ ).

**Female.** Close to *G. mexicanus* (Fig. 5), except as follows. TW 0.440-0.535 (49:  $0.486 \pm 0.0227$ ); HL 0.295-0.380 (49:  $0.330 \pm 0.0164$ ); submarginal and inner marginal temple setae 0.055-0.095 (38:  $0.072 \pm 0.0098$ ) and 0.025-0.035 (49:  $0.031 \pm 0.0031$ ) long, respectively. PW 0.305-0.390 (49:  $0.342 \pm 0.0173$ ). Abdominal tergal setae: II, 8-13 (49:  $10.8 \pm 1.14$ ); III, 17-27 (48:  $20.7 \pm 1.94$ ); IV, 19-29 (48:  $24.1 \pm 2.08$ ); V, 20-27 (47:  $23.6 \pm 1.90$ ); VI, 17-26 (47:  $21.6 \pm 2.03$ ); tergal and pleural setae on VII, 24-36 (48:  $30.9 \pm 2.71$ ). Longest seta of medial 10 on tergite VI, 0.060-0.100 (49:  $0.074 \pm 0.0078$ ); on tergite VII, 0.050-0.085 (46:  $0.074 \pm 0.0084$ ), longer seta of medial pair on tergite VIII, 0.040-0.080 (48:  $0.058 \pm 0.0105$ ). Each side of last tergite with inner seta displaced toward midline (Fig. 10), with outer seta 0.060-0.120 (39:  $0.082 \pm 0.0120$ ), middle seta 0.045-0.085 (41:  $0.064 \pm 0.0084$ ), inner seta 0.040-0.060 (45:  $0.052 \pm 0.0060$ ) long. Abdominal sternal setae: II, 6-12 (49:  $8.3 \pm 1.49$ ); III, 8-14 (46:  $10.4 \pm 1.53$ ); IV, 11-19 (45:  $14.6 \pm 1.77$ ); V, 11-20 (46:  $14.9 \pm 1.58$ ); VI, 10-17 (47:  $13.9 \pm 1.49$ ); VII, 9-15 (49:  $11.7 \pm 1.15$ ). Subgenital plate with 27-43 (49:  $34.1 \pm 3.32$ ) setae. TL 1.180-1.465 (49:  $1.339 \pm 0.0685$ ), GSW 0.130-0.240 (43:  $0.179 \pm 0.0239$ ), GSL 0.065-0.120 (46:  $0.086 \pm 0.0121$ ).

**Remarks.** This species, although closest to *G. mexicanus*, is easily recognized by the male with shorter median abdominal tergal setae and the female with the inner seta on each side of the last tergite displaced toward the midline. Quantitatively, the best features for separating males of *G. perotensis* from *G. mexicanus* involve the former having a narrower parameral arch, a shorter submarginal temple seta, and more setae on sternite II; the respective critical values for discrimination and probabilities of misidentification are 0.105 (0.033), 0.066 (0.071), and 7.08 (0.113). For females, the best characters are the shorter lengths of the middle, outer, and inner setae on each side of the last tergite; respective critical discrimination values and misidentification probabilities are 0.107 (0.000), 0.114 (0.008), and 0.070 (0.029).

***Geomydoecus perotensis perotensis*  
Price and Emerson  
(Fig. 9-11)**

*Geomydoecus perotensis perotensis* Price and Emerson 1971: 256. Type host: *Pappogeomys merriami estor* (Merriam).

**Male.** As for *G. perotensis*, except as follows. TW 0.405-0.455 (21:  $0.425 \pm 0.0164$ ); HL 0.300-0.335 (22:  $0.315 \pm 0.0118$ ). Antenna with SL 0.145-0.175 (22:  $0.162 \pm 0.0089$ ), SMW 0.095-0.110 (22:  $0.103 \pm 0.0040$ ), SDW 0.100-0.115 (22:  $0.108 \pm 0.0043$ ), PW 0.280-0.330 (22:  $0.304 \pm 0.0138$ ). Abdominal tergal setae on V, 20-24 (22:  $22.4 \pm 1.26$ ). Abdominal sternal setae: III, 9-15 (22:  $11.4 \pm 1.53$ ); IV, 12-17 (22:  $15.2 \pm 1.34$ ); V, 10-17 (21:  $14.4 \pm 1.50$ ); VI, 9-14 (21:  $11.6 \pm 1.60$ ). TL 0.995-1.230 (22:  $1.132 \pm 0.0733$ ). Genitalia with PAW 0.090-0.100 (22:  $0.095 \pm 0.0026$ ), EPW 0.035-0.045 (22:  $0.040 \pm 0.0015$ ), EPL 0.070-0.095 (17:  $0.080 \pm 0.0072$ ).

**Female.** As for *G. perotensis*, except as follows. TW 0.440-0.505 (24:  $0.471 \pm 0.0191$ ); HL 0.295-0.355 (24:  $0.324 \pm 0.0165$ ). Abdominal tergal setae: IV, 22-28 (23:  $25.0 \pm 1.62$ ); V, 22-27 (23:  $24.5 \pm 1.59$ ). Longest seta of medial 10 on tergite VI, 0.065-0.100 (24:  $0.077 \pm 0.0078$ ); on tergite VII, 0.060-0.085 (23:  $0.077 \pm 0.0071$ ). Longer seta of medial pair on tergite VIII, 0.050-0.080 (23:  $0.066 \pm 0.0081$ ). Each side of last tergite with outer seta 0.060-0.095 (20:  $0.077 \pm 0.0088$ ), middle seta 0.045-0.070 (19:  $0.059 \pm 0.0060$ ) long. Abdominal sternal setae: III, 10-14 (23:  $11.4 \pm 1.08$ ); IV, 13-19 (22:  $15.7 \pm 1.46$ ); V, 14-20 (23:  $15.6 \pm 1.44$ ); VI, 13-17 (23:  $14.8 \pm 1.11$ ); VII, 9-15 (24:  $12.2 \pm 1.06$ ). TL 1.180-1.430 (24:  $1.310 \pm 0.0710$ ), GSW 0.130-0.200 (21:  $0.167 \pm 0.0180$ ).

**Material Examined.** 52 ♂♂, 55 ♀♀, ex *P. m. estor*. MEXICO: Veracruz: 3 km E (1), 2 km E (1), and at (7) Las Vigas, 6 km SSE Altotonga (1), 2 km S Sierra de Agua (1), 7 km SE Jalacingo (1).

29 ♂♂, 25 ♀♀, ex *P. m. perotensis* (Merriam). MEXICO: Veracruz: 1 km NW Pescados (3), 10 km SE Perote (3).

***Geomydoecus perotensis irolonis*  
Price and Emerson**

*Geomydoecus perotensis irolonis* Price and Emerson 1971: 256. Type host: *Pappogeomys merriami irolonis* (Nelson and Goldman).

**Male.** As for *G. perotensis*, except as follows. TW 0.425-0.480 (26:  $0.453 \pm 0.0167$ ); HL 0.310-0.360 (26:  $0.332 \pm 0.0145$ ). Antenna with SL 0.160-0.190 (26:  $0.174 \pm 0.0071$ ), SMW 0.100-0.135 (26:  $0.113 \pm 0.0085$ ), SDW 0.105-0.135 (26:  $0.117 \pm 0.0076$ ), PW 0.300-0.355 (26:  $0.321 \pm 0.0155$ ). Abdominal tergal setae on V, 18-25 (27:  $21.1 \pm 1.74$ ). Abdominal sternal setae: III, 7-12 (24:  $9.7 \pm 1.37$ ); IV, 10-15 (26:  $13.0 \pm 1.30$ ); V, 9-15 (27:  $12.5 \pm 1.50$ ); VI, 7-12 (27:  $9.6 \pm 1.45$ ). TL 1.110-1.315

(24: 1.215 ± 0.0567). Genitalia with PAW 0.095–0.105 (26: 0.100 ± 0.0032), EPW 0.040–0.050 (25: 0.043 ± 0.0034), EPL 0.075–0.100 (20: 0.090 ± 0.0097).

**Female.** As for *G. perotensis*, except as follows. TW 0.475–0.535 (25: 0.500 ± 0.0164); HL 0.320–0.380 (25: 0.336 ± 0.0144). Abdominal tergal setae: IV, 19–29 (25: 23.4 ± 2.18); V, 20–27 (24: 22.8 ± 1.82). Longest seta of medial 10 on tergite VI, 0.060–0.080 (25: 0.070 ± 0.0064); on tergite VII, 0.050–0.085 (23: 0.070 ± 0.0082). Longer seta of medial pair on tergite VIII, 0.040–0.070 (25: 0.051 ± 0.0074). Each side of last tergite with outer seta 0.070–0.120 (19: 0.088 ± 0.0125), middle seta 0.060–0.085 (22: 0.068 ± 0.0080) long. Abdominal sternal setae: III, 8–12 (23: 9.4 ± 1.20); IV, 11–16 (23: 13.6 ± 1.44); V, 11–17 (23: 14.2 ± 1.40); VI, 10–15 (24: 13.0 ± 1.27); VII, 9–13 (25: 11.2 ± 1.05). TL 1.235–1.465 (25: 1.368 ± 0.0534). GSW 0.150–0.240 (22: 0.191 ± 0.0232).

**Material Examined.** 4 ♂♂, 7 ♀♀, ex *P. m. irolonis*. MEXICO: Hidalgo: Apan (1), Irolo (1).

92 ♂♂, 94 ♀♀, ex *P. t. tylosinus*. MEXICO: Hidalgo: 4 mi (6.4 km) S (1) and 6 mi (9.7 km) S (1) Pachuca, 85 km N Mexico City (1); México: San Agustín Acolman (7), Venta de Carpio (2), Piramides de San Juan Teotihuacan (2), 5 km NW Texcoco (2).

**Remarks.** Only quantitative differences separate *G. p. irolonis* from *G. p. perotensis*. Males of the former tend to have a broader genitalic parameral arch, broader temple, and fewer setae on sternite IV; the respective critical discrimination values and misidentification probabilities are 0.097 (0.189), 0.439 (0.196), and 14.11 (0.199). Females of *G. p. irolonis* tend to have a shorter medial seta on tergite VIII, fewer setae on sternite III, and broader temple; the respective values are 0.058 (0.179), 10.41 (0.185), and 0.486 (0.213). Although these differences are not profound, they are sufficient to justify recognition of these populations as subspecies; identification is facilitated in that they are separated geographically and have different hosts.

#### *Geomydoecus traubi* Price and Emerson

(Fig. 12–14)

*Geomydoecus traubi* Price and Emerson 1971: 257.

Type host: *Pappogeomys merriami merriami* (Thomas).

**Male.** Much as for *G. mexicanus*, except as follows. TW 0.420–0.485 (18: 0.456 ± 0.0174); inner marginal temple seta 0.020–0.030 (18: 0.024 ± 0.0024) long. Antenna with SL 0.160–0.200 (17: 0.186 ± 0.0101), SMW 0.105–0.130 (17: 0.120 ± 0.0066). Tergal and pleural setae on abdominal segment VII, 16–22 (18: 19.5 ± 1.92). Abdominal sternal setae on II, 4–6 (18: 4.7 ± 0.75). TL 1.120–1.345 (18: 1.254 ± 0.0558). Terminalia as in Fig. 13; each side of last tergite with pair of small sensilla near short seta. Genitalia as in Fig. 12; par-

ameral arch flattened medioposteriorly, with small projection, PAW 0.125–0.145 (18: 0.137 ± 0.0059); endomergeral plate slender, tapered, EPW 0.050–0.065 (18: 0.059 ± 0.0035), EPL 0.090–0.125 (18: 0.111 ± 0.0080); sac with 2 large spines, each flanked by several much smaller spines.

**Female.** Much as for *G. mexicanus*, except as follows. Abdominal tergal setae: IV, 18–25 (19: 22.2 ± 1.81); tergal and pleural setae on VII, 24–33 (19: 29.8 ± 2.37). Longest seta of medial 10 on tergite VII, 0.060–0.100 (18: 0.075 ± 0.0101). Inner seta on each side of last tergite 0.035–0.060 (19: 0.047 ± 0.0075) long, close to midline (Fig. 14). Subgenital plate with 27–34 (18: 30.1 ± 2.30) setae. TL 1.255–1.450 (17: 1.371 ± 0.0502). GSW 0.175–0.225 (18: 0.206 ± 0.0151), CSL 0.090–0.135 (18: 0.112 ± 0.0156).

**Material Examined.** 79 ♂♂, 109 ♀♀, ex *P. m. merriami*. MEXICO: México: 5 km W (1), 14 km S, 2.5 km W (2), and at (1) Río Frio, Lagunas de Zempoala (1), 5 mi (8.0 km) E Amecameca (1), 5 mi (8.0 km) S Texcoco (1), Chapingo (1); Distrito Federal: Gregorio Atapulco (1), 4 mi (6.4 km) S Churubusco (1), undefined (1); Puebla: Texmelucan (2); Tlaxcala, 8 km S, 7 km W Calpulalpan (2).

17 ♂♂, 11 ♀♀, ex *P. t. planiceps* (Merriam). MEXICO: México: Nevado de Toluca (2), N slope Nevado de Toluca (2), Iso (1), 12 mi (19.3 km) NNE Valle de Bravo (1), Toluca (1).

**Remarks.** The male genitalia of *G. traubi* are unique among all of the known species of *Geomydoecus*. Although there are excellent quantitative features separating male *G. traubi* from others of the complex, the best ones are associated with structures of the genitalia. Females of *G. traubi* are qualitatively separated from *G. mexicanus* by the medial displacement of the inner seta on each side of the last tergite (Fig. 14). Quantitatively, females of *G. traubi* are separable by their shorter inner seta on the last tergite and fewer setae on the subgenital plate; the critical values for discrimination and probabilities of misidentification are 0.067 (0.049) and 34.00 (0.062), respectively. Compared with *G. perotensis*, females of *G. traubi* have longer middle and outer setae on each side of the last tergite and fewer setae on sternite II; the respective values are 0.108 (0.000), 0.122 (0.001), and 6.53 (0.097).

#### *Geomydoecus fulvescens* Price and Emerson

(Fig. 15 and 16)

*Geomydoecus fulvescens* Price and Emerson 1971: 256. Type host: *Pappogeomys merriami fulvescens* (Merriam).

**Male.** Much as for *G. perotensis*, except as follows. HL 0.290–0.325 (14: 0.309 ± 0.0093); submarginal and inner marginal temple setae 0.070–0.095 (10: 0.081 ± 0.0083) and 0.020–0.025 (12: 0.023 ± 0.0025) long, respectively. Antenna with SMW 0.095–0.110 (14: 0.102 ± 0.0047), SDW

0.095–0.110 (14: 0.106 ± 0.0046). Abdominal tergal setae: III, 15–23 (14: 18.5 ± 1.95); V, 17–22 (14: 19.4 ± 1.50); VI, 9–14 (14: 10.7 ± 1.38); tergal and pleural setae on VII, 14–20 (14: 16.8 ± 1.93). Abdominal sternal setae on VIII, 6–10 (14: 8.1 ± 1.29). Terminalia with pair of small dorsal sensilla on each side as in Fig. 13. Genitalia as in Fig. 16; parameral arch of unique shape (Fig. 15); endomergeral plate broadly diamond shaped, EPW 0.045–0.055 (14: 0.053 ± 0.0034), EPL 0.085–0.110 (14: 0.097 ± 0.0073).

**Female.** Much as for *G. perotensis*, except as follows. Submarginal temple seta 0.070–0.090 (11: 0.081 ± 0.0079) long. Abdominal tergal setae on V, 20–24 (12: 22.2 ± 1.34). Longest seta of medial 10 on tergite VI, 0.055–0.080 (12: 0.066 ± 0.0072); on tergite VII, 0.045–0.075 (12: 0.063 ± 0.0088). Each side of last tergite with inner seta 0.035–0.045 (12: 0.039 ± 0.0036) long. Subgenital plate with 27–33 (12: 29.2 ± 2.22) setae.

**Material Examined.** 84 ♂♂, 101 ♀♀, ex *P. m. fulvescens*. MEXICO: Veracruz: 2 km E (5), 2 km N (1), and at (1) Perote, 2 km W (1), 3 km W (1), and at (1) Limón; Puebla: Guadalupe Victoria (1), Chalchicomula (2).

**Remarks.** As with the preceding species, the male genitalia of *G. fulvescens* are unique (Fig. 16) and it is unnecessary to supply the quantitative differences that exist between *G. fulvescens* and the other taxa. The female of *G. fulvescens* is morphologically closest to that of *G. perotensis*, being tenuously separable only by the former having a shorter inner seta on the last tergite; the critical value for discrimination and the probability of misidentification are 0.046 (0.122). The placement of this inner seta well toward the midline and the much shorter lengths of all three setae on each side of the last abdominal tergite will easily separate *G. fulvescens* females from those of *G. mexicanus*. The best quantitative features to separate female *G. fulvescens* from *G. traubi* are the former having much shorter outer and middle setae on the last tergite and the larger number of setae on sternite II; the respective critical discrimination values and misidentification probabilities are 0.123 (0.001), 0.105 (0.004), and 6.49 (0.057).

#### *Geomydoecus coronadoi* Complex

The six taxa of this complex are found on five of the seven subspecies of *P. merriami*, four of the six of *P. tylosinus*, one of the four of the Llano pocket gopher, *P. gymnurus* (Merriam), and on Zinser's pocket gopher, *P. zinseri* (Goldman).

The features shared by members of the *G. coronadoi* complex are for the male—(1) the temple margin with both inner and outer setae stout, spiniform (Fig. 20); (2) the antennal scape without a process on the posterior margin as in Fig. 1; and (3) a characteristic shape of the genitalic endomergeral arch and parameral arch (Fig. 18, 25, and 28) and

a prominent genital sac possessing six (Fig. 18 and 25) or 8–12 (Fig. 29) large spines; for the female—(1) a long outer dorsal head seta (Fig. 19); (2) the metanotum as for *G. mexicanus*; (3) very long medio-dorsal pair of setae on pleuron III (Fig. 17); (4) last tergite with three very short setae close together on each side (Fig. 17, 22, and 26); (5) subgenital plate transverse (Fig. 17, 23, and 26); and (6) genital sac large, with few to many medioanterior loops (Fig. 21, 24, and 27); and for both sexes the submarginal temple seta inserted between marginal setae (Fig. 19 and 20).

#### *Geomydoecus coronadoi* Barrera

(Fig. 17–22)

**Male.** Much as in Fig. 1. TW 0.410–0.465 (35: 0.434 ± 0.0146); HL 0.305–0.350 (35: 0.319 ± 0.0107); submarginal and inner marginal temple setae 0.035–0.050 (31: 0.047 ± 0.0042) and 0.025–0.030 (35: 0.026 ± 0.0016) long, respectively. Antenna with SL 0.195–0.225 (35: 0.212 ± 0.0085), SMW 0.115–0.150 (35: 0.132 ± 0.0092), SDW 0.120–0.150 (35: 0.136 ± 0.0090), PW 0.310–0.355 (36: 0.327 ± 0.0098). Abdominal tergal setae: I, 2; II, 11–17 (36: 13.3 ± 1.47); III, 17–25 (35: 21.2 ± 2.13); IV, 20–29 (35: 24.3 ± 2.00); V, 19–29 (35: 23.2 ± 2.21); VI, 12–22 (36: 17.4 ± 2.28); tergal and pleural setae on VII, 16–27 (36: 21.1 ± 2.45). Abdominal sternal setae: II, 8–13 (36: 10.6 ± 1.54); III, 9–16 (34: 11.9 ± 1.63); IV, 9–18 (32: 13.4 ± 2.53); V, 7–15 (34: 10.5 ± 2.11); VI, 6–12 (35: 8.1 ± 1.30); VII, 4–10 (36: 7.3 ± 1.15); VIII, 5–8 (36: 6.3 ± 0.61). TL 1.210–1.480 (34: 1.331 ± 0.0649). Terminalia close to Fig. 8. Genitalia as in Fig. 18; parameral arch with pointed medioposterior projection, PAW 0.145–0.165 (36: 0.154 ± 0.0052); endomergeral plate roughly triangular with tapered posterior point, EPW 0.070–0.085 (36: 0.080 ± 0.0040), EPL 0.070–0.090 (36: 0.079 ± 0.0052); sac with 6 large spines, the outer pair very long and slender.

**Female.** Grossly as in Fig. 5, but dorsal head as in Fig. 19 and abdomen as in Fig. 17. TW 0.455–0.530 (35: 0.487 ± 0.0187); HL 0.295–0.355 (35: 0.315 ± 0.0136); submarginal and inner marginal temple setae 0.030–0.050 (18: 0.045 ± 0.0048) and 0.035–0.050 (33: 0.044 ± 0.0044) long, respectively. PW 0.320–0.380 (34: 0.352 ± 0.0150). Abdominal tergal setae: I, 2; II, 13–18 (34: 15.2 ± 1.35); III, 20–31 (34: 25.7 ± 2.43); IV, 24–35 (32: 30.8 ± 2.74); V, 24–35 (32: 30.4 ± 2.83); VI, 20–31 (33: 27.2 ± 2.75); tergal and pleural setae on VII, 26–38 (35: 33.1 ± 3.33). Longest seta of medial 10 on tergite VI, 0.080–0.105 (34: 0.093 ± 0.0064); on tergite VII, 0.080–0.115 (30: 0.099 ± 0.0070), with 0–6 (30: 0.6 ± 1.43) of these longer than 0.100. Longer seta of medial pair on tergite VIII, 0.050–0.075 (29: 0.066 ± 0.0074). Each side of last tergite (Fig. 22) with outer seta 0.015–0.040 (33: 0.024 ± 0.0063), middle seta 0.010–0.045 (30: 0.021 ± 0.0075), inner seta 0.014–0.040 (33: 0.023 ± 0.0077).

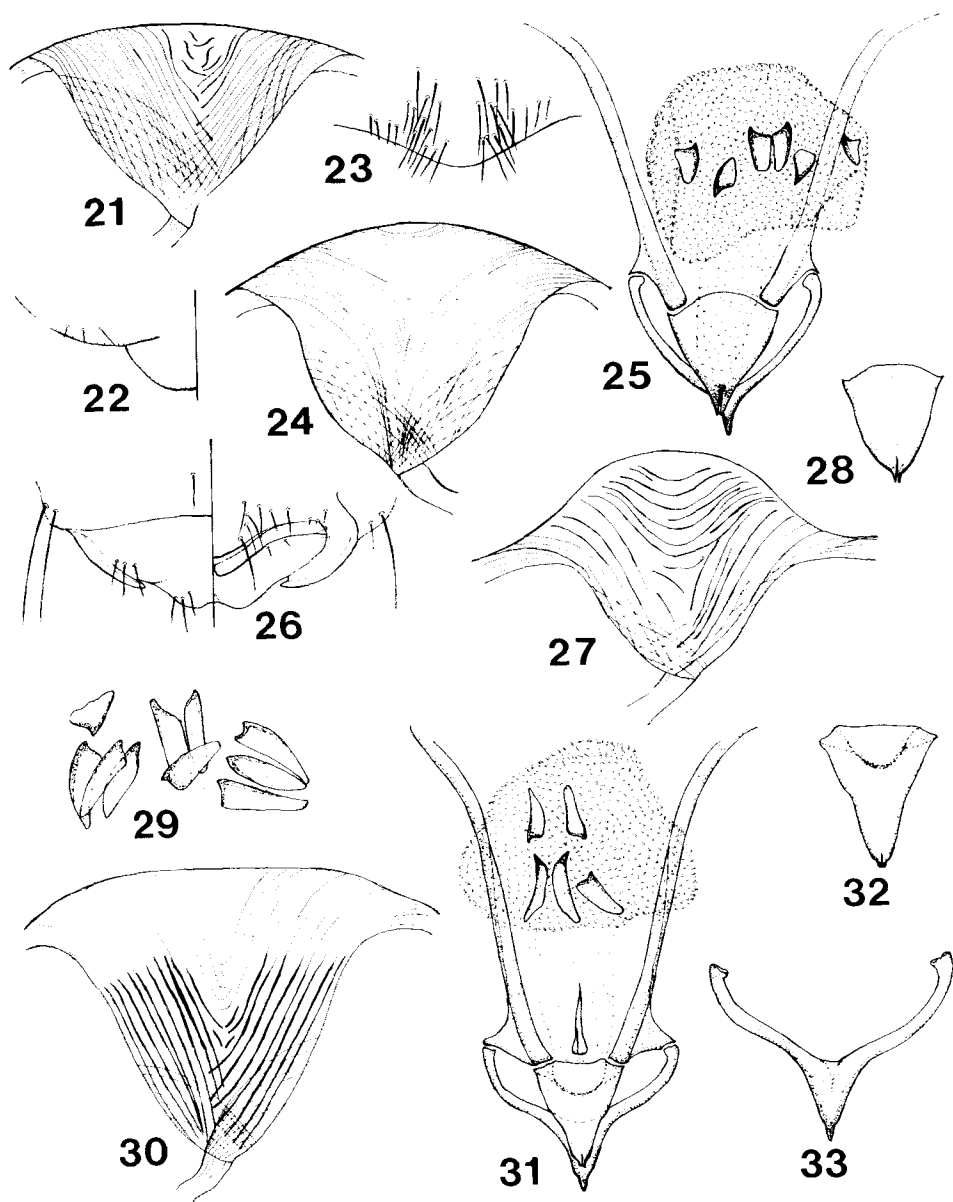


Fig. 21-33. (21-22) *Geomydoecus coronadoi coronadoi*. (21) Female, genital sac. (22) Female, terminal tergite. (23-25) *G. merriami*. (23) Female, subgenital plate. (24) Female, genital sac. (25) Male, genitalia. (26-28) *G. veracruzensis*. (26) Female, terminalia, dorsal-ventral view. (27) Female, genital sac. (28) Male, genitalic endomeral plate. (29-30) *G. polydentatus polydentatus*. (29) Male, genital sac spines. (30) Female, genital sac. (31-33) *G. mcgregori*. (31) Male, genitalia. (32) Male, genitalic endomeral plate. (33) Male, genitalic parameral arch.

long. Abdominal sternal setae: II, 8-14 (33:  $11.3 \pm 1.59$ ); III, 9-14 (33:  $11.6 \pm 1.20$ ); IV, 9-16 (32:  $12.9 \pm 2.23$ ); V, 9-16 (32:  $11.6 \pm 2.01$ ); VI, 6-11 (33:  $9.0 \pm 1.49$ ); VII, 6-11 (33:  $8.2 \pm 1.32$ ). Subgenital plate with cluster of 19-27 (35:  $23.3 \pm 2.48$ ) setae distributed continuously across plate (Fig. 17). TL 1.160-1.515 (35:  $1.308 \pm 0.0749$ ). Genital sac with only few medioanterior loops and loop fragments (Fig. 21), these forming 2-8 (35:  $4.0 \pm 1.31$ ) loops, with posteriormost loop situated 0.045-0.115 (34:  $0.069 \pm 0.0141$ ) from anterior sac margin, GSW 0.175-0.255 (35:  $0.219 \pm 0.0159$ ), GSL 0.150-0.200 (33:  $0.179 \pm 0.0129$ ).

**Remarks.** This species is readily distinguished from the other three in the complex by a combination of male genitalic features, principally the shape and number of large spines on the sac, the shape of the endomeral plate, and the configuration of the lines of the female genital sac. Numerous excellent quantitative features also support its recognition; these will be discussed under each of the following species.

*Geomydoecus coronadoi coronadoi*  
Barrera, new status  
(Fig. 17-22)

*Geomydoecus geomydis coronadoi* Barrera 1961:  
116. Type host: *Pappogeomys merriami estor*  
(Merriam).

**Male.** As for *G. coronadoi*, except as follows. TW 0.410-0.455 (15:  $0.431 \pm 0.0117$ ); HL 0.305-0.335 (15:  $0.315 \pm 0.0107$ ). Abdominal tergal setae: III, 20-25 (16:  $22.7 \pm 1.54$ ); IV, 22-29 (16:  $25.9 \pm 1.63$ ); V, 20-29 (16:  $24.4 \pm 2.19$ ); VI, 15-22 (16:  $18.1 \pm 2.11$ ); tergal and pleural setae on VII, 19-27 (16:  $22.6 \pm 1.89$ ). Abdominal sternal setae: II, 11-13 (16:  $11.9 \pm 0.72$ ); III, 11-16 (16:  $13.1 \pm 1.39$ ); IV, 12-18 (16:  $15.4 \pm 1.75$ ); V, 9-15 (16:  $11.6 \pm 1.82$ ); VI, 6-12 (16:  $8.6 \pm 1.41$ ). TL 1.215-1.420 (15:  $1.324 \pm 0.0538$ ). PAW 0.145-0.160 (16:  $0.154 \pm 0.0055$ ).

**Female.** As for *G. coronadoi*, except as follows. TW 0.455-0.495 (18:  $0.478 \pm 0.0116$ ); HL 0.295-0.330 (18:  $0.310 \pm 0.0110$ ). Inner marginal temple seta 0.035-0.050 (17:  $0.044 \pm 0.0051$ ) long. Abdominal tergal setae: III, 24-31 (18:  $26.7 \pm 2.09$ ); IV, 29-35 (16:  $32.4 \pm 1.75$ ); V, 28-35 (16:  $31.8 \pm 2.04$ ); VI, 25-31 (17:  $28.5 \pm 1.87$ ); tergal and pleural setae on VII, 30-38 (18:  $35.0 \pm 2.38$ ). Each side of last tergite with outer seta 0.015-0.030 (16:  $0.021 \pm 0.0047$ ), middle seta 0.010-0.025 (14:  $0.017 \pm 0.0038$ ) long. Abdominal sternal setae: II, 11-14 (18:  $12.4 \pm 0.92$ ); III, 10-14 (18:  $12.3 \pm 0.97$ ); IV, 12-16 (17:  $14.6 \pm 1.33$ ); V, 11-16 (18:  $12.9 \pm 1.49$ ); VI, 8-11 (18:  $10.1 \pm 0.83$ ); VII, 7-11 (18:  $9.0 \pm 1.14$ ). Subgenital plate with 19-26 (18:  $22.1 \pm 2.17$ ) setae. TL 1.160-1.385 (18:  $1.296 \pm 0.0634$ ). GSW 0.205-0.255 (18:  $0.225 \pm 0.0107$ ).

**Material Examined.** 35 ♂♂, 41 ♀♀, ex *P. m. estor*. MEXICO: Veracruz: 2 km E (1), 3 km E (1), and

at (7) Las Vigas, 6 km SSE Altotonga (1), 7 km SE Jalacingo (1).

5 ♂♂, 10 ♀♀, ex *P. m. perotensis*. MEXICO: Veracruz: 10 km SE Perote (2), 1 mi (1.6 km) NW Pescados (3).

*Geomydoecus coronadoi submerriami*  
Price and Helleenthal, new subspecies

**Type Host.** *Pappogeomys merriami merriami* (Thomas).

**Male.** As for *G. coronadoi*, except as follows. TW 0.425-0.465 (10:  $0.448 \pm 0.0146$ ); HL 0.320-0.350 (10:  $0.327 \pm 0.0099$ ). Abdominal tergal setae: III, 18-23 (10:  $20.5 \pm 1.58$ ); IV, 20-25 (9:  $23.1 \pm 1.45$ ); V, 21-25 (9:  $23.3 \pm 1.32$ ); VI, 15-21 (10:  $18.5 \pm 1.65$ ); tergal and pleural setae on VII, 17-25 (10:  $20.8 \pm 2.30$ ). Abdominal sternal setae: II, 8-12 (10:  $9.6 \pm 1.43$ ); III, 9-13 (9:  $10.9 \pm 1.27$ ); IV, 9-14 (9:  $11.7 \pm 1.50$ ); V, 7-14 (10:  $10.2 \pm 1.93$ ); VI, 7-9 (10:  $8.1 \pm 0.74$ ). TL 1.270-1.480 (10:  $1.382 \pm 0.0693$ ). PAW 0.150-0.165 (10:  $0.157 \pm 0.0050$ ).

**Female.** As for *G. coronadoi*, except as follows. TW 0.480-0.530 (7:  $0.514 \pm 0.0175$ ); HL 0.305-0.355 (7:  $0.329 \pm 0.0148$ ). Inner marginal temple seta 0.040-0.050 (7:  $0.045 \pm 0.0032$ ) long. Abdominal tergal setae: III, 23-27 (7:  $25.6 \pm 1.27$ ); IV, 29-33 (7:  $31.0 \pm 1.29$ ); V, 28-33 (7:  $30.6 \pm 1.72$ ); VI, 26-31 (6:  $28.2 \pm 2.04$ ); tergal and pleural setae on VII, 32-37 (7:  $33.6 \pm 1.72$ ). Each side of last tergite with outer seta 0.020-0.040 (7:  $0.029 \pm 0.0073$ ), middle seta 0.015-0.035 (7:  $0.022 \pm 0.0091$ ) long. Abdominal sternal setae: II, 8-12 (7:  $9.9 \pm 1.57$ ); III, 10-11 (6:  $10.7 \pm 0.52$ ); IV, 10-13 (7:  $11.0 \pm 1.15$ ); V, 9-13 (6:  $10.3 \pm 1.63$ ); VI, 7-9 (7:  $7.7 \pm 0.76$ ); VII, 7-9 (7:  $7.7 \pm 0.76$ ). Subgenital plate with 20-26 (7:  $23.6 \pm 2.30$ ) setae. TL 1.290-1.515 (7:  $1.393 \pm 0.0770$ ). GSW 0.175-0.235 (7:  $0.223 \pm 0.0205$ ).

**Type Material.** HOLOTYPE, ♀, ex *P. m. merriami* (KU-48540), Mexico, México, 5 mi (8.0 km) S, 1 mi (1.6 km) W Texcoco, 19-VII-1952, R. J. Russell, in collection of the University of Kansas. PARATYPES: 61 ♂♂, 48 ♀♀, ex *P. m. merriami*. MEXICO: Distrito Federal: Gregorio Atapulco (1), 4 mi (6.4 km) S Churubusco (1), undefined (1); México: 14 km S, 2.5 km W (2), 5 km W (1), and at (1) Río Frio, Chapingo (1), 5 mi (8.0 km) S, 1 mi (1.6 km) W Texcoco (1), 5 mi (8.0 km) E Amecameca (1); Puebla: Texmelucan (1); Tlaxcala, 8 km S, 7 km W Calpulalpan (1).

**Remarks.** Only quantitative differences separate *G. c. submerriami* from *G. c. coronadoi*. Males of the former tend to have fewer setae on abdominal sternites IV and II and tergite IV; the respective critical discrimination values and misidentification probabilities are 13.52 (0.133), 10.74 (0.138), and 24.49 (0.189). Females of *G. c. submerriami* tend to have fewer setae on abdominal sternites VI, IV, and II, as well as a wider temple; the respective

values are 8.91 (0.070), 12.79 (0.081), 11.15 (0.126), and 0.496 (0.093).

***Geomydoecus coronadoi saccharalis*  
Price and Hellenthal, new subspecies**

**Type Host.** *Pappogeomys merriami saccharalis* (Nelson and Goldman).

**Male.** As for *G. coronadoi*, except as follows. TW 0.415–0.440 (10: 0.425 ± 0.0067); HL 0.305–0.330 (10: 0.318 ± 0.0078). Abdominal tergal setae: III, 17–22 (9: 19.2 ± 1.64); IV, 21–24 (10: 22.9 ± 0.88); V, 19–24 (10: 21.3 ± 1.57); VI, 12–17 (10: 15.1 ± 1.45); tergal and pleural setae on VII, 16–21 (10: 18.8 ± 1.40). Abdominal sternal setae: II, 8–11 (10: 9.6 ± 1.07); III, 10–12 (9: 10.8 ± 0.67); IV, 9–13 (7: 11.3 ± 1.50); V, 7–11 (8: 8.6 ± 1.41); VI, 6–9 (9: 7.0 ± 1.00). TL 1.210–1.330 (9: 1.286 ± 0.0348). PAW 0.145–0.155 (10: 0.152 ± 0.0037).

**Female.** As for *G. coronadoi*, except as follows. TW 0.470–0.505 (10: 0.485 ± 0.0121); HL 0.295–0.330 (10: 0.312 ± 0.0110). Inner marginal temple seta 0.040–0.045 (9: 0.041 ± 0.0022) long. Abdominal tergal setae: III, 20–28 (9: 24.0 ± 2.92); IV, 24–31 (9: 27.9 ± 2.76); V, 24–33 (9: 27.8 ± 3.03); VI, 20–28 (10: 24.5 ± 2.55); tergal and pleural setae on VII, 26–33 (10: 29.2 ± 2.25). Each side of last tergite with outer seta 0.020–0.040 (10: 0.024 ± 0.0060), middle seta 0.015–0.045 (9: 0.026 ± 0.0095) long. Abdominal sternal setae: II, 9–11 (8: 10.1 ± 0.64); III, 9–12 (9: 10.8 ± 0.97); IV, 9–14 (8: 11.1 ± 1.64); V, 9–11 (8: 9.6 ± 0.74); VI, 6–10 (8: 7.7 ± 1.16); VII, 6–8 (8: 7.0 ± 0.93). Subgenital plate with 21–27 (10: 25.2 ± 1.99) setae. TL 1.210–1.330 (10: 1.272 ± 0.0486). GSW 0.180–0.225 (10: 0.206 ± 0.0137).

**Type Material.** HOLOTYPE, ♀, ex *P. m. saccharalis* (KU-62518), Mexico, Puebla, 2 mi (3.2 km) S Atlxco, 9-VIII-1954, R. W. Dickerman, in collection of the University of Kansas. PARATYPES: 24 ♂♂, 18 ♀♀, ex *P. m. saccharalis*. MEXICO: Puebla: 2 mi (3.2 km) S (4) and at (3) Atlxco.

**Remarks.** Only quantitative differences separate *G. c. saccharalis* from the other two subspecies. Compared with *G. c. coronadoi*, males of *G. c. saccharalis* tend to have fewer setae on abdominal sternites II and IV and tergites III and IV; the respective critical discrimination values and misidentification probabilities are 10.74 (0.095), 13.33 (0.112), 20.95 (0.135), and 24.39 (0.143). Females of *G. c. saccharalis* tend to have fewer setae on abdominal sternites II, VI, and V and fewer tergal and pleural setae on VII; the respective values are 11.25 (0.086), 8.93 (0.105), 11.26 (0.108), and 32.10 (0.107). Compared with *G. c. submerriami*, males of *G. c. saccharalis* tend to have fewer setae on abdominal tergite VI, a narrower temple, and shorter total length; the respective values are 16.80 (0.137), 0.437 (0.155), and 1.334 (0.193). Females of *G. c. saccharalis* tend to have fewer abdominal tergal and pleural setae on VII and smaller total

length and temple width; the respective values are 31.39 (0.144), 1.333 (0.165), and 0.500 (0.167).

Although we do not consider these quantitative separations strong enough for more than subspecific recognition, identification is facilitated in that these lice are separated geographically and have different hosts. All 16 collections of *G. c. coronadoi* were from host individuals also having *G. p. perotensis*, all 12 of *G. c. submerriami* from hosts with *G. traubi*, and all 7 of *G. c. saccharalis* from hosts with *G. mexicanus*. The converse does not always hold, as occasionally these members of the *G. mexicanus* complex were taken alone from an individual gopher.

***Geomydoecus merriami* Price and Emerson  
(Fig. 23–25)**

***Geomydoecus merriami* Price and Emerson 1971: 255.** Type host: *Pappogeomys merriami merriami* (Thomas)—probable error; more likely *Pappogeomys tylosinus planiceps* (Merriam).

**Male.** As for *G. coronadoi*, except as follows. HL 0.300–0.320 (7: 0.308 ± 0.0071). Antenna with SL 0.190–0.200 (7: 0.198 ± 0.0045), SDW 0.125–0.130 (7: 0.127 ± 0.0024). Abdominal tergal setae on III, 16–21 (7: 18.6 ± 1.90); V, 19–22 (7: 20.1 ± 1.35); tergal and pleural setae on VII, 16–20 (7: 17.4 ± 1.62). Abdominal sternal setae: VI, 8–11 (7: 9.4 ± 0.98); VII, 8–11 (7: 9.0 ± 1.00). Genitalia as in Fig. 25; PAW 0.155–0.165 (7: 0.161 ± 0.0035); EPW 0.080–0.095 (7: 0.088 ± 0.0049). EPL 0.085–0.110 (7: 0.101 ± 0.0082); sac with 6 large spines, with outer pair short and stout.

**Female.** As for *G. coronadoi*, except as follows. PW 0.325–0.360 (9: 0.335 ± 0.0123). Abdominal tergal setae: II, 12–17 (9: 13.9 ± 1.62); III, 20–26 (8: 22.6 ± 2.20); tergal and pleural setae on VII, 31–44 (8: 36.7 ± 3.85). Each side of last tergite with outer seta 0.025–0.045 (9: 0.034 ± 0.0073), middle seta 0.030–0.060 (9: 0.037 ± 0.0100), inner seta 0.025–0.045 (9: 0.034 ± 0.0078) long. Abdominal sternal setae: VI, 9–13 (8: 10.9 ± 1.46); VII, 10–13 (9: 10.8 ± 0.97). Subgenital plate (Fig. 23) with central area lacking setae. Genital sac with 9–16 (9: 13.2 ± 2.33) close-set medioanterior loops (Fig. 24), with posteriormost loop situated 0.080–0.115 (9: 0.094 ± 0.0112) from anterior sac margin. GSW 0.225–0.290 (9: 0.254 ± 0.0197), GSL 0.185–0.255 (9: 0.226 ± 0.0206).

**Material Examined.** 17 ♂♂, 15 ♀♀, ex *P. t. planiceps*. MEXICO: México: Nevado de Toluca (3), 12 mi (19.3 km) NNE Valle de Bravo (1).

**Remarks.** Both sexes of *G. merriami* are close to those of *G. coronadoi*, but males of the former have smaller outer genital sac spines (Fig. 25 versus Fig. 18), and females have a much different line configuration on the genital sac (Fig. 24 versus Fig. 21). Quantitatively, the best character for separating males is the longer genitalic endomeral plate

of *G. merriami*; the critical value for discrimination and probability of misidentification are 0.090 (0.029). Females of *G. merriami* have more genital sac loops and a longer genital sac; the respective values are 8.61 (0.001) and 0.202 (0.055).

***Geomydoecus veracruzensis* Price and Emerson  
(Fig. 26–28)**

***Geomydoecus veracruzensis* Price and Emerson 1971: 255.** Type host: *Pappogeomys merriami fulvescens* (Merriam).

**Male.** As for *G. coronadoi*, except as follows. HL 0.290–0.320 (12: 0.302 ± 0.0076). Submarginal temple seta 0.050–0.055 (7: 0.054 ± 0.0027) long. Antenna with SL 0.175–0.205 (12: 0.190 ± 0.0101), SMW 0.100–0.125 (12: 0.113 ± 0.0066), SDW 0.105–0.130 (12: 0.118 ± 0.0069). Abdominal sternal setae: VI, 8–11 (12: 9.4 ± 0.90); VII, 6–10 (12: 8.3 ± 0.98). Genitalia with PAW 0.155–0.175 (11: 0.170 ± 0.0064); endomeral plate (Fig. 28) apically broader, not narrowly attenuate.

**Female.** As for *G. coronadoi*, except as follows. TW 0.450–0.485 (13: 0.466 ± 0.0121); HL 0.280–0.320 (13: 0.297 ± 0.0134); submarginal temple seta 0.050–0.065 (9: 0.057 ± 0.0063) long. PW 0.300–0.370 (12: 0.332 ± 0.0174). Abdominal tergal setae: II, 12–16 (13: 14.1 ± 1.44); III, 18–23 (13: 20.2 ± 1.41); IV, 21–27 (12: 25.5 ± 1.62); V, 22–31 (13: 24.9 ± 2.25); VI, 21–29 (13: 24.2 ± 2.54). Longest seta of medial 10 on tergite VI, 0.070–0.090 (12: 0.083 ± 0.0058). Each side of last tergite with outer seta 0.025–0.055 (12: 0.037 ± 0.0086), middle seta 0.045–0.070 (13: 0.058 ± 0.0074), inner seta 0.050–0.065 (13: 0.056 ± 0.0038) long. Abdominal sternal setae: VI, 9–12 (13: 10.4 ± 1.04); VII, 8–12 (13: 9.5 ± 1.13). Terminalia as in Fig. 26, with subgenital plate having 15–18 (13: 16.8 ± 1.01) setae of lengths and distribution as shown. TL 1.160–1.350 (13: 1.247 ± 0.0545). Genital sac as in Fig. 27, with 6–9 (13: 7.8 ± 0.93) loops, with posteriormost loop situated 0.080–0.115 (13: 0.102 ± 0.0118) from anterior sac margin, GSL 0.115–0.230 (13: 0.200 ± 0.0294).

**Material Examined.** 53 ♂♂, 55 ♀♀, ex *P. m. fulvescens*. MEXICO: Puebla: Chalchicomula (1); Veracruz: 3 km W (1), 2 km W (1), and at (1) Limón, 2 km E (5) and 2 km N (1) Perote, Guadalupe Victoria (1).

**Remarks.** The male of *G. veracruzensis* is separated from both of the foregoing species by the unique shape of its genitalic endomeral plate (Fig. 28 versus Fig. 18 and 25). Quantitatively, the male genitalic parameral arch of *G. veracruzensis* tends to be wider than that of *G. coronadoi*; the critical discrimination value and misidentification probability are 0.162 (0.077). The endomeral plate of *G. veracruzensis* is shorter than that of *G. merriami*; the respective values are 0.088 (0.013). The female of *G. veracruzensis* has its genital sac intermediate between the other two species, having more loops

than *G. coronadoi* and fewer than *G. merriami* (Fig. 27 versus Fig. 21 and 24). Quantitatively, compared with *G. coronadoi*, females of *G. veracruzensis* have longer inner and middle setae on each side of the last tergite, more loops on the genital sac, and fewer subgenital plate setae; the respective discrimination values and misidentification probabilities are 0.040 (0.006), 0.040 (0.008), 5.88 (0.061), and 20.03 (0.069). Compared with *G. merriami*, females of *G. veracruzensis* have a longer inner seta on each side of the last tergite, fewer genital sac loops, and fewer subgenital plate setae; the respective values are 0.045 (0.025), 10.50 (0.048), and 21.00 (0.050).

***Geomydoecus polydentatus* Price and Emerson  
(Fig. 29–30)**

**Male.** Much as in Fig. 1. TW 0.435–0.505 (56: 0.468 ± 0.0154); HL 0.295–0.360 (56: 0.329 ± 0.0181); submarginal and inner marginal temple setae 0.030–0.055 (41: 0.043 ± 0.0054) and 0.025–0.030 (57: 0.026 ± 0.0018) long, respectively. Antenna with SL 0.190–0.240 (54: 0.220 ± 0.0112), SMW 0.115–0.150 (53: 0.134 ± 0.0082), SDW 0.120–0.155 (53: 0.138 ± 0.0088). PW 0.315–0.375 (61: 0.340 ± 0.0163). Abdominal tergal setae: I, 2; II, 10–18 (59: 13.0 ± 2.00); III, 17–25 (60: 21.5 ± 1.86); IV, 19–30 (61: 24.6 ± 2.43); V, 19–29 (61: 23.6 ± 2.20); VI, 13–22 (59: 17.1 ± 2.03); tergal and pleural setae on VII, 16–27 (56: 20.3 ± 2.54). Abdominal sternal setae: II, 7–13 (60: 10.0 ± 1.57); III, 9–15 (59: 11.3 ± 1.15); IV, 10–20 (59: 13.1 ± 1.82); V, 9–18 (58: 12.4 ± 1.67); VI, 8–13 (59: 10.5 ± 1.37); VII, 7–13 (59: 9.4 ± 1.31); VIII, 5–8 (60: 6.1 ± 0.61). TL 1.255–1.610 (56: 1.438 ± 0.0884). Terminalia close to Fig. 8. Genitalia much as in Fig. 18; parameral arch with pointed medioposterior projection, PAW 0.155–0.185 (61: 0.172 ± 0.0077); endomeral plate roughly triangular with tapered posterior point, EPW 0.080–0.110 (61: 0.096 ± 0.0060), EPL 0.085–0.125 (59: 0.106 ± 0.0111); sac with 8–12 large spines (Fig. 29).

**Female.** Grossly as in Fig. 5, but dorsal head close to Fig. 19 and abdomen to Fig. 17. TW 0.470–0.545 (61: 0.508 ± 0.0189); HL 0.280–0.360 (61: 0.321 ± 0.0162); submarginal and inner marginal temple setae 0.035–0.050 (40: 0.044 ± 0.0045) and 0.035–0.055 (58: 0.046 ± 0.0059) long, respectively. PW 0.330–0.390 (60: 0.358 ± 0.0155). Abdominal tergal setae: I, 2; II, 11–17 (60: 14.1 ± 1.23); III, 19–27 (60: 23.3 ± 2.09); IV, 24–36 (56: 30.0 ± 2.86); V, 23–35 (57: 30.1 ± 2.74); VI, 23–35 (58: 28.5 ± 2.92); tergal and pleural setae on VII, 28–42 (60: 35.1 ± 3.47). Longest seta of medial 10 on tergite VI, 0.075–0.100 (60: 0.087 ± 0.0061); on tergite VII, 0.100–0.140 (46: 0.118 ± 0.0091), with 0–8 (44: 6.0 ± 2.54) of these longer than 0.100. Longer seta of medial pair on tergite VIII, 0.050–0.095 (58: 0.069 ± 0.0082). Each side of last tergite with outer seta 0.020–0.070 (54: 0.047 ± 0.0115),

middle seta 0.025–0.085 (58: 0.048 ± 0.0162), inner seta 0.025–0.080 (58: 0.042 ± 0.0145) long. Abdominal sternal setae: II, 7–14 (60: 10.8 ± 1.25); III, 9–15 (58: 11.0 ± 1.01); IV, 9–15 (56: 11.9 ± 1.42); V, 9–15 (58: 11.6 ± 1.24); VI, 8–14 (60: 10.4 ± 1.28); VII, 9–14 (60: 10.8 ± 1.26). Subgenital plate with 19–35 (59: 25.2 ± 2.90) setae, with open central area as for *G. merriami* (Fig. 23). TL 1.210–1.575 (61: 1.407 ± 0.0977). Genital sac (Fig. 30) distinctive, with only faint lines anteriorly, much more pronounced posteriorly; with 0–7 (57: 4.14 ± 1.37) loops, posteriormost loop situated 0.070–0.130 (56: 0.101 ± 0.0136) from anterior sac margin, GSW 0.225–0.330 (60: 0.286 ± 0.0243), GSL 0.200–0.320 (60: 0.248 ± 0.0225).

**Remarks.** Males of *G. polydentatus* are readily separable from those of other species of the complex by the large number of genital sac spines. Females of *G. polydentatus* have a distinctive genital sac, with faint, deeply indented lines anteriorly and pronounced lines posteriorly. Quantitative values support this separation, but we feel it unnecessary to give them in view of the excellent qualitative features for both sexes.

*Geomydoecus polydentatus polydentatus*  
Price and Emerson, new status  
(Fig. 29 and 30)

*Geomydoecus polydentatus* Price and Emerson 1971: 255. Type host: *Pappogeomys zinserti* (Goldman).

**Male.** As for *G. polydentatus*, except as follows. TW 0.455–0.505 (39: 0.474 ± 0.0115); HL 0.320–0.360 (39: 0.338 ± 0.0123). Antenna with SL 0.200–0.240 (40: 0.223 ± 0.0098), SMW 0.125–0.150 (39: 0.137 ± 0.0073), SDW 0.125–0.155 (39: 0.141 ± 0.0083), PW 0.325–0.375 (41: 0.345 ± 0.0150). Abdominal tergal setae: II, 11–18 (39: 13.6 ± 2.01); III, 19–25 (40: 22.3 ± 1.30); IV, 20–30 (41: 25.5 ± 2.17); V, 20–29 (41: 24.2 ± 2.08); VI, 14–22 (40: 17.5 ± 2.07); tergal and pleural setae on VII, 18–27 (38: 21.3 ± 2.33). Abdominal sternal setae: II, 7–13 (40: 10.4 ± 1.50); V, 10–18 (39: 12.8 ± 1.60); VI, 8–13 (39: 10.8 ± 1.37); VII, 7–13 (40: 9.7 ± 1.38). TL 1.320–1.610 (39: 1.469 ± 0.0822). Genitalia with EPW 0.080–0.110 (41: 0.098 ± 0.0066).

**Female.** As for *G. polydentatus*, except as follows. TW 0.475–0.545 (43: 0.516 ± 0.0155); HL 0.305–0.360 (43: 0.327 ± 0.0126). PW 0.340–0.390 (42: 0.365 ± 0.0128). Abdominal tergal setae: II, 11–17 (43: 14.4 ± 1.22); IV, 26–36 (39: 30.7 ± 2.46); V, 23–35 (40: 30.9 ± 2.32); VI, 23–35 (41: 29.2 ± 2.77); tergal and pleural setae on VII, 29–42 (43: 35.8 ± 3.24). TL 1.270–1.575 (43: 1.449 ± 0.0771). Genital sac with 2–7 (41: 4.6 ± 1.21) loops.

**Material Examined.** 74 ♂♂, 68 ♀♀, ex *P. zinserti*. MEXICO: Jalisco: Lagos de Moreno (16).  
10 ♂♂, 19 ♀♀, ex *P. t. brevis* Russell. MEXICO: Guanajuato: 5 mi (8.0 km) E (1) and 2 mi (3.2 km) E (4) Celaya.

17 ♂♂, 15 ♀♀, ex *P. t. planiceps*. MEXICO: México: El Rio (=San Bernabe), 14 mi (22.5 km) NW Toluca (1), N slope Nevado de Toluca (1).

63 ♂♂, 47 ♀♀, ex *P. t. tylosinus*. MEXICO: Distrito Federal: Colonia del Valle (1); Hidalgo: Marques (2), 85 km N Mexico City (1); México: 5 km NW Texcoco (2), San Agustin Acolman (7), Venta de Carpio (2), Piramides de San Juan Teotihuacan (2).

*Geomydoecus polydentatus angustirostris*  
Price and Hellenthal, new subspecies

**Type Host.** *Pappogeomys tylosinus angustirostris* (Merriam).

**Male.** As for *G. polydentatus*, except as follows. TW 0.435–0.480 (17: 0.452 ± 0.0116); HL 0.295–0.340 (17: 0.309 ± 0.0114). Antenna with SL 0.190–0.220 (14: 0.210 ± 0.0091), SMW 0.115–0.130 (14: 0.126 ± 0.0052), SDW 0.120–0.135 (14: 0.131 ± 0.0054), PW 0.315–0.360 (20: 0.330 ± 0.0140). Abdominal tergal setae: II, 10–14 (20: 11.7 ± 1.22); III, 17–24 (20: 20.0 ± 1.96); IV, 19–27 (20: 22.7 ± 1.89); V, 19–26 (20: 22.2 ± 1.89); VI, 13–19 (19: 16.1 ± 1.54); tergal and pleural setae on VII, 16–21 (18: 18.2 ± 1.44). Abdominal sternal setae: II, 7–12 (20: 9.1 ± 1.37); V, 9–14 (19: 11.4 ± 1.43); VI, 8–11 (20: 9.7 ± 1.07); VII, 7–10 (19: 8.8 ± 0.92). TL 1.255–1.495 (17: 1.367 ± 0.0551). Genitalia with EPW 0.090–0.100 (20: 0.093 ± 0.0030).

**Female.** As for *G. polydentatus*, except as follows. TW 0.470–0.515 (18: 0.490 ± 0.0128); HL 0.280–0.330 (18: 0.306 ± 0.0138). PW 0.330–0.365 (18: 0.344 ± 0.0109). Abdominal tergal setae: II, 12–15 (17: 13.4 ± 0.86); IV, 24–35 (17: 28.4 ± 3.12); V, 24–32 (17: 28.4 ± 2.89); VI, 23–31 (17: 27.0 ± 2.74); tergal and pleural setae on VII, 28–40 (17: 33.2 ± 3.44). TL 1.210–1.440 (18: 1.306 ± 0.0605). Genital sac with 0–4 (16: 3.1 ± 1.18) loops.

**Type Material.** HOLOTYPE, ♂, ex *P. t. angustirostris* (KU-39815), Mexico, Jalisco, 4 mi (6.4 km) W Mazamitla, 18-X-1950, J. R. Alcorn, in collection of the University of Kansas. PARATYPES: 12 ♂♂, 16 ♀♀, ex *P. t. angustirostris*. MEXICO: Jalisco: 4 mi (6.4 km) W (3) and 3 mi (4.8 km) WSW (2) Mazamitla; Michoacán: 4.5 mi (7.2 km) NE Tarecuato (1), 1 mi (1.6 km) N Tinguindin (1), 10 mi (16.1 km) SW Nuevo San Juan (1), W slope Sierra Patamba (1), 1 km N, 2 km W Nahuatzen (1).

**Other Material Examined.** 28 ♂♂, 29 ♀♀, ex *P. g. imparilis* (Goldman). MEXICO: Michoacán: 5 mi (8.0 km) SE (3) and 8 mi (12.9 km) E (1) Opopeo, 2 mi (3.2 km) E San Gregorio (2), 6.5 km S (3), 5 mi (8.0 km) S (1), 3 mi (4.8 km) S (1), 2 mi (3.2 km) N (1), and at (1) Patzcuaro, 16 mi (25.8 km) W Ciudad Hidalgo (1).

**Remarks.** Only quantitative differences separate *G. p. angustirostris* from *G. p. polydentatus*. Males of *G. p. angustirostris* tend to have a shorter head and narrower temple; the respective critical discrimination values and misidentification probab-

ities are 0.324 (0.113) and 0.463 (0.167). Females of *G. p. angustirostris* tend to have a smaller total length, temple width, and prothorax width; the respective values are 1.378 (0.162), 0.503 (0.188), and 0.354 (0.199).

*Geomydoecus mcgregori* Complex

The three species of this complex are found on all four subspecies of *P. gymnurus*, all six of *P. tylosinus*, as well as on *P. zinserti* and on the smoky pocket gopher, *P. fumosus* (Merriam), Alcorn's pocket gopher, *P. alcorni* Russell, and the Querétaro pocket gopher, *P. neglectus* (Merriam).

The features shared by members of the *G. mcgregori* complex are for the male—(1) the temple margin and (2) antennal scape as for *G. mexicanus*, and (3) a characteristic shape of the genitalic endomeral plate (Fig. 32 and 39) and parameral arch (Fig. 33 and 38), and genital sac prominent, spiculate, with five or six large spines (Fig. 31 and 37); and for the female—(1) dorsal head, (2) metanotum, and (3) pleuron III as for *G. mexicanus*, (4) each side of last tergite with inner seta displaced toward midline (Fig. 34), (5) subgenital plate transverse (Fig. 34), and (6) genital sac with papillose anterior portion and number of distinct medioanterior loops (Fig. 36 and 40).

*Geomydoecus mcgregori* Price and Emerson  
(Fig. 31–36)

*Geomydoecus mcgregori* Price and Emerson 1971: 253. Type host: *Pappogeomys fumosus* (Merriam).

**Male.** Much as in Fig. 1, except as follows. TW 0.450–0.560 (71: 0.498 ± 0.0185); HL 0.320–0.390 (72: 0.352 ± 0.0162); submarginal and inner marginal temple setae 0.065–0.125 (65: 0.087 ± 0.0098) and 0.025–0.035 (70: 0.028 ± 0.0027) long, respectively. Antenna with SL 0.180–0.240 (72: 0.214 ± 0.0127), SMW 0.110–0.160 (71: 0.133 ± 0.0105), SDW 0.115–0.160 (71: 0.137 ± 0.0098), PW 0.330–0.390 (71: 0.358 ± 0.0142). Abdominal tergal setae: I, 2; II, 10–17 (72: 12.2 ± 1.30); III, 19–30 (71: 23.4 ± 2.19); IV, 22–32 (68: 26.2 ± 2.47); V, 17–28 (70: 22.0 ± 2.27); VI, 9–17 (69: 13.4 ± 1.57); tergal and pleural setae on VII, 18–26 (71: 21.6 ± 1.79). Abdominal sternal setae: II, 7–12 (71: 10.0 ± 1.28); III, 8–13 (71: 10.4 ± 1.19); IV, 10–17 (72: 13.8 ± 1.52); V, 9–17 (71: 12.5 ± 1.50); VI, 7–12 (70: 9.2 ± 1.25); VII, 6–11 (72: 8.4 ± 0.95); VIII, 5–10 (71: 7.5 ± 0.84). TL 1.345–1.650 (71: 1.503 ± 0.0682). Terminalia as in Fig. 35. Genitalia as in Fig. 31; parameral arch with broad medioposterior point (Fig. 33), PAW 0.165–0.200 (72: 0.183 ± 0.0077); endomeral plate (Fig. 32) shaped as elongate triangle with apical "shoulders," EPW 0.080–0.090 (71: 0.085 ± 0.0035), EPL 0.100–0.125 (71: 0.114 ± 0.0055); sac with only 5 large spines (Fig. 31), lacking 1 of outer posterior pair.

**Female.** Grossly as in Fig. 5, but with terminalia as in Fig. 34. TW 0.480–0.580 (67: 0.532 ± 0.0242); HL 0.305–0.380 (67: 0.349 ± 0.0190); submarginal and inner marginal temple setae 0.050–0.100 (59: 0.076 ± 0.0083) and 0.025–0.035 (65: 0.032 ± 0.0030) long, respectively. PW 0.340–0.425 (67: 0.374 ± 0.0189). Abdominal tergal setae: I, 2; II, 12–19 (66: 14.5 ± 1.39); III, 21–31 (66: 25.2 ± 2.09); IV, 24–36 (66: 30.1 ± 2.52); V, 22–36 (65: 28.0 ± 2.64); VI, 22–35 (65: 27.7 ± 2.81); tergal and pleural setae on VII, 31–49 (66: 38.4 ± 3.79). Longest seta of medial 10 on tergite VI, 0.070–0.100 (67: 0.084 ± 0.0065); on tergite VII, 0.090–0.125 (62: 0.112 ± 0.0084), with 0–8 (60: 3.8 ± 2.75) of these longer than 0.100. Longer seta of medial pair on tergite VIII, 0.065–0.100 (66: 0.078 ± 0.0075). Each side of last tergite with outer seta 0.080–0.125 (60: 0.104 ± 0.0121), middle seta 0.115 (63: 0.094 ± 0.0079) long. Abdominal sternal setae: II, 7–12 (67: 10.0 ± 1.05); III, 9–19 (64: 10.6 ± 1.43); IV, 11–21 (61: 14.4 ± 1.74); V, 11–17 (64: 13.9 ± 1.32); VI, 8–16 (66: 12.5 ± 1.51); VII, 10–16 (66: 12.0 ± 1.31). Subgenital plate as in Fig. 34, with 22–35 (65: 27.9 ± 3.18) setae. TL 1.290–1.645 (67: 1.464 ± 0.0811). Genital sac (Fig. 36) with 0–7 (67: 2.9 ± 1.53) loops, with posteriormost loop situated 0.045–0.130 (64: 0.082 ± 0.0208) from anterior sac margin, GSW 0.215–0.355 (66: 0.261 ± 0.0234), GSL 0.185–0.260 (65: 0.222 ± 0.0165).

**Material Examined.** 143 ♂♂, 193 ♀♀, ex *P. fumosus*. MEXICO: Colima: 4 mi (6.4 km) SW (2), 5 km SE (2), 2 mi (3.2 km) W (17), and at (5) Colima.

237 ♂♂, 228 ♀♀, ex *P. g. gymnurus*. MEXICO: Jalisco: 4 mi (6.4 km) ENE (1), 2.5 mi (4.0 km) ENE (2), and at (1) Jazmin, 2 mi (3.2 km) N (2), 3 km S, 14 km W (6), and 10 mi (16.1 km) W (3) Ciudad Guzman, 9 mi (14.5 km) N Atoyac (1), Zapotlan (3), Las Canoas (1), Nevado de Colima (3), 3.5 mi (5.6 km) WNW Zapotlan (1).

39 ♂♂, 35 ♀♀, ex *P. g. russelli* Genoways and Jones. MEXICO: Jalisco: 12 mi (19.3 km) S (6) and at (2) Toluca.

35 ♂♂, 30 ♀♀, ex *P. g. tellus* (Russell). MEXICO: Jalisco: 3 mi (4.8 km) W (1), 2.5 mi (4.0 km) W (2), and 1 mi (1.6 km) NE (2) Tala, 15 mi (24.1 km) E Ameca (3).

235 ♂♂, 209 ♀♀, ex *P. t. angustirostris*. MEXICO: Jalisco: 3 mi (4.8 km) WSW (3), 5 mi (8.0 km) SW (3), and 4 mi (6.4 km) W (6) Mazamitla, 8 mi (12.8 km) E (2) and at (2) Jilotlan de los Dolores; Michoacán: 4.5 mi (7.2 km) NE (1), 4 mi (6.4 km) NE (1), and at (1) Tarecuato, 8 mi (12.8 km) SE Carapan (1), 2 mi (3.2 km) SW Zacapu (1), 1 mi (1.6 km) N Tinguindin (1), 10 mi (16.1 km) SW Nuevo San Juan (1), W slope Sierra Patamba (1), 1 km N, 2 km W Nahuatzen (1).

10 ♂♂, 4 ♀♀, ex *P. t. atratus* (Russell). MEXICO: Jalisco: 19 mi (30.6 km) S, 9 mi (14.5 km) W Guadalupe (3).

11 ♂♂, 16 ♀♀, ex *P. t. zodioides* (Russell). MEXICO:

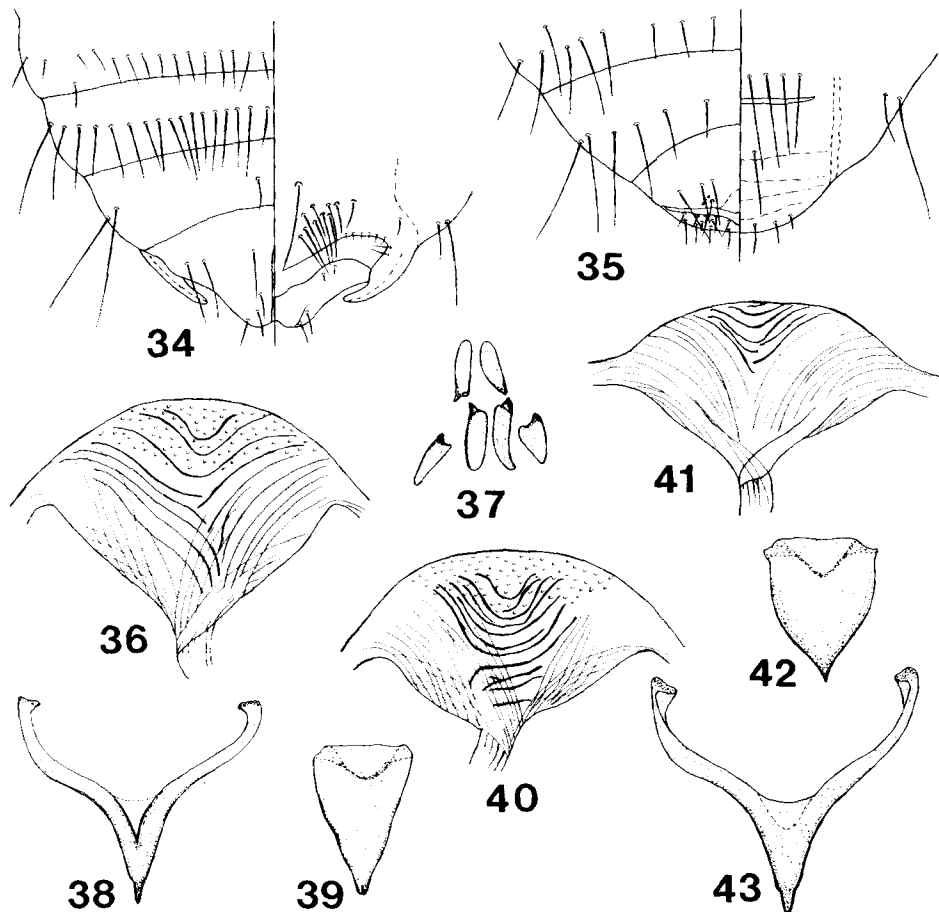


Fig. 34-43. (34-36) *Geomydoecus mcgregori*. (34) Female, terminalia, dorsal-ventral view. (35) Male, terminalia, dorsal-ventral view. (36) Female, genital sac. (37) *G. wernecki wernecki*. Male, genital sac spines. (38-40) *G. alcorni*. (38) Male, genitalic parameral arch. (39) Male, genitalic endomerale plate. (40) Female, genital sac. (41-43) *G. trichopti*. (41) Female, genital sac. (42) Male, genitalic endomerale plate. (43) Male, genitalic parameral arch.

Jalisco: 13 mi (20.9 km) S, 15 mi (24.1 km) W Guadalajara (2).

Questionable records: 6 ♂♂, 6 ♀♀, ex *P. bulleri bulleri* (Thomas). MEXICO: Jalisco: Nevajo de Colima (1), 7 km S, 21 km W (1), and at (1) Ciudad Guzman. 4 ♂♂, 5 ♀♀, ex *Zygogomys trichopus trichopus* Merriam. MEXICO: Michoacán: 6 km N, 2 km W Tancitaro (2).

**Remarks.** Both sexes of this species are morphologically closest to *G. wernecki* Price and Emerson. The only known qualitative difference involves the male genital sac of *G. mcgregori* having only five large spines, whereas that of *G. wernecki* has six such spines.

***Geomydoecus wernecki* Price and Emerson**  
(Fig. 37)

**Male.** As for *G. mcgregori*, except as follows. TW 0.470-0.565 (44: 0.518 ± 0.0197); HL 0.335-0.385 (44: 0.357 ± 0.0135). Antenna with SL 0.205-0.270 (39: 0.235 ± 0.0128), SDW 0.125-0.155 (39: 0.142 ± 0.0074). PW 0.345-0.420 (46: 0.370 ± 0.0159). Abdominal tergal setae: II, 11-21 (45: 15.5 ± 2.80); V, 19-30 (44: 23.6 ± 2.42); VI, 12-21 (44: 16.1 ± 2.32); tergal and pleural setae on VII, 18-34 (46: 23.8 ± 2.96). Abdominal sternal setae: III, 9-14 (46: 11.2 ± 0.88); IV, 10-19 (45: 15.2 ± 1.85); V, 10-17 (46: 13.9 ± 1.47); VI, 8-11 (46: 9.8 ±

0.99). TL 1.310-1.755 (42: 1.542 ± 0.0916). Genitalia with PAW 0.170-0.205 (46: 0.189 ± 0.0097); sac with 6 large spines (Fig. 37).

**Female.** As for *G. mcgregori*, except as follows. TW 0.520-0.615 (46: 0.565 ± 0.0248); HL 0.330-0.410 (46: 0.360 ± 0.0181); submarginal temple seta 0.060-0.090 (36: 0.076 ± 0.0081) long. PW 0.355-0.425 (45: 0.391 ± 0.0171). Abdominal tergal setae: II, 13-21 (44: 17.0 ± 2.35); V, 23-36 (44: 30.4 ± 2.93); VI, 20-37 (45: 30.6 ± 3.85); tergal and pleural setae on VII, 31-47 (46: 40.8 ± 4.02). Each side of last tergite with middle seta 0.090-0.115 (44: 0.101 ± 0.0070), inner seta 0.090-0.115 (42: 0.101 ± 0.0059) long. Abdominal sternal setae: II, 8-13 (46: 10.6 ± 1.36); III, 9-13 (43: 11.3 ± 0.97); IV, 12-21 (41: 16.0 ± 1.95); V, 12-18 (43: 15.2 ± 1.38); VI, 11-17 (45: 14.2 ± 1.38); VII, 10-16 (45: 12.7 ± 1.29). Subgenital plate with 20-29 (46: 25.1 ± 2.14) setae. TL 1.350-1.715 (46: 1.556 ± 0.1003). Genital sac with 4-10 (46: 6.0 ± 1.37) loops, with posteriormost loop situated 0.090-0.160 (46: 0.128 ± 0.0201) from anterior sac margin, GSW 0.215-0.315 (45: 0.270 ± 0.0208), GSL 0.175-0.285 (46: 0.228 ± 0.0225).

**Remarks.** The only qualitative feature useful in separating *G. wernecki* from *G. mcgregori* involves the possession by the male of the former of six large genital sac spines whereas that of *G. mcgregori* has only five. Quantitatively, males of *G. wernecki* show no useful features. Females of *G. wernecki* tend to have more genital sac loops and the posteriormost loop is placed farther back from the anterior sac margin; the critical values for discrimination and the probabilities of misidentification, respectively, are 4.48 (0.143) and 0.105 (0.131).

***Geomydoecus wernecki wernecki***  
**Price and Emerson, new status**  
(Fig. 37)

*Geomydoecus wernecki* Price and Emerson 1971: 253. Type host: *Pappogeomys zinseri* (Goldman).

**Male.** As for *G. wernecki*, except as follows. TW 0.470-0.535 (39: 0.513 ± 0.0138); HL 0.335-0.385 (39: 0.355 ± 0.0129). Antenna with SL 0.205-0.255 (34: 0.232 ± 0.0096). PW 0.345-0.405 (41: 0.368 ± 0.0142). Abdominal sternal setae on III, 9-13 (41: 11.1 ± 0.79). TL 1.310-1.670 (37: 1.524 ± 0.0814). Genitalia with PAW 0.170-0.200 (41: 0.187 ± 0.0080); EPW 0.080-0.095 (41: 0.087 ± 0.0042).

**Female.** As for *G. wernecki*, except as follows. TW 0.520-0.595 (41: 0.559 ± 0.0200); HL 0.330-0.390 (41: 0.357 ± 0.0157); submarginal temple seta 0.060-0.090 (33: 0.075 ± 0.0074) long. PW 0.355-0.420 (40: 0.388 ± 0.0151). Each side of last tergite with middle seta 0.090-0.115 (39: 0.102 ± 0.0068) long. TL 1.350-1.690 (41: 1.540 ± 0.0938). Genital sac with posteriormost loop situated 0.090-0.160 (41: 0.125 ± 0.0193) from anterior sac mar-

gin, GSW 0.215-0.305 (40: 0.267 ± 0.0192), GSL 0.175-0.255 (41: 0.224 ± 0.0189).

**Material Examined.** 32 ♂♂, 35 ♀♀, ex *P. zinseri*. MEXICO: Jalisco: Lagos de Moreno (13).

92 ♂♂, 87 ♀♀ ex *P. g. imparilis*. MEXICO: Michoacán: 5 mi (8.0 km) SE (3) and 8 mi (12.9 km) E (1) Opopeo, 2 mi (3.2 km) E San Gregorio (2), 5 mi (8.0 km) S (1), 6.5 km S (4), 3 mi (4.8 km) S (1), 2 mi (3.2 km) N (1), and at (2) Patzcuaro, 16 mi (25.8 km) W Ciudad Hidalgo (1).

28 ♂♂, 19 ♀♀, ex *P. t. breviostris*. MEXICO: Guanajuato: 5 mi (8.0 km) E (1) and 2 mi (3.2 km) E (4) Celaya.

11 ♂♂, 18 ♀♀, ex *P. t. tylosinus*. MEXICO: Hidalgo: Marques (2); México: San Agustín Acolman (3).

2 ♀♀, ex *P. neglectus*. MEXICO: Querétaro: 8 mi (12.9 km) NW Pinal de Amoles (1).

***Geomydoecus wernecki planiceps***  
**Price and Helleenthal, new subspecies**

**Type Host.** *Pappogeomys tylosinus planiceps* (Merriam).

**Male.** As for *G. wernecki*, except as follows. TW 0.555-0.565 (5: 0.559 ± 0.0045); HL 0.365-0.380 (5: 0.372 ± 0.0067). Antenna with SL 0.240-0.270 (5: 0.257 ± 0.0093). PW 0.380-0.420 (5: 0.390 ± 0.0167). Abdominal sternal setae on III, 11-14 (5: 12.2 ± 1.10). TL 1.620-1.755 (5: 1.671 ± 0.0522). Genitalia with PAW 0.202-0.207 (5: 0.206 ± 0.0022); EPW 0.095-0.100 (5: 0.099 ± 0.0027).

**Female.** As for *G. wernecki*, except as follows. TW 0.600-0.615 (5: 0.610 ± 0.0055); HL 0.375-0.410 (5: 0.387 ± 0.0144); submarginal temple seta 0.085-0.090 (3: 0.089 ± 0.0029) long. PW 0.410-0.425 (5: 0.417 ± 0.0057). Each side of last tergite with middle seta 0.090-0.095 (5: 0.094 ± 0.0027) long. TL 1.670-1.715 (5: 1.689 ± 0.0175). Genital sac with posteriormost loop situated 0.125-0.160 (5: 0.149 ± 0.0153) from anterior sac margin, GSW 0.275-0.315 (5: 0.296 ± 0.0157), GSL 0.255-0.285 (5: 0.266 ± 0.0130).

**Type Material.** HOLOTYPE, ♂, ex *P. t. planiceps* (KU-66161), Mexico, México, El Río (=San Bernabe), 14 mi (22.5 km) NW Toluca, 2-II-1955. R. W. Dickerman, in collection of the University of Kansas. PARATYPES: 7 ♂♂, 11 ♀♀, same data as holotype.

**Remarks.** Only quantitative differences separate *G. w. planiceps* from *G. w. wernecki*. Males of *G. w. planiceps* tend to have a wider temple, wider genitalic endomerale plate, and longer antennal scape; the respective critical discrimination values and misidentification probabilities are 0.536 (0.042), 0.094 (0.076), and 0.244 (0.094). Females of *G. w. planiceps* tend to have a wider temple, wider prothorax, longer genital sac, and longer submarginal temple seta; the respective values are 0.585 (0.091), 0.402 (0.157), 0.245 (0.127), and 0.082 (0.158).



***Geomydoecus alcorni* Price and Emerson**  
(Fig. 38–40)

*Geomydoecus alcorni* Price and Emerson 1971: 254. Type host: *Pappogeomys alcorni* Russell.

**Male.** As for *G. mcgregori*, except as follows. TW 0.435–0.455 (4: 0.448 ± 0.0099); HL 0.295–0.330 (4: 0.312 ± 0.0149). Antenna with SL 0.170–0.185 (3: 0.182 ± 0.0087), SMW 0.100–0.125 (3: 0.118 ± 0.0144), SDW 0.105–0.130 (3: 0.121 ± 0.0132). PW 0.320–0.335 (3: 0.325 ± 0.0076). Abdominal sternal setae: III, 11–14 (4: 12.7 ± 1.26); IV, 18–20 (4: 18.5 ± 1.00); V, 15–18 (4: 16.2 ± 1.26). TL 1.280–1.415 (4: 1.336 ± 0.0577). Parameral arch (Fig. 38) with pronounced V-shaped indentation of medioposterior point, PAW 0.145–0.165 (4: 0.159 ± 0.0091); endomerale plate (Fig. 39) evenly tapered to apex, without apical "shoulders," EPW 0.065–0.070 (4: 0.068 ± 0.0029); sac with 6 large spines.

**Female.** As for *G. mcgregori*, except as follows. TW 0.475–0.485 (5: 0.479 ± 0.0042); HL 0.305–0.330 (5: 0.315 ± 0.0091). PW 0.340–0.380 (5: 0.358 ± 0.0169). Each side of last tergite with middle seta 0.085–0.100 (5: 0.091 ± 0.0061), inner seta 0.065–0.090 (5: 0.081 ± 0.0100) long. TL 1.240–1.380 (5: 1.306 ± 0.0549). Genital sac as in Fig. 40, with 7–15 (5: 10.6 ± 2.97) loops, with posteriormost loop situated 0.140–0.165 (5: 0.154 ± 0.0120) from anterior sac margin, GSL 0.160–0.210 (5: 0.188 ± 0.0207).

**Material Examined.** 5 ♂♂, 5 ♀♀, ex *P. alcorni*. MEXICO: Jalisco: 4 mi (6.4 km) W (2) and 3 mi (4.8 km) WSW (1) Mazamitla.

**Remarks.** The shapes of the male genitalic parameral arch and endomerale plate and the configuration of the lines on the female genital sac distinguish *G. alcorni* from the other two species in this complex. Quantitatively, males of *G. alcorni* have a narrow genitalic endomerale plate and parameral arch and smaller temple width and head length than either *G. mcgregori* or *G. wernecki*; the respective critical discrimination values and misidentification probabilities are 0.077 (0.029), 0.172 (0.077), 0.477 (0.086), and 0.333 (0.086). Females of *G. alcorni* tend to have more genital sac loops and smaller temple width and head length than the other two species; the respective values are 7.39 (0.069), 0.512 (0.124), and 0.334 (0.156).

***Geomydoecus trichopi* Price and Emerson**  
(Fig. 41–43)

We have not included this species as part of any of the complexes considered previously. However, its distribution on the Michoacán pocket gopher, *Zygoeomys trichopus* Merriam, places it in close geographic proximity to lice of both the *G. coronadoi* and *G. mcgregori* complexes.

The features of this species are for the male—(1) the temple margin and (2) antennal scape as

for *G. mexicanus*, and (3) genitalia with distinctive endomerale plate (Fig. 42) and parameral arch (Fig. 43) and with prominent spiculate sac with six large spines; for the female—(1) the dorsal head, (2) metanotum, (3) pleuron III, (4) last tergite, and (5) shape of subgenital plate as for *G. coronadoi*, and (6) genital sac as in Fig. 41.

*Geomydoecus trichopi* Price and Emerson 1971: 253. Type host: *Zygoeomys trichopus trichopus* Merriam.

**Male.** Grossly as in Fig. 1. TW 0.420–0.475 (20: 0.447 ± 0.0162); HL 0.295–0.340 (20: 0.316 ± 0.0133); submarginal and inner marginal temple setae 0.075–0.105 (16: 0.092 ± 0.0093) and 0.025–0.030 (19: 0.027 ± 0.0024) long, respectively. Antenna with SL 0.165–0.210 (20: 0.192 ± 0.0121), SMW 0.105–0.135 (20: 0.119 ± 0.0078), SDW 0.110–0.135 (20: 0.125 ± 0.0077). PW 0.280–0.335 (19: 0.313 ± 0.0136). Abdominal tergal setae: I, 2; II, 11–15 (19: 12.5 ± 0.90); III, 17–24 (19: 20.8 ± 2.03); IV, 21–27 (18: 23.8 ± 1.76); V, 17–25 (20: 21.4 ± 2.28); VI, 12–16 (19: 13.4 ± 1.42); tergal and pleural setae on VII, 17–22 (19: 19.1 ± 1.54). Abdominal sternal setae: II, 8–11 (20: 9.9 ± 0.94); III, 9–12 (20: 10.8 ± 0.81); IV, 12–16 (20: 14.3 ± 1.04); V, 11–16 (20: 13.3 ± 1.09); VI, 7–11 (20: 9.6 ± 1.19); VII, 8–10 (19: 9.4 ± 0.68); VIII, 5–8 (20: 6.4 ± 0.83). TL 1.185–1.440 (19: 1.319 ± 0.0659). Terminalia close to Fig. 8, but with 2 sensilla near each short seta, as in Fig. 13. Genitalia with PAW 0.145–0.175 (20: 0.162 ± 0.0085); EPW 0.065–0.075 (18: 0.072 ± 0.0034), EPL 0.090–0.100 (19: 0.095 ± 0.0037); sac with 6 large spines, near Fig. 37, and with several much smaller spines flanking each lateroposterior spine.

**Female.** Grossly as in Fig. 5, but with terminalia near Fig. 34. TW 0.435–0.500 (17: 0.470 ± 0.0170); HL 0.275–0.330 (17: 0.301 ± 0.0164); submarginal and inner marginal temple setae 0.070–0.100 (15: 0.084 ± 0.0088) and 0.025–0.030 (17: 0.026 ± 0.0020) long, respectively. PW 0.305–0.355 (17: 0.330 ± 0.0152). Abdominal tergal setae: I, 2; II, 12–16 (17: 13.2 ± 1.38); III, 20–27 (17: 23.8 ± 1.71); IV, 23–31 (16: 27.7 ± 1.92); V, 21–28 (16: 25.0 ± 2.00); VI, 20–30 (17: 23.9 ± 2.50); tergal and pleural setae on VII, 26–36 (16: 32.9 ± 2.73). Longest seta of medial 10 on tergite VI, 0.075–0.090 (17: 0.086 ± 0.0054); on tergite VII, 0.095–0.115 (17: 0.108 ± 0.0053), with 0–6 (14: 3.0 ± 2.04) of these longer than 0.100. Longer seta of medial pair on tergite VIII, 0.075–0.085 (16: 0.079 ± 0.0040). Each side of last tergite with outer seta 0.060–0.085 (12: 0.074 ± 0.0072), middle seta 0.060–0.085 (13: 0.073 ± 0.0081), inner seta 0.050–0.080 (15: 0.066 ± 0.0079) long. Abdominal sternal setae: II, 8–12 (17: 10.4 ± 1.00); III, 10–14 (17: 11.2 ± 0.88); IV, 13–17 (17: 14.9 ± 1.03); V, 11–17 (17: 14.1 ± 1.39); VI, 12–18 (17: 13.6 ± 1.54); VII, 9–14 (17: 11.5 ± 1.28). Subgenital plate much as in Fig. 34, with 18–27 (17: 22.4 ± 2.23) setae.

TL 1.105–1.380 (17: 1.264 ± 0.0799). Genital sac (Fig. 41) with lines more distinct anteriorly than posteriorly, with 2–5 (17: 3.4 ± 1.00) loops, posteriormost loop situated 0.030–0.070 (17: 0.045 ± 0.0122) from anterior sac margin, GSW 0.210–0.270 (17: 0.238 ± 0.0165), GSL 0.125–0.205 (17: 0.173 ± 0.0236).

**Material Examined.** 120 ♂♂, 118 ♀♀, ex *T. t. trichopus*. MEXICO: Michoacán: Sierra Patamba (2), 7 km E (1), 5.3 km E (1), and 6 km N, 2 km W (7) Tancitaro, NW slopes Cerro Patamban (1). 3 ♂♂, 2 ♀♀, ex *T. t. tarascensis* Goldman. MEXICO: Michoacán: 10 km E Patzcuaro (1).

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