Geomydoecus bulleri Complex (Mallophaga: Trichodectidae) from Buller's Pocket Gopher, *Pappogeomys bulleri* (Rodentia: Geomyidae), in Westcentral Mexico

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ABSTRACT Five species and subspecies of *Geomydoecus* from *Pappogeomys bulleri* pocket gophers are described and illustrated: *G. bulleri bulleri* Price and Emerson (type host: *P. bulleri bulleri* (Thomas)), *G. b. melanuri* Price and Hellenthal, n. ssp. (type host: *P. b. melanurus* Genoways and Jones); *G. b. intermedius* Price and Hellenthal, n. ssp. (type host: *P. b.* ssp.); *G. burti* Price and Hellenthal, n. sp. (type host: *P. b. burti* Goldman); and *G. nadleri* Price and Hellenthal, n. sp. (type host: *P. b. nayaritensis* Goldman). A key is provided for the identification of these five taxa.

KEY WORDS Insecta, Mallophaga, *Geomydoecus*, *Pappogeomys*

PRICE & EMERSON (1971) described a new species of chewing louse, *Geomydoecus bulleri*, based on material from *Pappogeomys bulleri bulleri* (Thomas) (type host), *P. b. melanurus* Genoways and Jones, and *P. b. burti* Goldman, all from Jalisco, Mexico. We have subsequently collected *Geomydoecus* lice from all eight subspecies recognized by Hall (1981) of the Buller's pocket gopher, *P. bulleri*. An analysis of these lice shows them to represent five taxa instead of the one originally described. Here we present descriptions and illustrations of these taxa and provide a key for their identification.

Quantitative data for the lice considered in this paper combined with host and locality information form part of a computerized data base on pocket gophers and their lice. This data base is maintained at the University of Notre Dame. Counted or measured characters in the following 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.

In evaluating the usefulness of characters for specific discrimination, critical values 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 differ at a significance level of $P \leq 0.01$. Detailed descriptions of the characters and quantitative procedures used with *Geomydoecus* lice are included in Hellenthal & 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. The map of host distribution was produced by a computer from a pocket gopher–louse association data base (Hellenthal & Price 1984). The map projection is rectangular to facilitate determination of the latitude and longitude of individual collection sites. 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).

Abbreviations of institutions holding host skins are UA (University of Arizona), KU (University of Kansas), and LSU (Louisiana State University). Unless stated to the contrary, holotypes are in the collection of the University of Kansas. Although most paratypes will be retained at the University of Minnesota, representatives will be deposited at the U.S. National Museum of Natural History, Washington, D.C.; the Field Museum of Natural History, Chicago; and Oklahoma State University, Stillwater.

The five taxa of the *bulleri* complex share the following characteristics: both sexes with submarginal temple seta inserted between marginal temple setae (Fig. 1 and 7); male without process on posterior scape margin of antenna (Fig. 7); male genital sac with 6 prominent spines and cluster of smaller spines posterior to outer spines (Fig. 5); female's last tergite with pair of medioanterior setae separated from paired lateroposterior setae on each side (Fig. 1); female subgenital plate and postvulval sclerite with associated chaetotaxy as in Fig. 1; and female genital sac with median transverse

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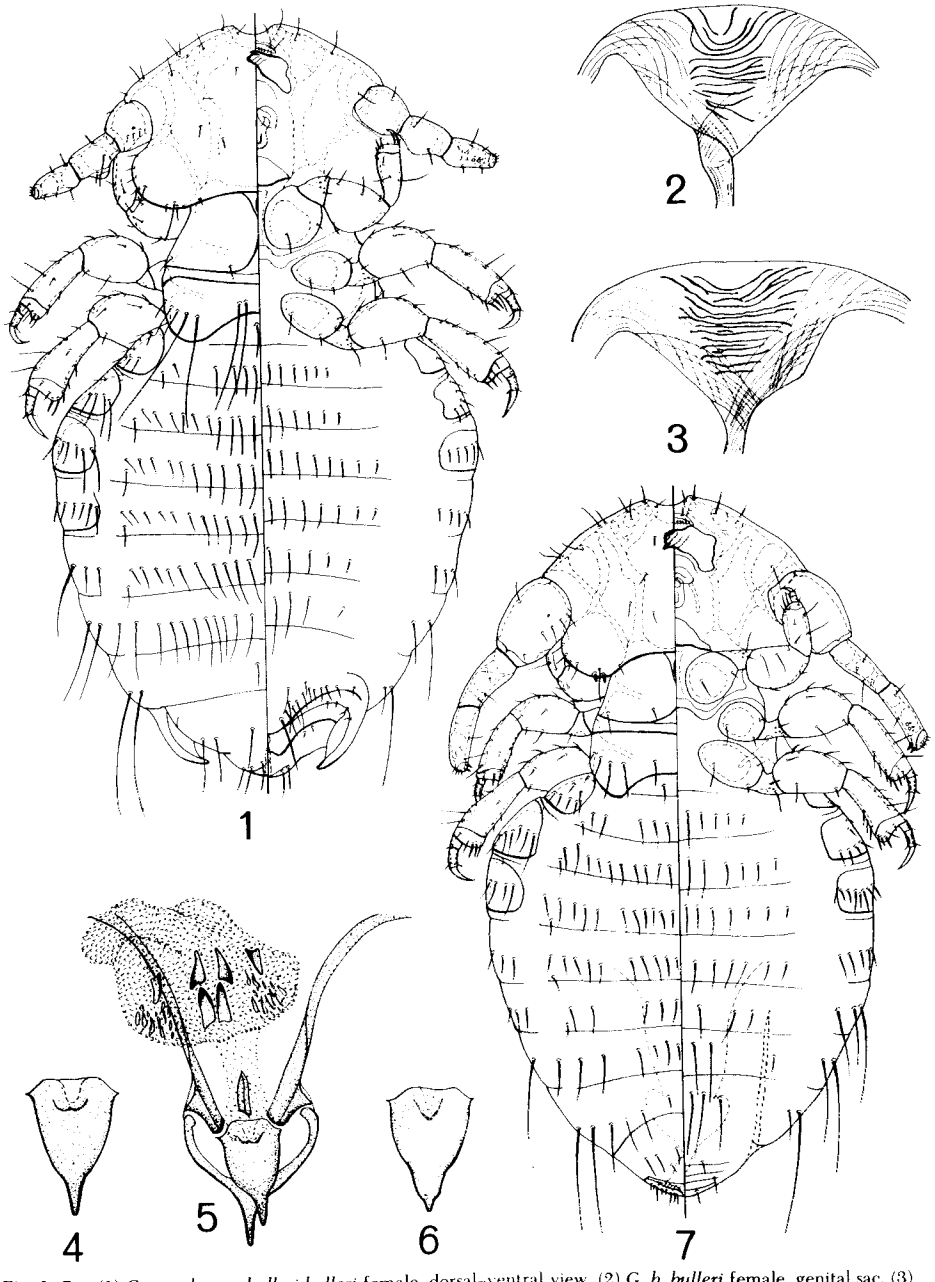

Fig. 1–7. (1) *Geomydoecus bulleri bulleri* female, dorsal–ventral view. (2) *G. b. bulleri* female, genital sac. (3) *G. nadleri* female, genital sac. (4) *G. b. bulleri* male, genitalic endomeral plate. (5) *G. b. bulleri* male, genitalia. (6) *G. nadleri* male, genitalic endomeral plate. (7) *G. b. bulleri* male, dorsal–ventral view.

lines and few weak to well-developed medioanterior loops (Fig. 2 and 3).

Geomydoecus bulleri
Price and Emerson
(Fig. 1, 2, 4, 5, and 7)

Geomydoecus bulleri Price and Emerson 1971: 253.

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

Male. As in Fig. 7. Temple width 0.405–0.490 (63: 0.441 ± 0.0201); head length 0.270–0.330 (63: 0.301 ± 0.0142); submarginal and inner marginal temple setae 0.065–0.095 (56: 0.076 ± 0.0063) and 0.020–0.030 (62: 0.025 ± 0.0019) long, respectively; both inner and outer marginal setae stout, spiniform. Antenna with scape length 0.155–0.195 (62: 0.176 ± 0.0098), scape medial width 0.100–0.130 (62: 0.113 ± 0.0074), scape distal width 0.100–0.130 (62: 0.117 ± 0.0075). Prothorax width 0.280–0.355 (63: 0.313 ± 0.0166). Abdominal tergal setae: I, 2; II, 10–16 (63: 12.3 ± 1.26); III, 19–28 (61: 22.4 ± 1.81); IV, 16–31 (60: 24.3 ± 2.68); V, 16–29 (58: 19.3 ± 2.28); VI, 10–15 (60: 12.0 ± 1.31); tergal and pleural setae on VII, 15–21 (60: 17.7 ± 1.10). Abdominal sternal setae: II, 6–13 (63: 10.3 ± 1.30); III, 8–13 (60: 10.4 ± 1.28); IV, 10–23 (62: 14.3 ± 2.17); V, 9–19 (61: 12.2 ± 1.93); VI, 6–12 (60: 8.0 ± 1.20); VII, 6–10 (61: 7.6 ± 0.76); VIII, 5–8 (62: 6.1 ± 0.70). Total length 1.185–1.455 (62: 1.317 ± 0.0661). Genitalia as in Fig. 5; parameral arch width 0.145–0.175 (60: 0.164 ± 0.0085); endomeral plate (Fig. 4) evenly rounded to apical point, with dark medial sub-basal line usually in form of flattened "W"; endomeral plate width 0.065–0.090 (62: 0.080 ± 0.0046), length 0.100–0.140 (60: 0.123 ± 0.0068).

Female. As in Fig. 1. Temple width 0.430–0.515 (66: 0.468 ± 0.0183); head length 0.275–0.345 (66: 0.296 ± 0.0136); submarginal and inner marginal temple setae 0.045–0.125 (62: 0.071 ± 0.0140) and 0.025–0.040 (66: 0.030 ± 0.0037) long, respectively. Prothorax width 0.290–0.380 (67: 0.332 ± 0.0164). Abdominal tergal setae: I, 2; II, 11–17 (65: 13.5 ± 1.25); III, 18–28 (65: 23.0 ± 2.11); IV, 21–33 (64: 27.3 ± 2.69); V, 18–30 (63: 25.4 ± 2.81); VI, 17–30 (63: 24.2 ± 2.78); tergal and pleural setae on VII, 25–39 (63: 32.0 ± 3.17). Longest seta of medial 10 on tergite VI, 0.065–0.095 (66: 0.084 ± 0.0061); on tergite VII, 0.085–0.120 (58: 0.102 ± 0.0094), with 0–8 (57: 1.5 ± 2.59) of these longer than 0.100. Longer seta of medial pair on tergite VIII, 0.055–0.090 (65: 0.071 ± 0.0072) long. Each side of last tergite with outer seta 0.065–0.120 (59: 0.089 ± 0.0126), middle seta 0.065–0.115 (60: 0.088 ± 0.0117), inner seta 0.055–0.095 (61: 0.076 ± 0.0080) long. Abdominal sternal setae: II, 6–13 (63: 9.9 ± 1.54); III, 7–12 (60: 9.9 ± 1.20); IV, 7–20 (58: 13.6 ± 2.27); V, 8–17 (61: 12.2 ± 2.02); VI, 6–14 (64: 9.9 ± 1.71); VII, 6–14 (64: 9.5 ± 1.47). Subgenital plate with 23–42 (63: 29.5 ± 4.11) setae. Total length 1.135–1.440 (66: 1.285 ± 0.0627). Genital sac as in Fig. 2, width 0.215–0.330 (64: 0.266 ± 0.0236), length 0.145–0.225 (62: 0.193 ± 0.0186), with 9–18 (64: 12.9 ± 2.07) loops and transverse lines, posteriormost line located 0.100–0.195 (64: 0.145 ± 0.0196) from anterior sac margin.

Remarks. The principal features separating *G. bulleri* from the other two species of this louse complex include a combination of the shape of the male genitalic endomeral plate, the line configuration of the female genital sac, and the smaller dimensions of both sexes. *G. bulleri* is found in Jalisco (Fig. 8) on six of the eight subspecies of *P. bulleri*; in addition, we have examined a series of this louse species from an unidentified subspecies of this gopher from Colima.

In our evaluation of character homogeneity within *G. bulleri*, we encountered small but consistent quantitative morphological differences that split this taxon into three allopatric populations. Although generally, we have found character differences sufficient for identification of specimens of only one sex, we regard the morphological differences to be strong and consistent enough to warrant taxonomic recognition of these populations as separate subspecies.

Geomydoecus bulleri bulleri
Price and Emerson
(Fig. 1, 2, 4, 5, and 7)

Male. As in *G. bulleri*, except as follows. Temple width 0.405–0.465 (43: 0.433 ± 0.0159); head length 0.270–0.330 (43: 0.298 ± 0.0136). Antenna with scape length 0.155–0.195 (42: 0.174 ± 0.0100), scape medial width 0.100–0.130 (42: 0.111 ± 0.0075), scape distal width 0.100–0.130 (42: 0.115 ± 0.0076). Prothorax width 0.280–0.340 (43: 0.307 ± 0.0142). Setae on tergite II, 10–14 (43: 11.9 ± 1.05); V, 16–29 (42: 19.8 ± 2.35). Sternal setae: III, 9–13 (43: 10.6 ± 1.24); IV, 11–23 (43: 14.9 ± 2.12); V, 9–19 (43: 12.8 ± 1.82); VI, 6–12 (42: 8.3 ± 1.03). Total length 1.185–1.455 (42: 1.307 ± 0.0722). Genitalic endomeral plate width 0.065–0.085 (42: 0.079 ± 0.0039).

Female. As in *G. bulleri*, except as follows. Temple width 0.430–0.495 (44: 0.461 ± 0.0153); head length 0.275–0.330 (44: 0.294 ± 0.0121). Prothorax width 0.290–0.355 (45: 0.327 ± 0.0147). Tergal setae: II, 11–16 (44: 13.2 ± 1.14); VI, 19–30 (43: 25.0 ± 2.33). Longest seta of medial 10 on tergite VII, 0.085–0.110 (40: 0.097 ± 0.0061), with 0–6 (40: 0.2 ± 0.97) of these longer than 0.100. Longer seta of medial pair on tergite VIII, 0.055–0.085 (45: 0.070 ± 0.0066) long. Each side of last tergite with outer seta 0.065–0.100 (39: 0.083 ± 0.0095), middle seta 0.065–0.100 (42: 0.084 ± 0.0096) long. Sternal setae: II, 8–13 (43: 10.3 ± 1.36); IV, 11–20 (39: 14.2 ± 1.87); V, 10–17 (42: 12.8 ± 1.73); VI, 8–14 (45: 10.5 ± 1.47). Subgenital plate with 23–34 (43: 28.0 ± 2.68) setae. Genital sac length 0.145–0.225 (42: 0.188 ± 0.0179).

Material Examined. MEXICO: Jalisco: 146 ♂♂, 171 ♀♀, ex *P. b. bulleri*, 20 mi (32.2 km) SE (1) and

at (2) Autlan, 14 mi (22.5 km) NW (1) and 5 mi (8.0 km) NW (1) Cuautla, 2.5 mi (4.0 km) ENE (1) and at (2) Jazmin, 2 mi (3.2 km) S (2) and at (2) La Cuesta, 14 mi (22.5 km) NW (1) and at (1) Mascota, Talpa (1), 9 mi (14.5 km) E, 15 mi (24.1 km) S (1) and 18 mi (29.0 km) SE (1) Talpa de Allende, 5 mi (8.0 km) SW San Sebastian (3), Nevajo de Colima (2); 90 ♂♂, 72 ♀♀, ex *P. b. albinasus* Merriam, Ciudad Granja (1), 2 mi (3.2 km) N (1), 2 mi (3.2 km) N, 0.5 mi (0.8 km) W (3), 4 mi (6.4 km) W (2), 4 mi (6.4 km) N, 13 mi (20.9 km) W (1), 10 mi (16.1 km) S, 8 mi (12.9 km) W (1), 13 mi (20.9 km) SW (1), and 14 mi (22.5 km) WNW (1) Guadalajara; 45 ♂♂, 28 ♀♀, ex *P. b. amecensis* Goldman, 13 mi (20.9 km) WSW (2), 5 mi (8.0 km) NNW (2), and at (2) Ameca; 40 ♂♂, 36 ♀♀, ex *P. b. infuscus* Russell, 7.5 mi (12.1 km) SSW (1), 7 mi (11.3 km) SSW (2), and 7 mi (11.3 km) S, 2 mi (3.2 km) W (1) Tequila; 9 ♂♂, 4 ♀♀, ex *P. b. lutulentus* Russell, Sierra de Cuale (2); 31 ♂♂, 33 ♀♀, ex *P. b.* ssp., 5 km W (1) and 4 km N (1) Soyatlan del Oro, 7 km S, 21 km W Ciudad Guzman (3); 2 ♂♂, 4 ♀♀, ex *P. gymnurus gymnurus* (Merriam), 2.5 mi (4.0 km) ENE (1) and at (1) Jazmin, 18 mi (29.0 km) W Ciudad Guzman (1).

Remarks. Three localities have a single collection of *G. b. bulleri* from a *P. g. gymnurus* gopher. These represent the only collections of *bulleri* complex lice off gophers not belonging to a *P. bulleri* subspecies. Interestingly, two of these localities near Jazmin are identical to those for *P. b. bulleri* gophers, whereas the Ciudad Guzman locality is within the range of *P. bulleri*. Several explanations of these records are possible, ranging from a crossover and establishment of this lice on *P. g. gymnurus* to a contamination following collection.

Geomydoecus bulleri melanuri Price and Hellenthal, n. ssp.

Type Host. *Pappogeomys bulleri melanurus* Genoways and Jones.

Male. As in *G. bulleri*, except as follows. Temple width 0.470–0.490 (5: 0.480 ± 0.0094); head length 0.315–0.330 (5: 0.321 ± 0.0076). Antenna with scape length 0.180–0.190 (5: 0.186 ± 0.0042), scape medial width 0.115–0.125 (5: 0.123 ± 0.0045), scape distal width 0.120–0.130 (5: 0.127 ± 0.0042). Prothorax width 0.330–0.355 (5: 0.341 ± 0.0120). Setae on tergite II, 11–13 (5: 12.2 ± 0.84); V, 17–20 (4: 18.7 ± 1.26). Sternal setae: III, 8–9 (3: 8.7 ± 0.58); IV, 11–14 (4: 12.7 ± 1.26); V, 11–12 (3: 11.3 ± 0.58); VI, 8–12 (3: 9.3 ± 2.31). Total length 1.380–1.400 (5: 1.386 ± 0.0084). Genitalic endomeral plate width 0.085–0.090 (5: 0.089 ± 0.0027).

Female. As in *G. bulleri*, except as follows. Temple width 0.485–0.515 (6: 0.500 ± 0.0114); head length 0.305–0.345 (6: 0.315 ± 0.0147). Prothorax width 0.345–0.380 (6: 0.355 ± 0.0133). Tergal setae: II, 12–14 (5: 13.2 ± 0.84); VI, 17–25 (5: 20.8 ± 2.86). Longest seta of medial 10 on tergite VII, 0.105–0.120 (5: 0.112 ± 0.0055), with 1–8 (5: 4.6 ± 3.05) of these longer than 0.100. Longer seta of medial pair on tergite VIII, 0.065–0.075 (5: 0.071 ± 0.0035) long. Each side of last tergite with outer seta 0.090–0.105 (4: 0.098 ± 0.0065), middle seta 0.080–0.095 (4: 0.090 ± 0.0075) long. Sternal setae: II, 9–11 (4: 10.0 ± 0.82); IV, 10–14 (4: 11.5 ± 1.73); V, 8–11 (4: 9.7 ± 1.26); VI, 7–9 (4: 7.7 ± 0.96). Subgenital plate with 24–31 (4: 27.0 ± 3.16) setae. Genital sac length 0.165–0.225 (5: 0.206 ± 0.0236).

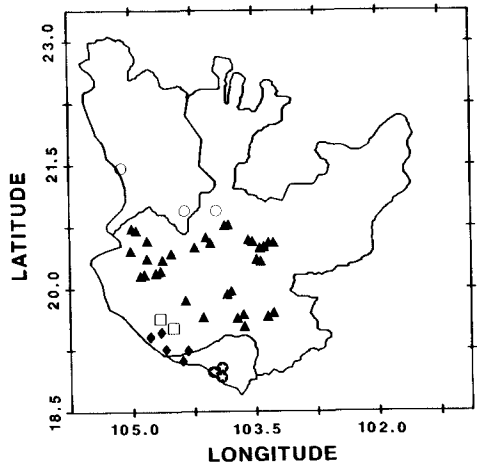

Fig. 8. Geographical distribution of *Geomydoecus bulleri bulleri* (solid triangles), *G. b. melanuri* (open squares), *G. b. intermedius* (open star-circles), *G. burti* (solid diamonds), and *G. nadleri* (open circles) in the states of Colima, Jalisco, and Nayarit in westcentral Mexico.

Type Material. HOLOTYPE, ♂: ex *P. b. melanurus* (PLC-12035), Tecomate, Jalisco, Mexico, 8-XII-1966, P. L. Clifton. PARATYPES: MEXICO: Jalisco: 1 ♂, 2 ♀♀, ex *P. b. melanurus*, same data as holotype; 6 ♂♂, 5 ♀♀, KU-33453, 5 mi (8.0 km) S Purificación, 20-V-1949, J. R. Alcorn.

Remarks. The best features for separating males of *G. b. melanuri* from those of *G. b. bulleri* are that the former have wider head, genitalic endomeral plate, and prothorax; respective critical values for discrimination and probabilities of misidentification are 0.456 (0.063), 0.084 (0.085), and 0.324 (0.108). The best characters for separating females are the larger number in *G. b. melanuri* of the medial 10 setae on tergite VII longer than 0.100, the greater length of the longest of these setae, and a wider head; respective critical discrimination values and misidentification probabilities are 2.41 (0.048), 0.104 (0.108), and 0.481 (0.099).

Geomydoecus bulleri intermedius Price and Hellenthal, n. ssp.

Type Host. *Pappogeomys bulleri* ssp.

Male. As in *G. bulleri*, except as follows. Temple width 0.425–0.470 (15: 0.451 ± 0.0126); head length 0.290–0.330 (15: 0.302 ± 0.0122). Antenna with scape length 0.165–0.190 (15: 0.180 ± 0.0073), scape medial width 0.105–0.120 (15: 0.114 ± 0.0045), scape distal width 0.110–0.125 (15: 0.119 ± 0.0049). Prothorax width 0.310–0.340 (15: 0.322 ± 0.0093). Setae on tergite II, 12–16 (15: 13.4 ± 1.30); V, 16–20 (12: 17.8 ± 1.59). Sternal setae: III, 9–12 (14: 10.1 ± 1.21); IV, 10–18, (15: 13.2 ± 1.93); V, 9–14 (15: 10.6 ± 1.40); VI, 6–8 (15: 7.0 ± 0.65). Total length 1.235–1.400 (15: 1.320 ± 0.0416). Genitalic endomeral plate width 0.075–0.085 (15: 0.081 ± 0.0030).

Female. As in *G. b. melanuri*, except as follows. Temple width 0.455–0.500 (16: 0.475 ± 0.0120); head length 0.275–0.320 (16: 0.295 ± 0.0120). Prothorax width 0.320–0.360 (16: 0.337 ± 0.0122). Subgenital plate with 27–42 (16: 34.2 ± 3.94) setae.

Type Material. HOLOTYPE, ♂: ex *P. b.* ssp. (LSU-11111), 3 km S Armeria, Colima, Mexico, 14-XII-1965, C. Gonzales B., in collection of the University of Minnesota. PARATYPES: MEXICO: Colima: 8 ♂♂, 16 ♀♀, ex *P. b.* ssp., same data as holotype; 5 ♂♂, 17 ♀♀, same data except LSU-11112; 20 ♂♂, 27 ♀♀, LSU-11113 and 11114, 1 km SE Manzanillo–Cuyutlan highway junction, 17-XII-1965, C. Gonzales B.; 38 ♂♂, 28 ♀♀, UA-11167, 11168, and 11171, 4 km SW Armeria, 16-VII-1964, C. Gonzales B.

Remarks. As the subspecific name suggests, *G. b. intermedius* lies morphologically between the other two subspecies. Males of *G. b. intermedius* have a narrower genitalic endomeral plate, a narrower head, and fewer setae on sternite VI than do males of *G. b. melanuri;* the respective values for discrimination and probabilities of misidentification are 0.085 (0.094), 0.465 (0.110), and 8.17 (0.126); females have a narrower head and more subgenital plate setae, the respective values being 0.487 (0.143) and 30.62 (0.171). Females of *G. b. intermedius* have a larger number of the medial 10 setae on tergite VII longer than 0.100, a greater length of the longest of these setae, and more setae on the subgenital plate than do females of *G. b. bulleri;* respective critical discrimination values and misidentification probabilities are 2.32 (0.091), 0.105 (0.109), and 31.12 (0.154). Males have no differences; the misidentification probability of the best discriminating character is 0.24.

Geomydoecus burti Price and Hellenthal, n. sp.

Type Host. *Pappogeomys bulleri burti* Goldman.

Male. Much as in *G. bulleri*, except as follows. Temple width 0.485–0.535 (10: 0.508 ± 0.0132); head length 0.315–0.385 (10: 0.332 ± 0.0200). Antenna with scape length 0.190–0.225 (8: 0.204 ± 0.0103), scape medial width 0.125–0.150 (8: 0.134 ± 0.0091), scape distal width 0.130–0.155 (8: 0.139 ± 0.0091). Prothorax width 0.350–0.385 (10: 0.357 ± 0.0102). Total length 1.440–1.620 (10: 1.497 ± 0.0525). Genitalia with parameral arch width 0.180–0.200 (9: 0.190 ± 0.0057); endomeral plate width 0.085–0.095 (10: 0.093 ± 0.0035), length 0.120–0.145 (10: 0.133 ± 0.0092).

Female. Much as in *G. bulleri*, except as follows. Temple width 0.515–0.550 (16: 0.531 ± 0.0090); head length 0.320–0.355 (16: 0.329 ± 0.0104). Submarginal temple seta 0.065–0.085 (11: 0.074 ± 0.0065) long. Prothorax width 0.365–0.400 (17: 0.380 ± 0.0088). Longest seta of medial 10 on tergite VII, 0.110–0.135 (9: 0.124 ± 0.0090), with 6–8 (7: 7.3 ± 0.95) of these longer than 0.100. Each side of last tergite with outer seta 0.090–0.115 (14: 0.103 ± 0.0080), middle seta 0.095–0.115 (15: 0.104 ± 0.0056), inner seta 0.075–0.100 (10: 0.090 ± 0.0072) long. Sternal setae: II, 7–11 (16: 8.7 ± 1.06); V, 9–14 (17: 10.9 ± 1.27); VI, 7–11 (17: 8.4 ± 1.18). Total length 1.300–1.545 (15: 1.433 ± 0.0642). Genital sac length 0.175–0.245 (15: 0.214 ± 0.0172), with 14–22 (15: 16.2 ± 2.08) loops and transverse lines, posteriormost line located 0.145–0.195 (15: 0.174 ± 0.0152) from anterior sac margin.

Type Material. HOLOTYPE, ♂: ex *P. b. burti* (KU-39817), 5 mi (8.0 km) NE Barra de Navidad, Jalisco, Mexico, 23-XI-1950, J. R. Alcorn. PARATYPES: MEXICO: Jalisco: 6 ♂♂, 6 ♀♀, ex *P. b. burti*, same data as holotype; 13 ♂♂, 13 ♀♀, KU-107587 and 107588, 10 mi (16.1 km) WSW La Huerta, 30-VI-1966, P. L. Clifton & H. H. Genoways, respectively; 8 ♀♀, HHG-719, La Huerta, 30-VI-1966, H. H. Genoways; Colima, 8 ♂♂, 1 ♀, KU-87422, 6 mi (9.7 km) N Santiago, 26-IV-1961, M. R. Lee; 1 ♂, KU-36675, 4 mi (6.4 km) W, 1 mi (1.6 km) S Santiago, 18-III-1950, J. R. Alcorn.

Remarks. Only quantitative features separate *G. burti* from *G. bulleri;* although the absence of qualitative characters might cast doubt on our placement of *G. burti* at the species level, the large number of these quantitative differences and their consistently low level of misidentification probability support specific recognition. Males of *G. burti* are larger than males of *G. bulleri* (s.l.); the best characters, critical discrimination values, and misidentification probabilities are: head width 0.474 (0.041), genitalic parameral arch width 0.177 (0.055), genitalic endomeral plate width 0.087 (0.074), antennal scape distal width 0.128 (0.075), scape length 0.190 (0.079), and total length 1.407 (0.081). Females also are larger; the best characters are head width 0.500 (0.031), prothorax width 0.356 (0.054), head length 0.313 (0.105), the longest of medial 10 setae on tergite VII 0.113 (0.115), the number of these more than 0.100 long 4.39 (0.121), and total length 1.359 (0.120).

Geomydoecus nadleri Price and Hellenthal, n. sp. (Fig. 3 and 6)

Type Host. *Pappogeomys bulleri nayaritensis* Goldman.

Male. Much as in *G. bulleri*, except as follows. Temple width 0.405–0.445 (8: 0.421 ± 0.0149). Submarginal temple seta 0.050–0.065 (7: 0.057 ± 0.0061) long. Antenna with scape length 0.155–0.175 (8: 0.166 ± 0.0078), scape distal width 0.100–0.120 (8: 0.110 ± 0.0074). Prothorax width 0.295–0.305 (8: 0.299 ± 0.0050). Tergal setae: II, 10–12 (8: 10.7 ± 0.71); III, 16–20 (8: 18.4 ± 1.30); IV, 19–23 (8: 21.0 ± 1.51); V, 15–19 (8: 16.6 ± 1.30); VI, 9–11 (8: 10.1 ± 0.83); tergal and pleural setae on VII, 14–17 (8: 15.5 ± 0.93). Sternal setae: II, 7–10 (8: 8.9 ± 0.99); VII, 6–8 (8: 6.4 ± 0.74). Total length 1.160–1.320 (8: 1.222 ± 0.0575). Genitalia with parameral arch width 0.145–0.160 (8: 0.154 ± 0.0063); endomeral plate shaped as in Fig. 6, with broadened apical portion and with dark medial sub-basal line usually evenly rounded.

Female. Much as in *G. bulleri*, except as follows. Temple width 0.425–0.465 (9: 0.444 ± 0.0124); submarginal and inner marginal temple setae 0.045–0.055 (9: 0.050 ± 0.0034) and 0.020–0.030 (9: 0.024 ± 0.0030) long, respectively. Prothorax width 0.305–0.335 (9: 0.314 ± 0.0101). Tergal setae: II, 11–14 (9: 12.1 ± 1.27); III, 18–21 (8: 19.2 ± 1.16); IV, 21–26 (7: 23.6 ± 1.90); V, 19–25 (9: 22.6 ± 1.74). Longest seta of medial 10 on tergite VI, 0.060–0.085 (9: 0.072 ± 0.0078); none on tergite VII longer than 0.100. Longer seta of medial pair on tergite VIII, 0.055–0.075 (9: 0.060 ± 0.0070) long. Sternal setae: II, 7–10 (9: 8.4 ± 0.88); VII, 7–8 (8: 7.7 ± 0.46). Total length 1.125–1.255 (9: 1.201 ± 0.0379). Genital sac as in Fig. 3, length 0.150–0.185 (7: 0.166 ± 0.0124), with 14–17 (7: 15.3 ± 1.25) loops and transverse lines, posteriormost line located 0.110–0.125 (7: 0.121 ± 0.0071) from anterior sac margin; lines flatter medioanteriorly, not deeply indented.

Type Material. HOLOTYPE: ♂: ex *P. b. nayaritensis* (KU-39802), 6 mi (9.7 km) S Ixtlan del Rio, Nayarit, Mexico, 2-IX-1950, J. R. Alcorn. PARATYPES: MEXICO: Nayarit: 1 ♂, 5 ♀♀, ex *P. b. nayaritensis*, same data as holotype; 16 ♂♂, 39 ♀♀, same except KU-39801; 13 ♂♂, 13 ♀♀, same except KU-36673, Jalcocotan, 11-III-1950; Jalisco, 7 ♂♂, 7 ♀♀, KU-39803, Magdalena, 14-IX-1950, J. R. Alcorn.

Remarks. The shape of the male genitalic endomeral plate (Fig. 6) and the line configuration on the female genital sac (Fig. 3) enable separation of *G. nadleri* from both of the other species of the *bulleri* complex. In addition, many quantitative features support these separations. Both sexes of *G. nadleri* are consistently much smaller than *G. burti*; the best male characters, critical discrimination values, and misidentification probabilities are prothorax width 0.328 (0.000), head width 0.465 (0.001), genitalic parameral arch width 0.172 (0.001), total length 1.360 (0.006), and antennal scape length 0.185 (0.020). The best female characters are head width 0.487 (0.000), the number of setae of medial 10 longer than 0.100 on tergite VII 3.64 (0.000), the longest of these setae 0.109 (0.023), prothorax width 0.347 (0.000), and submarginal temple seta length 0.062 (0.014). Males of *G. nadleri* have shorter submarginal temple setae, fewer tergal setae on III, and fewer tergal and pleural setae on VII than do males of *G. bulleri* (s.l.), the respective values being 0.066 (0.063), 20.38 (0.127), and 16.62 (0.149). Females have no characters with misidentification probability less than 0.16.

G. nadleri is at the northwest edge of the *P. bulleri* gopher range, *G. burti* is at the southwest edge, and most *G. bulleri* are between them (Fig. 8). The principal anomaly concerns the *P. bulleri* identified only to subspecies and bearing the *G. b. intermedius* lice.

Etymology. This species is named for Steven A. Nadler, Louisiana State University, in appreciation of his cooperation with us and his research in integrating data on pocket gopher lice with those of their hosts.

The five taxa described here will key to *G. bulleri* in couplet 32 of the key to males and couplet 10 of the key to females provided by Price & Emerson (1971). The following key may be used to separate the taxa of the *bulleri* complex:

1. Male with genitalic endomeral plate as in Fig. 6; female with lines of genital sac as in Fig. 3; on *P. b. nayaritensis* ..... *nadleri* Price and Hellenthal, n. sp.
   Male with genitalic endomeral plate as in Fig. 4; female with lines of genital sac as in Fig. 2; on other *P. b.* sspp. 2
2. Male with head width >0.474 and genitalic parameral arch width >0.177; female with head width >0.500, prothorax width >0.356, and >4 of medial 10 setae longer than 0.100 on tergite VII; on *P. b. burti* ..... *burti* Price and Hellenthal, n. sp.
   Male smaller; female usually smaller and with 4 or fewer of medial 10 setae longer than 0.100 on tergite VII; on other *P. b.* sspp. ..... (*bulleri* s.l.) 3
3. Male 4
   Female 6
4. Head width >0.467; on *P. b. melanurus* ..... *bulleri melanuri* Price and Hellenthal, n. ssp.
   Head width <0.467; on other *P. b.* sspp. .. 5
5. From Colima, Mexico ..... *bulleri intermedius* Price and Hellenthal, n. ssp.
   From Jalisco, Mexico ..... *bulleri bulleri* Price and Emerson
6. Medial 10 setae on tergite VII with only 0–2 longer than 0.100, longest <0.104; on *P. b.* sspp. from Jalisco, Mexico, other than *P. b. melanurus* ..... *bulleri bulleri* Price and Emerson
   Medial 10 setae on tergite VII with at least 3 longer than 0.100, longest >0.104; on *P. b. melanurus* or from Colima, Mexico 7
7. Head width >0.487; on *P. b. melanurus*, from Jalisco, Mexico . *bulleri melanuri* Price and Hellenthal, n. ssp.
   Head width <0.487; on *P. b.* ssp. from Colima, Mexico ..... *bulleri intermedius* Price and Hellenthal, n. ssp.

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