31 July 1980
JOURNAL OF THE KANSAS ENTOMOLOGICAL SOCIETY
53(3), 1980, pp. 567–580

The *Geomydoecus neocopei* Complex (Mallophaga: Trichodectidae) of the *Thomomys umbrinus* Pocket Gophers (Rodentia: Geomyidae) of Mexico

ROGER D. PRICE
Department of Entomology, Fisheries, and Wildlife,
University of Minnesota, St. Paul 55108

AND

RONALD A. HELLENTHAL
Department of Biology, University of Notre Dame,
Notre Dame, Indiana 46556

ABSTRACT: Seven species of the *Geomydoecus* (*Thomomydoecus*) *neocopei* complex are described and illustrated: *G.* (*T.*) *neocopei* Price and Emerson from *Thomomys umbrinus tolucae* Nelson and Goldman; *G.* (*T.*) *genowaysi* Price and Emerson from 6 subspecies of *T. umbrinus* (type-host: *T. u. madrensis* Nelson and Goldman); *G.* (*T.*) *asymmetricus* n. sp. from *T. u. chihuahuae* Nelson and Goldman; *G.* (*T.*) *greeri* n. sp. from *T. u. juntae* Anderson; *G.* (*T.*) *jamesbeeri* Price and Emerson from *T. u. supernus* Nelson and Goldman; *G.* (*T.*) *peregrini* n. sp. from *T. u. peregrinus* Merriam; and *G.* (*T.*) *potteri* n. sp. from *T. u. crassidens* Nelson and Goldman. A key is given for the identification of the males of the complex.

Following a revision of the genus *Geomydoecus* Ewing by Price and Emerson (1971), the new subgenus *Thomomydoecus* was erected by Price and Emerson (1972) to include 6 species of pocket gopher lice. Of these species, 5 are apparently restricted to hosts among the subspecies of *Thomomys bottae* (Eydoux and Gervais) and *T. umbrinus* (Richardson). Extensive collecting of lice from these gopher hosts since then has shown members of *Thomomydoecus* to occur much more widely than previously thought and to include a number of undescribed taxa. The *Thomomydoecus* on the *bottae-umbrinus* complex can be separated into the *minor* complex containing 2 recognized species whose males have tergites II–III with short widely separated setae and into the *neocopei* complex containing 3 recognized species whose males have tergites II–III with long and clustered setae.

Received for publication 5 October 1979.

It is our intent here to treat the taxonomy of the latter group. This will involve the redescription of the 3 included species, the description of 4 new species, and the presentation of a key for the recognition of the males of these taxa.

Quantitative data for lice of the *neocopei* complex combined with their host and locality information are included as a part of a computerized pocket gopher louse data base maintained at the University of Minnesota. The retrieval and analysis of these data were performed with an integrated group of computer programs developed by the authors and called the BUG system. A description and explanation of our data handling and analysis procedures may be found in Price and Hellenthal (1979).

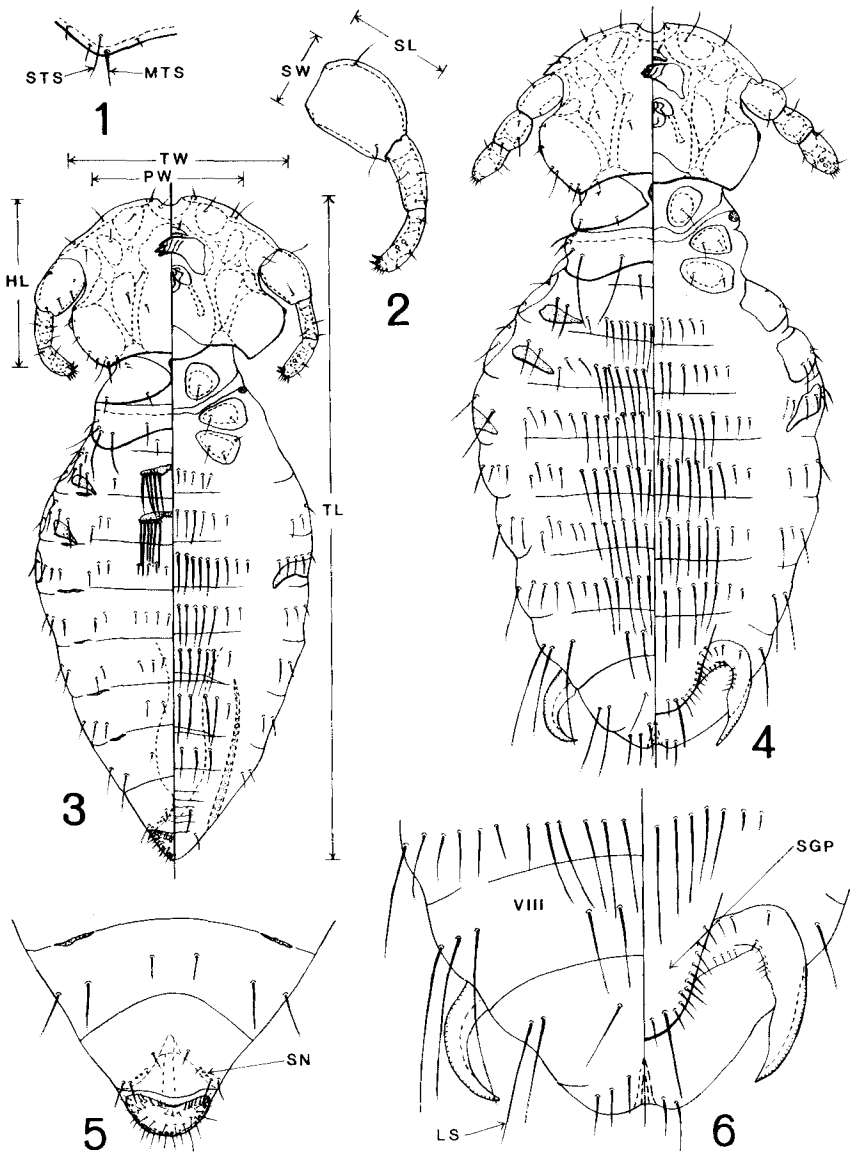
In the following descriptions, counted or measured characters are followed by the minimum and maximum observed values, then the sample size, mean, and standard deviation in parentheses. All measurements are in millimeters. Illustrations are for specimens from the type-host. In evaluating character usefulness for specific discrimination, critical values for each character were calculated at the point where the likelihood of single character misidentification of the 2 compared taxa was equal, given normality and equal variance, and ignoring 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 species description, quantitative data are given only for those characters whose means differ at a significance level of $P \leq 0.01$. In the "Material" section, a number in parentheses following a locality represents the total 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.

The discriminant functions given in this paper were calculated using the U.C.L.A. Biomedical Computer Program BMD04M (Discriminant Analysis for Two Groups), as described in Dixon (1973). The principal components analysis used a computer program adapted from program PCFLOR in Goldstein and Grigal (1972).

Geomydoecus (*Thomomydoecus*) *neocopei* Price and Emerson (Figs. 1–7)

Geomydoecus neocopei Price and Emerson, 1971, J. Med. Ent. 8:248. Type-host: *Thomomys umbrinus tolucae* Nelson and Goldman.

MALE: As in Fig. 3. Temple width (TW) 0.360–0.385 (22: 0.372 ± 0.0067); head length (HL) 0.255–0.285 (22: 0.271 ± 0.0069); submarginal and inner marginal temple setae (STS, MTS: Fig. 1) 0.025–0.035 (21: 0.028 ± 0.0033) and 0.025–0.035 (21: 0.032 ± 0.0030) long, respectively, with STS



Figs. 1–6. *Geomydoecus neocopei*. 1. Male temple margin. 2. Ventral male antenna. 3. Male. 4. Female. 5. Dorsal male terminalia. 6. Female terminalia.

lateroanterior to inner MTS. Antenna (Fig. 2) with scape length (SL) 0.100–0.110 (22: 0.107 ± 0.0034), scape width (SW) 0.070–0.080 (22: 0.076 ± 0.0026). Prothorax width (PW) 0.245–0.270 (22: 0.259 ± 0.0063). Tergal setae: I, 2; II, 11–16 (21: 13.2 ± 1.29); III, 16–22 (22: 18.3 ± 1.80); IV, 12–20 (21: 15.5 ± 1.72); V, 10–17 (21: 13.5 ± 1.57); VI, 9–13 (21: 11.0 ± 1.24); tergal and pleural setae on VII, 11–15 (20: 12.8 ± 1.02). Dorsal terminalia (Fig. 5) with broad setose posterior portion, preceded on each side by 2 lateral setae, 2 sensilla (SN) generally anterior to these setae, then minute seta and short seta. Sternal setae: II, 8–11 (21: 9.9 ± 0.89); III, 12–15 (21: 13.7 ± 0.97); IV, 13–20 (22: 16.4 ± 1.71); V, 10–18 (22: 13.9 ± 1.82); VI, 10–14 (22: 12.5 ± 1.01); VII, 10–14 (22: 11.3 ± 1.04); VIII, 4–8 (22: 5.9 ± 1.02). Total length (TL) 1.060–1.210 (22: 1.137 ± 0.0336). Genitalia as in Fig. 7A; parameral arch (PA) as in Fig. 7C, width (PAW) 0.075–0.090 (22: 0.080 ± 0.0041); endomeral plate (EP) as in Fig. 7B, broad and asymmetrical, width (EPW) 0.050–0.060 (22: 0.055 ± 0.0028), length (EPL) 0.055–0.070 (22: 0.064 ± 0.0036).

FEMALE: As in Fig. 4. Temple width 0.395–0.420 (17: 0.406 ± 0.0077); head length 0.255–0.290 (17: 0.276 ± 0.0081); submarginal and inner marginal temple setae 0.025–0.035 (16: 0.028 ± 0.0031) and 0.030–0.040 (14: 0.035 ± 0.0028) long, respectively, positioned as for male. Prothorax width 0.265–0.310 (17: 0.294 ± 0.0110). Tergal setae: I, 2; II, 14–19 (17: 15.8 ± 1.48); III, 19–27 (17: 22.8 ± 2.04); IV, 22–31 (15: 26.2 ± 2.54); V, 21–29 (15: 25.7 ± 2.26); VI, 21–28 (15: 23.7 ± 1.72); tergal and pleural setae on VII, 26–33 (16: 30.2 ± 2.07); median setae tergite VIII, 2–6 (17: 3.4 ± 1.11). Longest seta of medial 10 on tergite VI, 0.095–0.115 (16: 0.107 ± 0.0056); on tergite VII, 0.100–0.120 (16: 0.109 ± 0.0051), with 0–8 (15: 3.0 ± 2.20) of these longer than 0.100. Longest of medial setae on tergite VIII, 0.085–0.100 (17: 0.094 ± 0.0050). Last tergite (Fig. 6) with 2 lateral setae (LS) close together on each side and pair near midline; outer seta 0.090–0.125 (13: 0.108 ± 0.0094), middle seta 0.085–0.100 (10: 0.094 ± 0.0059), inner seta 0.060–0.085 (16: 0.074 ± 0.0066) long. Sternal setae: II, 9–15 (16: 11.5 ± 1.46); III, 12–17 (16: 15.3 ± 1.44); IV, 18–22 (16: 19.8 ± 1.06); V, 16–21 (16: 19.3 ± 1.40); VI, 16–21 (16: 18.5 ± 1.46); VII, 13–18 (16: 15.2 ± 1.38). Subgenital plate (SGP: Fig. 6) with 24–33 (17: 29.7 ± 2.52) setae, with long heavy medioposterior seta on each side over twice length of adjacent setae. Total length 1.110–1.275 (17: 1.212 ± 0.0472).

MATERIAL: 34 males, 18 females, *T. u. tolucae*, Mexico, Mexico—Nevado de Toluca (3), NW slope Nevado de Toluca, Ojo de Agua (3), 18 km S, 12 km W Toluca de Lerdo (2).

REMARKS: The male of *G. neocopei* is easily separable from all others of the complex by the shape of the genitalic endomeral plate; there are no known reliable qualitative features that enable female recognition. For males, the best quantitative characters separating them from all other members of the complex and their critical values for discrimination and probabilities of misidentification were the endomeral plate width 0.041 (0.000), the number of setae on tergite II 11.00 (0.016), and the parameral arch width 0.069 (0.022). For females, the best quantitative characters were the number of setae on tergite II 14.28 (0.118), the number of setae on sternite VII 14.05 (0.179), and the number of setae on tergite III 21.06 (0.184).

genowaysi group

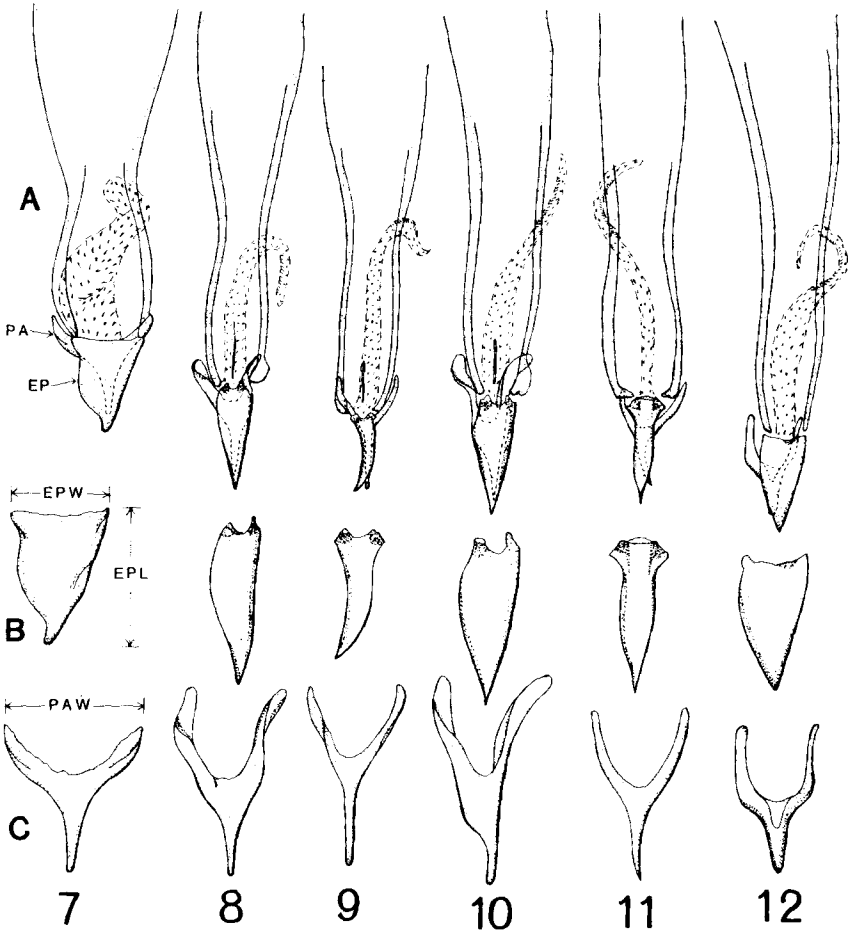
The 3 species included in this group are distinguished from the other members of the *neocopei* complex in that on each side of abdominal segments II–III the male has a pair of relatively long heavy pleural setae comparable to the median tergal setae (Fig. 19), has median tergal setae on II extending only to or slightly beyond bases of those on III, has genitalia as in Figs. 8–10, and has a pair of sensilla on each side of the dorsal terminalia (Figs. 17, 18), these being on line with or posterior to the lateral pair of setae.

Geomydoecus (*Thomomydoecus*) *genowaysi* Price and Emerson (Figs. 8, 18, 19)

Geomydoecus (*Thomomydoecus*) *genowaysi* Price and Emerson, 1972, J. Med. Ent. 9:464. Type-host: *Thomomys umbrinus madrensis* Nelson and Goldman.

MALE: Close to Fig. 3. Temple width 0.340–0.380 (103: 0.357 ± 0.0098); head length 0.235–0.285 (104: 0.255 ± 0.0081); submarginal and inner marginal temple setae 0.020–0.030 (94: 0.024 ± 0.0031) and 0.025–0.045 (94: 0.035 ± 0.0033) long, respectively. Antenna with scape length 0.090–0.110 (104: 0.103 ± 0.0043), scape width 0.060–0.080 (104: 0.070 ± 0.0043). Prothorax width 0.220–0.265 (105: 0.242 ± 0.0087). Tergal setae: II, 7–11 (102: 8.8 ± 0.97); III, 11–17 (105: 14.2 ± 1.28); IV, 10–16 (102: 13.4 ± 1.28); V, 9–14 (102: 11.5 ± 1.07); VI, 6–12 (104: 8.8 ± 0.98); tergal and pleural setae on VII, 10–13 (102: 11.9 ± 0.47). Dorsal terminalia (Fig. 18) with narrow setose posterior portion having darkly pigmented medioanterior indentation; paired sensilla posterior to lateral long setae. Sternal setae: II, 7–11 (105: 8.6 ± 1.02); III, 8–15 (104: 11.5 ± 1.28); IV, 11–17 (102: 13.6 ± 1.46); V, 9–15 (105: 11.2 ± 1.10); VI, 8–13 (104: 10.6 ± 0.90); VII, 8–11 (104: 9.8 ± 0.88); VIII, 3–8 (104: 5.5 ± 0.92). Total length 1.005–1.190 (97: 1.106 ± 0.0390). Genitalia as in Fig. 8A; parameral arch as in Fig. 8C, width 0.050–0.065 (103: 0.059 ± 0.0037); endomeral plate as in Fig. 8B, with 1 side having relatively straight thickened margin and other convex, not thickened, width 0.020–0.030 (102: 0.025 ± 0.0016), length 0.065–0.090 (100: 0.080 ± 0.0045).

FEMALE: Close to *G. neocopei* (Fig. 4), except as follows. Temple width 0.370–0.420 (97: 0.394 ± 0.0127); head length 0.240–0.285 (97: 0.263 ±



Figs. 7–12. (A) Male genitalia, (B) endomeral plate, (C) parameral arch. 7. *Geomydoecus neocopei*. 8. *G. genowaysi*. 9. *G. greeri* n. sp. 10. *G. asymmetricus* n. sp. 11. *G. jamesbeeri*. 12. *G. potteri* n. sp.

0.0084); submarginal and inner marginal temple setae 0.020–0.035 (89: 0.025 ± 0.0032) and 0.030–0.055 (84: 0.039 ± 0.0048) long, respectively. Prothorax width 0.255–0.305 (101: 0.280 ± 0.0096). Tergal setae: II, 10–16 (102: 12.9 ± 1.21); III, 15–27 (102: 19.4 ± 1.93); IV, 17–32 (102: 23.8 ± 2.46); V, 18–30 (102: 23.2 ± 2.30); VI, 17–27 (101: 21.7 ± 2.22); tergal and pleural setae on VII, 20–34 (102: 26.5 ± 2.74); median setae tergite VIII, 2. Sternal setae: II, 8–14 (102: 11.4 ± 1.11); III, 11–17 (101: 14.4 ± 1.41); IV, 14–25 (101:

17.5 ± 2.07); V, 14–22 (102: 17.2 ± 1.64); VI, 13–21 (102: 16.3 ± 1.58); VII, 10–16 (102: 13.1 ± 1.19). Subgenital plate with 20–41 (102: 26.6 ± 3.69) setae, with long heavier seta on each side usually less than twice length of adjacent setae. Total length 0.985–1.330 (94: 1.160 ± 0.0650).

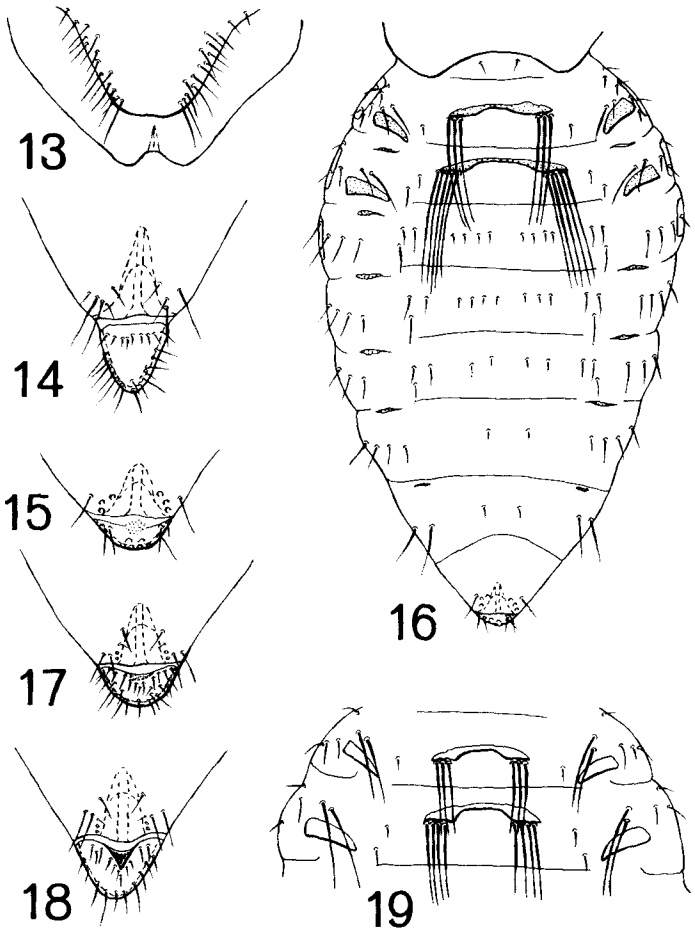
MATERIAL: 333 males, 223 females, *T. u. madrensis*, Mexico, Chihuahua—3 mi (4.8 km) SW (2) and 3 mi (4.8 km) S, 10 mi (16.1 km) E (1) Pacheco, 2.4 mi (3.9 km) NE (4), 1 mi (1.6 km) W (4), 9 mi (14.5 km) SE (2), 3.5 mi (5.6 km) NE (3), and at (4) Colonia Garcia, Water Canyon, 3 mi (4.8 km) S Colonia Garcia (3), Meadow Valley, 5 mi (8.0 km) S Colonia Garcia (2), Valle Moctezuma, 11.6 mi (18.7 km) SE Colonia Garcia (8), Rio Gavilon, 9 mi (14.5 km) SW (1) and 7 mi (11.3 km) SW (2) Pacheco, Canon del Oro, 12 mi (19.3 km) E Pacheco (1), 1.3 mi (2.1 km) E Chuhuichupa (3), 1.5 mi (2.4 km) NE Madera (2). 31 males, 23 females, *T. u. chihuahuae* Nelson and Goldman, Mexico, Chihuahua—2 mi (3.2 km) W Samachic (3), Yaguirachic, 130 mi (209.2 km) W Chihuahua (2), 9.6 mi (15.4 km) W Tomochic (4), Rancho El Pajarito, 25.0 mi (40.2 km) W Tomochic (4). 2 males, 5 females, *T. u. evexus* Nelson and Goldman, Mexico, Durango—Villa Ocampo (2). 1 male, 8 females, *T. u. goldmani* Merriam, Mexico, Chihuahua—Sierra Almagre, 19 mi (30.6 km) S, 4 mi (6.4 km) E Jaco (1); Coahuila—3 mi (4.8 km) NE Sierra Mojada (1). 99 males, 108 females, *T. u. juntae* Anderson, Mexico, Chihuahua—Rosario (1), 11 mi (17.7 km) E La Junta (1), 2 mi (3.2 km) W Minaca (1), 4 mi (6.4 km) S, 1 mi (1.6 km) W Santo Tomas (1), 5 mi (8.0 km) N (2) and at (1) Chihuahua, 2 mi (3.2 km) SW Babicora (1), 7 mi (11.3 km) WSW (2) and 8.4 mi (13.5 km) W (3) Cuauhtemoc, 1 mi (1.6 km) S, 0.5 mi (0.8 km) E Santa Clara (1), Canon del Potrero, 7 mi (11.3 km) W El Sauz (2), Arroyo Mesteno, Sierra del Nido (10), 5 mi (8.0 km) N Cerro La Campana (2). 11 males, 18 females, *T. u. nelsoni* Merriam, Mexico, Chihuahua—10 mi (16.1 km) SE Hd del Parral (1), Jimenez (1); Durango—14.7 mi (23.7 km) N Las Nieves (4).

Geomydoecus (*Thomomydoecus*) ***asymmetricus*** n. sp. (Fig. 10)

MALE: Much as for *G. genowaysi*, except as follows. Antenna with scape length 0.095–0.105 (13: 0.100 ± 0.0036). Setae tergite III, 10–15 (13: 13.2 ± 1.41). Total length 1.060–1.265 (13: 1.162 ± 0.0516). Genitalia as in Fig. 10A; parameral arch as in Fig. 10C, with pronounced convexity on 1 side, width 0.060–0.070 (13: 0.066 ± 0.0029); endomeral plate as in Fig. 10B, length 0.080–0.090 (12: 0.084 ± 0.0033).

FEMALE: Much as for *G. genowaysi*, except as follows. Setae tergite II, 10–14 (11: 11.8 ± 1.33). Sternal setae on VI, 12–19 (10: 14.7 ± 2.21); on VII, 11–14 (11: 12.0 ± 1.10).

MATERIAL: Holotype male, *Thomomys umbrinus chihuahuae* Nelson and Goldman (University of California Museum of Vertebrate Zoology-



Figs. 13–19. *Geomydoecus jamesbeeri*. 13. Ventral female terminalia. 14. Dorsal male terminalia. *G. potteri* n. sp. 15. Dorsal male terminalia. 16. Dorsal male abdomen. 17. *G. greeri* n. sp., dorsal male terminalia. *G. genowaysi*. 18. Dorsal male terminalia. 19. Dorsal male abdominal segments II–III.

150476), 1.8 mi (2.9 km) E El Vergel, Chihuahua, Mexico, 17.VII.1976, J. L. Patton; in collection of the University of Minnesota. Paratypes: 24 males, 28 females, *T. u. chihuahuae*, Mexico, Chihuahua—same as holotype (3), Lagunita, 7 mi (11.3 km) SW El Vergel (1), 10 km N Guachochic (5), Sierra Madre, 65 mi (104.6 km) E Batopiles (1), 10 mi (16.1 km) SW Agostadero (1).

REMARKS: Both sexes of *G. asymmetricus* are very close to *G. genowaysi*, with only the shape of the male parameral arch affording a means of recognition. However, this is such a consistent difference that we feel it supports specific separation of these 2 taxa. For males, the critical value for discrimination and probability of misidentification using the width of the parameral arch were 0.063 (0.177).

Geomydoecus (*Thomomydoecus*) ***greeri*** n. sp.
(Figs. 9, 17)

MALE: As for *G. genowaysi*, except as follows. Inner marginal temple seta 0.040–0.045 (2: 0.043 ± 0.0035) long. Dorsal terminalia (Fig. 17) with relatively broader posterior setose portion lacking pronounced pigmented medioanterior indentation; paired sensilla more or less on level with paired lateral setae. Genitalia as in Fig. 9A; parameral arch as in Fig. 9C, width 0.050 (4); endomeral plate as in Fig. 9B, width 0.020–0.025 (4: 0.021 ± 0.0025), length 0.060–0.065 (4: 0.065 ± 0.0025).

FEMALE: As for *G. genowaysi*.

MATERIAL: Holotype male, *Thomomys umbrinus juntae* Anderson (University of Kansas Museum of Natural History-54534), 5 mi (8.0 km) N, 5 mi (8.0 km) E Meoqui, Chihuahua, Mexico, 23.VI.1953, J. K. Greer; in collection of the University of Kansas. Paratypes: 3 males, 2 females, *T. u. juntae*, Mexico, Chihuahua—same as holotype (1), 1 mi (1.6 km) S Delicias (1).

REMARKS: Qualitatively, the male of *G. greeri* is distinguished from the closely related *G. genowaysi* in details of the genitalia and the dorsal terminalia. For males, the best discriminating quantitative characters and their critical values for discrimination and probabilities of misidentification were the length of the endomeral plate 0.073 (0.039), the width of the endomeral plate 0.023 (0.111), and the length of the inner marginal temple seta 0.039 (0.113). There are no known qualitative or quantitative features for separating females of *G. greeri* from those of *G. genowaysi*.

jamesbeeri group

The 3 members of this group are separable from the other members of the *neocopei* complex by the male having finer shorter pleural setae on abdominal segments II–III (Fig. 16), having much longer median setae on tergites II–III, having genitalia as in Figs. 11 or 12, and lacking sensilla on the dorsal terminalia (Figs. 14, 15).

Geomydoecus (*Thomomydoecus*) *jamesbeeri* Price and Emerson
(Figs. 11, 13, 14)

Geomydoecus (*Thomomydoecus*) *jamesbeeri* Price and Emerson, 1972, J. Med. Ent. 9:464. Type-host: *Thomomys umbrinus supernus* Nelson and Goldman.

MALE: Much as in Fig. 3. Temple width 0.360–0.380 (7: 0.366 ± 0.0070); head length 0.255–0.280 (8: 0.268 ± 0.0076); submarginal and inner marginal temple setae 0.015–0.020 (8: 0.019 ± 0.0023) and 0.030–0.035 (5: 0.031 ± 0.0022) long, respectively. Antenna with scape length 0.095–0.110 (8: 0.102 ± 0.0052), scape width 0.070–0.080 (8: 0.075 ± 0.0032). Prothorax width 0.235–0.260 (8: 0.248 ± 0.0060). Tergal setae: II, 9–11 (8: 10.0 ± 0.53); III, 13–16 (8: 14.3 ± 0.89); IV, 11–14 (8: 12.9 ± 0.99); V, 8–13 (8: 10.6 ± 1.51); VI, 8–10 (8: 8.9 ± 0.83); tergal and pleural setae on VII, 11–13 (8: 12.1 ± 0.64). Dorsal terminalia (Fig. 14) with relatively long narrow setose terminal portion, preceded on each side by 4–5 short to long setae. Sternal setae: II, 6–8 (8: 7.1 ± 0.83); III, 10–12 (8: 11.0 ± 0.76); IV, 10–16 (8: 13.3 ± 1.75); V, 10–11 (8: 10.5 ± 0.53); VI, 9–11 (8: 10.3 ± 0.89); VII, 7–10 (8: 8.9 ± 1.13); VIII, 4–6 (8: 5.4 ± 0.74). Total length 1.145–1.235 (7: 1.189 ± 0.0354). Genitalia as in Fig. 11A; parameral arch as in Fig. 11C, width 0.045–0.055 (8: 0.049 ± 0.0042); endomeral plate as in Fig. 11B, narrow and symmetrical, width 0.025–0.030 (8: 0.029 ± 0.0023), length 0.070–0.080 (8: 0.075 ± 0.0035).

FEMALE: Much as in Fig. 4. Temple width 0.395–0.440 (9: 0.417 ± 0.0137); head length 0.265–0.290 (9: 0.278 ± 0.0087); submarginal and inner marginal temple setae 0.020–0.025 (9: 0.021 ± 0.0022) and 0.030–0.035 (4: 0.031 ± 0.0025) long, respectively. Prothorax width 0.285–0.315 (9: 0.298 ± 0.0094). Tergal setae: II, 12–15 (8: 13.3 ± 0.89); III, 18–23 (9: 20.8 ± 1.56); IV, 20–26 (9: 24.2 ± 2.11); V, 21–25 (9: 22.9 ± 1.54); VI, 18–24 (9: 21.6 ± 1.81); tergal and pleural setae on VII, 23–31 (9: 28.0 ± 2.78); median setae tergite VIII, 2. Longest seta of medial 10 on tergite VI, 0.095–0.110 (9: 0.103 ± 0.0043); on tergite VII, 0.085–0.120 (7: 0.107 ± 0.0118), with 0–4 (7: 1.4 ± 1.40) of these longer than 0.100. Longest of medial setae on tergite VIII, 0.080–0.100 (8: 0.092 ± 0.0069). Last tergite with outer seta 0.100–0.120 (6: 0.111 ± 0.0071), middle seta 0.100–0.105 (5: 0.103 ± 0.0027), inner seta 0.070–0.085 (8: 0.077 ± 0.0042) long. Sternal setae: II, 10–13 (8: 11.4 ± 1.19); III, 12–16 (9: 14.6 ± 1.13); IV, 15–22 (9: 18.4 ± 2.13); V, 16–21 (9: 17.9 ± 1.62); VI, 15–19 (9: 16.7 ± 1.41); VII, 11–14 (9: 12.6 ± 0.88). Subgenital plate (Fig. 13) with 23–30 (9: 25.3 ± 2.29) setae, with long heavier seta on each side usually less than twice length of adjacent setae. Total length 1.235–1.360 (9: 1.308 ± 0.0479).

MATERIAL: 8 males, 9 females, *T. u. supernus*, Mexico, Guanajuato—Santa Rosa (6).

Geomydoecus (*Thomomydoecus*) ***peregrini*** n. sp.

MALE: Close to *G. jamesbeeri*, except as follows. Length of submarginal temple seta 0.015 (4); head length 0.240–0.265 (5: 0.253 ± 0.0084); total length 1.120–1.180 (5: 1.139 ± 0.0251).

FEMALE: Close to *G. jamesbeeri*, except as follows. Temple width 0.385–0.405 (10: 0.393 ± 0.0070); head length 0.260–0.270 (10: 0.265 ± 0.0041). Prothorax width 0.270–0.295 (10: 0.277 ± 0.0066). Tergal setae on III, 16–20 (11: 18.2 ± 1.17); tergal and pleural setae on VII, 22–26 (11: 24.3 ± 1.35). Length of inner seta on last tergite 0.060–0.070 (9: 0.063 ± 0.0035). Sternal setae: V, 13–16 (11: 15.5 ± 0.93); VI, 13–15 (11: 14.2 ± 0.87). Subgenital plate with 19–23 (11: 21.3 ± 1.56) setae. Total length 1.180–1.265 (10: 1.234 ± 0.0264).

MATERIAL: Holotype female, *Thomomys umbrinus peregrinus* Merriam (University of Kansas Museum of Natural History-38368), 2 mi (3.2 km) SSW Parres, Distrito Federal, Mexico, 1.V.1950, J. A. Alcorn; in collection of the University of Kansas. Paratypes: 7 males, 10 females, *T. u. peregrinus*, same as holotype (1).

REMARKS: Although there are no good qualitative differences for separating the male of *G. peregrini* from that of *G. jamesbeeri*, the best quantitative features and their critical values for discrimination and probabilities of misidentification were the head length (HL) 0.260 (0.164), the length of the submarginal temple seta (STS) 0.017 (0.167), and the total length (TL) 1.164 (0.216). Because of the high probability of error using any 1 of these quantitative characters, discriminant functions were calculated using these 3 and each combination of 2 of these 3 characters. An explanation of the use of discriminant functions for louse identification is given in Price and Hellenthal (1975). The use of STS, HL, and TL in combination provided much improved discrimination, giving a probability of misidentification of 0.054, with respective discriminant function coefficients of 0.1195, 0.0581, and −0.0064 and a critical value for the discriminant of 9.555 (discriminant means and standard deviations for *G. jamesbeeri* were 10.114 ± 0.3914 and for *G. peregrini* 8.996 ± 0.2579). Contrasted to this, the female of *G. peregrini* demonstrated a number of good quantitative differences from those of *G. jamesbeeri*. The best of these and their critical values for discrimination and probabilities of misidentification were the length of the inner seta on the last tergite 0.070 (0.035), the width of the prothorax 0.288 (0.095), the temple width 0.405 (0.127), and the number of setae on sternite VI 15.42 (0.139).

Geomydoecus (*Thomomydoecus*) ***potteri*** n. sp.
(Figs. 12, 15, 16)

MALE: Much as for *G. jamesbeeri*, except as follows. Tergal setae on II, 8 (2). Sternal setae on V, 11–13 (2: 12.0 ± 1.41). Abdomen broadly rounded posteriorly (Fig. 16), with wide short posterior setose portion (Fig. 15; missing setae with bases shown). Genitalia as in Fig. 12A; parameral arch as in Fig. 12C; endomeral plate as in Fig. 12B, broad, blade-like, width 0.035 (2), length 0.065 (2).

FEMALE: Much as for *G. jamesbeeri*, except as follows. Length of inner marginal temple seta 0.045 (2). Number of medial 10 setae on tergite VII

longer than 0.100, 4–5 (2: 4.5 ± 0.71). Length of middle seta on last tergite 0.125 (1). Setae on tergite II, 11–12 (2: 11.5 ± 0.71); on sternite III, 11–13 (2: 12.0 ± 1.41); on subgenital plate, 28–31 (2: 29.5 ± 2.12).

MATERIAL: Holotype male, *Thomomys umbrinus crassidens* Nelson and Goldman (U.S. National Museum-91994), Valparaiso Mts., Zacatecas, Mexico, 2.XII.1897, Nelson and Goldman; in collection of the U.S. National Museum. Paratypes: 1 male, 2 females, *T. u. crassidens*, same as holotype (1).

REMARKS: Qualitatively, the shape of the genitalic endomeral plate and parameral arch and the terminalia will separate males of *G. potteri* from those of the other 2 species of this group. There are no known qualitative features for recognizing the females. For males, the best quantitative characters separating *G. potteri* from both *G. jamesbeeri* and *G. peregrini* and their critical values for discrimination and probabilities of misidentification were the width of the endomeral plate 0.032 (0.079), the length of the inner marginal temple seta 0.033 (0.108), and the number of setae on tergite V 11.65 (0.165); separating *G. potteri* from *G. jamesbeeri*, the number of setae on tergite II 9.00 (0.023), the width of the endomeral plate 0.032 (0.075), and the length of the endomeral plate 0.070 (0.093); separating *G. potteri* from *G. peregrini*, the length of the inner marginal temple seta 0.033 (0.000), the length of the submarginal temple seta 0.019 (0.017), and the width of the endomeral plate 0.032 (0.067). For females, the best quantitative characters for separating *G. potteri* from *G. jamesbeeri* and *G. peregrini* were the length of the inner marginal temple seta 0.039 (0.004), the length of the middle seta on the last tergite 0.115 (0.080), and the number of setae on the subgenital plate 26.30 (0.123); separating *G. potteri* from *G. jamesbeeri*, the length of the middle seta on the last tergite 0.115 (0.000), the length of the inner marginal temple seta 0.038 (0.001), and the number of setae on sternite III 13.28 (0.136); separating *G. potteri* from *G. peregrini*, the number of setae on the subgenital plate 25.39 (0.005), the length of the inner marginal temple seta 0.039 (0.006), and the number of setae on sternite VI 15.84 (0.027).

This species is named for Bruce D. Potter in recognition of his faithful patience in the accumulation of the quantitative data for this study.

The males of the *neocopei* complex all will come out as *G. neocopei* in the second half of couplet 13 of the key to males given by Price and Emerson (1971). From there, they may be identified by the following modification:

13a. Genitalia (Fig. 7A) with broad endomeral plate (Fig. 7B) and parameral arch (Fig. 7C); dorsal terminalia with sensilla anterior to paired lateral setae (Fig. 5) ..... *neocopei*
– Genitalia not as above (Figs. 8–12); dorsal terminalia either with sensilla not anterior to paired lateral setae or absent 13b
13b. Dorsal terminalia with paired sensilla on each side (Figs. 17, 18); median clustered setae on tergite II at most only extending slightly beyond bases of those on III (Fig. 19) 13c
– Dorsal terminalia without sensilla (Figs. 14, 15); median clustered setae on tergite II extending far beyond bases of those on III (Fig. 16) 13e
13c. Parameral arch markedly asymmetrical (Fig. 10C) ..... *asymmetricus* n. sp.
– Parameral arch more or less symmetrical (Figs. 8C, 9C) 13d
13d. Dorsal terminalia (Fig. 18) with prominent pigmented V-shaped medioanterior area of terminal portion; endomeral plate (Fig. 8B) usually over 0.073 long ..... *genowaysi*
– Dorsal terminalia (Fig. 17) without such pigmented area of terminal portion; endomeral plate (Fig. 9B) less than 0.073 long ..... *greeri* n. sp.
13e. Dorsal terminalia (Fig. 15) with wide short terminal portion; endomeral plate broad, as in Fig. 12B; parameral arch as in Fig. 12C ..... *potteri* n. sp.
– Dorsal terminalia (Fig. 14) with narrow long terminal portion; endomeral plate narrow, as in Fig. 11B; parameral arch as in Fig. 11C 13f
13f. Head length often under 0.260 and length of submarginal temple seta often under 0.017; on *T. u. peregrinus* ..... *peregrini* n. sp.
– Head length often over 0.260 and length of submarginal temple seta often over 0.017; on *T. u. supernus* ..... *jamesbeeri*

Identification of specific taxa within the subgenus *Thomomydoecus* is based primarily on excellent features of male morphology. Females are either inseparable or at most tenuously recognizable on the basis of quantitative characteristics. Since these do not lend themselves to a good workable key structure, we will not attempt to present a key to females here, pending a more complete analysis of specimens within the subgenus. Females may be placed to species by association with identified males, by host association, or by reference to details in the descriptions.

Acknowledgments

We thank the following individuals for permitting us to brush lice from pocket gopher skins or for otherwise contributing to this paper: Dr. K. C. Emerson, U.S. National Museum; Dr. Robert S. Hoffmann, University of Kansas Museum of Natural History; and Dr. James L. Patton, University of California Museum of Vertebrate Zoology. We also wish to thank the staff of the University of Minnesota University Computer Center for the use of its facilities and Dr. Frank B. Martin, Director of the University of Minnesota Statistical Center, for his advice throughout our study.

Paper No. 10,977, Scientific Journal Series, Minnesota Agricultural Experiment Station, St. Paul, Minnesota 55108. Partial support for this study was supplied by a grant to the University of Minnesota from the National Science Foundation (Grant No. DEB77-10179).

Literature Cited

Dixon, W. J., ed. 1973. BMD biomedical computer programs. 3rd ed. Univ. of California Press, Berkeley. 773 p.

Goldstein, R. A., and D. F. Grigal. 1972. Computer programs for the ordination and classification of ecosystems. Oak Ridge National Laboratory, Tennessee. Ecological Sciences Division Publication No. 417. 125 p.

Price, R. D., and K. C. Emerson. 1971. A revision of the genus *Geomydoecus* (Mallophaga: Trichodectidae) of the New World pocket gophers (Rodentia: Geomyidae). J. Med. Ent. 6:228–257.

———, and ———. 1972. A new subgenus and three new species of *Geomydoecus* (Mallophaga: Trichodectidae) from *Thomomys* (Rodentia: Geomyidae). J. Med. Ent. 9:463–467.

Price, R. D., and R. A. Hellenthal. 1975. A reconsideration of *Geomydoecus expansus* (Duges) (Mallophaga: Trichodectidae) from the yellow-faced pocket gopher (Rodentia: Geomyidae). J. Kansas Entomol. Soc. 48:33–42.

———, and ———. 1979. A review of the *Geomydoecus tolucae* complex (Mallophaga: Trichodectidae) from *Thomomys* (Rodentia: Geomyidae), based on qualitative and quantitative characters. J. Med. Ent. 16:265–274.