

J. Med. Entomol.
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RUNNING HEAD: Hellenthal & Price: New Subgenera of Pocket Gopher Lice

Two New Subgenera of Chewing Lice (Phthiraptera: Trichodectidae)
from Pocket Gophers (Rodentia: Geomyidae),
with a Key to All Included Taxa

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ABSTRACT The new subgenera *Thaelerius* and *Jamespattonius* are described, respectively, for the eight species of *Geomydoecus* in the *thomomys* complex of lice and the four species of *Thomomydoecus* in the *wardi* complex. Except for *T. byersi* from *Thomomys bottae*, these lice are restricted to the *Thomomys talpoides* complex of pocket gophers and are the only lice found on these hosts. A key is given for the identification of the currently-recognized 122 taxa of pocket gopher lice.

KEY WORDS Insecta Mallophaga *Geomydoecus* *Thomomydoecus*

Once the taxonomic study of the lice of pocket gophers had been completed and the results subsequently summarized by Hellenthal & Price (1991), we became increasingly aware of a problem involving the supraspecific classification of these lice. All pocket gopher lice had been included in the genus *Geomydoecus* Ewing until they were divided into two subgenera by Price & Emerson (1972), the nominate subgenus and *Thomomydoecus* Price & Emerson. The latter included the slenderer tapered smaller form that typically occurred on the same host individuals as *Geomydoecus*. Later, Hellenthal & Price (1984) elevated *Thomomydoecus* to generic status.

Lyal (1985), in his cladistic study of supraspecific trichodectid classification, rejected the generic status of *Thomomydoecus*, relegating it again to subgenus. In doing so, he theorized that *Geomydoecus* may be paraphyletic and that *Thomomydoecus* may also be paraphyletic or possibly even polyphyletic. Since then, Nadler & Hafner (1989) have substantiated the generic validity of *Geomydoecus* and *Thomomydoecus* on both morphological and genetic grounds. At the time of Lyal's analysis, 20 new pocket gopher louse taxa were yet to be described in nine taxonomic publications, including those treating the *thomomys* complex and the *wardi* complex, both of which constitute the members of the new subgenera described here. We believe that his conclusions were a consequence of an incomplete comprehension of these louse complexes and that an understanding of the full spectrum of chewing lice of pocket

gophers warrants a taxonomic reconsideration of these genera.

One of the purposes of the present paper is to divide each of *Geomysdoecus* and *Thomomydoecus* into two subgenera, thereby recognizing that the lice found on hosts in the *Thomomys talpooides* complex of pocket gophers are quite distinct from those on all other geomyid hosts. This action further substantiates the division of *Thomomys* pocket gophers into two subgenera, *Thomomys* and *Megascapheus*, by Thaeler (1980). The subgenus *Thomomys* includes the three species of the *talpooides* complex that carry only specimens of our two new subgenera; the subgenus *Megascapheus* includes four species of the *bottae* complex that carry, with one exception, members of the two nominate louse subgenera. A further discussion of this may be found in Hellenthal & Price (1991).

The extensive taxonomic work and numerous publications on pocket gopher lice that have appeared since the last published keys to the species of *Geomysdoecus* in Price & Emerson (1971) have made identification extremely difficult. Since 1971, the number of recognized pocket gopher louse species and subspecies has increased from 45 to 122. These new taxa are treated in 25 separate publications. Although an effort was made to provide modifications for the keys in Price & Emerson (1971) in some taxonomic treatments, many pocket gopher louse taxa only can be identified through comparison with original descriptions. Since the known associations between pocket gophers and their lice are now well documented (Hellenthal & Price 1991), we are concerned that workers may turn to host association as a short-cut method of species determination. Therefore, we present here a new key to the lice of pocket gophers that incorporates all known taxa.

Thaelerius Hellenthal & Price, new subgenus
(Figs. 12, 20, 54-57, 135-141)

Type species. *Geomysdoecus thomomys* (McGregor).

Diagnosis. Male antennal scape without median process; lateral temple margin (Fig. 12) with very long seta at least 0.09 mm long and with adjacent marginal setae slender, none stout spiniform; genitalia with relatively large pointed subtriangular endomeral plate overlying reduced parameral arch (Fig. 20) and with sac usually bearing 2 slender elongate spines and 1-5 shorter spines (Fig. 54-57). Female with temple as for male; last tergite with 2+2+2 setae; genital sac (Fig. 135-141) only weakly to moderately developed, subrectangular in shape with medioposterior stalk and lines, if present, restricted to lateral areas.

Remarks. The eight species of this subgenus, which identify in couplets 22-28 of the accompanying key, possess the general features of the genus *Geomysdoecus*; their descriptions may be found in Hellenthal & Price (1989a). The unique male genitalia and female genital sac, along with the chaetotaxy of the temple margin, readily separate the members of this subgenus from all other taxa in the nominate subgenus.

Etymology. This subgenus is named for Charles S. Thaeler, Jr., New Mexico State University, in recognition of his extensive research on pocket gophers of the *Thomomys talpooides* complex (i.e., subgenus *Thomomys*) and his generous cooperation with us in our pocket gopher/louse investigations.

Jamespattonius Hellenthal & Price, new subgenus
(Figs. 22, 23, 31, 32, 133, 134)

Type species. *Thomomydoecus wardi* (Price & Emerson).

Diagnosis. Male antennal scape without median process; lateral temple lacking either very long setae or short stout spiniform setae; abdominal tergites II-I with long closely set clustered setae extending well into following tergite; abdomen posteriorly somewhat

tapered; genitalia with wide (at least 0.10 mm wide) broadly rounded parameral arch crossing endomeral plate near latter's midpoint (Fig. 22 and 23), conspicuous elongate tapered endomeral plate (Fig. 22, 23, 31, 32), and prominent spinose sac without large spines. Female with temple as for male and lacking clustered setae on tergites II-I; last tergite with 2+2+2 setae; subgenital plate U-shaped, fringed on each side with irregular row of short to medium setae; genital sac of moderate size, with close-set faint lines (Fig. 133 and 134).

Remarks. The four species of this subgenus, which identify in couplets 4-6 of the accompanying key, possess the general features of the genus *Thomomydoecus*; their descriptions may be found in Hellenthal & Price (1989b). The unique male genitalia, with the orientation and shape of the parameral arch and endomeral plate as given above and the conspicuous sac, and female genital sac structure are grossly different from all other taxa in the nominate subgenus.

Etymology. This subgenus is named for James L. Patton, University of California, Berkeley, in recognition of his extensive research on pocket gophers, especially of the large *Thomomys bottae* complex, and his generous cooperation with us in our pocket gopher/louse investigations.

The following key stresses morphological characters in separating the 122 species and subspecies of pocket gopher lice currently recognized. The sequence of characters within a couplet gives those for both sexes followed by those of the male, then those of the female. In some couplets, the only features presented are those of one or two of these categories. Under certain circumstances, we have included host or locality information as a confirmatory feature, especially where the morphological details are considered marginally successful for separation or where there are major breaks in the key and the user may be alerted to avoid going the wrong direction. All measurements are in millimeters. The accompanying illustrations are drawn to various scales and are not intended for size comparison with equivalent parts, but are included simply to illustrate qualitative features.

Key to Lice from Pocket Gophers

1. Male tergites II-I with paired groups of clustered setae (Fig. 1-3); temple width <0.410. Female subgenital plate U-shaped (Fig. 115, 122); weak to inconspicuous genital sac; temple as in Fig. 129. Ex *Thomomys* (genus *Thomomydoecus*)
 - 2
- Male tergites II-I without clustered setae (Fig. 5) or temple width >0.410. Female (Fig. 120) with subgenital plate not as above; conspicuous genital sac; temple variable, not as above. Ex all genera (genus *Geomymoecus*). 21
 - 2(1). Male tergites II-I with long closely set setae (Fig. 2, 3)
 - 3
 - Male tergites II-I with short moderately separated setae (Fig. 1) (subgenus *Thomomydoecus*: minor complex) 13
 - 3(2). Male parameral arch 80.100 wide or shaped as in Fig. 22 or 23. Female genital sac with faint lines (Fig. 133, 134) (subgenus *Jamespattonius*). 4
 - Male parameral arch <0.100 wide, shaped otherwise (Fig. 24-26, 29). Female genital sac inapparent (subgenus *Thomomydoecus*: neocopei complex). 7
 - 4(3). Male parameral arch and endomeral plate as in Fig. 23. Female genital sac as in Fig. 134. Ex *T. bottae*
 - *T. byersi* Hellenthal & Price
 - Male parameral arch and endomeral plate near Fig. 22. Female genital sac as in Fig. 133. Ex *T. talpoides*. 5
 - 5(4). Male endomeral plate as in Fig. 22, 60.045 wide
 - *T. wardi* (Price & Emerson)
 - Male endomeral plate as in Fig. 31 or 32, 80.045 wide
 - 6
 - 6(5). Male endomeral plate as in Fig. 31
 - *T. barbarae* Hellenthal & Price
 - Male endomeral plate as in Fig. 32
 - *T. arleneae* Hellenthal & Price
 - 7(3). Male parameral arch >0.070 wide (Fig. 24); endomeral plate >0.040 wide (Fig. 33). *T. neocopei* (Price & Emerson)
 - Male parameral arch otherwise, 60.070 wide; endomeral plate

- otherwise, <0.040 wide 8
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 9
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 Male dorsal terminalia (Fig. 48) without such pigmented area; endomeral plate (Fig. 36) <0.073 long
 *T. greeri* (Price & Hellenthal)
 11(8). Male with wide short dorsal terminal portion (Fig. 45); endomeral plate broad (Fig. 35); parameral arch as in Fig.
 26 *T. potteri* (Price & Hellenthal)
 Male with narrow long dorsal terminal portion (Fig. 49); endomeral plate narrow (Fig. 37); parameral arch as in Fig.
 29 12
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 *T. jamesbeeri* (Price & Emerson)
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Acknowledgments

We thank the many curators of mammal collections for their cooperation that made our studies of pocket gopher lice possible. Partial support for our studies was supplied by grants from the National Science Foundation to the University of Minnesota (Grant DEB77-10179) and to the University of Notre Dame (Grants DEB81-17567, BSR86-14456). Our studies also have been supported partially by project Min-17-015 of the Minnesota Agricultural Experiment Station.

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Footnotes

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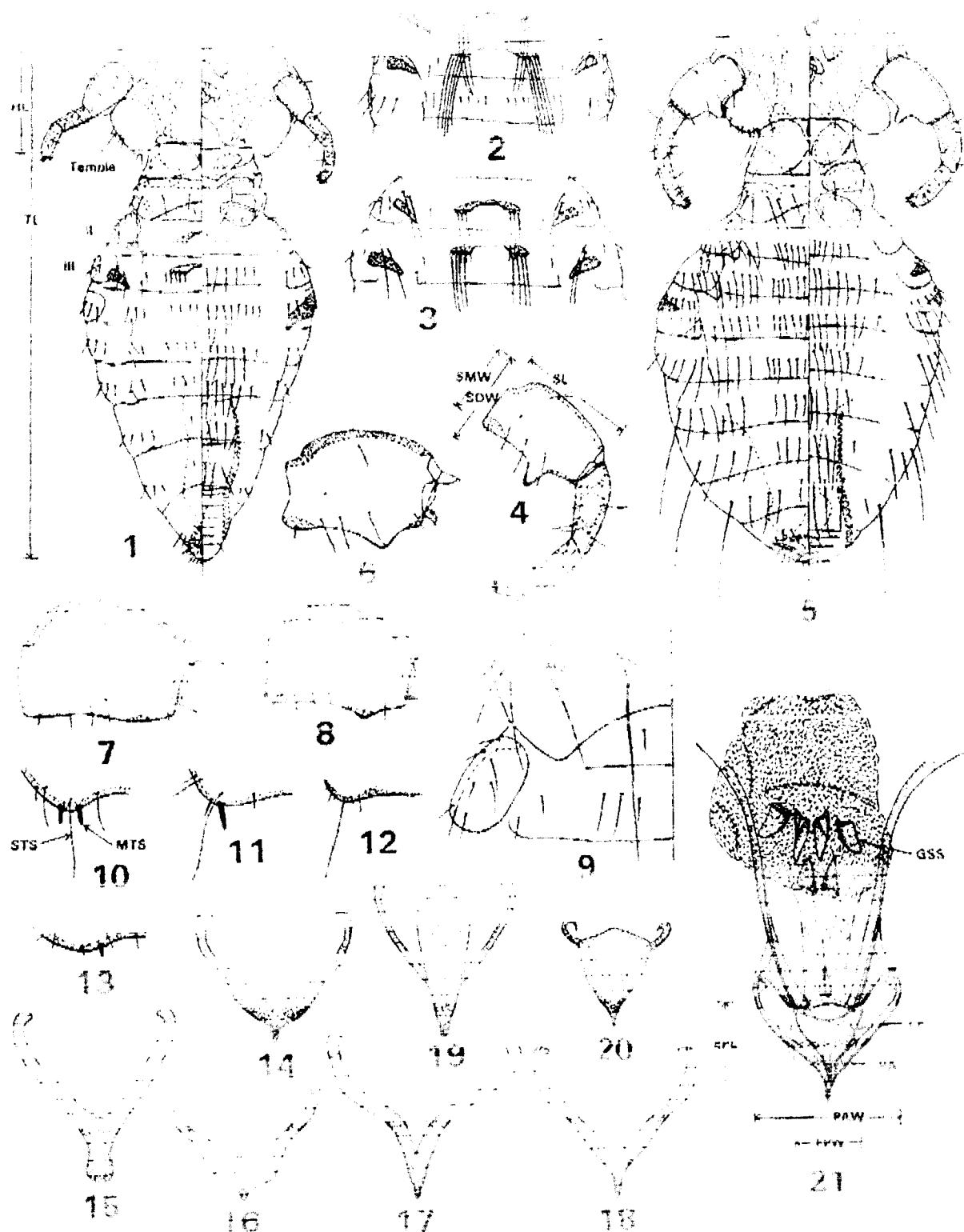
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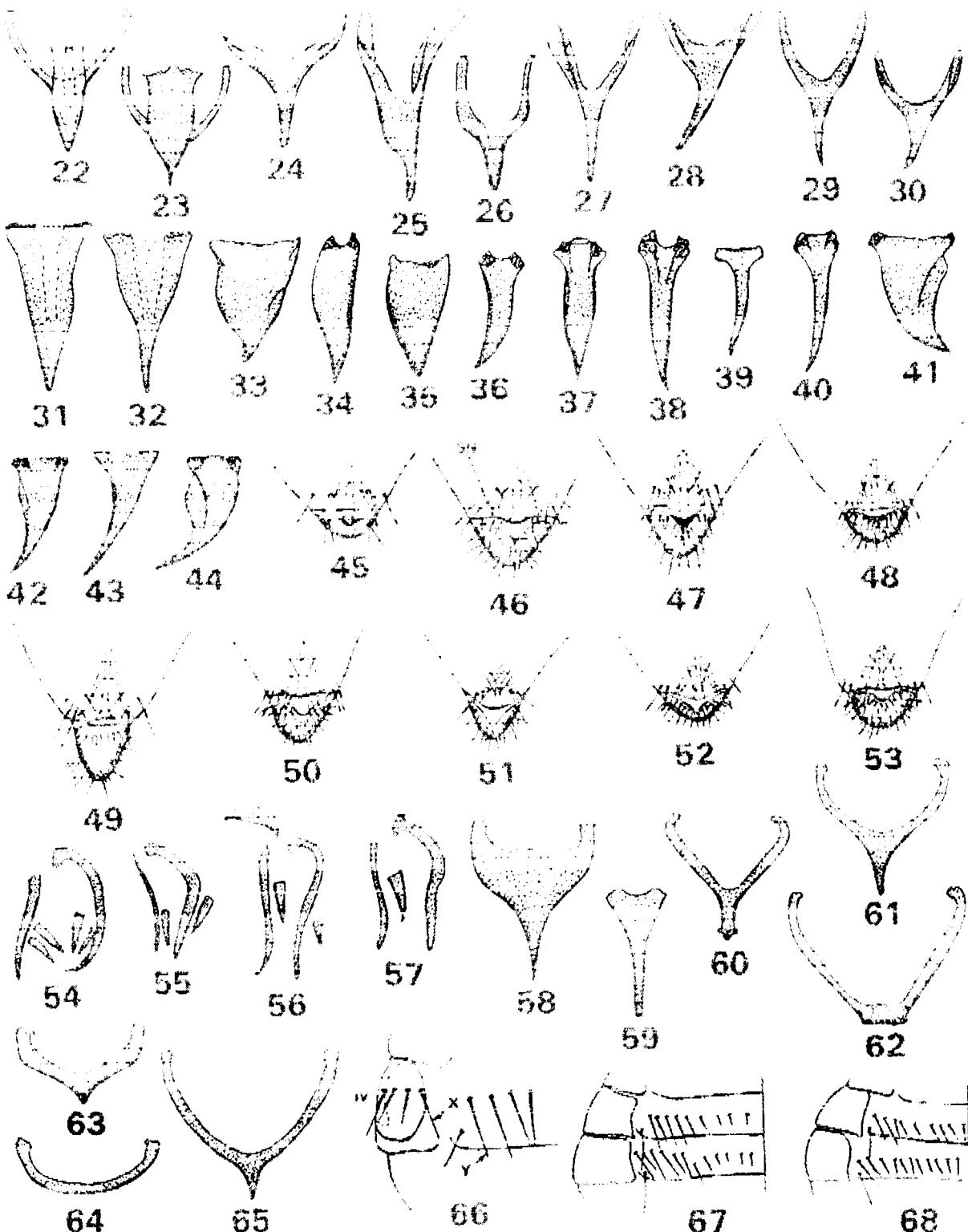
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Figs. 1-21. Males. Fig. 1. *Thomomymoecus minor*, dorsal-ventral view (TW, temple width; PW, prothorax width; HL, head length; TL, total length). Figs. 2 and 3. Abdominal terga II-III: (2) *T. potteri*; (3) *T. genowaysi*. Figs. 4 and 5. *Geomydoecus subcalifornicus*: (4) antenna (SMW, scape medial width; SDW, scape distal width; SL, scape length); (5) dorsal-ventral view. Figs. 6-8. Antennal scape: (6) *G. extimi*; (7) *G. expansus*; (8) *G. geomysidis*. Fig. 9. *G. yucatanensis*, metanotum (OMS, outer metanotal seta; IMS, inner metanotal seta). Figs. 10-13. Left temple: (10) *G. subcalifornicus* (STS, submarginal temple seta; MTS, inner marginal temple seta); (11) *G. fulvi*; (12) *G. thomomys*; (13) *G. yucatanensis*. Figs. 14-18. Genitalic parameral arch: (14) *G. c. chihuahuae*; (15) *G. pattoni*; (16) *G. tolucae*; (17) *G. alcorni*; (18) *G. c. emersoni*. Figs. 19 and 20. Genitalic parameral arch and endomeral plate: (19) *G. troubi*; (20) *G. thomomys*. Fig. 21. *G. c. cinni*, genitalia (GSS, genital sac spine; EP, endomeral plate; EPL, endomeral plate length; EPW, endomeral plate width; PA, parameral arch; PAW, parameral arch width).

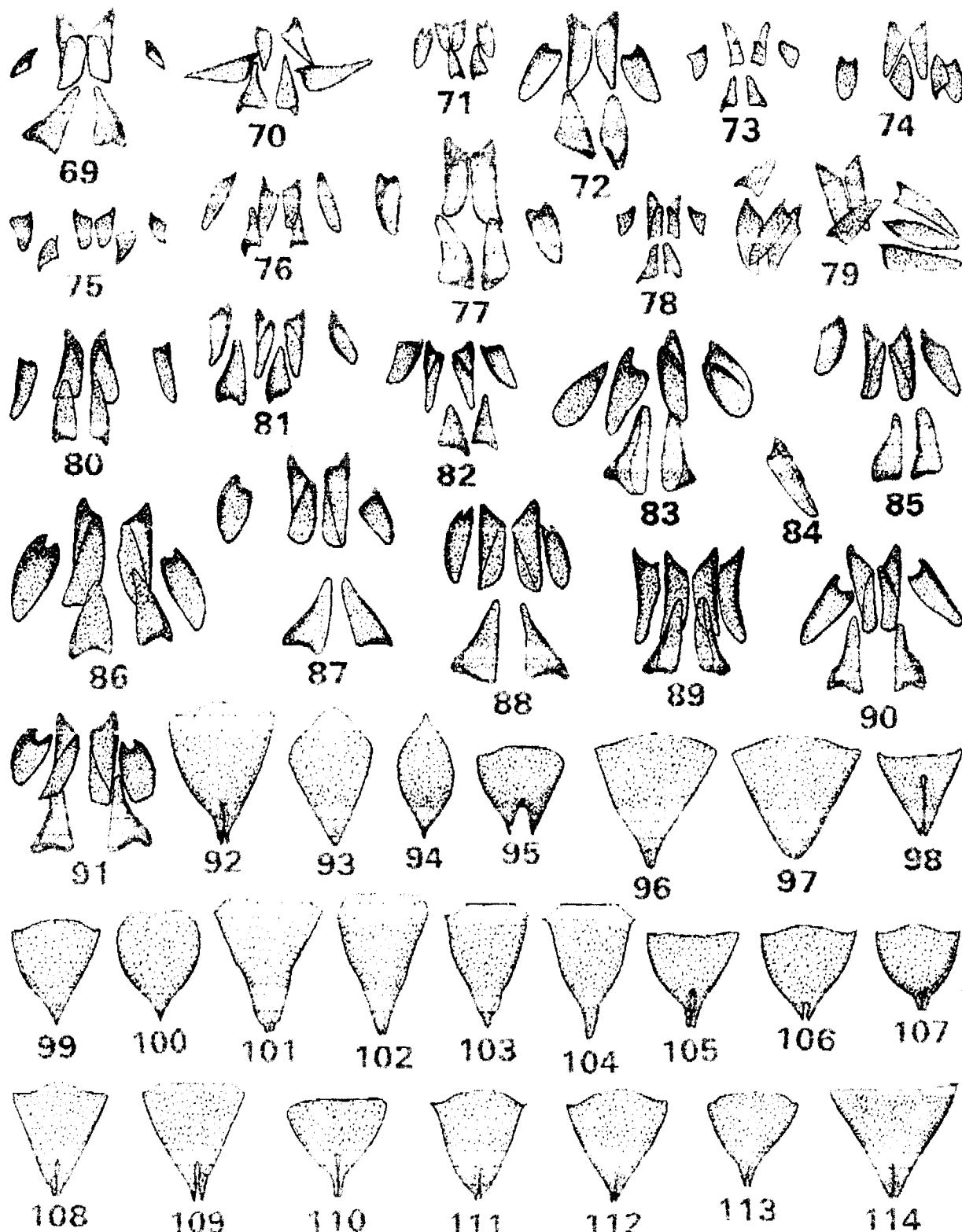


Figs. 22-68. Males. Figs. 22 and 23. Genitalic parameral arch and endomeral plate: (22) *Thomomydoecus wardi*; (23) *T. byersi*. Figs. 24-30. Genitalic parameral arch: (24) *T. neocopei*; (25) *T. asymmetricus*; (26) *T. potteri*; (27) *T. minor*; (28) *T. dickermani*; (29) *T. jamesbeeri*; (30) *T. johnhafneri*. Figs. 31-44. Genitalic endomeral plate: (31) *T. barbae*; (32) *T. arleneae*; (33) *T. neocopei*; (34) *T. genowaysi*; (35) *T. potteri*; (36) *T. greeri*; (37) *T. jamesbeeri*; (38) *T. minor*; (39) *T. timmi*; (40) *T. birneyi*; (41) *T. williamsi*; (42) *T. johnhafneri*; (43) *T. dickermani*; (44) *T. markhafneri*. Figs. 45-53. Dorsal terminalia: (45) *T. potteri*; (46) *T. minor* (SN, sensilla); (47) *T. genowaysi*; (48) *T. greeri*; (49) *T. jamesbeeri*; (50) *T. birneyi*; (51) *T. orizabae*; (52) *T. johnhafneri*; (53) *T. dickermani*. Figs. 54-57. Genital sac spines: (54) *Geomydoecus dakotensis*; (55) *G. craigi*; (56) *G. thaelerti*; (57) *G. thomomyus*. Figs. 58-65. Genitalic parameral arch: (58) *G. yucatanensis*; (59) *G. copei*; (60) *G. scleritus*; (61) *G. nadleri*; (62) *G. truncatus*; (63) *G. fulvescens*; (64) *G. mexicanus*; (65) *G. merriami*. Figs. 66 and 67. Abdominal pleuron and tergum IV. Figs. 67 and 68. Abdominal terga III-IV: (67) *G. v. perotensis*; (68) *G. merriami*.

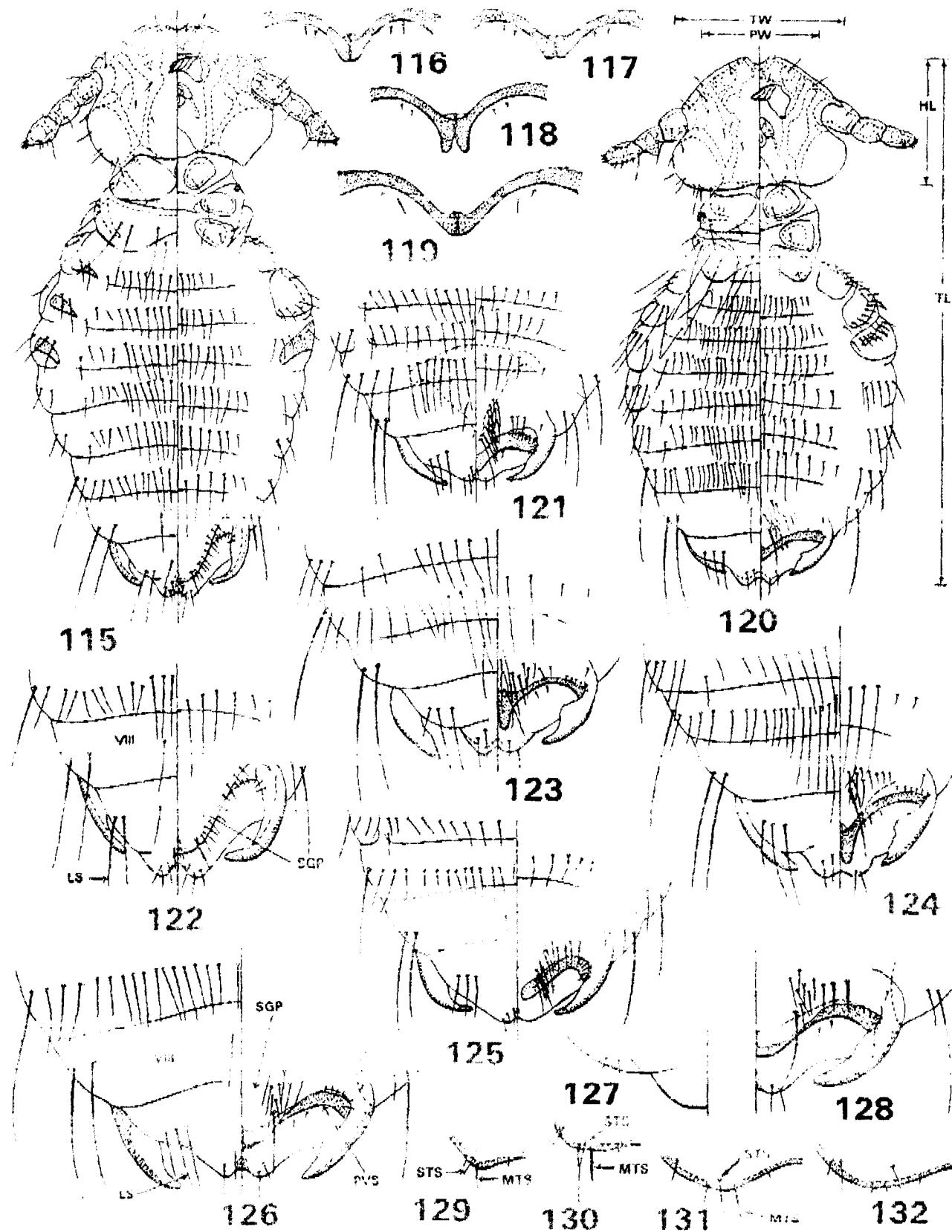
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Figs. 69–114. Males. Figs. 69–91. Genital sac spines: (69) *Geomydoecus crovelloii*; (70) *G. pattoni*; (71) *G. oregonus*; (72) *G. hueyi*; (73) *G. geomydis*; (74) *G. idahoensis*; (75) *G. merriami*; (76) *G. c. coronadoi*; (77) *G. shastensis*; (78) *G. nebrathkensis*; (79) *G. p. polydentatus*; (80) *G. w. welleri*; (81) *G. cliftoni*; (82) *G. umbrini*; (83) *G. californicus*; (84) *G. a. grahamensis*, single lateral spine; (85) *G. l. limitaris*; (86) *G. clausonae*; (87) *G. bajaiensis*; (88) *G. sinaloae*; (89) *G. warmanae*; (90) *G. a. aurei*; (91) *G. actuosi*. Figs. 92–114. Genitalic endomeral plate: (92) *G. subnubili*; (93) *G. fulvescens*; (94) *G. mexicanus*; (95) *G. costaricensis*; (96) *G. t. texanus*; (97) *G. tamaulipensis*; (98) *G. telli*; (99) *G. daviddashneri*; (100) *G. setzeri*; (101) *G. mcgregori*; (102) *G. alcorni*; (103) *G. nadleri*; (104) *G. b. bulleri*; (105) *G. fulvi*; (106) *G. shastensis*; (107) *G. hueyi*; (108) *G. c. chihuahuae*; (109) *G. expansus*; (110) *G. martini*; (111) *G. veracruzensis*; (112) *G. merriami*; (113) *G. c. coronadoi*; (114) *G. californicus*.

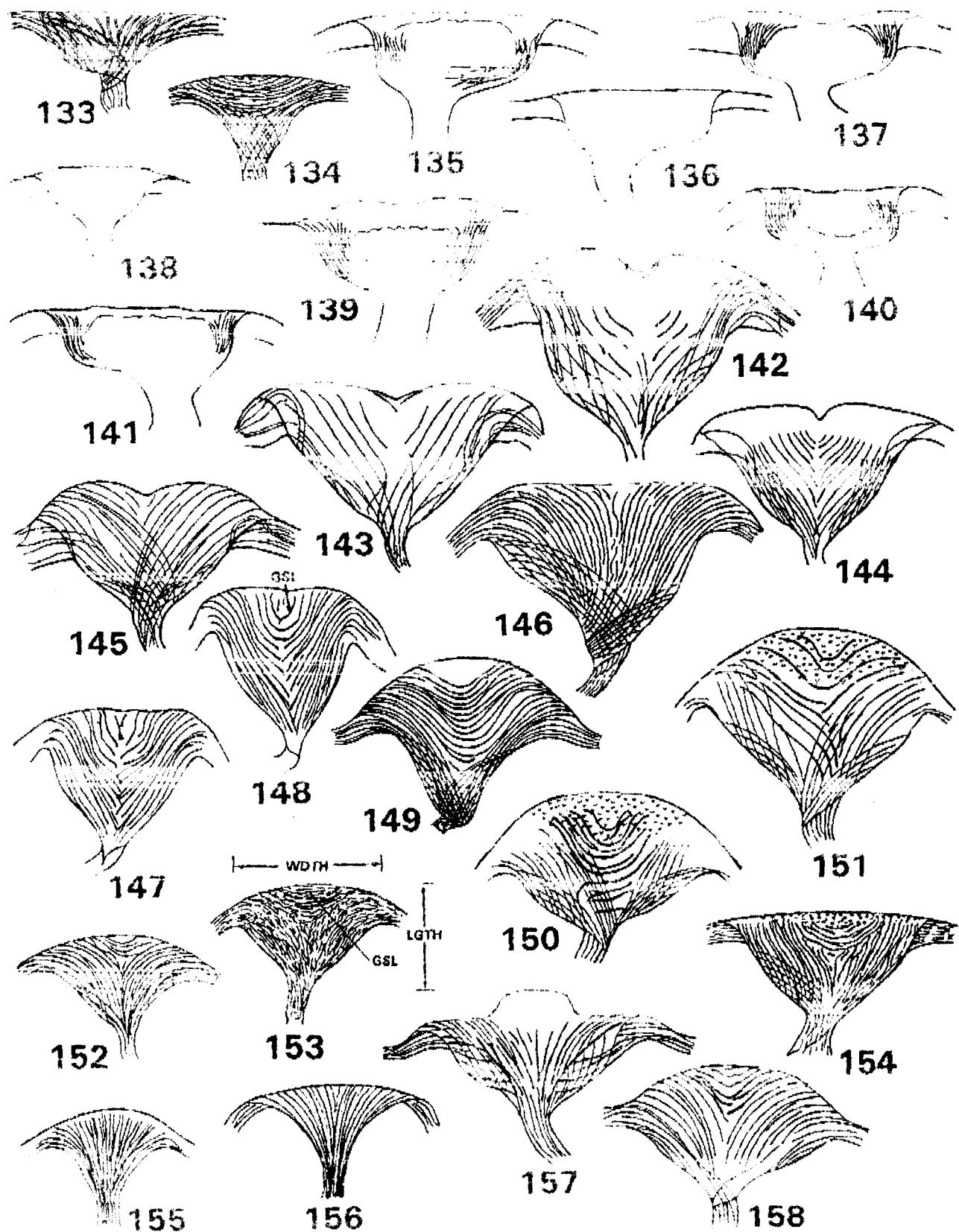


Figs. 115-132. Females. Fig. 115. *Thomomymoecus minor*, dorsal-ventral view. Figs. 116-119. Postvulval sclerite and setae: (116) *Geomymoecus fulvi*; (117) *G. tolucae*; (118) *G. c. chihuahuae*; (119) *G. w. welleri*. Fig. 120. *C. tolucae*, dorsal-ventral view (TW, temple width; PW, prothorax width; HL, head length, TL, total length). Figs. 121-126. Dorsal-ventral terminalia (LS, lateral seta; SGP, subgenital plate; PVS, postvulval sclerite): (121) *G. t. texanus*; (122) *T. minor*; (123) *G. pattoni*; (124) *G. c. chihuahuae*; (125) *G. subnubili*; (126) *G. californicus*. Fig. 127. *G. c. coronadoi*, dorsal terminalia. Fig. 128. *G. bajaiensis*, ventral terminalia. Figs. 129-132. Left temple (STS, submarginal temple seta, MTS, inner marginal temple seta): (129) *T. minor*; (130) *G. tolucae*; (131) *G. sparsus*; (132) *G. alleni*.

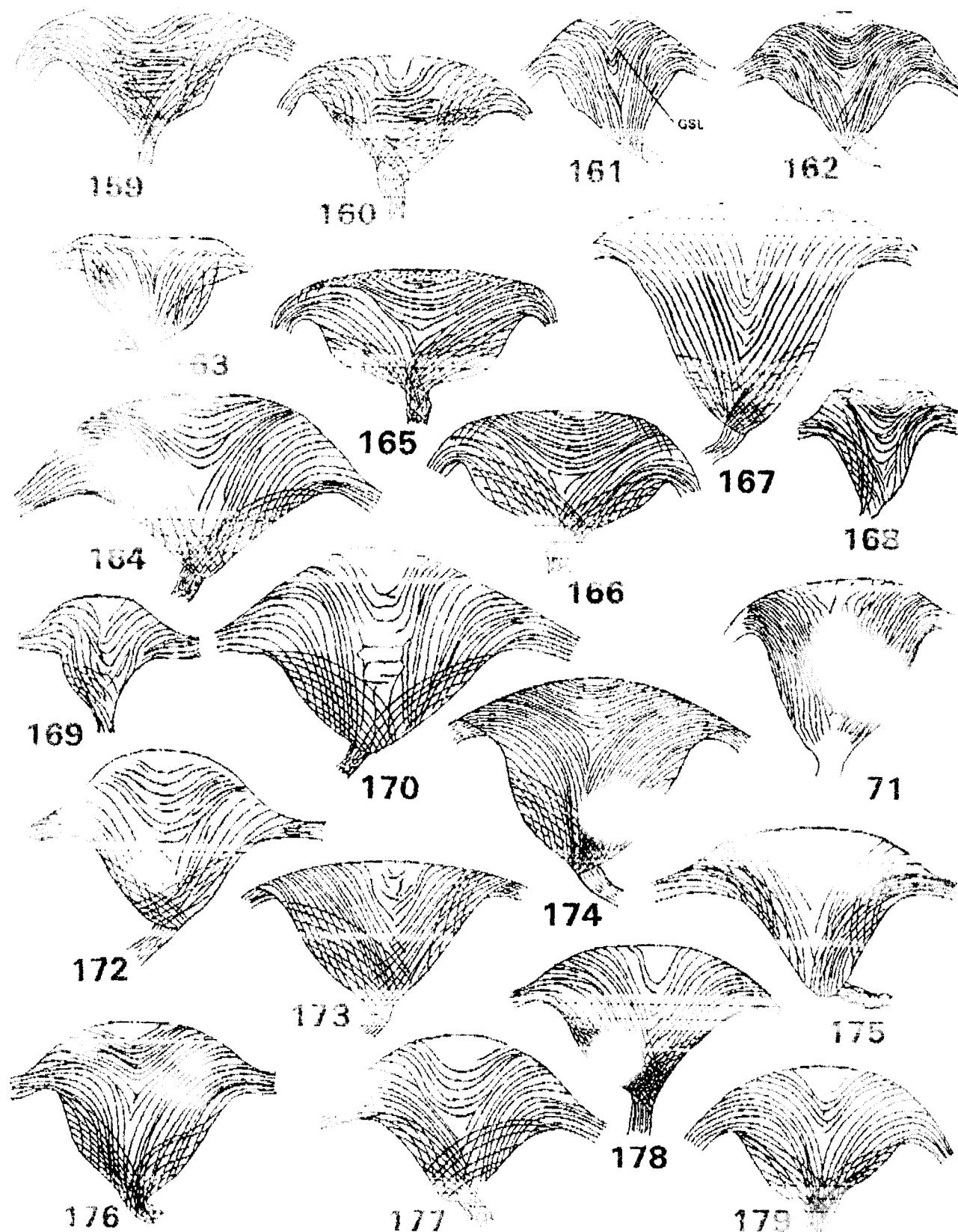
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Figs. 133–158. Female genital sac (GSL, genital sac loop): (133) *Thomomydoecus wardi*; (134) *T. byersi*; (135) *Geomysdoecus fuchsii*; (136) *G. thaeleri*; (137) *G. thomomys*; (138) *G. duchesnensis*; (139) *G. craigi*; (140) *G. biagiae*; (141) *G. dakotensis*; (142) *G. setzneri*; (143) *G. costaricensis*; (144) *G. p. panamensis*; (145) *G. cherriei*; (146) *G. allenii*; (147, 148) *G. t. texanus*; (149) *G. subcalifornicus*; (150) *G. alcorni*; (151) *G. mcgregori*; (152) *G. yucatanensis*; (153) *G. scleritus*; (154) *G. truncatus*; (155) *G. copei*; (156) *G. mexicanus*; (157) *G. telli*; (158) *G. trichopterum*.



Figs. 159-179. Female genital sac (GSL), genital sac loop. (159) *Geomysdeucus nadleri*; (160) *G. b. bidentata*; (161) *G. expansus*; (162) *G. martini*; (163) *G. tolucae*; (164) *G. angularis*; (165) *G. shastensis*; (166) *G. hueyi*; (167) *G. p. polydentatus*; (168) *G. geomysdis*; (169) *G. nebrathkensis*; (170) *G. clauzonae*; (171) *G. illinoensis*; (172) *G. veracruzensis*; (173) *G. c. coronadoi*; (174) *G. merriami*; (175) *G. dingleishi*; (176) *G. w. multilineatus*; (177) *G. baytensis*; (178) *G. quadridentatus*; (179) *G. c. californicus*.