

**TEN NEW SPECIES IN THE SUBGENUS *UNIONICOLIDES*
(ACARI: UNIONICOLIDAE: *UNIONICOLA*) IN NORTH AND SOUTH AMERICA,
WITH A RE-EVALUATION OF RELATED SPECIES**

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ABSTRACT—Ten new species (*Unionicola (Unionicolides) bakeri, hoesei, poundsi, fulleri, conroyi, burchi, scutella, lasallei, calnani* and *stansberyi*) are described for the first time. Ten species were previously known in the subgenus *Unionicolides*, a New World group that parasitizes fresh-water mussels. All North American species are re-evaluated. *Unionicolides* contains a large number of incipient species which may be diverging through sympatric host race formation.

INTRODUCTION

The subgenus *Unionicolides* Lundblad 1937 in the genus *Unionicola* has been redefined (Vidrine 1985a). All the known species are parasites of fresh-water mussels (Unionoida) in North and South America. Studies species oviposit in the ventral edge of the host's outer gills (demibranchs). Ten species were known prior to this paper and ten new species are described for the first time in this paper. The known species of North America are re-evaluated. The diversity in this group poses some interesting evolutionary questions which may be answered by detailed studies of host-parasite preferences.

The author has examined the types in The Field Museum of Natural History, Chicago (FMNH) and in The Museum of Comparative Zoology, Harvard University, Cambridge (MCZ). Also preserved mussel lots have been examined for mites in the following collections: The Academy of Natural Sciences of Philadelphia (ANSP); The Ohio State University Museum, Columbus (OSUM); The United States National Museum (Smithsonian Institution), Washington (USNM); The Museum of Zoology of the University of Michigan, Ann Arbor (MZUM); and the National Museum of Canada, Ottawa (NMC). The fresh-water mussels have recently been re-evaluated by Burch (1975), Clarke (1981) and Davis and Fuller (1981).

Holotypes and representative paratypes are deposited in the Canadian National Collections and Biosystematics Research Institute, Agriculture Canada,

Ottawa (CNC). Additional paratypes are retained in the author's collection.

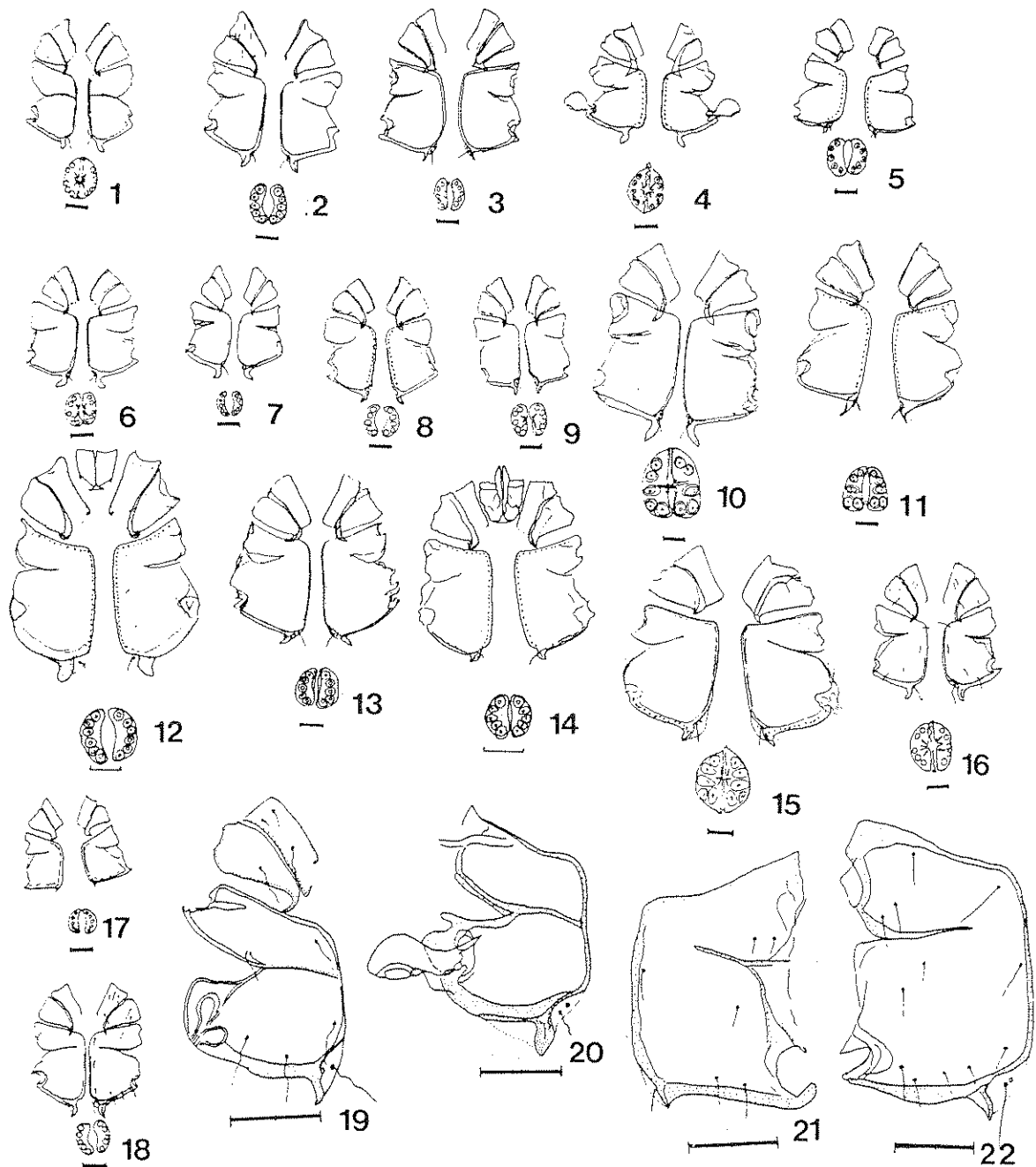
Terminology for adult structures follows that used by Vidrine (1985a). Measurements are expressed in microns in the format, mean (range). All bars on figures equal 100 microns (0.1 mm).

RESULTS

1. *Unionicola (Unionicolides) fossulata*
(Koenike 1895)
(Fig. 129)

DIAGNOSIS — Character states of the subgenus; dorsum with 2 pairs of short, linear apodemes; posterior coxal group with an incomplete suture; genital field somewhat expanded posteriorly with each plate bearing 5 acetabula, with the 2, posteriad acetabula usually lying side-by-side; pedipalps heavy; all legs setose; first walking leg Ge with three rows of moderately long, heavy, blunt setae, and Ti with 2 rows of short, stout setae; all tarsal claws bifid, especially the first walking leg's claws; tarsal claws of the posterior walking legs nearly straight, tapered evenly, and bifid near the tip with the dorsal prong smaller (and shorter on the fourth pair of legs) than the ventral prong (fig. 129); female walking legs more setigerous than male walking legs, especially noticeable in the first walking leg.

MALE (6 specimens): Length including capitulum 1383 (1100-1500); length of posterior coxal group 483



Figs. 1-22. Venters (coxal plates): 1. *Unionicola scutella* n. sp. (female); 2. *U. vikitra* Mitchell and Wilson (male); 3. *U. amandita* Mitchell and Wilson (male); 4. *U. amandita* (female); 5. *U. fulleri* n. sp. (male); 6. *U. vamana* Mitchell and Wilson (female); 7. *U. vamana* (male); 8. *U. poundsi* n. sp. (male); 9. *U. poundsi* (female); 10. *U. bakeri* n. sp. (female); 11. *U. bakeri* (male); 12. *U. stansberyi* n. sp. (male); 13. *U. conroyi* n. sp. (male); 14. *U. burchi* n. sp. (male); 15. *U. hoesei* n. sp. (female); 16. *U. sakantaka* Mitchell and Wilson (female); 17. *U. vamana* (male); 18. *U. vamana* (male); 19. *U. stricta* (Wolcott) (male); 20. *U. tupara* Mitchell and Wilson (female); 21. *U. vamana* (male); and 22. *U. fulleri* n. sp. (male).

(390-560); length of genital field 252 (210-280); dorsal lengths of pedipalp segments: Ti 182 (150-200); Ta 78 (70-90); dorsal lengths of leg segments: leg I: TFe 197 (170-220); Ge 250 (210-300); Ti 232 (190-260); Ta 182 (170-200); leg IV: TFe 215 (190-240); Ge 337 (290-370); Ti 462 (400-510); Ta 458 (400-500).

FEMALE (5 specimens): Length including capitulum 1540 (1300-1700); length of posterior coxal group 512 (470-550); length of genital field 323 (300-340); dorsal lengths of pedipalp segments: Ti 197 (190-200); Ta 83 (80-90); dorsal lengths of leg segments: leg I: TFe 216 (190-240); Ge 288 (250-330); Ti 252 (220-290); Ta 190 (180-200); Leg IV: TFe 248 (220-270); Ge 386 (360-420); Ti 496 (460-540); Ta 482 (430-530).

NOTES — *U. fossulata* is discussed and figured in Koenike (1895), Wolcott (1899), Marshall (1933), Mitchell (1955 and 1965) and Baker (1982). Specimens examined in this study are from *Lampsilis siliquoidea* (Barnes) from Arkansas, Ohio, Wisconsin and Minnesota (Vidrine 1980a). Additional specimens that were examined include lots from: *L. siliquoidea* from: 1.) (NMC 66170) Cox Creek at Highway 86, E. Zuber Corners, Waterloo County, Ontario, Canada, 6 June 1970 (B. T. Kidd); and 2.) (MZUM lot) north shore of Lake Margrethe, west of Grayling, Crawford County, Michigan; and *Actinonaias carinata* (Barnes) from: 1.) (NMC 66048) from Smith Creek at Poole ca. 6.0 km southeast of Milverton, Porth County, Ontario, Canada, 3 August 1971 (B. T. Kidd); and 2.) (NMC 66004) Nith River footbridge ca. 100 m upstream from CNRR bridge, Oxford County, Ontario, Canada, 1 August 1971 (B. T. Kidd).

REMARKS — Vidrine (1979a and 1980a) reported this species from a large number of host taxa, but upon re-examination of the lots and examination of new lots from northeastern North America and Mexico, three separate morphological groups were discovered. *U. fossulata* sensu stricta appears to be found only in *L. siliquoidea* and *A. carinata* (from Canada). Although *U. fossulata* is nearly identical to the next two species, it can be readily separated based upon the structure of the tarsal claws of the posterior walking legs.

2. *Unionicola (Unionicolides) bakeri* new species (Figs. 10-11, 49-50, 62, 89 and 133)

DIAGNOSIS — Character states of the subgenus; dorsum with 2 pairs of short, linear apodemes; posterior coxal group with an incomplete suture (figs. 10-11); genital field somewhat expanded posteriorly and usually with the 2, posteriad acetabula on each plate lying side-by-side (figs. 49-50); pedipalps thick (fig. 62); legs setose; first walking leg Ge with 3 rows of moderately long, heavy, blunt setae, and Ti with 2

rows of short, stout setae (fig. 89); all tarsal claws bifid, especially the claws of the first walking leg; tarsal claws of the posterior pairs of walking legs nearly straight and tapered evenly but slightly expanded at the tip where the claws are finely bifid with the dorsal prong equal to the ventral prong (fig. 133); female first walking leg more setigerous than male first walking leg.

MALE (6 specimens): Length including capitulum 1300 (1000-1600); length of posterior coxal group 463 (400-540); length of genital field 236 (200-260); dorsal lengths of pedipalp segments: Ti 173 (160-190); Ta 72 (70-80); dorsal lengths of leg segments: leg I: TFe 182 (160-200); Ge 250 (220-280); Ti 225 (200-250); Ta 167 (160-170); leg IV: TFe 212 (190-240); Ge 338 (300-380); Ti 465 (420-530); Ta 432 (410-460).

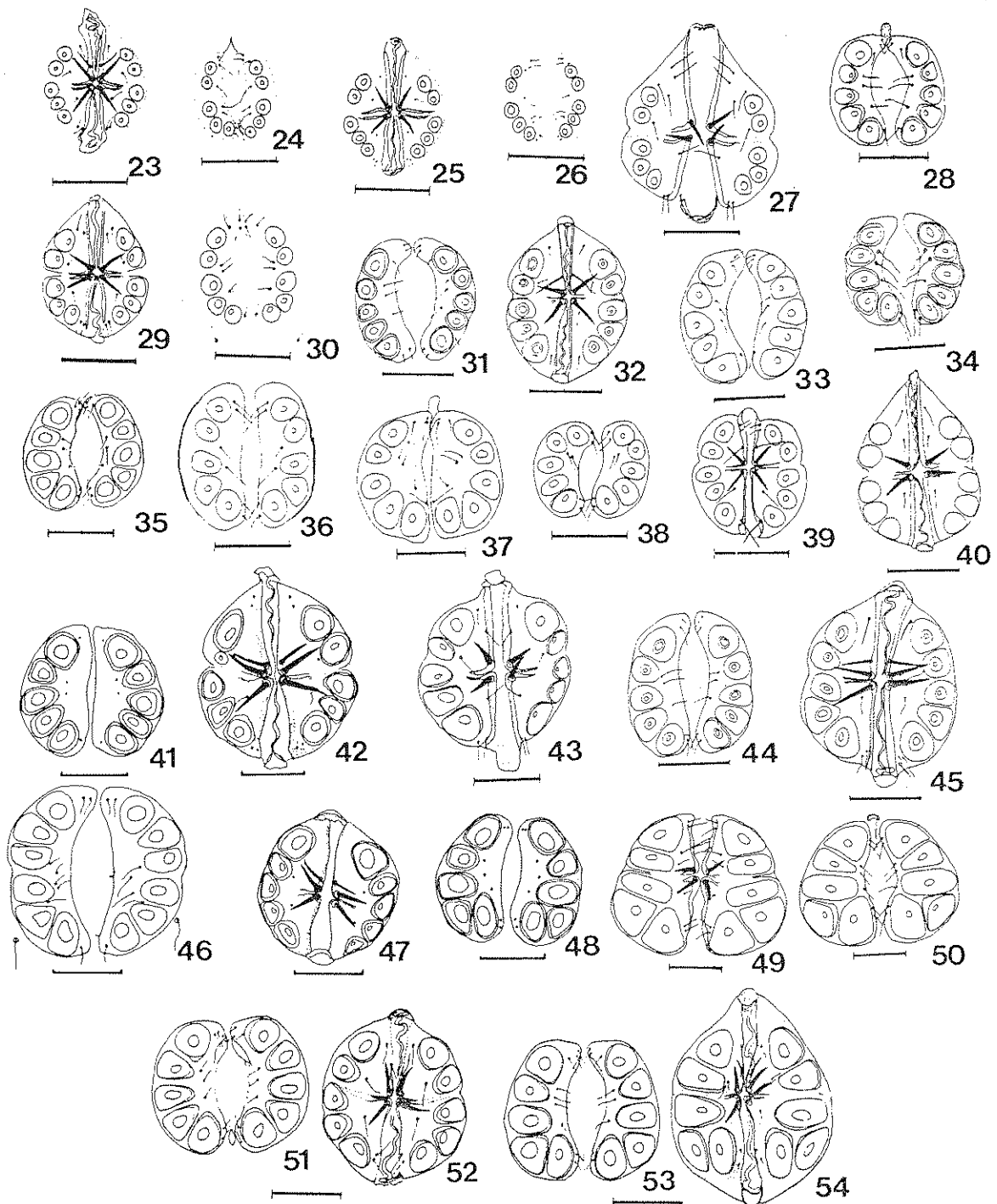
FEMALE (7 specimens): Length including capitulum 1307 (1000-1750); length of posterior coxal group 446 (380-550); length of genital field 258 (250-280); dorsal lengths of pedipalp segments: Ti 167 (150-190); Ta 74 (70-80); dorsal lengths of leg segments: leg I: TFe 189 (160-230); Ge 246 (220-300); Ti 230 (200-280); Ta 179 (170-190); leg IV: TFe 221 (200-260); Ge 353 (320-410); Ti 464 (410-550); Ta 436 (390-490).

NOTES — Holotype (female) (CNC type number 19100) is from *A. carinata* from Ouachita River at Rte. U.S. 270, Rocky Shoals Park, Montgomery County, Arkansas, 15 August 1985 (Gail, Macky and M.F. Vidrine). Usually a single male and one or two females occur in each infested host. This species is only known from *A. carinata* in Arkansas and Tennessee and was treated under the name, *U. fossulata* sensu stricta, in Vidrine (1980a).

REMARKS — *U. bakeri* closely resembles *U. fossulata*, except *U. bakeri* possesses minutely bifid tarsal claws on the three posterior pairs of walking legs. The two species are apparently sibling species, and their ranges and hosts overlap, and both have been found in the same localities.

3. *Unionicola (Unionicolides) hoesei* new species (Figs. 15, 51-54, 65, 90-91 and 131)

DIAGNOSIS — Character states of the subgenus; dorsum with 2 pairs of short, linear apodemes; posterior coxal group with an incomplete suture (fig. 15); genital fields may be expanded posteriorly or nearly circular in outline and sometimes with the posterior 2 acetabula lying side-by-side (figs. 51-54); pedipalps thick (fig. 65); leg setose; first walking leg Ge with 3 rows of moderately long, heavy, blunt setae, and Ti with 2 rows of short, stout setae (figs. 90-91); all tarsal claws of walking legs bifid; tarsal claws of posterior 3 pairs of walking legs obviously bifid with the dorsal prong ca. one-half the length of the ventral prong (fig.



Figs. 23-54. Genital fields: 23. *U. stricta* (Wolcott) (female); 24. *U. stricta* (male); 25. *U. tupara* Mitchell and Wilson (female); 26. *U. tupara* (male); 27. *U. tupara* (female); 28. *U. fulleri* n. sp. (male); 29. *U. amandita* Mitchell and Wilson (female); 30. *U. amandita* (male); 31. *U. vamana* Mitchell and Wilson (male); 32. *U. vamana* (female); 33. *U. sakantaka* Mitchell and Wilson (male); 34. *U. poundsi* n. sp. (male); 35. *U. conroyi* n. sp. (male); 36. *U. lasallei* n. sp. (male); 37. *U. fulleri* (male); 38. *U. vamana* (male); 39. *U. vamana* (female); 40. *U. scutella* n. sp. (female); 41. *U. burchi* n. sp. (male); 42. *U. burchi* (female); 43. *U. fulleri* (female); 44. *U. vikitra* Mitchell and Wilson (male); 45. *U. vikitra* (female); 46. *U. stansberyi* n. sp. (male); 47. *U. contoyi* (female); 48. *U. conroyi* (male); 49. *U. bakeri* n. sp. (female); 50. *U. bakeri* (male); 51. *U. hoesei* n. sp. (male); 52. *U. hoesei* (female); 53. *U. hoesei* (male); and 54. *U. hoesei* (female).

131); female first walking leg more setigerous than male first walking leg.

MALE (14 specimens): Length including capitulum 1276 (1100-1600); length of posterior coxal group 465 (380-600); length of genital field 224 (170-300); dorsal lengths of pedipalp segments: Ti 167 (130-200); Ta 71 (55-90); dorsal lengths of leg segments: leg I: TFe 217 (170-280); Ge 259 (220-340); Ti 224 (180-290); Ta 150 (130-180); leg IV: TFe 217 (170-280); Ge 338 (270-440); Ti 435 (330-600); Ta 454 (350-580).

FEMALE (17 specimens): Length including capitulum 1679 (1350-2250); length of posterior coxal group 520 (440-600); length of genital field 306 (270-360); dorsal lengths of pedipalp segments: Ti 189 (160-230); Ta 79 (70-95); dorsal lengths of leg segments: leg I: TFe 223 (190-270); Ge 299 (240-380); Ti 264 (220-330); Ta 169 (140-200); leg IV: TFe 265 (220-330); Ge 409 (340-510); Ti 508 (430-630); Ta 508 (420-620).

NOTES — Holotype (female) (CNC type number 19101) is from *Lampsilis teres* (Rafinesque) from Bayou des Cannes at Rte. LA 13, ca. 4.0 km north of Eunice, border of Evangeline and St. Landry parishes, Louisiana, 1 April 1972 (Blake and M.F. Vidrine). Usually one male and one or two females occur in each infested host. This species was treated under the manuscript name, *U. fossulata* group variable 1, in Vidrine (1980a).

REMARKS — *U. hoesei* is separated from *U. fossulata* and *U. bakeri* based upon the structure of the tarsal claws of the posterior three pairs of walking legs. *U. hoesei* possesses tarsal claws on the posterior legs that are distinctly curved and rather deeply bifid. In other respects, *U. hoesei* is nearly identical to the other two species, and the three form an artenkreis. *U. hoesei* has the widest range, since it is known from Canada to southern Mexico. *U. hoesei* occurs in a large number of genera that form a major part of the Lampsilini of Davis and Fuller (1981). The large range and great number of host taxa permit this species to be readily collected and studied. Although it is quite variable, the tarsal claw structure is relatively uniform, but I strongly suspect that *U. hoesei* is in itself a rassenkreis of subspecies that possess host preferences and minor differences in chaetotaxy in different portions of its range.

4. *Unionicola (Unionicolides) stricta* (Wolcott 1898)
(Figs. 19, 23-24, 56, 73-74 and 145)

DIAGNOSIS — Character states of the subgenus; dorsum lacking obvious secondary sclerotization; posterior coxal group usually divided by a complete suture (fig. 19); genital fields lightly sclerotized (figs. 23-24);

pedipalps moderately stout (fig. 56); legs moderately setose, but the first walking leg has few setae or hairs (figs. 73-74); all tarsal claws of walking legs simple (fig. 145); male and female first walking legs similar.

MALE (6 specimens): Length including capitulum 725 (650-800); length of posterior coxal group 205 (180-230); length of genital field 145 (130-150); dorsal lengths of pedipalp segments: Ti 85 (70-100); Ta 47 (40-50); dorsal lengths of leg segments: leg I: TFe 82 (75-90); Ge 120 (100-130); Ti 105 (90-120); Ta 130 (110-140); leg IV: TFe 118 (90-140); Ge 188 (150-220); Ti 195 (160-220); Ta 168 (150-180).

FEMALE (6 specimens): Length including capitulum 817 (750-900); length of posterior coxal group 218 (200-230); length of genital field 240 (230-250); dorsal lengths of pedipalp segments: Ti 97 (90-105); Ta 53 (50-55); dorsal lengths of leg segments: leg I: TFe 91 (90-95); Ge 135 (130-140); Ti 116 (110-130); Ta 140 (130-150); leg IV: TFe 148 (140-150); Ge 215 (210-220); Ti 215 (200-220); Ta 182 (170-190).

NOTES — The types of this species are in The Field Museum of Natural History and The Museum of Comparative Zoology; however, the types are mounted on glass slides with other species. The slide from the Field Museum also has *U. vikitra* Mitchell and Wilson and *U. amandita* Mitchell and Wilson, while the slide from the Museum of Comparative Zoology also has *U. vikitra*. Although Wolcott's (1898 and 1899) description of this species is clear, there has been some confusion. All of the specimens in my collection were found in a single host species, *Uniomermis tetralasmus* (Say), from Louisiana, Alabama, Arkansas and Texas (Vidrine 1980a). Vidrine (1980b) defined its range as from the Mississippi Interior Basin and Gulf of Mexico drainages from the Yellow River in Florida to the central Texas drainages.

REMARKS — *U. stricta* is readily separated from all other species by its simple tarsal claws of the walking legs. It resembles *U. tupara* Mitchell and Wilson and *U. berezai* Vidrine. A single infested host may contain more than 100 individuals. This lack of population regulation is considered a primitive character, since most of the derived species practice strict population control (Mitchell 1965).

5. *Unionicola (Unionicolides) tupara*
Mitchell and Wilson 1965
(Figs. 20, 25-27, 59-60, 75-76 and 146)

DIAGNOSIS — Character states of the subgenus; dorsum with 2 pairs of short, linear apodemes; posterior coxal group usually divided by a complete suture (fig. 20); pedipalps slightly elongate and weakly sclerotized (figs. 59-60); genital field lightly sclerotized (figs.

25-27); legs moderately setose, but the first walking leg has few setae or hairs (figs. 75-76); tarsal claws of first walking legs bifid at tip (fig. 146); other tarsal claws appear simple; male and female walking legs similar.

MALE (7 specimens): Length including capitulum 725 (650-800); length of posterior coxal group 216 (190-240); length of genital field 140 (120-160); dorsal lengths of pedipalp segments: Ti 67 (60-80); Ta 54 (50-60); dorsal lengths of leg segments: leg I: TFe 77 (65-90); Ge 128 (110-145); Ti 101 (90-110); Ta 116 (110-120); leg IV: TFe 106 (90-120); Ge 187 (160-210); Ti 188 (160-210); Ta 174 (150-190).

FEMALE (10 specimens): Length including capitulum 778 (550-950); length of posterior coxal group 228 (210-250); length of genital field 216 (170-250); dorsal lengths of pedipalp segments: Ti 72 (60-80); Ta 60 (50-70); dorsal lengths of leg segments: leg I: TFe 83 (70-100); Ge 139 (120-160); Ti 106 (95-120); Ta 126 (120-130); leg IV: TFe 118 (90-150); Ge 206 (165-240); Ti 202 (160-240); Ta 180 (145-210).

NOTES — The types of this species are in the Field Museum of Natural History. Apalachicolan specimens match the Tennessee types, while more western specimens are smaller and have hairs instead of spines on the first walking leg. Vidrine (1980a) discussed this species under the names: *U. tupara* and *U. tupara* (western morph). Vidrine (1979b) discussed the mussel hosts of *U. tupara*, and Vidrine (1980a) detailed the known reports of this species. *U. tupara* prefers hosts that belong to the genus *Amblema*, and a single infested host may contain more than 100 individuals.

REMARKS — *U. tupara* resembles *U. stricta* and *U. berezai*, but *U. tupara* has the distinctive combination of pedipalp and tarsal claw structure. The three species are considered less derived than other species in their respective taxa.

6. *Unionicola (Unionicolides) amandita*
Mitchell and Wilson 1965
(Figs. 3-4, 29-30, 63-64 and 82-83)

DIAGNOSIS — Character states of the subgenus; dorsum with 2 pairs of short, linear apodemes; posterior coxal group usually divided by an incomplete suture (figs. 3-4); genital fields lightly sclerotized (figs. 29-30); pedipalps well sclerotized (figs. 63-64); legs moderately setose, but the first walking leg has few setae or hairs (figs. 82-83); tarsal claws of the first walking leg bifid at the tip; tarsal claws of the three posterior pairs of walking legs appear simple; male and female first walking legs are similar.

MALE (10 specimens): Length including capitulum 915 (700-1100); length of posterior coxal group 320 (290-400); length of genital field 172 (150-200); dorsal lengths of pedipalp segments: Ti 112 (100-140);

Ta 61 (50-70); dorsal lengths of leg segments: leg I: TFe 121 (100-170); Ge 178 (150-240); Ti 136 (120-180); Ta 143 (130-160); leg IV: TFe 144 (120-190); Ge 223 (200-290); Ti 262 (220-370); Ta 249 (210-340).

FEMALE (11 specimens): Length including capitulum 1073 (900-1200); length of posterior coxal group 333 (300-430); length of genital field 252 (230-280); dorsal lengths of pedipalp segments: Ti 119 (100-140); Ta 65 (60-70); dorsal lengths of leg segments: leg I: TFe 123 (100-170); Ge 187 (160-250); Ti 137 (120-170); Ta 147 (130-160); leg IV: TFe 147 (120-190); Ge 232 (200-300); Ti 263 (230-380); Ta 252 (220-340).

NOTES — The types are in the Field Museum of Natural History. Specimens from the Tennessee River system and the Apalachicolan Region match the types, but the western specimens are distinctly smaller. The western specimens also generally possess Ta longer than the Ti on the first walking leg. However the overall similarities within this group and their occurrence only within a single host species, *Amblema plicata* Say, support tentatively treating them as a single taxon. Vidrine (1980a) treats this taxon under the names: *U. amandita* and *U. amandita* (western morph). The host and distribution are discussed in Vidrine (1979b and 1980a). Usually an infested host contains a single male and one or two females.

REMARKS — *U. amandita* resembles *U. tupara* in tarsal claw structure of the walking legs, but *U. amandita* has distinctive coxal plates and is much larger than *U. tupara*. The many synapomorphies between these two species suggest that they are probably closely related. The tarsal claw structure of the first walking leg separates these two species from others in the subgenus.

7. *Unionicola (Unionicolides) sakantaka*
Mitchell and Wilson 1965
(Figs. 16, 33, 57, 94-102 and 147)

DIAGNOSIS — Character states of the subgenus; dorsum with 2 pairs of short, linear apodemes; posterior coxal group divided by an incomplete suture (fig. 16); genital fields well sclerotized (fig. 33); pedipalps well sclerotized (fig. 57); all legs setose; first walking leg Ge with 3 rows of large setae (figs. 94-102), but male and female legs differ with the male having fewer setae; tarsal claws of the first walking leg distinctly bifid; tarsal claws of the posterior three pairs of walking legs bifid at the tip, with the dorsal and ventral prongs curved and near equal in length, but the ventral prong is nearly three times thicker than the dorsal prong (fig. 147).

MALE (18 specimens): Length including capitulum 1053 (800-1200); length of posterior coxal group

330 (280-400); length of genital field 182 (150-210); dorsal lengths of pedipalp segments: Ti 125 (110-140); Ta 61 (50-70); dorsal lengths of leg segments: leg I: TFe 148 (120-180); Ge 188 (170-210); Ti 158 (130-180); Ta 114 (100-130); leg IV: TFe 205 (170-240); Ge 291 (250-340); Ti 359 (300-400); Ta 320 (280-350).

FEMALE (8 specimens): Length including capitulum 1183 (1050-1350); length of posterior coxal group 345 (320-370); length of genital field 267 (260-280); dorsal lengths of pedipalp segments: Ti 141 (130-160); Ta 69 (65-70); dorsal lengths of leg segments: leg I: TFe 168 (150-200); Ge 220 (200-250); Ti 184 (170-200); Ta 128 (120-150); leg IV: TFe 234 (220-270); Ge 330 (300-390); Ti 401 (350-490); Ta 360 (330-420).

NOTES — The types are in the Field Museum of Natural History. Specimens in my collection agree well with the types. Vidrine (1980a) discussed the hosts and distribution of this species, which usually occurs as a single male and one or two females in each infested host.

REMARKS — *U. sakantaka* resembles *U. fossulata*, but tarsal claw structure of the posterior three pairs of walking legs is used to readily separate these species. Although there is some variation among members of my lots, apparently *U. sakantaka* is a relatively cohesive group.

8. *Unionicola (Unionicolides) vikitra*
Mitchell and Wilson 1965

(Figs. 2, 44-45, 61, 85, 87, 103, 105-107, 128 and 134)

DIAGNOSIS — Character states of the subgenus; dorsum with 2 pairs of short, linear apodemes (fig. 128); posterior coxal group with an incomplete suture (fig. 2); genital fields well sclerotized (figs. 44-45); pedipalps well sclerotized (fig. 61); all legs setose; male and female first walking legs similar, but much variation occurs; first walking leg Ge with 3 rows of large setae, and Ti with several elongate setae proximally (figs. 85, 87, 103 and 105-107); tarsal claws of first walking leg distinctly bifid; tarsal claws of posterior three pairs of walking legs bifid at tip, with dorsal and ventral prongs curved and near equal in length (fig. 134).

MALE (7 specimens): Length including capitulum 1007 (800-1200); length of posterior coxal group 364 (280-420); length of genital field 200 (130-230); dorsal lengths of pedipalp segments: Ti 121 (90-140); Ta 63 (50-70); dorsal lengths of leg segments: leg I: TFe 156 (130-180); Ge 209 (170-250); Ti 170 (140-200); Ta 128 (120-140); leg IV: TFe 204 (140-240); Ge 300 (220-360); Ti 360 (240-450); Ta 331 (230-410).

FEMALE (13 specimens): Length including capitulum 1242 (1100-1350); length of posterior coxal group 415 (300-480); length of genital field 278

(220-320); dorsal lengths of pedipalp segments: Ti 142 (100-160); Ta 70 (60-80); dorsal lengths of leg segments: leg I: TFe 180 (140-210); Ge 242 (190-290); Ti 194 (150-230); Ta 139 (120-150); leg IV: TFe 245 (170-300); Ge 356 (270-430); Ti 411 (280-490); Ta 376 (260-450).

NOTES — The types are in the Field Museum of Natural History. This species group is highly variable and appears intermediate between *U. sakantaka* and *U. vamana* Mitchell and Wilson. Vidrine (1980a) treated this species under three names: *U. vikitra*, *U. vikitra* group variable 1 and *U. vikitra* group variable 2. The first group named resembles the types; the second group named resembles *U. vamana*; and the third group named resembles *U. sakantaka*. However, all three groups were found in the same group of hosts, *Quadrula* spp., and the same localities. Usually a single male and one or two females occur in each infested host, but I have on several occasions found more than 20 individuals in a single host during the Spring months. The hosts and distribution of *U. vikitra* has been detailed in Vidrine (1980a).

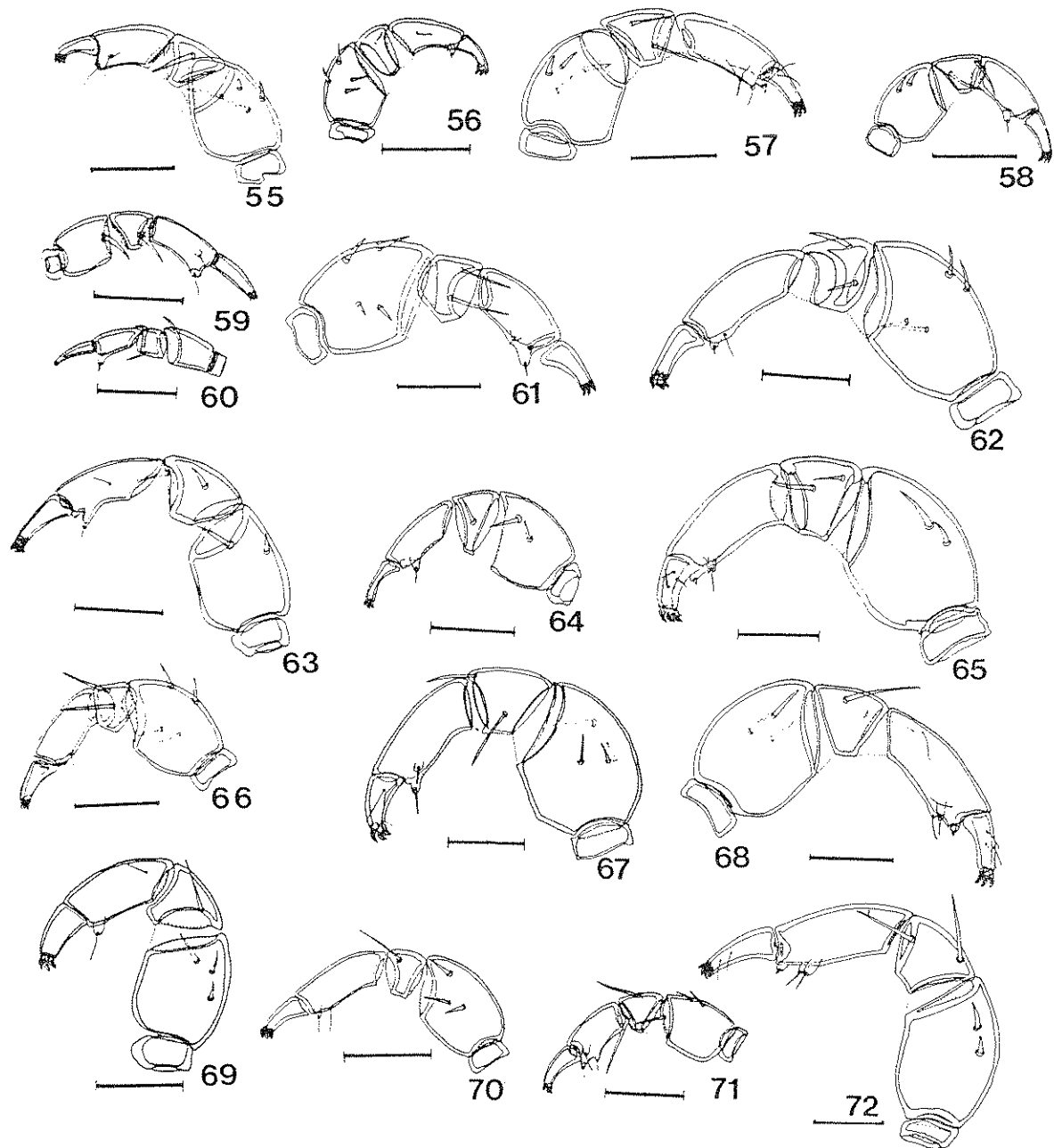
REMARKS — *U. vikitra* is extremely variable, but it consistently has several elongate setae on the Ti of the first walking leg. This character state is used to separate it from related species. Apparently *U. vikitra*, *U. vamana* and *U. sakantaka* are sibling species and form a large and diverse artenkreis in eastern North America.

9. *Unionicola (Unionicolides) vamana*
Mitchell and Wilson 1965

(Figs. 6-7, 17-18, 21, 31-32, 38-39, 58, 66, 70, 79-80, 108-125, 132, 138 and 140)

DIAGNOSIS — Character states of the subgenus; dorsum with 2 pairs of short, linear apodemes, and in some groups, the apodemes are rounded into small plates; posterior coxal group usually with an incomplete suture (figs. 6-7, 17-18 and 21); genital fields well sclerotized (figs. 58, 66 and 70); all legs setose, but first walking leg bears relatively few setae; first walking leg Ti with short setae proximally (figs. 79-80 and 108-125); some groups with first walking leg Ta longer than Ti; male and female first walking legs similar; tarsal claws of first walking leg distinctly bifid; tarsal claws of posterior three pairs of walking legs bifid at tip, with dorsal and ventral prongs slightly curved and nearly equal in length (figs. 132, 138 and 140).

MALE (72 specimens): Length including capitulum 939 (750-1300); length of posterior coxal group 334 (190-440); length of genital field 174 (140-220); dorsal lengths of pedipalp segments: Ti 126 (80-160); Ta 60 (45-80); dorsal lengths of leg segments: leg I:



Figs. 55-72. Pedipalps: 55. *Unionicola scutella* n. sp. (female); 56. *U. stricta* (Wolcott) (female); 57. *U. sakantaka* Mitchell and Wilson (male); 58. *U. vamana* Mitchell and Wilson (male); 59. *U. tupara* Mitchell and Wilson (female); 60. *U. tupara* (female); 61. *U. vikitra* Mitchell and Wilson (male); 62. *U. bakeri* n. sp. (male); 63. *U. amandita* Mitchell and Wilson (male); 64. *U. amandita* (female); 65. *U. hoesei* n. sp. (female); 66. *U. vamana* (male); 67. *U. conroyi* n. sp. (male); 68. *U. calnani* n. sp. (male); 69. *U. lasallei* n. sp. (male); 70. *U. vamana* (male); 71. *U. fulleri* n. sp. (male); and 72. *U. stansberyi* n. sp. (male).

TFe 143 (90-210); Ge 194 (90-210); Ti 162 (100-210); Ta 140 (80-190); leg IV: TFe 166 (130-280); Ge 249 (190-360); Ti 323 (220-460); Ta 305 (190-410).

FEMALE (62 specimens): Length including capitulum 1109 (800-1500); length of posterior coxal group 360 (220-540); length of genital field 257 (200-320); dorsal lengths of pedipalp segments: Ti 139 (80-170); Ta 63 (50-80); dorsal lengths of leg segments: leg I: TFe 157 (110-210); Ge 214 (150-270); Ti 176 (120-240); Ta 150 (90-180); leg IV: TFe 177 (150-290); Ge 273 (230-410); Ti 356 (260-490); Ta 334 (220-480).

NOTES — The types are in the Field Museum of Natural History. This species group is extremely variable and infests a large number of genera of hosts, which are placed in several tribes of North American mussels. Specific morphs are generally only found in a few closely related species or genera of hosts (Vidrine 1980a). Vidrine (1980a) treated this species group under 9 names: *U. vamana* and *U. vamana* group variables 1-8. Many lots in my collection are not large enough for a thorough re-evaluation of these mites, but there are a number of distinctive morphs that must be separated by leg segment measurements and host associations. A single habitat that contains a diverse community of fresh-water mussels may contain as many as 5 of the morphs. Vidrine (1980a) discussed the host groups and distributions of the varied morphs.

REMARKS — Although there are many morphs in *U. vamana*, it is considered best to treat them as a single taxon representing a large and complex rassenkreis, until detailed host-specificity studies have been conducted. All morphs can be distinguished from *U. vikitra* by the absence of long setae on the Ti of the first walking leg, and the morphs can be distinguished from *U. sakantaka* by the paucity of setae on the Ge and Ti of the first walking legs. The claw morphology can be used to distinguish these morphs from *U. tupara* and *U. amandita*. All future records of these species should be accompanied by specific host data, since morphs of all the above species appear host specific (Vidrine 1980a). All morphs are similar in that they usually occur as a single male and one or two females in each infested host.

10. *Unionicola (Unionicolides) poundsi* new species
(Figs. 8-9, 34, 81 and 130)

DIAGNOSIS — Character states of the subgenus; dorsum with 2 pairs of small, rounded apodemes; posterior coxal group usually with an incomplete suture (figs. 8-9); genital fields well sclerotized (fig. 34); pedipalps well sclerotized; all legs setose, but first walking leg Ge with 6-7, large, blunt setae (fig. 81); male and female first walking legs similar; tarsal claws of all legs deeply bifid (fig. 130).

MALE (8 specimens): Length including capitulum 925 (850-1000); length of posterior coxal group 367 (350-380); length of genital field 170 (160-180); dorsal lengths of pedipalp segments: Ti 143 (130-155); Ta 63 (57-70); dorsal lengths of leg segments: leg I: TFe 156 (140-170); Ge 221 (200-240); Ti 180 (170-190); Ta 134 (130-140); leg IV: TFe 184 (170-200); Ge 281 (270-290); Ti 368 (340-390); Ta 349 (330-370).

FEMALE (6 specimens): Length including capitulum 950 (800-1000); length of posterior coxal group 350 (310-370); length of genital field 220 (180-240); dorsal lengths of pedipalp segments: Ti 143 (130-150); Ta 61 (55-65); dorsal lengths of leg segments: leg I: TFe 158 (150-170); Ge 222 (200-240); Ti 178 (170-190); Ta 130 (120-140); leg IV: TFe 192 (170-200); Ge 295 (270-320); Ti 372 (330-400); Ta 347 (330-360).

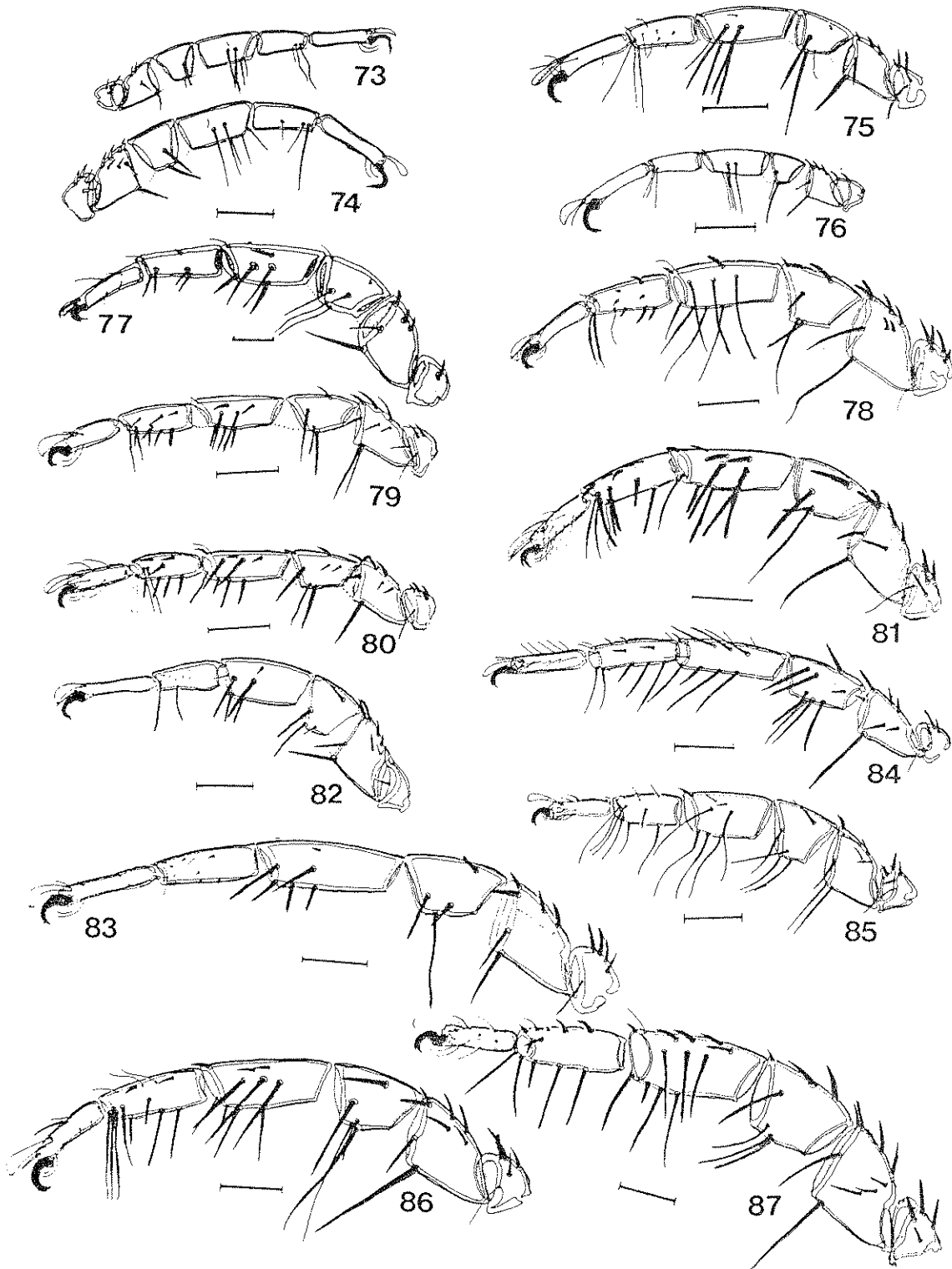
NOTES — Holotype (male) (CNC type number 19102 is from *Villosa amygdala* (Lea) from Kissimmee River at Rte. U.S. 98, border of Okeechobee and Highlands Counties, Florida, 9 July 1977 (M.F. Vidrine). Vidrine (1980a) treats this species under the manuscript name: *U. fossulata* group variable 2. It is only known from Florida from several species in the genus *Villosa*, in which usually a single male and one or two females are found per infested host.

REMARKS — *U. poundsi* resembles *U. hoesei* in tarsal claw structure of the walking legs, but the first walking legs have divergent chaetotaxy. *U. poundsi* resembles *U. vamana* in chaetotaxy of the first walking leg. *U. poundsi* is divergent from all other taxa in the combination of the tarsal claw structure and the chaetotaxy of the first walking leg.

11. *Unionicola (Unionicolides) fulleri* new species
(Figs. 5, 22, 28, 37, 43, 71, 84 and 135)

DIAGNOSIS — Character states of the subgenus; dorsum with 2 pairs of small, rounded apodemes; posterior coxal group with an incomplete suture (figs. 5 and 22); genital fields well sclerotized (figs. 28, 37 and 43); pedipalps well sclerotized (fig. 71); all legs setose; first walking leg Ge with 5-6, long, hairlike setae (fig. 84); tarsal claws of first walking leg deeply bifid; tarsal claws of posterior three pairs of walking legs bifid at the very tip with the ventral prong thick and the dorsal prong thin and straight (fig. 135); male and female first walking legs similar.

MALE (5 specimens): Length including capitulum 846 (780-900); length of posterior coxal group 290 (250-330); length of genital field 188 (160-220); dorsal lengths of pedipalp segments: Ti 84 (80-90); Ta 64 (60-70); dorsal lengths of leg segments: leg I: TFe 148 (130-170); Ge 202 (180-230); Ti 158 (140-180); Ta 140 (130-150); leg IV: TFe 218 (190-250); Ge 298 (260-340); Ti 308 (270-350); Ta 310 (270-350).



Figs. 73-87. First walking legs: 73. *Unionicola stricta* (Wolcott) (male); 74. *U. stricta* (female); 75. *U. tupara* Mitchell and Wilson (female); 76. *U. tupara* (female); 77. *U. stansberyi* n. sp. (male); 78. *U. scutella* n. sp. (female); 79. *U. vamana* Mitchell and Wilson (male); 80. *U. vamana* (female); 81. *U. poundsi* n. sp. (female); 82. *U. amandita* Mitchell and Wilson (female); 83. *U. amandita* (male); 84. *U. fulleri* n. sp. (male); 85. *U. vikitra* Mitchell and Wilson (male); 86. *U. lasallei* n. sp. (male); and 87. *U. vikitra* (male).

FEMALE (5 specimens): Length including capitulum 1030 (900-1100); length of posterior coxal group 308 (270-330); length of genital field 298 (270-320); dorsal lengths of pedipalp segments: Ti 91 (83-100); Ta 68 (65-70); dorsal lengths of leg segments: leg I: TFe 154 (140-160); Ge 212 (190-230); Ti 160 (150-170); Ta 140 (130-150); leg IV: TFe 226 (200-240); Ge 312 (290-330); Ti 314 (280-330); Ta 322 (290-340).

NOTES — Holotype (male) (CNC type number 19103) is from *Proptera purpurata* (Lamarck) from Louisiana Irrigation Canal ca. 5.0 km north of Iowa at Rte. LA 383, Jefferson Davis Parish, Louisiana, 2 May 1981 (Macky and M.F. Vidrine). Additional specimens were measured from *P. alata* (Say) from the Mississippi River at Rock Island, Rock Island County, Illinois (U.S. Army Corps of Engineers Mississippi River Project), 1977 (S.L.H. Fuller). The Illinois specimens were considerably larger than the Louisiana specimens. This species was treated by Vidrine (1980a) under the manuscript name: *Unionicola* sp. nov. type C. An infested host may contain more than 100 mites. The hosts and distribution of this species were discussed in Vidrine (1980a).

REMARKS — Apparently *U. fulleri* may have been confused with *U. stricta* in earlier literature. *U. fulleri* has distinctive tarsal claws on the posterior three pairs of walking legs, and the chaetotaxy of the first walking leg is unusual.

12. *Unionicola (Unionicolides) conroyi* new species
(Figs. 13, 35, 47-48, 67, 104 and 136)

DIAGNOSIS — Character states of the subgenus; dorsum with 2 pairs of short, linear apodemes; posterior coxal group with an incomplete suture (fig. 13); genital fields well sclerotized (figs. 35, 47 and 48); pedipalps well sclerotized (fig. 67); all legs setose; first walking leg Ge with 10-12, large setae, and Ti with 10, thick setae (fig. 104); male and female legs similar; all tarsal claws of walking legs deeply bifid (fig. 136).

MALE (4 specimens): Length including capitulum 1250 (1100-1300); length of posterior coxal group 510 (500-540); length of genital field 205 (200-220); dorsal lengths of pedipalp segments: Ti 188 (175-200); Ta 79 (75-85); dorsal lengths of leg segments: leg I: TFe 217 (200-230); Ge 277 (260-290); Ti 253 (230-270); Ta 167 (160-180); leg IV: TFe 303 (290-320); Ge 430 (410-450); Ti 565 (540-590); Ta 510 (470-540).

FEMALE (5 specimens): Length including capitulum 1540 (1500-1600); length of posterior coxal group 502 (470-530); length of genital field 276 (250-300); dorsal lengths of pedipalp segments: Ti 180; Ta 80 (75-85); dorsal lengths of leg segments: leg I: TFe 205 (190-230); Ge 272 (260-290); Ti 238 (220-250); Ta 166

(160-170); leg IV: TFe 284 (280-290); Ge 426 (410-450); Ti 558 (550-570); Ta 486 (480-490).

NOTES — Holotype (female) (CNC type number 19104) is from *Anodonta nuttalliana* Lea (NMC 67555) from Vereux Lake ca. 12 km north of Oliver at public beach, British Columbia, Canada, 6 August 1972 (A.H. Clarke). Additional specimens that were measured are from: *A. nuttalliana* (NMC 67608) from Okanagan Lake, west side, ca. 12 km due west of Vernon, British Columbia, Canada, 12 August 1972 (A.H. Clarke and B.T. Kidd); *A. kennealyi* (NMC 67554) from First Nanaimo Lake, east end of boat landing, ca. 21 km west of Nanaimo, British Columbia, Canada, 6 August 1972 (A.H. Clarke); *A. oregonensis* Lea (= *A. nuttalliana*) (NMC 40069) from Columbia River ca. 45 km above junction with Yakima Run, Washington; *A. wahlmatensis* Lea (= *A. nuttalliana*) from Pit River, California (S.L.H. Fuller and D. Martin). Usually a single male and one or two females are found in each infested host. Vidrine (1980a) treats this species under the manuscript name: *Unionicola* sp. nov. type 4.

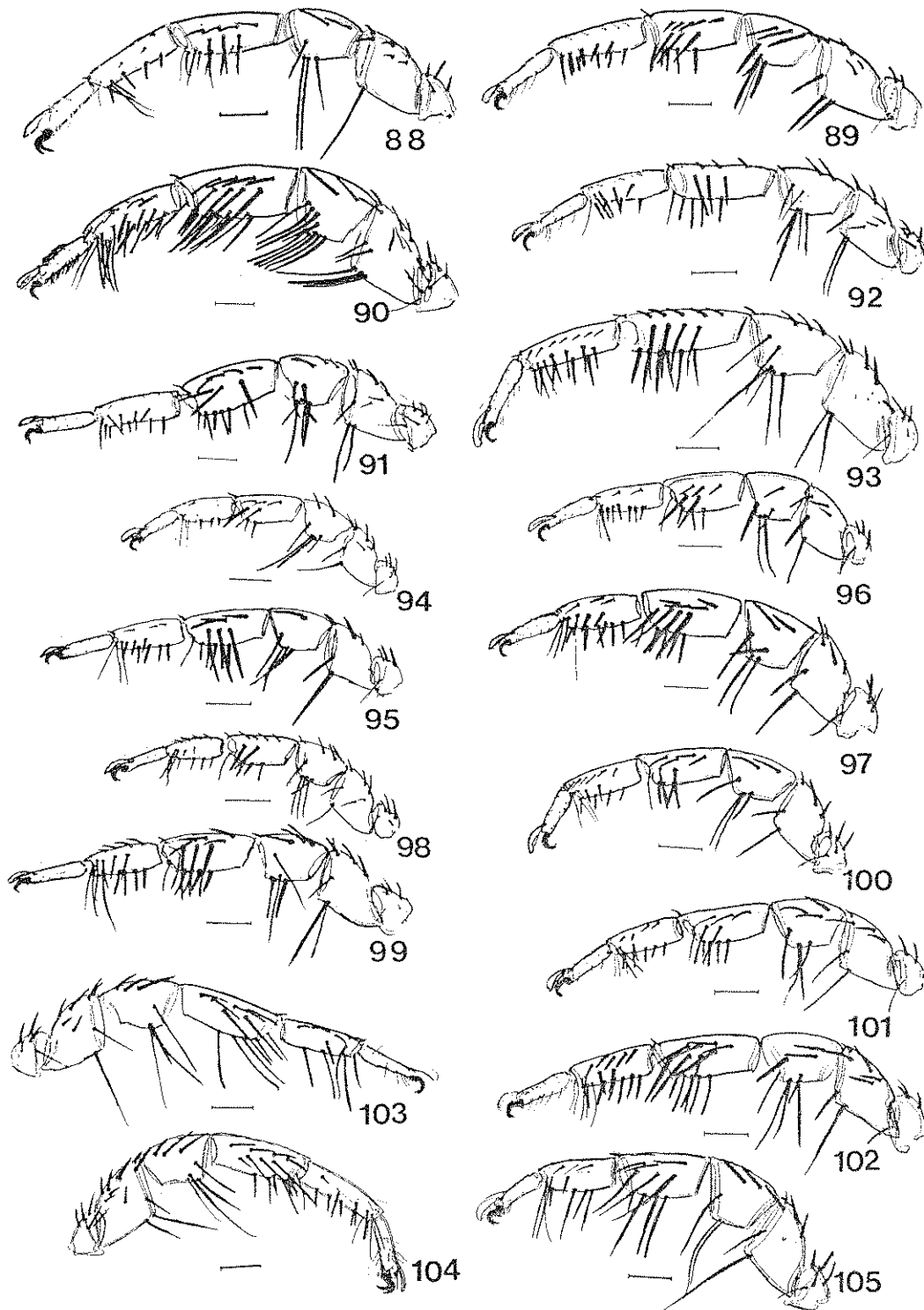
REMARKS — *U. conroyi* has distinctive chaetotaxy of the first walking leg and unique tarsal claws on the walking legs. It resembles *U. hoesei*, but it is apparently restricted to the northwest Pacific drainages and anodontine mussels in the genus *Anodonta*. It is apparently closely related to the next species.

13. *Unionicola (Unionicolides) burchi* new species
(Figs. 14, 41-42, 88 and 137)

DIAGNOSIS — Character states of the subgenus; dorsum with 2 pairs of short, linear apodemes; posterior coxal group with an incomplete suture (fig. 14); genital fields well sclerotized (figs. 41-42); pedipalps well sclerotized; all legs setose; first walking leg Ge with 10-12, large setae, and Ti with 6-8, thick setae (fig. 88); all tarsal claws deeply bifid (fig. 137); male and female first walking legs similar.

MALE (3 specimens): Length including capitulum 1000; length of posterior coxal group 386 (380-400); length of genital field 170 (160-180); dorsal lengths of pedipalp segments: Ti 135; Ta 65; dorsal lengths of leg segments: leg I: TFe 163 (160-170); Ge 216 (210-230); Ti 190 (180-200); Ta 143 (140-150); leg IV: TFe 213 (190-240); Ge 327 (310-350); Ti 433 (410-460); Ta 397 (370-430).

FEMALE (3 specimens): Length including capitulum 1350 (1250-1500); length of posterior coxal group 366 (360-370); length of genital field 256 (250-260); dorsal lengths of pedipalp segments: Ti 135 (130-140); Ta 67 (60-70); dorsal lengths of leg segments: leg I: TFe 150 (140-160); Ge 203 (200-210); Ti 180; Ta 137



Figs. 88-105. First walking legs: 88. *Unionicola burchi* n. sp. (male); 89. *U. bakeri* n. sp. (male); 90. *U. hoesei* n. sp. (female); 91. *U. hoesei* (male); 92. *U. calnani* n. sp. (male); 93. *U. calnani* (female); 94. *U. sakantaka* Mitchell and Wilson (male); 95. *U. sakantaka* (female); 96. *U. sakantaka* (male); 97. *U. sakantaka* (female); 98. *U. sakantaka* (male); 99. *U. sakantaka* (female); 100. *U. sakantaka* (male); 101. *U. sakantaka* (male); 102. *U. sakantaka* (female); 103. *U. vikitra* Mitchell and Wilson (female); 104. *U. conroyi* n. sp. (male); 105. *U. vikitra* Mitchell and Wilson (female).

(130-140); leg IV: TFe 217 (210-220); Ge 320 (310-330); Ti 400 (380-430); Ta 363 (360-370).

NOTES — Holotype (female) (CNC type number 19105) is from *Anodonta* sp. (MZUM—CDB 69-105) from Rio Turbio ca. 12 km east of Penjamo at Highway 110 crossing, Guanajuato, Mexico, 10 June 1969 (C.D. Barbour and R.J. Douglass). Six specimens were found in 4 mussels.

REMARKS — *U. burchi* is almost identical to *U. conroyi*, but the chaetotaxy of the first walking leg differs. *U. conroyi* is larger and has more setae on the first walking leg Ti than *U. burchi*, which is only known from its type locality. These two mites inhabit the same host genus, and they are the only members of the *Unionicolides* known from the Pacific drainages.

14. *Unionicola (Unionicolides) scutella* new species (Figs. 1, 40, 55, 78, 126 and 139)

DIAGNOSIS — Character states of the subgenus; dorsum with a large oval plate (fig. 126); posterior coxal group usually divided by a complete suture (fig. 1); genital fields well sclerotized (fig. 40); pedipalps well sclerotized (fig. 55); all legs setose, but first walking leg Ge with one short and 6, long, hairlike setae (fig. 78); tarsal claws of first walking leg moderately bifid at tip; tarsal claws of posterior three pairs of walking legs bifid at tip with 2, equal, lateral prongs (fig. 139).

FEMALE (3 specimens): Length including capitulum 1000 (950-1050); length of posterior coxal group 380 (360-400); length of genital field 257 (250-270); dorsal plate 647 (580-700) long, 420 (400-440) wide; dorsal lengths of pedipalp segments: Ti 105 (100-110); Ta 54 (52-55); dorsal lengths of leg segments: leg I: TFe 130 (120-140); Ge 180 (170-190); Ti 133 (130-140); Ta 117 (110-120); leg IV: TFe 143 (130-150); Ge 266 (250-280); Ti 343 (320-360); Ta 293 (270-310).

NOTES — Holotype (female) (CNC type number 19106) is from *Fusconaia ebena* Lea from Leaf River at Rte. U.S. 98, Greene County, Mississippi, 23 July 1977 (D.J. Bereza and M.F. Vidrine). Three females were found in 2 mussels, and the males are unknown. Vidrine (1980a) treats this species under the manuscript name: *Unionicola* sp. nov. type 7.

REMARKS — *U. scutella* has distinctive dorsal and ventral morphology. The dorsal plate somewhat resembles that of *U. sica* Lundblad 1937. The first walking legs are similar to *U. fulleri*.

15. *Unionicola (Unionicolides) lasallei* new species (Figs. 36, 69, 86 and 144)

DIAGNOSIS — Character states of the subgenus; dorsum with 2 pairs of small, nearly circular apo-

demes; posterior coxal group with an incomplete suture; genital fields well sclerotized (fig. 36); pedipalps well sclerotized (fig. 69); all legs setose, but first walking legs with somewhat reduced chaetotaxy (fig. 86); male and female first walking legs similar; tarsal claws of first walking legs moderately bifid; tarsal claws of posterior three pairs of walking legs obviously bifid with divergent prongs (fig. 144).

MALE (7 specimens): Length including capitulum 1110 (1000-1200); length of posterior coxal group 358 (300-430); length of genital field 208 (200-220); dorsal lengths of pedipalp segments: Ti 142 (125-160); Ta 69 (60-75); dorsal lengths of leg segments: leg I: TFe 169 (150-190); Ge 236 (210-260); Ti 191 (170-220); Ta 150 (140-170); leg IV: TFe 199 (170-230); Ge 314 (270-370); Ti 380 (330-440); Ta 336 (290-370).

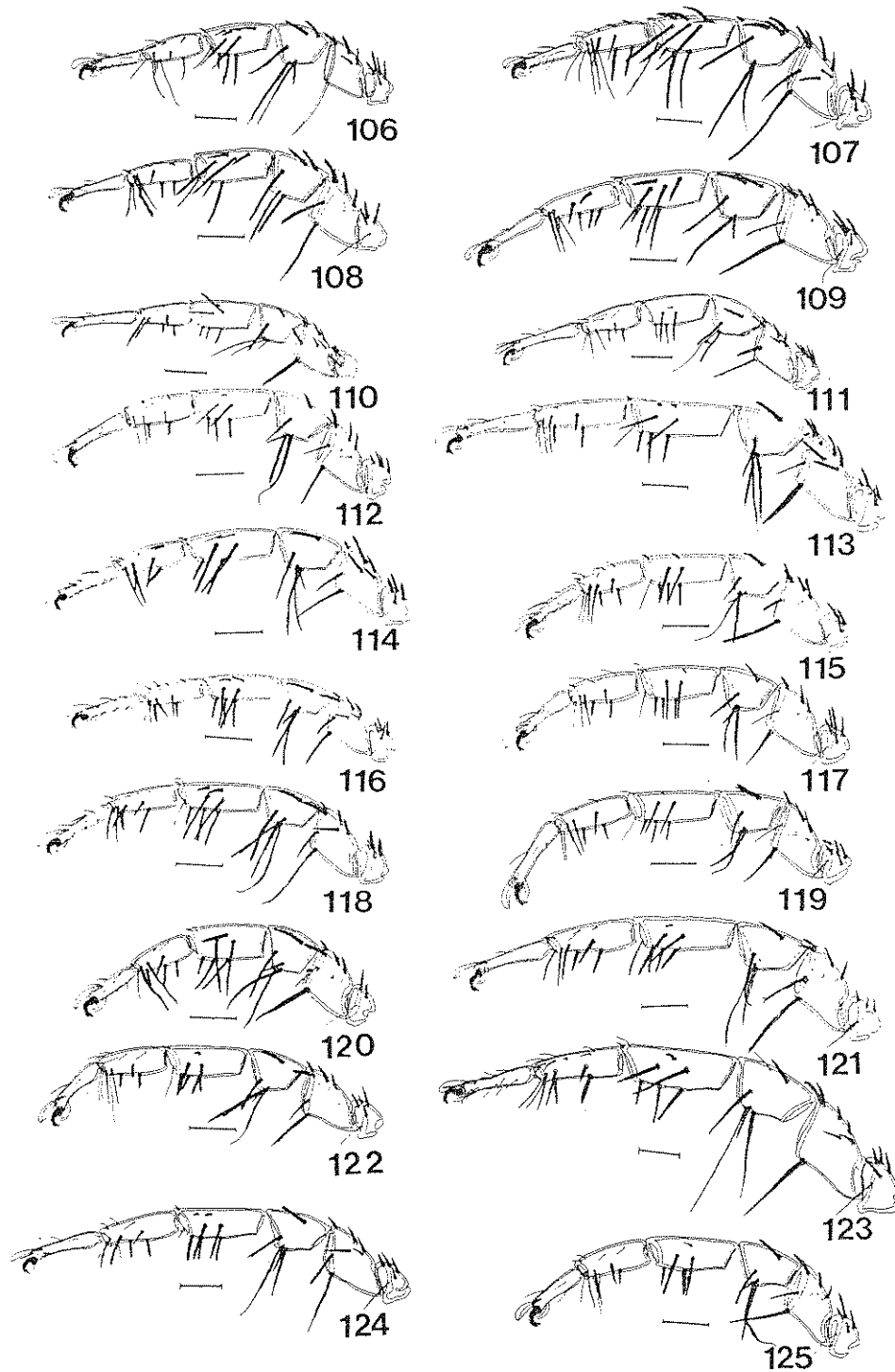
FEMALE (3 specimens): Length including capitulum 1300; length of posterior coxal group 430; length of genital field 300; dorsal lengths of pedipalp segments: Ti 163 (160-170); Ta 77 (75-80); dorsal lengths of leg segments: leg I: TFe 200 (190-210); Ge 270 (260-280); Ti 206 (200-220); Ta 163 (160-170); leg IV: TFe 223 (220-230); Ge 363 (360-370); Ti 426 (420-440); Ta 363 (350-380).

NOTES — Holotype (male) (CNC type number 19107) is from *Uniomerus tetralasmus* from pond at headwater of Mosquito Creek off Rte. U.S. 90, Gadsden County, Florida, 19 July 1977 (D.J. Bereza and M.F. Vidrine). This species is only known from *U. tetralasmus* from Florida and North and South Carolina. Vidrine (1980a) treats this species under the manuscript name: *Unionicola* sp. nov. type 5. Usually a single male and one or two females occur in each infested host.

REMARKS — *U. lasallei* resembles *U. vamana* and *U. fulleri*, but *U. lasallei* has unique tarsal claw structure on the posterior three pairs of walking legs. Both *U. stricta* and *U. lasallei* parasitize *U. tetralasmus*, but the ranges of these two mites apparently do not overlap.

16. *Unionicola (Unionicolides) calnani* new species (Figs. 68, 92-93 and 141)

DIAGNOSIS — Character states of the subgenus; dorsum with 2 pairs of small, nearly circular apodemes; posterior coxal group with an incomplete suture; genital fields well sclerotized; pedipalps well sclerotized (fig. 68); female first walking leg with more setae than male first walking leg; all legs setose; first walking leg Ge with 3 rows of large setae, and Ti with 3 rows of short setae (figs. 92-93); tarsal claws of first walking leg moderately bifid; tarsal claws of posterior three pairs of walking legs bifid at the tip, with the dorsal and ventral prongs curved and the dorsal prong smaller than but nearly equal in length to the ventral



Figs. 106-125. First walking legs: 106. *Unionicola vikitra* Mitchell and Wilson (male); 107. *U. vikitra* (female); 108. *U. vamana* Mitchell and Wilson (male); 109. *U. vamana* (female); 110. *U. vamana* (male); 111. *U. vamana* (female); 112. *U. vamana* (male); 113. *U. vamana* (female); 114. *U. vamana* (female); 115. *U. vamana* (male); 116. *U. vamana* (male); 117. *U. vamana* (male); 118. *U. vamana* (female); 119. *U. vamana* (male); 120. *U. vamana* (male); 121. *U. vamana* (female); 122. *U. vamana* (male); 123. *U. vamana* (female); 124. *U. vamana* (male); and 125. *U. vamana* (male).

prong (fig. 141).

MALE (10 specimens): Length including capitulum 1150 (1050-1250); length of posterior coxal group 454 (400-500); length of genital field 204 (180-220); dorsal lengths of pedipalp segments: Ti 177 (160-200); Ta 79 (70-84); dorsal lengths of leg segments: leg I: TFe 200 (180-220); Ge 277 (260-300); Ti 218 (200-240); Ta 157 (150-170); leg IV: TFe 226 (200-250); Ge 366 (350-400); Ti 466 (430-500); Ta 435 (400-470).

FEMALE (6 specimens): Length including capitulum 1458 (1350-1700); length of posterior coxal group 553 (530-570); length of genital field 322 (310-340); dorsal lengths of pedipalp segments: Ti 218 (200-225); Ta 98 (85-100); dorsal lengths of leg segments: leg I: TFe 252 (230-270); Ge 340 (310-350); Ti 275 (250-290); Ta 180 (170-190); leg IV: TFe 288 (260-310); Ge 453 (420-480); Ti 552 (510-590); Ta 505 (460-530).

NOTES — Holotype (male) (CNC type number 19108) is from *Cyrtoneias tampicoensis* (Lea) (ANSP A5226) from Nueces River at Rte. TX 16, ca. 17 km south of Tilden, McMullen County, Texas, 28 May 1973 (S.L.H. Fuller). Additional specimens that were measured were from: *C. tampicoensis* and *Disconaias discus* (Lea) from Rio Guayalejo at Rte. MX 80 near Maxcoltzin, Tamaulipas, Mexico, 28 January 1982 (D.J. Bereza, S.V. Hensley and M.F. Vidrine); and *C. tampicoensis* from: 1.) Rio Tempoal at Rte. MX 105 between Tempoal and Planton Sanchez, Veracruz, Mexico, 8 February 1982 (D.J. Bereza, S.V. Hensley, R.T. Hensley and M.F. Vidrine); 2.) Rio San Juan at Rte. MX 25 ca. 30 km south of Santiago Tuxtla, Veracruz, Mexico, 15 February 1982 (D.J. Bereza, S.V. Hensley, R.T. Hensley and M.F. Vidrine); and 3.) Rio Paploapan off Rte. MX 175 ca. 12 km south of Tlacotalpan, Veracruz, Mexico, 17 February 1982 (D.J. Bereza, S.V. Hensley, R.T. Hensley and M.F. Vidrine). Vidrine (1980a) studied this species under the manuscript name: *Unionicola* sp. nov. type 6. Usually a single male and one or two females occur in each infested host.

REMARKS — *U. calnani* resembles *U. fossulata* and *U. sakantaka*, but *U. calnani* has tarsal claws distinct from *U. fossulata* and chaetotaxy of the first walking leg distinct from *U. sakantaka*. *U. calnani* is apparently restricted to the southwestern United States and Mexico, and it inhabits distinctly southern mussel species.

17. *Unionicola (Unionicolides) stansberyi* new species (Figs. 12, 46, 72, 77, 127, 142 and 143)

DIAGNOSIS — Character states of the subgenus; dorsum with 2 pairs of small, nearly circular apodemes (fig. 127); posterior coxal group with an incomplete

suture (fig. 12); genital fields well sclerotized (fig. 46); pedipalps well sclerotized (fig. 72); first walking legs with few setae (fig. 77); posterior walking legs setose; tarsal claws of first walking leg distinctly bifid (fig. 142); tarsal claws of posterior three pairs of walking legs bifid with the dorsal prong distant from the tip (fig. 143).

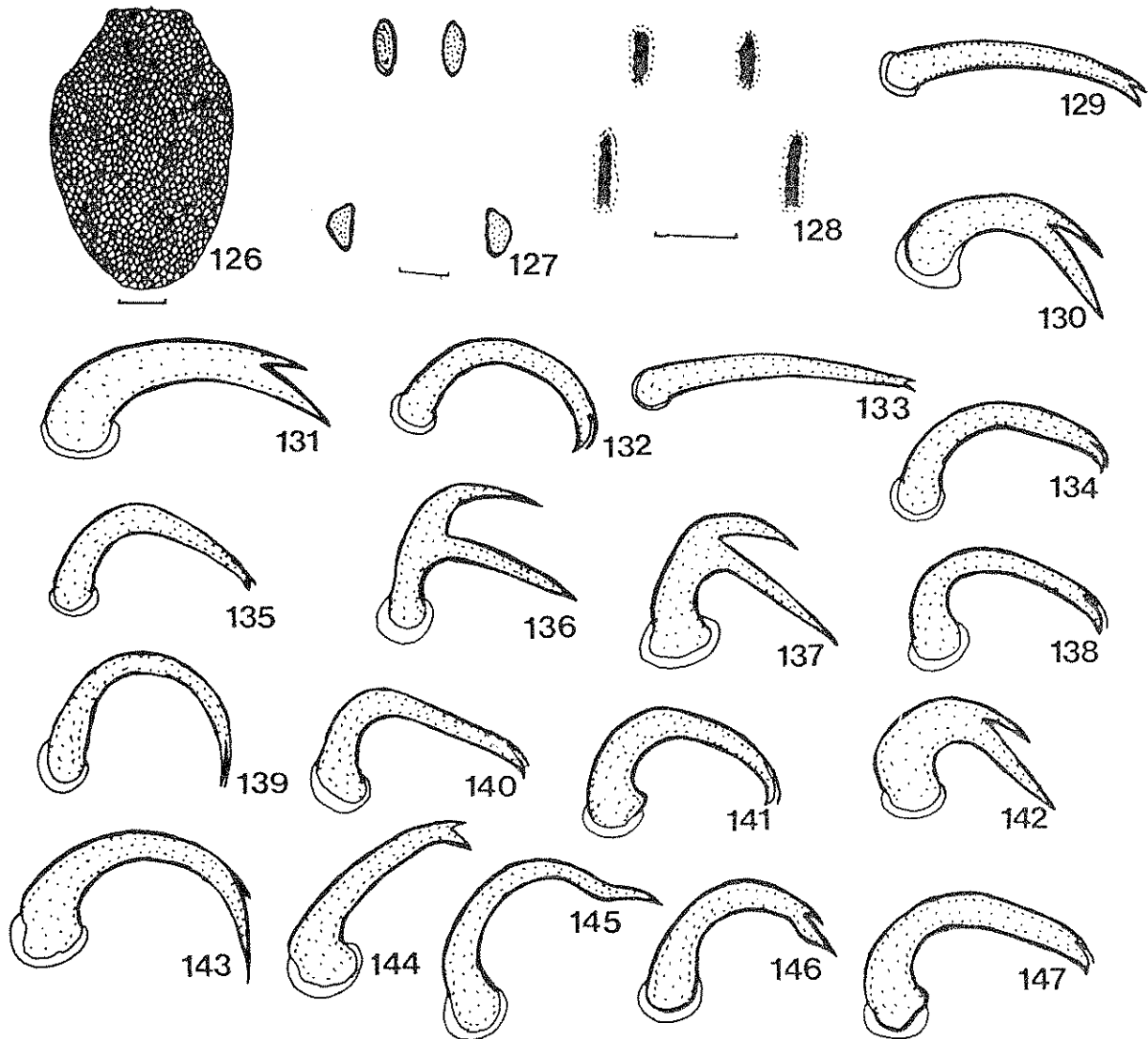
MALE (2 specimens): Length including capitulum 1650 (1600-1700); length of posterior coxal group 625 (620-630); length of genital field 285 (280-290); dorsal lengths of pedipalp segments: Ti 203 (200-205); Ta 113 (110-115); dorsal lengths of leg segments: leg I: TFe 230 (210-250); Ge 315 (300-330); Ti 260; Ta 215 (210-220); leg IV: TFe 285 (270-300); Ge 450 (440-460); Ti 590 (570-610); Ta 495 (480-510).

NOTES — Holotype (male) (CNC type number 19109) is from *Prisodon obliquus* (Schumacher) (USNM 804421) from the entrance to a small, clear, feeder stream into Rio Jutai ca. 4.0 km upstream from the mouth of Rio Jutai (into Rio Solimoes of the Amazon drainage), Municipio de Jutai, Amazonas Province, Brazil, 6 November 1982 (B. Nelson and K. Redford). Each of two host individuals had a single male of this species, while one host had *U. recta* Vidrine and the other host also had *U. nelsoni* Vidrine (Vidrine 1985b).

REMARKS — *U. stansberyi* resembles three South American species: *U. sica*, *U. bonariensis* Mauri and Alzuet 1972 and *U. pachyscelus* Lundblad 1941. *U. stansberyi* lacks the large dorsal plate of *U. sica*, which is figured in Rosso de Ferradas (1974). *U. stansberyi* is approximately twice the size of *U. bonariensis*, but otherwise, the two species are quite similar. *U. stansberyi* and *U. pachyscelus* have different first walking legs (see Lundblad 1941-1942). *U. stansberyi* resembles some of the larger *U. vama*, but the South American species appear to form a cohesive group with similar tarsal claw structure and leg morphology.

DISCUSSION

Unionicolides forms the most commonly encountered group of mites in fresh-water mussels in North America. The group shares many synapomorphies and is distinctly holophyletic and different from all other *Unionicola*. Within a single large population individual mites usually possess 5 pairs of genital acetabula but some individuals with 4 or 6 pairs can be found. The least derived characters (absence of extensive secondary sclerotization, reduced chaetotaxy, lack of population regulation, extreme similarity in males and females and small size) appear in the simplest combination in *U. tupara*. Thus *U. tupara* is considered the least derived species. All other species are considered



Figs. 126-147. Dorsal structures: 126. *Unionicola scutella* n. sp. (female plate); 127. *U. stansberyi* n. sp. (male apodemes); and 128. *U. vikitra* Mitchell and Wilson (male apodemes); Tarsal claws of walking legs: 129. *U. fossulata* (Koenike) (leg II); 130. *U. poundsi* n. sp. (leg IV); 131. *U. hoesei* n. sp. (leg II); 132. *U. vamana* Mitchell and Wilson (leg IV); 133. *U. bakeri* n. sp. (leg II); 134. *U. vikitra* (leg IV); 135. *U. fulleri* n. sp. (leg III); 136. *U. conroyi* n. sp. (leg IV); 137. *U. burchi* n. sp. (leg IV); 138. *U. vamana* (leg IV); 139. *U. scutella* (leg IV); 140. *U. vamana* (leg IV); 141. *U. calnani* n. sp. (leg IV); 142. *U. stansberyi* n. sp. (leg I); 143. *U. stansberyi* (leg IV); 144. *U. lasallei* n. sp. (leg IV); 145. *U. stricta* (Wolcott) (leg I); 146. *U. tupara* Mitchell and Wilson (leg I); and 147. *U. sakantaka* Mitchell and Wilson (leg IV).

as derivatives of *U. tupara*-like stock. Vidrine (1985a) discussed many synapomorphies shared between *U. tupara* and less derived members of related American subgenera. These mites display an excellent example of evolutionary adaptive radiation about a generalized body form and also display excellent examples of co-evolution with their host mussels.

Mites of the *Unionicolides* have been poorly understood since many species concepts lacked the scope necessary to appreciate the varied morphs that are found. Zoogeographic and host-specificity studies permitted an initial attempt to distinguish morphs in eastern North American populations (Vidrine 1980a). Additional survey work and museum study have

revealed additional morphs. These morphs apparently exist not only as geographically isolated populations (rassenkreis) but also as host-isolated populations (artenkreis). Vidrine (1980a) suggested that "sympatric host race formation", as described by Bush (1969 and 1975), may provide a theory for the evolution of such diversity. A further evaluation of the systematics of *Unionicolides* and its related subgenera will require detailed zoogeographic and host-specificity data, possibly with the assistance of numerical analysis and multivariate morphometric analysis. At present, many of my lots are small and not readily useful for detailed analysis. In order to prevent the creation of an inordinate number of newly named taxa which may represent merely ecophenotypes displaying geographic variation, I have lumped populations into large groups that generally fit previous descriptions. All future references to this group require, by necessity, the names of the hosts from which the specific morphs have been obtained in order to prevent taxonomic chaos.

The *Unionicolides* are only known from North and South America. They can be tentatively divided into three groups based upon their host preferences: (1) parasites of the Ambleminae of Davis and Fuller (1981); (2) parasites of the Anodontinae of Davis and Fuller (1981) in western North America; and (3) parasites in the Hyriidae and Mutelacea in South America. The most diverse group is parasitic upon the Ambleminae which occurs in North America and is probably the most diverse group of mussels in the world. Only the mussel species in the Ambleminae that occur east of the Rocky Mountains are known to be parasitized by *Unionicolides*.

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