

**NEW NORTH AMERICAN RECORDS OF WATER MITES
(ACARI: UNIONICOLIDAE: *UNIONICOLA*: *UNIONICOLA* AND *PENTATAX*)**

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ABSTRACT — Range extensions and new host records are reported for four species of *Unionicola* in North America. *U. crassipes laurentiana* Crowell and Davids, *U. furcula* (Lundblad) and *U. gracilipalpis tenuis* (Lundblad) are reported from sponges in Louisiana. *U. aculeata* (Koenike) is reported from mussels in Mexico.

INTRODUCTION

In North America, members of the subgenera *Unionicola* Haldeman and *Pentatax* Thor in the genus *Unionicola* are not routinely found inside mussels, but rather they are transients that use mussels as oviposition sites and/or as sites where resting stages (protonymphs and/or tritonymphs) undergo metamorphosis (Vidrine 1980 and 1984). More than 20,000 freshwater mussels (Unionoida) from North America and 5 sponge species (Spongillidae) from Louisiana were examined for mites. Mussels were examined for adult and nymphal mites, and encysted stages were reared. Sponges were collected and transported to the laboratory in habitat water, where encysted stages were permitted to emerge. Adult and nymphal mites were then collected from the water, where a light was used to attract them, since the mites exhibited positive phototaxis. This paper presents the findings from these observations.

Representative lots of mites are deposited in the Canadian National Collections and Biosystematics Research Institute, Agriculture Canada, Ottawa. All sponge species have been reported from Louisiana (Poirrier and Arceneaux 1972).

Terminology for adult structures follows that used by Vidrine (1985). Measurements are expressed in microns and in the format, mean (range).

RESULTS

Unionicola (Unionicola) crassipes laurentiana
Crowell and Davids 1979

MALE (10 specimens) — Length including capitulum 775 (600-900); length of posterior coxal group 346 (260-420); dorsal lengths of pedipalp segments: Ti 135 (90-160); Ta 91 (80-100); dorsal lengths of leg segments: leg I: TFe 274 (210-320); Ge 369 (280-450); Ti 266 (200-340); Ta 245 (180-280); leg IV: TFe 299 (220-330); Ge 379 (270-420); Ti 484 (350-570); Ta 384 (310-460).

FEMALE (12 specimens) — Length including capitulum 658 (500-850); length of posterior coxal group 322 (180-400); dorsal lengths of pedipalp segments: Ti 135 (80-180); Ta 95 (60-130); dorsal lengths of leg segments: leg I: TFe 275 (170-350); Ge 375 (230-470); Ti 260 (160-340); Ta 252 (150-340); leg IV: TFe 286 (170-370); Ge 354 (210-470); Ti 455 (270-580); Ta 383 (230-480).

NOTES — The North American members of the *U. crassipes* complex were recently re-evaluated by Conroy (1984). Arndt and Viets (1938) reviewed the sponge associations of the *U. crassipes* and reported mostly European records. Vidrine (1980) treated this species under two names: *U. minor* (Soar) and *U. crassipes* (Mueller). Incidental mussel hosts have been reviewed (Vidrine 1980). In North America, Conroy

(1979) and Old (1933) reported this mite from the sponge, *Spongilla lacustris* (Linnaeus). Mites measured in this study were obtained from encysted stages in the mussel, *Anodonta grandis* (Say) (in the suprabranchial chamber), and from four sponge species: *Dosilia radiospiculata* (Mills 1888) from University of Southwestern Louisiana research ponds, Lafayette, Lafayette Parish, Louisiana, 21 September 1979; *Trochospongilla horrida* (Weltner 1893) from Bayou Lacombe at Rte. LA 190, St. Tammany Parish, Louisiana, 31 August 1979; *T. pennsylvanica* (Potts 1882) from Henderson Swamp ca. 1.0 km north of Rte. I-10, St. Martin Parish, Louisiana, 21 June 1978; and *T. leidy* (Bowerbank 1863) from Bayou Peyronnet ca. 1.0 km north of Rte. I-10, St. Martin Parish, Louisiana, 15 July 1979. The mussel was obtained at the latter locality. These mites match the measurements in Conroy (1984). Related mites have been reported from North America including: *U. poirrieri* Vidrine 1984), *U. pectinata* (Wolcott 1898), *U. figuralis* (Koch 1836), *U. conjuncta* Cook 1980 and *U. mexicana* Cook 1980.

Unionicola (Unionicola) gracilipalpis tenuis
(Lundblad 1935)

FEMALE (2 specimens) - Length including capitulum 700; length of posterior coxal group 300; dorsal lengths of pedipalp segments: Ge 120 (110-130); Ti 325 (320-330); Ta 235 (230-240); dorsal lengths of leg segments: leg I: TFe 440 (430-450); Ge 590 (580-600); Ti 490 (480-500); Ta 370 (360-380); leg IV: TFe 420 (410-430); Ge 540 (530-550); Ti 690 (670-710); Ta 590 (570-610).

NOTES — Two females were reared from encysted stages in the sponge, *D. radiospiculata*, from the University of Southwestern Louisiana research ponds, Lafayette, Lafayette Parish, Louisiana, 21 September 1979. These specimens match the description of Lundblad (1935) for Haitian specimens, but they are larger than specimens reported from Mexico (Cook 1980) and smaller than *U. gracilipalpis gracilipalpis* (Viets) reported from Germany (Hevers 1977 and 1978). Interestingly, these specimens match the measurements of *U. crassipes crassipes* (Mueller) reported from Germany (Hevers 1977 and 1978). Conroy (1979) reported *U. gracilipalpis* from *S. lacustris* in Canada. *U. gracilipalpis tenuis* has also been reported from the Panama Canal Zone (Gliwicz and Biesiadka 1975) and Guatemala (Viets 1975). The status of the *U. gracilipalpis* complex in North America remains uncertain. This complex has not been reported in North American mussels.

Unionicola (Pentatax) furcula (Lundblad 1935)

MALE (3 specimens) — Length including capitulum 537 (460-650); length of posterior coxal group 170 (160-180); dorsal lengths of pedipalp segments: Ti 130; Ta 70; dorsal lengths of leg segments: leg I: TFe 130; Ge 157 (150-160); Ti 187 (180-190); Ta 130; leg IV: TFe 160; Ge 210; Ti 246 (240-250); Ta 243 (240-250).

FEMALE (7 specimens) — Length including capitulum 657 (550-800); length of posterior coxal group 196 (180-210); dorsal lengths of pedipalp segments: Ti 163 (150-180); Ta 81 (70-90); dorsal lengths of leg segments: leg I: TFe 161 (140-180); Ge 193 (170-220); Ti 223 (190-250); Ta 157 (140-180); leg IV: TFe 196 (180-220); Ge 239 (210-270); Ti 287 (260-330); Ta 227 (230-320).

NOTES — These specimens were obtained and reared from encysted stages from: *Ephydatia fluviatilis* (Linnaeus 1758) from New Orleans City Park ponds, Orleans Parish, Louisiana, 28 August 1978; *D. radiospiculata* from University of Southwestern Louisiana research ponds, Lafayette, Lafayette Parish, Louisiana, 21 September 1979; *T. horrida* from Bayou Lacombe at Rte. LA 190, St. Tammany Parish, Louisiana, 31 August 1979; *T. pennsylvanica* from Henderson Swamp ca. 1.0 km north of Rte. I-10, St. Martin Parish, Louisiana, 21 June 1978; and *T. leidy* from Bayou Peyronnet ca. 1.0 km north of Rte. I-10, St. Martin Parish, Louisiana, 15 July 1979. These specimens match the description of Haitian types (Lundblad 1935) and are smaller than the types of *U. furculopsis* Cook 1980 from Mexico. A single nymph was obtained in the mussel, *A. grandis*, from St. Croix River, Wisconsin (Vidrine 1980). This species has been reported from the Panama Canal Zone (Gliwicz and Biesiadka 1975) and Guatemala (Viets 1975).

Unionicola (Pentatax) aculeata (Koenike 1890)

MALE (11 specimens) — Length including capitulum 783 (700-900); length of posterior coxal group 332 (300-370); dorsal lengths of pedipalp segments: Ti 137 (100-170); Ta 72 (60-90); dorsal lengths of leg segments: leg I: TFe 235 (190-280); Ge 325 (270-390); Ti 223 (180-270); Ta 214 (180-260); leg IV: TFe 265 (210-340); Ge 326 (260-400); Ti 397 (330-490); Ta 352 (300-420).

FEMALE (15 specimens) — Length including capitulum 932 (750-1300); length of posterior coxal group 398 (320-470); dorsal lengths of pedipalp segments: Ti 173 (130-210); Ta 89 (70-110); dorsal lengths of leg segments: leg I: TFe 293 (210-370); Ge 409 (290-540); Ti 270 (180-350); Ta 253 (180-330); leg IV:

TFe 305 (220-390); Ge 366 (260-460); Ti 451 (320-560); Ta 389 (270-480).

NOTES — Adults were collected and reared from fresh-water mussels, where resting stages were found in the siphonal mantle. Vidrine (1977 and 1980) reported 21 genera of mussels as hosts: *Actinonaias*, *Amblema*, *Anodonta*, *Carunculina*, *Ellipsaria*, *Elliptio*, *Fusconaia*, *Lampsilis*, *Lasmigona*, *Leptodea*, *Ligumia*, *Obliquaria*, *Obovaria*, *Orthonymus*, *Prop-tera*, *Ptychobranthus*, *Quadrula*, *Strophitus*, *Truncilla*, *Unio* and *Villosa*. This species has also been reported from two European genera: *Anodonta* and *Unio*. The mites that were measured are from several North American lots including two lots from Mexico from *Cyrttonaias tampicoensis* (Lea) 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). Mitchell (1955) discussed the anatomy and life history of *U. aculeata*. These specimens agree with the measurements of German specimens (Hevers 1978). This species has not been reported from sponges. This species is usually found encysted in mussels during the late Spring and early Summer in the southern United States.

DISCUSSION

Apparently, these mites are widely distributed in North America. Few studies have been conducted to determine their ranges. The difficulties in obtaining and rearing these mites may account for the scant knowledge of their biologies. Diversity among these mites remains poorly understood, with recent revision of *U. crassipes* and new species (Conroy 1984, Cook 1980 and Vidrine 1984).

Although *U. aculeata* shows a distinct preference for mussel hosts, it apparently parasitizes no one specific group (Vidrine 1980). Among the sponge species, the mites that apparently prefer sponges as hosts do not show specificity in the few studies conducted. The presence of water currents seems to be important to the sponge mites, since encysted stages are found in the regions of filter feeding in sponges and mussels.

The occurrence of sponges on the shells of fresh-water mussels (Curry, Everitt and Vidrine 1981) may provide necessary proximity of host groups that would permit the occurrence of transient sponge mites in both sponges and mussels. Larval *Unionicola* have been shown to parasitize chironomid flies (Jones 1965), which are also abundant within cases on the shells of living fresh-water mussels. The intimate occurrences of all three host groups may have provided the conditions necessary for the evolution of para-

sitism of mussels and sponges by ancestral mites with larvae that were parasitic on the flies.

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LITERATURE CITED

- Arndt, W. and K. Viets. 1938. Die Biologischen (Parasitologischen) Beziehungen zwischen Arachnoideen und Spongen. Z. Parasitenkunde 10: 67-93.
- Conroy, J.C. 1979. The taxonomy and ecology of *Unionicola crassipes crassipes* (Mueller), a water mite parasitic on the freshwater sponge, *Spongilla lacustris* (Linne), in Marion Lake, British Columbia. Proc. IV Internat. Congr. Acarol. (1974), Akad. Kiado, Budapest, pp. 135-142.
- Conroy, J.C. 1984. A re-examination of the North American members of the *Unionicola crassipes* complex of water mites (Acari: Unionicolidae). Acarology 6, 2: 951-958.
- Cook, D.R. 1980. Neotropical water mites. Mem. Amer. Ent. Inst. no. 31: 645 pages.
- Crowell, R.M. and C. Davids. 1979. Systematics of *Unionicola laurentiana*, n. sp., and *U. nearctica*, n. sp., sponge-associated Hydracarina (Parasitengona: Unionicolidae) from North America. Ohio J. Sci. 79 (4): 178-186.
- Curry, M.G., B. Everitt and M.F. Vidrine. 1981. Hapto-benthos on shells of living freshwater clams in Louisiana. Wasmann J. Biol. 39 (1-2): 56-62.
- Gliwicz, Z.M. and E. Biesiadka. 1975. Pelagic water mites (Hydracarina) and their effect on the plankton community in a neotropical man-made lake. Arch. Hydrobiol. 76: 65-88.
- Hevers, J. 1977. Revision der in Deutschland vorkommenden Arten der Untergattung *Unionicola* s. str. (Hydrachnellae, Acari). Acarologia 18 (4): 691-703.
- Hevers, J. 1978. Morphologie und Systematik der in Deutschland auftretenden Schwamm- und Muschel-Milben-Arten der Gattung *Unionicola* (Acarina: Hydrachnellae: Unionicolidae). Entomol. Gen. 5 (1): 57-84.
- Jones, R.K.H. 1965. Parasitism by larvae of *Unionicola intermedia* Koenike and another *Unionicola* sp. (Acarina, Pionae), on chironomids. Nature 207: 317-318.
- Koenike, F. 1890. Ein neuer Bivalven-Parasit. Zool. Anz. 13 (330): 138-140.
- Lundblad, O. 1935. An investigation of some Hispan-

- iolan lakes. Uben einige Hydracarininen aus Haiti. Ark. Zool. 28, A, 13: 1-30.
- Mitchell, R. 1955. Anatomy, life history and evolution of the mites parasitizing fresh water mussels. Misc. Publ. Mus. Zool., Univ. Mich., 89: 1-28.
- Old, M. 1933. Contribution to the biology of the freshwater sponges (Spongillidae). Pap. Mich. Acad. Sci. Arts and Lett. 17: 663-679.
- Poirrier, M.A. and I.M. Arceneaux. 1972. Studies of southern Sisyridae (Spongilla-flies) with a key to the third-instar larvae and additional sponge-host records. Am. Midl. Nat. 88: 455-458.
- Vidrine, M.F. 1977. New host records for two water mites (Acarina: Unionicolidae). ASB (Assoc. Southeast. Biol.) Bull. 24 (2): 92 (abstract).
- Vidrine, M.F. 1980. Systematics and coevolution of unionicolid water-mites and their unionid mussel hosts in the eastern United States. Ph.D. dissertation, Univ. Southwestern Louisiana, Lafayette, LA. xvii + 661 pages. Univ. Microfilms Int. No. 8100290.
- Vidrine, M.F. 1984. A new species of mite of the genus *Unionicola* (Acari: Unionicolidae) from the sponge *Trochospongilla leidy* (Bowerbank) in Louisiana. Proc. Louisiana Acad. Sci. 47: 23-26.
- Vidrine, M.F. 1985. *Berezatax*, new subgenus (Acari: Unionicolidae: Unionicolinae: *Unionicola*), in subtropical and tropical North America, with a re-evaluation of the higher taxonomic groups of related American unionicoline mites. Internat. J. Acarol. 11 (2): 133-141.
- Viets, K.O. 1975. Watermites (Hydrachnellae, Acari) from standing water in Guatemala. Stud. Neotrop. Fauna. 10 (1): 57-76.
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