

**FULLERATAX, NEW SUBGENUS (ACARI: UNIONICOLIDAE:
UNIONICOLINAE: UNIONICOLA), IN SOUTHEAST ASIA**

Malcolm F. Vidrine

Jefferson Davis Parish Mosquito Abatement District No. 1, P.O. Box 917, Jennings, Louisiana, USA 70546.

ABSTRACT—*Unionicola (Fulleratax) robacki*, new species, and *U. (F.) davisi*, new species, are described from freshwater mussels (Unionacea) in Thailand. They comprise a new subgenus that resembles the subgenera *Parasitatax* Viets, *Polyatax* Viets, and *Neoatax* Lundblad.

INTRODUCTION

Many adult and nymphal *Unionicola* are parasites of fresh-water mussels (Unionacea and Mutelacea) and snails (Viviparidae and Ampullariidae), while other *Unionicola* are free-swimming and commonly associated with sponges (Spongillidae) (Cook 1974). Larval *Unionicola* of several species are parasitic on chironomid flies (Chironominae) (Hevers 1978). Although the group has a worldwide distribution, few studies have been conducted on southeast Asian members of the group.

Viets (1926) reported two species from Bengal (India) and Burma, and later Viets (1957) described two species from Borneo. Cook (1967) studied Indian *Unionicola*. This paper reports a new subgenus and its two species from Thailand and Laos. The fresh-water mussel hosts (Unionacea) have recently been monographed (Brandt 1974).

MATERIALS AND METHODS

In the winter of 1979, the author examined the extensive mussel holdings in the Academy of Natural Sciences of Philadelphia. The mussels were preserved in alcohol, and the mites were preserved in situ.

Holotypes and allotypes are deposited in the Canadian National Collections and Biosystematics Institute, Ottawa. Additional types are retained in the author's collection.

The following abbreviations are used in this paper: LT—length of body; GF—genital field; CP-I...CP-IV—coxal plates 1 through 4; CPIII-IV—mesial length of combined coxal plates 3 and 4; P-III, P-IV and P-V—palpal segments 3, 4 and 5; I-L-1... I-L-6—segments 1 through 6 of the first walking leg; and IV-L-1...IV-L-6—segments 1 through 6 of the

fourth walking leg. In the text, all measurements of palpal and leg segments are dorsal lengths and are expressed in microns—the mean is given first followed by the range. All bars on figures equal 100 microns.

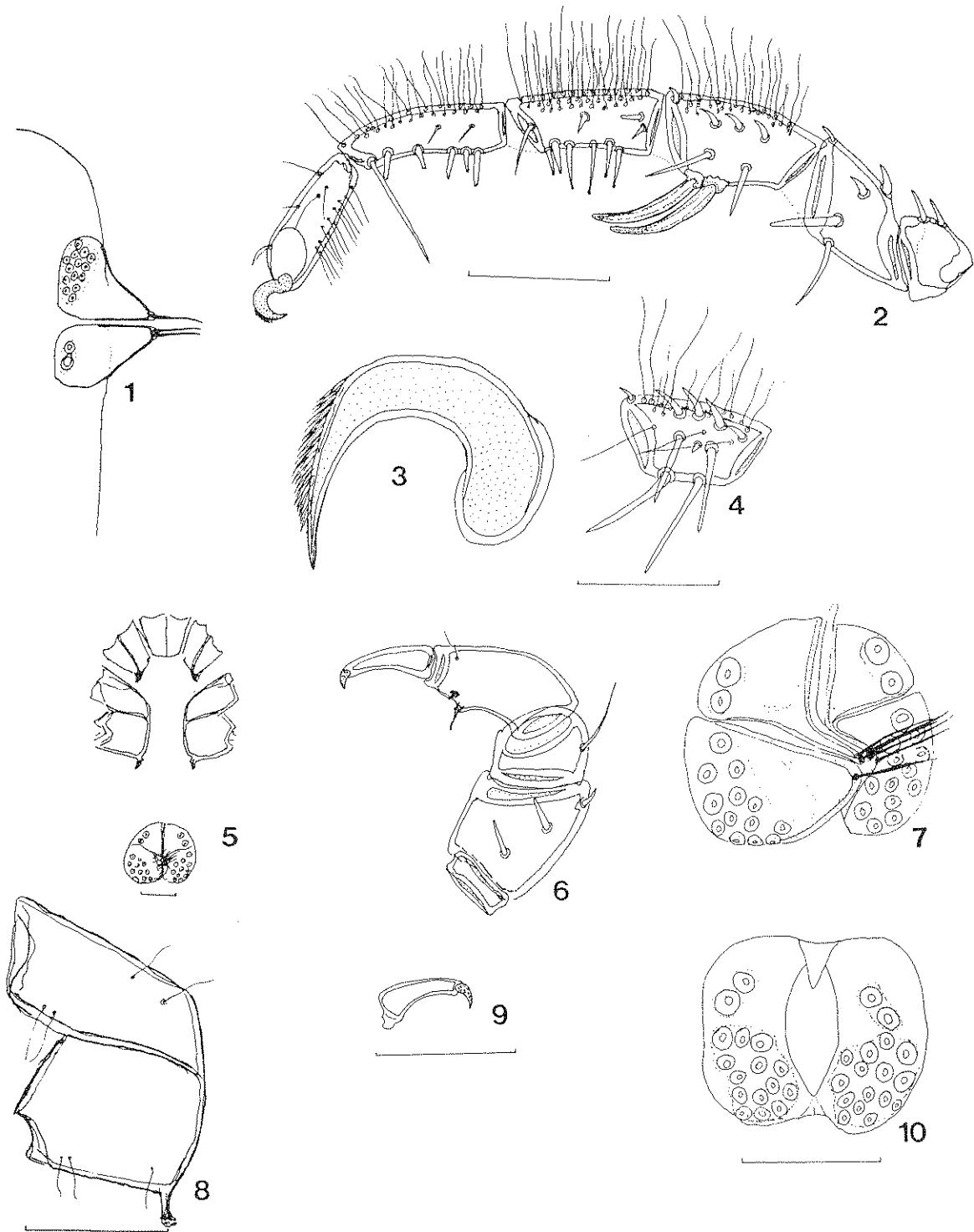
RESULTS

Fulleratax, new subgenus

DIAGNOSIS—Characters of the genus *Unionicola* (see Cook 1974); P-V elongate with a single distal clawlet (figs. 6, 9, 15, 16); all legs with claws that are serrated dorsally (figs. 3, 13); serrate spines of several types on all legs; female GF with 4 plates (2 per side of genital opening), each bearing an inner, thickened flap that extends outward such that all flaps of plates meet at a common area; female GF ventral and anterior of posterior end; anterior female genital plates with two hairlike setae on inner flaps, posterior plates with each a single hairlike seta on the flap; male GF posterior and comprised of two plates that are united both anteriorly by chitinous bands; no apparent dorsal shields; CP-III and CP-IV divided by complete suture; first legs of one species sexually dimorphic; found on gills of fresh-water mussels in Thailand and Laos.

Unionicola (Fulleratax) robacki new species
(Figs. 1-10)

DESCRIPTION—Characters of subgenus; CP-IV pointed posteriorly (fig. 8); anterior female genital plates bearing 2 acetabula each, posterior plates bearing 13-16 acetabula each (figs. 1, 7); male genital plates with two clusters of acetabula, anterior cluster with 2 acetabula, posterior cluster with 13-15 acetabula (fig. 10); first leg of male distinct with I-L-3 bearing 2 large, blunt, ventral setae and I-L-3, 4 and 5 bearing moderately dense, dorsal patches of hair-like setae (fig. 2);



Figs. 1-10. *Unionicola (Fulleratax) robacki* n. sp.: 1. lateral view, female genital field; 2. male first walking leg; 3. claw of walking legs; 4. female segment I-L-3; 5. female venter; 6. lateral view of male palp; 7. female genital field; 8. female CP-III and CP-IV; 9. female P-V, slightly turned; 10. male genital field.

first leg of female no so modified, but possessing 2 large, pointed setae on I-L-3 (fig. 4) and much less dense patches of setae on I-L-3, 4 and 5; other legs similar in both sexes.

MALE (4 specimens)—LT 950 (850-1050); CPIII-IV 274 (265-280); GF 165 (150-190) long, 189 (175-200) wide; P-III 55 (50-60); P-IV 118 (115-120); P-V 72 (70-75); I-L-3 150 (145-160); I-L-4 143 (135-150); I-L-5 148 (145-150); I-L-6 124 (120-125); IV-L-3 179 (175-180); IV-L-4 198 (195-200); IV-L-5 230 (225-240); IV-L-6 180.

FEMALE (3 specimens)—LT 1080 (940-1200); CPIII-IV 265 (240-275); GF 242 (225-250) long, 332 (325-340) wide; P-III 73 (65-80); P-IV 123 (115-130); P-V 80 (75-85); I-L-3 133 (125-145); I-L-4 145 (135-150); I-L-5 143 (130-150); I-L-6 112 (110-115); IV-L-3 173 (170-175); IV-L-4 210 (200-215); IV-L-5 228 (215-240); IV-L-6 167 (160-175).

NOTES—Holotype (male) from ANSP mussel lot A3571 from Lam Khlong, Boribun, Ban Choho, Nakhon Ratchasima, Nakhon Ratchasima Province, Thailand. The mussels, *Hyriopsis bialatus* Simpson, were collected on 15 February 1971 by Dr. Bill Heard. Allotype (female) is from the same lot. As many as 14 mites were found in a single mussel. *Hyriopsis* from Thailand and Laos were infested.

ADDITIONAL MATERIAL—*H. bialatus* from (1) (ANSP mussel lot A3615) type locality, 31 January 1971 (Bill Heard); (2) (ANSP mussel lot A3647) Lam Nam Mun, Amphoe Phimai, Nakhon Ratchasima Province, Thailand, 11 July 1971 (Bill Heard); (3) (ANSP mussel lot 5058) Ban Dan, Mekong River, Isles off mouth of Mun River, Ubon Province, Thailand, 14 March 1972 (G. Davis); (4) (ANSP mussel lot 5085) Khong town, Ban Nuah near sports club, Khong Island, Laos, 23 March 1972 (G. Davis); (5) (ANSP mussel lot 5329) Ban Dan, Mekong River, Ubon Province, Thailand (site #5), 19 April 1973 (G. Davis); (6) (ANSP Mussel lot A5428) Ban Dan, Mekong River, island site #4, Ubon Province, 19 April 1973 (G. Davis); *H. myersiana* (Lea) from (1) (ANSP mussel lot A4431) Ban Dan, Mekong River, Ubon Province, Thailand, 18 April 1973 (G. Davis); (2) (ANSP mussel lot A4430) Mun River, Phibun Mangsahan, Ubon Ratchathani Province, Thailand, 17 April 1973 (G. Davis); (3) (ANSP mussel lot A3656) Mae Nam Khwae Yai, Ban Nong Bua, Kanchanaburi, Kanchanaburi Province, Thailand, 10 April 1971 (Bill Heard); *Pilsbryoconcha exilis compressa* (Martens) from (ANSP Mussel lot A3590) Lam Seio Yai, Amphoe Suwannaphum, Roi Et Province, Thailand, 8 July 1971 (Bill Heard) (a single mite which is probably incidental in this host).

Unionicola (Fulleratax) davisi new species
(Figs. 11-19)

DESCRIPTION—Characters of the subgenus; CP-IV rounded posteriorly (fig. 12); first legs of both sexes similar, with many short, clubbed spines that are serrate at the tips (fig. 11); first legs also lacking dense patches of spines dorsally; anterior female genital plates with 2-4 (usually 2) acetabula, posterior plates with 13-20 acetabula each (figs. 17, 18); male genital plates with two clusters of acetabula, anterior cluster with 2 acetabula, posterior cluster with 13-16 acetabula (fig. 19); legs of both sexes similar.

MALE (2 specimens)—LT 1025 (1000-1050); CPIII-IV 255 (250-260); GF 210 (200-220) long, 235 (220-250) wide; P-IV 110; P-V 70; I-L-3 150; I-L-4 200; I-L-5 195 (190-200); I-L-6 155 (150-160); IV-L-3 173 (170-175); IV-L-4 220 (210-230); IV-L-5 270 (265-275); IV-L-6 205 (200-210).

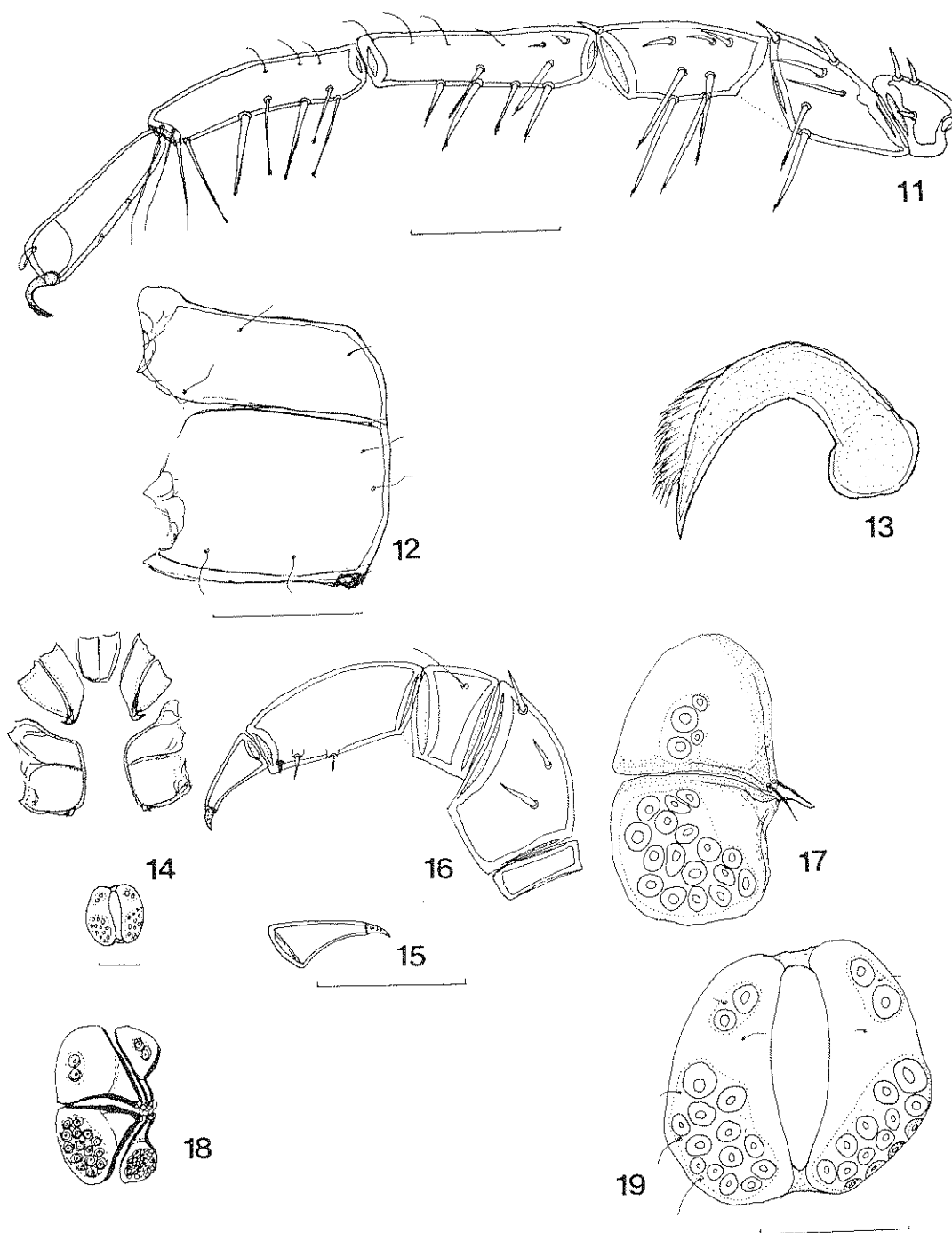
FEMALE (3 specimens)—LT 1125 (1100-1150); CPIII-IV 241 (225-250); GF 232 (220-250) long, 238 (225-250) wide; P-III 70; P-IV 125 (120-130); P-V 68 (65-70); I-L-3 147 (130-160); I-L-4 185 (175-200); I-L-5 163 (150-175); I-L-6 142 (130-150); IV-L-3 192 (180-210); IV-L-4 258 (250-275); IV-L-5 263 (250-275); IV-L-6 200 (190-210).

NOTES—Holotype (male) from ANSP mussel lot A3635 from Huai Phen, Amphoe Phen, Udon Thani Province, Thailand. The mussels, *P. e. compressa*, were collected 24 March 1971 by Dr. Bill Heard. Allotype (female) is from the same lot. Only 6 specimens were available for study. The type lot contained 3 specimens. All specimens were from Thailand and occurred in the same species of host.

ADDITIONAL MATERIAL —*P. e. compressa* from (1) (ANSP mussel lot A3581) Lam Se Bai, Amphoe Amnat Charoen, Ubon Ratchathani Province, Thailand, 29 April 1971 (Bill Heard); (2) (ANSP mussel lot 3580) Huai Chuang Lang, Ban Nong Sai, Udon Thani, Udon Thani Province, Thailand, 24 March 1971 (Bill Heard).

DISCUSSION

Mitchell (1965) considered the site of oviposition in the host (hence the structure of the female genital field) to be an important species criterion for *Unionicola*. In several cases subgenera are based upon female genital field structure (Cook 1974). Revisions of the Unionicolinae have not employed single character states for decisions regarding higher taxa. I suggest that the female genital structure should be used as a



Figs. 11-19. *Unionicola (Fulleratax) davisi* n. sp.: 11. male first walking leg; 12. male CP-III and CP-IV; 13. claw of walking legs; 14. male venter; 15. female P-V; 16. male palp; 17. half of female genital field; 18. angled (near lateral) view of female genital field; 19. male genital field.

primary subgeneric criterion, with palpal and leg morphology as secondary criteria.

Fulleratax contains species with female genital fields that are distinct from any other known *Unionicola*. The males, on the other hand, have genital fields that are similar to the subgenera *Parasitatax* Viets and *Polyatax* Viets and *Neoatax* Lundblad. These three subgenera are distinguished by the structure of the female genital field. *Fulleratax* appears restricted to southeast Asia, whereas the other three subgenera are not.

Parasitatax, an apparently monophyletic group, occurs in southeast Asia, Asia, Europe and North America. *Polyatax* contains three subgroups of species. The species from South and Central America occur in snails and are apparently unique with distinctive palpal structure. The Asian *Polyatax* occur in mussels and snails and resemble the North American group. The North American *Polyatax* are closely related to the endemic North American subgenus *Neoatax* Lundblad (Vidrine 1981 and 1983). *Polyatax* and *Neoatax* include many mussel and snail parasites in North America.

Fulleratax appears to form a monophyletic group with *Parasitatax*, *Polyatax* and *Neoatax*. In many features, *Fulleratax* is intermediate between the other subgenera, yet it is unique.

ACKNOWLEDGMENTS

My knowledge of *Unionicola* has grown immensely with the gracious assistance of Daniel J. Bereza. Much of the work was done while the author studied at the Academy of Natural Sciences of Philadelphia under a Jessup Fellowship. Samuel L. H. Fuller,

Selwyn S. Roback and George M. Davis were extremely helpful in this pursuit. I also acknowledge Colin Fake and the Sowela Technological Institute in Lake Charles, Louisiana, for their assistance in plate preparation.

LITERATURE CITED

- Brandt, R. 1974. The non-marine aquatic Mollusca of Thailand. Arch. Moll. 105 (I-IV): 1-423.
- Cook, D. 1967. Water mites from India. Mem. Am. Entomol. Inst. (Ann Arbor), no. 9: 1-411.
- Cook, D. 1974. Water mite genera and subgenera. Mem. Am. Entomol. Inst. (Ann Arbor), no. 21: 1-860.
- Hevers, J. 1978. Interspezifische Beziehungen zwischen *Unionicola*-larven (Hydrachnellae, Acari) und Chironomidae (Diptera, Insecta). Verhandl. der Ges. f. Okologie, Kiel, 1977, pp. 211-217.
- Mitchell, R. 1965. Population regulation of a water mite parasitic of unionid mussels. J. Parasit. 51 (6): 990-996.
- Vidrine, M. 1981. A comparison of the acarine subgenera *Neoatax* and *Polyatax* (Unionicolidae: Unionicolinae: *Unionicola*). ASB (Assoc. Southeast. Biol.) Bull. 28 (2): 79 (abstract).
- Vidrine, M. 1983. Verification of oviposition sites of two water-mites in the subgenus *Polyatax* (Acari: Unionicolidae: *Unionicola*). ASB (Assoc. Southeast. Biol.) Bull. 30 (2): 89 (abstract).
- Viets, K. 1926. Indische Wassermilben. Zool. Jb., Syst. 52: 371-394.
- Viets, K. 1957. Neue Wassermilben (Hydrachnellae, Acari) von Borneo, Indonesia. Abh. naturwiss. Ver. Bremen 35 (1): 8-23.

5
.
.

5
.
.