

Comparison of the Male and Female Genitalia of *Mecidea major* and *M. minor* (Hemiptera: Pentatomidae: Pentatominae: Mecideini)¹

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Abstract The male genitalia, including the pygophore, parameres, and inflated aedeagus, and the female terminalia, are compared between *Mecidea major* Sailer and *M. minor* Ruckes (Hemiptera: Pentatomidae). These structures are markedly different between these species, particularly the inflated aedeagus. In *M. major*, the penial lobes of the aedeagus diverge in the basal 1/3, converge distally, with each lobe subquadrangle apically. In *M. minor*, the penial lobes diverge midway to the apex, weakly converge distally, with each lobe rounded apically. We suggest the same 3 structures should be examined in the remaining 15 species of *Mecidea* to determine if the taxonomic status of each of these species is supported by the results.

Key Words *Mecidea major*, *Mecidea minor*, Pentatomidae, genitalia

The stink bug genus *Mecidea* Dallas, a phytophagous genus apparently associated with xerophytic and semixerophytic environments, occurs within the subtropical and adjacent temperate regions of the world (Sailer 1952) and is the only member of the Mecideini (Schuh and Slater 1995). It contains at least 17 species (Sailer 1952, Schuh and Slater 1995) but is represented in America north of Mexico by only 2, *M. major* Sailer and *M. minor* Ruckes (Sailer 1952, Froeschner 1988).

Mecidea major and *M. minor*, collectively, range within America north of Mexico from the midwestern states to California (Froeschner 1988). Specifically, *M. major* ranges from southern Illinois (McPherson and Vogt 1981) and Missouri southwest to Arizona, Texas (Froeschner 1988, Sailer 1952), and New Mexico (Bundy 2004), whereas *M. minor* ranges from South Dakota and Iowa south and west to Texas and California (Froeschner 1988, Sailer 1952). Both species have been reported from Mexico (Thomas 2000).

Dallas (1851) established the genus *Mecidea* and included 2 new species, *indica* and *linearis*. Stål (1854) described *M. longula* from St. Barthélemy (French West Indies), which was the only species listed from America north of Mexico from the latter part of the 19th Century (i.e., Uhler 1876) to about the middle of the 20th Century (i.e., Ruckes 1946). Ruckes (1946) described a second species, *M. minor*, from New Mexico, which he contrasted with *M. longula*, using both written descriptions and illustrations.

Sailer (1952) authored a revision of the genus and reported that although *M. longula* was a valid species, it had a limited distribution and did not occur in America north of

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Mexico. Therefore, he redescribed the species, heretofore called *M. longula*, and named it *M. major*.

Ruckes (1946) and Sailer (1952) concentrated on external features in their descriptions of *M. minor* and *M. major*, respectively. They provided only brief descriptions of the male and female genitalia with simple illustrations (Ruckes, male and female; Sailer, male) of *M. major* and *M. minor*. McDonald (1966) subsequently provided more substantial descriptions and illustrations of the male and female genitalia of *M. major* (as *M. longula*). However, the above descriptions by these 3 authors are not as informative as they might be.

During an on-going study of the Heteroptera in America north of Mexico, we examined the male and female genitalia of *M. major* and *M. minor*. Presented here are the results of our study.

Materials and Methods

Pinned specimens were relaxed and the aedeagi removed and inflated roughly following Ahmad (1986) and Ahmad and McPherson (1990). However, with these males, the pygophores and aedeagi were so lightly sclerotized that boiling in 10% KOH for only 30 sec, washing in tap water, grasping the anterior end of the pygophore with the forceps, and applying gradual pressure with a second pair of forceps just posterior to the first pair was enough to pop the aedeagus out, often with full inflation occurring almost immediately. Drawings were made with the aid of an ocular grid and graph paper, modified freehand, scanned into a computer, and finalized.

Terminology for the inflated aedeagus and paramere follows that of Ahmad and McPherson (1990), and the pygophore generally follows that of Schaefer (1981). The length medially and width at the widest point (usually at lateral lobes) of the pygophore were measured along the dorsal (anterior) surface.

Label information for specimens used in this study is given below. Additional data, including sex (M, F), are given in parentheses. All specimens are deposited in the Southern Illinois University Insect Collection.

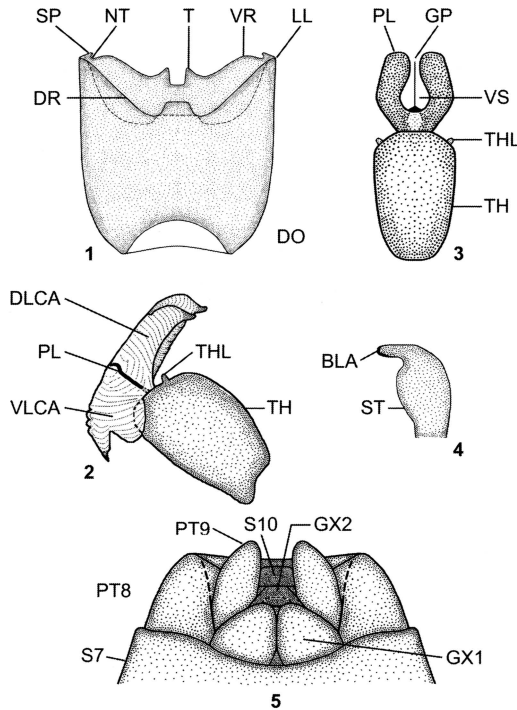
***Mecidea major* Sailer.** New Mexico, Hildago Co., Gray Ranch, grama grass, 9 May 2003 (1 M, 1 F), C. S. Bundy, Coll.; Dona Ana Co., Coralitos, tobosagrass, 17 May 2004 (1 M), S. O'Donnell, Coll.; Dona Ana Co., Las Cruces, lovegrass, 2 June 2003 (1 F), 6 August 2003 (1 M), 13 October 2006 (1 F), C. S. Bundy, Coll.

***Mecidea minor* Ruckes.** New Mexico, Dona Ana Co., Las Cruces, lovegrass, 13 October 2006 (1 M), 25 October 2007 (2 MM, 3 FF), C. S. Bundy, Coll.

Results and Discussion

***Mecidea major*.**

Male. Pygophore subquadrate, approx. 1.7X as wide as long, outer margins weakly converging laterally, converging in basal 1/3 (Fig. 1); dorsal rim convex medially, substraight laterally; lateral lobes produced, conical; ventral rim deeply notched medially, delimited either side by tooth, sinuate laterally, with distinct notch and acute spine distally; posteroventral surface without small medial tubercle submarginally. Aedeagus with dorsoanterior pair of small thecal lobes (Fig. 2); penial lobes generally heavily sclerotized, fused basally but lightly sclerotized medially, diverging in basal 1/3, converging distally, each lobe subquadrate apically, thickened with inner wall lightly sclerotized (Fig. 3); vesica filamentous (Fig. 3); one membranous pair of bilobed



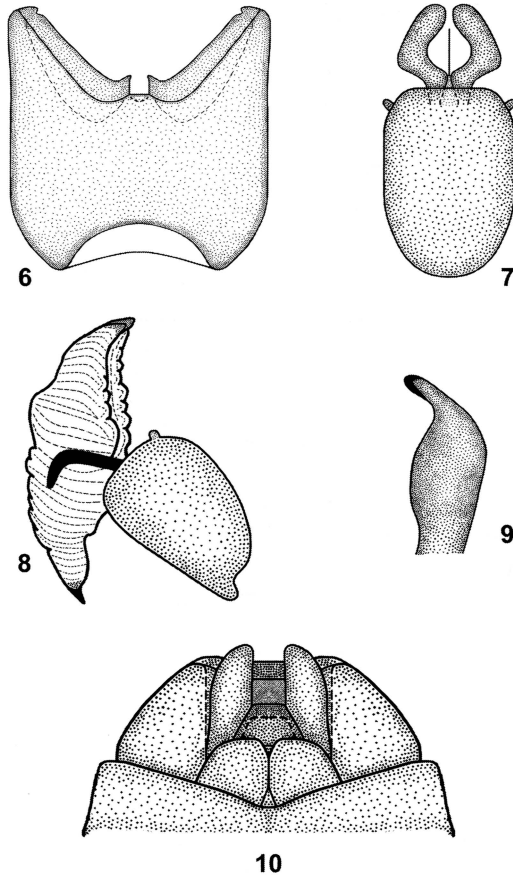
Figs. 1-5. Genitalia of *Mecidea major*. 1. Pygophore, dorsal (anterior) view. 2. Aedeagus, lateral view. 3. Aedeagus, ventral view (conjunctival appendages removed). 4. Paramere. 5. Female genitalia, ventral (posterior) view. BLA, blade; DLCA, dorsal lobe, conjunctival appendage; DO, dorsal opening; DR, dorsal rim; GP, gonopore; GX1, gonocoxa 1; GX2, gonocoxa 2; LL, lateral lobe; NT, notch; PL, penial lobe; PT8, paratergite 8; PT9, paratergite 9; S7, sternum 7; S10, sternum 10; SP, spine; ST, stem; T, tooth; TH, theca; THL, thecal lobe; VLCA, ventral lobe, conjunctival appendage; VR, ventral rim; VS, vesica.

conjunctival appendages, dorsal lobe longest, tip acute, weakly sclerotized, ventral lobe with tip depressed, margin of tip more sclerotized than tip of dorsal lobe (Fig. 2). Paramere L-shaped (Fig. 4); blade at nearly right angle to stem, outer margin angulate, inner margin deeply concave, apex thumblike; stem with outer margin convex, inner margin sinuate.

Female. Seventh abdominal sternite with posterior margin concave medially, sinuate sublaterally (Fig. 5). First gonocoxae subtriangular. Eighth paratergites with outer margins weakly convex, weakly converging distally.

***Mecidea minor*.**

Male. Pygophore subquadrate, approx. 2X as wide as long, outer margins almost parallel-sided laterally, converging in basal 1/3 (Fig. 6); dorsal rim convex medially, concave submedially, substraight laterally; lateral lobes produced, acute; ventral rim deeply concave medially, delimited either side by tooth, substraight laterally, with distinct notch and conical tooth distally; posteroventral surface with small medial tubercle



Figs. 6-10. Genitalia of *Mecidea minor*. 6. Pygophore, dorsal (anterior) view. 7. Aedeagus, lateral view. 8. Aedeagus, ventral view (conjunctival appendages removed). 9. Paramere. 10. Female genitalia, ventral (posterior) view.

submarginally. Aedeagus with dorsoanterior pair of small thecal lobes (Fig. 7); penial lobes generally heavily sclerotized, fused basally but lightly sclerotized medially, diverging midway toward apex, converging distally, each lobe rounded apically, not thickened (Fig. 8); vesica filamentous (Fig. 8); one membranous pair of bilobed conjunctival appendages, dorsal lobe approximately same length as ventral lobe, tip acute, weakly sclerotized, ventral lobe with tip depressed, margin of tip more sclerotized than tip of dorsal lobe (Fig. 7). Paramere somewhat J-shaped (Fig. 9); blade at obtuse angle to stem, outer margin substraight, inner margin concave, apex thumb-like; stem with outer margin convex, inner margin sinuate.

Female. Seventh abdominal sternite with posterior margin concave medially, substraight laterally (Fig. 10). First gonocoxae subrectangular. Eighth paratergites with outer margins generally straight, strongly converging distally.

Summary. The results of this study show that the male and female genitalia can be used to support identification of *M. major* and *M. minor* (Table 1). The genitalia in

Table 1. Comparison of male and female genitalia of *Mecidea major* and *M. minor*

	<i>M. major</i>	<i>M. minor</i>
Male		
Pygophore	outer margins weakly converging laterally, posteroventral surface without medial tubercle submarginally	outer margins almost parallel-sided laterally converging at base, posteroventral surface with medial tubercle submarginally
Dorsal rim	convex medially, substraight laterally	convex medially, concave submedially, substraight laterally
Lateral lobes	produced, conical	produced, acute
Ventral rim	deeply notched medially, sinuate laterally, with distinct notch and acute spine distally	deeply concave medially, weakly sinuate laterally, with distinct notch and conical tooth distally
Aedeagus Vesica	filamentous	filamentous
Penial lobes	fused basally, diverging in basal 1/3, converging distally, each lobe subquadrate apically	fused basally, diverging midway toward apex, weakly converging distally, each lobe rounded apically
Conjunctival lappendages	one pair, membranous, bilobed; dorsal lobe largest with tip acute, weakly sclerotized; ventral lobe depressed, margin of tip more sclerotized than tip of dorsal lobe	one pair, membranous, bilobed; dorsal lobe ca. same length as ventral lobe with tip acute, weakly sclerotized; ventral lobe with tip depressed, margin of tip more sclerotized than tip of dorsal lobe
Paramere	L-shaped, blade at nearly right angle to stem	somewhat J-shaped, blade at obtuse angle to stem
Female		
Seventh abdominal sternite	posterior margin concave medially, sinuate sublaterally	posterior margin concave medially, substraight laterally
First gonocoxae	subtriangular	subrectangular
Eighth paratergites	outer margins weakly convex, weakly converging distally	outer margins generally straight, strongly converging distally

the remaining species should be examined to determine if the present taxonomic status of each species is warranted. Finally, the males possess a filamentous vesica that may be unique, not only within the tribe but also within the family.

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References Cited

- Ahmad, I. 1986.** A fool-proof technique for inflation of male genitalia in Hemiptera (Insecta). Pak. J. Entomol. Karachi 1: 111-112.
- Ahmad, I. and J. E. McPherson. 1990.** Male genitalia of the type species of *Corimelaena* White, *Galgupha* Amyot and Serville, and *Cydnoides* Malloch (Hemiptera: Cydnidae: Corimelaeninae) and their bearing on classification. Ann. Entomol. Soc. Am. 83: 162-170.
- Bundy, C. S. 2004.** The genus *Mecidea* (Heteroptera: Pentatomidae) in New Mexico. Southwest. Entomologist 29: 305-307.
- Dallas, W. S. 1851-1852.** List of the specimens of hemipterous insects in the collection of the British Museum. Taylor & Francis, London. Part I: 1-368, Plates I-XI.
- Froeschner, R. C. 1988.** Family Pentatomidae Leach, 1815. The stink bugs, pp. 544-597. In T. J. Henry and R. C. Froeschner (eds.), Catalog of the Heteroptera, or true bugs, of Canada and the continental United States. E. J. Brill, New York. 958 pp.
- McDonald, F. J. D. 1966.** The genitalia of North American Pentatomoidea (Hemiptera: Heteroptera). Quaest. Entomol. 2: 7-150.
- McPherson, J. E. and T. E. Vogt. 1981.** The first report of the occurrence of *Mecidea major* (Hemiptera: Pentatomidae) in Illinois. Great Lakes Entomol. 14: 70.
- Ruckes, H. 1946.** *Mecidea minor*, a new species of pentatomid from New Mexico. Bull. Brooklyn Entomol. Soc. 41: 86-88.
- Sailer, R. I. 1952.** A review of the stink bugs of the genus *Mecidea*. Proc. U. S. Nat. Mus. 102: 471-505.
- Schaefer, C. W. 1981.** Genital capsules, trichobothria, and host plants of the Podopinae (Pentatomidae). Ann. Entomol. Soc. Am. 74: 590-601.
- Schuh, R. T. and J. A. Slater. 1995.** True bugs of the world (Hemiptera: Heteroptera). Classification and natural history. Cornell Univ. Press, Ithaca, NY. 336 pp.
- Stål, C. 1854.** Nya Hemiptera. Öfversigt af Kongliga Vetenskaps-Akademiens Förhandlingar 11 (8): 231-255.
- Thomas, D. B. 2000.** Pentatomidae (Hemiptera), Pp. 335-352. In J. E. L. Bousquets, E. G. Soriano, and N. Papavero (eds.), Biodiversidad, taxonomía y biogeografía de artrópodos de México; hacia una síntesis de su conocimiento, vol. II. Universidad Nacional Autónoma de México, Instituto de Biología, México. 676 pp.
- Uhler, P. R. 1876.** List of Hemiptera of the region west of the Mississippi River, including those collected during the Hayden Explorations of 1873. Bull. U. S. Geol. Geogr. Surv. Territories 2: 269-361.

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