The Great Lakes Entomologist

Volume 45
Numbers 3 & 4 - Fall/Winter 2012 *Numbers 3 & 4 - Fall/Winter 2012*
Article 12

October 2012

An Updated Synopsis of the Pentatomoidea (Heteroptera) of Michigan.

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Abstract

An overview of the 75 species of Pentatomoidea found in Michigan is presented, along with updated identification keys, distributional lists, and relevant literature. New state records for *Corimelaena agrella* McAtee (Thyreocoridae), *Melanaethus robustus* Uhler (Cydnidae), *Pangaeus bilineatus* (Say) (Cydnidae), and *Banasa sordida* (Uhler) (Pentatomidae: Pentatominae) are included.

The knowledge of the Pentatomoidea in Michigan is probably the greatest for any group of terrestrial Heteroptera in the state. O'Brien (1983, 1988) listed the relevant sources of information for the terrestrial arthropods of Michigan. Townsend (1980) and Hussey (1921, 1922a) contributed to the beginnings of the knowledge of the Pentatomoidea of Michigan, cataloging the Heteroptera found in the vicinity of Constantine, Saint Joseph County and Berrien County, respectively. Stoner (1922) also treated the species encountered around a biological station in the northernmost Lower Peninsula (Cheboygan County). McPherson (1970, 1979b) greatly augmented the knowledge and the known diversity of the Michigan fauna. In addition to these state-focused studies, the majority of Michigan's taxa are known from the surrounding area, and many extra-Michiganian references have supplied applicable information.

As a tribute to Dr. J. E. McPherson on his 70th birthday and retirement, for his great and numerous contributions to the field of pentatomology, I am pleased to present herein an update of his landmark study of the Pentatomoidea of Michigan.

Materials and Methods

The author examined the pentatomoid holdings of the two major university collections in southern Michigan. County records were compiled, identification keys were modified, and the existing natural history and systematic information, both Michiganian and some extralimital, was summarized.

The identification of the 8450 specimens included in this study was rendered or confirmed by the author, although the vast majority of specimens already had been studied by McPherson (1970, 1979b). All specimens reside in one of the collections listed below unless otherwise noted. Collection dates indicate the earliest and latest adults examined and refer specifically to specimens collected in Michigan. In the few instances where it is provided, label data are not transcribed verbatim but the locality information is included in its entirety. I have eschewed the use of individual species distribution maps in this synopsis owing to the lack of significant change from the maps provided by McPherson (1970) as well as the large number of species included in this treatment; therefore, the distributions are provided at the end of each species account as a list of counties. Locations of Michigan counties from which specimens were collected are depicted in Figure 1.

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Figure 1. The counties of the State of Michigan.

As this study is an update of the extensive work done by McPherson (1970, 1979b), I have endeavored mostly to expand and supplement that work. Since that time, one species (*Halyomorpha halys* (Stål)), in addition to the four reported here, have been added to the Michigan fauna. Two hundred seventy four county records have been added. Additionally, much of the taxonomy has changed in the past forty years; thus, references to more contemporary systematic treatments are provided, and 14 nomenclatural changes affecting 15 species and 1 family-group have been incorporated (noted within the relevant section). The number of additions and changes necessitated that new dichotomous keys to the Michigan fauna be synthesized.

Regarding host data, Stoner (1922) and McPherson (1970, 1979b) provided a list of host plants, often from extra-Michigan sources. However, I have not reproduced those lists of plants provided by Stoner, McPherson, and other authors but essentially limited this treatment to those data from Michigan-collected specimens.

Collections are designated as follows: Daniel R. Swanson, personal collection (DRS); Albert J. Cook Arthropod Research Collection, Michigan State University, East Lansing, Michigan (MSUC); and University of Michigan Museum of Zoology Insect Collection, Ann Arbor, Michigan (UMMZ).

Results and Discussion

Superfamily PENTATOMOIDEA

The Pentatomoidea are a superfamily of true bugs comprising 352 species in 103 genera in 7 families in the United States. Treated as the Scutelleroidea in the past, they are informally recognized by the usually 5-segmented antennae and enlarged scutellum, which completely covers the body in some groups; these features, combined with an ovoid or elliptical shape, make members of this group generally easy to recognize. The paired trichobothria (single in the Podopinae) of the abdominal sternites also is an important distinguishing character (Henry 1997). Most are uni- or bivoltine, overwinter as adults, and lay eggs in the spring (McPherson 1982). Additionally, many species are well-known and frequently encountered, as pests of gardens and commercial crops, singly or in large aggregations around lights at night (i.e., McPherson and Sites 1989), or as conspicuous overwintering guests in human domiciles. Most are phytophagous, often feeding on a wide range of plants, although the members of one subfamily (Pentatomidae: Asopinae) are predaceous. The group contains many economically important taxa; references relating to particular groups or species are mentioned under their respective headings. The acoustic behavior viz. stridulation of members of this group was summarized by Schaefer (1980). The genitalia often provide the only dependable character for unequivocally identifying species, and those of selected species were described by McDonald (1966) and Davidová-Vilímová and McPherson (1991); these also are mentioned under the species accounts, where applicable.

Six chapters by Froeschner (1988a, 1988b, 1988c, 1988d, 1988e, 1988f) compose the most current catalog for the taxa found in America north of Mexico. Blatchley (1926) and Torre-Bueno (1939) presented keys to the species of the eastern and continental United States, respectively, but out-dated and erroneous data diminish their utility. Rolston and McDonald (1979) and Schuh and Slater (1995) discussed the relationships of and provided keys for the world families of the Pentatomoidea, and Grazia et al. (2008) provided a cladistic analysis for the superfamily. Many of the species found in Michigan are treated by Hoffman (1971); yet, McPherson's (1982) seminal treatment of the Northeastern Pentatomoidea remains one of the most complete and informative.

Five of the seven subfamilies found in the Nearctic region are represented in Michigan; the Plataspidae and Tessaratomidae, each represented by a single species, have a more southerly distribution. Seventy-five species in 43 genera are found in the state (Table 1).

The key presented below is synthesized primarily from works by McPherson (1970, 1982), Rolston and McDonald (1979), and Schuh and Slater (1995). The difficulty created in the key by the distribution of the greatly enlarged scutellum within the group is worth noting, and other characters might provide a "cleaner" criterion for identification. The natural relationships, however, become even more greatly obscured in several other iterations; thus, I have opted for the form presented below.

Table 1. List of the Michigan Pentatomoidea.

Scutelleridae
Acantholomidea denticulata (Stål), 1870
Eurygaster alternata (Say), 1828
Homaemus aeneifrons (Say), 1824
Phimodera binotata (Say), 1824
Tetyra bipunctata (Herrich-Schaeffer), 1839

Thyreocoridae
Corimelaena agrella McAtee, 1919
Corimelaena lateralis lateralis (Fabricius), 1803
Corimelaena nigra Dallas, 1851
Corimelaena obscura McPherson and Sailer, 1978
Corimelaena pulicaria (Germar), 1839
Cydnoides ciliatus orientis McAtee and Malloch, 1933
Galgupha aterrima Malloch, 1919
Galgupha atra Amyot and Serville, 1843
Galgupha carinata McAtee and Malloch, 1933
Galgupha loboprostethia Sailer, 1940
Galgupha nitiduloides nitiduloides (Wolff), 1802
Galgupha ovalis Hussey, 1925

Cydnidae
Amnestus pallidus Zimmer, 1910
Amnestus pusillus Uhler, 1876
Amnestus spinifrons (Say), 1825
Melanaethus robustus Uhler, 1877
Pangaeus bilineatus (Say), 1825
Sehirus cinctus albomaculatus Dallas, 1851
Sehirus cinctus cinctus (Palisot de Beauvois), 1811

Acanthosomatidae
Elasmostethus atricornis (Van Duzee), 1904
Elasmostethus cruciatus (Say), 1831
Elasmucha lateralis (Say), 1831

Pentatomidae: Asopinae
Apoecilus bracteatus (Fitch), 1856
Apoecilus cynicus (Say), 1832
Perillus bioculatus (Fabricius), 1775
Perillus circumcinctus (Stål), 1862
Perillus exaptus (Say), 1825
Podisus brevispinus Phillips, 1982
Podisus maculiventris (Say), 1832
Podisus neglectus (Westwood), 1837
Podisus placidus Uhler, 1870
Podisus serieventris Uhler, 1871
Rhacognathus americanus (Stål), 1870
Stiretrus anchorago (Fabricius), 1775
Zicrona caerulea (Linnaeus), 1758

Pentatomidae: Pentatominae
Aelia americana Dallas, 1851
Banasa calva (Say), 1832
Banasa dimidiata (Say), 1832
Banasa sordida (Uhler), 1871
Brochymena quadripustulata (Fabricius), 1775
Chinavia hilaris (Say), 1832
Chinavia pensylvanica (Gmelin), 1790
Chlorochroa persimilis Horvath, 1908
Coenus delius (Say), 1832
Cosmopepla lintneriana Kirkaldy, 1909
Dendrocoris humeralis (Uhler), 1877
Euschistus ictericus (Linnaeus), 1763
Euschistus politus Uhler, 1897
Euschistus servus euschistoides (Vollenhoven), 1868
Euschistus servus servus (Say), 1832
Euschistus tristigmus luridus Dallas, 1851
Euschistus tristigmus tristigmus (Say), 1832
Euschistus variolarius (Palisot de Beauvois), 1817
Halyomorpha halys (Stål), 1855
Holcostethus fulvipes (Ruckes), 1957
Holcostethus limbolarius (Stål), 1872
Holcostethus mcdonaldi Rider and Rolston, 1995
Hymenarcys nervosa (Say), 1832
Mcphersonarcys aequalis (Say), 1832
Menecles insertus (Say), 1832
Mormidea lugens (Fabricius), 1775
Neottiglossa trilineata (Kirby), 1837
Neottiglossa undata (Say), 1832
Oebalus pugnax (Fabricius), 1775
Parabrochymena arborea (Say), 1825
Prionosoma podopioides Uhler, 1863
Sciocoris microphthalmus Flor, 1860
Thyanta calceata (Say), 1832
Thyanta custator accerra McAtee, 1919
Trichopepla atricornis (Stål), 1872
Trichopepla semivittata (Say), 1832

Pentatomidae: Podopinae
Amaurochrous brevitylus Barber and Sailer, 1953
Amaurochrous cinctipes (Say), 1828

Key to the North American families of Pentatomoidea

1	Tibiae armed with numerous strong spines; [tarsi 3-segmented] 2
1'	Tibiae not armed with numerous strong spines 3
2 (1)	Scutellum greatly enlarged, U-shaped, covering most of hemelytra and abdomen .....Thyreocoridae
2'	Scutellum not greatly enlarged, more or less triangular, leaving hemelytra and abdomen broadly exposed .....Cydnidae
3 (1')	Scutellum greatly enlarged, U-shaped, covering most of hemelytra and abdomen 4
3'	Scutellum not greatly enlarged, more or less triangular (except *Stiretrus* (Pentatomidae: Asopinae), then with bright contrasting colors), leaving hemelytra and abdomen broadly exposed (except Podopinae (Pentatomidae), then with prominent humeral projection) 5
4 (3)	Hemelytra much longer than abdomen, bent between corium and membrane and folded below scutellum in repose; abdominal sterna with straight, transverse sulcus on each side; tarsi 2-segmented [not present in Michigan] .....Plataspidae
4'	Hemelytra, at most, only slightly longer than abdomen, not bent at junction of corium and membrane; abdominal sterna lacking transverse sulci; tarsi 3-segmented.....Scutelleridae
5 (3')	Pronotum extending over base of scutellum; spiracles of second abdominal sternite exposed, not hidden by the metapleura, a short but evident distance from posterior margin; [tarsi 3-segmented] [not present in Michigan] .....Tessaratomidae
5'	Pronotum ending at base of scutellum; spiracle of second abdominal sternite concealed by metapleura, rarely exposed just at the posterior margin of metasternum.....6
6 (5')	Tarsi 2-segmented; thoracic and abdominal sterna with distinct mid-longitudinal carina .....Acanthosomatidae
6'	Tarsi 3-segmented; thoracic and abdominal sterna without distinct longitudinal carina .....Pentatomidae

Family SCUTELLERIDAE Leach, 1815

Commonly known as shield bugs, the Scutelleridae are recognized by the greatly enlarged, rounded scutellum, which covers most of the abdomen (although this feature is present in a few other groups, most noticeably the Thyreocoridae). Its members are marked by great variation in color and color pattern such that these characters rarely can be used in species recognition. The group has been accorded variously familial or subfamilial rank under the Pentatomidae, although contemporary treatments almost unanimously assign the higher status. Javahery et al. (2000) discussed the economic importance of this group, and some Old World members of the group may cause severe agricultural damage in large numbers.

Lattin (1964) provided the most recent comprehensive treatment of the U.S. species; unfortunately, as an unpublished dissertation, its taxonomic acts are not recognized as valid. I have chosen to include information that relates to the Michigan taxa, although the aforementioned admonition should be heeded. Lattin's (1964) county records are included, where ascertainable by the author, without reservation, as repositories or ownership were included with the specimen data; these few instances are noted under the appropriate entry.

In the United States, the Scutelleridae comprise 37 species in 16 genera (Froeschner 1988d). Members of all four New World subfamilies may be found north of Mexico (Hoteinae contains only Old World taxa), and three of those subfamilies are represented in Michigan; members of the nominate Scutellerinae do not occur in the state. Five genera are each represented by a single species in Michigan. The provided key was modified from McPherson's (1970) treatment, with the subfamily framework adapted from Schuh and Slater (1995).

Key to the Scutelleridae of Michigan

1	All abdominal sterna lacking stridulatory areas 2
1'	Stridulatory area present on fourth, fifth, and sometimes sixth abdominal sternite (Pachycorinae) 3
2 (1)	Scutellum narrower, exposing hemelytra for entire length and broadly exposing connexiva; wings with intervannal vein well developed; ostiole distinct, with evident canal (Eurygastrinae) ..... *Eurygaster alternata*
2'	Scutellum broadly developed, exposing hemelytra only near base and only narrowly exposing connexiva; wing with intervannal vein greatly reduced; ostiole indistinct, without evident canal (Odontotarsinae) ..... *Phimodera binotata*
3 (1')	Pronotum with distinct transverse groove; head distinctly deflexed; lateral margins of head and pronotum finely and irregularly dentate ..... *Acantholomidea denticulata*
3'	Pronotum without transverse groove; head gradually declivent; lateral margins of head and pronotum entire 4
4 (3')	Ostiolar opening not extended as canal towards lateral margin of metapleuron; length 12 mm or more ..... *Tetyra bipunctata*
4'	Ostiolar opening extended as long, slender canal towards lateral margin of metapleuron; length 9 mm or less ..... *Homaemus aeneifrons*

Subfamily EURYGASTRINAE Amyot & Serville, 1843

Genus EURYGASTER Laporte, 1832

Eurygaster alternata (Say), 1828. – This species was reported from Michigan by Stoner (1922), who frequently found it "in open, dry grassy situations... particularly on the higher ground." Hussey (1922a), however, described *E. alternata* as "[m]oderately common in marshy localities, where it occurs among the grasses and sedges", suggesting this scutellerid may thrive in habitats of varying wetness. Label data indicate *E. alternata* has been collected from fruiting sedge heads in Livingston County and a window pane trap in Montmorency County. This species also has been collected on Isle Royale (Keweenaw County). Javahery et al. (2000) discussed the economic importance of several species in this genus. McDonald (1966) described the genitalia. Vojdani (1961) reviewed the species of *Eurygaster* found in the United States. 128 specimens examined. Collection dates from 14 May to 13 September.

Distribution: Alger, Allegan, Alpena, Barry, Berrien, Charlevoix, Cheboygan, Chippewa, Clare, Crawford, Delta, Dickinson, Emmet, Gogebic, Grand Traverse, Houghton, Huron, Iosco, Kent, Keweenaw, Lake, Livingston, Mackinac, Marquette, Mecosta, Menominee, Midland, Montcalm, Montmorency, Muskegon, Newaygo, Oscoda, Otsego, Schoolcraft, Van Buren, and Washtenaw counties.

Eurygaster amerinda Bliven, 1956. – Lattin (1964) reported his new subspecies, *Eurygaster amerinda knighti*, from Michigan, although it was not included in the state faunal list by McPherson (1970), perhaps for the reasons associated

with doctoral dissertations noted above. Subsequently, McPherson (1980a) did include the reference in his treatment of the northeastern states. Lattin's maps include records for this species in what appear to be Cheboygan and Marquette counties as well as Isle Royale (Keweenaw County). The author has not examined any specimens that might be unequivocally referred to this species.

Subfamily ODONTOTARSINAE Stål, 1872

Genus PHIMODERA Germar, 1839

Phimodera binotata (Say), 1824. – Lattin (1964) and McPherson (1970) recorded this species from Michigan, and the former author's record for Cheboygan County is included in the distribution list. McDonald (1966) and Davidová-Vilímová and McPherson (1991) described the genitalia. Reuter (1906) monographed the genus (in German), although *P. binotata* is treated only peripherally in that work. 3 specimens examined. Collection dates from 24 July to 18 August.

Distribution: Charlevoix, Cheboygan, and Mackinac counties.

Phimodera torpida Walker, 1867. – This species was reported from Michigan by Steyskal (1938), and the record was included by Froeschner (1988d). Steyskal included the locality data, and the specimen on which this record is based resides in the UMMZ. However, Hussey modified his identification since Steyskal's publication as indicated by the 1921 determination label for *P. torpida* being folded up and re-placed on the pin, with a new determination label for *P. binotata* being added in 1956. Lattin (1964) synonymized this (and another) species with *P. binotata*, negating this issue had the act been considered valid. This specimen was included in McPherson's (1970) treatment under *P. binotata*. Thus, *P. torpida*, an otherwise western species recorded from Colorado, Utah, Alberta, British Columbia, and Saskatchewan (Froeschner 1988d), is not known from Michigan and should be excluded from the faunal list.

Subfamily PACHYCORINAE Amyot & Serville, 1843

Genus ACANTHOLOMIDEA Sailer, 1945

Acantholomidea denticulata (Stål), 1870. – Lattin (1964) and McPherson (1970) recorded this species from Michigan, and the former author's record for Cheboygan County is included in the distribution list. The dentate margin of the pronotum is unique among the Michigan scutellerids. Harris and Andre (1934) reported biological notes on *A. denticulata*, including its occurrence on *Ceanothus pubescens* (Watson) and *C. ovatus* Desfontaines. 2 specimens examined. Collection dates from 6 May to 7 July.

Distribution: Berrien, Cheboygan, Saint Joseph, and Washtenaw counties.

Genus HOMAEMUS Dallas, 1851

Homaemus aeneifrons (Say), 1824. – This species was reported from Michigan by Stoner (1922), who noted it fairly common in dry habitats (i.e., sandy or grassy high ground) as well as wet ones (i.e., bogs and creek sides). This species has been collected from flowers of *Rubus* sp. (Rosaceae) in Iron County and "[s] weeping brackensweet fern fallow field" in Isabella County. It also has been collected on Isle Royale (Keweenaw County). The shiny black head may serve as a visual cue in separating this species from *E. alternata*, a species which, while not closely related, resembles *H. aeneifrons* in color and form. McDonald (1966) and Davidová-Vilímová and McPherson (1991) described the genitalia. Walley (1929) keyed the species of *Homaemus* found north of Mexico. 344 specimens examined. Collection dates from 26 June to 16 October.

Distribution: Alcona, Alger, Alpena, Baraga, Barry, Benzie, Charlevoix, Cheboygan, Chippewa, Clare, Crawford, Delta, Dickinson, Emmet, Gogebic, Grand Traverse, Houghton, Ingham, Ionia, Iosco, Iron, Isabella, Jackson, Kalkaska, Keweenaw, Lenawee, Livingston, Luce, Mackinac, Marquette, Menominee, Midland, Missaukee, Montmorency, Oakland, Ogemaw, Ontonagon, Oscoda, Otsego, Presque Isle, Roscommon, and Schoolcraft counties.

Genus TETYRA Fabricius, 1803

Tetyra bipunctata (Herrich-Schaeffer), 1839. – Lattin (1964) and subsequently McPherson (1970) reported the shield-backed pine seed bug from Michigan, with each noting its proclivity for attacking pines. Label data from examined specimens corroborate this predilection, indicating its collection from jack pine (*Pinus banksiana* Lamb.) and European black pine (*Pinus nigra* Arnold) in Saint Joseph County. Gilbert et al. (1967) treated the bionomics of *T. bipunctata* in association with jack pine in Wisconsin, and Javahery et al. (2000) discussed the economic importance of this species. Additional label data indicate several individuals were taken on the Lake Michigan shoreline in Manistee County. The large size of this scutellerid will separate it instantly from all other members of the family in Michigan. Davidová-Vilímová and McPherson (1991) described and illustrated the male genitalia. 32 specimens examined. Collection dates from 26 May to 18 September.

Distribution: Cass, Cheboygan, Grand Traverse, Iosco, Leelanau, Manistee, Marquette, Montmorency, Oscoda, and Saint Joseph counties.

Family THYREOCORIDAE Amyot & Serville, 1843

Commonly referred to as the ebony or negro bugs, the small shiny black members of this group are chiefly recognized by the enlarged scutellum which covers most of the abdomen and wings, a condition also found in the Scutelleridae. The scutellum, along with the small black habitus, render these insects frequently confused with beetles. Thyreocorids are frequently found on short vegetation, feeding on flowers and developing seeds. The group is not generally regarded to be of economic importance (Lis et al. 2000), although some of its members negatively affect the taste of berries on which they feed (Metcalf et al. 1962).

The taxonomic position of the Thyreocoridae has varied greatly, as full familial status or as subfamilies of the Pentatomidae or Cydnidae; several contemporary treatments (i.e., Dolling 1981, Schuh and Slater 1995, Lis et al. 2000) relegate them to subfamilial status under the latter. Here the more traditional treatment is followed, without intentional support of either position. There has also been contention regarding the family name (i.e., Rolston and McDonald 1979, Štys and Davidová 1979), and although many authors have used Corimelaenidae to refer to the group in the past, I have used the Thyreocoridae here in keeping with the current catalog (Froeschner 1988f). Ahmad and McPherson (1990) described the male genitalia and its taxonomic significance for species in each of the three genera here included.

The Thyreocoridae comprises 41 species in 4 genera in the United States (Froeschner 1988f). McAtee and Malloch (1933) treated the group (as a subfamily of the Pentatomidae), and this remains perhaps the most relevant for the taxa of the United States. All species found north of Mexico belong to the subfamily Corimelaeninae. Twelve species in 3 genera are known from Michigan, and the key provided is modified from McPherson's (1982) treatment of the northeastern Pentatomoidea.

Key to the Thyreocoridae of Michigan

1 Lateral margins of pronotum and abdomen ciliate; [costal margin bordered within by definite groove; spiracles nearer to trichobothria than to lateral margins of abdominal sternites; corium entirely black, never with pale costal margin] ..... *Cydnoides ciliatus orientis*

1' Lateral margins of body not ciliate 2

2 (1') Pronotum and scutellum, in lateral view, not forming continuous convex line but with distinct transverse declivity between; costal margin of hemelytra not bordered within by groove; spiracles nearer to lateral margins of abdominal sternites than to trichobothria (*Corimelaena*) 3

2' Pronotum and scutellum, in lateral view, forming continuous convex line; costal margin of hemelytra bordered within by definite groove; spiracles nearer to trichobothria than to lateral margins of abdominal sternites; [corium entirely black, never with pale costal margin] (*Galgupha*) 7

3 (2) Apex of corium acute; [corium with pale costal margin, inner margin of pale costal stripe slightly angulate near middle; length greater than 3.5 mm] ..... *Corimelaena agrella*

3' Apex of corium rounded or nearly so 4

4 (3') Corium entirely black, distinctly punctured to costal margin; [length greater than 3.5 mm] ..... *Corimelaena nigra*

4' Corium with pale costal margin, almost impunctate along costa 5

5 (4') Pale costal stripe widened basally, extending over cubital vein; size smaller, length 3.5 mm or less ..... *Corimelaena pulicaria*

5' Pale costal stripe narrowed basally, not extending over cubital vein; size larger, length usually greater than 3.5 mm 6

6 (5') Pale costal stripe well-defined, entire; first conjunctival appendages usually serrate only on outer margins (occasionally with 1-2 teeth on inner margins) with apical hooks obtusely rounded; genital plates usually subtriangular ..... *Corimelaena lateralis lateralis*

6' Pale costal stripe invaded and frequently almost obscured by fuscous coloration, particularly in middle third; first conjunctival appendages strongly serrate on inner and outer margins with gradually tapering and acute apical hooks; genital plates usually subquadrangular ..... *Corimelaena obscura*

7 (2') Metapleuron with lateral area adjacent to evaporatorium distinctly punctate (subgenus *Nothocoris*) ..... *Galgupha nitiduloides nitiduloides*

7' Metapleuron with lateral area impunctate or nearly so (subgenus *Galgupha*) 8

8 (7') Prostethium with anterior margin produced to form explanate lobe, granulate portion as wide as base of second rostral segment ..... *Galgupha loboprostethia*

8' Prostethium with anterior margin not lobed, granulated portion narrow 9

9 (8') Anterodorsal series of spines on each protibia with distal two spines either decidedly weak or absent; corium without distinct ridge inside costal groove, ridge represented only by series of punctures distally; punctation on discal portions of pronotum and scutellum mostly obsolete 10

9' Anterodorsal series of spines on each protibia terminating in two spines equal or subequal in size to remaining spines in series; corium

with distinct ridge inside costal groove; punctation on discal portions of pronotum and scutellum more evident.....11

10 (9) Outline, in dorsal view, distinctly more narrowly rounded posteriorly than anteriorly; scutellum thickened along apical margin; outline of pygophore, in dorsal view, subquadrate, dorsal rim with well-developed carinate elevation on each inner side anteriorly; genital plates about two-thirds the length of sixth abdominal sternite.....*Galgupha carinata*

10' Outline, in dorsal view, usually scarcely more narrowly rounded posteriorly than anteriorly; scutellum not thickened along apical margin; outline of pygophore, in dorsal view, subtriangular, broadly basin-like giving cup a scooped out appearance, dorsal rim without anterior carinae; genital plates about half the length of sixth abdominal sternite.. ..... *Galgupha atra*

11 (9') Scutellum abruptly declivent posteriorly; sixth sternite angulate in both sexes; branches of exocorial vein subparallel; posterior border of pygophore, in ventral view, strongly concave, dorsal rim with numerous long hairs posteriorly.....*Galgupha aterrima*

11' Scutellum gradually declivent posteriorly; sixth sternite rounded to subangulate in both sexes; branches of exocorial vein noticeably divergent; posterior border of pygophore, in ventral view, weakly concave, dorsal rim without numerous long hairs posteriorly..... ..... *Galgupha ovalis*

Subfamily CORIMELAENINAE Uhler, 1871

Genus CORIMELAENA White, 1839

Corimelaena agrella McAtee, 1919. – (**NEW STATE RECORD**). A single specimen of this thyreocorid recently was collected by the author. Label data as follows: MICHIGAN: Jackson Co., Sharonville State Wildlife Mngmt. Area, swept from open grassy field, 27 May 2012, 42.1875°N 84.1443°W, 990 ft., D. R. Swanson, #33, det. D. R. Swanson 2012 [1 male] (DRS). This species is otherwise known from Iowa, Illinois, Kentucky, Maryland, Texas, and Washington, D.C. (Froeschner 1988f). Although its recorded range might not strongly support a Michigan extension, the specimen undoubtedly belongs to a species heretofore unknown from Michigan as it does not possess a rounded corial apex. Furthermore, the larger size and slight inner angulation of the marginal corial stripe (figured by McPherson (1982)) leaves little doubt to its specific identity. 1 specimen examined. Collection date is 27 May.

Distribution: Jackson County.

Corimelaena lateralis lateralis (Fabricius), 1803. – This species was reported from Michigan by Townsend (1890) where it was commonly taken on flowers. Label data indicate *C. l. lateralis* has been collected from golden alexander (*Zizia aurea* (L.) W. D. J. Koch) in Washtenaw County. McPherson (1971a, 1972a) described the life history and rearing of this species on wild carrot. Davidová-Vilímová and McPherson (1991) described and illustrated the male genitalia. 118 specimens examined. Collection dates from 14 May to 4 October.

Distribution: Bay, Berrien, Calhoun, Cass, Clinton, Gladwin, Gratiot, Hillsdale, Huron, Ingham, Ionia, Isabella, Jackson, Kalamazoo, Lapeer, Lenawee, Livingston, Macomb, Menominee, Midland, Monroe, Montcalm, Montmorency, Oakland, Saint Joseph, Shiawassee, Tuscola, Van Buren, Washtenaw, and Wayne counties.

Corimelaena nigra Dallas, 1851. – McAtee and Malloch (1933) reported this species from Michigan. Label data indicate *C. nigra* has been collected from a black light in Ottawa County and a Malaise trap in Lake County. It also

has been collected on Isle Royale (Keweenaw County). 23 specimens examined. Collection dates from 26 April to 10 August.

Distribution: Barry, Berrien, Cheboygan, Chippewa, Clinton, Kalamazoo, Keweenaw, Lake, Lapeer, Livingston, Luce, Mackinac, Marquette, Midland, Muskegon, Oakland, Ottawa, Presque Isle, and Washtenaw counties.

Corimelaena obscura McPherson and Sailer, 1978. – This species was reported from Michigan in the original description (McPherson and Sailer 1978) based on a single specimen collected in Wayne County on 2 April; McPherson (1979b) subsequently mentioned the record. Bundy and McPherson (1997) described the life history and laboratory rearing of this species. 1 specimen examined. Collection dates from 2 April to 21 June.

Distribution: Clinton and Wayne counties.

Corimelaena pulicaria (Germar), 1839. – A common thyreocorid in Michigan, *C. pulicaria* was first recorded from the state by Townsend (1890) who noted it frequently taken on flowers. Stoner (1922) took the species in a field with redtop (*Agrostis* sp.), timothy (*Phleum pratense* L.), and bristly crowfoot (*Ranunculus pennsylvanicus* L.f.). Hussey (1922a) found it "taken from ragweed (*Ambrosia*) and a few were found in marsh grasses…several were collected from roadside grasses." Label data indicate the species has been swept from open fields in Oakland County and lakeplain prairies in Allegan and Saint Clair counties as well as collected on beaches in Berrien County. One collection in Isabella County was described as "sweeping fallow roadside. *Solidago* dominant. Some shrubs." Further label data also indicate some plants from which this species was collected: willow (*Salix* sp.) in Huron County, alfalfa (*Medicago sativa* L.) in Ingham County, and gray goldenrod (*Solidago nemoralis* Aiton) in Livingston County. This insect has been collected from a rotary trap in a field of oats in Berrien County and a pitfall trap in Ingham County. It is well documented that secretions given off by this insect may unpleasantly alter the taste of berries on which it feeds (Metcalf et al. 1962). McDonald (1966) described the genitalia. 425 specimens examined. Collection dates from 8 April to 13 November.

Distribution: Alcona, Allegan, Arenac, Barry, Bay, Berrien, Branch, Cass, Charlevoix, Cheboygan, Chippewa, Clinton, Crawford, Dickinson, Eaton, Emmet, Genesee, Gladwin, Gogebic, Grand Traverse, Gratiot, Hillsdale, Houghton, Huron, Ingham, Iosco, Iron, Isabella, Jackson, Kalamazoo, Kalkaska, Kent, Lake, Lapeer, Leelanau, Livingston, Luce, Mason, Mecosta, Midland, Missaukee, Montcalm, Muskegon, Newaygo, Oakland, Oceana, Ontonagon, Otsego, Presque Isle, Roscommon, Saginaw, Saint Clair, Saint Joseph, Shiawassee, Tuscola, Van Buren, Washtenaw, and Wayne counties.

Genus CYDNOIDES Malloch, 1919

Cydnoides ciliatus orientis McAtee and Malloch, 1933. – This species was reported from Michigan by McPherson (1979b). Davidová-Vilímová and McPherson (1991) described and illustrated the male genitalia. 2 specimens examined. Collection dates from 13-17 August.

Distribution: Van Buren County.

Genus GALGUPHA Amyot & Serville, 1843

Subgenus GALGUPHA Amyot & Serville, 1843

Galgupha aterrima Malloch, 1919. – This species was reported from Michigan by Hussey (1922a) where "[o]ne was swept from ground vegetation on the dunes." This species has been taken from a rotary trap in an oat field and a wheat field in Berrien and Kalamazoo County, respectively, as well as from a pyramid trap in Leelanau County. McPherson (1978c) re-examined type

material of this species. Davidová-Vilímová and McPherson (1991) described and illustrated the male genitalia. 69 specimens examined. Collection dates from 22 March to 13 November.

Distribution: Berrien, Charlevoix, Cheboygan, Crawford, Huron, Ingham, Kalamazoo, Kent, Lapeer, Leelanau, Mason, Montmorency, Muskegon, Saint Joseph, Van Buren, Washtenaw, Wayne, and Wexford counties.

Galgupha atra Amyot and Serville, 1843. – This species was reported from Michigan by Townsend (1890) (as *Corimelaena atra*) where it was commonly taken on flowers. Stoner (1922) collected purported nymphs of this species from a low grassy creekbed and found several adults in a low field of redtop (*Agrostis* sp.); he also recorded it (as *Thyreocoris ater*) from beach drift. Hussey (1922a) noted them "swept from a tangle of grasses and vines on the flood plain of the Galien River." Label data indicate this species has been taken from a Malaise trap in Monroe County and on Virginia strawberry (*Fragaria virginiana* Duchesne) in Livingston County. 58 specimens examined. Collection dates from 13 May to 12 September.

Distribution: Allegan, Barry, Benzie, Berrien, Cass, Charlevoix, Cheboygan, Clare, Clinton, Crawford, Dickinson, Emmet, Gogebic, Kalamazoo, Kalkaska, Livingston, Mackinac, Macomb, Marquette, Mecosta, Midland, Monroe, Oakland, Ogemaw, Saginaw, Saint Joseph, Schoolcraft, Van Buren, Washtenaw, and Wexford counties.

Galgupha carinata McAtee and Malloch, 1933. – This species was reported from Michigan by McPherson (1970). 3 specimens examined. Collection date is 2 August.

Distribution: Washtenaw County.

Galgupha loboprostethia Sailer, 1940. – This species was reported from Michigan by McPherson (1970). This species has been collected from a Malaise trap in Berrien County. Sailer's (1940) original description and subsequent notes (Sailer 1941) constitute the bulk of the information on this purportedly rare species. 6 specimens examined. Collection dates from 22 May to 8 August.

Distribution: Allegan, Berrien, Jackson, Mason, and Otsego counties.

Galgupha ovalis Hussey, 1925. – This species was reported from Michigan by McPherson (1970). Biehler and McPherson (1982) described the life history and laboratory rearing of this thyreocorid. 19 specimens examined. Collection dates from 27 April to 13 November.

Distribution: Allegan, Benzie, Berrien, Cheboygan, Clare, Ingham, Ionia, Livingston, and Oceana counties.

Subgenus NOTHOCORIS McAtee and Malloch, 1928

Galgupha nitiduloides nitiduloides (Wolff), 1802. – This species was reported from Michigan by Townsend (1890) (as *Corimelaena nitiduloides*) "taken in the rubbish on the top of an ant-hill belonging to *Formica schaufussi* [Mayr, 1866]. This species is commonly…found on flowers." Subsequently, Stoner (1922) and Hussey (1922a) each recorded it from Michigan; the latter noted them "taken from roadside grasses…and another was beaten from vegetation in a clearing behind the Sawyer Dunes." Label data indicate *G. n. nitiduloides* has been taken under debris on the Lake Michigan shore in Allegan County. It also has been collected on Isle Royale (Keweenaw County). McDonald (1966) described the female genitalia. 26 specimens examined. Collection dates from 22 May to 13 November.

Distribution: Allegan, Barry, Berrien, Cass, Cheboygan, Clinton, Delta, Dickinson, Houghton, Ingham, Kalamazoo, Kalkaska, Keweenaw, Mason, Midland, Missaukee, Montcalm, Newaygo, Roscommon, Saint Joseph, Schoolcraft, and Wayne counties.

Family CYDNIDAE Billberg, 1820

The burrowing (or burrower) bugs, aptly named for their hypogean lifestyle, are typically small and black, like the thyreocorids, but lack the distinct enlarged scutellum found in that family. Cydnids generally feed on roots and other subterranean plant material (except perhaps the Sehirinae), and it has been suggested that the members of this family are univoltine, lay eggs in or on the soil, and may be attracted to lights during the surface-dwelling portion of their life (Froeschner 1960). These insects are not thought to be particularly injurious to those plants of agricultural significance to mankind, and Lis et al. (2000) summarized the economic importance of the group. Members of this family also have had a high tendency for accidental introduction through soil ballasts in old sailing ships (Froeschner 1960).

The position of the Cydnidae, like many other pentatomoid family-groups, has experienced several changes. A wide view of the family (ie. Dolling 1981, Schuh and Slater 1995) subsumes the Thyreocoridae within it, but the more traditional view is followed here (as mentioned under the Thyreocoridae). The Cydnidae also has been accorded subfamilial rank under the Pentatomidae in the past.

The Cydnidae comprises 43 species in 13 genera in the United States (Froeschner 1988b). Four of six world subfamilies may be found north of Mexico, but only three of those are represented in Michigan; species of the Scaptocorinae are known only from the southeastern states. Froeschner's (1960) monograph remains the most important reference for the taxa north of Mexico. Six species in 4 genera are known from Michigan, and the two new state records presented below encompass the first record of the nominate subfamily, Cydninae, for Michigan. The following key was modified from Froeschner's (1960) treatment.

Key to the Cydnidae of Michigan

1	Clavi meeting beyond scutellum and forming commissure; anterior margin of head with distinct peg-like teeth (Amnestinae: *Amnestus*) 2
1'	Clavi not meeting beyond scutellum, not forming claval commissure; anterior margin of head without distinct peg-like teeth 4
2 (1)	Jugum with four marginal pegs; smaller species, length usually less than 2.5 mm; [rostrum attaining base of metacoxae]..... .....*Amnestus pusillus*
2'	Jugum with five or more marginal pegs; larger species, length usually greater than 2.5 mm.....3
3 (2')	Rostrum not reaching base of abdomen, attaining, at most, middle of metasternum; color usually reddish-brown .....*Amnestus pallidus*
3'	Rostrum long, at least reaching base of abdomen; color usually dark chestnut brown .....*Amnestus spinifrons*
4 (1')	Pronotum without lateral, submarginal row of setigerous punctures; second tarsomere distinctly narrower than first and third (Sehirinae: *Sehirus cinctus*) 5
4'	Pronotum with lateral, submarginal row of setigerous punctures; all tarsomeres subequal in diameter (Cydninae).....6
5 (4)	Corium marked with white spot at apex of radial vein; jugal margins elevated above dorsum of head in profile ....*Sehirus cinctus albomaculatus*
5'	Corium not marked with white at apex of radial vein; jugal margins lower than dorsum of head in profile.....*Sehirus cinctus cinctus*

6 (4') Anterior part of osteolar peritreme modified apically into distinct simple, flat, posteriorly differentiated polished lobe which is wider than basal part of peritreme (*Melanaethus*); pronotum anteriorly without distinctly impressed line; jugum with one submarginal seta; size smaller, length less than 5 mm..... *Melanaethus robustus*

6' Anterior part of osteolar peritreme without differentiated apical structure; pronotum anteriorly with deep, sharply impressed impunctate line paralleling anterior margin from side to side; jugum with three or more submarginal setae; size larger, length greater than 5 mm..... ..... *Pangaeus bilineatus*

Subfamily AMNESTINAE Hart, 1919

Genus AMNESTUS Dallas, 1851

Amnestus pallidus Zimmer, 1910. – Froeschner (1960) reported this species from Michigan. Label data indicate *A. pallidus* has been taken from white and ultraviolet lights in Clinton County. It also has been collected from pitfall and window pane traps in Ingham and Kalkaska County, respectively. McDonald (1966) described the genitalia. 28 specimens examined. Collection dates from 26 April to 9 August.

Distribution: Clinton, Ingham, Kalkaska, Midland, Saginaw, and Washtenaw counties.

Amnestus pusillus Uhler, 1876. – This species was reported from Michigan by McPherson (1970). Label data indicate it has been collected in a window pane trap in Kalkaska County. 39 specimens examined. Collection dates from 8 May to 5 September.

Distribution: Alpena, Cheboygan, Clare, Clinton, Gladwin, Ingham, Iosco, Kalamazoo, Kalkaska, Lenawee, Livingston, Midland, Monroe, Osceola, Roscommon, and Washtenaw counties.

Amnestus spinifrons (Say), 1825. – Parshley (1917) reported this species from Michigan. Label data indicate *A. spinifrons* has been taken on red clover (*Trifolium pratense* L.) in Kalamazoo County and from a rotary trap in a field of oats and on a beach in Berrien County. Davidová-Vilímová and McPherson (1991) described and illustrated the male genitalia. 14 specimens examined. Collection dates from 19 April to October [no date].

Distribution: Berrien, Clinton, Ingham, Kalamazoo, Kent, Lenawee, Mason, Midland, and Washtenaw counties.

Subfamily CYDNINAE Billberg, 1820

Genus MELANAETHUS Uhler, 1876

Melanaethus robustus Uhler, 1877. – (**NEW STATE RECORD**). Three specimens of this small cydnine were collected by the author in the late spring of 2012. Label data as follows: MICHIGAN: Oakland Co., Highland, Highland State Rec. Area, swept from low grass in open woods, 20 May 2012, 42.6427°N 83.5536°W, 870 ft., D. R. Swanson, #29, det. D. R. Swanson 2012 [1 female] (DRS); MICHIGAN: Jackson Co., Sharonville State Wildlife Mngmt. Area, swept from open grassy field, 27 May 2012, 42.1875°N 84.1443°W, 990 ft., D. R. Swanson, #33, det. D. R. Swanson 2012 [2 females] (DRS). The occurrence of this species in Michigan is not implausible as it is known from Illinois, Indiana, and Ohio, among other states (Froeschner 1988b). The Jackson County record is approximately 225 air kilometers northwest of Delaware County, Ohio and 280 air kilometers west of Ashtabula County, Ohio, the nearest localities reported by Froeschner (1960). Davidová-Vilímová and McPherson

(1991) described and illustrated the male genitalia. 3 specimens examined. Collection dates from 20 to 27 May.

Distribution: Jackson and Oakland counties.

Genus PANGAEUS Stål, 1862

Pangaeus bilineatus (Say), 1825. – (**NEW STATE RECORD**). To the author's knowledge, this species has never been reported from Michigan. This fact, perhaps partially explained by the lack of representation in the collections (all but three specimens came from the author's personal collection), is surprising considering the larger habitus and relative abundance of this species, especially given the depauperate cydnid fauna of Michigan. Label data indicate *P. bilineatus* has been collected from white and ultraviolet lights in Clinton County. In Washtenaw County, the author has taken several individuals crawling on concrete sidewalks and parking lots on sunny days in early summer. There has been some question as to whether this cydnid might adversely affect growth of spinach and peanut crops (Gould 1931, Smith and Pitts 1974, Chapin and Thomas 2003, Chapin et al. 2006), and Lis et al. (2000) summarized the literature regarding the economic importance of this species. Davidová-Vilímová and McPherson (1991) described and illustrated the male genitalia. Sailer (1954) summarized the literature, both bionomic and economic, pertaining to this species. 16 specimens examined. Collection dates from 16 May to 15 September.

Distribution: Clinton, Kalamazoo, Kent, and Washtenaw counties.

Subfamily SEHIRINAE Amyot & Serville, 1843

Genus SEHIRUS Amyot & Serville, 1843

Sehirus cinctus albonotatus Dallas, 1851. – Froeschner (1960) reported this species from Michigan. Stoner's (1922) record of *Sehirus cinctus* remains unplaced to subspecies, but the author has examined actual individuals of *S. c. albonotatus* from Cheboygan County (see below). This subspecies also has been collected from Mackinac Island (Mackinac County). This cydnid, along with the nominate subspecies below, are commonly referred to as the white-margined burrower bug. 71 specimens examined. Collection dates from 16 May to 15 September.

Distribution: Alcona, Charlevoix, Cheboygan, Chippewa, Delta, Dickinson, Emmet, Gogebic, Iosco, Iron, Kalamazoo, Luce, Mackinac, Manistee, Marquette, Menominee, Midland, Montmorency, Muskegon, Newaygo, Oceana, Ontonagon, and Tuscola counties.

Sehirus cinctus cinctus (Palisot de Beauvois), 1811. – Stoner (1922) reported *Sehirus cinctus* swept from weeds in a rye field in Cheboygan County, although it is not known to what subspecies his record applies. He did not indicate the presence of subapical corial spots; thus, one might assume the record refers to the nominate subspecies. Nevertheless, the record was not included for lack of certainty. This subspecies has been taken on willow (*Salix* sp.) in Berrien County and black raspberry (*Rubus occidentalis* L.) in Livingston County. It also has been collected from a Malaise trap in Livingston County, a rotary trap in a wheat field in Berrien County, and a rotary trap in an oat field in both Berrien and Kalamazoo counties. McDonald (1968a) and Sites and McPherson (1982) provided notes on the life history of this species. McDonald (1966) and Davidová-Vilímová and McPherson (1991) described the genitalia. 93 specimens examined. Collection dates from 13 April to 13 September.

Distribution: Allegan, Berrien, Cass, Eaton, Grand Traverse, Gratiot, Ingham, Jackson, Kalamazoo, Kent, Livingston, Mackinac, Mason, Monroe, Oakland, Osceola, Saint Joseph, Shiawassee, Washtenaw, and Wayne counties.

Family ACANTHOSOMATIDAE Signoret, 1863

The acanthosomatids superficially resemble and might easily be mistaken for pentatomids, and in the past, the family had been afforded subfamilial or tribal rank within the Pentatomidae. The group, however, has been shown to occupy a more basal position in the pentatomoid phylogeny (Grazia et al. 2008). The species, perhaps unlike other pentatomoids, seem to prefer shrubs and trees over forbs, and Schaefer and Ahmad (1987) discussed some of the host plants of this family. These insects also are more abundant in the northern United States and Canada (Froeschner 1988a) than in the southern states. Members of this group are notable for reports of extended maternal care (Frost and Haber 1944).

Acanthosomatidae is a small family, contrasting the great diversity of some of the other pentatomoid groups. Kumar (1974) revised the Acanthosomatidae on a global scale and supplied a generic key, whereas Rolston and Kumar (1974) provided keys to the species of the Western Hemisphere. Thomas (1991) reviewed the North American species of the family. Froeschner's (1988a) catalog is the most current for the United States fauna, and 5 species in 2 Holarctic genera occur in the United States, all belonging to the nominate subfamily. Both genera are represented in Michigan, and 3 of the 5 species are known from the state; the northwestern *Elasmostethus interstinctus* (Linnaeus), 1758 and southwestern *Elasmucha cordillera* Thomas, 1991 are absent. The key provided is modified from McPherson's (1970) treatment.

Key to the Acanthosomatidae of Michigan

1	Ostiolar canal short, reaching only middle of metapleuron; inner angles of posterior margin of pronotum produced posteriorly..... ..... *Elasmucha lateralis*
1'	Ostiolar canal long, much surpassing middle of metapleuron; inner angles of posterior margin of pronotum not produced posteriorly (*Elasmostethus*) 2
2 (1')	Antennae piceous or shining black with the incisures pale; pronotal punctures fine, concolorous anteriorly, dark narrow series posteriorly; humeri to posterior angles blackish ..... *Elasmostethus atricornis*
2'	Antennae pale except apical segment more or less darker; pronotal punctures coarse, dark, almost foveolate, widely separated; humeri to posterior angles more or less pale or reddish..... *Elasmostethus cruciatus*

Subfamily ACANTHOSOMATINAE Signoret, 1863

Genus ELASMOSTETHUS Fieber, 1861

Elasmostethus atricornis (Van Duzee), 1904. – This species was recorded from Michigan by McPherson (1970). Jones and McPherson (1980) and Carter and Hoebeke (2003) provided bionomic information for this acanthosomatid. 30 specimens examined. Collection dates from 10 July to 15 August.

Distribution: Alcona, Cheboygan, Clare, Gogebic, Grand Traverse, Iosco, Lapeer, Manistee, Midland, and Muskegon counties.

Elasmostethus cruciatus (Say), 1831. – Occasionaly referred to as the red-cross shield bug, *E. cruciatus* was recorded from Michigan by Stoner (1922), who collected one female sweeping vegetation along a low swampy lakeshore. It also has been collected on Drummond Island (Chippewa County), Isle Royale (Keweenaw County), and Mackinac Island (Mackinac County). Jones and McPherson (1980) provided life history data on this species in South Carolina. McDonald (1966) and Davidová-Vilímová and McPherson (1991) described the genitalia. 67 specimens examined. Collection dates from 8 May to 7 October.

Distribution: Cheboygan, Chippewa, Delta, Dickinson, Emmet, Houghton, Huron, Kalamazoo, Keweenaw, Lapeer, Leelanau, Mackinac, Manistee, Marquette, Midland, Ogemaw, Ontonagon, and Roscommon counties.

Genus ELASMUCHA Stål, 1864

Elasmucha lateralis (Say), 1831. – This species was recorded from Michigan by Stoner (1922) as *Meadorus lateralis*; McPherson (1970) also treated it under that binomial. Stoner (1922) took several individuals, all in wet or swampy situations, including one on a lily pad. Label data indicate that it also has been taken on flowers of meadow sweet (*Spiraea alba* Du Roi) in Montcalm County. However, *E. lateralis* has a well-established association with birch and beech (Jones and McPherson 1980), and these records seem to represent incidental encounters. Additional label data indicate that twenty-three individuals were taken in beach drift in early June in Baraga County. This acanthosomatid also has been collected on Isle Royale (Keweenaw County). Jones and McPherson (1980) provided life history information on this species in South Carolina. McDonald (1966) and Davidová-Vilímová and McPherson (1991) described the genitalia. 180 specimens examined. Collection dates from 4 May to 5 October.

Distribution: Alcona, Alger, Antrim, Baraga, Charlevoix, Cheboygan, Chippewa, Clare, Delta, Emmet, Gladwin, Gogebic, Houghton, Ingham, Iosco, Iron, Isabella, Kalamazoo, Keweenaw, Leelanau, Luce, Mackinac, Manistee, Marquette, Mason, Missaukee, Montcalm, Oceana, Ontonagon, Roscommon, and Saint Joseph counties.

Family PENTATOMIDAE Leach, 1815

The Pentatomidae are one of the largest and most diverse of heteropteran families. Comprising approximately 224 species in 64 genera in the United States (Froeschner 1988c), the stink bugs, although varied in morphology, still generally retain the recognizable stink bug habitus. Many species, whether primarily herbivorous or predaceous, are generalist feeders. Adults usually overwinter, often becoming conspicuous guests in homes. Eggs generally are laid in the spring; most are uni- or bivoltine in Michigan, although multivoltinism is known to occur in a few species (McPherson 1982). Many pentatomids frequent lights at night, occasionally in large aggregations. The Asopinae, or predatory stink bugs, are members of this family and are easily recognized by the free first segment of the rostrum. Also included are the Podopinae (previously the Graphosomatinae), or turtle bugs, a group of generally paludicolous pentatomids with a greatly enlarged scutellum, similar to the Scutelleridae.

The economic significance varies from species to species, with many being innocuous and others encompassing some of the worst pests of commercial crops known to mankind. McPherson and McPherson (2000) provided a wealth of information on the economic importance of the family in North America, and De Clercq (2000) and Panizzi et al. (2000) discussed the positive impact of the asopines and the negative impact of the herbivorous pentatomids, respectively, on a world scale.

Froeschner (1988c) provided the most current catalog to the species found north of Mexico. Five subfamilies are represented in the United States, with the majority of the species belonging to the nominate Pentatominae. Two small subfamilies, the Discocephalinae and Edessinae, are represented each by two species in the United States; they do not occur in Michigan. Esselbaugh (1948) provided bionomic information for many Midwestern species. Thomas (1992) treated the Asopinae of the New World. Barber and Sailer (1953) and Davidová-Vilímová and McPherson (1994) dealt with the classification of the

Podopinae. The Pentatominae were treated in a series of papers by Rolston and McDonald (1979, 1980, 1984), and Rolston et al. (1980). In Michigan, 49 species in 29 genera are known.

The following key is synthesized from McPherson (1970) and the other taxonomic works mentioned above. Although it would be more desirable to shape the key to better follow the phylogeny of the group, I have not been able to find a more satisfactory treatment of the tribal classification than is offered by Rolston and McDonald (1979). Additionally, three species (*Perillus strigipes* (Asopinae), *Brochymena carolinensis* (Pentatominae: Halyini), and *Murgantia histrionica* (Pentatominae: Pentatomini)) reported from Michigan by Furth (1974) but based on unconfirmed records, are included in the key to facilitate identification of legitimate records.

Key to the Pentatomidae of Michigan

1	First rostral segment directed away from head, incrassate, free, with only base between bucculae which converge ventrally (Asopinae).....2
1'	First rostral segment not directed away from head, slender, lying between bucculae which are subparallel.....15
2 (1)	Scutellum greatly enlarged, U-shaped, covering most of hemelytra and abdomen; frena about one-fourth to one-third length of scutellum; protibia greatly dilated..... *Striretrus anchorago*
2'	Scutellum not greatly enlarged, more or less triangular, leaving hemelytra and abdomen broadly exposed; frena about one-half or more length of scutellum; protibia not distinctly dilated 3
3 (2')	Apical part of scutellum (tongue) enlarged, about as wide as corium.....4
3'	Apical part of scutellum small, much narrower than corium 8
4 (3)	Juga distinctly longer than tylus, convergent and contiguous in front; abdominal venter without anteriorly projecting process; profemur without subdistal spine .....*Rhacognathus americanus*
4'	Juga subequal to tylus; abdominal venter with prominent stout anterior directed tubercle; profemur with small to large subdistal spine (*Perillus*) 5
5 (4')	Profemur with subdistal spine obsolescent, spine not longer than wide 6
5'	Profemur with distinct subdistal spine which is longer than wide 7
6 (5)	Pronotum orange or yellow with uninterrupted medial transverse black stripe or pronotum mostly black except for margins, never with midlongitudinal stripe; scutellum with U-shaped submarginal band of yellow or with apex pale, never chevron-shaped ..... *Perillus exaptus*
6'	Pronotum black with yellow or orange midlongitudinal stripe and/or with yellow to orange chevron on scutellum .....*Perillus strigipes*
7 (5')	Pronotum usually with pale transverse fascia in middle; abdominal venter with submarginal row of black spots which enclose spiracles... .....*Perillus bioculatus*
7'	Pronotum usually without pale transverse fascia; abdomen lacking black submarginal ventral spots, spiracles enclosed within yellow area..... .....*Perillus circumcinctus*
8 (3')	Second abdominal sternite unarmed; ostiole of scent gland without elevated ruga, evaporatorium reduced; dorsal color metallic blue; size small, length usually less than 8 mm..... *Zicrona caerulea*

8' Second abdominal sternite produced cephalad as spine or tubercle; ostiole of scent gland attended by elevated ruga and surrounded by distinct evaporatorium; dorsal color brown, reddish, or grey, not metallic blue; size larger, length greater than 8 mm 9

9 (8') Juga usually slightly longer than tylus; males with glandular patches of silky hairs on abdominal venter; female basal gonocoxites separated by intervening plate or contiguous, if contiguous then inner margins of juga distinctly convergent; size larger, length usually 14 mm or more (*Apoecilus*) 10

9' Juga equal to tylus; males without glandular patches of silky hairs on abdominal venter; female basal gonocoxites contiguous; inner margins of juga parallel; size smaller, length usually 12 mm or less (*Podisus*) 11

10 (9) Anterior half of pronotum usually with six dark spots, two submedian spots between pairs of submarginal spots; basal gonocoxites of female convergent apically, mesal plate between them triangular; upper arm of male paramere curvilinear, not bent, about equal in diameter to lower arm .....*Apoecilus bracteatus*

10' Anterior half of pronotum usually with only four dark spots, two submarginal spots on each side; basal gonocoxites of female not convergent apically, mesal plate between them quadrangular; upper arm of male paramere bent or more slender in diameter than lower arm..... .....*Apoecilus cynicus*

11 (9') Anterolateral margin of pronotum straight; hemelytral membrane clear (sometimes with faint stripe); [humeri rounded]..... .....*Podisus placidus*

11' Anterolateral pronotal margin concave; hemelytral membrane with dark blotch or stripe 12

12 (11') Humeral angles acute to spinose; femora with pair of anteapical spots; seventh abdominal sternite usually with median spot ....*Podisus maculiventris*

12' Humeral angles rounded or obtusely angular; femora variably maculate or immaculate; abdominal sternites immaculate or with row of spots 13

13 (12') Basal ventral abdominal spine long, protruding between and attaining anterior margin of metacoxae .....*Podisus neglectus*

13' Basal ventral abdominal spine short, not attaining anterior margin of metacoxae.....14

14 (13') Metafemora immaculate; abdominal venter without median row of spots.....*Podisus brevispinus*

14' Metafemora densely spotted; abdominal venter usually with median row of spots .....*Podisus serieventris*

15 (1') Scutellum greatly enlarged, U-shaped, covering most of hemelytra and abdomen; frena much less than one-fourth as long as scutellum (Podopinae: *Amaurochrous*) 16

15' Scutellum not greatly enlarged, more or less triangular, leaving hemelytra and abdomen broadly exposed; frena at least one-fourth as long as scutellum (Pentatominae) 17

16 (15) Juga distinctly longer than tylus, often contiguous in front; fifth antennal segment subequal to second, third and fourth combined; scutellum more than twice as long as head and pronotum combined ....*Amaurochrous brevitylus*

16' Juga subequal to tylus; fifth antennal segment slightly longer than third and fourth combined; scutellum one-fourth longer than head and pronotum combined ..... *Amaurochrous cinctipes*

17 (15') Juga with lateral tooth near apex; hemelytral membrane with arborescent dark markings (Hyalini) 18

17' Juga without lateral tooth near apex; hemelytral membrane immaculate or with streaks or spots 20

18 (17) Humeral angles subquadrate with large teeth ..... *Parabrochymena arborea*

18' Humeral angles subtriangular with small teeth (*Brochymena*) 19

19 (18') Juga subequal to tylus or exceeding tylus by less than jugal width at apex of tylus ..... *Brochymena carolinensis*

19' Juga distinctly longer than tylus, often convergent and contiguous in front ..... *Brochymena quadripustulata*

20 (17') Body broad, flat with margins explanate, broadest behind middle; [second antennal segment at least 1.5 times length of third]; head nearly as wide as base of scutellum (Sciocorini) ..... *Sciocoris microphthalmus*

20' Body usually broadest before middle, margins not flattened and explanate (except *Menecles*, in this case second antennal segment less than 1.5 times length of third); head usually narrower than base of scutellum or, if nearly as wide, not flat above (Pentatomini) 21

21 (20') Second abdominal sternite produced cephalad as spine or tubercle 22

21' Second abdominal sternite unarmed 27

22 (21) Juga surpassing tylus, convergent and contiguous in front ..... *Dendrocoris humeralis*, females (in part)

22' Juga subequal to tylus 23

23 (22') Abdominal process spinous, reaching between metacoxae; metasternum unmodified, not in apposition with abdominal spine (*Chinavia*) 24

23' Abdominal process tuberculate, not extending between metacoxa; metasternum subelevated, notched posteriorly, in apposition with abdominal tubercle (*Banasa*) 25

24 (23) Anterolateral margins of pronotum straight or nearly so; width of head across eyes equal or subequal to length; rostrum reaching between metacoxae; connexival spots at least on basal segments expanding onto laterotergite ..... *Chinavia hilaris*

24' Anterolateral margins of pronotum broadly rounded; head wider across eyes than long; rostrum reaching only to mesocoxae; connexiva immaculate or black mark at posterolateral angles of segments confined to edge of sternite ..... *Chinavia pensylvanica*

25 (23') Pronotum, disc of scutellum, and corium concolorous, usually grey or sordid brown; rostrum long, surpassing posterior margin of tubercle-bearing abdominal sternite ..... *Banasa sordida*

25' Pronotum bicolored, anterior half lighter than posterior half and/or corium with pale or reddish coloration contrasting with greenish scutellum; rostrum short, not reaching posterior margin of tubercle-bearing abdominal sternite 26

26 (25') Metapleuron without or with small inconspicuous spot; juga without pigmented punctations ..... *Banasa calva*

26' Metapleuron with distinct stigmatose spot; juga usually with pigmented punctations ..... *Banasa dimidiata*

27 (21') Margins of propleura before coxae produced, anterior margin covering base of head from eyes mesad nearly to rostrum; [metathoracic ostiole normally with distinct auricle, existing, at most, as short abruptly ending canal, rounded on inner margin; scutellum equal to or longer than corium with apical third wider than apex of corium and with tip broadly rounded] 28

27' Propleura not produced 30

28 (27) Base of antennae hidden from lateral view by anterior production of propleuron; pronotum longitudinally tricarinate ..... *Aelia americana*

28' Antenniferous tubercles not covered by anterior production of propleuron; pronotum only midlongitudinally carinate (*Neottiglossa*) 29

29 (28') Head entirely black, with deep dense punctures; vertex without pale line extending caudad onto pronotum ..... *Neottiglossa trilineata*

29' Head not black, without deep dense punctures; vertex with median pale line extending caudad onto pronotum ..... *Neottiglossa undata*

30 (27') Metathoracic ostiole unattended by sulcus or ruga; brightly colored black, red, and yellow species ..... *Murgantia histrionica*

30' Sulcus or ruga of various lengths extending laterad from metathoracic ostiole; species not brightly or contrastingly colored 31

31 (30') Metathoracic ostiole without auricle, existing as tapering canal, V-shaped on inner margin 32

31' Metathoracic ostiole normally with distinct auricle, existing, at most, as short abruptly ending canal, rounded on inner margin 41

32 (31) Canal of metathoracic ostiole not extending beyond middle of metapleuron 33

32' Canal of metathoracic ostiole extending beyond middle of metapleuron 35

33 (32) Head and pronotum glabrous; green species..... *Chlorochroa persimilis*

33' Head and usually pronotum hirsute; tan or brownish species (*Trichopepla*) 34

34 (33') Head broadly rounded or truncate apically, ratio of width to length 1:1 or less, dorsal surface with few hairs; pseudoclaspers with few lateral spines at most ..... *Trichopepla atricornis*

34' Head distinctly elongate, tapering apically, ratio of width between eyes to length (apex to line across base of eyes) 1:1.3, dorsal surface often densely pilose; pseudoclaspers with numerous stout spines on surface ..... *Trichopepla semivittata*

35 (32') Size large, length greater than 12 mm; third and fourth antennal segments distinctly banded; dorsal and ventral surface of pronotum with metallic green punctures ..... *Halyomorpha halys*

35' Size smaller, length 10 mm or less; third and fourth antennal segments not distinctly banded; dorsal and ventral surface of pronotum without metallic green punctures 36

36 (35') Juga shorter or subequal to tylus (*Thyanta*) 37

36' Juga longer than tylus 38

37 (36) Anterolateral margins of pronotum and apical angles of abdominal segments pale or concolorous; pronotal cicatrices without piceous spots on inner angles; elytra usually provided with scattered pale spots ..... *Thyanta custator accerra*

37' Anterolateral margin of pronotum and apical angles of abdominal segments with black spots; pronotal cicatrices with piceous spot in inner angles; elytra usually without scattered pale spots ..... *Thyanta calceata*

38 (36') Anterolateral margins of pronotum strongly concave .... *Dendrocoris humeralis*, males (in part)

38' Anterolateral margins of pronotum, at most, weakly concave (*Holcostethus*) 39

39 (38') Abdominal venter dark chocolate brown, margins occasionally yellow ..... *Holcostethus mcdonaldi*

39' Abdominal venter yellow or reddish brown, with or without black markings 40

40 (39') Reddish brown species with distinctive black zig-zag markings on abdominal venter; juga not contiguous in front of tylus .... *Holcostethus fulvipes*

40' Brown colored species without distinct markings on abdominal venter; juga contiguous in front of tylus ..... *Holcostethus limbolarius*

41 (31') Body hirsute; posterior margins of humeral angles emarginate .... *Prionosoma podopioides*

41' Body glabrous; humeral angles prominent or rounded but not emarginate 42

42 (41') Scutellum equal to or longer than corium, apical third wider than apex of corium, apex broadly rounded 43

42' Scutellum shorter than corium, apical third narrower than apex of corium, apex not broadly rounded 44

43 (42) Head horizontal or slightly declivent; tylus distinctly elevated above juga; dull brownish species ..... *Coenus delius*

43' Head more deflexed; tylus scarcely elevated above juga; black and red species ..... *Cosmopepla lintneriana*

44 (42') Dorsal surface of tibia rounded for most of its length 45

44' Dorsal surface of tibia sulcate for most of its length 46

45 (44) Humeral angles rounded; black species with distinct white scutellar markings ..... *Mormidea lugens*

45' Humeral angles distinctly spined; tan or brownish species .... *Oebalus pugnax pugnax*

46 (44') Anterolateral pronotal margins entire 47

46' Anterolateral margins of pronotum crenulate or denticulate (*Euschistus*) 49

47 (46) Head deeply inserted into pronotum, imaginary line drawn across anterior limits of pronotum bisecting eyes near middle; margins of pronotum strongly explanate; rostrum reaching second abdominal sternite ..... *Menecles insertus*

47' Head not deeply inserted into pronotum, imaginary line drawn across anterior limits of pronotum passing near posterior margin of eyes; margins of pronotum not explanate; rostrum not surpassing metacoxae 48

48 (47') Hemelytral membrane with numerous small dark spots; veins nearly obscure, few, simple or bifurcate; posterior margin of bucculae sloping abruptly in lateral view; anterolateral margins of pronotum straight to slightly concave; smaller, length 6-8.5 mm..... *Mcphersonarcys aequalis*

48' Hemelytral membrane without spots, unmarked or brown except along veins; venation reticulate; posterior margin of bucculate roundly truncate in lateral view; anterolateral margins of pronotum broadly rounded; larger, length 9-11.5 mm ..... *Hymenarcys nervosa*

49 (46') Pronotum with irregular raised impunctate transverse line between humeral angles ..... *Euschistus ictericus*

49' Pronotum without raised impunctate line between humeral angles.....50

50 (49') Incisures of abdominal sternites without black spots near anterolateral angle ..... *Euschistus variolarius*

50' Incisures of abdominal sternites with black spot near anterolateral angle 51

51 (50') Abdominal sternites with one or more medial black spots (*Euschistus tristigmus*).....52

51' Abdominal sternites without black medial spots.....53

52 (51) Humeral angles rounded; apical half of fourth antennal segment and nearly all of fifth fuscous ..... *Euschistus tristigmus luridus*

52' Humeral angles acute or spinose; antennae entirely rufous or testaceous ..... *Euschistus tristigmus tristigmus*

53 (51') Anterolateral margins of pronotum straight or nearly so, pale margin bordered within by well-defined line of black punctures..... ..... *Euschistus politus*

53' Anterolateral margins of pronotum distinctly sinuate, pale margin not bordered within by well-defined line of black punctures (*Euschistus servus*)..... 54

54 (53') Juga clearly exceeding apex of tylus ..... *Euschistus servus euschistoides*

54' Juga equaling or slightly exceeding apex of tylus..... .....*Euschistus servus servus*

Subfamily ASOPINAE Spinola, 1850

Genus APOECILUS Stål, 1870

Apoecilus bracteatus (Fitch), 1856. – This species was reported from Michigan by Hart (1919) as *Apateticus crocatus* (Uhler), 1897; Thomas's (1992) treatment of that name as a junior synonym of *A. bracteatus* is followed. Stoner (1922) and Hussey (1922a) each reported *Apateticus bracteatus* from Michigan. Stoner (1922) found this species to be more common than the the following species and swept several individuals from willow (*Salix* sp.) and collected some from beach drift. Hussey found *A. bracteatus* to be much less common than its Michigan congener, but also took several individuals from beach drift. In Michigan, the members of this genus are the largest predatory stink bugs as well as among the largest pentatomoids. Evans and Root (1980) reported biological information for this species. De Clerq (2000) discussed this as one of the less economically important species. McDonald (1966) described the genitalia. Thomas (1992) raised *Apoecilus* to full generic rank. 53 specimens examined. Collection dates from 6 June to 3 October.

Distribution: Alger, Allegan, Barry, Berrien, Charlevoix, Cheboygan, Chippewa, Delta, Emmet, Gladwin, Gratiot, Houghton, Huron, Iosco, Isabella, Keweenaw, Livingston, Luce, Mackinac, Marquette, Midland, Oakland, Ogemaw, Schoolcraft, Washtenaw, and Wayne counties.

Apoecilus cynicus (Say), 1832. – This species was reported from Michigan by Townsend (1890) (as *Podisus cynicus*). Stoner (1922) collected this species from beach drift. As *Apateticus cynicus*, Hussey (1922a) reported:

> "Nymphs which probably should be referred to this species were common on the maples...and one adult female was beaten from a maple there...this form was by far the most abundant of the beach-drift of early July; it was estimated that 80 per cent of the Hemiptera washed up between July 7 and July 15 were *A. cynicus*, and on some days the number of individuals of this species on the beach was estimated at about 250 per mile."

It has also been taken beating the edge of wooded areas in Saint Joseph County. In Michigan, the members of this genus are the largest predatory stink bugs as well as among the largest pentatomoids. Jones and Coppel (1968) reported biological information for this species. De Clerq (2000) discussed this as one of the less economically important species. Davidová-Vilímová and McPherson (1991) described and illustrated the male genitalia. Thomas (1992) raised *Apoecilus* to full generic rank. 89 specimens examined. Collection dates from 18 June to 12 November.

Distribution: Alger, Allegan, Berrien, Cheboygan, Crawford, Gladwin, Houghton, Huron, Ingham, Iosco, Isabella, Keweenaw, Lenawee, Livingston, Midland, Muskegon, Oakland, Oceana, Oscoda, Saint Joseph, Shiawassee, Van Buren, and Washtenaw counties.

Genus PERILLUS Stål, 1862

Perillus bioculatus (Fabricius), 1803. – The two-spotted stink bug was reported from Michigan by Yothers (1911) (as *Perillus claudus*). Hussey (1922a) collected this species from the beach-drift. Stoner (1922) swept an individual from a low grassy area in a rye field and also noted a dead, presumably overwintering individual taken indoors. It was taken in a house in Livingston County on 12 March as well as in a museum on 18 October and in a house on 12 December in Washtenaw County, suggesting it may come into contact with humans as a frequent overwinterer, which also support Stoner's (1922) observation. McDaniel (1924) also discussed the economic impact of this species in Michigan, like Yothers (1911), as specifically related to the Colorado potato beetle (*Leptinotarsa decimlineata* (Say), 1824); Froeschner (1988c) cast doubt on this instance of host specificity in the predaceous pentatomid. Knight (1922, 1924) discussed the life history and variables affecting the color and color pattern of this species. De Clerq (2000) discussed the economic impact of this species. Davidová-Vilímová and McPherson (1991) described and illustrated the male genitalia. Knight (1952) reviewed and keyed the genus. 91 specimens examined. Collection dates from 11 March to 25 December.

Distribution: Alger, Antrim, Arenac, Bay, Benzie, Berrien, Branch, Cass, Cheboygan, Clinton, Eaton, Emmet, Huron, Ingham, Kalamazoo, Kent, Lapeer, Livingston, Mackinac, Macomb, Marquette, Menominee, Midland, Missaukee, Montcalm, Muskegon, Oakland, Oceana, Ottawa, Presque Isle, Saint Clair, Saint Joseph, Van Buren, Washtenaw, Wayne, and Wexford counties.

Perillus circumcinctus Stål, 1862. – McPherson (1970) reported this species from Michigan. Evans (1982a, 1982b, 1982c) provided biological information. Knight (1952) reviewed and keyed the genus. 13 specimens examined. Collection dates from 10 June to 31 July.

Distribution: Cheboygan, Houghton, Mecosta, Oakland, Roscommon, Van Buren, Washtenaw, and Wayne counties.

Perillus exaptus (Say), 1825. – This species was reported from Michigan by Stoner (1922). It has been taken in a window pane trap in Montmorency County. Knight (1952) reviewed and keyed the genus. 24 specimens examined. Collection dates from 17 April to 7 August.

Distribution: Charlevoix, Cheboygan, Chippewa, Clare, Crawford, Dickinson, Delta, Emmet, Iosco, Lake, Livingston, Mackinac, Marquette, Montmorency, Newaygo, Osceola, Roscommon, and Wexford counties.

Perillus strigipes (Herrich-Schaeffer), 1853. – Furth (1974) listed this species among the Michigan fauna based on specimens purportedly housed in the UMMZ, but McPherson (1970, 1979b) could not locate the specimens. They remain unfound. The species, however, is included in the key to facilitate identification of legitimate records. Nevertheless, it should be dropped from the Michigan faunal list until the specimens are found or additional material is collected. This species was excluded from Knight's review (1952) of *Perillus* as the *P. strigipes* was included in the genus *Mineus* Stål, 1867, until Thomas (1990) synonymized the names.

Genus PODISUS Herrich-Schaeffer, 1851

Podisus brevispinus Phillips, 1982. – Stoner (1922) and Hussey (1922a) reported this species from Michigan (both as *Podisus modestus*). Hussey (1922a) took the species "in the same situations about the Warren Woods as was [*P. maculiventris*], but not found either in the dune region or in the beach drift." Stoner (1922), however, did take this species in beach drift, and additional label data indicate it has been on beaches as well as from unspecified flowers in Cheboygan County. This species has been taken on flowers of meadow sweet (*Spiraea alba* Du Roi) in Montcalm County. It also has been collected on Drummond Island (Chippewa County). This species previously has been recorded in the United States as *Podisus modestus* (Dallas), 1851, but this name was shown to refer to *P. maculiventris*. Phillips (1983) clarified the status of *Arma modestus* Dallas, 1851 and renamed this taxon, which was accepted by Thomas (1992). Tostowaryk (1971) described the life history of this species in Quebec. Evans (1985) provided a key for separating the nymphs of this species from several of its congeners. De Clerq (2000) discussed this as one of the less economically important species. 175 specimens examined. Collection dates from 8 April to 23 October.

Distribution: Alger, Allegan, Baraga, Barry, Bay, Benzie, Berrien, Cass, Charlevoix, Cheboygan, Chippewa, Clare, Clinton, Crawford, Delta, Dickinson, Eaton, Emmet, Genesee, Gogebic, Gratiot, Houghton, Huron, Ingham, Ionia, Iosco, Iron, Isabella, Jackson, Kalamazoo, Kalkaska, Kent, Keweenaw, Lake, Lapeer, Livingston, Luce, Mackinac, Marquette, Midland, Missaukee, Monroe, Montcalm, Montmorency, Newaygo, Oakland, Oceana, Ogemaw, Ontonagon, Osceola, Oscoda, Otsego, Roscommon, Saginaw, Schoolcraft, Shiawassee, Washtenaw, and Wayne counties.

Podisus maculiventris (Say), 1832. – Commonly referred to as the spined soldier bug, *P. maculiventris* was reported from Michigan by Townsend (1890) based on "larvae, probably [*Podisus spinosus*], often found with imagos on various plants in early summer." Stoner (1922) suggested this species might be found in low, moist, grassy areas and took several specimens from willow (*Salix* sp.) and in beach drift. Hussey (1922a) reported this species "[r]ather common on various bushes and in the grass about Warren Woods...and also found in the dune region. This was one of the most common species in the beach drift." This species is the most common predatory pentatomid in Michigan and has been taken in a variety of circumstances. Label data describe one collection of *P. maculiventris* as "Sweeping fallow roadside. *Solidago* dominant. Some shrubs." in Isabella and Jackson counties. In Monroe County, it was taken under a board on a beach, and it has been taken in open woods in Washtenaw County. This species has been taken from a rotary trap in a wheat field in Berrien County as well as white and ultraviolet lights in Clinton and Livingston counties. It has

been taken from cultivated strawberries (*Fragaria* sp.) in Berrien County. A specimen from Kalamazoo County has been pinned with its moth prey, and it has been taken "feeding on *Malacosoma* sp. [Lepidoptera: Lasiocampidae] larvae" in Livingston County. Mukerji and LeRoux (1969) and McPherson (1980b) supplied information on the feedings habits of this species. Evans (1985) provided a key for separating the nymphs of this species from several of its congeners. De Clerq (2000) discussed the economic impact of this species. McDonald (1966) and Davidová-Vilímová and McPherson (1991) described the genitalia. 426 specimens examined. Collection dates from 12 April to 13 November.

Distribution: Allegan, Barry, Bay, Benzie, Berrien, Branch, Calhoun, Cass, Charlevoix, Cheboygan, Clare, Clinton, Crawford, Delta, Eaton, Genesee, Gladwin, Gratiot, Hillsdale, Houghton, Huron, Ingham, Ionia, Iosco, Isabella, Jackson, Kalamazoo, Kent, Lake, Lapeer, Leelanau, Lenawee, Livingston, Mackinac, Macomb, Manistee, Marquette, Mason, Mecosta, Menominee, Midland, Missaukee, Monroe, Montcalm, Muskegon, Newaygo, Oakland, Oceana, Ottawa, Roscommon, Saginaw, Saint Joseph, Schoolcraft, Shiawassee, Tuscola, Van Buren, Washtenaw, and Wayne counties.

Podisus neglectus (Westwood), 1837. – Blatchley (1926) recorded this species from Michigan (as *Podisus fretus* Olsen, 1916), which McPherson (1970, 1979b) tentatively included and later confirmed. Thomas (1992) synonymized *P. fretus* under Westwood's taxon. 1 specimen examined. Collection dates from 10 June to 10 September.

Distribution: Houghton and Ottawa counties.

Podisus placidus Uhler, 1870. – This species was reported from Michigan by Townsend (1890) taken on "flowers of golden rod." Stoner (1922) found this to be the most common Podisus species around Douglas Lake, taking it from swampy regions, burn-over areas, and beach drift as well as from balsam poplar (*Populus balsamifera* L.), white cedar (*Thuja occidentalis* L.), and willow (*Salix* sp.). It has been collected in a Malaise trap at 6 feet height in Manistee County and a window pane trap in Oscoda County. This asopine has been taken from eastern black oak (*Quercus velutina* Lamb.) in Livingston County. Oetting and Yonke (1971) gave bionomic information. Evans (1985) provided a key for separating the nymphs of this species from several of its congeners. De Clerq (2000) discussed this as one of the less economically important species. 92 specimens examined. Collection dates from 26 April to 9 October.

Distribution: Alcona, Allegan, Alpena, Barry, Cass, Charlevoix, Cheboygan, Clare, Clinton, Crawford, Grand Traverse, Gratiot, Huron, Ingham, Iron, Kalamazoo, Kalkaska, Lake, Lapeer, Livingston, Mackinac, Manistee, Marquette, Midland, Montcalm, Montmorency, Newaygo, Oakland, Oscoda, Otsego, Roscommon, Saint Joseph, Tuscola, Van Buren, Washtenaw, Wayne, and Wexford counties.

Podisus serieventris Uhler, 1871. – Hart (1919) reported this species from Michigan (as *Apateticus (Podisus) serieventris*). This species has been taken on tamarack (*Larix laricina* (Du Roi) Koch) and red pine (*Pinus resinosa* Sol. ex. Aiton) in Livingston County; *P. serieventris* has also been taken on tamarack in Oakland County. Prebble (1933) reported biological information. Evans (1985) provided a key for separating the nymphs of this species from several of its congeners. De Clerq (2000) discussed this as one of the less economically important species. 73 specimens examined. Collection dates from 12 April to 8 October.

Distribution: Alcona, Cheboygan, Chippewa, Crawford, Emmet, Houghton, Huron, Ingham, Iosco, Kalamazoo, Keweenaw, Lake, Leelanau, Livingston, Mackinac, Oakland, Oceana, Saint Joseph, and Washtenaw counties.

Genus RHACOGNATHUS Fieber, 1861

Rhacognathus americanus Stål, 1870. – This species was reported from Michigan by Hussey (1922a) who noted "[o]ne mutilated individual of this very rare species was found in old beach-drift." Steyskal (1938) provided additional records. The long convergent juga will easily separate this species from all other Michigan asopines. McDonald (1966) described the genitalia. 4 specimens examined. Collection dates from 25 May to 18 July.

Distribution: Berrien, Clare, Livingston, and Midland counties.

Genus STIRETRUS Laporte, 1833

Stiretrus anchorago (Fabricius), 1775. – Commonly referred to as the anchor stink bug, this species was reported from Michigan by McPherson (1970). Much variation exists in the color and color pattern of this species, and many color forms were subsequently described either as separate species or as varieties of *S. anchorago*. I follow Thomas (1992) in essentially ignoring all the color forms; nevertheless, only individuals that would fall under *Stiretrus anchorago* var. *fimbriatus* (Say), 1828 occur in Michigan. The enlarged scutellum is unique among the Michigan pentatomids, differing from the podopines, and will easily separate it from all other taxa. This species has been taken from wrinkleleaf goldenrod (*Solidago rugosa* Mill.) and early goldenrod (*S. juncea* Aiton) in Cheboygan County. Waddill and Shepard (1974) described the biology. De Clerq (2000) discussed this as one of the less economically important species. McDonald (1966) and Davidová-Vilímová and McPherson (1991) described the genitalia. 48 specimens examined. Collection dates from 18 May to 11 September.

Distribution: Arenac, Barry, Berrien, Cheboygan, Clare, Clinton, Delta, Dickinson, Gladwin, Grand Traverse, Gratiot, Huron, Ingham, Iosco, Isabella, Jackson, Kalkaska, Kent, Menominee, Midland, Missaukee, Montcalm, Montmorency, Newaygo, Ogemaw, Oscoda, Otsego, Roscommon, Tuscola, and Wexford counties.

Genus ZICRONA Amyot & Serville, 1843

Zicrona caerula (Linnaeus), 1758. – Hart (1919) reported this species from Michigan. The small habitus and shiny deep blueish color will render this species instantly recognizable within the Michigan pentatomid fauna. De Clerq (2000) discussed this as one of the less economically important species. McDonald (1966) described the genitalia. 2 specimens examined. Collection dates from 29 May to 18 June.

Distribution: Houghton and Schoolcraft counties.

Subfamily PENTATOMINAE Leach, 1815

Tribe HALYINI Amyot & Serville, 1843

Genus BROCHYMENA Amyot & Serville, 1843

Brochymena carolinensis (Westwood), 1837. – Furth (1974) listed this species among the Michigan fauna based on specimens purportedly housed in the UMMZ, but McPherson (1970, 1979b) could not locate the specimens. They remain unfound. The species, however, is included in the key to facilitate identification of legitimate records. Nevertheless, it should be dropped from the Michigan faunal list until the specimens are found or additional material is collected.

Brochymena quadripustulata (Fabricius), 1775. – The author assumes that Townsend (1890) reported this species from Michigan as *Brochymena annulata* since only two species of the genus are known from Michigan (and *B. quadripustulata* quite commonly so); McPherson (1980a) also had come to this conclusion. Nevertheless, *B. quadripustulata*, commonly referred to as the four-humped stink bug, was unequivocally reported by McPherson (1970) in his treatment of the Michigan pentatomoids. Label data describe one collection in Isabella County as "Sweeping fallow roadside. *Solidago* dominant. Some shrubs." It also has been taken on tamarack (*Larix laricina* Du Roi) in Oakland County and wild grape (*Vitis riparia* Michx.) in Livingston County. Ruckes (1946) reported this species as occasionally predaceous on soft-bodied larvae. Cuda and McPherson (1976) provided notes on the biology and laboratory rearing for this species. Gamboa and Alcock (1973) described the mating behavior, and McDonald (1966) and Davidová-Vilímová and McPherson (1991) described the genitalia. Ruckes (1946) keyed the genus, and Larivière (1992) keyed those species excluded from the *arborea* group. 216 specimens examined. Collection dates from 20 March to 30 November.

Distribution: Allegan, Barry, Bay, Berrien, Cass, Charlevoix, Chippewa, Clare, Clinton, Crawford, Eaton, Genesee, Gladwin, Grand Traverse, Gratiot, Hillsdale, Ingham, Ionia, Isabella, Jackson, Kalamazoo, Kent, Lapeer, Lenawee, Livingston, Manistee, Mecosta, Menominee, Midland, Oakland, Ottawa, Saginaw, Saint Clair, Saint Joseph, Sanilac, Shiawassee, Van Buren, Washtenaw, and Wayne counties.

Genus PARABROCHYMENA Larivière, 1992

Parabrochymena arborea (Say), 1825. – Townsend (1890) reported this rough stink bug, a name commonly used for members of the genus, from Michigan (as *Brochymena arborea*). It has been taken under leaves at the edge of woodlands and on red maple (*Acer rubrum* L.) in Livingston County. Although primarily an herbivorous species, Hart (1919) recorded it attacking larvae of the Colorado potato beetle (*Leptinotarsa decimlineata* (Say), 1824), Larivière (1990, 1992, 1994) described and revised the new genus for the members of the *arborea* species group, and several studies done on genitalic morphology (Ahmad and McPherson 1998; McPherson and Ahmad 2005, 2007) support the monophyly of the group. Cuda and McPherson (1976) provided biological notes for this species. McDonald (1966) described the genitalia. Ruckes (1946) keyed the genus, and Larivière (1994) keyed the members of the genus. 32 specimens examined. Collection dates from 26 March to 1 November.

Distribution: Barry, Clinton, Ingham, Ionia, Isabella, Kalamazoo, Lake, Lapeer, Livingston, Midland, Oakland, Ottawa, Saint Joseph, Shiawassee, and Washtenaw counties.

Tribe PENTATOMINI Leach, 1815

Genus AELIA Fabricius, 1803

Aelia americana Dallas, 1851. – McPherson (1970) reported this species from Michigan. Old World species of *Aelia* are well known pests of wheat (Kretovich 1944), and Panizzi et al. (2000) treated this as one of the less economically important species. McDonald (1966) described the genitalia. 5 specimens examined. Collection dates from 16 July to 7 October.

Distribution: Cheboygan, Houghton, Luce, and Marquette counties.

Genus BANASA Stål, 1860

Banasa calva (Say), 1832. – McPherson (1970) reported this species from Michigan. It has been taken at lights in Mason and Otsego counties. DeCoursey (1963) provided notes on the life history of this species. Davidová-Vilímová and McPherson (1991) described and illustrated the male genitalia. Thomas and Yonke (1981, 1985) reviewed, keyed, and provided a cladistic analysis of the genus, and Hoffman (2005) keyed several of the eastern species. 46 specimens examined. Collection dates from 27 May to 13 November.

Distribution: Benzie, Ingham, Livingston, Mason, Otsego, Ottawa, Saint Joseph, and Washtenaw counties.

Banasa dimidiata (Say), 1832. – This species was reported from Michigan by Stoner (1922) and Hussey (1922a). Stoner (1922) indicated this species showed a strong preference for white cedar (*Thuja occidentalis* L.) as a host, but a few specimens also were taken from round-leaved dogwood (*Cornus rugosa* Lam.), blueberry (*Vaccinium* sp.), and Canadian service berry (*Amelanchier canadensis* (L.) Medik.); it also was found in beach drift. This species has been taken on Drummond Island (Chippewa County) and Mackinac Island (Mackinac County). Label data indicate *B. dimidiata* has been taken in a hickory-oak forest in Calhoun County and at white and ultraviolet lights in Clinton, Livingston, Saint Joseph, and Washtenaw counties. This species has been taken on goldenrod (*Solidago* sp.) in Clinton County and chokecherry (*Prunus virginiana* L.) in Washtenaw County, as well as white cedar (*Thuja occidentalis* L.), and flowers of oxeye daisy (*Leucanthemum vulgare* Lam.) and carolina rose (*Rosa carolina* L.) in Cheboygan County. Over the last century, this pentatomid has been recorded variously under the original spelling, *B. dimidiata* (i.e., Froeschner 1988c) and the emendation *B. dimidiata* (i.e., Thomas and Yonke 1981, Hoffman 2005). DeCoursey (1963) provided notes on the life history of this species. McDonald (1966) and Davidová-Vilímová and McPherson (1991) described the genitalia. Thomas and Yonke (1981, 1985) reviewed, keyed, and provided a cladistic analysis of the genus, and Hoffman (2005) keyed several of the eastern species. 410 specimens examined. Collection dates from 20 April to 10 November.

Distribution: Alcona, Alpena, Antrim, Arenac, Bay, Benzie, Berrien, Calhoun, Cass, Charlevoix, Cheboygan, Chippewa, Clare, Clinton, Crawford, Delta, Dickinson, Emmet, Genesee, Gladwin, Grand Traverse, Houghton, Huron, Ingham, Iosco, Isabella, Jackson, Kalamazoo, Kalkaska, Kent, Keweenaw, Lapeer, Leelanau, Livingston, Mackinac, Macomb, Manistee, Marquette, Mason, Mecosta, Midland, Missaukee, Montcalm, Newaygo, Oakland, Oceana, Ontonagon, Osceola, Otsego, Presque Isle, Roscommon, Saginaw, Saint Joseph, Schoolcraft, Shiawassee, Tuscola, Van Buren, Washtenaw, Wayne, and Wexford counties.

Banasa euchlora Stål, 1872. – Commonly called the juniper stink bug, one individual of *B. euchlora*, bearing the following label data, was examined by the author: MICHIGAN: Washtenaw Co., Ann Arbor, 10 January 1976, I. J. Cantrall, det. I. J. Cantrall 1976 [1 female] (UMMZ). A secondary label seems to negate the possibility of a mislabelled specimen: "Introduced? Found on cedar twigs in planter from local greenhouse." It seems very likely that Cantrall's suspicions were correct, and this individual represents an accidental introduction. This species is currently recorded from Alabama, Arizona, Arkansas, Colorado, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Maryland, Nevada, New Jersey, New Mexico, New York, North Carolina, Oklahoma, South Carolina, Texas, Utah, and Virginia (Froeschner 1988c) and shows a preference for juniper (*Juniperus* sp.) (Thomas and Yonke 1981). It should, however, be excluded from the Michigan faunal list, until it can be demostrated that a population persists in the state; nevertheless, it remains a potentially adventive species. The species is easily separated from other Michigan *Banasa* by the distinct white callosities at the basal angles of the scutellum.

Banasa sordida (Uhler), 1871. – (**NEW STATE RECORD**). Two individuals of this pentatomid were examined by the author. Label data as follows: MICHIGAN: Saint Joseph Co., Klinger Lake, 9 May 1979, D. C. L. & N. M. Gosling, det. D. R. Swanson 2012 [1 male]; idem. 17 July 1983 [1 female] (UMMZ). The dates of the two collections indicate the likelihood of an established population in southern Michigan. Currently recorded from Arizona, California, Colorado, District of Columbia, Illinois, Massachusetts, Maryland, New Jersey, New Mexico, Utah, Virginia, Washington, British Columbia, and Ontario (Froeschner 1988c), it is plausible that this species occurs in Michigan; furthermore, Thomas and Yonke (1981) characterized the distribution of *B. sordida* as "Entire U.S., northern Mexico and southern Canada." The long rostrum, which reaches the base of the tubercle-bearing sternite, is a distinctive feature. Thomas and Yonke (1981, 1985) reviewed, keyed, and provided a cladistic analysis of the genus, and Hoffman (2005) keyed several of the eastern species. 2 specimens examined. Collection dates from 9 May to 17 July.

Distribution: Saint Joseph County.

Genus CHINAVIA Orian, 1965

Chinavia hilaris (Say), 1832. – Hussey (1922a) reported the green stink bug from Michigan, where many individuals were collected from beach drift as well as beaten from various trees. A female sand wasp, *Bicyrtes quadrifasciatus* (Say), 1824 (Crabronidae: Bembicinae), was taken with a late-instar nymph of this pentatomid as prey in Oakland County. Label data indicate *C. hilaris* has been taken from a Malaise trap at 6 feet height in Newaygo County and white and ultraviolet lights in Livingston and Saint Joseph counties. This conspicuous species is known to attack several commercial crops and may cause significant damage in large numbers; Panizzi et al. (2000) dealt with the economic importance of this species. Olsen (1912) recorded this species occasionally attacking soft-boded larvae. McPherson and Tecic (1997) reported on the life history of this species. Davidová-Vilímová and McPherson (1991) described and illustrated the male genitalia. Rolston (1983) revised the group encompassing those species found in the United States. The members of this genus previously were placed in *Acrosternum* Fieber, 1860, with *Chinavia* variously accorded generic, subgeneric, or synonymic rank. However, *Acrosternum* has been restricted to a group of Old World taxa and the generic status of *Chinavia* seems to be well supported and generally accepted (Ahmad 1996; Schwertner 2005; Schwertner and Grazia 2006, 2007; Genevcius et al. 2012). 285 specimens examined. Collection dates from 10 January to 11 December.

Distribution: Allegan, Baraga, Barry, Bay, Benzie, Berrien, Branch, Calhoun, Cass, Cheboygan, Clinton, Eaton, Gratiot, Hillsdale, Houghton, Ingham, Isabella, Jackson, Kalamazoo, Lapeer, Lenawee, Livingston, Mackinac, Macomb, Marquette, Mason, Menominee, Midland, Monroe, Montcalm, Muskegon, Newaygo, Oakland, Oceana, Ottawa, Saginaw, Saint Joseph, Shiawassee, Van Buren, Washtenaw, and Wayne counties.

Chinavia pensylvanica (Gmelin), 1790. – This species was reported from Michigan by Hussey (1922a), who noted a single specimen "swept from low vegetation at the base of a dune." McDonald (1966) described the genitalia. Rolston (1983) revised the group encompassing those species found in the United States. As mentioned above, this species previously was placed in *Acrosternum*, a genus now restricted to a group of Old World species. 25 specimens examined. Collection dates from 5 June to 4 October.

Distribution: Berrien, Cass, Ingham, Lapeer, Livingston, Saint Joseph, and Van Buren counties.

Genus CHLOROCHROA Stål, 1872

Subgenus CHLOROCHROA Stål, 1872

Chlorochroa persimilis Horvath, 1908. – Townsend's record (1890) of a nymph of *Lioderma ligata* is referred here. Stoner (1922) reported this species (as *Chlorochroa uhleri*) on smooth sumac (*Rhus glabra* L.), lowbush blueberry (*Vaccinium angustifolium* Aiton), and black huckleberry (*Gaylussacia baccata* (Wangenh.) Koch). Hussey (1922a) noted this species (under the same binomial as Stoner) taken on flowering spurge (*Euphorbia corollata* L.) on the dunes and among beach drift; nymphs also were frequently taken on milkweed (*Asclepias* sp.). Label data indicate this species has been taken on wild rose (*Rosa blanda* Gray) and sumac (*Rhus* sp.) in Cheboygan County as well as on common juniper (*Juniperus communis* L.) in Livingston County. Davidová-Vilímová and McPherson (1991) described and illustrated the male genitalia. Buxton et al. (1983) revised the *sayi* group, the complex to which this taxon belongs, and Thomas (1983) treated the group relationships within the genus. 156 specimens examined. Collection dates from 9 April to 17 November.

Distribution: Alger, Baraga, Benzie, Berrien, Charlevoix, Cheboygan, Chippewa, Crawford, Emmet, Gladwin, Grand Traverse, Huron, Ingham, Iosco, Jackson, Kalkaska, Keweenaw, Lake, Lapeer, Livingston, Mackinac, Marquette, Mecosta, Midland, Missaukee, Montmorency, Muskegon, Oakland, Oscoda, Roscommon, Saint Joseph, Schoolcraft, Shiawassee, Washtenaw, and Wexford counties.

Genus COENUS Dallas, 1851

Coenus delius (Say), 1832. – This species was reported from Michigan by Stoner (1922) and Hussey (1922a). Stoner (1922) took a few individuals among beach drift and swept several specimens from wild raspberry (*Rubus* sp.). Hussey (1922a) noted this uncommon species "taken from grass by a creek...[and] at the edge of a cranberry bog." Label data indicate *C. delius* has been taken on common mullein (*Verbascum thapsus* L.) in Livingston County and "[s]weeping brackensweet fern fallow field" in Isabella County. Oetting and Yonke (1971) provided biological information for this species. McDonald (1966) and Davidová-Vilímová and McPherson (1991) described the genitalia. Rider (1995) reviewed the genus. 139 specimens examined. Collection dates from 20 March to 9 November.

Distribution: Allegan, Barry, Bay, Berrien, Calhoun, Cass, Cheboygan, Crawford, Emmet, Gogebic, Hillsdale, Huron, Ingham, Iosco, Isabella, Jackson, Kalamazoo, Kalkaska, Kent, Lake, Lapeer, Lenawee, Livingston, Mackinac, Mason, Mecosta, Midland, Missaukee, Montmorency, Newaygo, Oakland, Oscoda, Otsego, Ottawa, Presque Isle, Roscommon, Saginaw, Saint Clair, Schoolcraft, Van Buren, Washtenaw, and Wayne counties.

Genus COSMOPEPLA Stål, 1867

Cosmopepla lintneriana Kirkaldy, 1909. – This species was reported from Michigan by Townsend (1890) (as *Cosmopepla carnifex*) who reported "numbers flying in late summer," although Hussey (1922a) found it "surprisingly uncommon" in Berrien County. Stoner (1922) swept this species from rough cinquefoil (*Potentilla norvegica* L.) in low moist areas. This species was taken on swamp milkweed (*Asclepias incarnata* L.) in Livingston County, parsnip (*Pastinaca sativa* L.) in Washtenaw County, and "feeding on *Ranunculus* seeds" in Cheboygan County. It also was collected from Stone Ring Marsh in the Edwin S. George Reserve (Livingston County). This species also has been collected on Isle Royale (Keweenaw County). In the past, *C. lintneriana* has been treated under the name *Cosmopepla bimaculata* (Thomas), 1865, but Rider and Rolston

(1995) clarified the nomenclature. Olsen (1910) and Fish and Alcock (1973) discussed its behavior. McDonald (1966) and Davidová-Vilímová and McPherson (1991) described the genitalia. McDonald (1968b), McPherson (1976b), and McPherson and Tecic (1997) provided notes on the life history, and McDonald (1986) revised the genus. 718 specimens examined. Collection dates from 1 March to 13 November.

Distribution: Alcona, Alger, Allegan, Baraga, Bay, Benzie, Berrien, Branch, Calhoun, Cass, Charlevoix, Cheboygan, Chippewa, Clinton, Delta, Dickinson, Eaton, Emmet, Genesee, Gladwin, Gogebic, Grand Traverse, Gratiot, Hillsdale, Houghton, Huron, Ingham, Ionia, Iosco, Jackson, Kalamazoo, Kalkaska, Kent, Keweenaw, Lake, Lapeer, Lenawee, Livingston, Mackinac, Macomb, Marquette, Mason, Menominee, Midland, Missaukee, Monroe, Montcalm, Montmorency, Muskegon, Newaygo, Oakland, Oceana, Ogemaw, Ontonagon, Otsego, Presque Isle, Saginaw, Saint Clair, Saint Joseph, Sanilac, Schoolcraft, Shiawassee, Tuscola, Van Buren, Washtenaw, Wayne, and Wexford counties.

Genus DENDROCORIS Bergroth, 1891

Dendrocoris humeralis (Uhler), 1877. – McPherson (1970) reported this species from Michigan. This pentatomid has been taken in a prairie in Saint Joseph County and on black oak (*Quercus velutina* Lamb.) in Livingston County. McDonald (1966) and Davidová-Vilímová and McPherson (1991) described the genitalia. Nelson (1955) revised and Thomas and Brailovsky (1999) reviewed and keyed the genus. 62 specimens examined. Collection dates from 26 April to 13 November.

Distribution: Berrien, Huron, Ingham, Jackson, Lake, Livingston, Midland, Newaygo, Oakland, Saint Joseph, Shiawassee, Van Buren, Washtenaw, and Wayne counties.

Genus EUSCHISTUS Dallas, 1851

Euschistus ictericus (Linnaeus), 1763. – This species was reported from Michigan by Hussey (1922a) who found it "sweeping sedges and grasses in more or less marshy localities, a few were secured from *Saururus cernuus*." It also has been taken in a grass prairie in Calhoun County and from "[m]ixed iris-carex" in Livingston County. McPherson and Paskewitz (1984a) provided information on the life history of this species. Drickamer and McPherson (1992) compared the mating behavior of this species with several congeners and *Thyanta custator accerra*. 62 specimens examined. Collection dates from 17 May to 13 November.

Distribution: Barry, Bay, Berrien, Calhoun, Cheboygan, Huron, Iosco, Kent, Lapeer, Livingston, Monroe, Oakland, Oceana, Saint Joseph, Washtenaw, and Wexford counties.

Euschistus politus Uhler, 1897. – Blatchley (1926) included Michigan in the range of *E. politus* without citing specific localities. It has been collected from a Malaise trap in Lake County. McPherson (1974a) provided biological information for this species. Drickamer and McPherson (1992) compared the mating behavior of this species with several congeners and *Thyanta custator accerra*. 32 specimens examined. Collection dates from 11 May to 26 August.

Distribution: Clare, Crawford, Huron, Iosco, Lake, Livingston, Manistee, Mecosta, Midland, Muskegon, Saint Joseph, Van Buren, and Washtenaw counties.

Euschistus servus euschistoides (Vollenhoven), 1868. – This species was reported from Michigan by Townsend (1890) (as *Euschistus fissilis*). Stoner (1922) reported it from Michigan (as *Euschistus euschistoides*) and suggested it had a bivoltine life cycle around Douglas Lake, based on the emergence of nymphs. Stoner also recorded the species on smooth sumac (*Rhus glabra* L.),

raspberry, and blackberry (*Rubus* spp.) as well as from open woods, grassy fields, cultivated areas, burned-over regions, and beach drift. Hussey (1922a) also took it from grassy areas, "especially in the hay fields and by the roadsides... and, more rarely, in clearings on the dunes"; he also found it abundant in beach drift. This species has been taken in from a field in Calhoun County, a moist meadow in Newaygo County, and Stone Ring Marsh in the Edwin S. George Reserve (Livingston County). Label data describe one locality as "Sweeping fallow roadside. *Solidago* dominant. Some shrubs." in Isabella County. It has been collected from milkweed (*Asclepias* sp.) in Cheboygan County and common mullein (*Verbascum thapsus* L.) in Isabella and Livingston counties. A pair also was taken in copula on common milkweed (*Asclepias syriaca* L.) in Livingston County. This is, by far, the more common form of *E. servus* found in Michigan, although there is certainly some question as to the validity of the subspecies. In absence of definitive studies, I have chosen to conserve the traditional view of the two subspecies for this treatment. Youther and McPherson (1975) and Munyaneza and McPherson (1994) provided information on the life history of this species. Culliney (1985) summarized the occasional predaceous habits of this species. Panizzi et al. (2000) dealt with the economic importance of this species. Drickamer and McPherson (1992) compared the mating behavior of this species with several congeners and *Thyanta custator accerra*. Davidová-Vilímová and McPherson (1991) described and illustrated the male genitalia. Rolston (1974) revised the *Euschistus* species of Middle America. 553 specimens examined. Collection dates from 15 April to 13 November.

Distribution: Alcona, Alger, Allegan, Arenac, Baraga, Barry,Bay, Berrien, Calhoun, Cass, Charlevoix, Cheboygan, Chippewa, Clare, Clinton, Crawford, Dickinson, Eaton, Genesee, Gladwin, Gogebic, Grand Traverse, Gratiot, Hillsdale, Houghton, Huron, Ingham, Ionia, Iosco, Iron, Isabella, Jackson, Kalamazoo, Kent, Keweenaw, Lake, Lapeer, Lenawee, Livingston, Luce, Mackinac, Macomb, Manistee, Marquette, Mason, Mecosta, Menominee, Midland, Missaukee, Montcalm, Montmorency, Newaygo, Oakland, Oceana, Oscoda, Otsego, Ottawa, Presque Isle, Roscommon, Saginaw, Saint Joseph, Schoolcraft, Shiawassee, Van Buren, Washtenaw, Wayne, and Wexford counties.

Euschistus servus servus (Say), 1832. – As Townsend (1890) had already reported the other subspecies as *E. fissilis* (see above), it is assumed that his record of *E. servus* refers to the nominate subspecies. Townsend reported it on the bud of a dandelion (*Taraxacum officinale* F. H. Wigg). Although the subspecies have been retained, all literature relevant to *E. servus* is listed under the above account. 6 specimens examined. Collection dates from 22 April to 18 August.

Distribution: Cass, Clinton, Hillsdale, Ingham, Kalamazoo, and Saint Joseph counties.

Euschistus tristigmus luridus Dallas, 1851. – Townsend's (1890) record of *E. tristimus* is reported under this subspecies as it is by the far the more common form in Michigan. Still it should be noted that since his collections were taken in the southernmost line of counties in Michigan, this is very close to the purported overlap zone between the subspecies, and the record's placement here is purely subjective. Townsend collected this species on holly-hock seed-cups (*Alcea* sp.). Stoner's (1922) record of *E. tristigmus* also is referred here, and he reported the species from beach drift and such plants as smooth sumac (*Rhus glabra* L.), willow (*Salix* sp.), raspberry (*Rubus idaeus* L.), and blackberry (*Rubus* sp.). Hussey (1922a) reported of this species:

> "Fairly common...especially in damp localities; specimens were taken from *Saururus cernuus*, from marsh grasses, and from *Benzoin aestivale*...from wild rose and from the button-bush (*Cephalanthus occidentalis*). No specimens were taken in the dune region, nor were any found in the beach drift."

Label data indicate collections of *E. t. luridus* from many situations: a beach in Cheboygan County, a moist meadow in Newaygo County, night lights in Livingston County as well as in open woods and strangely, under bark in Washtenaw County. One collection from Isabella County is described as "Sweeping fallow roadside. *Solidago* dominant. Some shrubs." The species also has been taken from tamarack (*Larix laricina* (Du Roi) Koch), swamp birch (*Betula pumila* L.), and the leaves of common milkweed (*Asclepias syriaca* L.) in Livingston County as well as feeding on flowering spurge (*Euphorbia corollata* L.) in Isabella County and in copula on roadside elderberry (*Sambucus* sp.) in Washtenaw County. It has also been taken on flowers of several plants: meadow sweet (*Spiraea alba* Du Roi) in Montcalm County, sumac (*Rhus* sp.) in Benzie County, and oxeye daisy (*Leucanthemum vulgare* Lam.) in Cheboygan County. It also has been collected on Isle Royale (Keweenaw County). A large series of studies (McPherson 1971b, 1974b, 1975a, 1975b, 1976a, 1979a, 1979c; McPherson and Vangeison 1975; Clair and McPherson 1981; McPherson and Paskewitz 1982b) have sought to elucidate the life cycle and the relationship between certain variable morphological features and photoperiod in *E. tristigmus*. Additionally, the status of the subspecies remains questionable, although I have followed the traditional treatment. Culliney (1985) summarized the occasional predaceous habits of this species. Panizzi et al. (2000) treated this as one of the less economically important species. Drickamer and McPherson (1992) compared the mating behavior of this species with several congeners and *Thyanta custator accerra*. McDonald (1966) described the genitalia. Rolston (1974) revised the *Euschistus* species of Middle America. 866 specimens examined. Collection dates from 14 January to 21 December.

Distribution: Alger, Allegan, Alpena, Antrim, Arenac, Baraga, Barry, Bay, Benzie, Berrien, Calhoun, Cass, Charlevoix, Cheboygan, Chippewa, Clare, Clinton, Crawford, Delta, Dickinson, Eaton, Emmet, Genesee, Gladwin, Gogebic, Gratiot, Hillsdale, Houghton, Huron, Ingham, Ionia, Iosco, Iron, Isabella, Jackson, Kalamazoo, Kalkaska, Kent, Keweenaw, Lake, Lapeer, Lenawee, Livingston, Luce, Mackinac, Macomb, Manistee, Marquette, Mason, Mecosta, Menominee, Midland, Missaukee, Monroe, Montcalm, Montmorency, Newaygo, Oakland, Oceana, Ogemaw, Ontonagon, Osceola, Oscoda, Otsego, Presque Isle, Roscommon, Saginaw, Saint Clair, Saint Joseph, Sanilac, Schoolcraft, Shiawassee, Tuscola, Van Buren, Washtenaw, Wayne, and Wexford counties.

Euschistus tristigmus tristigmus (Say), 1832. – I could not locate the MSUC specimens referred to *Euschistus tristigmus pyrrhocerus* (Herrich-Schaeffer), 1841 by McPherson (1970). Furthermore, McPherson (1980a) subsequently did not include Michigan in the distribution of the nominate subspecies. Although the subspecies have been retained, all literature relevant to *E. tristigmus* is listed under the above account. No specimens examined. Collection dates (from McPherson 1970) from 18 July to 19 September.

Distribution: Berrien, Hillsdale, and Kalamazoo counties.

Euschistus variolarius (Palisot), 1817. – This species was reported from Michigan by Townsend (1890) from mullein in fields and raspberry bushes in gardens. Stoner (1922) recorded this species from lakeshore grasses and beach drift. Hussey (1922a) noted:

> "The most abundant pentatomid in southern Michigan...though less common in the dunes than in the other collecting localities. It occurred chiefly in the hayfields and on golden-rod, ragweed, and mullein; and during the second half of July it was the most abundant hemipteron found in the beach drift."

Label data indicate *E. variolarius* has been taken from red clover (*Trifolium pratense* L.) in Branch, Calhoun, Eaton, Hillsdale, Ingham, Ionia, Kalamazoo, Lenawee, Mecosta, Montcalm, Saint Joseph, and Washtenaw counties. Additional label data indicate it has been taken from beach drift in Berrien

County, a farm field in Calhoun County, a moist meadow in Newaygo County, and in Stone Ring Marsh in the Edwin S. George Reserve (Livingston County). It has been taken on flowering spurge (*Euphorbia corollata* L.) and cultivated strawberries (*Fragaria* sp.) in Berrien County as well as willow (*Salix* sp.) in Huron County. This species has been collected in a rotary trap in a wheat field in Berrien County. Munyaneza and McPherson (1994) provided information on the life history of this species. Culliney (1985) summarized the occasional predaceous habits of this species. Panizzi et al. (2000) treated this as one of the less economically important species. Drickamer and McPherson (1992) compared the mating behavior of this species with several congeners and *Thyanta custator accerra*. Rolston (1974) revised the *Euschistus* species of Middle America. 744 specimens examined. Collection dates from 14 January to 28 November.

Distribution: Alger, Allegan, Baraga, Barry, Bay, Berrien, Branch, Calhoun, Cass, Cheboygan, Clinton, Crawford, Dickinson, Eaton, Emmet, Genesee, Gogebic, Gratiot, Hillsdale, Houghton, Huron, Ingham, Ionia, Jackson, Kalamazoo, Kent, Lake, Lapeer, Lenawee, Livingston, Macomb, Manistee, Mason, Mecosta, Midland, Missaukee, Monroe, Montcalm, Montmorency, Newaygo, Oakland, Oceana, Ottawa, Presque Isle, Roscommon, Saginaw, Saint Joseph, Schoolcraft, Shiawassee, Tuscola, Van Buren, Washtenaw, and Wayne counties.

Genus HALYOMORPHA Mayr, 1864

Halyomorpha halys (Stål), 1855. – Michigan was recently added to the list of states encompassing the growing range of the brown marmorated stink bug (Michigan Department of Agriculture and Rural Development 2011). However, this invasive Asiatic species is probably more widely distributed in the state than the sparse records indicate. Considered to be a major pest of many commercial crops, *H. halys* also may be a frequent and conspicuous overwintering guest in human habitations. Hoebeke and Carter (2003) reported this species from the United States, and Nielsen and Hamilton (2009) studied the life history of this species in the northeastern United States. 2 specimens examined. Collection dates from 30 April to 24 July.

Distribution: Berrien, Eaton, Oceana, and Washtenaw counties.

Genus HOLCOSTETHUS Fieber, 1860

Holcostethus fulvipes (Ruckes), 1957. – McPherson (1979b) reported this species from Michigan, citing a specimen taken on common juniper (*Juniperus communis* L.) in Livingston County. McPherson also clarified that the specimen on which the Michigan records of *Holcostethus abbreviatus* Uhler, 1872 were based in his previous treatment (McPherson 1970) were misidentified individuals of *H. fulvipes*; thus, *H. abbreviatus* is not known from Michigan. McDonald (1974, 1982) revised the genus. 5 specimens examined. Collection dates from 12 May to 27 July.

Distribution: Charlevoix, Livingston, and Montcalm counties.

Holcostethus limbolarius (Stål), 1872. – This species was reported from Michigan by Townsend (1890) (as *Peribalus limbolarius*). Stoner (1922) reported a single individual from an oat field. Hussey (1922a) reported it abundant in the fields. Label data indicate *H. limbolarius* has been taken from a field in Calhoun County, corroborating the two authors' observations. It has been collected on common mullein (*Verbascum thapsus* L.) and flowers of catsfoot (*Antennaria* sp.) in Livingston County as well as on cedar (*Thuja* sp.) and goldenrod (*Solidago* sp.) in Washtenaw County. This species also has been collected on Isle Royale (Keweenaw County). McDonald (1966) and Davidová-Vilímová and McPherson (1991) described the genitalia. McDonald (1974, 1982) revised the genus. 159 specimens examined. Collection dates from 13 April to 13 November.

Distribution: Allegan, Bay, Benzie, Berrien, Calhoun, Cass, Cheboygan, Clinton, Crawford, Emmet, Gratiot, Huron, Ingham, Ionia, Jackson, Kent, Keweenaw, Lapeer, Livingston, Mackinac, Mecosta, Midland, Muskegon, Oakland, Osceola, Ottawa, Saginaw, Saint Joseph, Schoolcraft, Tuscola, Van Buren, Washtenaw, and Wayne counties.

Holcostethus mcdonaldi Rider and Rolston, 1995. – Furth (1974) reported this species from Michigan, and McPherson (1979b) corroborated the record and provided an additional locality. In the past, this species has been treated under the binomial *Holcostethus piceus* (Dallas), 1851, but Rider and Rolston (1995) clarified the status of *Pentatoma picea* and renamed the Nearctic taxon. McDonald (1974, 1982) revised the genus. 2 specimens examined. Collection dates from 21 to 26 June.

Distribution: Alger and Cheboygan counties.

Genus HYMENARCYS Amyot & Serville, 1843

Hymenarcys nervosa (Say), 1832. – This species was reported from Michigan by Hussey (1922a) who noted it taken from fresh herbage by a spring, a hayfield, and under the bark of a beech stump at the edge of the woods. McDonald (1966) and Davidová-Vilímová and McPherson (1991) described the genitalia. Rolston (1973) reviewed the genus. 17 specimens examined. Collection dates from 11 February to 13 November.

Distribution: Berrien, Ingham, Livingston, and Washtenaw counties.

Genus MCPHERSONARCYS Thomas, 2012

Mcphersonarcys aequalis (Say), 1832. – This species was reported from Michigan by McPherson (1970) under the genus *Hymenarcys*. Rolston (1973) noted several differences between *H. aequalis* and its congeners, and Thomas (2012) subsequently erected a genus for the species. Esselbaugh (1947) provided biological information for this species. 5 specimens examined. Collection dates from 4 May to 3 October.

Distribution: Clinton, Crawford, Kalamazoo, Livingston, Washtenaw, and Wayne counties.

Genus MENECLES Stål, 1867

Menecles insertus (Say), 1832. – Hussey (1922a) reported *Menecles incertus* [sic] from Michigan in beach drift. Label data indicate this species has been taken on red maple (*Acer rubrum* L.) in Mason County. The deep set head is a unique character among the Michigan pentatomids. Balduf (1945) provided bionomic notes for this species. McDonald (1966) and Davidová-Vilímová and McPherson (1991) described the genitalia. Rolston (1972) reviewed the genus. 130 specimens examined. Collection dates from 23 March to 19 December.

Distribution: Antrim, Berrien, Cheboygan, Clinton, Ingham, Ionia, Isabella, Lake, Lapeer, Livingston, Mason, Mecosta, Missaukee, Oakland, Saint Joseph, and Washtenaw counties.

Genus MORMIDEA Amyot and Serville, 1843

Subgenus MELANOCHILA Stål, 1872

Mormidea lugens (Fabricius), 1775. – This species was reported from Michigan by Townsend (1890) on leaves of oak (*Quercus* sp.). Stoner (1922) took a single nymph from reeds, and Hussey (1922a) found the species common, particularly in shaded grasses, and collected it from raspberry (*Rubus* sp.),

beds of lizard's tail (*Saururus cernuus* L.), and "sedge zones in the marshes." The author has swept *M. lugens* from low grass in open woodlands in Oakland and Washtenaw counties, thus supporting one of Hussey's observations. This species also has been taken in Stone Ring Marsh in the Edwin S. George Reserve (Livingston County). However, *M. lugens* seems to be most commonly associated with grasses and sedges (McPherson 1974a, Rolston 1978); thus, several of the aforementioned plant records may represent incidental encounters. McPherson (1974a) provided biological notes for this species. McDonald (1966) and Davidová-Vilímová and McPherson (1991) described the genitalia. Rolston (1978) revised the genus. 368 specimens examined. Collection dates from 2 May to 13 November.

Distribution: Alcona, Allegan, Arenac, Bay, Berrien, Branch, Calhoun, Cass, Cheboygan, Clare, Clinton, Crawford, Dickinson, Eaton, Emmet, Genesee, Gratiot, Huron, Ingham, Ionia, Iosco, Jackson, Kalamazoo, Kalkaska, Kent, Lake, Lapeer, Lenawee, Livingston, Manistee, Mecosta, Menominee, Midland, Missaukee, Monroe, Montmorency, Newaygo, Oakland, Oceana, Ogemaw, Osceola, Oscoda, Otsego, Roscommon, Saginaw, Saint Joseph, Sanilac, Shiawassee, Tuscola, Van Buren, Washtenaw, and Wayne counties.

Genus MURGANTIA Stål, 1862

Murgantia histrionica (Hahn), 1834. – Furth (1974) listed the harlequin bug among the Michigan fauna based on specimens purportedly housed in the UMMZ, but McPherson (1970, 1979b) could not locate the specimens. They remain unfound. The species, however, is included in the key to facilitate identification of legitimate records. Nevertheless, it should be dropped from the Michigan faunal list until the specimens are found or additional material is collected.

Genus NEOTTIGLOSSA Kirby, 1837

Subgenus NEOTTIGLOSSA Kirby, 1837

Neottiglossa trilineata (Kirby), 1837. – This species was reported from Michigan by Hussey (1922b). Blatchley (1926) and Torre-Bueno (1939) also included Michigan in the range for this species. No additional data other than that given by McPherson (1970) is available regarding this species in Michigan. McDonald (1966) described the genitalia. Rider (1989) revised the genus. 1 specimen examined. Collection dates is 31 May.

Distribution: Mackinac County.

Neottiglossa undata (Say), 1832. – The record of *Neottiglossa sulcifrons* Stål, 1872 reported by Townsend (1890) surely refers to this species as suggested by Hussey (1921). Hussey (1922a) found the species uncommon, but Stoner (1922) reported it numerous on bluegrass (*Poa* sp.) and redtop (*Agrostis* sp.) in association with aspen (*Populus* sp.) and other moist places. Label data indicate *N. undata* has been taken under oak (*Quercus* sp.) leaves in Livingston County and swept from an open field in Oakland County. It also has been collected on Isle Royale (Keweenaw County). Rider (1989) revised the genus. 234 specimens examined. Collection dates from 18 April to 13 November.

Distribution: Alcona, Alpena, Antrim, Arenac, Barry, Bay, Benzie, Berrien, Charlevoix, Cheboygan, Clare, Clinton, Crawford, Dickinson, Emmet, Genesee, Gladwin, Gogebic, Hillsdale, Huron, Ingham, Ionia, Iosco, Iron, Jackson, Kalamazoo, Kalkaska, Kent, Keweenaw, Lapeer, Lenawee, Livingston, Mackinac, Marquette, Mason, Mecosta, Menominee, Midland, Missaukee, Montmorency, Newaygo, Oakland, Otsego, Roscommon, Saint Joseph, Schoolcraft, Shiawassee, Van Buren, Washtenaw, Wayne, and Wexford counties.

Genus OEBALUS Stål, 1862

Oebalus pugnax pugnax (Fabricius), 1775. – Commonly known as the rice stink bug, this species is easily recognized by the anteriorly-directed humeral spines. Steyskal (1938) reported this species from Michigan; no additional data is available regarding this species in Michigan. This is one of the more agriculturally destructive species; Panizzi et al. (2000) dealt with the economic importance of this species. McDonald (1966) and Davidová-Vilímová and McPherson (1991) described the genitalia. Sailer (1944) revised the genus under the name *Solubea* Bergroth, 1891 and subsequently clarified the validity of the generic name (Sailer 1957). 3 specimens examined. Collection dates from 30 May to 20 September.

Distribution: Berrien and Wayne counties.

Genus PRIONOSOMA Uhler, 1863

Prionosoma podopioides Uhler, 1863. – This rare pentatomid was reported from Michigan in McPherson's faunal list (1970); no additional data is available regarding this species in Michigan. The notched humeral angles render *P. podopioides* instantly recognizable among the pentatomids of Michigan. McDonald (1966) and Davidová-Vilímová and McPherson (1991) described the genitalia. 2 specimens examined. Collection date is 14 August.

Distribution: Hillsdale County.

Genus THYANTA Stål, 1860

Thyanta calceata (Say), 1832. – This species was originally reported as *Thyanta custator* (Fabricius), 1803 in the original Michigan list (McPherson 1970), but was subsequently corrected (McPherson 1979b); thus, *T. custator* is not known from Michigan. Many aspects of the life history and laboratory rearing of *T. calceata* have been described (Oetting and Yonke 1971, McPherson, 1977a, Paskewitz and McPherson 1982), including studies of the effect of varying photoperiod on the development of this pentatomid (McPherson 1977b, 1978a, 1978b; McPherson and Paskewitz 1982a, McPherson et al. 1983). Rolston and McDonald (1984) revised the concept of the genus, and Ruckes (1957) keyed the species. Ueshima's (1963) cytological study also elucidated the specific status of some members of this genus. Rider and Chapin (1992) revised the North American species of the genus. 1 specimen examined. Collection date is 16 May.

Distribution: Wayne County.

Thyanta custator accerra McAtee, 1919. – Hussey's record (1922a) of *Thyanta custator* certainly refers to this species. He reported it "swept from ragweed...[and] in the June beach-drift." McPherson (1970) included this species as *Thyanta pallido-virens accerra*, like many other authors of the time. Label data indicate *T. c. accerra* has been taken on roundhead bushclover (*Lespedeza capitata* Michx.) and common mullein (*Verbascum thapsus* L.) in Livingston County. It also has been taken in a farm field in Calhoun County. McPherson (1979d) studied the morphological effects of varying photoperiod during the development of this species. Panizzi et al. (2000) treated this as one of the less economically important species. Drickamer and McPherson (1992) compared the mating behavior of this species with several species of *Euschistus*. Davidová-Vilímová and McPherson (1991) described and illustrated the male genitalia. Rolston and McDonald (1984) revised the concept of the genus in transferring several western species to the western *Tepa* Rolston and McDonald, 1984, and Ruckes (1957) keyed the species currently in *Thyanta*. Ueshima's (1963) cytological study also elucidated the specific status of some members of this genus. Rider and Chapin (1992) revised the

North American species of the genus. 136 specimens examined. Collection dates from 3 March to 9 November.

Distribution: Antrim, Barry, Berrien, Branch, Calhoun, Cass, Clinton, Crawford, Grand Traverse, Ingham, Ionia, Jackson, Kalamazoo, Kent, Lapeer, Lenawee, Livingston, Mason, Montcalm, Newaygo, Oakland, Saginaw, Saint Joseph, Shiawassee, Van Buren, Washtenaw, and Wayne counties.

Genus TRICHOPEPLA Stål, 1867

Trichopepla atricornis Stål, 1872. – McPherson (1970) added *T. atricornis* to the faunal list of Michigan. The conspicuous pubescence of the dorsum renders species of this genus instantly recognizable among the state fauna, although this feature is shared with *Prionosoma podopioides*. McDonald (1976) revised the genus but did not include Michigan in the distribution of this species. 11 specimens examined. Collection dates from 11 June to 14 September.

Distribution: Kalamazoo, Livingston, and Saint Joseph counties.

Trichopepla semivittata (Say), 1832. – This species was reported from Michigan by Hussey (1922a), who found them "in the fields about the Warren Woods." The conspicuous pubescence of the dorsum renders species of this genus instantly recognizable among the fauna of Michigan, although this feature is shared with *Prionosoma podopioides*. Label data indicate *T. semivittata* has been taken in a farm field in Calhoun County. McPherson (1972b) described the laboratory rearing of this species. McDonald (1966) described the genitalia of both sexes of *T. semivittata*; he later revised the genus (1976). Davidová-Vilímová and McPherson (1991) described and illustrated the male genitalia. 54 specimens examined. Collection dates from 3 March to October [no date].

Distribution: Barry, Bay, Berrien, Branch, Calhoun, Cass, Cheboygan, Clinton, Hillsdale, Ingham, Kalamazoo, Kent, Lapeer, Livingston, Mason, Midland, Oceana, Shiawassee, Van Buren, Washtenaw, and Wayne counties.

Tribe SCIOCORINI Amyot & Serville, 1843

Genus SCIOCORIS Fallén, 1829

Sciocoris microphthalmus Flor, 1860. – Stoner (1920) reported this small species from Michigan, and Hussey (1921) provided a corroborative account, in which he stated "I have also taken this species at Douglas Lake, from roadside grasses in a lowland stand of arbor-vitae, balsam fir, birch, and aspen." The small size combined with the flattened habitus renders this species instantly recognizable among the Michigan fauna. McDonald (1966) described the genitalia. 7 specimens examined. Collection dates from 31 May to 18 July.

Distribution: Cheboygan and Mackinac counties.

Subfamily PODOPINAE Amyot & Serville, 1843

Genus AMAUROCHROUS Stål, 1872

Amaurochrous brevitylus Barber and Sailer, 1953. – This turtle bug was reported from Michigan by McPherson (1970). Barber and Sailer (1953) revised the members of the subfamily in North America, and Davidová-Vilímová and McPherson (1994) discussed the history of the higher classification of the subfamily. 3 specimens examined. Collection dates from 13 May to 22 June.

Distribution: Kalamazoo, Lenawee, and Mason counties.

Amaurochrous cinctipes (Say), 1828. – Hussey (1922a) reported this species from Michigan (as *Podops cinctipes*) as "taken from *Carex* and *Scirpus* in the marsh." This species also has been taken in sphagnum in late February in

Washtenaw County. McPherson and Paskewitz (1984b) provided notes on the laboratory rearing and immatures stages of this species. McDonald (1966) and Davidová-Vilímová and McPherson (1991) described the genitalia. Barber and Sailer (1953) revised the turtle bugs of North America, and Davidová-Vilímová and McPherson (1994) discussed the history of the higher classification of the subfamily. 58 specimens examined. Collection dates from 23 February to 13 November.

Distribution: Bay, Berrien, Branch, Cheboygan, Clinton, Gladwin, Ingham, Kalamazoo, Kent, Livingston, Mason, Mecosta, Midland, Oakland, Saint Joseph, Van Buren, Washtenaw, and Wayne counties.

Acknowledgments

I am grateful to Mark O'Brien (UMMZ) and Gary Parsons (MSUC) for the privilege of studying the material under their care. I also thank Dr. David A. Rider, North Dakota State University, Fargo, North Dakota, for generously sharing his expertise, particularly involving unresolved taxonomic issues. I owe much appreciation to two anonymous reviewers, whose insightful comments greatly improved the manuscript.

LITERATURE CITED

Ahmad, I. 1996. A revision of the green stink bug tribe Pentatomini Leach (Hemiptera: Pentatomidae: Pentatominae) from Indo-Pakistan subcontinent with special reference to their cladistics. Proceedings of the Pakistan Congress of Zoology 16: 41–86.

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: Thyreocorinae) and their bearing on classification. Annals of the Entomological Society of America 83: 162–170.

Ahmad, I., and J. E. McPherson. 1998. Additional information on male and female genitalia of *Parabrochymena* Larivière and *Brochymena* Amyot & Serville (Hemiptera: Pentatomidae). Annals of the Entomological Society of America 91: 800–807.

Balduf, W. V. 1945. Bionomic notes on *Menecles insertus* (Say) (Hemiptera, Pentatomidae). Bulletin of the Brooklyn Entomological Society 40: 61–65.

Barber, H. G., and R. I. Sailer. 1953. A revision of the turtle bugs of North America (Hemiptera: Pentatomidae). Journal of the Washington Academy of Sciences 43: 150–162.

Blatchley, W. S. 1926. Heteroptera or True Bugs of Eastern North America, with Especial Reference to the Faunas of Indiana and Florida. Indianapolis: Nature Publishing Company. pp. 34–207.

Biehler, J. A., and J. E. McPherson. 1982. Life history and laboratory rearing of *Galgupha ovalis* (Hemiptera: Corimelaenidae), with descriptions of immature stages. Annals of the Entomological Society of America 75: 465–470.

Bundy, C. S., and J. E. McPherson. 1997. Life history and laboratory rearing of *Corimelaena obscura* (Heteroptera: Thyreocoridae) with descriptions of immature stages. Annals of the Entomological Society of America 90: 20–27.

Buxton, G. M., D. B. Thomas, and R. C. Froeschner. 1983. Revision of the species of the *sayi*-group of *Chlorochroa* Stal (Hemiptera: Pentatomidae). California Department of Food and Agriculture Occasional Papers in Entomology 29: 1–25.

Carter, M. E., and E. R. Hoebeke. 2003. Biology and seasonal history of *Elasmostethus atricornis* (Van Duzee) (Hemiptera: Acanthosomatidae), with descriptions of the immature states and notes on Pendergrast organs. Proceedings of the Entomological Society of Washington 105: 525–534.

Chapin, J. W., and J. S. Thomas. 2003. Burrower bugs (Heteroptera: Cydnidae) in peanut: seasonal species abundance, tillage effects, grade reduction effects, insecticide efficacy, and management. Journal of Economic Entomology 96: 1142–1152.

Chapin, J. W., T. H. Sanders, L. L. Dean, K. Hendrix, and J. S. Thomas. 2006. Effect of feeding by a burrower bug, *Pangaeus bilineatus* (Say), (Heteroptera: Cydnidae), on peanut flavor and oil quality. Journal of Entomological Science 41: 33–39.

Clair, D. J., and J. E. McPherson. 1981. Effects of temperature on development and reproduction in *Euschistus tristigmus tristigmus* (Hemiptera: Pentatomidae) with notes on reproductive behavior. Transactions of the Illinois State Academy of Science 73[1980]: 80–92.

Cuda, J. P., and J. E. McPherson. 1976. Life history and laboratory rearing of *Brochymena quadripustulata* with descriptions of immature stages and additional notes on *Brochymena arborea* (Hemiptera: Pentatomidae). Annals of the Entomological Society of America 69: 977–983.

Culliney, T. W. 1985. Predation of the imported cabbageworm *Pieris rapae* by the stink bug *Euschistus servus euschistoides* (Hemiptera: Pentatomidae). The Canadian Entomologist 117: 641–642.

Davidová-Vilímová, J., and J. E. McPherson. 1991. Pygophores of selected species of Pentatomoidea (Heteroptera) from Illinois. Acta Universitatis Carolinae Biologica 35: 143–183.

Davidová-Vilímová, J., and J. E. McPherson. 1994. History of the higher classification of the subfamily Podopinae (Heteroptera: Pentatomidae) - an historical review. Acta Universitatis Carolinae Biologica 38: 99–124.

De Clercq, P. 2000. Chapter 32, Predaceous Stinkbugs (Pentatomidae: Asopinae), pgs. 737–789. *In* C. W. Schaefer, and A. R. Panizzi (eds.), Heteroptera of Economic Importance. CRC Press, New York.

DeCoursey, R. M. 1963. The life histories of *Banasa dimidiata* and *Banasa calva* (Hemiptera: Pentatomidae). Annals of the Entomological Society of America 56: 687–693.

Dolling, W. R. 1981. A rationalized classification of the Burrower Bugs (Cydnidae). Systematic Entomology 6: 61–76.

Drickamer, L. C., and J. E. McPherson. 1992. Comparative aspects of mating behavior patterns in six species of stink bugs (Heteroptera: Pentatomidae). The Great Lakes Entomologist 25: 287–295.

Esselbaugh, C. O. 1947. Some notes on the biology of *Hymenarcys aequalis* Say (Pentatomidae). Bulletin of the Brooklyn Entomological Society 42: 25–30.

Esselbaugh, C. O. 1948. Notes on the bionomics of some Midwestern Pentatomidae. Entomologica Americana, New Series 28: 1–73.

Evans, E. W. 1982a. Timing of reproduction by predatory stinkbugs (Hemiptera: Pentatomidae): patterns and consequences for a generalist and a specialist. Ecology 63: 147–158.

Evans, E. W. 1982b. Feeding specialization in predatory insects: hunting and attack behavior of two stinkbug species (Hemiptera: Pentatomidae). American Midland Naturalist 108: 96–104.

Evans, E. W. 1982c. Habitat differences in feeding habits and body size of the predatory stinkbug *Perillus circumcinctus* (Hemiptera: Pentatomidae). Journal of the New York Entomological Society 90: 129–133.

Evans, E. W. 1985. A key to nymphs of four species of the genus *Podisus* (Hemiptera: Pentatomidae) of northeastern North America. Proceedings of the Entomological Society of Washington 87: 94–97.

Evans, E. W., and R. B. Root. 1980. Group molting and other lifeways of a solitary hunter, *Apateticus bracteatus* (Hemiptera: Pentatomidae). Annals of the Entomological Society of America 73: 270–274.

Fish, J., and J. Alcock. 1973. The behavior of *Chlorochroa ligata* (Say) and *Cosmopepla bimaculata* (Thomas), (Hemiptera:Pentatomidae). Entomological News 84: 260–268.

Froeschner, R. C. 1960. Cydnidae of the Western Hemisphere. Proceedings of the United States National Museum 3430: 337–680.

Froeschner, R. C. 1988a. Family Acanthosomatidae Signoret, 1863. The acanthosomatids, pp. 1–3. *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.

Froeschner, R. C. 1988b. Family Cydnidae Billberg, 1820. Burrowing bugs, pp. 119–129. *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.

Froeschner, R. C. 1988c. 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.

Froeschner, R. C. 1988d. Family Scutelleridae Leach, 1815. The shield bugs, pp. 684–693. *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.

Froeschner, R. C. 1988e. Family Tessaratomidae Stål, 1864. The tessaratomids, pp. 694–695. *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.

Froeschner, R. C. 1988f. Family Thyreocoridae Amyot and Serville, 1843. The negro bugs, pp. 698–707. *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.

Frost, S. W., and V. R. Haber. 1944. A case of parental care in the Heteroptera. Annals of the Entomological Society of America 37: 161–166.

Furth, D. G. 1974. The stink bugs of Ohio (Hemiptera: Pentatomidae). Bulletin of the Ohio Biological Survey (N.S.) 5: 1–60.

Gamboa, G., and J. Alcock. 1973. The mating behavior of *Brochymena quadrapustulata* [sic] (Fabricius). Psyche 80: 265–270.

Genevcius, B. C., J. Grazia, and C. F. Swertner. 2012. Cladistic analysis and revision of the *obstinata* group, genus *Chinavia* Orian (Hemiptera: Pentatomidae). Zootaxa 3434: 1–30.

Gilbert, B. L., S. J. Barras, and D. M. Norris. 1967. Bionomics of *Tetyra bipunctata* (Hemiptera: Pentatomidae: Scutellerinae) as associate with *Pinus banksiana* in Wisconsin. Annals of the Entomological Society of America 60: 698–701.

Gould, C. S. 1931. *Pangaeus uhleri*, a pest of spinach. Journal of Economic Entomology 24: 484–486.

Grazia, J., R. T. Schuh, W. C. Wheeler. 2008. Phylogenetic relationships of family groups in Pentatomoidea based on morphology and DNA sequences (Insecta: Heteroptera). Cladistics 24: 932–976.

Harris, H. M., and F. Andre. 1934. Notes on the biology of *Acantholomidea denticulata* Stal (Hemiptera, Scutelleridae). Annals of the Entomological Society of America 27: 5–15.

Hart, C. A. 1919. The Pentatomoidea of Illionois with keys to the Nearctic genera. Illinois Natural History Survey Bulletin 13: 157–223.

Henry, T. J. 1997. Phylogenetic analysis of family groups within the infraorder Pentatomomorpha (Hemiptera: Heteroptera), with emphasis on the Lygaeoidea. Annals of the Entomological Society of America 90: 275–301.

Hoebeke, E. R., and M. E. Carter. 2003. *Halyomorpha halys* (Stål) (Heteroptera: Pentatomidae): a polyphagous plant pest from Asia newly detected in North America. Proceedings of the Entomological Society of Washington 105: 225–237.

Hoffman, R. L. 1971. The insects of Virginia: No. 4. Shield bugs (Hemiptera: Scutelleroidea: Scutelleridae, Corimelaenidae, Cydnidae, Pentatomidae). Virginia Polytechnic Institute and State University, Research Division Bulletin 67: 1–61.

Hoffman, R. L. 2005. The Virginia species of *Banasa*, three decades later (Heteroptera: Pentatomidae). Banisteria 25: 41–44.

Hussey, R. F. 1921. Distributional notes on Hemiptera, with the description of a new *Gerris*. Psyche 28: 8–15.

Hussey, R. F. 1922a. Hemiptera from Berrien County, Michigan. Occasional Papers of the Museum of Zoology, University of Michigan 118: 1–39.

Hussey, R. F. 1922b. Notes on *Neottiglossa trilineata* Kirby (Hemiptera, Pentatomidae). Psyche 29:85–88.

Javahery, M., C. W. Schaefer, and J. D. Lattin. 2000. Chapter 14, Shield Bugs (Scutelleridae), pp. 475–503. *In* C. W. Schaefer, and A. R. Panizzi (eds.), Heteroptera of Economic Importance. CRC Press, New York.

Jones, P. A., and H. C. Coppel. 1968. Immature stages and biology of *Apateticus cynicus* (Say) (Hemiptera: Pentatomidae). The Canadian Entomologist 95: 770–779.

Jones, W. A., Jr., and J. E. McPherson. 1980. The first report of the occurrence of acanthosomatids in South Carolina. Journal of the Georgia Entomological Society 15: 286–289.

Knight, H. H. 1922. Studies on the life history and biology of *Perillus bioculatus* Fab., including observations on the nature of the color pattern (Heteroptera, Pentatomidae), pp. 50–96. *In* Ruggles, A. G. (ed.), Nineteenth report of the state entomologist of Minnesota to the Governor. Minnesota Agricultural Experiment Station, St. Paul.

Knight, H. H. 1924. On the nature of the color patterns in Heteroptera with data on the effects produced by temperature and humidity. Annals of the Entomological Society of America 17: 258–273.

Knight, H. H. 1952. Review of the genus *Perillus* with description of a new species (Hemiptera, Pentatomidae). Annals of the Entomological Society of America 45: 229–232.

Kretovich, V. L. 1944. Biochemistry of the damage to grain by the wheat-bug. Cereal Chemistry 21: 1–16.

Kumar, R. 1974. A revision of world Acanthosomatidae (Heteroptera: Pentatomoidea): keys, to and description of subfamilies, tribes and genera, with designation of types. Australian Journal of Zoology, Supplementary Series, 34: 1–60.

Larivière, M.-C. 1990. Systematics of *Brochymena* Amyot and Audinet-Serville and *Parabrochymena*, new genus (Heteroptera: Pentatomidae: Halyini). Ph.D. dissertation, McGill University, Montreal. 324 pp.

Larivière, M.-C. 1992. Description of *Parabrochymena*, new genus, and redefinition and review of *Brochymena* Amyot and Audinet-Serville (Hemiptera: Pentatomidae), with considerations on natural history, chorological affinities and evolutonary relationships. Memoirs of the Entomological Society of Canada 163: 1–75.

Larivière, M.-C. 1994. *Parabrochymena* Larivière (Hemiptera: Pentatomidae): systematics, natural history, chorological affinities, and evolutionary relationships, with a biogeographic analysis of *Parabrochymena* and *Brochymena* Amyot and Audinet-Serville. The Canadian Entomologist 126: 1193–1250.

Lattin, J. D. 1964. The Scutellerinae of America north of Mexico (Hemiptera: Heteroptera: Pentatomidae). Ph.D. dissertation, University of California, Berkeley. 350 pp.

Lis, J. A., M. Becker, and C. W. Schaefer. 2000. Chapter 12, Burrower Bugs (Cydnidae), pgs. 405–419. *In* C. W. Schaefer, and A. R. Panizzi (eds.), Heteroptera of Economic Importance. CRC Press, New York.

McAtee and Malloch. 1933. Revision of the subfamily Thyreocorinae of the Pentatomidae (Hemiptera-Heteroptera). Annals of the Carnegie Museum 21: 191–411.

McDaniel, E. I. 1924. The potato-beetle destroyer, *Perillus claudus*, a stink-bug enemy of the potato-beetle. Quarterly Bulletin of the Michigan Agricultural College Experiment Station 6: 185–186.

McDonald, F. J. D. 1966. The genitalia of North American Pentatomoidea (Hemiptera: Heteroptera). Quaestiones Entomologicae 2: 7–150.

McDonald, F. J. D. 1968a. Some observations on *Sehirus cinctus* (Palisot de Beauvois) (Heteroptera: Cydnidae). Canadian Journal of Zoology 46: 855–858.

McDonald, F. J. D. 1968b. The life history of *Cosmopepla bimaculata* (Thomas) (Heteroptera: Pentatomidae) in Alberta. Quaestiones Entomologicae 4: 35–38.

McDonald, F. J. D. 1974. Revision of the genus *Holcostethus* in North America (Hemiptera: Pentatomidae). Journal of the New York Entomological Society 82: 245–258.

McDonald, F. J. D. 1976. Revision of the genus *Trichopepla* (Hemiptera: Pentatomidae) in N. America. Journal of the New York Entomological Society 84: 9–22.

McDonald, F. J. D. 1982. Description of the male genitalia of *Holcostethus hirtus* (Van Duzee) with a revised key to North American species (Hemiptera: Pentatomidae). Journal of the New York Entomological Society 90: 5–7.

McDonald, F. J. D. 1986. Revision of *Cosmopepla* Stål (Hemiptera: Pentatomidae). Journal of the New York Entomological Society 94: 1–15.

McPherson, J. E. 1970. A key and annotated list of the Scutelleroidea of Michigan (Hemiptera). The Great Lakes Entomologist 3: 34–63.

McPherson, J. E. 1971a. Notes on the laboratory rearing of *Corimelaena lateralis lateralis* (Hemiptera: Coreimelaenidae) on wild carrot. Annals of the Entomological Society of America 64: 313–314.

McPherson, J. E. 1971b. Laboratory rearing of *Euschistus tristigmus tristigmus*. Journal of Economic Entomology 64: 1339–1340.

McPherson, J. E. 1972a. Life history of *Corimelaena lateralis lateralis* (Hemiptera: Thyreocoridae) with descriptions of immature stage and list of other species of Scutelleroidea found with it on wild carrot. Annals of the Entomological Society of America 65: 906–911.

McPherson, J. E. 1972b. Laboratory rearing of *Trichopepla semivittata* (Hemiptera: Pentatomidae) on wild carrot. Annals of the Entomological Society of America 65: 985–987.

McPherson, J. E. 1974a. Notes on the biology of *Mormidea lugens* and *Euschistus politus* (Hemiptera: Pentatomidae) in southern Illinois. Annals of the Entomological Society of America 67: 940–942.

McPherson, J. E. 1974b. Photoperiod effects in a southern Illinois population of the *Euschistus tristigmus* complex (Hemiptera: Pentatomidae). Annals of the Entomological Society of America 67: 943–952.

McPherson, J. E. 1975a. Life history of *Euschistus tristigmus tristigmus* (Hemiptera: Pentatomidae) with information on adult seasonal dimorphism. Annals of the Entomological Society of America 68: 333–334.

McPherson, J. E. 1975b. Effects of developmental photoperiod on adult morphology in *Euschistus tristigmus tristigmus* (Say) (Hemiptera: Pentatomidae). Annals of the Entomological Society of America 68: 1107–1110.

McPherson, J. E. 1976a. Effects of photoperiod on a population of *Euschistus tristigmus* (Hemiptera: Pentatomidae) from Storrs, CT. Annals of the Entomological Society of America 69: 691–694.

McPherson, J. E. 1976b. Notes on the biology of *Cosmopepla bimaculata* (Hemiptera: Pentatomidae) in southern Illinois. Transactions of the Illinois State Academy of Science 69: 362–366.

McPherson, J. E. 1977a. Notes on the biology of *Thyanta calceata* (Hemiptera: Pentatomidae) with information on adult seasonal dimorphism. Annals of the Entomological Society of America 70: 370–372.

McPherson, J. E. 1977b. Effects of developmental photoperiod on adult color and pubescence in *Thyanta calceata* (Hemiptera: Pentatomidae) with information on ability of adults to change color. Annals of the Entomological Society of America 70: 373–376.

McPherson, J. E. 1978a. Sensitivity of immature *Thyanta calceata* (Hemiptera: Pentatomidae) to photoperiod as reflected by adult color and pubescence. The Great Lakes Entomologist 11: 71–76.

McPherson, J. E. 1978b. Effects of various photoperiods on color and pubescence in *Thyanta calceata* (Hemiptera: Pentatomidae). The Great Lakes Entomologist 11: 155–158.

McPherson, J. E. 1978c. A reexamination of the *Galgupha aterrima* Malloch types (Hemiptera: Thyreocoridae). Journal of the Kansas Entomological Society 51: 403–404.

McPherson, J. E. 1979a. Effects of various photoperiods on morphology in *Euschistus tristigmus tristigmus* (Hemiptera: Pentatomidae). The Great Lakes Entomologist 12: 23–26.

McPherson, J. E. 1979b. Additions and corrections to the list of Michigan Pentatomoidea (Hemiptera). The Great Lakes Entomologist 12: 27–29.

McPherson, J. E. 1979c. Effects of continuous and split developmental photophases during each 24 hour period on adult morphology in *Euschistus tristigmus tristigmus* (Hemiptera: Pentatomidae). The Great Lakes Entomologist 12: 79–81.

McPherson, J. E. 1979d. Effects of various photoperiods on color and pubescence in *Thyanta pallidovirens accerra* (Hemiptera: Pentatomidae). The Great Lakes Entomologist 12: 83–84.

McPherson, J. E. 1980a. The distribution of the Pentatomoidea in the northeastern quarter of the United States (Hemiptera). The Great Lakes Entomologist 13: 1–16.

McPherson, J. E. 1980b. A list of the prey species of *Podisus maculiventris* (Hemiptera: Pentatomidae). The Great Lakes Entomologist 13: 17–24.

McPherson, J. E. 1982. The Pentatomoidea (Hemiptera) of Northeastern North America with emphasis on the fauna of Illinois. Southern Illinois University Press, Carbondale. 240 pp.

McPherson, J. E., and I. Ahmad. 2005. Further information on male genitalia of *Parabrochymena* Amyot & Serville (Hemiptera: Pentatomidae). Annals of the Entomological Society of America 98: 282–290.

McPherson, J. E., and I. Ahmad. 2007. Redescriptions of *Brochymena* and *Parabrochymena* (Hemiptera: Heteroptera: Pentatomidae), based primarily on male genitalia, with reclassification of three species and description of New World tribe (Halyini). Annals of the Entomological Society of America 100: 673–682.

McPherson, J. E., and R. M. McPherson. 2000. Stink Bugs of Economic Importance in America North of Mexico. CRC Press, Boca Raton. 253 pp.

McPherson, J. E., and S. M. Paskewitz. 1982a. Effects of continuous and split developmental photophases during each 24-hour period on adult color and pubescence in *Thyanta calceata* (Hemiptera: Pentatomidae). The Great Lakes Entomologist 15: 97–98.

McPherson, J. E., and S. M. Paskewitz. 1982b. Effects of various split developmental photophases and constant light during each 24-hour period on adult morphology in *Euschistus tristigmus tristigmus* (Hemiptera: Pentatomidae). The Great Lakes Entomologist 15: 159–161.

McPherson, J. E., and S. M. Paskewitz. 1984a. Life history and laboratory rearing of *Euschistus ictericus* (Hemiptera: Pentatomidae), with descriptions of immature stages. Journal of the New York Entomological Society 92: 53–60.

McPherson, J. E., and S. M. Paskewitz. 1984b. Laboratory rearing of *Amaurochrous cinctipes* (Hemiptera: Pentatomidae: Podopinae) with descriptions of immature stages. Journal of the New York Entomological Society 92: 61–68.

McPherson, J. E., and R. I. Sailer. 1978. A new species of *Corimelaena* (Hemiptera: Thyreocoridae) from America north of Mexico. Journal of the Kansas Entomological Society 51: 516–520.

McPherson, J. E., and R. W. Sites. 1989. Annotated records of species of Pentatomoidea (Hemiptera) collected at lights. The Great Lakes Entomologist 22: 95–98.

McPherson, J. E., and D. L. Tecic. 1997. Notes on the life histories of *Acrosternum hilare* and *Cosmopepla bimaculata* (Heteroptera: Pentatomidae) in southern Illinois. The Great Lakes Entomologist 30: 79–84.

McPherson, J. E., and K. W. Vangeison. 1975. Effects of photoperiod on a population of *Euschistus tristigmus* (Say) (Hemiptera: Pentatomidae) from Gainesville, Florida. Annals of the Entomological Society of America 68: 205–206.

McPherson, J. E., T. E. Vogt, and S. M. Paskewitz. 1983. Effects of various split developmental photophases and constant light during each 24-hour period on adult morphology in *Thyanta calceata* (Hemiptera: Pentatomidae). The Great Lakes Entomologist 16: 43–46.

Metcalf, C. L., W. P. Flint, and R. L. Metcalf. 1962. Destructive and useful insects: their habits and control. McGraw-Hill Book Co., New York. 1087 pp.

Michigan Department of Agriculture and Rural Development. 2011, 1 February. "State Ag. Department confirms brown marmorated stink bug in Michigan." Accessed June 20, 2012, online at (http://www.michigan.gov/mdard/0,4610,7-125-1572_3628-250625--,00.html).

Munyaneza, J., and J. E. McPherson. 1994. Comparative study of life histories, laboratory rearing, and immature stages of *Euschistus servus* and *Euschistus variolarius* (Hemiptera: Pentatomidae). The Great Lakes Entomologist 26: 263–274.

Mukerji, M. K., and E. J. LeRoux. 1969. A quantitative study of food consumption and growth of *Podisus maculiventris* (Hemiptera: Pentatomidae). The Canadian Entomologist 101: 387–403.

Nelson, G. H. 1955. A revision of the genus *Dendrocoris* and its generic relationships (Hemiptera, Pentatomidae). Proceedings of the Entomological Society of Washington 57: 49–67.

Nielsen, A. L., and G. C. Hamilton. 2009. Life history of the invasive species *Halyomorpha halys* (Hemiptera: Pentatomidae) in Northeastern United States. Annals of the Entomological Society of America 102: 608–616.

O'Brien, M. F. 1983. Bibliographic guide to the terrestrial arthropods of Michigan. The Great Lakes Entomologist 16: 87–97.

O'Brien, M. F. 1988. Bibliographic guide to the terrestrial arthropods of Michigan: Supplement 1. The Great Lakes Entomologist 21: 25–29.

Oetting, R. D., and T. R. Yonke. 1971. Biology of some Missouri stink bugs. Journal of the Kansas Entomological Society 44: 446–459.

Olsen, C. E. 1910. Notes on breeding Hemiptera. Journal of the New York Entomological Society 18: 39–42.

Olsen, C. E. 1912. Contribution to an annotated list of Long Island insects. Journal of the New York Entomological Society 20: 48–58.

Panizzi, A. R., J. E. McPherson, D. G. James, M. Javahery, and R. M. Pherson. 2000. Chapter 13, Stink Bugs (Pentatomidae), pp. 421–474. *In* C. W. Schaefer, and A. R. Panizzi (eds.), Heteroptera of Economic Importance. CRC Press, New York.

Parshley, H. M. 1917. Fauna of New England. 14. List of the Hemiptera–Heteroptera. Occasional Papers of the Boston Society of Natural History 7: 1–125.

Paskewitz, S. M., and J. E. McPherson. 1982. Descriptions of nymphal instars of *Thyanta calceata* (Hemiptera: Pentatomidae). The Great Lakes Entomologist 15: 231–235.

Phillips, K. A. 1983. A taxonomic revision of the Nearctic species of *Apateticus* Dallas and Podisus Herrich-Schaeffer (Heteroptera: Pentatomidae: Asopinae). Ph.D. dissertation, Oregon State University, Corvallis. 275 pp.

Prebble, M. L. 1933. The biology of *Podisus serieventris* Uhler in Cape Breton, Nova Scotia. Canadian Journal of Research 9: 17–30.

Reuter, O. M. 1906. Monographia generis heteropterorum *Phimodera* Germ. Acta Societatis Scientiarum Fennicae 33: 1–51.

Rider, D. A. 1989. Review of the New World species of the genus *Neottiglossa* Kirby (Hemiptera: Pentatomidae). Journal of the New York Entomological Society 97: 394–408.

Rider, D. A. 1995. Review of the genus *Coenus* Dallas, with the description of *C. explanatus*, new species (Heteroptera: Pentatomidae). Journal of the New York Entomological Society 103: 39–47.

Rider, D. A, and L. H. Rolston. 1995. Nomenclatural changes in the Pentatomidae (Hemiptera-Heteroptera). Proceedings of the Entomological Society of Washington 97: 845–855.

Rider, D. A., and J. B. Chapin. 1992. Revision of the genus *Thyanta* Stål, 1862 (Heteroptera: Pentatomidae) II. North America, Central America, and the West Indies. Journal of the New York Entomological Society 100: 42–98.

Rolston, L. H. 1972. The genus *Menecles* Stål (Hemiptera: Pentatomidae). Journal of the New York Entomological Society 80: 234–237.

Rolston, L. H. 1973. A review of *Hymenarcys* (Hemiptera: Pentatomidae). Journal of the New York Entomological Society 81: 111–117.

Roston, L. H. 1974. Revision of the genus *Euschistus* in Middle America (Hemiptera, Pentatomidae, Pentatomini). Entomologica Americana 48: 1–102.

Rolston, L. H. 1978. A revision of the genus *Mormidea* (Hemiptera: Pentatomidae). Journal of the New York Entomological Society 86: 161–219.

Rolston, L. H. 1983. A revision of the genus *Acrosternum* Fieber, subgenus *Chinavia* Orian, in the Western Hemisphere (Hemiptera: Pentatomidae). Journal of the New York Entomological Society 91: 97–176.

Rolston, L. H., and R. Kumar. 1974. Two new genera and two new species of Acanthosomatidae (Hemiptera) from South America, with a key to the genera of the Western Hemisphere. Journal of the New York Entomological Society 82: 271–278.

Rolston, L. H., and F. J. D. McDonald. 1979. Keys and diagnoses for the families of Western Hemisphere Pentatomoidea, subfamilies of Pentatomidae and tribes of Pentatominae (Hemiptera). Journal of the New York Entomological Society 87: 189–207.

Rolston, L. H., and F. J. D. McDonald. 1980. Conspectus of Pentatomini genera of the Western Hemisphere: Part 2 (Hemiptera: Pentatomidae). Journal of the New York Entomological Society 88: 257–272.

Rolston, L. H., and F. J. D. McDonald. 1984. A conspectus of Pentatomini of the Western Hemisphere. Part 3 (Hemiptera: Pentatomidae). Journal of the New York Entomological Society 92: 69–86.

Rolston, L. H., F. J. D. McDonald, and D. B. Thomas, Jr. 1980. A conspectus of Pentatomini genera of the Western Hemisphere. Part I (Hemiptera: Pentatomidae). Journal of the New York Entomological Society 88: 120–132.

Ruckes, H. 1946. Notes keys to the genus *Brochymena* (Pentatomidae, Heteroptera). Entomologica Americana, New Series 26: 143–238.

Ruckes, H. 1957. The taxonomic status and distribution of *Thyanta custator* (Fabricius) and *Thyanta pallido-virens* (Stål) (Heteroptera, Pentatomidae). American Museum Novitates 1824: 1–22.

Sailer, R. I. 1940. A new species of Thyreocorinae. Journal of the Kansas Entomological Society 13: 62–63.

Sailer, R. I. 1941. Additional notes on *Galgupha loboprostethia* Sailer. Journal of the Kansas Entomological Society 14: 19.

Sailer, R. I. 1944. The genus *Solubea* (Heteroptera: Pentatomidae). Proceedings of the Entomological Society of Washington 46: 105–127.

Sailer, R. I. 1954. Concerning *Pangaeus bilineatus* (Say) (Hemiptera: Pentatomidae, subfamily Cydnidae). Journal of the Kansas Entomological Society 27: 41–44.

Sailer, R. I. 1957. *Solubea* Bergroth, 1891, a synonym of *Oebalus* Stål, 1862, and a notes concerning the distribution of *O. ornatus* (Sailer) (Hemiptera: Pentatomidae). Proceedings of the Entomological Society of Washington 59: 41–42.

Schaefer, C. W. 1980. The sound-producing structures of some primitive Pentatomoidea (Hemiptera: Heteroptera). Journal of the New York Entomological Society 88: 230–235.

Schaefer, C. W., and I. Ahmad. 1987. The food plants of four pentatomoid families (Hemiptera: Acanthosomatidae, Tessaratomidae, Urostylidae, and Dinidoridae). Phytophaga 1: 21–34.

Schuh, R. T., and J. A. Slater. 1995. True Bugs of the World (Hemiptera: Heteroptera). Classification and Natural History. Cornell University Press, Ithaca, New York. 338 pp.

Schwertner, C. F. 2005. Filogenia e classificação do grupo *Nezara* Amyot & Serville, 1843 (Hemiptera, Pentatomidae, Pentatominae). Ph.D. dissertation, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil. 256 pp.

Schwertner, C. F., and J. Grazia. 2006. Descrição de seis espécies de Chinavia (Hemiptera, Pentatomidae, Pentatominae) da América do Sul. Iheringia, Série Zoologia 96: 237–248.

Schwertner, C. F., and J. Grazia. 2007. O gênero *Chinavia* Orian (Hemiptera, Pentatomidae, Pentatominae) no Brasil, com chave pictórica para os adultos. Revista Brasileira de Entomologia 51: 416–435.

Sites, R. W., and J. E. McPherson. 1982. Life history and laboratory rearing of *Sehirus cinctus cinctus* (Hemiptera: Cydnidae), with descriptions of immature stages. Annals of the Entomological Society of America 75: 210–215.

Smith, J. W., Jr., and J. T. Pitts. 1974. Pest status of *Pangaeus bilineatus* attacking peanuts in Texas. Journal of Economic Entomology 67: 111–113.

Steyskal, G. C. 1938. Unusual pentatomid records. Bulletin of the Brooklyn Entomological Society 33: 201.

Stoner, D. 1920. *Sciocoris microphthalmus* Flor. in Northern Michigan (Heterop.). Entomological News 31: 141.

Stoner, D. 1922. The Scutelleroidea of the Douglas Lake region. University of Iowa Studies in Natural History 10: 45–65.

Štys, P., and J. Davidová. 1979. Taxonomy of *Thyreocoris* (Heteroptera, Thyreocoridae). Annotationes Zoologicae et Botanicae 134: 1–40.

Townsend, C. H. T. 1890. Hemiptera collected in southern Michigan. Proceedings of the Entomological Society of Washington 2: 52–56.

Thomas, D. B., Jr. 1983. Taxonomic status of the genera *Chlorochroa* Stål, *Rhytidilomia* Stål, *Liodermion* Kirkaldy, and *Pitedia* Reuter, and their included species (Hemiptera: Pentatomidae). Annals of the Entomological Society of America 76: 215–224.

Thomas, D. B. 1990. The status of the genus *Mineus* Stal 1862 (Heteroptera: Pentatomidae: Asopinae). Proceedings of the Entomological Society of Washington 92: 304–305.

Thomas, D. B. 1991. The Acanthosomatidae (Heteroptera) of North America. The Pan-Pacific Entomologist 67: 159–170.

Thomas, D. B. 1992. Taxonomic synopsis of the asopine Pentatomidae (Heteroptera) of the Western Hemisphere. Thomas Say Monographs, Volume 16. 156 pp.

Thomas, D. B. 2012. *Mcphersonarcys,* a new genus for *Pentatoma aequalis* Say (Heteroptera: Pentatomidae). The Great Lakes Entomologist 45: 127–133.

Thomas, D. B., and H. Brailovsky. 1999. Review of the genus *Dendrocoris* Bergroth with descriptions of new species (Pentatomidae: Heteroptera). Insecta Mundi 13: 1–9.

Thomas, D. B., and T. R. Yonke. 1981. A review of the Nearctic species of the genus *Banasa* Stål (Hemiptera: Pentatomidae). Journal of the Kansas Entomological Society 54: 233–248.

Thomas, D. B., and T. R. Yonke. 1985. Cladistic analysis of zoogeography and polypoloid evolution in the stinkbug genus *Banasa* Stål (Hemiptera: Pentatomidae). Annals of the Entomological Society of America 78: 855–862.

Torre-Bueno, J. R. de la. 1939. A synopsis of the Hemiptera-Heteroptera of America north of Mexico. Part I. Families Scutelleridae, Cydnidae, Pentatomidae, Aradidae, Dysodiidae and Termitaphididae. Entomologica Americana 19: 141–310.

Tostowaryk, W. 1971. Life history and behavior of *Podisus modestus* (Hemiptera: Pentatomidae) in boreal forest in Quebec. The Canadian Entomologist 103: 662–674.

Ueshima, N. 1963. Chromosome study of *Thyanta pallidovirens* (Stål) in relation to taxonomy (Hemiptera: Pentatomidae). The Pan-Pacific Entomologist 34: 149–154.

Vojdani, S. 1961. The Nearctic species of the genus *Eurygaster* (Hemiptera: Pentatomidae: Scutellerinae). The Pan-Pacific Entomologist 37: 97–107.

Waddill, V., and M. Shepherd. 1974. Biology of a predaceous stinkbug, *Stiretrus anchorago* (Hemiptera: Pentatomidae). The Florida Entomologist 57: 249–253.

Walley, G. S. 1929. Notes on *Homaemus* with a key to the species (Hemip., Scutelleridae). The Canadian Entomologist 61: 253–256.

Yothers, M. A. 1911. *Perillus claudus* a beneficial insect. The Canadian Entomologist 43: 418.

Youther, M. L., and J. E. McPherson. 1975. A study of fecundity, fertility, and hatch in *Euschistus servus* (Hemiptera: Pentatomidae) with notes on precopulatory and copulatory behavior. Transactions of the Illinois State Academy of Science 68: 321–338.