



# Article

## Richness of the Nearctic Treehopper Fauna (Hemiptera: Aetalionidae and Membracidae)

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### Abstract

The indigenous Nearctic treehopper fauna includes 2 families, 6 subfamilies, 20 tribes, 68–72 genera, and 276–280 described species, of which 1 tribe, 16 genera, and 195 species are endemic. This work provides an alphabetical checklist of the species (with distributions as documented in the literature) as well as discussions and two tables summarizing the taxonomic and regional diversity of this rich, distinctive fauna. The tribes Smiliini and Telamonini (Membracidae: Smiliinae), which include many specialists on oaks (*Quercus* spp.), are the two most species-rich tribes. Maps of the Nearctic subregions document the species richness of each state and province, 22 of which have between 60 and 118 reported species. The Southwest U.S. has the largest number of genera of the subregions, while both the Southwest and the Central and Eastern U.S. are highly species rich. Arizona stands apart as an area of exceptional endemism with one genus and 25 species known only from within its borders. Among families of auchenorrhynchous Hemiptera, Membracidae rank third in total numbers of Nearctic species. This study highlights the need for: (1) improved taxonomic understanding, especially through comprehensive generic revisions; (2) further collecting to fill gaps in geographic sampling; and (3) the preservation of identifiable voucher material, with full data (including geo-coordinates and, where known, host plant data) to document all published research.

**Key words:** Aetalionidae, checklist, endemic, distribution, diversity, Membracidae, Nearctic region, treehoppers, United States, zoogeography

### Introduction

Our objective is to summarize the current knowledge of treehopper distribution within the Nearctic zoogeographic region—the temperate and arctic areas of North America (including Bermuda and Greenland) (Fig. 1). Based on the literature, we provide an annotated checklist of the Nearctic species, with the known distribution (subregion/state or province) for each, and review the taxonomic diversity and regional species richness of the Nearctic treehopper fauna. Knowledge of species distributions is vital to making informed decisions related to conservation management (Samways 1994) as well as to understanding the natural history of treehoppers in general.

Need for an updated list of Nearctic treehoppers became apparent early in our work on the treehoppers of various parts of the United States (Dietrich *et al.* 1999; Wallace and Troyano 2006; Wallace and Deitz 2007; Bartlett *et al.* 2008; Wallace 2008; Wallace *et al.* 2009; Wallace and Maloney 2010). Though invaluable, the catalogue of Metcalf and Wade (1965), which listed the world species through 1955 with state distributions, is now 57 years out-of-date. McKamey's (1998) supplemental catalogue reviewed more recent nomenclatural changes, listing geographic data for the few new Nearctic species after 1955, but gave no data on distributions within the United States. Thus, with few exceptions, those interested in determining which treehopper species occur in a particular state must do an extensive search of Metcalf's catalogue as well as the literature published since 1955.

Interactive identification keys to the genera and higher taxa of Nearctic treehoppers (Wallace 2010) are available as part of a new online resource devoted to treehoppers (Deitz and Wallace 2010). It includes photographs of

nearly all treehopper genera and hundreds of species. A world list of treehopper species described through early 1997 is also now online (McKamey 2010); it provides synonymy with authorship and year for each entry.

## Material and methods

We list the valid names of all Nearctic species following the nomenclature of McKamey (1998, 2010) with a few changes mandated by recent works. With one exception (see *Campylenchia rugosa* (Fowler)), noted below, we do not accept a number of unexplained generic reassignments introduced in a checklist for Canada (Maw *et al.* 2000). For simplicity, subgenera and subspecies were not differentiated, and nomenclatural data available online (McKamey 2010; Deitz and Wallace 2010) are omitted here. We follow Wallace's (2011) concept of the tribe Smiliini, including the reinstatement of the tribe Telamonini (Membracidae: Smiliinae) from synonymy. Our checklist is alphabetical, however, Table 1 provides the taxonomic hierarchy for all included genera.

**TABLE 1.** Taxonomic diversity of the Nearctic treehoppers (endemic taxa in **bold**; numbers of Nearctic species in parentheses).

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FAMILY AETALIONIDAE: SUBFAMILY AETALIONINAE: Tribe: Aetalionini: *Aetalion* (2 spp.).

FAMILY MEMBRACIDAE:

SUBFAMILY CENTROTINAE:

Tribe Boocerini: *Campylocentrus* (1 sp.).

Tribe **Centrodontini**: *Centrodontus* (1 sp.), *Multareis* (1 sp.), *Multareoides* (3 spp.).

Tribe Centrotini: *Centrotus* [1 sp. introduced].

Tribe Gargarini: *Gargara* [1 sp. introduced].

Tribe Monobelini: *Monobelus* (1 sp.).

Tribe Platycentrini: *Platycentrus* (3 spp.), *Tylocentrus* (2 spp.).

SUBFAMILY DARNINAE:

Tribe Darnini: *Darnis* (1 sp.), *Stictopelta* (5 spp.).

Tribe Procyrtini: *Procyrta* (1 sp.).

SUBFAMILY STEGASPIDINAE:

Tribe Microcentrini: *Microcentrus* (5 spp.), *Tumecauda* (1 sp.).

Tribe Stegaspidini: *Smerdalea* (1 sp.).

SUBFAMILY MEMBRACINAE:

Tribe Aconophorini: *Aconophora* (5 spp.), *Guayaquila* (1 sp.).

Tribe Hoplophorionini: *Metcalfiella* (1 sp.), *Platycotis* (4 spp.), *Umbonia* (1 sp.).

Tribe Hypsoprurini: *Hypsoprora* (2 spp.), *Notocera* (? 1 sp.), *Philya* (2 spp.), *Scalmophorus* (1 sp.).

Tribe Membracini: *Bolbonota* (? 1 spp.), *Campylenchia* (3 spp.), *Enchenopa* (as many as 15 spp., only 4 described), *Leioscyta* (2 spp.), *Membracis* (2 spp.), *Tylopelta* (1 sp.).

SUBFAMILY SMILIINAE:

Not placed to tribe: *Antianthe* (1 sp.), *Tropidarnis* (1 sp.).

Tribe Acutalini: *Acutalis* (2 spp.).

Tribe Amastrini: *Amastris* (2 spp.), *Bajulata* (1 sp.), *Idioderma* (1 sp.), *Vanduzee* (5 spp.).

Tribe Ceresini: *Anisostylus* (4 spp.), *Antoniae* (? 1 sp.), *Ceresa* (1 sp.), *Hadrophallus* (2 spp.), *Paraceresa* (1 sp.), *Parantonae* (2 spp.), *Spissistilus* (6 spp.), *Stictocephala* (17 spp.), *Stictolobus* (3 spp.), *Tortistilus* (10 spp.), *Trichaetipyga* (2 spp.), *Vestistilus* (3 spp.).

Tribe Micruralini: *Micruralis* (6 spp.), *Trachytalis* (? 1 sp.).

Tribe Polyglyptini: *Aphetea* (1 sp.), *Bryantopsis* (1 sp.), *Entylia* (1 sp.), *Polyglypta* (2 spp.), *Publilia* (5 spp.).

Tribe Smiliini: *Ashmeadea* (1 sp.), *Atymna* (6 spp.), *Cyrtolobus* (41 spp.), *Grandolobus* (1 sp.), *Ophiderma* (13 spp.), *Smilia* (2 spp.), *Xantholobus* (12 spp.).

Tribe Telamonini: *Archasia* (3 spp.), *Carynota* (4 spp.), *Glossonotus* (5 spp.), *Heliria* (12 spp.), *Helonica* (1 sp.), *Palonica* (4 spp.), *Telamona* (27 spp.), *Telamonanthe* (3 spp.), *Telonaca* (2 spp.), *Thelia* (2 spp.).

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Notable recent nomenclatural changes among Nearctic taxa since McKamey's listings are as follows: Cryan *et al.* (2004) described *Microcentrus solussidus*, n. sp., and restored the combination *Tumecauda schaefferi* Goding [from *Dontodontus*]. Recent generic reassignments included *Campylenchia rugosa* (Fowler) [from *Enchenopa*] (Maw *et al.* 2000); *Hadrophallus bubalus* (Fabricius) [from *Ceresa*], which is a senior synonym of *C. borealis* Fairmaire (1997, 2005); *Paraceresa colon* (Germar) [from *Ceresa*] (Andrade 2004); and *Stictocephala alta*

(Walker) [from synonymy under *Ceresa malina* (Germar)], which is a senior synonym of *Thelia constans* Walker (Andrade 1997, 2008). Hamilton and Cocroft (2010) designated a neotype for *Enchenopa binotata* (Say) [and *E. porrecta* Buckton] and established its host to be *Celastrus scandens* L. (Celastraceae), recognized *E. brevis* Walker as a distinct species on *Dirca* (Thymelaeaceae), and noted that as many as 15 species (most undescribed) may belong to the *E. binotata* species complex.

**Sources.** Our survey of the literature focused on works published since 1955, the cutoff date of Metcalf and Wade's bibliography (1963) and catalog (1965). To identify later publications with relevant state and regional data, we checked the titles and annotations given in the comprehensive bibliographies of Deitz and Kopp (1987) and Deitz (1989), as well as more recent works collected for an updated bibliography in preparation as part of the TREE-HOPPERS website and knowledge base (Deitz and Wallace 2010). To our knowledge, our coverage of published state and regional data is comprehensive through 2011. Although our "Literature cited" section fully documents the state and regional records reported herein, it is not intended to be a complete listing of works with more precise geographic data on Nearctic treehoppers.

As with any compilation based on the literature, the data presented are only as reliable as the taxonomic understanding, identification skills, accuracy, and thoroughness of those who prepared the original sources. Consequently, the checklist that follows is a starting point to encourage future collecting and improved systematic understanding, rather than the ultimate authoritative checklist for the Nearctic region. It represents the legacy of generations of entomologists who have studied the Nearctic treehopper fauna.

The following publications and theses include data relevant to this study: Andrade 1997, 2004, 2005, 2008; Bartlett *et al.* 2008; Beirne 1961; Betsch 1978 (M.S. thesis); Bickley and Seek 1975; Boggs 1980 (M.S. thesis); Carroll and Loye 1986; Cocroft 1999, 2003; Cocroft *et al.* 2006, 2010; Cryan and Deitz 1995, 1999; Cryan *et al.* 2004; Dennis 1960, 1961a–b, 1962, 1963, 1964a–c, 1965, 1966, 1968a–b, 1969a–d, 1970, 1971a–c, 1973, 1974; Dennis and Dicke 1953; Dennis and Kopp 1969; Dietrich and Deitz 1991; Dietrich *et al.* 1999; Ebel and Kormanik 1966; Entomological Information Services 1997; Essig 1958; Flock and Gill 1987; Flynn *et al.* 2003; Fowler-Finn and Rodríguez 2011; Freytag *et al.* 1981; Froeshner 1968; Frost 1957; Gambino 1986; Gates and Peters 1962; Girault 1911; Godoy *et al.* 2006; Goeden and Ricker 1987; Greene 1982; Guttman and Weigt 1989; Guttman *et al.* 1981; Halbert 2007; Hamilton and Cocroft 2010; Howard 1980, 1991; Howard and McCoy 1980; Howard and Mead 1980; Howard and Trickle 1982; Howard *et al.* 1981; Hurd and Linsley 1975; Inada 1948; Kathirithamby and Taylor 2005; Kiss 1984; Kiss and Chau 1984; Kopp and Tsai 1983; Kopp and Yonke 1973a–c, 1974, 1979; Kumar *et al.* 1976; Lariviere and Larochelle 1988; Lin 2000 (Ph.D. dissertation); Lin *et al.* 2004, 2007; Lin and Wood 2002; Loye 1987; Loye and Kyker 1985; Macnamara *et al.* 2005; Mason and Loye 1981a–b; Maw *et al.* 2000; McDaniel and Tsai 1990; McKamey 1998; McKamey and Deitz 1991, 1996; Mead 1962, 1967, 1986, 1994; Messina 1981; Metcalf and Wade 1965; Mispagel 1974 (M.S. thesis); Moellenbeck *et al.* 1993; Morales and Beal 2006; Nixon 1979 (Ph.D. dissertation); Nixon and McPherson 1977; Nixon and Thompson 1987; Olmstead and Wood 1990; Ostry and Anderson 1998; Paeiro *et al.* 2003; Palmer 1987; Parker 1974; Pratt and Wood 1992, 1993; Ramos 1979; Reithel and Campbell 2008; Rey 1981; Rey and McCoy 1982; Rodríguez and Cocroft 2006; Rodríguez *et al.* 2006; Rothschild 1996; Salas-Araiza *et al.* 2011; Scarborough 1984 (Ph.D. dissertation); Silagyi *et al.* 2005; Simons 1962; Smith and Dixon 2007; Stave and Shiff 1981; Stoner and Surber 1969; Tsai 1997; Tsai and Brown 1991; Tsai and Fisher 1993; Tsai and Kopp 1981; Tsai and Mead 1982; Van Pelt 1971; Wallace 2008; Wallace and Deitz 2007; Wallace and Maloney 2010; Wallace and Troyano 2006; Wallace *et al.* 2003, 2009; Ward *et al.* 1977; Webster and Nielsen 1984; Wilson and Hilburn 1991; Wood 1968 (Ph.D. dissertation), 1980, 1987; Wood and Guttman 1981, 1985; Wood and Keese 1990; Woodiel and Reinert 1975a–b; Zimmerman 1948; Zhang *et al.* 2011; Zink 2003.

As noted above, Metcalf and Wade (1965) summarized geographic data from works published through 1955, only a few of which are cited here with reference to the faunas of Hawaii and New York. No new original locality records are introduced here.

Our resource for plant names was the USDA plant database (2012).

**Interpretation of records.** Records based on statements such as "probably present" were not included. Records indicated as problematic were treated as questionable (?), while those indicated as "errors" were treated as absent. If a work stated that a prior record was in error or a misidentification, we followed the more recent work. Thus, for North Carolina, as an example, 13 species that could not be verified from the state are listed as questionable, while records of 3 others based on misidentifications (Dietrich *et al.* 1999) are omitted. Herein we use the word "endemic" in the sense of "restricted to a particular locality or region."

Our interpretations of several records merit clarification. Records of *Trachytalis isabellina* Fowler in the United States (California) are treated as questionable based on McKamey (1998). Reports of *Sundarion flavum* (Fairmaire) (McKamey 1998, Godoy *et al.* 2006) and *Umbonia signoreti* Fairmaire (McKamey 1998) in the United States seem to originate solely from Metcalf and Wade's (1965) listing of "North America" and are omitted herein. Although *Cyrtolobus cristiferus* (Stål 1864) was listed in *Nomina Insecta Nearctica* (Entomological Information Services 1997), the only locality records are from "Mexico" (Metcalf and Wade 1965)—we follow McKamey (1998), who attributed this species to Neotropical Mexico (his locality "17"). Records of *Ceresa patruelis* [sic] Stål from Florida and southern states, listed in synonymy under *C. cavicornis* (Stål) by Metcalf and Wade (1965), are here listed under *Vestistilus patruelis* (Stål). Our distributional data for the undescribed species of the *Enchenopa binotata* complex are based on works published since 1955, however, an extensive search of the pre-1955 literature may imply additional locality records based on host data. A questionable record of *Bajulata* for Nicaragua (Maes 1998), the first report of the genus from the Neotropical region, should be verified to assure it is not based on a mis-identification. We included five records (apparently new) given in Boggs' (1980) M.S. thesis: *Bryantopsis ensigera* Ball in Nearctic Mexico, p. 86 (fig. 49); *Publilia concava* (Say) in California; *P. modesta* (Uhler) in San Luis Potosi (Mexico) and Oregon; and *P. porrecta* Fowler in Arizona (all documented by specimens in the collections he listed). Boggs' unpublished thesis also included distribution maps suggesting additional locality records (not explicitly documented in his text), descriptions of new species, and nomenclatural changes—none of which is presented herein. A report of *P. modesta* for Alabama [as "AL"] (Ward *et al.* 1977, attributed to Metcalf and Wade 1965) actually refers to Alberta [AB] based on the latter work (pp. 924–925). We listed both *Tortistilus abnormus* (Caldwell) and *Vanduzea segmentata* (Fowler) as questionable in Nuevo León [near Monterrey] and Tamaulipas, northern Mexico, based on Palmer (1987), whose data indicate one or both species are present in these locations. Records of species from the "Gulf of California" are listed as present for Nearctic Mexico and as questionable (?) for Sonora, Baja California, and Baja California Sur. Records given only as "Dakota" are listed as questionable for North Dakota (2 species) and South Dakota (1 species). Records given only as "Northwestern states" or "Southwestern states" are listed as present for our corresponding subregion (but not for any state included in that subregion).

**Subregions of the Nearctic.** Our division of the Nearctic into subregions (see Regional richness, below, and Fig. 1) is based on an informal assessment of generic distributions among manmade political boundaries. The advantages of global coordinates for reporting locality data are obvious, but, in reality, most published records over the past 250 years refer to political units, rather than precise coordinates. Moreover, a few political units could arguably be placed into either the Neotropical or Nearctic region (or both) or in two different Nearctic subregions, but again, for practical reasons, we assigned each to a single subregion based on our current understanding of generic distributions. Many records for "Mexico" presumably refer to Neotropical Mexico (locality 17 of McKamey 1998) and are omitted here unless specific localities were given that fell within our definition of "MEXICO (Nearctic)" (see discussion below; includes McKamey's localities 48–51, northern Mexico and associated islands). State/province names (with abbreviations) are given under each region in the section on Regional richness, below.

## Results and discussion

### Annotated checklist of Nearctic treehoppers

Superscripts: E, endemic to the Nearctic region; I, introduced from the Old World. Species with no superscript occur also in the Neotropical region.

*Aconophora albipennis* Dietrich, in Dietrich and Deitz 1991: MEXICO (Nearctic): Durango.

*Aconophora compressa* Walker 1851: MEXICO (Nearctic): San Luis Potosi, Zacatecas. USA: Southwestern States: AZ.

*Aconophora laminata* Fairmaire 1846: MEXICO (Nearctic): Durango, Guanajuato.

*Aconophora longicornis* Dietrich, in Dietrich and Deitz 1991: MEXICO (Nearctic): San Luis Potosi.

*Aconophora mexicana* Stål 1864: MEXICO (Nearctic): San Luis Potosi.

*Acutalis nigrinervis* Fowler 1895: USA: Central & Eastern States: MO. CANADA: Central & Eastern Provinces: QC.

*Acutalis tartarea* (Say 1830): USA: Southwestern States: CO, TX, UT; Central & Eastern States: AL, AR, CT, DC, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, MI, MN, MO, MS, NC, NE, NJ, NY, OH, OK, PA, RI, SC, SD, TN, VA, WI. CANADA: Central & Eastern Provinces: ON, QC.

*Aetalion nervosopunctatum* Signoret 1851: MEXICO (Nearctic): Durango. USA: Southwestern States: AZ. This species was described from Mexico and may be a Nearctic endemic. Neotropical records from Ecuador, apparently based on doubtful identification, and Jamaica (Metcalf and Wade 1965) need confirmation.

*Aetalion quadratum* Fowler 1897: USA: Central & Eastern States: FL.

*Amastris lycioda* Ball 1933: USA: Southwestern States: AZ. This species is also recorded from central Mexico (Ball 1933), but not specifically the Nearctic region.

<sup>E</sup>*Amastris templa* Ball 1933: USA: Southwestern States: UT.

*Anisostylus elongatus* (Fowler 1895): MEXICO (Nearctic): Durango.

<sup>E</sup>*Anisostylus fulgidus* (Ball 1937): USA: Southwestern States: AZ, NM.

<sup>E</sup>*Anisostylus gillettei* (Goding 1892): USA: Southwestern States: CA, CO, UT; Northwestern States.

<sup>E</sup>*Anisostylus stylatus* Caldwell 1949: USA: Southwestern States: UT; Northwestern States: ID.

*Antianthe expansa* (Germar 1835): USA: Southwestern States: AZ, CA; Central & Eastern States: FL.

*Antonae pacificata* (Buckton 1905): [? Nearctic region: USA: Southwestern States: CA; Northwestern States: OR, WA].

*Aphetea inconspicua* Fowler 1895: USA: Southwestern States: CA.

<sup>E</sup>*Archasia auriculata* (Fitch 1851): USA: Southwestern States: CO, NM, TX, UT; Central & Eastern States: AL, AR, CT, DC, DE, FL, GA, IA, IL, IN, KS, MA, MD, MI, MN, MO, NC, NE, NJ, NY, OH, OK, PA, SC, SD, VA, WI. CANADA: Central & Eastern Provinces: ON, QC.

<sup>E</sup>*Archasia belfragei* Stål 1869: USA: Southwestern States: NM, TX; Central & Eastern States: AR, CT, DC, DE, FL, GA, IA, IL, IN, KS, KY, MA, MD, MI, MO, NC, NJ, NY, OH, OK, PA, TN, VA, VT, WI. CANADA: Central & Eastern Provinces: ON, QC.

<sup>E</sup>*Archasia pallida* (Fairmaire 1846): USA: Southwestern States: AZ, TX; Central & Eastern States: DE, FL, MO, MS, NC, NJ, OH, OK, PA.

*Ashmeadea carinata* (Stål 1864): USA: Southwestern States: AZ.

*Atymna castaneae* (Fitch 1851): MEXICO (Nearctic): Chihuahua. USA: Central & Eastern States: CT, DC, DE, GA, IN, MA, NC, NH, NJ, NY, OH, PA, TN. CANADA: Central & Eastern Provinces: ON.

<sup>E</sup>*Atymna helena* (Woodruff 1915): USA: Central & Eastern States: CT, DE, IA, IL, IN, MI, MN, MO, NJ, NY, OH, OK, PA, SD, VA, WI. CANADA: Central & Eastern Provinces: MB, QC.

<sup>E</sup>*Atymna inornata* (Say 1830): USA: Central & Eastern States: CT, DC, IA, IL, MD, MI, [? NC], NJ, NY, OH, PA, VA. CANADA: Central & Eastern Provinces: ON, QC.

<sup>E</sup>*Atymna querci* (Fitch 1851): USA: Southwestern States: TX; Central & Eastern States: AR, CT, DC, DE, GA, IA, IL, IN, KS, KY, MA, MD, MI, MN, MO, NC, NE, NH, NJ, NY, OH, PA, SC, SD, TN, VA, WI. CANADA: Central & Eastern Provinces: ON, QC.

<sup>E</sup>*Atymna reticulata* Ball 1937: USA: Southwestern States: AZ.

<sup>E</sup>*Atymna simplex* (Van Duzee 1908): USA: Southwestern States: AZ, TX.

<sup>E</sup>*Bajulata bajula* (Goding 1893): USA: Southwestern States: AZ. We regard *Bajulata* as endemic to the Nearctic region, but note a possible report of the genus from Nicaragua (Maes 1998) that needs verification.

*Bolbonota tuberculata* (Coquebert 1801): [? Nearctic region: USA: Central & Eastern States: FL].

<sup>E</sup>*Bryantopsis ensigera* Ball 1937: MEXICO (Nearctic). USA: Southwestern States: AZ.

*Campylenchia curvata* (Fabricius 1803): USA: Southwestern States: CA, CO, NM, TX; Northwestern States: MT, ND, OR, WA, WY; Central & Eastern States: DC, IA, IL, KS, MA, MD, MI, MO, MS, NC, NE, NJ, NY, PA, VA, VT. CANADA: Central & Eastern Provinces: QC.

*Campylenchia latipes* (Say 1824): USA: Southwestern States: AZ, CA, CO, NM, NV, TX, UT; Northwestern States: ID, MT, ND, OR, WA, WY; Central & Eastern States: AL, AR, CT, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NE, NH, NJ, NY, OH, OK, PA, RI, SC, SD, TN, VA, VT, WI, WV. CANADA: Western Provinces: AB, BC, SK; Central & Eastern Provinces: MB, NB, NS, ON, PE, QC.

*Campylenchia rugosa* (Fowler 1884): CANADA: Western Provinces: AB, BC, SK; Central & Eastern Provinces: MB. Described from Mexico, this species is also reported from Ecuador and Canada (Metcalf and Wade 1965;

McKamey 1998; Maw *et al.* 2000), a distribution that may reflect differences in species concepts within this genus.

*Campylocentrus brunneus* Fowler 1896: MEXICO (Nearctic): Tamaulipas.

<sup>E</sup>*Carynota maculata* Funkhouser 1915: USA: Central & Eastern States: FL.

<sup>E</sup>*Carynota marmorata* (Say 1830): USA: Central & Eastern States: CT, DC, GA, IL, IN, KY, MA, ME, MI, MN, MO, NC, NH, NJ, NY, OH, PA, RI, VA, VT, WI. CANADA: Central & Eastern Provinces: MB, NB, NS, ON, PE, QC.

<sup>E</sup>*Carynota mera* (Say 1830): USA: Southwestern States: TX; Central & Eastern States: CT, DC, DE, FL, GA, IA, IL, IN, KS, KY, MA, MD, MI, MO, MS, NC, NE, NH, NJ, NY, OH, OK, PA, SC, TN, WI, WV. CANADA: Central & Eastern Provinces: NB, ON, QC.

<sup>E</sup>*Carynota stupida* (Walker 1851): USA: Central & Eastern States: CT, MA, ME, MI, NH, NY. CANADA: Western Provinces: SK; Central & Eastern Provinces: MB, NB, NS, ON, QC.

<sup>E</sup>*Centrodontus atlas* (Goding 1892): MEXICO (Nearctic): Baja California. USA: Southwestern States: AZ, CA, CO, NM, NV, UT.

<sup>I</sup>*Centrotus cornutus* (Linnaeus 1758): Introduced: USA: Central & Eastern States: PA.

*Ceresa vitulus* (Fabricius 1775): USA: Southwestern States: TX; Central & Eastern States: NE, OH.

<sup>E</sup>*Cyrtolobus acuminatus* Woodruff 1924: USA: Central & Eastern States: NJ, NY, PA.

<sup>E</sup>*Cyrtolobus acutus* Van Duzee 1908: USA: Southwestern States: AZ, CO, NM, UT; Central & Eastern States: IN.

*Cyrtolobus arcuatus* (Emmons 1854): USA: Southwestern States: CO; Central & Eastern States: AR, CT, DE, FL, GA, IA, IL, IN, KS, MA, MD, MI, MO, NC, NY, OH, OK, PA, RI, SC, TN, WI.

<sup>E</sup>*Cyrtolobus arizonae* Ball 1932: USA: Southwestern States: AZ.

<sup>E</sup>*Cyrtolobus aureus* Woodruff 1924: USA: Central & Eastern States: AR, CT, DE, MA, MD, MO, NC, NJ, NY, OH, PA, TN, WI.

<sup>E</sup>*Cyrtolobus celsus* Van Duzee 1916: USA: Southwestern States: NM; Central & Eastern States: AL, GA, KS, MA, MO, NC, NJ, NY.

<sup>E</sup>*Cyrtolobus cinctus* Van Duzee 1908: USA: Central & Eastern States: CT, NY, OH. CANADA: Central & Eastern Provinces: QC.

<sup>E</sup>*Cyrtolobus cinereus* (Emmons 1854): USA: Central & Eastern States: CT, KS, NJ, NY, OH, SD. CANADA: Central & Eastern Provinces: ON, QC.

<sup>E</sup>*Cyrtolobus clarus* Woodruff 1924: USA: Central & Eastern States: AL, FL, NC, OK.

<sup>E</sup>*Cyrtolobus coronatus* Ball 1932: USA: Southwestern States: AZ.

<sup>E</sup>*Cyrtolobus discoidalis* (Emmons 1854): USA: Central & Eastern States: CT, DE, GA, IL, MA, MI, MO, [? NC], NJ, NY, OH, OK, PA, WI. CANADA: Central & Eastern Provinces: ON, QC.

<sup>E</sup>*Cyrtolobus dixianus* Woodruff 1924: USA: Southwestern States: TX; Central & Eastern States: AL, DE, MD, MO, NC, NY, OK, PA. CANADA: Central & Eastern Provinces: ON, QC.

<sup>E</sup>*Cyrtolobus fenestratus* (Fitch 1851): USA: Southwestern States: CO; Central & Eastern States: CT, DC, DE, FL, GA, IL, KS, KY, MA, MD, MO, MS, NC, NJ, NY, OH, OK, PA, TN, WI. CANADA: Central & Eastern Provinces: ON, QC.

<sup>E</sup>*Cyrtolobus flavolatus* Woodruff 1924: USA: Central & Eastern States: MD, NC, NY, OK, PA, TN, WI.

<sup>E</sup>*Cyrtolobus frigidus* Ball 1932: USA: Southwestern States: AZ, UT.

<sup>E</sup>*Cyrtolobus fuliginosus* (Emmons 1854): USA: Southwestern States: CO, TX; Central & Eastern States: AL, AR, CT, DE, GA, IL, IN, KS, LA, MA, MD, MI, MN, MO, MS, NC, NE, NY, OH, OK, PA, SC, TN, VA, WI. CANADA: Central & Eastern Provinces: ON, QC.

<sup>E</sup>*Cyrtolobus funkhousei* Woodruff 1924: USA: Central & Eastern States: CT, DE, IL, IN, MA, MD, MO, NC, NJ, NY, OK, PA, WI. [? CANADA: Central & Eastern Provinces: ON].

<sup>E</sup>*Cyrtolobus fuscipennis* Van Duzee 1908: USA: Southwestern States: CO; Central & Eastern States: AR, CT, DE, IA, IL, IN, MA, MD, MI, MN, MO, NC, NJ, NY, OH, OK, PA, TN, WI. CANADA: Central & Eastern Provinces: QC.

<sup>E</sup>*Cyrtolobus gloveri* Goding 1893: USA: Central & Eastern States: MD.

<sup>E</sup>*Cyrtolobus gramatanus* Woodruff 1924: USA: Central & Eastern States: NJ, NY, PA, VT. CANADA: Central &

Eastern Provinces: QC.

- <sup>E</sup>*Cyrtolobus graciosus* Woodruff 1924: USA: Central & Eastern States: CT, IN, NJ, OH. CANADA: Central & Eastern Provinces: QC.
- <sup>E</sup>*Cyrtolobus griseus* Van Duzee 1908: USA: Southwestern States: TX; Central & Eastern States: AR, IA, IL, IN, KS, LA, MI, MN, MO, NC, NY, OH, OK, PA, SD, WI. CANADA: Central & Eastern Provinces: MB, ON, QC.
- <sup>E</sup>*Cyrtolobus inermis* (Emmons 1854): USA: Southwestern States: UT; Central & Eastern States: CT, DC, DE, FL, IL, MD, MO, NC, NE, NJ, NY, OH, OK, PA, SD, WI.
- <sup>E</sup>*Cyrtolobus limus* Van Duzee 1908: USA: Southwestern States: CA, CO; Central & Eastern States: OH.
- <sup>E</sup>*Cyrtolobus maculifrontis* (Emmons 1854): USA: Southwestern States: CO, TX; Central & Eastern States: AL, CT, DE, GA, IA, IL, KS, KY, MD, MI, MN, MO, NC, NE, NJ, NY, OH, OK, PA, SC, SD, TN, VA, WI. CANADA: Central & Eastern Provinces: MB, ON, QC.
- <sup>E</sup>*Cyrtolobus maxinei* Dennis 1970: USA: Central & Eastern States: WI.
- <sup>E</sup>*Cyrtolobus oblongatus* Ball 1932. USA: Southwestern States: AZ.
- <sup>E</sup>*Cyrtolobus ovatus* Van Duzee 1908: USA: Southwestern States: TX; Central & Eastern States: AL, CT, DE, FL, GA, IL, MD, MO, NC, NJ, NY, OH, PA, VA. CANADA: Central & Eastern Provinces: ON.
- <sup>E</sup>*Cyrtolobus pallidifrontis* (Emmons 1854): USA: Southwestern States: CO; Central & Eastern States: CT, DE, GA, IA, IL, KS, MD, MI, MN, MO, NC, NJ, NY, OH, OK, PA, TN, VA, WI. CANADA: Central & Eastern Provinces: MB, ON, QC.
- <sup>E</sup>*Cyrtolobus parvulus* Woodruff 1924: USA: Central & Eastern States: DE, MO, NC, NJ, NY.
- <sup>E</sup>*Cyrtolobus pictus* Van Duzee 1925: USA: Southwestern States: UT; Central & Eastern States: FL, NJ, NY, OH.
- <sup>E</sup>*Cyrtolobus pulchellus* Woodruff 1924: USA: Central & Eastern States: DE, MN, MO, NC, NJ, NY, WI.
- <sup>E</sup>*Cyrtolobus puritanus* Woodruff 1924: USA: Central & Eastern States: AR, CT, DE, IN, MA, MI, MN, MO, NC, NJ, NY, OH, PA, WI. CANADA: Central & Eastern Provinces: ON, QC.
- <sup>E</sup>*Cyrtolobus rufulus* Woodruff 1924: USA: Southwestern States: TX; Central & Eastern States: AL, IA, IL, KS, LA, MN, MS, NJ, NY, SD, WI. CANADA: Central & Eastern Provinces: QC.
- <sup>E</sup>*Cyrtolobus sculptus* (Fairmaire 1846): USA: Central & Eastern States: DC, FL, IL, MD, MI, [? NC], NJ, NY, OH, PA, VA.
- <sup>E</sup>*Cyrtolobus togatus* Woodruff 1924: USA: Central & Eastern States: AL, DE, LA, NC.
- <sup>E</sup>*Cyrtolobus tuberosus* (Fairmaire 1846): USA: Southwestern States: TX; Central & Eastern States: CT, DE, FL, GA, IL, KS, LA, MA, MD, MI, MO, MS, NC, NJ, NY, OH, OK, PA, SC, TN, VA, WI. CANADA: Central & Eastern Provinces: MB, ON.
- <sup>E</sup>*Cyrtolobus vanduzii* (Goding 1893): USA: Southwestern States: AZ, CA.
- <sup>E</sup>*Cyrtolobus vau* (Say 1830): USA: Southwestern States: CO, NM, TX; Central & Eastern States: AR, CT, DC, DE, FL, GA, IA, IL, IN, KS, KY, MA, MD, ME, MI, MN, MO, NC, NE, NH, NJ, NY, OH, OK, PA, TN, WI. CANADA: Central & Eastern Provinces: MB, ON, QC.
- <sup>E</sup>*Cyrtolobus viridis* (Emmons 1854): USA: Central & Eastern States: IL, MI, NY, OH, PA.
- <sup>E</sup>*Cyrtolobus woodruffi* Ball 1932: USA: Southwestern States: AZ.
- Darnis lateralis* (Coquebert 1801): USA: Southwestern States: CA.
- Enchenopa binotata* (Say 1824) complex: USA: Southwestern States: AZ, TX, UT; Northwestern States: ND; Central & Eastern States: AL, AR, CT, DC, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NE, NH, NJ, NY, OH, OK, PA, SC, SD, TN, VA, VT, WI, WV. CANADA: Central & Eastern Provinces: MB, NS, ON, QC. We found no host records for the underscored locations, but assume each has at least one *Enchenopa* species. The following entries are based primarily on publications since 1955 that give host data. Only the first species is described; the others are thought to represent undescribed species within this complex. Further research is needed to clarify which undescribed species are Nearctic endemics. Metcalf and Wade's catalogue (1965: 1297–1303, *E. binotata*) lists earlier references, including some with “notes of food plants” that may broaden the host-based distributions given below.
- <sup>E</sup>*E. binotata* (Say 1824): on *Celastrus scandens* L. (Celastraceae): USA: Central & Eastern States: DE, IN, KY, MD, MI, MO, NY [includes neotype (Hamilton and Cocroft 2010)], OH, PA.
- E. binotata* complex: on *Betula* sp. (Betulaceae): CANADA: Central & Eastern Provinces: NB.

- E. binotata* complex: on *Carya* spp. (Juglandaceae): USA: Central & Eastern States: DE, LA, MD, NC, OH, OK.
- E. binotata* complex: on *Cercis canadensis* L. (Fabaceae): USA: Southwestern States: TX; Central & Eastern States: DE, IN, KY, MD, MO, MS, NC, OH, TN, VA.
- E. binotata* complex: on *Juglans nigra* L. or *J. cinerea* L. (Juglandaceae): Central & Eastern States: AR, DE, IL, IN, KY, LA, MD, MO, NC, NY, OH, TN, VA.
- E. binotata* complex: on *Liriodendron tulipifera* L. (Magnoliaceae): USA: Central & Eastern States: DE, MD, NC, OH.
- E. binotata* complex: on *Ptelea trifoliata* L. (Rutaceae): USA: Central & Eastern States: AR, IN, KY, MI, MO, NY, OH, TN.
- E. binotata* complex: on *Robinia pseudoacacia* L. (Fabaceae): USA: Central & Eastern States: AR, IN, MI, MO, NC, NY, OH, PA, TN, WI.
- E. binotata* complex: on *Sideroxylon lycidoides* L. or *S. lanuginosum* Michx. (Sapotaceae): USA: Southwestern States: TX; Central & Eastern States: AL, MO.
- E. binotata* complex: on *Tilia* (Tiliaceae): CANADA: Central & Eastern Provinces: ON.
- E. binotata* complex: on *Viburnum* spp. (Caprifoliaceae): USA: Central & Eastern States: AR, DE, KY, MD, MO, NC, NY, OH, TN, VA, WI.
- <sup>E</sup>*Enchenopa brevis* Walker 1851: on *Dirca palustris* L. (Thymelaeaceae): USA: Central & Eastern States: IN. CANADA: Central & Eastern Provinces: ON. The host distribution suggests this species in endemic (USDA 2012).
- <sup>E</sup>*Enchenopa permutata* Van Duzee 1908: MEXICO (Nearctic): Baja California Sur. USA: Southwestern States: AZ, UT. CANADA: Western Provinces: AB.
- Enchenopa sericea* Walker 1851: USA: Southwestern States: AZ.
- Entylia carinata* (Forster 1771): USA: Southwestern States: NV, TX; Northwestern States: ID; Central & Eastern States: CT, DC, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NE, NH, NJ, NY, OH, OK, PA, SC, SD, TN, VA, VT, WI. CANADA: Central & Eastern Provinces: NS, ON, PE, QC.
- <sup>1</sup>*Gargara genistae* (Fabricius 1775): Introduced: USA: Central & Eastern States: CT, ME, NJ; CANADA: Western Provinces: BC; [? Central & Eastern Provinces: ON].
- <sup>E</sup>*Glossonotus acuminatus* (Fabricius 1775): USA: Central & Eastern States: AR, CT, DE, IA, IL, IN, KS, MA, MD, MI, MN, MO, NC, NJ, NY, OH, OK, PA, RI, SC, VA, WI. CANADA: Central & Eastern Provinces: ON, QC.
- <sup>E</sup>*Glossonotus crataegi* (Fitch 1851): USA: Central & Eastern States: CT, DE, IA, IL, MA, MD, ME, MI, MN, MO, NE, NJ, NY, OH, PA, SD, WI, WV. CANADA: Central & Eastern Provinces: MB, NS, ON, QC.
- <sup>E</sup>*Glossonotus nimbatulus* Ball 1925: USA: Northwestern States: ND; Central & Eastern States: IL, MA, MN, NH, NJ, NY, OH, PA. CANADA: Western Provinces: SK; Central & Eastern Provinces: MB, NB, ON, QC.
- <sup>E</sup>*Glossonotus turriculatus* (Emmons 1854): USA: Central & Eastern States: CT, DE, GA, IA, IL, KS, MA, MD, MI, MN, MO, NC, NE, NJ, NY, OH, OK, PA, VA, WI. CANADA: Central & Eastern Provinces: NB, QC.
- <sup>E</sup>*Glossonotus univittatus* (Harris 1841): USA: Southwestern States: CO, NM; Northwestern States: MT; Central & Eastern States: AR, CT, DC, GA, IA, IL, IN, KY, MA, MD, MI, MN, MO, NC, NE, NH, NJ, NY, OH, PA, SC, TN, WI. CANADA: Western Provinces: BC, SK; Central & Eastern Provinces: MB, ON, QC.
- <sup>E</sup>*Grandolobus grandis* (Van Duzee 1908): USA: Southwestern States: AZ.
- Guayaquila pallescens* (Stål 1869): MEXICO (Nearctic): San Luis Potosi.
- Hadrophallus bubalus* (Fabricius 1794): USA: Southwestern States: CO, TX, UT; Northwestern States: OR, WA; Central & Eastern States: CT, DC, DE, GA, IA, IL, IN, KS, KY, MD, MI, MO, NC, NE, NJ, NY, OH, OK, PA, SD, TN, WI. CANADA: Central & Eastern Provinces: ON, QC.
- <sup>E</sup>*Hadrophallus varians* (Caldwell 1949): USA: Southwestern States: TX.
- Heliria clitella* Ball 1925: USA: Southwestern States: AZ.
- Heliria cornutula* Ball 1925: USA: Central & Eastern States: DE, MD, NC, NJ, NY, PA.
- Heliria cristata* (Fairmaire 1846): USA: Southwestern States: TX; Central & Eastern States: CT, DC, DE, FL, GA, IA, IL, IN, KS, LA, MA, MD, MO, NC, NE, NJ, NY, [? OH], OK, PA, SD, WI. CANADA: Central & Eastern Provinces: ON.



- <sup>E</sup>*Heliria fitchi* Ball 1925: USA: Central & Eastern States: DE, MD, NY, PA. CANADA: Central & Eastern Provinces: ON.
- <sup>E</sup>*Heliria gemma* Ball 1925: USA: Central & Eastern States: CT, IA, MA, ME, NC, NH, NY, OK, VT. CANADA: Central & Eastern Provinces: ON.
- <sup>E</sup>*Heliria gibberata* Ball 1925: USA: Southwestern States: TX; Central & Eastern States: DE, IA, IL, IN, LA, MD, NC, NE, NJ. CANADA: Central & Eastern Provinces: ON.
- Heliria mexicana* (Stål 1869): USA: Southwestern States: CA; Central & Eastern States: MD, [? NC], NJ, NY, PA, TN. An examination of the type material of *Heliria mexicana* (by MSW) raised questions about these Nearctic records, which may refer to *H. cornutula*.
- <sup>E</sup>*Heliria molaris* (Butler 1877): USA: Northwestern States: ND; Central & Eastern States: DE, IA, IL, KS, KY, MO, NC, NY, WI. CANADA: Western Provinces: SK; Central & Eastern Provinces: MB, ON.
- <sup>E</sup>*Heliria praealta* (Fowler 1894): USA: Southwestern States: CO, UT; Northwestern States: ID, MT, WA. CANADA: Western Provinces: AB, SK; Central & Eastern Provinces: ON, QC.
- <sup>E</sup>*Heliria scalaris* (Fairmaire 1846): USA: Southwestern States: CO; Central & Eastern States: CT, IA, IL, KS, MD, MN, MO, NC, NJ, NY, OH, PA, SD, WI. CANADA: Western Provinces: AB, SK; Central & Eastern Provinces: MB, NB, NS, ON, QC.
- Heliria sinuata* (Fowler 1896): USA: Southwestern States: AZ, NM.
- <sup>E</sup>*Heliria strombergi* Goding 1893: USA: Central & Eastern States: IA, IL, IN, KY, LA, MO, MS, OH, SD. CANADA: Central & Eastern Provinces: NB.
- <sup>E</sup>*Helonica excelsa* (Fairmaire 1846): USA: Central & Eastern States: DE, IA, IL, MD, MO, NJ, NY, SC, TN.
- <sup>E</sup>*Hypsoprora nogolata* Ball 1933: USA: Southwestern States: AZ.
- Hypsoprora simplex* Van Duzee 1923: MEXICO (Nearctic): Baja California, Baja California Sur. USA: Southwestern States: CA.
- Idioderma virescens* Van Duzee 1909: USA: Southwestern States: TX; Central & Eastern States: FL.
- Leioscyta ferruginipennis* (Goding 1893): MEXICO (Nearctic): Baja California, Baja California Sur. USA: Southwestern States: AZ, CA, CO, NV, UT; Northwestern States: ND. CANADA: Western Provinces: AB, SK.
- Leioscyta pallidipennis* (Stål 1869): USA: Southwestern States: AZ.
- Membracis mexicana* Guérin-Méneville 1829: MEXICO (Nearctic): Guanajuato, Tamaulipas. USA: Southwestern States: CA; Central & Eastern States: FL.
- Membracis nigra* Olivier 1792: USA: Southwestern States: CA.
- Metcalfiella monogramma* (Germar 1835): MEXICO (Nearctic): [? Baja California], Queretaro.
- <sup>E</sup>*Microcentrus caryae* (Fitch 1851): USA: Southwestern States: TX; Central & Eastern States: AL, CT, DC, DE, FL, GA, IA, IL, KS, KY, MA, MD, MO, NC, NE, NH, NJ, NY, OH, OK, PA, SC, TN, VA, WI. CANADA: Central & Eastern Provinces: ON, QC.
- Microcentrus lynx* Ball 1933: MEXICO (Nearctic): Durango, Nuevo León. USA: Southwestern States: AZ, CO, NM, TX.
- Microcentrus nicholi* Ball 1933: MEXICO (Nearctic): Durango. USA: Southwestern States: AZ.
- Microcentrus perditus* (Amyot & Serville 1843): MEXICO (Nearctic): Durango, Nuevo León, Tamaulipas. USA: Southwestern States: AZ, CO, NM, TX; Central & Eastern States: AL, AR, DC, DE, FL, GA, IL, IN, KS, KY, LA, MA, MD, MI, MO, MS, NC, NE, NH, NJ, NY, OH, OK, PA, SD, TN, VA. CANADA: Central & Eastern Provinces: ON.
- Microcentrus solussidus* Cryan, Robertson, and Deitz 2004, MEXICO (Nearctic): Chihuahua, Coahuila, Durango, Sonora, Tamaulipas. USA: Southwestern States: AZ, TX.
- Microtalis calva* (Say 1830): USA: Southwestern States: CO, NM, TX; Central & Eastern States: AL, AR, CT, DC, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, MI, MN, MO, MS, NC, NE, NH, NJ, NY, OH, OK, PA, SD, TN, VA, WI. CANADA: Central & Eastern Provinces: ON, QC.
- <sup>E</sup>*Microtalis dorsalis* (Fitch 1851): USA: Southwestern States: NM, TX; Central & Eastern States: CT, MD, MI, MN, NC, NE, NJ, NY, OH, PA. CANADA: Central & Eastern Provinces: ON, QC.
- <sup>E</sup>*Microtalis flava* Goding 1929: USA: Southwestern States: UT.
- Microtalis malleifera* Fowler 1895: USA: Central & Eastern States: FL, NC.
- <sup>E</sup>*Microtalis occidentalis* (Goding 1893): USA: Southwestern States: CA, TX, UT; Central & Eastern States: IA, KS, MI.
- <sup>E</sup>*Microtalis parva* (Goding 1893): USA: Southwestern States: AZ, CA.

- Monobelus biguttatus* (Fabricius 1803): BERMUDA.
- <sup>E</sup>*Multareis cornutus* Goding 1895: MEXICO (Nearctic): Baja California, Coahuila, Sonora. USA: Southwestern States: AZ, CA, NM, NV, TX, UT.
- <sup>E</sup>*Multareoides bifurcatus* Cook 1953: MEXICO (Nearctic): Baja California. USA: Southwestern States: AZ, CA, NM, NV, UT.
- <sup>E</sup>*Multareoides digitatus* (Van Duzee 1923): MEXICO (Nearctic): Baja California, Coahuila. USA: Southwestern States: AZ, CA, NM, TX, UT.
- <sup>E</sup>*Multareoides planifrons* (Van Duzee 1923): MEXICO (Nearctic): Baja California, Baja California Sur. USA: Southwestern States: AZ, CA.
- Notocera hispida* (Fairmaire 1846): [? Nearctic region: USA: Southwestern States: CO].
- <sup>E</sup>*Ophiderma compacta* Gibson and Wells 1917: USA: Southwestern States: AZ.
- <sup>E</sup>*Ophiderma definita* Woodruff 1919: USA: Southwestern States: TX; Central & Eastern States: AR, CT, DE, FL, IL, KY, LA, MA, MD, MI, MO, NC, NJ, NY, OH, OK, PA, SC, TN, WI. CANADA: Central & Eastern Provinces: ON, QC.
- <sup>E</sup>*Ophiderma evelyna* Woodruff 1919: USA: Southwestern States: TX; Central & Eastern States: AR, DE, FL, GA, IL, KY, LA, MD, MN, MO, MS, NC, NJ, NY, OK, PA, RI, SC, TN, WI. CANADA: Central & Eastern Provinces: ON, QC.
- <sup>E</sup>*Ophiderma flava* Goding 1893: USA: Central & Eastern States: AR, CT, DE, FL, IL, KS, LA, MA, MD, ME, MI, MO, NC, NJ, NY, OH, OK, PA, SC, TN, VA, WI, WV. CANADA: Central & Eastern Provinces: ON, QC.
- <sup>E</sup>*Ophiderma flavicephala* Goding 1893: USA: Southwestern States: TX; Central & Eastern States: AL, AR, CT, DE, FL, GA, IL, IN, LA, MA, MD, MI, MO, MS, NC, NJ, NY, OH, OK, PA, SC, WI, WV. CANADA: Central & Eastern Provinces: ON, QC.
- <sup>E</sup>*Ophiderma grisea* Woodruff 1919: USA: Southwestern States: TX; Central & Eastern States: AR, CT, DE, GA, IA, IN, MA, MD, MI, MN, MO, NC, NY, OH, OK, PA, VA, WI.
- <sup>E</sup>*Ophiderma infantilis* Ball 1932: USA: Central & Eastern States: FL.
- <sup>E</sup>*Ophiderma pallida* Van Duzee 1908: USA: Southwestern States: AZ.
- <sup>E</sup>*Ophiderma panda* Ball 1932: USA: Southwestern States: AZ.
- <sup>E</sup>*Ophiderma pubescens* (Emmons 1854): USA: Central & Eastern States: AR, CT, DC, DE, FL, GA, IA, IL, IN, KS, KY, MA, MD, ME, MI, MN, MO, NC, NH, NJ, NY, OH, OK, PA, RI, SC, TN, VA, WI. CANADA: Central & Eastern Provinces: ON, QC.
- <sup>E</sup>*Ophiderma salamandra* Fairmaire 1846: USA: Southwestern States: AZ, TX; Central & Eastern States: AR, CT, DC, DE, FL, GA, IA, IL, KS, KY, MA, MD, MI, MN, MO, MS, NC, NE, NH, NJ, NY, OH, OK, PA, SC, TN, VA, WI. CANADA: Central & Eastern Provinces: NB, NS, ON, QC.
- <sup>E</sup>*Ophiderma stonei* Ball 1932: USA: Central & Eastern States: FL.
- <sup>E</sup>*Ophiderma tricincta* Ball 1932: USA: Southwestern States: AZ.
- <sup>E</sup>*Palonica nogalana* Ball 1933: USA: Southwestern States: AZ.
- <sup>E</sup>*Palonica pyramidata* (Uhler 1877): USA: Southwestern States: CA, CO, UT; Northwestern States: ID, MT, ND, OR, WA, WY; Central & Eastern States: CT, DC, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, NE, NJ, NY, OH, OK, SD, VA, WI. CANADA: Western Provinces: AB, BC, NT, SK; Central & Eastern Provinces: MB, ON, QC.
- <sup>E</sup>*Palonica tremulata* (Ball 1925): USA: Southwestern States: CO, UT; Northwestern States: MT; Central & Eastern States: CT, IA, ME, MN, NJ, NY, WI. CANADA: Western Provinces: AB, BC, SK; Central & Eastern Provinces: MB, NB, NS, ON, QC.
- <sup>E</sup>*Palonica viridia* (Ball 1903): USA: Southwestern States: AZ, CO, NM, TX; Northwestern States: WY; Central & Eastern States: AR, IA, IL, IN, KS, KY, MO, NE, NY, OH, SD. CANADA: Western Provinces: AB; Central & Eastern Provinces: MB, QC.
- Paraceresa colon* (Germar 1835): USA: Southwestern States: NV; Central & Eastern States: NE. CANADA: Western Provinces: BC.
- <sup>E</sup>*Parantonia arida* Flock and Gill 1987: USA: Southwestern States: AZ, CA.
- <sup>E</sup>*Parantonia hispida* Van Duzee 1914: MEXICO (Nearctic): Baja California. USA: Southwestern States: AZ, CA, NV.
- <sup>E</sup>*Philya californensis* (Goding 1893): USA: Southwestern States: CA.

- <sup>E</sup>*Philya ferruginosa* (Goding 1893): USA: Southwestern States: AZ.  
*Platycentrus acuticornis* Stål 1869: USA: Southwestern States: AZ, CA.  
*Platycentrus brevicornis* Van Duzee 1923: MEXICO (Nearctic): Baja California, Baja California Sur.  
*Platycentrus taurinus* Ball 1918: USA: Southwestern States: CA.  
*Platycotis acutangula* Stål 1869: USA: Southwestern States: CA.  
*Platycotis minax* Goding 1892: USA: Southwestern States: CA.  
*Platycotis tuberculata* (Fairmaire 1846): USA: Southwestern States: CA.  
*Platycotis vittata* (Fabricius 1803): USA: Southwestern States: AZ, CA, TX, UT; Northwestern States: OR, WA; Central & Eastern States: AL, AR, DC, DE, FL, GA, IL, IN, KY, LA, MA, MD, MO, MS, NC, NJ, NY, OH, OK, PA, SC, TN, VA, WV. CANADA: Western Provinces: BC; Central & Eastern Provinces: ON.  
*Polyglypta costata* Burmeister 1835: MEXICO (Nearctic): Tamaulipas.  
*Polyglypta dorsalis* Burmeister 1836: USA: Southwestern States: TX; Central & Eastern States: GA.  
*Procyrtia pectoralis* (Fabricius 1803): MEXICO (Nearctic): Nuevo León.  
*Publilia concava* (Say 1824): MEXICO (Nearctic): Guanajuato, Tamaulipas. USA: Southwestern States: CA, TX, UT; Northwestern States: ND, WA; Central & Eastern States: AR, CT, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, NC, NE, NH, NJ, NY, OH, OK, PA, RI, SD, TN, VA, WI. CANADA: Western Provinces: NT, SK; Central & Eastern Provinces: MB, NB, NS, ON, QC.  
<sup>E</sup>*Publilia erecta* Plummer 1935: USA: Southwestern States: AZ.  
<sup>E</sup>*Publilia modesta* (Uhler 1872): MEXICO (Nearctic): San Luis Potosi. USA: Southwestern States: AZ, CA, CO, NM, NV, TX, UT; Northwestern States: ID, MT, ND, OR, WY; Central & Eastern States: IA, KS, NE, NY, SD. CANADA: Western Provinces: AB, SK; Central & Eastern Provinces: MB.  
<sup>E</sup>*Publilia porrecta* Fowler 1896: USA: Southwestern States: AZ, UT.  
<sup>E</sup>*Publilia reticulata* Van Duzee 1908: USA: Central & Eastern States: AR, DC, DE, IA, IL, IN, KS, KY, MD, MO, NC, NE, NJ, NY, OH, OK, PA, SD, TN, VA. CANADA: Central & Eastern Provinces: ON.  
<sup>E</sup>*Scalmophorus minutus* Ball 1933: USA: Southwestern States: AZ.  
*Smerdalea horrescens* Fowler 1896: MEXICO (Nearctic): San Luis Potosi.  
<sup>E</sup>*Smilia camelus* (Fabricius 1803): USA: Southwestern States: CA, TX; Central & Eastern States: AL, CT, DE, FL, GA, IA, IL, IN, KS, KY, MA, MD, MI, MN, MO, MS, NC, NH, NJ, NY, OH, OK, PA, WI. CANADA: Central & Eastern Provinces: ON, QC.  
<sup>E</sup>*Smilia fasciata* Amyot & Serville 1843: USA: Central & Eastern States: DE, FL, GA, NC, NE, NJ, PA.  
*Spissistilus femoratus* (Fairmaire 1846): MEXICO (Nearctic): Guanajuato. USA: Southwestern States: CA, CO, UT; Central & Eastern States: FL, MS, [? NC], OH, SD. CANADA: Western Provinces: AB.  
*Spissistilus festinus* (Say 1830): MEXICO (Nearctic): Baja California, Durango. USA: Southwestern States: AZ, CA, CO, NM, NV, TX, UT; Northwestern States: MT, WA; Central & Eastern States: AL, AR, CT, [? DC], DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, MI, MO, MS, NC, NE, NJ, NY, OK, PA, RI, SC, SD, TN, VA, WI. CANADA: Western Provinces: BC; Central & Eastern Provinces: ON. BERMUDA.  
<sup>E</sup>*Spissistilus nigricans* (Van Duzee 1914): USA: Southwestern States: CA.  
<sup>E</sup>*Spissistilus occidentalis* (Funkhouser 1915): USA: Southwestern States: [? AZ], CA.  
*Spissistilus rotundatus* (Stål 1869): MEXICO (Nearctic): Tamaulipas. USA: Southwestern States: [? NM], TX; Central & Eastern States: FL, [? GA], LA, [? NC].  
*Spissistilus uniformis* (Fairmaire 1846): USA: Southwestern States: TX; [? Central & Eastern States: no definite state records]. Metcalf and Wade's (1965) listings of "Central States" and "Southern States," based on earlier records, are questionable, because the one record from North Carolina, the only southern state listed, was based on a misidentification (Dietrich *et al.* 1999), and Texas is here considered a southwestern state.  
<sup>E</sup>*Stictocephala albescens* (Van Duzee 1908): USA: Northwestern States: ND; Central & Eastern States: CT, DC, FL, IA, IL, IN, KS, KY, MA, MD, MN, MO, NJ, NY, OH, OK, PA, RI, VA, WI. CANADA: Central & Eastern Provinces: MB, ON, QC.  
*Stictocephala alta* (Walker 1851): USA: Southwestern States: Central & Eastern States: CT, DC, IA, IL, IN, KS, KY, MD, MO, [? NC], NE, NY, OH, OK, SD, WI. CANADA: Central & Eastern Provinces: ON, QC.  
*Stictocephala basalis* (Walker 1851): USA: Southwestern States: CA, CO, NM, UT; Northwestern States: ID, ND, OR, WA; Central & Eastern States: CT, DE, IL, IN, KS, KY, MA, ME, MI, MN, NH, NJ, NY, OH, OK, PA,

SD, VT, WI, WV. CANADA: Western Provinces: AB, BC, NT, SK; Central & Eastern Provinces: MB, NB, NS, ON, PE, QC.

<sup>E</sup>*Stictocephala bisonia* Kopp & Yonke 1977: USA: Southwestern States: CA, CO, NM, NV, TX, UT; Northwestern States: ID, MT, ND, OR, WA, WY; Central & Eastern States: AR, CT, DC, DE, FL, GA, IA, IL, IN, KS, KY, MA, MD, ME, MI, MN, MO, NC, NE, NH, NJ, NY, OH, OK, PA, RI, SD, TN, VA, VT, WI, WV. CANADA: Western Provinces: AB, BC, SK; Central & Eastern Provinces: MB, NB, NS, ON, PE, QC.

<sup>E</sup>*Stictocephala brevicornis* (Fitch 1856): USA: Central & Eastern States: CT, IA, IL, IN, KS, KY, MA, ME, MO, [? NC], NJ, NY, OH, PA. CANADA: Western Provinces: AB, SK; Central & Eastern Provinces: MB, ON, QC.

<sup>E</sup>*Stictocephala brevis* (Walker 1851): USA: Southwestern States: CO; Northwestern States: ID; Central & Eastern States: CT, IL, KY, MD, MO, [? NC], NE, NY, OH, VA. CANADA: Western Provinces: AB; Central & Eastern Provinces: QC.

<sup>E</sup>*Stictocephala brevitylus* (Van Duzee 1908): USA: Central & Eastern States: DC, DE, FL, GA, IL, IN, KY, MD, MO, NC, NJ, NY, OH, PA, TN, WI. CANADA: Central & Eastern Provinces: MB, QC.

<sup>E</sup>*Stictocephala diceros* (Say 1824): USA: Southwestern States: CO, NM, TX, UT; Northwestern States: MT, ND; Central & Eastern States: CT, DC, DE, IA, IL, IN, KS, KY, MA, MD, ME, MI, MN, MO, NC, NE, NH, NJ, NY, OH, OK, PA, SD, TN, VA, WI, WV. CANADA: Western Provinces: AB, BC, SK; Central & Eastern Provinces: MB, NB, NS, ON, QC.

<sup>E</sup>*Stictocephala diminuta* Van Duzee 1908: USA: Central & Eastern States: FL, [? NC].

<sup>E</sup>*Stictocephala lutea* (Walker 1851): USA: Southwestern States: AZ, TX; Northwestern States: MT; Central & Eastern States: AL, AR, CT, DC, DE, FL, GA, IA, IL, IN, KS, KY, MA, MD, MI, MN, MO, MS, NC, NE, NJ, NY, OH, OK, PA, RI, SC, SD, TN, VA, WI. CANADA: Central & Eastern Provinces: ON, QC.

<sup>E</sup>*Stictocephala militaris* (Gibson & Wells 1917): USA: Central & Eastern States: DE, GA, MO, NC, TN.

<sup>E</sup>*Stictocephala nervosa* Buckton 1903: USA: Central & Eastern States: NY.

<sup>E</sup>*Stictocephala palmeri* (Van Duzee 1908): USA: Central & Eastern States: CT, DC, IL, IN, KS, KY, MD, MI, MN, MO, NC, NY, OH, OK, PA, SD, WI. CANADA: Central & Eastern Provinces: ON, QC.

<sup>E</sup>*Stictocephala stimulea* (Van Duzee 1914): USA: Central & Eastern States: FL, NC, SD.

<sup>E</sup>*Stictocephala substriata* (Walker 1851): USA: Central & Eastern States: FL, GA, [? NC], NJ, OH, PA, SD.

<sup>E</sup>*Stictocephala taurina* (Fitch 1856): USA: Southwestern States: AZ, CO, UT; Northwestern States: ND, WY; Central & Eastern States: CT, DC, DE, IA, IL, IN, KS, KY, MA, MD, ME, MI, MN, MO, MS, NC, NE, NJ, NY, OH, OK, PA, SD, TN, VA, VT, WI. CANADA: Central & Eastern Provinces: MB, NS, ON, QC.

<sup>E</sup>*Stictocephala tauriniformis* Caldwell 1949: USA: Central & Eastern States: DC, IA, IL, IN, MO, NC, NY, PA, WI. CANADA: Central & Eastern Provinces: ON, QC.

<sup>E</sup>*Stictolobus arcuatus* Caldwell 1949: USA: Southwestern States: TX.

<sup>E</sup>*Stictolobus borealis* Caldwell 1949: USA: Central & Eastern States: MD, NE.

*Stictolobus minutus* (Funkhouser 1915): USA: Southwestern States: TX; Central & Eastern States: GA, IL, MD, MS, NC, VA. CANADA: Central & Eastern Provinces: ON, QC.

<sup>E</sup>*Stictopelta caerulea* Ball 1933: USA: Southwestern States: AZ.

*Stictopelta marmorata* Goding 1892: USA: Southwestern States: AZ, NM, TX.

*Stictopelta nova* Goding 1892: USA: Southwestern States: AZ, CA, NM.

<sup>E</sup>*Stictopelta pulchella* Ball 1933: USA: Southwestern States: AZ, CO.

*Stictopelta varians* Fowler 1894: MEXICO (Nearctic): Durango. USA: Southwestern States: AZ, CA.

<sup>E</sup>*Telamona agrandata* Ball 1931: USA: Central & Eastern States: IA, IN, OH, WI.

<sup>E</sup>*Telamona ampelopsidis* (Harris 1841): USA: Southwestern States: CO, TX; Northwestern States: MT; Central & Eastern States: CT, DC, DE, FL, GA, IA, IL, IN, KS, KY, MA, MD, ME, MO, NC, NE, NH, NJ, NY, OH, OK, PA, RI, SC, SD, VA, VT, WI, WV. CANADA: Central & Eastern Provinces: MB, NS, ON, QC.

<sup>E</sup>*Telamona archboldi* Froeschner 1968: USA: Central & Eastern States: FL.

<sup>E</sup>*Telamona barbata* Van Duzee 1908: USA: Southwestern States: NM; Central & Eastern States: CT, NY, OH, SD. CANADA: Western Provinces: BC.

<sup>E</sup>*Telamona calva* Ball 1933: USA: Southwestern States: CA.

<sup>E</sup>*Telamona collina* (Walker 1851): USA: Southwestern States: CA; Central & Eastern States: DC, DE, FL, IA, IL, IN, KS, KY, MD, MO, NC, NY, OH, PA, SD, TN, VA, WV.

- <sup>E</sup>*Telamona compacta* Ball 1903: USA: Southwestern States: CO; Central & Eastern States: AR, IA, IL, MD, MN, NE, OH, PA, WI. CANADA: Central & Eastern Provinces: NS.
- <sup>E</sup>*Telamona concava* Fitch 1851: USA: Central & Eastern States: MA, MI, NH, NJ, NY, OH, OK, PA, WI. CANADA: Central & Eastern Provinces: ON, QC.
- <sup>E</sup>*Telamona coronata* Ball 1931: USA: Southwestern States: CA.
- <sup>E</sup>*Telamona decorata* Ball 1903: USA: Southwestern States: CA, NM; Northwestern States: WY; Central & Eastern States: AR, CT, DE, IA, IL, IN, KS, KY, MD, MN, MO, NC, NJ, NY, OH, OK, PA, SC, SD, TN, WI. CANADA: Western Provinces: AB; Central & Eastern Provinces: ON, QC.
- <sup>E</sup>*Telamona dorana* Ball 1931: USA: Central & Eastern States: FL.
- <sup>E</sup>*Telamona dubiosa* Van Duzee 1916: USA: Central & Eastern States: CT, IA, IL, KS, MN, NC, NE, NJ, NY, OH, WI. CANADA: Western Provinces: SK; Central & Eastern Provinces: ON, QC.
- <sup>E</sup>*Telamona extrema* Ball 1903: USA: Central & Eastern States: AL, AR, CT, DE, GA, IA, IL, IN, KS, MA, MD, MO, NC, NJ, NY, OH, OK, PA, RI, SC, VA, WI, WV.
- <sup>E</sup>*Telamona gibbera* Ball 1925: USA: Southwestern States: AZ, NM.
- <sup>E</sup>*Telamona lugubris* Ball 1903: USA: Central & Eastern States: IA, IL, KS, MI, MN, NY, OH, SD, WI.
- <sup>E</sup>*Telamona maculata* Van Duzee 1908: USA: Southwestern States: TX; Northwestern States: ND; Central & Eastern States: CT, DE, GA, IA, IL, KS, KY, MD, MN, MO, NC, NE, NY, OH, PA, SD, WI. CANADA: Central & Eastern Provinces: ON, QC.
- <sup>E</sup>*Telamona monticola* (Fabricius 1803): USA: CO, NM, NV, TX; Northwestern States: ND; Central & Eastern States: AL, AR, CT, DC, DE, FL, GA, IA, IL, IN, KS, KY, MA, MD, ME, MI, MN, MO, NC, NE, NH, NJ, NY, OH, OK, PA, SC, SD, TN, VA, VT, WI. CANADA: Western Provinces: SK; Central & Eastern Provinces: MB, ON, QC.
- <sup>E</sup>*Telamona reclinata* Fitch 1851: USA: Southwestern States: CA, CO, TX; Central & Eastern States: CT, DE, GA, IA, IL, IN, KS, KY, MD, MI, MN, MO, NC, NE, NH, NJ, NY, OH, OK, PA, SC, SD, WI. CANADA: Western Provinces: AB; Central & Eastern Provinces: ON, QC.
- Telamona salvini* Distant 1879: USA: Central & Eastern States: CT, DE, FL, GA, [? NC], NJ, OH, SC.
- <sup>E</sup>*Telamona spreata* Goding 1893: USA: Northwestern States: ND; Central & Eastern States: IA, IL, MI, MN, NY, OH, OK, SD, WI. CANADA: Western Provinces: AB, SK; Central & Eastern Provinces: MB, ON, QC.
- <sup>E</sup>*Telamona tarda* Ball 1925: USA: Central & Eastern States: DC, NJ.
- <sup>E</sup>*Telamona tiliae* Ball 1925: USA: Central & Eastern States: CT, DE, IA, IL, IN, MI, MN, [? NC], NH, NJ, NY, OH, OK, PA, WI. CANADA: Central & Eastern Provinces: ON, QC.
- <sup>E</sup>*Telamona tristis* Fitch 1851: USA: Central & Eastern States: CT, DE, FL, IA, IL, KS, MA, MD, MI, MN, MO, NE, NJ, NY, OH, PA, SD, VT, WI, WV. CANADA: Central & Eastern Provinces: MB, NB, ON, QC.
- <sup>E</sup>*Telamona unicolor* Fitch 1851: USA: Southwestern States: TX; Central & Eastern States: AL, AR, CT, DE, FL, IA, IL, IN, KS, KY, MA, MD, MI, MN, MO, NC, NE, NJ, NY, OH, OK, PA, TN, WI. CANADA: Central & Eastern Provinces: ON, QC.
- <sup>E</sup>*Telamona vestita* Ball 1925: USA: Southwestern States: CA; Northwestern States: OR.
- <sup>E</sup>*Telamona westcotti* Goding 1893: USA: Southwestern States: TX; Central & Eastern States: DE, IA, IL, KS, MA, MD, MI, MN, MO, NC, NE, NH, NY, OH, OK, SD, VA, VT, WI. CANADA: Central & Eastern Provinces: MB, ON, QC.
- <sup>E</sup>*Telamona woodruffi* Ball 1925: USA: Central & Eastern States: NH, NJ, NY.
- <sup>E</sup>*Telamonanthe pulchella* (Ball 1903): USA: Southwestern States: AZ, CO, NM, UT.
- <sup>E</sup>*Telamonanthe rileyi* (Goding 1892): USA: Southwestern States: AZ, CA; Central & Eastern States: IA, KS.
- <sup>E</sup>*Telamonanthe turbinella* Jorgensen 1935: USA: Southwestern States: UT.
- <sup>E</sup>*Telonaca alta* (Funkhouser 1915): USA: Central & Eastern States: FL, GA.
- <sup>E</sup>*Telonaca ramona* Ball 1918: USA: Southwestern States: CA.
- <sup>E</sup>*Thelia bimaculata* (Fabricius 1794): USA: Southwestern States: [? TX], UT; Central & Eastern States: CT, DC, DE, IA, IL, IN, KS, KY, MA, MD, MI, MO, NC, NH, NJ, NY, OH, OK, PA, RI, SC, TN, VA, WI. CANADA: Central & Eastern Provinces: ON, QC. The presence of *Thelia bimaculata* in Texas is listed as questionable because the host plant data of the only report (Scarborough 1984) suggests a misidentification.

- <sup>E</sup>*Thelia uhleri* Stål 1869: USA: Northwestern States: ND; Central & Eastern States: IA, IL, IN, KS, MD, MI, MN, MO, NE, NY, OH, PA, SD, VA, WI. CANADA: Central & Eastern Provinces: MB, ON, QC.
- <sup>E</sup>*Tortistilus abnormus* (Caldwell 1949): [? MEXICO (Nearctic): Nuevo León, Tamaulipas]. USA: Southwestern States: TX; Central & Eastern States: NC, TN.
- <sup>E</sup>*Tortistilus albidosparsus* (Stål 1859): USA: Southwestern States: CA, NV, TX, UT; Northwestern States: WA; Central & Eastern States: KS. CANADA: Western Provinces: BC.
- <sup>E</sup>*Tortistilus collinus* (Van Duzee 1908): USA: Southwestern States: CO; Central & Eastern States: NE.
- <sup>E</sup>*Tortistilus curvatus* (Caldwell 1949): USA: Central & Eastern States: MO, NE, OK, WI.
- <sup>E</sup>*Tortistilus inermis* (Fabricius 1775): USA: Southwestern States: AZ, CA, CO, NM, NV, TX, UT; Northwestern States: ID, MT, ND, OR, WA, WY; Central & Eastern States: CT, DE, FL, IA, IL, IN, KS, KY, MD, MI, MN, MO, [? NC], NE, NJ, NY, OH, OK, PA, SD, TN, VA, WI. CANADA: Western Provinces: AB, BC, SK; Central & Eastern Provinces: MB, ON, QC.
- <sup>E</sup>*Tortistilus lateralis* (Funkhouser 1936): USA: Central & Eastern States: AR, IL, NC.
- <sup>E</sup>*Tortistilus minutus* Caldwell 1949: USA: Northwestern States: MT, [? ND]; Central & Eastern States: MO, SD. CANADA: Central & Eastern Provinces: MB.
- <sup>E</sup>*Tortistilus pacificus* (Van Duzee 1908): USA: Southwestern States: CA, CO, UT; Northwestern States: [? ID, OR], WA. CANADA: Western Provinces: AB, BC.
- <sup>E</sup>*Tortistilus trilineatus* (Funkhouser 1918): USA: Southwestern States: TX; Central & Eastern States: FL, IL, LA, MS, TN.
- <sup>E</sup>*Tortistilus wickhami* (Van Duzee 1908): USA: Southwestern States: CA, UT; Northwestern States: WA. CANADA: Western Provinces: AB, BC.
- Trachytalis isabellina* Fowler 1895: [? Nearctic region: USA: Southwestern States: CA].
- Trichaetipyga infantilis* (Ball 1937): USA: [? Northwestern States: ND]; Central & Eastern States: NE, [? SD].
- <sup>E</sup>*Trichaetipyga juniperina* (Ball 1937): USA: Southwestern States: AZ.
- Tropidarnis tectigera* Fowler 1895: USA: Southwestern States: AZ.
- <sup>E</sup>*Tumecauda schaefferi* Goding 1930: USA: Southwestern States: AZ.
- <sup>E</sup>*Tylocentrus quadricornis* Funkhouser 1919: MEXICO (Nearctic): Baja California. USA: Southwestern States: AZ, CA, UT.
- <sup>E</sup>*Tylocentrus reticulatus* Van Duzee 1908: USA: Southwestern States: AZ, CA, NM, NV, TX, UT.
- Tylopelta gibbera* (Stål 1869): MEXICO (Nearctic): Baja California. USA: Southwestern States: AZ, TX; Central & Eastern States: AL, AR, FL, GA, KY, LA, MD, MO, MS, NC, SC, TN, VA.
- Umbonia crassicornis* (Amyot and Serville 1843): USA: Central & Eastern States: FL, [? OH, SC].
- Vanduzea albifrons* (Fowler 1895): MEXICO (Nearctic): [? Baja California, Baja California Sur, Sonora]. USA: Southwestern States: CA.
- <sup>E</sup>*Vanduzea arquata* (Say 1830): USA: Southwestern States: AZ, CO, TX; Central & Eastern States: CT, DC, DE, GA, IA, IL, IN, KS, KY, MA, MD, MI, MO, NC, NJ, NY, OH, OK, PA, SC, TN, VA, WI. CANADA: Central & Eastern Provinces: NS, ON.
- Vanduzea laeta* Goding 1893: USA: Southwestern States: AZ, CA, CO.
- Vanduzea segmentata* (Fowler 1895): [? MEXICO (Nearctic): Nuevo León, Tamaulipas]. USA: Southwestern States: AZ, TX; Central & Eastern States: FL, LA.
- Vanduzea triguttata* (Burmeister 1836): USA: Southwestern States: AZ, CA, CO, NM, TX; Central & Eastern States: AL, DC, FL, IA, IL, KS, KY, MN, MO, NC, NE, OK, SC, SD, WI. CANADA: Western Provinces: SK; Central & Eastern Provinces: MB.
- <sup>E</sup>*Vestistilus ancora* (Ball 1937): USA: Southwestern States: AZ.
- Vestistilus patruclis* (Stål 1864): USA: Central & Eastern States: FL.
- Vestistilus testaceus* (Fairmaire 1846): MEXICO (Nearctic): Aguascalientes.
- <sup>E</sup>*Xantholobus altus* Ball 1932: USA: Southwestern States: AZ.
- <sup>E</sup>*Xantholobus arenatus* Ball 1937: USA: Southwestern States: TX.
- <sup>E</sup>*Xantholobus arizonensis* Funkhouser 1943: USA: Southwestern States: AZ.
- <sup>E</sup>*Xantholobus coconinus* Ball 1932: USA: Southwestern States: AZ.
- <sup>E</sup>*Xantholobus hirsutus* Ball 1932: USA: Southwestern States: AZ.

- <sup>E</sup>*Xantholobus inflatus* (Van Duzee 1908): USA: Southwestern States: AZ, CO, UT.
- <sup>E</sup>*Xantholobus intermedius* (Emmons 1854): USA: Southwestern States: UT; Central & Eastern States: CT, DE, IA, IL, MA, MD, ME, NC, NJ, NY, OH, OK, PA, RI, TN, VA, WI. CANADA: Central & Eastern Provinces: ON, QC.
- <sup>E</sup>*Xantholobus lateralis* (Van Duzee 1908): USA: Central & Eastern States: CT, DE, IL, IN, KS, KY, MA, MD, MO, NC, NY, OH, OK, PA, TN, WI.
- <sup>E</sup>*Xantholobus muticus* (Fabricius 1777): USA: Northwestern States; Central & Eastern States: CT, DE, GA, IA, IL, KS, KY, MD, MI, MN, MO, NC, NH, NJ, NY, OH, OK, PA, RI, SC, SD, TN, WI. CANADA: Western Provinces: NT; Central & Eastern Provinces: MB, ON, QC.
- <sup>E</sup>*Xantholobus nigrocinctus* (Van Duzee 1908): USA: Southwestern States: AZ, CO.
- <sup>E</sup>*Xantholobus nitidus* (Van Duzee 1908): USA: Southwestern States: TX; Central & Eastern States: DC, DE, FL, GA, IL, NC, NJ, NY, OK.
- <sup>E</sup>*Xantholobus tumidus* (Walker 1851): USA: Central & Eastern States: FL, MS. CANADA: Central & Eastern Provinces: QC.

### Taxonomic diversity of the Nearctic treehopper fauna

The richness and distinctiveness of the Nearctic treehopper fauna (Tables 1 and 2) is sometimes overshadowed by the diversity of the Neotropical fauna (Table 3). Within the Nearctic, the family Aetalionidae is represented by only two species of the primarily Neotropical genus *Aetalion*: one reported from Florida, the other from Durango (Nearctic Mexico) and Arizona. The remaining Nearctic treehoppers belong to five subfamilies of Membracidae: Centrotinae, Darninae, Membracinae, Smiliinae, and Stegaspidinae. No treehopper tribe, genus, or species occurs naturally in both the Old and New Worlds (Wallace and Deitz 2004). Two Old World treehoppers were sporadically reported in the Nearctic—*Centrotus cornutus* (Centrotinae: Centrotini) and *Gargara genistae* (Centrotinae: Gargarini)—but were certainly introduced, and are thus not considered part of its fauna (indicated by the superscript “I” in the checklist, above).

Overall, the indigenous Nearctic treehopper fauna includes 2 families, 6 subfamilies, 20 tribes, 68–72 genera, and 276–280 described species. The Nearctic distribution records of four genera and species are questionable, thus they are doubtfully included within our count of Nearctic taxa. Of 280 described indigenous treehopper species listed here, 195 (nearly 70 percent) are endemic to the Nearctic region [these are indicated by the superscript “E” in the list above]. Sixteen genera (7 in the tribe Telamonini) and one tribe (Centrodontini) are likewise recorded only from the Nearctic (**bold** in Table 1). Nevertheless, many New World genera and species occur in both the Neotropical and Nearctic regions.

Among some 23 tribes of the subfamily Centrotinae worldwide, the endemic tribe Centrodontini, which occurs only in Nearctic Mexico and the southwestern United States, is the sister group to the remainder of the subfamily (Wallace and Deitz 2004). It includes three genera (*Centrodontus*, *Multareis*, and *Multareoides*, with a total of 5 species and 5 subspecies) that feed exclusively on creosote bush, *Larrea divaricata tridentata* (DC) Felger and Lowe (family Zygophyllaceae) (Deitz 1975; Wallace and Deitz 2004). A second centrotine tribe, Platycentrini (Centrotinae), is predominately Nearctic (Wallace and Deitz 2004), including two genera: one endemic, *Tylocentrus*, and the largely Nearctic genus *Platycentrus*, which occurs also in Neotropical Mexico.

The most species-rich Nearctic tribes are the Smiliini and Telamonini (Smiliinae), considered a single tribe since 1975. Wallace (2011) recently reinstated the Telamonini from synonymy with Smiliini (Deitz 1975) based on morphological characters of the head, pronotum, wings, and genitalia. Together, these two tribes include eight genera endemic to the Nearctic (*Archasia*, *Carynota*, *Glossonotus*, *Helonica*, *Telamonanthe*, *Telonaca*, *Thelia* [all Telamonini], and *Xantholobus* [Smiliini]), eight predominately Nearctic genera (*Atymna*, *Ashmeadea*, *Cyrtolobus*, *Ophiderma*, *Smilia* [all Smiliini], *Heliria*, *Palonica*, and *Telamona* [all Telamonini]), and three genera of Smiliini that occur largely (*Grandolobus*) or exclusively (*Godingia* and *Atymnina*) in the Neotropical region. The genera *Cyrtolobus* (41 spp.) and *Telamona* (27 spp.) rank first and second in species richness among all Nearctic treehoppers.

**TABLE 2.** Numbers of genera (and species) of indigenous Nearctic Membracidae in seven geographic subregions.

	Nearctic Mexico	SW USA	NW USA	C & E USA	Western Canada	C & E Canada	Bermuda
MEMBRACIDAE	26–27 (38–39)	57–60 (177–180)	17–19 (39–41)	39–40 (176–178)	16 (36)	26 (103–104)	2 (2)
CENTROTINAE	6 (8)	3 (5)					1 (1)
Boocerini	1 (1)						
Centrodontini	3 (5)	3 (5)					
Monobelini							1 (1)
Platycentrini	2 (2)	2 (4)					
DARNINAE	2 (2)	2 (6)					
Darnini	1 (1)	2 (6)					
Procyrtini	1 (1)						
STEGASPIDINAE	2 (5)	2 (6)		1 (2)		1 (2)	
Microcentrini	1 (4)	2 (6)		1 (2)		1 (2)	
Stegaspidini	1 (1)						
MEMBRACINAE	8 (12)	10–11 ( 21–22 )	4 (5)	6–7 (16–17)	4 (5)	3 (7)	
Aconophorini	2 (6)	1 (1)					
Hoplophorionini	1 (1)	1 (4)	1 (1)	2 (2)	1 (1)	1 (1)	
Membracini	4 (4)	5 (11)	3 (4)	4–5 (14–15)	3 (4)	2 (6)	
Hypsoprurini	1 (1)	3–4 (5–6)					
SMILIINAE	8–9 (11–12)	40–42 (139–141)	13–15 (34–36)	32 (158–159)	12 (31)	22 (94–95)	1 (1)
Not placed to tribe		2(2)		1(1)			
Acutalini		1 (1)		1 (2)		1 (2)	
Amastrini	1 (1–2)	4 (9)		2 (4)	1 (1)	1 (2)	
Ceresini	3–4 (5–6)	11–12 (33–34)	5–7 (16–18)	9 (35–36)	4 (12)	5 (17)	1 (1)
Microtalini		1–2 (5–6)		1 (4)		1 (2)	
Polyglyptini	3 (4)	5 (8)	2 (3)	3 (5)	1 (2)	2 (4)	
Smiliini	1 (1)	7 (47)	1 (1)	5 (55)	1 (1)	5(31–32)	
Telamonini		9 (34)	5 (14)	10 (52)	5 (15)	7 (36)	

The remaining endemic Nearctic genera belong to other tribes of Smiliinae: *Bajulata* (Amastrini), *Bryantopsis* (Polyglyptini), and *Hadrophallus* and *Tortistilus* (Ceresini). Most species of the Ceresini genera *Anisostylus* and *Stictocephala* are also Nearctic in distribution. While no endemic Nearctic genera are known from the subfamilies Darninae, Stegaspidinae, and Membracinae, each includes at least a few species endemic to this region.

**TABLE 3.** Comparison of Nearctic, Neotropical, and Old World treehopper diversity (Numbers of endemic taxa in parentheses).

New World fauna	Neotropical region <sup>1,2</sup>	Old World fauna <sup>1,2</sup>
Nearctic region	Neotropical region <sup>1,2</sup>	Afrotropical, Australian/Oceanic, Indomalayan Palearctic regions
2 families (0)	3 families (1)	1 family (0)
6 subfamilies (0)	12 subfamilies (6)	1 subfamily (0)
20 tribes (1)	34 tribes (14)	18 tribes (all)
68–72 genera (16)	229–331 genera (175–179)	187 genera (all)
276–280 species (195)	>1600 species (>1500)	> 1500 species (all)

<sup>1</sup> McKamey (1998)<sup>2</sup> Deitz and Wallace (2010)



## Regional richness of the Nearctic Membracidae

(Fig. 1)

For the discussion that follows, we compare membracid diversity among seven subregions of the Nearctic that have reported species (Table 2; Fig. 1). Concerning the fauna of the United States, we note that no treehoppers are known from Alaska (Fig. 1A), while Hawaii belongs to the Oceanic region. Three membracid species are reported from Hawaii, one introduced from the Old World, *Tricentrus albomaculatus* Distant 1908 (Centrotinae: Gargarini), and two from the New World, *Spissistilus festinus* (Smiliinae: Ceresini) and *Vanduzeeia segmentata* (Smiliinae: Amastrini) (Inada 1948; Zimmerman 1948). No treehoppers are reported from Greenland (Fig. 1H) or some northern provinces of Canada (see below; Fig. 1).

**Nearctic Mexico** (Fig. 1F). As defined herein, this subregion includes the Mexican states of Aguascalientes, Baja California, Baja California Sur, Chihuahua, Coahuila, Durango, Guanajuato, Nuevo León, Queretaro, San Luis Potosi, Sonora, Tamaulipas, and Zacatecas. Our delineation of Neotropical from Nearctic Mexico, in part, is based on the apparent absence of 29 Neotropical genera from the latter states, which are reported elsewhere in Mexico: *Adippe*, *Alcmeone*, *Amblycentrus*, *Atymnina*, *Bilimekia*, *Bolbonotodes*, *Brachybelus*, *Calloconophora*, *Centriculus*, *Centruchoides*, *Cladonota*, *Clepsydrius*, *Cyphonia*, *Dysyncritus*, *Godingia*, *Heteronotus*, *Hypheodana*, *Hyphinoe*, *Hypsoprorachis*, *Lycoderes*, *Neotynelia*, *Ochropepla*, *Pieltainellus*, *Polyglyptodes*, *Poppea*, *Psilocentrus*, *Thrasymedes*, *Tolania*, and *Vestistiloides*. Three primarily Neotropical tribes, Boocerini, Procyrtini, and Stegaspidini, are represented in Nearctic Mexico but not elsewhere in the Nearctic (Table 2). The Nearctic endemic tribe Centrodontini occurs only here and in the southwestern USA. Nearctic members of the tribes Platycentrini (Centrotinae), Darnini (Darninae), and Aconophorini and Hypsoprorini (both Membracinae) are likewise restricted to these two subregions. Most widespread Nearctic tribes are present in Nearctic Mexico, but members of the large subfamily Smiliinae are not well represented, and the tribes Acutalini and Micratalini have yet to be reported. Overall, Nearctic Mexico appears to be poorly sampled. For example, only a single species is reported for Zacatecas (*Aconophora compressa*) and the small states of Aguascalientes (*Vestistilus testaceus*) and Queretaro (*Metcalfiella monogramma*).

**Southwestern United States** (Fig. 1E). Seven states are included here: Arizona (AZ), California (CA), Colorado (CO), Nevada (NV), New Mexico (NM), Texas (TX), and Utah (UT). As noted above, this region shares with Nearctic Mexico the endemic tribe Centrodontini as well as the tribes Platycentrini (Centrotinae), Darnini (Darninae), and Aconophorini and Hypsoprorini (both Membracinae) (Table 2). Moreover, 46 species are endemic to the Southwestern United States. This subregion has the largest number of genera and species of the seven subregions (Table 2). It far exceeds Nearctic Mexico in members of the subfamily Smiliinae, a group also especially well represented in the Central and Eastern USA. Among southwestern localities, Arizona stands out for its exceptional number of endemics (1 genus, 25 species). Five treehopper species are endemic to California, three to Texas, and two to Utah. Nevada has only 15 recorded species.

**Northwestern United States** (Fig. 1D). Relative to the southwestern states, the six states included here—Idaho (ID), Montana (MT), North Dakota (ND), Oregon (OR), Washington (WA), and Wyoming (WY)—have a rather limited treehopper fauna, with only the tribes Hoplophorionini, Membracini (Membracinae), Ceresini, Polyglyptini, Smiliini, and Telamonini (Smiliinae) (Table 2). Moreover, the number of species reported ranges from 9 (Wyoming) to 19 (North Dakota).

**Central and Eastern United States** (Fig. 1I). This large subregion includes Alabama (AL), Arkansas (AR), Connecticut (CT), Delaware (DE), Florida (FL), Georgia (GA), Illinois (IL), Indiana (IN), Iowa (IA), Kansas (KS), Kentucky (KY), Louisiana (LA), Maine (ME), Maryland (MD), Massachusetts (MA), Michigan (MI), Minnesota (MN), Mississippi (MS), Missouri (MO), Nebraska (NE), New Hampshire (NH), New Jersey (NJ), New York (NY), North Carolina (NC), Ohio (OH), Oklahoma (OK), Pennsylvania (PA), Rhode Island (RI), South Carolina (SC), South Dakota (SD), Tennessee (TN), Vermont (VT), Virginia (VA), Washington, D.C. (DC), West Virginia (WV), and Wisconsin (WI). The number of reported species ranges from 118 (New York), the highest of any Nearctic state, to 14 (West Virginia). Although lacking the distinctive elements of Nearctic Mexico and the Southwestern United States, this subregion (second in overall diversity) rivals the Southwest for species richness, owing to great radiation within the tribes Smiliini and Telamonini (Table 2). Many members of these tribes feed exclusively on oaks (Fagaceae: genus *Quercus*), which are widespread, abundant elements of the native flora.



**FIGURE 1.** Map of Nearctic region (center, colored) indicating component subregions (not to scale) with species richness (see legend) for states and provinces. Species reported as questionable are excluded from these counts.

*Western Canada* (Fig. 1B). The Canadian provinces and territories placed here include: Alberta (AB), British Columbia (BC), Northwest Territories (NT), Saskatchewan (SK), and Yukon Territory (YT). Treehoppers are not recorded from Yukon Territory, however, Alberta and Saskatchewan each have 22 recorded species. The treehopper

fauna of Western Canada is similar to that of the Northwestern United States, but with one additional smiliine tribe, Acutalini (Table 2).

*Central and Eastern Canada* (Fig. 1C). Nine Canadian provinces are included here: Labrador (NL), Manitoba (MB), New Brunswick (NB), Newfoundland (NL), Nova Scotia (NS), Nunavut (NU), Ontario (ON), Prince Edward Island (PE), and Quebec (QC). No treehoppers are reported from Labrador, Newfoundland, or Nunavut, however, Quebec and Ontario each have more than 80 recorded species. The subregion's tribal composition largely duplicates that of its neighbor to the south, but with lower numbers of genera and species (Table 2). Two undescribed species of the *Enchenopa binotata* complex have thus far been reported only from this region (on *Betula* in New Brunswick and on *Tilia* in Ontario) and merit further study (Hamilton and Cocroft 2010).

*Bermuda* (Fig. 1H). Only two membracids are reported from Bermuda: *Monobelus biguttatus* (Monobelini) (Ramos 1979) and *Spissistilus festinus* (Ceresini) (Wilson and Hilburn 1991). Generally regarded as belonging to the Nearctic region, Bermuda is the only locality outside of the Caribbean from which the tribe Monobelini has been reported.

## Conclusions

Although somewhat eclipsed by the overwhelming diversity of the Neotropical treehopper fauna (Table 3), the indigenous Nearctic fauna is nonetheless robust, with 2 families, 6 subfamilies, 20 tribes, 68–72 genera, and 276–280 species. Indeed, nearly 70% (195) of the Nearctic species treehopper species are endemic to this region. Furthermore, the Nearctic treehopper fauna is more diverse in numbers of families, subfamilies, and tribes than the entire Old World fauna (including the Afrotropical, Australian/Oceanic, Indomalayan, and Palearctic regions) (Table 3). Treehoppers rank third among Auchenorrhyncha (Hemiptera) in the total number of species in the Nearctic, following leafhoppers and delphacid planthoppers (Entomological Information Services 1997).

Differences in taxonomic interpretation and collecting efforts, along with an area's size, climate, and ecological diversity, certainly influence the numbers of species reported for that region. Thus, these factors may explain the large variation in reported species from the northeastern states (e.g., NY, 118; PA, 94; VT, 15; WV, 14). Missouri (Kopp and Yonke 1973a–c, 1974), New York (Funkhouser 1917), and North Carolina (Dietrich *et al.* 1999) are examples of well-collected states. The southern Nearctic states of Mexico (Fig. 1) are undoubtedly examples of poorly collected states.

The Southwest has the largest number of treehopper genera of the seven Nearctic subregions (Fig. 1), while the Southwest and the Central and Eastern U.S. are both remarkably species-rich. The richness in the Southwest can be partially explained by the high number of state endemics, highlighted by Arizona (25). Nevertheless, 11 Central and Eastern states or provinces boast more total treehopper species than Arizona. A large number of species in eastern North America are from the Smiliini and Telamonini (Membracidae: Smiliinae), the two largest tribes in the Nearctic in numbers of species. A phylogenetic and geographical analysis (Wallace 2011) suggested the high diversity of the Smiliini and Telamonini in the southwestern U.S. supports a Neotropical origin for these tribes, followed by dispersal north and east. Many smiliines and telamonines are specialists on oaks (*Quercus* spp.) (Wallace 2011), a host genus that is extremely diverse in the Central and Eastern U.S. Wallace (2011) concluded the ancestral diversification of oaks and these treehoppers roughly coincided with one another, leading to the hypothesis that Smiliini and Telamonini treehoppers coevolved with their oak hosts.

Gaps in taxonomic knowledge and geographic sampling became apparent in our study. Regarding taxonomic gaps, the existence of the *Enchenopa binotata* complex suggests, for example, there be many unrecognized sibling species hiding in plain view but on different host plants. An examination of the type material of *Heliria cornutula* and *H. mexicana* [by MSW] raised questions about records of the latter species in the Nearctic region, and a review of North Carolina treehoppers (Dietrich *et al.* 1999) indicates the literature likely includes many such instances of questionable identifications.

Nearctic treehoppers are notoriously challenging to identify to the species level, and recent revisionary studies are precious and few (see Literature Cited). Many Nearctic genera are in need of a comprehensive species-level revision, incorporating modern phylogenetic methods, an examination of all relevant types, and a broad range of morphological characters. Until this goal is accomplished, disagreement in species and genus level concepts, so evident in comparisons of identified material in major collections, is certain to persist. Thus, apparent gaps in the

distribution of various species may represent a lack of taxonomic understanding, the need for further collecting, or true disjunct distributions.

Current difficulties in identifying our treehopper fauna make it imperative to preserve identifiable voucher material, with full data labels, for all published research, thus enabling future workers to correct misidentifications. Even with molecular studies, scientists who fail to do so “commit the perfect crime.” Documenting host plant associations is also especially important and may prove critical to accurate identification.

Much, if not most, of our “legacy” knowledge of the distribution of Nearctic treehoppers is summarized in terms of place names, rather than precise geo-coordinates. Global positioning systems (GPS) became widely used in the mid-1990’s. The geographic distributions of certain treehoppers, known only from early descriptions, may be as indefinite as “America borealis.” In a review of the problems inherent in retrospective geo-referencing such data, Murphey *et al.* (2004) stressed the need to establish sound protocols. They emphasized that the end goal is “a quantitative and qualitative biological history derived from geospatial and temporal information unleashed from existing museum collections.” In light of the availability of online global mapping resources, as well as GPS devices, the omission of geo-coordinates on contemporary collected specimen labels is no longer defensible.

Just as taxonomic nomenclature evolves over time, geographic nomenclature is likewise evolving. Historical disparities in terminology (including synonymy and homonymy) encumber both nomenclatures. Yet to summarize fully the accumulated knowledge of living organisms, past and present nomenclatures for localities, as well as for taxa, must somehow be linked. An awareness of these needs merits the attention not only of those developing biological databases, but also those collecting new material. We strongly endorse the use of geo-coordinates in future collecting efforts as a best practice.

Gaps in our understanding of Nearctic treehoppers provide promising areas for future research. We hope the work reported here will encourage and broaden efforts to study the ecology, ethology, evolution, distribution, and taxonomy of this rich, distinctive fauna.

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