

New state and United States records for Anthocoridae (Hemiptera: Heteroptera)

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Abstract. New state and United States records for species of Anthocoridae (Hemiptera: Heteroptera) are summarized for insects that we have collected from the western and northeastern United States. New U.S. records include *Macrotachelia* Reuter, 1871 (apparently *M. nigronitens* (Stål, 1860)), collected in southern California, representing the first record for this genus in the continental United States; *Orius diespeter* Herring, 1966, collected in Washington and Maine; and *Anthocoris dimorphicus* Anderson & Kelton, 1963, collected in several northern states. New state records for Anthocoridae noted by us while examining collections in several museums are also summarized.

Key Words. Insecta, Anthocoridae, new records, continental United States.

INTRODUCTION

Predatory bugs in the family Anthocoridae (Hemiptera: Heteroptera) are important natural enemies in agricultural and natural systems throughout the world (Lattin 1999). The family comprises 400–600 species in approximately 100 genera (Péricart 1972, 1996; Lattin 1999), and is represented in the continental United States and Canada by approximately 90 species in 23 genera (Henry 1988, Maw et al. 2000). Listings of species and information on distributions in North America have been summarized for the continental U.S. and Canada (Henry 1988), for Canada plus Alaska (Kelton 1978, Maw et al. 2000), and for the Yukon (Scudder 1997). Keys to North American taxa are available in Hill (1957), Herring (1966, 1976), and Kelton (1976, 1978).

We are currently conducting studies on the basic biology of certain Anthocoridae, and these studies have provided us with the opportunity to collect this family from a variety of geographic locations in the United States. Several of the specimens that we have collected represent new U.S. or state records, based upon distribution data provided by Henry (1988) and other published sources. Here, we report these new records. We also summarize new records for specimens that we have examined in museum collections. Records are for specimens deposited with University of Idaho (UI), University of Arizona (UA), Texas Tech University (TTU), California Academy of Sciences (CAS), Michigan State University (MSU), Oregon State University (OSU), and California Department of Food and Agriculture (CDFA). New state records are printed in bold lettering.

The classification scheme used here follows Schuh & Slater (1995) in which the family name Anthocoridae excludes Lasiochilidae and Lyctocoridae, now assigned to their own families; subfamilial names for Anthocoridae listed here include species from the Tribes Anthocorini, Oriini, and Xylocorini.

Voucher specimens for species collected by us are in the collection of the senior author, located at USDA-ARS, Wapato, WA.

Anthocorini

Acompocoris lepidus (Van Duzee, 1921), is restricted to coniferous trees in the genus *Picea* A. Dietr. and *Pinus* L. (both Pinaceae), on which it apparently feeds on aphids (Lattin &

Stanton 1992). Henry (1988) listed the species in the U.S. as occurring in California; Lattin & Stanton (1992) collected *A. lepidus* in Colorado, Oregon, and Wyoming. We collected several adults of *A. lepidus* from *Pinus* sp. (apparently *Pinus albicaulis* Engelm.) in August 1999, 40 km NW of Yakima, Yakima County, Washington.

Anthocoris albiger Reuter, 1884 is a southwestern species recorded from California, New Mexico, Texas, Utah, and Mexico (Ward et al. 1977, Henry 1988), where it often occurs in association with mesquite, *Prosopis* L. (Fabaceae) (Ward et al. 1977). Most of the records published in Henry (1988) and Ward et al. (1977) apparently are for specimens deposited in the museum at Texas Tech University. In late May 2001, we collected adults and nymphs of *A. albiger* from mountain mahogany, *Cercocarpus ledifolius* Nuttall (Rosaceae), growing on the western slopes of the Santa Rita mountains, in Santa Cruz County, Arizona. Other Arizona state records for *A. albiger* have been found in the W.F. Barr collection (UI), and include specimens collected in the 1980's from *Mimosa* L., *Prosopis* L., and *Acacia* P. Mill. (all Fabaceae), and from *Celtis pallida* Torrey (hackberry; Ulmaceae), growing in Cochise and Pima Counties in Arizona. The UA collection includes a specimen of *A. albiger* collected from *Condalia lycioides* (Gray) Weberbauer (= *Ziziphus obtusifolia* Hooker ex Torrey & Gray (Gray)) (Rhamnaceae) growing near Superior, Pinal County, Arizona (J.C. Bequaert, 4 June 1962). Barr (UI) collected an adult female from *Quercus* L. (Fagaceae) growing in Cloudcroft, Otero County, New Mexico, July 1984. Several specimens of *A. albiger* lacking host-plant information were found in the UA and TTU collections. With the exception of two specimens from the plains area near Lubbock, Texas, the insects were collected in or very near mountainous areas: Chisos Mountains, Texas; the Jornada Range, New Mexico; the White Mountains, the Santa Catalina Mountains, the Santa Rita Mountains, and the Picketpost Mountains, Arizona.

Anthocoris antevolens White, 1879 is one of the most widespread species of Anthocoridae in North America. The insect is transcontinental in Canada, extending north into Alaska and south into southern California in the west (Anderson 1962, Kelton 1978, Henry 1988). Henry (1988) listed this species in the U.S. from Alaska, California, Colorado, Idaho, Montana, Nevada, and Wyoming. Other published records for the U.S. include Washington and Oregon (Anderson 1962), and Utah (Knowlton 1936). This predator is found on a number of deciduous tree and shrub species, including especially species in *Salix* L. (Salicaceae), *Pyrus* L. (Rosaceae), *Populus* L. (Salicaceae), *Alnus* P. Mill. (Betulaceae), and *Quercus* (Kelton 1978, Horton & Lewis 2000). In late May 2001, we collected nymphs and adults of *A. antevolens* from *Salix* growing near Patagonia, Santa Cruz County, Arizona. Other Arizona records include 7 females collected in August 1983 (W.F. Barr; UI) from *Salix* growing 7.2 km W of Portal, Cochise County, Arizona, and one female collected by W.F. Barr (UI) in May 1988 from *Robinia* L. (locust; Fabaceae), a leguminous shrub growing in the Chiricahua Mountains, Cochise County, Arizona. Specimens from Arizona in the UA collection include adults swept from alfalfa (*Medicago* L.; Fabaceae) in Solomon, Graham County, and Elfrida and St. David, Cochise County in May 1956, and adults associated with nests of *Malacosoma* Hübner, 1820 (Lepidoptera: Lasiocampidae) collected by G.D. Butler in April 1958 from western Phoenix, Maricopa County.

Anthocoris bakeri Poppius, 1913 is a relatively uncommon western species that apparently occurs exclusively on species of *Arctostaphylos* Adans. (Ericaceae) infested with gall

producing aphids (Anderson 1962; unpublished data). Henry (1988) listed *A. bakeri* as occurring in California. The species was described from specimens collected in San Mateo County, California. Van Duzee (1914, 1916, 1917) reported *A. bakeri* from 5 additional counties spanning the length of the state, including El Dorado, Siskiyou, Sonoma, Santa Cruz, and San Diego Counties. We collected adults of *A. bakeri* from *Arctostaphylos* in May 1999 at the James San Jacinto Mountains Reserve (Univ. California), 13 km N of Idyllwild, Riverside County, California. Valenti et al. (1996) studied insects associated with *Arctostaphylos patula* Greene in Shasta County, California; we examined the voucher specimens of *Anthocoris* from this study, and found them to be primarily *A. bakeri*, mixed with a few *Anthocoris whitei* Reuter, 1884. Anderson (1962) collected *A. bakeri* from *Arctostaphylos* in North Bend, Coos County and Florence, Lane County, Oregon, in association with aphid-infested *Arctostaphylos*. We collected *A. bakeri* in July of 1999 from *Arctostaphylos* in Bandon, Coos County, Oregon. *Anthocoris bakeri* has also been found in the Santa Catalina Mountains, Molino Basin, Pima County, Arizona (UA; T.P. Sluss, Sept. 1971 and July 1972). We visited this site in May 2001, and found *Arctostaphylos* to be abundant in the area, but failed to collect *A. bakeri*.

Anthocoris confusus Reuter, 1884 is a European species first reported in North America (Maine; 5 May 1938) by Procter (1946: 77) and later by Anderson & Kelton (1963). Henry (1988) listed *A. confusus* in the U.S. as occurring in Maine and Tennessee. The species has also been collected in Isabella County, Michigan (MSU; R.R. Driesbach; 3 females and 5 males, September 1955). It is not known how this Old World species colonized North America.

Anthocoris dimorphicus Anderson & Kelton, 1963 is a dimorphic species with both long- and short-winged forms, which is unusual for this genus. The species appears to be transcontinental in Canada (Kelton 1978). There are no published U.S. records. We collected brachypterous females in April and May 1998 from *Salix* growing at Homestake Pass, 11 km SE of Butte, Jefferson County, Montana. Both short- and long-winged forms of both sexes were collected by us from *Salix* in Manchester and Landgrove, Bennington County, Vermont, and from *Salix* growing near Mexico, Oswego County, New York, in June 1999. On 26 June 2003, we collected a nymph from *Salix*, growing just east of Nobleboro, Lincoln County, Maine; the nymph was reared to a brachypterous female. A brachypterous female was collected from *Salix*, Port Hope, Huron County, Michigan in May 1965 by J. and L. Donahue (MSU). *Anthocoris dimorphicus* seems to be restricted to *Salix*. Its feeding habits are unknown, but we have raised a complete generation in the laboratory on aphids collected from *Salix*.

Anthocoris musculus (Say, 1832) is a common anthocorid associated with deciduous trees and shrubs in North America. The insect is very similar in appearance to *A. antevolens* and occurs on similar host-plant taxa. This species appears to be more common in the eastern U.S. than in the western U.S., but is widespread in Canada (Kelton 1978). The two species are separated by differences in the length and erectness of pubescence (Hill 1957, Kelton 1978). However, "intermediate" forms have been collected (Harper 1959), and there are questions as to whether *A. antevolens* and *A. musculus* are distinct species (Hill 1957, Anderson 1962). We are currently doing work that we hope will resolve this question. Here, we follow the conventional protocol of separating the two species by pubescence. Henry (1988) listed *A. musculus* in the U.S. from Alaska,

Colorado, Illinois, Indiana, Kansas, Missouri, New York, North Carolina, and Oregon. Other published U.S. records include Maine and Massachusetts (Torre-Bueno 1930), and Utah (Knowlton 1944). Two female *A. musculus* were collected in 1951 near Grand Marais, Cook County, **Minnesota** (CAS). The species has also been collected in Huron, Roscommon, Gladwin, Ionia, Newaygo, and Dickinson Counties, **Michigan** (MSU; specimens from 1928–1983).

We have collected many specimens from different geographic areas whose pubescence characteristics key the insects readily to *A. musculus* in Hill (1957) or Kelton (1978). Several of these represent state records not included in Henry (1988; see above) or apparently elsewhere. In May of 1998, we collected adults and nymphs of *A. musculus* from *Salix* at sites in **Montana** (24 km W of Drummond, Granite County; 10 km SE of Butte, Silver Bow County; Deer Lodge, Powell County); in June 2001, adults and nymphs were collected from *Salix* 32 km W of Lolo, Missoula County. On 25 June 2001, we collected nymphs of *A. musculus* from *Salix* growing 8 km W of Lookout Pass, Shoshone County, **Idaho**. Two females and two males were collected 22 July 2002 from *Salix* growing 24 km E of Lovell, Big Horn County, **Wyoming**. We collected adults and nymphs from *Salix* and *Alnus* (alder) growing in **Vermont** (Rutland, Bennington, and Chittenden Counties; June 1999), and from *Salix* near Beal City, Isabella County and Nunica, Muskegon County, **Michigan** in June 2003.

Anthocoris nemoralis (Fabricius, 1794) is an Old World species that was intentionally released in British Columbia, Canada, and in northcentral and central Washington for control of pear psylla (*Cacopsylla pyricola* (Förster, 1848); Psyllidae), a pest in pear orchards. A chronology of releases and recoveries is summarized in Horton et al. 2004. Henry (1988) did not list the species as occurring in the U.S. Since the late 1980's, the predator has been collected in central and southern California (Hagen & Dreistadt 1990, Horton et al. 2004). We collected *A. nemoralis* from pear orchards and from Scotch broom, *Cytisus scoparius* (L.) Link (Fabaceae), in Hood River, Hood River County, **Oregon** in 2003. We have also collected *A. nemoralis* from pear orchards in southcentral **Washington** (Naches and Yakima, Yakima County; 2001–2003), from *Salix* and Scotch broom growing near Silverdale, **Washington** (Pierce County; 2002), from Scotch broom growing near Roy, **Washington** (Kitsap County; 2002), and one female from *Alnus* growing along the American River, **Washington** (65 km NW of Yakima, Yakima County; August 2003). A full summary of North American records for *A. nemoralis* is available in Horton et al. (2004).

Anthocoris tomentosus Péricart, 1971 is a western species that associates often with deciduous trees and shrubs, but that may also often be found on certain herbaceous species (Anderson 1962). Henry (1988) listed the species in the U.S. as occurring in Alaska, California, Colorado, Idaho, Nevada, and Utah. The insect has also been collected in Oregon (Anderson 1962) and Washington (Tamaki & Weeks 1968). We regularly collect *A. tomentosus* from *Salix*, *Populus*, *Pyrus*, and *Alnus* growing in and near the fruit-growing regions of the Yakima valley (Yakima County) and from *Salix* in the Peshastin/Wenatchee area in Chelan County, Washington. We collected adults in late April 1998 from psyllid-infested *Shepherdia argentea* (Pursh) Nuttall (Elaeagnaceae) growing near Three Forks, Gallatin County, **Montana**, and from *Salix* at Homestake Pass, 11 km SE of Butte, Jefferson County, **Montana**. In July 2002, we collected adults and nymphs from *Rumex* L. (Polygonaceae) at the Homestake site. Museum records include the Phelps Botanical Area, Greer, Apache County, **Arizona**

(UA; G. Butler-F. Werner, June 1957); Clear Creek and Highway 270, Harper County, **Oklahoma** (CAS; Hugh B. Leach; 1 male, August 1967); Roubaix, Lawrence County, **South Dakota** (OSU; R.F. Koontz; 1 female, August 1963); and the Curtis Gulch Campground, Medicine Bow National Forest, Albany County, **Wyoming** (MSU; Roland L. Fischer, July 1974).

Anthocoris whitei Reuter, 1884 is a western North American species occurring often on species of *Purshia* DC. ex Poir. (Rosaceae), *Ceanothus* L. (Rhamnaceae), and *Cercocarpus* Kunth, generally in association with psyllid prey (Kelton 1978, Horton & Lewis 2000; unpublished data). Henry (1988) listed the species in the U.S. as occurring in California and Idaho. Anderson (1962) recorded *A. whitei* from several locations in Oregon, where it was found on mountain mahogany, *Cercocarpus ledifolius*, a species known to host psyllids (Hodkinson 1988). As new state records, we regularly collect *A. whitei* from psyllid-infested antelope bitterbrush, *Purshia tridentata* (Pursh) DC, in Yakima County, **Washington**, and from psyllid-infested *Ceanothus* growing near Peshastin, Chelan County, **Washington**. We have also collected scattered individuals from *Salix*, *Ribes* L. (Grossulariaceae), *Rumex*, and *Pyrus* growing in the Yakima valley; all are plants which host native or introduced psyllids in western North America. Adults and nymphs of *A. whitei* were collected in late May 2001 from *C. ledifolius*, growing on the western slopes of the Santa Rita mountains, Santa Cruz County, **Arizona**, at sites from which we also collected *A. albiger* (see above). Museum records include Tombstone, Cochise County, **Arizona** (UA; R.A. Flock, 1 female, ex *Flourensia cernua* Candolle [Asteraceae], June 1940); Manitou, El Paso County, **Colorado** (CAS; Van Duzee, July 1903; now called Manitou Springs); and Zephyr Point, Lake Tahoe, Douglas County (CDFA; H.H. Keifer, Sept. 1930) and Murray Summit, White Pine County, **Nevada** (UI; W.F. Barr and R.L. Westcott, 3 females, ex *Cercocarpus*, July 1965).

Elatophilus dimidiatus (Van Duzee, 1921) was described as a species of *Anthocoris* by Van Duzee (1921), but eventually was placed in *Elatophilus* Reuter, 1884 (Kelton 1976). Henry (1988) listed the species as occurring in California; Lattin & Stanton (1992) added Oregon to its known range. We collected *E. dimidiatus* from *Pinus ponderosa* P.& C. Lawson near Klickitat, Klickitat County, Washington. Our collections included adult females and males in July 1999 and one adult female in May 2000.

Macrotrachelia is a genus of primarily Central American distribution characterized by the presence of a broad black band that extends down the middle of the membrane (Champion 1900). Champion (1900) recorded six species in this genus from Central America. Species of *Macrotrachelia* often resemble species of Thysanoptera (Champion 1900), and appear to prey extensively on Thysanoptera. We collected *Macrotrachelia* sp. (Fig. 1) in May 2001 from leaf galls on ornamental *Ficus* L. (fig; Moraceae) growing in Riverside, Riverside County, **California**. *Ficus* leaf galls in Riverside County may also be colonized by two species of small black Oriini, *Macrotracheliella nigra* Parshley, 1917 and *Montandoniola moraguesi* (Puton, 1896) (Paine 1992, Hanlon & Paine 2003). *Macrotrachelia* can be distinguished from these Oriini by the presence of a sickle-shaped clasper (which differs from the spiral-shaped clasper typical in the Oriini) and by the absence of pulvilli. In addition, this species of *Macrotrachelia* has a short ostiolar canal that does not extend beyond the anterior third of the metapleuron, while both *M. nigra* and *M. moraguesi* have a long, more strongly curved ostiolar canal that reaches the anterior border of the metapleuron. Our specimens



Figure 1. Female *Macrotrachelia* sp. (apparently *M. nigronitens*) collected in May 2001 from leaf galls on *Ficus* growing in Riverside, Riverside County, California. Length 3.2 mm, excluding antennae.

(Fig. 1) keyed to *Macrotrachelia nigronitens* (Stål) in Champion (1900), who recorded the species from Panama and Brazil. The predators apparently were feeding on Cuban laurel thrips, *Gynaikothrips ficorum* (Marchal, 1908) (Thysanoptera: Phlaeothripidae), an introduced pest in southern California; we have successfully reared the predator on this diet. Cuban laurel thrips both in and out of its native range is attacked by a number of Anthocoridae (Tawfik & Nagui 1965, Clausen 1978, Paine 1992), including *Macrotrachelia* (Bennett 1965). These are the first records for this genus in the continental U.S. (see also Hanlon & Paine 2003).

Oriini

Macrotrachelielliella nigra Parshley is a small black anthocorid described from specimens collected in Massachusetts. The insect appears to occur often in association with

thysanopteran prey (Anderson 1962, Kelton 1978). The majority of U.S. records are for eastern North America. Henry (1988) listed *M. nigra* in the U.S. from Arkansas, Florida, Massachusetts, New Jersey, New York, and Rhode Island. Kelton (1978) reported that the species is transcontinental in Canada. Paine (1992) studied the species on ornamental *Ficus* as a predator of Cuban laurel thrips in Riverside, California. The predator may have been intentionally released in southern California, although records are apparently too incomplete to confirm this. New state records for *M. nigra* include an adult female that we collected in July 2000 from an unidentified shrub growing 32 km N of Naches, Yakima County, **Washington**. We also collected a number of adults and nymphs from dogwood, *Cornus* L. sp. (Cornaceae), in July 2002 from Saltse, Mineral County, **Montana**, where the predator was feeding on an unidentified species of a large red thrips.

Orius diespeter Herring, 1966 was described from specimens collected in 1936–1939 in British Columbia, Canada (Herring 1966). We regularly collect adults and nymphs of *O. diespeter* from flowering herbaceous plants growing in Peshastin, Chelan County, **Washington**. In June 2003, we collected adults of *O. diespeter* from Asteraceae in Ellsworth, Hancock County, **Maine**. At the Peshastin site, *O. diespeter* was often found co-occurring on the same plants with *Orius tricolor* (White, 1879). These are the first published U.S. records for *Orius diespeter*.

Xylocorini

Xylocoris umbrinus Van Duzee, 1921 was described from specimens collected in California. Species of this genus generally occur beneath the bark of deciduous trees, in stored grain, or in plant litter (Kelton 1978). Henry (1988) listed *X. umbrinus* in the U.S. from California and Idaho; Anderson (1962) collected *X. umbrinus* in Oregon. The species occurs as both brachypterous and macropterous forms (Kelton 1978). We collected brachypterous and macropterous forms from the Yakima valley, Yakima County, **Washington** between 1997 and 2002. The majority of these specimens were adults of both sexes found overwintering in cardboard bands placed around fruit trees or found overwintering in the leaf rosettes of common mullein, *Verbascum thapsus* L. (Scrophulariaceae). Adult males and females were also collected during the summers of 1997, 2000, and 2001 from ground cover in pear orchards, from an experimental plot of potatoes, and from antelope bitterbrush, *Purshia tridentata*, all growing in the Yakima valley.

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