ISSN 2007-9133

DUGESIANA

Revista de Entomología

Julio 2017

Volumen 24 Número 2

Disponible en línea
http://www.revistascientificas.udg.mx/index.php/DUG/index

DEPARTAMENTO DE BOTÁNICA Y ZOOLOGÍA

Dugesiana, Año 24, No. 2, julio 2017- diciembre 2017 (segundo semestre de 2017), es una publicación Semestral, editada por la Universidad de Guadalajara, a través del Centro de Estudios en Zoología, por el Centro Universitario de Ciencias Biológicas y Agropecuarias. Camino Ramón Padilla Sánchez # 2100, Nextipac, Zapopan, Jalisco, Tel. 37771150 ext. 33218, http://www.revistascientificas.udg.mx/index.php/DUG/index, glenusmx@gmail.com. Editor responsable: José Luis Navarrete Heredia. Reserva de Derechos al Uso Exclusivo 04-2009-062310115100-203, ISSN: 2007-9133, otorgados por el Instituto Nacional del Derecho de Autor. Responsable de la última actualización de este número: José Luis Navarrete Heredia, Editor y Ana Laura González-Hernández, Asistente Editorial. Fecha de la última modificación 1 de julio de 2017, con un tiraje de un ejemplar.

Dugesiana 24(2): 257-263
Fecha de publicación: 1 de julio 2017

ISSN 1405-4094 (edición impresa)
ISSN 2007-9133 (edición online)

New distribution records and plant associations for *Crophius scabrosus* (Uhler, 1904) (Hemiptera: Lygaeoidea: Oxycarenidae)

Nuevos registros de distribución y de plantas asociadas a *Crophius scabrosus* (Uhler, 1904) (Hemiptera: Lygaeoidea: Oxycarenidae)

A.G. Wheeler, Jr.
Department of Plant and Environmental Sciences, Clemson University, Clemson, South Carolina 29634-0310, U.S.A. awhlr@clemson.edu

ABSTRACT

Previous distribution records and plant associations are reviewed for the little-known oxycarenid *Crophius scabrosus* (Uhler, 1904). Based on fieldwork in the western United States, Kansas and Wyoming are reported as new state records. Adults were found on diverse plants in Nebraska, including juniper (*Juniperus*; Cupressaceae), pine (*Pinus*; Pinaceae), and composites (Compositae = Asteraceae); they were common in crowns of bunchgrasses (Poaceae), especially *Panicum virgatum* and *Schizachyrium scoparium*. Despite extensive fieldwork, nymphs were not found; a mating pair was observed on *P. virgatum*. Host plants—those supporting nymphal development—remain unknown, but composites such as species of *Artemisia* are suggested as potential hosts.
Key words: Heteroptera, Lygaeoidea, Oxycarenidae, taxonomy, new records.

RESUMEN

Anteriores registros de distribución y asociación a plantas se revisaron para *Crophius scabrosus* (Uhler, 1904), un oxycarenido poco conocido. Basado en el trabajo de campo en el oeste de Estados Unidos, la presencia de *C. scabrosus* se reportó en Kansas y Wyoming, como nuevos registros estatales. Se encontraron adultos en diversas plantas en Nebraska, como en el enebro (*Juniperus*; Cupressaceae), pino (*Pinus*; Pinaceae), y plantas compuestas (Compositae = Asteraceae). Se reportó la presencia de esta especie en las coronas de zacates amacollados (Poaceae), en particular en *Panicum virgatum* y *Schizachyrium scoparium*. A pesar de haber realizado un trabajo extensivo de campo, no se encontraron ninfas. Se observó un par en apareamiento sobre *P. virgatum*. Plantas hospedantes—en las que se desarrollan las ninfas—permanecen desconocidas. Se cree que especies de plantas compuestas, del género *Artemisia* podrían ser las potenciales plantas hospedantes.
Palabras clave: Heteroptera, Lygaeoidea, Oxycarenidae, taxonomía, nuevos registros.

The Oxycarenidae (Stål, 1862) were among the former subfamilies of a composite Lygaeidae that were elevated to family status by Henry (1997). This predominantly Eastern Hemisphere group comprises about 24 genera and 150 species (Henry 2009; Henry *et al*. 2015a, b). Five genera and 22 species are represented in the Neotropics (Henry *et al*. 2015a). The Mexican fauna includes the recently described *Neaplax baja* (Brailovsky and Cervantes 2011) and the new genus *Neocrophius* Henry and Dellapé, 2015 that was described to accommodate two previously described species (Henry *et al*. 2015b), including *N. singularis* Brailovsky and Barrera, 1979. In North America, only one native oxycarenid, *Crophius disconotus* (Say, 1832), is found east of the Mississippi River; the remaining species, nine native and two adventive, are restricted to the western United States and western provinces of Canada (Ashlock and Slater 1988, Maw *et al*. 2000, Wheeler and Hoebeke 2013, Wheeler and Henry 2015).

Crophius Stål, 1874, a mainly New World genus, was synonymized with *Anomaloptera* Amyot and Serville, 1843 by Hoberlandt (1987) but it was resurrected from synonomy by Henry *et al*. (2015b). Little is known about the habits of the species found in North America. *Crophius disconotus* most often has been associated with goldenrods, composites of the genus *Solidago* (Asteraceae) (Van Duzee 1894, 1910; Torre-Bueno 1924, 1925; Sweet 2000; Wheeler 2004). Whether nymphs complete their development on goldenrod is unknown. Even less is known about the bionomics of other species of *Crophius* native to North America.

Here I review previous information on the bionomics of *C. scabrosus* (Uhler, 1904) and present new distribution records and plant associations based on fieldwork in Nebraska and elsewhere in the western United States, emphasizing its occurrence on *Juniperus* (Cupressaceae) and in crowns of bunchgrasses (Poaceae). Plants that probably represent incidental occurrences are distinguished from species more likely to support nymphal development. Explanations are offered to account for the bug's anomalous presence on plants of diverse families. Asteraceae (Compositae), such as species of *Artemisia*, are suggested as the most likely hosts of *C. scabrosus*.

With great pleasure, I dedicate this paper to Dr. Harry Brailovsky, whose research and publications on Heteroptera have included the Oxycarenidae. In a career marked

by extraordinary productivity, he has made substantial contributions to our knowledge of Mexico's heteropteran fauna.

MATERIALS AND METHODS

Crophius scabrosus was collected during fieldwork to document host relationships of plant-feeding heteropterans in the western United States, especially in western Nebraska. Trees and shrubs were sampled by using the flat end of an ax handle to tap branches over a beating net, as described for junipers (Wheeler 2015). Bunchgrasses were sampled by placing the net at a 45°angle to the ground and striking the base (crown) with an ax handle to dislodge arthropods and then using small snap-cap plastic vials to collect specimens from the net bag (Wheeler 2005, 2017; Wilson and Wheeler 2005). The numbers of *C. scabrosus* collected from various plant species were recorded.

Aggregation, as used herein, refers to the occurrence of adults (typically >10) on plant species not known to support nymphal development; aggregative behavior in oxycarenids often has been referred to as swarming (Froggatt 1901, USDA 1962, Sweet 2000, Fletcher 2007). Coordinates are given for collection sites without a negative sign for longitude. Plant names follow the USDA NRCS (2017) database. Voucher specimens of *C. scabrosus* are deposited in the Heteroptera collection of the National Museum of Natural History, Smithsonian Institution, Washington, DC.

RESULTS

Crophius scabrosus (Uhler, 1904)

(Figs. 1, 2)

Recognition. Henry *et al*. (2015b) provided a key to the oxycarenid genera of the Western Hemisphere, diagnoses, and color photographs of adults (including *Crophius scabrosus*) that enable this genus to be distinguished from similar-appearing genera.

In the field, adults of *C. scabrosus* look like small, dark, rather nondescript bugs whose forewings (hemelytra) are speckled with light-colored areas.

Crophius scabrosus (Figs. 1, 2) is elongate-oval, somewhat flattened, and 3.0–3.5 mm long. The porrect head tapers apically and is piceous, indistinctly punctate, with recumbent sericeous setae; the clypeus is spatulate with more erect, pale (possibly glandular) setae at the apex. Antennomere I and the basal three-fourths of II are reddish brown, with the apical fourth of II and III and IV piceous; antennomere I bears apparent glandular setae and extends beyond the clypeus; antennomere II is the longest, slightly exceeding IV. The labium is piceous, extended to (or nearly to) the mesocoxae; dense, white setae border the labial groove. The pronotum is slightly convex and broader posteriorly; the anterior lobe is fuscous, indistinctly punctate with scattered pale, recumbent setae, and bears a small, polished, pale spot at the middle of the anterior margin; the posterior lobe is sparsely pubescent, uniformly punctate, and fuscous; the midregion is castaneous with two small, nearly impunctate patches on either side of a glabrous midline. The scutellum is nearly equilateral and piceous; the midline is glabrous, with its apical half pale, and is bordered by pale recumbent setae. The hemelytra extend beyond the end of the abdomen and are stramineous, with dark punctures on the clavus and corium; the corial margin is straight, explanate, and alternated with pale yellow and fuscous; the membrane is infuscate medially with scattered, fuscous areas; the veins are straight and unbranched, the apical margin is pellucid with alternating small fuscous areas. The femora are piceous and the tibiae ochraceous to ferruginous but paler medially, with the pale area most extensive on the metatibiae; the forefemur is incrassate with a prominent spine at the distal third. The venter is sparsely pubescent, uniformly piceous except for the pale pro- and mesocoxal acetabula (coxal covers) and white metapleural area posterior to the scent gland auricle.

Distribution. Previous records from the United States, as listed by Ashlock and Slater (1988), are Arizona, California, Colorado, Idaho, Nebraska, New Mexico (type locality: Las Vegas Hot Springs; Uhler 1904), and Utah; a recent addition is Oregon (Scudder 2012). Scudder's (2010) new state record of Nevada (Carson City and Pyramid) was preceded by Barber's (1938) record (state listing only; repeated by Torre-Bueno 1946). Slater (1964) and Ashlock and Slater (1988), however, omitted Nevada from the known distribution of *C. scabrosus*. This oxycarenid also is known from the Mexican states of Distrito Federal (Mexico City), Durango, Estado de México, Guerrero, Hidalgo, Jalisco, Michoacán, Morelos, Oaxaca, Puebla, and Tamaulipas (Brailovsky and Barrera 1979).

Kansas and Wyoming are added to the U.S. distribution based on the present study. The Nebraska record from Rock County is the easternmost record (99°31.57′W) for this western species.

Plant associations. Adults of *C. scabrosus* have been recorded from juniper (*Juniperus* spp.) (Van Duzee 1910, Brailovsky and Barrera 1979, Scudder 2010). They also have been observed in numbers on an unidentified, low-growing composite (Asteraceae) in California (Van Duzee 1914). In Oregon, this oxycarenid was taken on "sagebrush" (*Artemisia* sp.; Asteraceae) (Scudder 2012). *Crophius scabrosus* has been intercepted at U.S. ports of entry in shipments from Mexico of ornamental plants such as orchids (Marlatt 1927; Wheeler *et al*. 1950, 1951, 1952) and the composite *Centaurea cyanus* L. (Wheeler *et al*. 1952).

At a site in western Nebraska (Scotts Bluff County) in early July, I observed numerous (>25) adults on Rocky Mountain juniper (*J. scopulorum* Sarg.) and >15 adults on ponderosa pine (*Pinus ponderosa* Lawson & C. Lawson; Pinaceae). Few adults (<5) were observed on *J. scopulorum* at the same site in early September. In early May in western Nebraska, *C. scabrosus* was taken on *J. virginiana* L. (Figs. 1, 2) at four sites, including 48 adults at a site in Morrill County and 47 in Deuel County. An adult was collected on whiskey currant (*Ribes cereum* var. *pedicellare* W.H.

Brewer & S. Watson; Grossulariaceae) in western Nebraska, and adults were found on various composites: *Artemisia campestris* L. ssp. *caudata* (Michx.) H.M. Hall & Clem., *A. filifolia* Torr., *A. frigida* Willd., and *A. ludoviciana* Nutt. In Wyoming, adults were beaten from another composite, rubber rabbitbrush (*Ericameria nauseosa* [Pall. ex Pursh] G.L. Nesom & Baird).

Adults in Nebraska also were collected from the crowns of bunchgrasses: big bluestem (*Andropogon gerardii* Vitman; 2 sites), little bluestem (*Schizachyrium scoparium* [Michx.] Nash; 8 sites), prairie cordgrass (*Spartina pectinata* Bosc ex Link; 1 site), and switchgrass (*Panicum virgatum* L.; 17 sites + 2 in Colorado and 2 in Kansas). A mating pair was beaten from the crown of switchgrass in early September at a site in Nebraska (Cheyenne County) where adults also were observed on inflorescences of this grass. In Colorado, an adult was taken in the crown of alkali sacaton (*Sporobolus airoides* [Torr.] Torr.), and in New Mexico, an adult was beaten from the crown of big sacaton (*S. wrightii* Munro ex Scribn.).

Specimens examined. UNITED STATES: COLORADO: *Cheyenne Co*., Rt. 385, 38 km N of Cheyenne Wells, 38°53.73´N 102°21.11´W, 27 Jun 2016, 3♀ ex *Panicum virgatum*. *Costilla Co*., Rt. 160, W of Blanca, 37°27.11´N 105°32.72´W, 29 Jun 2016, 1♀ ex *Sporobolus airoides*. *Pueblo Co*., Rt. 50, 1.6 km W of Huerfano River, S of Boone, 38°13.73´N 104°16.78´W, 29 Aug 2014, 2♀ ex *P. virgatum*. KANSAS: *Greeley Co*., Rt. 96, 10.5 km E of Tribune, 39°27.58´N 101°37.96´W, 1 Sep 2014, 2♀ ex *P. virgatum*; Rt. 27, 7.8 km N of Tribune, 38°32.13´N 101°45.14´W, 1 Sep 2014, 3♀ ex *P. virgatum*. NEBRASKA: *Banner Co*., Rt. 88, 6 km W of jct. Rt. 71, NW of Harrisburg, 41°38.43´N 103°44.86´W, 29 Jun 2012, 5♂, 2♀, ex *P. virgatum*; Rt. 88, 16.8 km E of Wyoming state line, 13. 6 km W of jct. Rt. 71, W of Harrisburg, 41°38.39´N 103°50.59´W, 3 Sep 2014, 1 adult ex *Artemisia frigida. Chase Co*., Rt. 6, 10 km E of Imperial, 40°29.68´N 101°34.14´W, 30 Jun 2011, 1♀ ex *P. virgatum*; Rt. 6, 8 km E of Imperial, 40°29.70´N 101°33.68´W, 30 Jun 2013, 1 adult ex *P. virgatum*; Rt. 6, 6 km W of Wauneta, 40°24.98´N 101°25.33´W, 30 Jun 2011, 1♂, 1♀ ex undet. bunchgrass. *Cherry Co*., Rt. 97, 10.0 km S of Valentine, 42°48.58´N 100°38.91´W, 23 Jun 2016, 1♀ ex *P. virgatum*. *Cheyenne Co*., Sidney, 41°07.78´N 102°56.76´W, 3 Sep 2014, 5 adults (including a mating pair) ex *P. virgatum*. *Custer Co*., Rt. 2, 3.3 km SE of Blaine Co. line, 18 km SE of Dunning, 41°43.04´N 99°58.73´W, 16 Jul 2015, 1♂ ex *P. virgatum*. *Dawes Co*., Toadstool Rd., NNW of Crawford, 42°48.42´N 103°28.60´W, 7 Jul 2011, 1♂, 2♀ ex *Artemisia ludoviciana*. *Deuel Co*., Rt. 25A, 3.7 km S of Chappell, 41°03.88´N 102°28.58´W, 4 Sep 2014, 2 adults ex *P. virgatum*; Rt. 27, Berea Cemetery, 23.5 km S of Oshkosh, 41°12.04´N 102°20.65´W, 9 May 2017, 21♂, 26♀ ex *Juniperus virginiana*. *Dundy Co*., Rt. 61, 10.4 km N of Benkelman, 40°08.96´N 101°31.86´W, 26 Jun 2016, 1♀ ex *P. virgatum. Furnas Co*., Rts.6/34, 4.5 km E of Cambridge, 40°17.54´N 100°05.76´W, 4 Jul 2010, 2♂, 1♀ ex *Schizachyrium scoparium*. *Garden Co*., Rt. 26, W of Lisco, 41°30.3´N 102°37.6´W, 16 Jun 1998, 1♀ ex *S. scoparium*; Rt. 26, 8.8 km W of Lewellen, 41°15.58´N 102°06.43´W, 1 Jul 2012, 1 adult, ex *P. virgatum*; Rt. 27, 0.5 km N of North Platte River, 1.6 km S of Oshkosh, 41°23.0´N 102°20.8´W, 4 Sep 2014, 1 adult, ex *Spartina pectinata;* Rt. 27, 8.5 km S of Oshkosh, 41°20.13´N 102°20.23´W, 8 May 2017, 1♀ ex *Artemisia filifolia*; Rt. 26, SE of Lewellen, 41°15.22´N 102°06.32´W, 9 May 2017, 8♂, 7♀ ex *Schizachyrium scoparium,* 7♂, 10♀ ex *Juniperus virginiana*. *Grant Co*., Rt. 61, 16.5 km S of Hyannis, 41°45.08´N 102°20.08´W, 20 Jul 2015, 2♀ ex *P. virgatum*. *Hayes Co*., Rt. 25, NE of Palisade, 40°21.08´N 101°00.68´W, 30 Jun 2013, 2♂ ex *P. virgatum*. *Hooker Co*., Rt. 2, 1.6 km E of Mullen, 42°02.58´N 101°01.48´W, 8 May 2017, 1♂, 3♀ ex *Juniperus virginiana*. *Keith Co*., Rt. 61 nr Kingsley Dr., 13 km N of Ogallala, 41°12.5´N 101°40.3´W, 15 Jun 1998, 1♀ ex *S. scoparium*; same site but 5 Jul 2010, 1♀ ex *S. scoparium*; Cedar Point Biological Station, NE of Ogallala, 41°12.5´N 101°38.4´W, 19 Aug 1998, 1♀ ex *Andropogon gerardii*; Rt. 30, 8.5 km W of Brule, 41°05.46´N 101°58.83´W, 30 Sep 2016, 1♀ ex *Artemisia campestris* ssp. *caudata*; Rt. 30, 13 km W of Brule, 41°05.45´N 102°01.44´W, 30 Sep 2016, 1♂ ex *P. virgatum*. *McPherson Co*., Rt. 92, 6.9 km W of Tryon, 41°32.68´N 101°02.85´W, 17 Jul 2015, 1♂ ex *P. virgatum*. *Morrill Co*., Courthouse Rock, S of Bridgeport, 41°35.90´N 103°06.84´W, 20 Aug 1998, 2♂, 4♀ ex *A. gerardii*; Rt. 26, 8 km SE of Broadwater, 41°34.21´N 102°46.39´W, 6 Jul 2010, 3♂, 15♀ ex *S. scoparium*; Rt. 26, 5 km SE of Broadwater, 41°34.67´N 102°47.84´W, 6 Jul 2010, 2♂, 1♀ ex *S. scoparium*; Rt. 26, 15.4 km W of Broadwater, 41°38.99´N 103°01.25´W, 1 Jul 2012, 1♀ ex *P. virgatum*; Rt. 26, Broadwater, 41°35.76´N 102°51.26´W, 9 May 2017, 1♂, 1♀ ex *J. virginiana*; Rt. 26, 14.7 km NW of Lisco, 41°34.04´N 102°45.85´W, 9 May 2017, 20♂, 28♀ ex *S. scoparium*, 1♂ ex *Artemisia filifolia*. *Perkins Co*., Rt. 23, 8 km W of Madrid, 40°50.8´N 101°38.1´W, 21 Aug 1998, 3♂, 3♀ ex *P. virgatum*; Rt. 23, 7.5 km W of Elsie, 40°51.03´N 101°28.80´W, 30 Jun 2013, 2 adults ex *P. virgatum. Rock Co*., Rt. 183, 3.5 km N of Loup Co. line, 52.8 km S of Bassett, 42°07.01´N 99°31.57´W, 22 Jun 2016, 1♀ ex *P. virgatum*. *Scotts Bluff Co*., Rt. 71, Wildcat Hills, S of Gering, 41°42.30´N 103°40.63´W, 7 Jul 2010, 3♀ ex *S. scoparium*; Scotts Bluff National Monument, Saddle Rock Summit, 41°50.23´N 103°42.04´W, 2 Jul 2013, >40 adults ex *Juniperus scopulorum* and *Pinus ponderosa*; same site but 5 Sep 2014, 1 adult ex *J. scopulorum. Sioux Co*., Monroe Canyon Rd., 7.5 km N of Harrison, 42°45.08´N 103°55.02´W, 8 Jul 2011, 1♀ ex *Ribes cereum* var. *pedicellare*; Agate Fossil Beds National Monument, Visitor Center, 43°25.48´N 103°43.77´W, 7 Sep 2014, 1 adult ex *J. scopulorum.* NEW MEXICO: *Hidalgo Co*., Rt. 338, ca. 8 km S of Animas, 31°52.6´N 108°47.9´W, 15 May 2004, 1♀ ex *Sporobolus wrightii.* WYOMING: *Laramie Co*., 3.7 km N of Colorado state line, S of Cheyenne, 41°02.01´N

104°47.01´W, 12 Sep 2014, 4 adults ex *Ericameria nauseosa*.

DISCUSSION

Among Oxycarenidae, host plants are well known for economically important species in the Old World genus *Oxycarenus* Fieber, 1837, which is the largest (ca. 55 species) in the family (Sweet 2000, Henry 2009). Species of *Oxycarenus* (subgenus *Pseudoxycarenus* Samy, 1969) in South Africa might specialize on plants of the Proteaceae (Slater 1972, Roets *et al*. 2006), a distinctive component of the Cape Floristic Region (Goldblatt and Manning 2002). In the remaining, substantially smaller, oxycarenid genera, the bionomics of relatively few species have been investigated, including some found in Britain and continental Europe (Péricart 1999). Little information has been added to the biological knowledge of oxycarenids native to North America since Van Duzee (1910) commented that food plants, except for those of *Crophius disconotus*, are unknown. The bionomics are better known in North America for the adventive *Metopoplax ditomoides* (Costa, 1847) that is established in the Pacific Northwest (Lattin and Wetherill 2002, Wheeler and Hoebeke 2013) than they are for many native oxycarenids.

Adults of *Crophius* are found on diverse plant species that are unlikely to support nymphal development, including economically important fruit crops (Sweet 2000, Cassis and Gross 2002). *Crophius disconotus* occasionally aggregates on the malvaceous forbs *Malva rotundifolia* L. and *Sida pusilla* Sm. (as *S. rhombifolia* L), whereas its occurrence on species of *Solidago* is thought to represent a true host relationship for this seldom-collected bug (Sweet 2000, Wheeler 2004). Its presence in "root mats" of *Polemonium pulcherrimum* Hook. (Polemoniaciae) in the Yukon (Scudder 1997) might also be incidental. In California, large numbers of adults of *C. bohemani* (Stål, 1859) have been observed on several, apparently nonhost, trees and shrubs: ornamental arborvitae (*Thuja* sp.; Cupressaceae), gum (*Eucalyptus* sp.; Myrtaceae), maple (*Acer* sp.; Aceraceae), and oriental planetree (*Platanus orientalis* L.; Platanaceae) (USDA 1962–1966). Adults severely damaged barley (*Hordeum vulgare* L.; Poaceae) in California (USDA 1962).

The occurrence of *C. scabrosus* in Mexico on three species of the bromeliad genus *Tillandsia* probably is incidental. Alternatively, the bromeliads might provide adults with food, moisture, or shelter.

Despite extensive fieldwork in Nebraska (and other western states), the host relationships of *C. scabrosus* remain undetermined. Junipers, on which adults sometimes were numerous, would seem unlikely to support the bug's nymphal development. Yet my observations, and previous records of *C. scabrosus* on *Juniperus* in California (Van Duzee 1910), Nevada (Scudder 2010), and Mexico (Brailovsky and Barrera 1979), suggest that junipers might play a role in the fitness of this oxycarenid. Adults of *C. scabrosus* in Nebraska also were found on various bunchgrasses, including numerous individuals in crowns of *Schizachyrium scoparium* in early May, which suggests that adults overwinter in grasses. Nymphs were not collected from Poaceae, but the collection of a mating pair on *Panicum virgatum* in early September and adults on various grasses during summer suggests that the crowns also provide protection from desiccation by heat and wind and serve as a source of food and water.

In addition to species of *Solidago* as hosts of *C. disconotus* in the United States, other composites (Asteraceae) are known, or implicated, as oxycarenid hosts in North America (Sweet 2000), South America (Brailovsky 2014), and the Palearctic Region (Péricart 1999). Potential host composites of *C. scabrosus* in the western United States might include the species of *Artemisia* on which adults were observed in Nebraska: *A. campestris*, *A. filifolia*, *A. frigida*, and *A. ludoviciana*. If certain Asteraceae prove to be hosts, the nymphs might not feed on plants (e.g., in seed heads) but on seeds in the litter layer. In Mexico, Brailovsky and Barrera (1979) found *C. scabrosus* on and under juniper. Moreover, the oxycarenid *Leptodemus irroratus* Slater, 1972 apparently feeds primarily on seeds of the composite *Matricaria* sp. in the litter layer in South Africa (Slater 1972) where another oxycarenid, *Barberocoris myrmecoides* Slater and Sweet, 1970, lives on the ground and on its host plant (Slater and Sweet 1970). The pestiferous *Oxycarenus hyalinipennis* Costa, 1843 typically feeds in cotton (*Gossypium*; Malvaceae) bolls, but sometimes is found beneath cotton plants (Smith and Brambila 2008).

Continued fieldwork is needed to determine host-plant relationships and voltinism for *C. scabrosus* and other North American oxycarenids. Why these bugs tend to aggregate on plants that do not support nymphal development awaits explanation. In arid regions of western North America, aggregating might be triggered by drought. Sweet (2000) posited that oxycarenids might aggregate on and damage fruits of economically important trees to obtain water. I suggest that as drought-stressed herbaceous hosts of oxycarenids deteriorate, well-watered ornamental trees and shrubs in suburban and urban landscapes might become important sources of moisture and food. Under drought conditions in Australia, *Oxycarenus arctatus* (Walker, 1872) feeds and develops opportunistically in cattle dung (Woodward 1984).

Sweet (2000) suggested that aggregative behavior in Oxycarenidae might facilitate feeding or reproduction, or involve predator defense. Mating pairs, however, have not been reported from oxycarenid aggregations to suggest the use of plants as substrate-based mating arenas. If aggregating on plants not used for nymphal development were part of the mating system in *C. scabrosus*, their aggregations might have attracted more attention than is suggested by the scant literature on this bug. In addition, specimens from aggregations apparently have not been

submitted to BugGuide for identification, nor have accounts of their aggregative behavior been disseminated via social networks such as Twitter. The red pronotum and abdomen of certain oxycarenids suggests aposematism (Sweet 2000). Although brightly colored Lygaeidae (sensu Henry 1997) and heteropterans of several other families sequester secondary plant compounds such as cardiac glycosides and pyrrolizidine alkaloids for their own defense, sequestration of metabolites has not been demonstrated for Oxycarenidae (Opitz and Müller 2009). Even so, Sweet's (2000) hypotheses to explain aggregation in oxycarenids should not be dismissed and warrant experimental studies.

ACKNOWLEDGMENTS

I thank the editor of *Dugesiana*, José Luis Navarrete-Heredia, for inviting me to submit an article for the issue honoring Harry Brailovsky; Gerald Carner (Department of Plant and Environmental Sciences, Clemson University) for photographing *C. scabrosus*; Livy Williams (USDA ARS, U.S. Vegetable Laboratory, Charleston, SC) for calling my attention to the article by Opitz and Müller); Robert Manasek (Scotts Bluff National Monument, Gering, Nebraska) for his help and hospitality when I visited in July 2013 and September 2014; Fred MacVaugh and Alvis Mar (Agate Fossil Beds National Monument, Harrison, Nebraska) for their assistance in September 2014; Sofia Muñoz-Tobar (Department of Plant and Environmental Sciences, Clemson University) for providing the Spanish abstract; Thomas Henry (Systematic Entomology Laboratory, USDA, ARS, Washington, DC) for formatting the color plate; and Peter Adler (Department of Plant and Environmental Sciences, Clemson University) for helpful comments on an early draft of the manuscript.

LITERATURE CITED

Amyot, C.J.B. and J.G.A. Serville. 1843. *Histoire naturelle des insectes*. *Hémiptères*. Encyclopédique de Roret, Paris.

Ashlock, P.D. and A. Slater. 1988. Family Lygaeidae Schilling, 1829 (= Infericornes Amyot and Serville, 1843; Myodochidae Kirkaldy, 1899; Geocoridae Kirkaldy, 1902). The seed bugs and chinch bugs. (pp. 167-245). In: Henry, T.J. and R.C. Froeschner (Eds.). *Catalog of the Heteroptera, or True Bugs, of Canada and the Continental United States*. E.J. Brill, Leiden.

Barber, H.G. 1938. A review of the genus *Crophius* Stål, with descriptions of three new species (Hemiptera–Heteroptera: Lygaeidae). *Journal of the New York Entomological Society*, 46(3): 313-319.

Brailovsky, H. 2014. First record of the Oxycarenidae from Venezuela and description of two new *Anomaloptera* species (Hemiptera: Heteroptera). *Acta Entomologica Musei Nationalis Pragae*, 54(2): 461-467.

Brailovsky, H. y E. Barrera. 1979. Contribucion al estudio de los Hemiptera-Heteroptera de Mexico XVI. La subfamilia Oxycareninae (Lygaeidae), con descripcion de una nueva especie. *Folia Entomológica Mexicana*, (41): 81-93.

Brailovsky, H. and L. Peredo Cervantes. 2011. A second species of the genus *Neaplax* Slater 1974, from Mexico (Heteroptera: Lygaeoidea: Oxycarenidae). *Proceedings of the Entomological Society of Washington*, 113(1): 1-6.

Cassis, G. and G.F. Gross. 2002. Hemiptera: Heteroptera (Pentatomomorpha). *Zoological Catalogue of Australia.* Vol. 27.3B. CSIRO Australia, Canberra.

Fletcher, M. 2007. Plant bugs. *Primefacts* (New South Wales Department of Plant Industries) (508): 1-4.

Froggatt, W.W. 1901. Notes on Australian Hemiptera. (Plant Bugs). *Agricultural Gazette of New South Wales*, 12(12): 1592-1601.

Goldblatt, P. and J.C. Manning. 2002. Plant diversity of the Cape Region of southern Africa. *Annals of the Missouri Botanical Garden*, 89(2): 281-302.

Henry, T.J. 1997. Phylogenetic analysis of family groups within the infraorder Pentatomomorpha (Hemiptera: Heteroptera), with emphasis on the Lygaeoidea. *Annals of the Entomological Society of America*, 90(3): 275-301.

Henry, T.J. 2009. Biodiversity of Heteroptera. (pp. 223-263). In: Foottit, R.G. and P.H. Adler (Eds.). *Insect Biodiversity: Science and Society*. Wiley-Blackwell, Chichester, UK.

Henry, T.J. and P.M. Dellapé. 2009. A new genus and species of Oxycarenidae (Hemiptera, Heteroptera, Lygaeoidea) from Argentina. *ZooKeys*, (25): 49-59.

Henry, T.J., P.M. Dellapé and A.S. de Paula. 2015a. The big-eyed bugs, chinch bugs, and seed bugs (Lygaeoidea). (pp. 459-514). In: Panizzi, A.R. and J. Grazia (Eds.). *True Bugs (Heteroptera) of the Neotropics*. Springer, Dordrecht.

Henry, T.J., P.M. Dellapé and G.G.E. Scudder. 2015b. Resurrection of the genera *Crophius* Stål and *Mayana* Distant from synonymy under *Anomaloptera* Amyot and Serville, description of a new genus, and a key to the New World oxycarenid genera (Hemiptera: Heteroptera: Oxycarenidae). *Proceedings of the Entomological Society of Washington*, 117(3): 367-380.

Hoberlandt, L. 1987. Results of the Czechoslovak-Iranian Entomological Expeditions to Iran 1970, 1973 and 1977. Heteroptera, Lygaeidae, Oxycareninae. *Acta Entomologica Musei Nationalis Pragae*, 42: 11-29.

Lattin, J.D. and K. Wetherill. 2002. *Metopoplax ditomoides* (Costa), a species of Oxycarenidae new to North America (Lygaeoidea: Hemiptera: Heteroptera). *Pan-Pacific Entomologist*, 78(1): 63-65.

Marlatt, C.L. (Chairman). 1927. Pests collected from imported plants and plant products from January 1 to December 31, 1926, inclusive. *United States Department of Agriculture*, *Service and Regulatory Announcements, Federal Horticultural Board*, (89 supplement). U.S. Government Printing Office, Washington, DC.

Maw, H.E.L., R.G. Foottit,, K.G.A. Hamilton, and G.G.E. Scudder. 2000. *Checklist of the Hemiptera of Canada and Alaska*. NRC Research Press, Ottawa, Ontario.

Opitz, S.E.W. and C. Müller. 2009. Plant chemistry and insect sequestration. *Chemoecology*, 19(3): 117-154.

Péricart, J. 1999 (1998). Hémiptères Lygaeidae Euro-Méditerranéens. 2. *Faune de France*, 84B: 1-453.

Roets, F., L.L. Dreyer, H. Geertsema, and P.W. Crous. 2006. Arthropod communities in Proteaceae infructescences: seasonal variation and the influence of infructescence phenology. *African Entomology*, 14(2): 257-265.

Scudder, G.G.E. 1997. True bugs (Heteroptera) of the Yukon. (pp. 241-336). In: Danks, H.V. and J.A. Downs (Eds.). *Insects of the Yukon*. Biological Survey of Canada (Terrestrial Arthropods), Ottawa, Ontario.

Scudder, G.G.E. 2010. New distribution records for United States Lygaeoidea (Hemiptera: Heteroptera). *Journal of the Entomological Society of British Columbia*, 107: 83-84.

Scudder, G.G.E. 2012. Additional provincial and state records for Heteroptera (Hemiptera) in Canada and the United States. *Journal of the Entomological Society of British Columbia*, 109: 55-69.

Slater, J.A. 1964. *A Catalogue of the Lygaeidae of the World*. Vol. I. University of Connecticut, Storrs, CT.

Slater, J.A. 1972. The Oxycareninae of South Africa (Hemiptera: Lygaeidae). *University of Connecticut Occasional Papers, Biology Science* Series, 2(7): 59-103.

Slater, J.A. and M.H. Sweet. 1970. Two new species of ant-mimetic Lygaeidae from South Africa (Hemiptera: Heteroptera). *Journal of the Kansas Entomological Society*, 43(2): 221-237.

Smith, T.R. and J. Brambila. 2008. A major pest of cotton, *Oxycarenus hyalinipennis* (Heteroptera: Oxycarenidae) in the Bahamas. *Florida Entomologist*, 91(3): 479-482.

Sweet, M.H. II. 2000. Seed and chinch bugs (Lygaeoidea). (pp. 143-264). In: Schaefer, C.W. and A.R. Panizzi (Eds.). *Heteroptera of Economic Importance*. CRC Press, Boca Raton, FL.

Torre-Bueno, J.R. de la. 1924. On a few Heteroptera from Massachusetts. *Bulletin of the Brooklyn Entomological Society*, 14(1): 48-51.

Torre-Bueno, J.R. de la. 1925. Methods of collecting, mounting and preserving Hemiptera [continued from p. 10]. *Canadian Entomologist*, 57(2): 27-32.

Torre-Bueno, J.R. de la. 1946. A synopsis of the Hemiptera–Heteroptera of America north of Mexico. Part III. Family XI—*Entomologica Americana*, 26(1): 1-141.

Uhler, P.R. 1904. List of Hemiptera–Heteroptera of Las Vegas Hot Springs, New Mexico, collected by Messrs. E. A. Schwarz and Herbert S. Barber. *Proceedings of the United States National Museum*, 27(1360): 349-364.

USDA (United States Department of Agriculture). 1962-1966. A lygaeid (*Crophius scabrosus*). *Cooperative Economic Insect Report* 12(26): 685, 704, 1962; 13(30): 868, 1963; 15(30): 831, 1965; 16(31): 758, 1966.

USDA NRCS (United States Department of Agriculture Natural Resources Conservation Service). 2017. The Plants Database (http://plants.usda.gov). National Plant Data Team, Greensboro, NC. Accessed 10 April 2017.

Van Duzee, E.P. 1894. A list of the Hemiptera of Buffalo and vicinity. *Bulletin of the Buffalo Society of Natural Sciences*, 5(4): 167-204.

Van Duzee, E.P. 1910 (1909). Monograph of genus *Crophius* Stal [sic]. *Bulletin of the Buffalo Society of Natural Sciences*, 9(3): 389-398.

Van Duzee, E.P. 1914. A preliminary list of the Hemiptera of San Diego County, California. *Transactions of the San Diego Society of Natural History*, 2(1): 1-57.

Wheeler, A.G, Jr. 2004. *Crophius disconotus* (Say) (Hemiptera: Lygaeoidea: Oxycarenidae): southeastern extension of the U.S. range, with rectification of an old Alabama record. *Proceedings of the Entomological Society of Washington*, 106(3): 725-727.

Wheeler, A.G, Jr. 2005. *Blissus minutus* (Blatchley) and *Toonglasa umbrata* (Distant): seldom-collected native chinch bugs (Hemiptera: Lygaeoidea: Blissidae) as colonists of the African bunchgrass *Eragrostis curvula*, and their association with other grasses in the southern United States. *Proceedings of the Entomological Society of Washington*, 107(2): 336-345.

Wheeler, A.G, Jr. 2015. Rocky Mountain juniper (*Juniperus scopulorum*; Cupressaceae) as a host plant of *Banasa tumidifrons* Thomas and Yonke (Hemiptera: Pentatomidae) in the western United States. *Proceedings of the Entomological Society of Washington*, 117(3): 400-406.

Wheeler, A.G, Jr. 2017. Myodochine seed bugs (Hemiptera: Rhyparochromidae) from crowns of an African bunchgrass, *Eragrostis curvula* (Poaceae), native grasses, and other tussock-forming graminoids (Cyperaceae, Juncaceae) in the southern United States. *Proceedings of the Entomological Society of Washington*, 119(1): 130-141.

Wheeler, A.G., Jr. and T.J. Henry. 2015. First North American record of the Palearctic *Microplax albofasciata* (Costa) (Hemiptera: Lygaeidae: Oxycarenidae). *Proceedings of the Entomological Society of Washington*, 117(1): 55-61.

Wheeler, A.G., Jr. and E.R. Hoebeke. 2013 (2012). *Metopoplax ditomoides* (Costa) (Hemiptera: Lygaeoidea: Oxycarenidae): first Canadian record of a Palearctic seed bug. *Journal of the Entomological Society of British Columbia*, 109: 70-71.

Wheeler, W.H., J. Hunt and E.P. Reagan (Compilers). 1950. List of intercepted pests, 1948. *United States Department of Agriculture, Bureau of Entomology and Plant Quarantine*. U.S. Government Printing Office, Washington, DC.

Wheeler, W.H., J. Hunt and P.X. Peltier (Compilers). 1951. List of intercepted pests, 1949. *United States Department of Agriculture, Bureau of Entomology and Plant Quarantine*. U.S. Government Printing Office, Washington, DC.

Wheeler, W.H., J. Hunt and P.X. Peltier (Compilers). 1952. List of intercepted pests, 1950. *United States Department of Agriculture, Bureau of Entomology and Plant Quarantine*. U.S. Government Printing Office, Washington, DC.

Recibido: 30 de mayo 2017
Aceptado: 16 de junio 2017

Wilson, S.W. and A.G. Wheeler, Jr. 2005. An African grass, *Eragrostis curvula* (Poaceae), planted in the southern United States recruits rarely collected native planthoppers (Hemiptera: Fulgoroidea: Dictyopharidae, Fulgoridae). *Journal of the New York Entomological Society*, 113(3-4): 174-204.

Woodward, T.E. 1984. The plant-sucking bug *Oxycarenus arctatus* (Walker) (Hemiptera: Lygaeidae) developing in cattle dung in drought and post-drought conditions. *Journal of the Australian Entomological Society*, 23(2): 147-148.

Figures 1, 2. *Crophius scabrosus* on *Juniperus virginiana* in western Nebraska, USA, May 2017.