NORTHERN RANGE EXTENSION OF THE FIGEATER BEETLE, *COTINIS MUTABILIS* (SCARABAEIDAE: CETONIINAE), INTO NEVADA, UTAH, AND COLORADO

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ABSTRACT.—The native Figeater Beetle, *Cotinis mutabilis* (Coleoptera: Scarabaeidae: Cetoniinae), is known to occur from Texas, New Mexico, Arizona, and California to northern South America. Here we present records from Nevada, where it became established in the late 1960s; from Utah, where it has been found since the late 2000s; and from Colorado, where it was found in 2012. These records indicate a recent northward range extension of the species, which circumvents the Colorado Plateau. The range extension of *C. mutabilis* has potential positive effects, namely the addition of a new pollinator to those areas, but also potential negative implications if the species damages fruit crops or facilitates damage by the Japanese Beetle, as the closely related *Cotinis nitida* does.

RESUMEN.—El Escarabajo verde de junio o Pipiol Autóctono, *Cotinis mutabilis* (Coleoptera: Scarabaeidae: Cetoniinae) se distribuye desde Texas, New México, Arizona y California hasta el norte de Sudamérica. Aquí presentamos los registros de Nevada, donde se estableció a finales de los 60s; de Utah, donde se encuentra desde finales de los 2000s; y de Colorado, donde fue descubierto en el año 2012. Estos datos indican un reciente aumento del rango de distribución de la especie hacia el norte, eludiendo la meseta de Colorado. La extensión del rango de *C. mutabilis* tiene posibles efectos positivos, concretamente al agregar un nuevo polinizador a esas áreas, y también posibles consecuencias negativas, en caso de que la especie dañe los cultivos de frutas o facilite el daño causado por el escarabajo Japonés, al igual que hace su semejante, *Cotinis nitida*.

With a warming climate and the continued increase of both anthropogenic transport opportunities and man-made habitats in otherwise unsuitable areas, species have recently had ample opportunities to alter their distributional ranges (Chen et al. 2011, Fridley 2011) and establish themselves in new places, often in unprecedented numbers as seen in exotic pest species. Results from Bebbert et al. (2013) suggest that from 1960, the ranges of hundreds of pest species and pathogens have shifted polewards. The northward movements of pests and pathogens were faster than the movements of wild species not associated with crops or other man-made habitats, indicating that both warming and disturbance work synergistically to enable—indeed, even to accelerate—range extensions.

The figeater beetle (fig beetle, or western green June beetle), *Cotinis mutabilis* (Gory and Percheron, 1833), might be extending its range in this fashion. This 3 cm long beetle is dark

green with a lighter elytral margin (Fig. 1) and is known to occur from Texas, New Mexico, Arizona, and California, and south to northern South America (Fig. 2; Goodrich 1966). A conspicuous diurnal flower chafer, the adult is associated with fruit trees and orchards, while its larvae live in or under mulch, compost piles, composting manure, or haystack bottoms (Nichol 1935; W.B. Warner personal communication). Both larval and adult habitats are thus clearly enhanced by human agricultural activities. The figeater beetle looks similar to the green June beetle, *Cotinis nitida* (Linnaeus, 1758); the latter is a serious pest species of fruit in the southeastern United States and is distributed westward to Nebraska (Lesoin 2011), Kansas, Oklahoma, and Texas (Goodrich 1966). Recently, sightings and specimens of *Cotinis mutabilis* from Nevada, Utah, and Colorado came to our attention, 3 states from which there were previously no published records for the genus.

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Fig. 1. *Cotinis mutabilis*, Utah, Washington County, Saint George, Seegmiller Marsh, 4.x.2009. Photo: P. Wheeler.

MATERIAL

Specimens of *Cotinis mutabilis* from the following collections were examined:

CSUC: C.P. Gillette Museum of Arthropod Diversity, Colorado State University, Fort Collins, CO 80523-1177, USA.

DMNS: Denver Museum of Nature & Science, 2001 Colorado Blvd., Denver, CO 80205-5798, USA.

JJRC: private collection of Jeffrey Johns Roberts, 21900 County Road 196, Nathrop, CO 81236-9201, USA.

NVDA: Nevada Department of Agriculture, 405 South 21st Street, Sparks, NV 89431, USA.

NEW STATE RECORDS

Nevada

(first recorded in 1967)

Clark Co.: Henderson, 1238 Sonatina Drive, 35°59'02"N, 115°05'41"W, alt. 772 m, 26.iv.2004, leg. T. Beach (no voucher, NVDA# 04E11-26). -Henderson, 205 Kola Street, 36°02'31"N, 114°57'58"W, alt. 707 m, 25.vii.2002,

leg. R. Secora (no voucher, NVDA# 02H6-20).

-Clark County Wetlands Park, Las Vegas Wash, 36°05'17.4"N, 114°58'59.3"W, alt. 469 m, 5.ix.2013, feeding on *Baccharis salicifolia* (Asteraceae), vid. J. Eckberg (photo record).

-Las Vegas, Spring Valley, 6384 Tanager Way, 36°07'17"N, 115°13'53"W, alt. 705 m, dead near peach tree, vii.2008, vid. K.-M. Adkins (sighting, no photo or specimen).

-Las Vegas, 2100 Santiago Street, 36°08'48"N, 115°08'38"W, alt. 615 m, 21.vii.1993, leg. M. Carderman (no voucher, NVDA# 93G22-1).

-Las Vegas, 1313 S 15 Street, 36°09'16"N, 115°07'58"W, alt. 606 m, 2.ix.1992, leg. M. Runn (det. R.C. Bechtel, no voucher, NVDA# 92/21-1).

-Las Vegas, Spring Valley, 2915 Ashby Avenue, 36°09'24"N, 115°10'51"W, alt. 639 m, 2.x.1967, leg. D.F. Zoller (1 spm., det. R.C. Bechtel 1967, NVDA# 67J12-4).

-Las Vegas, 2525 Pinto Lane, 36°09'51"N, 115°10'35"W, alt. 636 m, 31.vii.1969, leg. A.G. Williams (1 spm., det. R.C. Bechtel, NVDA# 69H1-5).

-Las Vegas, 202 Rose Street, 36°09'56"N, 115°10'02"W, alt.

628 m, 20.iv.1970, leg. D.F. Zoller (1 spm., det. R.C. Bechtel, NVDA# 70I28-2). -Las Vegas, Sunrise, 463 Wilshire Boulevard, 36°10'03"N, 115°01'30"W, alt. 562 m, leg. E. Shults (det. R.C. Bechtel, no voucher, NVDA# 87H21-1). -Las Vegas, 6112 Granada Circle, 36°10'43"N, 115°13'29"W, alt. 702 m, 20.vii.2001 (no voucher, NVDA# 01G31-10). -Las Vegas, Centennial, 1100 Ironwood Drive, 36°11'01"N, 115°11'34"W, alt. 661 m, 17.iv.1970 (1 spm., det. R.C. Bechtel, NVDA# 70I28-1). -Las Vegas, Summerlin, 3506 N. Campbell Road, 36°13'27.6"N, 115°17'33.3"W, alt. 765 m, dead, 9.ix.2013, leg. E. Barrett-Drew (1 ♂, DMNS). -North Las Vegas, 6207 Shadow Oak Drive, 36°16'23.9"N, 115°09'51.4"W, alt. 653 m, 21.viii.2012, vid. J. Eckberg (photo record). -Las Vegas, without further specification, 5.vii.1973 and 29.vii.1973, leg. D. Zoller (2 spm., NVDA).

Utah

(first recorded in 2009)

Washington Co.: Saint George, east of the bridge where River Road crosses the Virgin River, 37°05'13"N, 113°33'01"W, alt. 778 m, summer of 2008 or 2009, vid. P. Wheeler (photo record). -Saint George, Seegmiller Marsh, 37°05'20"N, 113°32'11"W, alt. 789 m, 4.x.2009, vid. P. Wheeler, photo record (Fig. 1). -Washington City, N 300 E at cemetery, 37°07'56"N, 113°30'17"W, alt. 867 m, flying east into the cemetery, 24.vii.2013, vid. P. Wheeler (sighting, no photo or specimen). -Lytle Ranch, 37°08'24"N, 114°01'24"W, alt. 844 m, vid. P. Wheeler (photo record). -Between Washington and Hurricane, willow/tamarisk habitat along Virgin River, near Barry Springs, 37°09'55.0"N, 113°23'09.3"W, alt. 842 m, 2.x.2013, freshly dead on shore, leg. K. Wheeler (1 ♂, DMNS). -Hurricane, 60 W 600 N, 37°11'09"N, 113°17'22"W, alt. 1013 m, vii./viii.2010, vid. P. Wheeler (sighting, no photo or specimen). -Hurricane, 670 N 200 W, 37°11'11"N, 113°17'30"W, alt. 1019 m, backyard, across from the city ball fields, 28.viii.2013, vid. P. Wheeler (sighting, no photo or specimen). -Hurricane, 802 N 300 S, 37°11'18"N, 113°17'35"W, alt. 1027 m, x.2011, dead in yard, leg. D. Trevino (1 spm.; CSUC).

Colorado

(first recorded in 2012)

Pueblo Co.: Pueblo [ca. 38°15'N, 104°37'W, alt. 1420–1480 m], 15.ix.2012, on roadside, leg. J. Roberts (1 spm., JJRC).

Oklahoma

(*Cotinis mutabilis* yet to be confirmed)

Records of *Cotinis mutabilis* from Oklahoma existed in several databases. However, those specimens, collected at Broken Arrow, Wagoner Co. (Texas AM University, College Station, TX; E. Riley, personal communication, 2013); Weatherford, Custer Co. (Museum of Southwestern Biology, Albuquerque, NM); and Latimer County (Sam Noble Oklahoma Museum of Natural History, Norman, OK) were examined and determined to be *Cotinis nitida*. *Cotinis mutabilis* is not unlikely to occur in southern Oklahoma, but we have yet to see a verified specimen from this state.

DISCUSSION

Distribution and Range Extension

(Fig. 2)

In the United States, *Cotinis mutabilis* has long been known from Texas to Arizona, possibly being more common in the southern part of this area because Wickham (1896) did not record it from the northern parts of New Mexico and Arizona; neither did Nichol (1935), who states its distribution in Arizona to be limited to the Gila River drainage and a small area around Skull Valley and Date Creek (Yavapai Co.). The occurrence of *C. mutabilis* in southern California was originally assumed to be due to an invasion in the 1930s (McKenzie 1934, Mackie 1935)—a plausible scenario given Nichol's (1935) statement that the species had not been found west of the Colorado River. In his more recent checklist, Fagerlund (2000) indicated the species' occurrence in south central, central, but also north central New Mexico, a mere 150 km from Pueblo, where the Colorado specimen was collected. Since Fall and Cockerell (1907) had not mentioned *C. mutabilis* from north central New Mexico, but only from the southwestern, central, and eastern areas of the state, the species might have moved northwards in this region in the 20th century. *Cotinus mutabilis* has frequently been recorded from Texas, but not from Oklahoma (Goodrich 1966).

Currently the figeater beetle is distributed from northern South America (Goodrich 1966) to California, Arizona, and Texas. Its range skirts the southern margin of the Colorado Plateau, wrapping around it in the west into southwestern Utah and southern Nevada and

Fig. 2. Previous and current distribution of *Cotinis mutabilis*. Arrows with years indicate approximate time and direction of range extensions. Map: J. Eckberg.

in the east into north central New Mexico and potentially southeastern Colorado. Similar distribution patterns that circumvent the Colorado Plateau have been found in species of several insect groups, including tiger beetles (Stevens and Huber 2003), aquatic and semi-aquatic Heteroptera (Stevens and Polhemus 2008), and Odonata (Stevens and Bailowitz 2009). The Grand Canyon ecoregion is a barrier for some species of the vertebrate and invertebrate groups studied in this respect (Stevens 2012). The lack of old records from Nevada, Utah, and Colorado indicates that the species is extending its range northwards as it presumably did westward 80 years ago in California.

Ecological Importance of Range Extension

Prior to anthropogenic cultivation in the southwestern United States, *Cotinis mutabilis* fed on and likely pollinated prickly pear cactus,

especially *Opuntia engelmannii* Salm-Dyck ex Engelm., throughout its range (Nichol 1935). Rare or occasional observations of *C. mutabilis* on other native plants have been recorded throughout its known range: desert broom (*Baccharis sarothroides* Gray) in southeast Arizona (Meyer et al. 1979), broom snakeweed (*Gutierrezia sarothrae* (Pursh) Britt. & Rusby [= *Xanthocephalum sarothrae*]) in West Texas (Foster et al. 1981), and seep willow (*Baccharis salicifolia* Ruiz & Pav.) in southern Nevada (reported here). Perhaps *C. mutabilis* will benefit plant species in its new range, as populations of native pollinators are in decline (Potts et al. 2010).

Economic Risks of a Range Extension

Currently, *Cotinis mutabilis* (= *Cotinis texana*) is not considered a pest species (Pontasch 2009). As early as 1898, however, it was occasionally reported as harmful to fruit, destroying

apples, peaches, apricots, figs, and grapes in Arizona (Wickham 1898, Morrill 1913, O'Dell 1929, Lebert 1931) and peaches, plums, figs, apricots, grapes, and tomatoes in the San Joaquin Valley and southern California (Bentley and Bowen 1980). Although figeater beetles are unable to penetrate a fruit's skin with their mandibles, they are capable of puncturing the skin with their clypeal horn and then raising a flap of skin to access the flesh (Nichol 1935, Bentley and Bowen 1980).

Hammons et al. (2009) demonstrated that Japanese beetles (*Popillia japonica* Newm.) inadvertently allow the green June beetle (*Cotinis nitida*) to cause greater fruit damage, as the biting of ripening fruit by Japanese beetles makes the fruits much more accessible to *C. nitida*. It is likely that the figeater beetle (*Cotinis mutabilis*) also prefers predamaged, and hence more easily accessible fruit. With Japanese beetles being established (Colorado) or having been present in all 3 states now invaded by *C. mutabilis* (Anonymous 1997, Hodgson et al. 2010, Krell 2010), an economically detrimental synergistic interaction between the 2 species might be experienced in those states in the future.

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