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## Redescription of *Crassomicrodus fulvescens* (Cresson) (Hymenoptera: Braconidae: Agathidinae), with new distributional data and revised taxonomic status

JOSÉ ISAAC FIGUEROA<sup>1</sup>, MICHAEL J. SHARKEY<sup>2</sup>, JESÚS ROMERO NÁPOLES<sup>3</sup>,  
VICTOR LÓPEZ-MARTÍNEZ<sup>4</sup>, JOSÉ ANTONIO SÁNCHEZ GARCÍA<sup>5</sup>,  
ANA MABEL MARTÍNEZ<sup>1</sup>, & SAMUEL PINEDA<sup>1</sup>

<sup>1</sup>Instituto de Investigaciones Agropecuarias y Forestales, Universidad Michoacana de San Nicolás de Hidalgo, Km. 9.5 carretera Morelia-Zinapécuaro, Tarímbaro, Michoacán, 58880, México. E-mail: figueroaji@yahoo.com.mx

<sup>2</sup>Department of Entomology, University of Kentucky, S-225 Ag. Science Center North, Lexington, Kentucky 40546-0091, USA

<sup>3</sup>Instituto de Fitosanidad, Colegio de Postgraduados, Km. 36.5 Carretera Mex-Texcoco, Montecillo Edo. de México, 56230, México

<sup>4</sup>Facultad de Ciencias Agropecuarias, Universidad Autónoma del Estado de Morelos, Av. Universidad 1001, Col. Chamilpa, Cuernavaca, Morelos, C.P. 62210, México

<sup>5</sup>CIIDIR-IPN-Unidad Oaxaca, Área de Control biológico, Hornos #1003, Santa Cruz Xoxocotlán, Oaxaca, C.P. 71230, México

### Abstract

A detailed description of the adult of *Crassomicrodus fulvescens* (Cresson) is provided along with illustrations. New distributional data in the USA and Mexico are presented, and the first records from Canada are reported. *Microdus medius* Cresson is found to be a junior subjective synonym of *M. fulvescens*. *Autographa californica* (Speyer) is reported as a possible host for *C. fulvescens* based exclusively on label data.

**Key words:** Nearctic, new synonym, New World, parasitoid, taxonomy

### Introduction

*Crassomicrodus fulvescens* (Cresson) is a member of the subfamily Agathidinae and was described by Cresson (1865) as *Microdus fulvescens*. Ashmead (1900) used it as the type species of *Crassomicrodus*. Muesebeck (1927) distinguished it from other members of the genus by its uniformly honey-yellow color, gena distinctly bulging, and relatively short inner hind tibial spur, which is half as long as the basitarsus. The original description of *C. fulvescens* was based on one female specimen collected in Colorado (Cresson 1865). Since then the only new distributional data from USA were reported by Muesebeck (1927), Muesebeck *et al.* (1951), and Marsh (1979), who reported it from Arizona, California, Colorado, Idaho, Kansas, New Mexico, New York, Oregon, Texas, and Washington. The only previous record of *C. fulvescens* from Mexico was given by Marsh (1979), but he did not provide more detailed distributional information.

Cresson (1865) described *M. medius* based on one male specimen. Muesebeck (1927) revised *Crassomicrodus* and transferred four species from *Microdus*, including *M. medius*. He continued to treat *C. fulvescens* and *C. medius* as distinct species but mentioned that all specimens of *C. medius* were males and that *C. fulvescens* and *C. medius* are similar.

The objectives of this paper are to synonymize *C. fulvescens* and *C. medius*, add new distributional information, and report a possible new host record for *C. fulvescens*.

## Material and methods

Our redescription is based on specimens previously determined as *C. fulvescens* and *C. medius* borrowed from the Academy of Natural Sciences, Philadelphia, Pennsylvania (ANSP) and the Smithsonian Institution National Museum of Natural History, Washington, DC (USNM). We determined additional material from the following institutions: American Entomological Institute Collection, Gainesville, Florida (AEIC); American Museum of Natural History, New York, New York (AMNH); ANSP; California Academy of Sciences, San Francisco (CAS); Universidad Autónoma de Nuevo León, México (CIBE-UANL); Canadian National Collection, Ottawa, Ontario (CNC); Essig Museum of Entomology, University of California, Berkeley (EMEC); University of Wyoming, Laramie (ESUW); Florida State Collection of Arthropods, Gainesville (FSCA); Hymenoptera Institute Insect Collection, University of Kentucky, Lexington (HIIC); Kansas State University Collection, Manhattan (KSUC); Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts (MCZ); Michigan State University Collection, East Lansing (MSUC); Texas A&M University, College Station (TAMU); The Bohart Museum of Entomology, University of California, Davis (UCDC); University of Colorado Museum, Boulder (UCMC); University of California, Riverside (UCR); University of Minnesota, St. Paul (UMSP); and USNM. We examined the holotypes of the two nominal species described by Cresson and compared them to the original descriptions and the descriptions of Muesebeck (1927). Collection data for holotypes are presented exactly as they appear on labels. Collection data for other specimens examined are presented in a standardized format organized by country and state. Measurement data are based on the analysis of 10 specimens for both female and male. Measurements were taken using a micrometer adapted to an Iroscope microscope and are given in millimeters. Morphological terminology follows Sharkey and Wharton (1997) and Sharkey (2006); microsculpture terms are from Eady (1968). Photographs were taken using a Leica MZ 16 stereoscope equipped with JVC KY-F75 3CCD digital camera and were prepared using an Auto-Montage® imaging system. The illustrations were prepared using Adobe Illustrator 10.0.3. The possible record of *C. fulvescens* from *Autographa californica* (Speyer) is based on label data from a female specimen in the USNM. Host remains are not associated with the specimen.

## Description

### *Crassomicrodus fulvescens* (Cresson 1865)

(Fig. 1a–f)

*Microdus fulvescens* Cresson 1865: 297 [Examined].

*Microdus medius* Cresson 1865: 298 [Examined]. **New synonymy.**

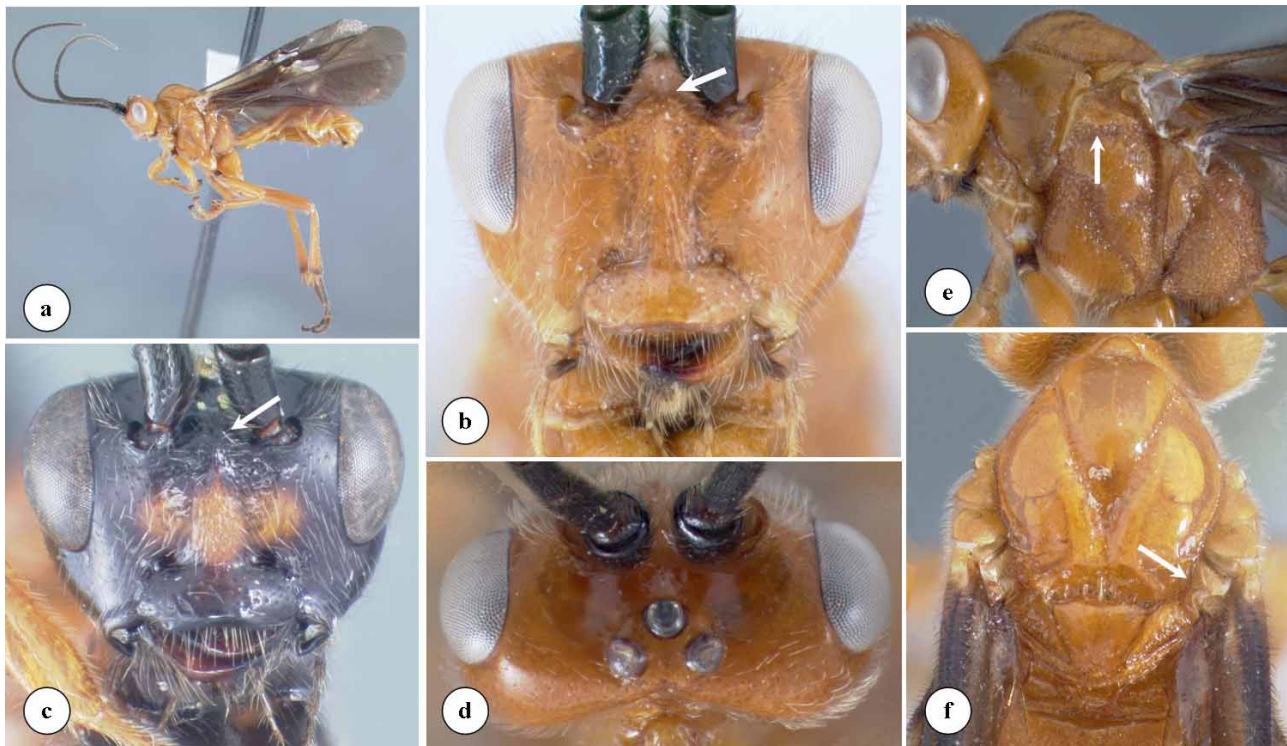
**Holotype:** Female. Col. No. 1727.1 (ANSP). Holotype of *M. medius*: Male. Col. No. 1725 (ANSP).

**Description:** Female.

**Color:** Integument yellowish orange except eye silver (Fig. 1a, b) or blackish, ocelli translucent yellow (Fig. 1d); antenna black; apical area of hind tibia and tarsomeres blackish, sometimes apical area of middle tibia, tarsomeres and/or trochanter blackish; wing veins dark brown; forewing infumate with large hyaline spot in first submarginal and second discal cells.

**Head:** Transverse in frontal view; face with weak longitudinal ridge dorsomesally; eye height/width = 1.48–1.55; eye height (lateral view) 0.59–0.61X inter-ocular distance (anterior view); pyramidal-shaped raised surface between antennae with two weakly defined tubercles (Fig. 1b, c); frons deeply excavated; posterior area of antennal sockets smooth (Fig. 1d); groove between lateral ocelli smooth; median ocellus separated from lateral ocellus by smooth groove; gena distinctly bulging (Fig. 1b, c); malar space (anterolateral view) 0.55–0.65X longer than eye height; clypeus (anterior view) 2.44–2.67X wider than high; length of ven-

trolateral margin of clypeus similar to diameter of tentorial pit; antenna with 34–37 flagellomeres; setae at base of mandible distinctly longer than setae on rest of body surface. **Mesosoma:** Pronotum smooth (Fig. 1e); lateral pronotal margins with superficially crenulate groove; notauli impressed; anterolateral edges of scutellum lacking small acute projection (Fig. 1f); scutellar disc convex with sparse setae from 0.08–0.09 mm in length; scutellar disc sloped posteriorly and rounded; lateral scutellar depression rugose and foveolate (Fig. 1f); carinae of central metanotal area almost circular shaped; propodeum reticulate rugose; subalar lobe separated from mesopleuron by narrow rugulose groove, with rugosities posteriorly (Fig. 1e); metapleuron reticulate-rugose. **Legs:** inner spur of middle tibia 0.54–0.58X length of basitarsus; inner spur of hind tibia 0.48–0.54X length of basitarsus; metabasitarsus 1.10–1.24X length of tarsomeres III, IV, and V combined; hind tibia 2.17–2.38X longer than basitarsus; hind femur length 3.70–4.00X its maximum width. **Wings:** forewing length/width = 2.61–2.72; stigma 3.38–3.85X longer than maximum width; forewing vein R1 0.56–0.66X as long as vein RS; vein RS not sinuate; vein r arising beyond middle of stigma; second submarginal cell triangular, with petiole 0.13–0.24 mm long; vein M+CU distinctly pigmented throughout; hind wing length/width = 3.46–3.56; hind wing vein 1M 1.47–1.71X longer than 1r-m; hind wing with 5–7 hamuli. **Metasoma:** Apical width of petiole (tergum 1) 2.73–2.97X wider than basal width (dorsal view); minimum width of petiole 0.61–0.62X apical width (dorsal view); length of ovipositor sheath 0.24–0.33 mm.



**FIGURE 1.** *Crassomicrodus fulvescens*. a. female habitus; b. female: anterior view of head, arrow indicates ridge between antennae; c. male: anterior view of head, arrow indicates ridge between antennae; d. female: dorsal view of head; e. female: lateral view of mesosoma, arrow indicates narrow and rugulose groove; f. female: dorsal view of mesosoma, arrow indicates anterolateral edge of scutellum.

**Body length:** 6.35–8.05 mm.

**Male:** Similar to female except color as follows: integument black except medial area of mandible, pronotum, mesonotum, subalar lobe, tegula, metasoma, femora, tibia, and tarsomeres yellowish orange. Apical area of hind tibia and all hind tarsomeres sometimes blackish.

**Host:** The alfalfa looper, *Autographa californica* (Speyer) (Lepidoptera: Noctuidae), is reported as a possible host for *C. fulvescens* based exclusively on label data from a female specimen in the USNM from Walla



Walla, Washington. However, isolated rearings are necessary to verify *A. californica* as a host since host remains are not associated with the specimen. *Autographa californica* is distributed throughout the United States and parts of Canada. Larval host plants include pea, sugarbeet, alfalfa, bean, mint, and spinach (Berry 1998).

**Specimens examined:** Holotype ♀ *M. fulvescens*: Col. (ANSP). Holotype ♂ *M. medius*: Col. (ANSP). *Other specimens examined:* **CANADA, British Columbia:** Osoyoos: 1 ♀ 4 ♂ 21/VII/1953, McGillis J.R. (1 ♀ 3 ♂ CNC, 1 ♂ HIIC); 1 ♂ 22/VII/1953, McGillis J.R. (CNC); 4 ♂ (1 homotype) 25/VIII/1953, Martin J.E.H. (3 CNC, 1 HIIC); 1 ♀ 3 ♂ 27/VII/1953, Martin J.E.H. (1 ♀ 2 ♂ CNC, 1 ♂ HIIC). **MEXICO, Chihuahua:** Boquilla, 1 ♀ 23/VII/1987, González A. (CIBE-UANL). **Coahuila:** 39 km S Agua Nueva, 1 ♂ 20/X/1994, 1770 m., Mercado I., 24.53.21 N 101.04.63 W (TAMU). **Sonora:** Minas Nuevas, 1 ♂ 7/VIII/1952, Vaurie C. & Vaurie P. (AMNH). **Zacatecas:** 9 miles S Fresnillo, 2 ♀ 9/VII/1954, Linsley E.G, MacSwain J.W. & Smith R.F. (EMEC, USNM). **USA:** Ckll, 1 ♂ 4523, 1926; 1 ♀ [no date]; 1 ♀ 17/VII/1877, Greeley; Pasco, 4 ♂ 26/V/1894, Piper C.V. (1 AEIC, 3 USNM). **Arizona:** Cochise Co.: Portal, 1 ♀ 2–12/IX/1976, Van der Vecht J. (AEIC). 2 miles E Portal, 1 ♀ 25/VIII/1966, Gertsch W.J.; 2 miles NE Portal, 1 ♂ 1/IX/1960, Cazier & Feight; 2.5 miles NE Portal, 1 ♂ 26/VIII/1959, Statham M.; Skeleton Cyn., Peloncillo Mountains, 1 ♀ 4/V/1966, Rozen & Favreau (AMNH). 1.5 miles W St. David, 1 ♀ 3/IX/1961, Hurd P.D. (EMEC). Chiricahua Mountains, Portal: 1 ♀ 1 ♂ 15/VIII/1958, Bohart R.M.; 1 ♀ 6/VIII/1958, James R.H.; Portal: 1 ♀ 16/VIII/1958, Marsh P.M.; 3 ♀ 1 ♂ 16/VIII/1958, Moore C.G.; 1 ♀ 5/VIII/1958, Bohart R.M.; 85 miles W Tombstone, 1 ♂ 1/VIII/1966, Kovacic C.R.; San Simon, 1 ♂ 13/VIII/1981, Bohart R.M.; Willcox, 1 ♀ 28/VIII/1974, Bohart R.M.; 7 miles N Tucson, Pima Co., 1 ♀ 4/IX/1968, Miller D.R. & Lauck J.E. (UCDC). Tucson, 1 ♂ 6/IX/1933, Bryant (CAS). N Sonoita, 1 ♂ 10/VIII/1959 (CNC). Continental, 1 ♀ 24/IV/1958, Butler G.D.; Portal Creek Cyn., 1 ♂ 5/VIII/1977, Masner L. (HIIC). Vernon, 1 ♀ 25/VI/1957, Butler G. & Werner F. (USNM). **Arkansas:** Willcox, 1 ♀ 1 ♂ 31/VII/1909, Fisher A.K. (USNM). **California:** Oak Glen, San Bernardino Co.: 1 ♀ 25/VII/1984, 1500 m., Wagner Robert E., Malaise trap; 4 ♀ 31-VIII/6-IX/1984, 1500 m., Wagner Robert E.; 1 ♂ 12–18/X/1984, 1500 m., Newton and Thayer (CNC). 18 miles E Camp Ozena, Ventura Co., 1 ♀ 2/VII/1965, Powell J.; Sand dunes, 1 mile S Rio Vista, Solano Co., 2 ♀ 7/VIII/1976, Whitman Doug (EMEC). Menifee Valley, Riverside Co., 1 ♀ 20/VIII/1976, Frommer S.I. & Frommer S.L., 117.12.45 N 33.39.19 W (FSCA). Reedley, Fresno Co., 2 ♀ 3 ♂ 7–10/VII (UCDC). Valley Field Station, UC Moreno, Riverside Co., 1 ♀ 10/V/1979, (UCR). Madera, Madera Co., 1 ♀ 5/X/1975, Linsley E.G., J.M. & Michelbacher A.E., M.M. (USNM). **Colorado:** La Junta, 2 ♀ 2 ♂ 12/VIII/1920, 1250 m., 37.59 N 103.31 W; Pueblo, 1 ♀ 9/VIII/1920, 1433 m., 38.10 N 104.36 W (AMNH). Baca Co., 1 ♀ VI/1939, Landburg R. (CAS). Rocky Ford, 1 ♀ 26/VI/1917, Popenoe C.H.; Estes Park, 1 ♀ (homotype) 2/VII/1961, 2286 m., Mason W.R.M. (CNC). Wray, 1 ♀ 17–19/VIII/1919, 40.0 N 102.10 W, 3,700 ft (HIIC). Colorado, 1 ♀ VII/1916, Popenoe; Hartman, 1 ♀ 14/VII/1955, Marston Norman; Hartman, 1 ♂ 21/VI/1957, Marsron N. (KSUC). Chimney, 1 ♂ (MCZ). Pueblo, 1 ♀ 11/VI/1956, Dreisbach R. & Dreisbach K. (MSUC). Inspiration, Denver, 1 ♂ 2/VII/1933, Gibbons H.I. (UCMC). Canon City, 1 ♀ ; Colorado, 2 ♀ 1 ♂ ; 0.5 miles SE Earl, 1 ♂ 23/VIII/1929, Romey V.E.; Rocky Ford: 1 ♀ 10/VII/1954, Titus E.S.G.; 4 ♂ 23VII/16VIII/1909, Marsh H.O.; 1 ♀ 26/VI/1917, Popenoe C.H.; 1 ♂ 5/IX/1909, Marsh H.O.; 1 ♂ 9/VII/1912, Marsh H.O. (USNM). **Idaho:** Montpelier, 1 ♀ 2 ♂ 6/VII/1920, 1859 m., 42.19 N 111.18 W (AMNH). 1 ♀ 2 ♂ Preston, 17/VII/1922, Van Duzee E.P. (CAS). Burley, 2 ♀ 27/VI/1932, Fox David E.; Hansen, 1 ♂ 29/VII/1932, Fox David E.; Oakley: 2 ♂ 1/VII/1927, Carter W.; 1 ♂ 14/VII/1927, Carter W.; 1 ♂ 17/VIII/1927, Carter W.; 1 ♀ 19/VI/1933, Fox David E.; 2 ♂ 25/VI/1928; 3 ♂ 29/VII/1932, Fox David E.; 1 ♂ 30/VIII/1932, Fox David E.; Paul, 1 ♀ 20/VI/1930 (USNM). **Kansas:** Seward Co., 1 ♂ 27/VI, Lantz, (KSUC). Garden City, 2 ♀ VI/1896, Menke H.; Garden City, 1 ♀ VIII/1896, Menke H. (USNM). **New Mexico:** Hatch: 1 ♂ 28/VIII/1974, Townes H. & Townes M.; 2 ♀ 1 ♂ 29/VIII/1974, Townes H. & Townes M.; 1 ♂ 30/VIII/1974, Townes H. & Townes M.; Nutt, 1 ♀ 29/VIII/1974, Townes H. & Townes M.; Rodeo, 1 ♀ 7/IX/1974, Townes H. & Townes M.; Tucumcari, 2 ♂ 13/V/1981, Dasch C. & Dasch B. (AEIC). Cubero, Valencia Co., 1 ♂ 18/VIII/1948, Vaurie C. & Vaurie P. (AMNH). Santa Fe: 1 ♂ 22/VII/1926, Van

Dyke E.C.; 1 ♀ 24/VII/1926, Van Dyke E.C. (CAS). 25 miles N Las Cruces, Dona Ana Co., 1 ♂ 24/IX/1974, Bohart G. & Hanson W. (CNC). 7 miles NE Albuquerque, Bernalillo Co., 1 ♀ 1 ♂ VII/1955 (EMEC). Oasis St. Park, Roosevelt Co., 1 ♂ 31/VIII/1971, 1250 m., Brown K.W. & Petrulis P.J. (ESUW). 2 miles NW Rodeo, Hidalgo Co., 1 ♀ 31/VIII/1960, Cazier & Feight (HIIC). 16 miles S Datil, Catron Co., 1 ♀ 16/VI/1956, Dreisbach R. & Dreisbach K.; Hoxie Jc. [Colfax Co. ], 1 ♀ 2 ♂ 12/VI/1956, Dreisbach R. & Dreisbach K.; Rotan, 1 ♀ 12/VI/1956, Dreisbach R. & Dreisbach K. (MSUC). 15 miles N Rodeo La Cienega L., Hidalgo Co., 1 ♂ 10/IX/1971, Villegas B.; Carrizozo, Lincoln Co., 1 ♀ 6/VIII/1966, Kovacic C.R.; Rodeo, Hidalgo Co.: 1 ♀ 1 ♂ 10/VIII/1958, Rice R.E.; 1 ♂ 2/VIII/1958, Rice R.E.; Tucumcari, Quay Co.: 1 ♂ 10/VII/1963, Bohart R.M.; 2 ♀ 7 ♂ 17/VIII/1967, Bohart R.M. (UCDC). 14 miles SW of Portales, nr. Boone Draw, Roosevelt Co., 4 ♀ 26/V/1972, Frommer Saul & Jorgensen N. (UCR). 0.5 miles W Springer, 1 ♀ 23/VIII/1929, Romney V.E.; 2 miles N San Jon, 1 ♂ 12/VII/1929, Romney V.E.; 16 miles S Datil, Catron Co., 1 ♂ 16/VI/1956, Dreisbach R. & Dreisbach K.; 5.7 miles W Grady, 1 ♂ 28/VI/1929, Romney V.E.; Correo, Valerica Co., 1 ♀ 15/VI/1956, Dreisbach R. & Dreisbach K.; Jemez Springs, 1 ♂ 21/VII/1929, Englehardt G.P.; Hoxie Jc. [Colfax Co. ], 1 ♀ 1 ♂ 12/VI/1956, Dreisbach R. & Dreisbach K.; Las Cruces, Cockerell 1 ♀ ; Las Cruces, 1 ♂ V/1923?, Garcia (USNM). **Oklahoma:** Forgan, 1 ♀ 1 ♂ 14/VI/1935, Brues (MCZ). **Oregon:** Hermiston, 2 ♂ 9/VII/1922, Melander A.L. (MCZ). Hermiston, 1 ♀ 10/V/1930, Scullen H.A. (USNM). **Texas:** Davis Mountains, 1 ♀ 11/VIII/1957, Arnett R.H. (CNC). 20 miles S Kent, Jeff Davis Co., 1 ♀ 15/VIII/1965, Schaffner J.C. (HIIC). Conlen, 1 ♀ 7/VIII/1952, Dreisbach R.R.; El Paso, 1 ♀ 20/VI/1909, Bishop F.C. (USNM). **Utah:** Huntsville, Ogden Co., 1 ♂ 21/VII/1922, Van Duzee E.P. (CAS). Delta, 1 ♀ 27/VI/1945, Knowlton G.F. (UMSP). **Washington:** Lind, 2 ♀ 24/VI/1919, Carlson F.W. (AEIC). Yakima, 1 ♂ 24/IV/1932, Rolfs A.R.; Walla Walla, 1 ♀ 20/VI/1980, Graham Vernon D., *Autographa californica* (Speyer) (USNM). **Wyoming:** Old Faithful Yellowstone Pk., 1 ♀ Brues C.T. (MCZ).

**Distribution.** This species has a broad western Nearctic distribution, ranging from northern Mexico to southwestern Canada and east as far as Arkansas. The species was previously known only from Arizona, California, Colorado, Idaho, Kansas, New Mexico, New York, Oregon, Texas, and Washington in the U.S., and one specimen was reported only as from Mexico (Marsh 1979).

**Discussion.** The only characters used by Muesebeck (1927), in his key and descriptions, to separate *C. fulvescens* and *C. medius* were body colors. Our careful examination of more than 192 specimens revealed that males generally correspond to the coloration of Muesebeck's concept of *C. medius* and females to *C. fulvescens*. We found no consistent morphological characters (see redescription above) to separate the two species concepts other than genitalic and secondary sexual characteristics. Many early descriptions of braconid species were based primarily or entirely on color differences (Sarmiento & Sharkey 2005), and although sometimes correct, careful studies of long series from diverse localities are needed to corroborate these concepts. Moreover, many braconid species have been shown to have a wide range of color variation (e.g., *Toxoneuron bicolor* Szépligeti) (Mercado & Wharton 2000). In the case of *C. medius* and *C. fulvescens*, we could find no morphological data to support separate species status and no females that match the color patterns of males. *Crassomicrodus medius* and *C. fulvescens* were both described in the same paper (Cresson 1865) as *Microdus*. We chose *C. fulvescens* as the senior synonym because the holotype is a female; the holotype of *C. medius* is a male. Female holotypes are the standard for most hymenopteran taxonomy.

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