NOTE

Chrysomya rufifacies (Macquart) (Diptera: Calliphoridae) in Nebraska[1]

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In the last two decades, four species of blow flies (Diptera: Calliphoridae) in the genus *Chrysomya* (originating from the Paleartic, Oriental, and Australian regions) have become established in the Western Hemisphere (Guimaraes, Prado and Linhares, 1978, Rev. Bras. Entomol. 22: 53–60; Laurence, 1981, Trans. R. Soc. Trop. Med. Hyg. 75: 130–131; Gagné, 1981, Entomol. Soc. Amer. Bull. 27: 21–22; Richard and Ahrens, 1983, Southwest. Entomol. 8: 216–218; Baumgartner and Greenberg, 1984, J. Med. Entomol. 21: 105–113; Greenberg, 1988, J. Med. Entomol. 25: 199–200; Olsen, Angold, Gross and Sidebottom, 1992, Pan-Pacific Entomol. 68: 280–281). Two species, *C. rufifacies* (Macquart) and *C. megacephala* (F.), have recently been recorded in the U.S. *Chrysomya megacephala* was observed in California (Greenberg, 1988, J. Med. Entomol. 25: 199–200; Poorbaugh, 1989, Vec. Ecol. Newsl. 20: 8–9; Bennet, 1989, Vec. Ecol. Newsl. 20: 15) and Texas (Wells, 1991, J. Med. Entomol. 28: 471–473). In 1980, *C. rufifacies* adults were collected in Texas (Gagné, Gerrish and Richard, 1982, Correspondence, Entomol. Soc. Amer. Newsl. 5: 9), and the first case of myiasis caused by this species was documented in 1982 (Richard and Gerrish, 1983, J. Med. Entomol. 20: 685). It also has been reported in the warmer areas of the U.S., such as Arizona (Baumgartner, 1986, J. Entomol. Sci. 21: 130–132), California (Dowell and Gill, 1989, Pan-Pac. Entomol. 65: 132–145; Poorbaugh, 1989, Vec. Ecol. Newsl. 20: 8–9), and Florida (Mertins, 1991, Animal Health Rep. USDA-APHIS, Winter 1991. pp. 1–2).

We collected two gravid *C. rufifacies* females by netting on 8 Aug 1996, outdoors near our laboratory (22nd and W Streets) in Lincoln, NE, while collecting flies for another study. The flies were placed, individually, into test tubes (about 14 ml) containing about 10 g of ground beef where they could oviposit. Only one of the females laid eggs. The eggs were incubated at 37° C in a microprocessor CO_2 incubator

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(Lab-Line Instruments Inc., Melrose Park, IL). The larvae emerged in less than 24 h, were transferred to a 14 × 14 cm plastic pan half-filled with ground beef, and then placed in an environmental incubator at 33° C (Harris Manufacturing Co., North Billerica, MA) until maturation (with periodic addition of fresh ground beef). Five third instars were collected for identification and verification purposes; the remainder were allowed to pupate in sawdust. Eleven days after oviposition, the adults started to emerge; all progeny were female (n = 109). *Chrysomya rufifacies* is known to produce unisexual progeny (Roy and Siddons, 1939, Parasitol. 31: 442–447). This is a monogenic trait where female-producing females are heterozygous for a dominant or epistatic female sex realizer *F* gene while male-producing females, as well as males, are homozygous for the recessive allele *f* (Ullerich, 1975, Chromosoma 50: 393–419; Ullerich, 1984, Mol. Gen. Genet. 193: 479–487).

Chrysomya rufifacies adults look similar to *Phaenicia sericata* (Meigen) adults, but the former can be easily separated by their white mesothoracic spiracle (black on *Phaenicia*), less numerous and shorter hairs on the dorsum of the abdomen, and the presence of dark bands on the abdomen. The larvae differ significantly from *Cochliomyia, Phaenicia* and *Phormia* maggots by the presence of numerous abdominal tubercles/processes, giving them a "hairy" appearance.

Chrysomya rufifacies and the very similar species, *C. albiceps* (Wiedemann) (which also has established in the Western Hemisphere, particularly in South America), are not readily distinguished from one another. Erzincliogluu (1987, Med. Vet. Entomol. 1: 121–125) separated third instars of both species by the presence/absence of short spines on the shaft of dorsal process 1. However, Tantawi and Greenberg (1993, J. Med. Entomol. 30: 646–648) observed inconsistencies in this character on flies collected from Texas and Egypt. They differentiated the third instars by the shape of the outermost ventral process and the number and distance of spines in the dorsomedial process. We used the latter characters in identifying our specimens.

The adults are usually separated by the presence of prostigmatic bristles (absent in *albiceps*) (Holdaway, 1933, Bull. Entomol. Res. 24: 549–560), but Tantawi and Greenberg (1993, J. Med. Entomol. 30: 646–648) showed this character to also be highly variable. Our specimens, which included all progeny of the single female and the other females collected later, had prostigmatic bristles and three propleural bristles. We further note that *C. albiceps* has not been recorded in the U.S. to date.

The consequence of invasion of *Chrysomya* spp., through interaction with the native blow fly fauna and its potential for causing myiasis, has been studied for several years now. Guimaraes, Prado and Buralli (1979, Rev. Bras. Entomol. 23: 245–255) observed a reduction of *Cochliomyia macellaria* (Fabricius) populations in Brazil, while Baumgartner and Greenberg (J. Med. Entomol. 21: 105–113) noticed suppression and displacement of the same species in Peru as populations of two *Chrysomya* species, *putoria* (Weidemann) and *albiceps* (Weidemann), increased. Similarly, *C. rufifacies* appears to have outcompeted the formerly abundant *C. macellaria* in Texas (Wells and Greenberg, 1992, Bull. Entomol. Res. 82: 133–137). *Chrysomya rufifacies* has been observed to adversely affect the survivorship of *C. macellaria* by increasing its mortality when reared together (Wells and Greenberg, 1992, Environ. Entomol. 21: 641–644). A comprehensive review of the biology, ecological role, medical and veterinary importance, and other potential effects of *C. rufifacies* has been presented (Baumgartner, 1993, J. Med. Entomol. 30: 338–352). It is generally considered a secondary myiasis fly and, although it is a very adaptable

insect, we doubt it has much potential for becoming a major pest of animals in Nebraska.

The appearance of *C. rufifacies* in Nebraska is not totally unexpected. Richard and Ahrens (1983, Southwest. Entomol. 8: 216–218) reported collecting a number of adults near the Texas-Oklahoma border. Baumgartner and Greenberg (1984, J. Med. Entomol. 21: 105–113) estimated its dispersal ability at 0.77–3.2 km/day based on studies of populations in South America. If these estimates are correct, then this species could have invaded northern areas of the U.S. much earlier than we report here. We were surprised to find no reports of *C. rufifacies* from states between Texas and Nebraska.

All *C. rufifacies* were collected during the month of August, and all were female. No *C. rufifacies* were collected in September and October, probably due to the decrease in temperature during these months. *Chrysomya rufifacies* is predominantly a summer species and would likely be eliminated during the winter months. Nonetheless, this is the first report that specimens have been collected this far north in the U.S., and it is interesting that we collected them near the center of a large town. This species is probably present in other central and northern states, especially during the summer, but additional collections are necessary to determine if its range is expanding and, if so, what ecological role *Chrysomya rufifacies* is playing in the termperate regions of the U.S.

Collection records

All flies were collected by netting in Lincoln (Lancaster County), NE:

8 August 1996, 2 females

13 August 1996, 1 female

23 August 1996, 5 females

27 August 1996, 2 females

Seven females and three males were collected between July 28–September 30, 1997 at the same collection site as in 1996. Only one female laid eggs and all progeny were male (n = 157).

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