Presence of a Red Morph in Adult Populations of *Mecidea minor* (Hemiptera: Pentatomidae: Pentatominae: Mecideini) in New Mexico[1]

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Abstract A red morph of adult *Mecidea minor* Ruckes (Hemiptera: Pentatomidae) is reported from New Mexico. Coloration in this morph varies from red to pink and is confined to specific areas of the body, primarily the hemelytra and pronotum. Adults are normally straw-colored. Both morphs were found throughout most of the year, but the percentage of each collected between August and December was remarkably different (red morph, 91.9%; straw-colored morph, 62.4%).

Key Words *Mecidea minor*, Pentatomidae, adult red coloration

The stink bug genus *Mecidea* Dallas is a phytophagous taxon that occurs within the subtropical and adjacent temperate regions of the world and apparently is associated with xerophytic and semixerophytic environments (Sailer 1952). It is the only genus within the Mecideini (Schuh and Slater 1995) and contains at least 17 species (Sailer 1952, Schuh and Slater 1995). Two of these, *M. major* Sailer and *M. minor* Ruckes, occur in America north of Mexico (Sailer 1952, Froeschner 1988) including New Mexico (Bundy 2004, Bundy et al. 2005).

Sailer (1952) reviewed *Mecidea* and provided a detailed description of the genus. He stated that the body is "elongate, linear, straw colored, with the punctures sometimes darkened. Color quite uniform throughout the genus." (p. 480). He further stated that the hemelytra are "pale to straw colored" but noted that the corium and clavus are "more or less regularly punctured, punctures often rufescent" (i.e., somewhat reddish) (p. 481). In his descriptions of *M. major* and *M. minor*, he implied the presence of some red coloration. For *M. major*, he stated that the head, pronotum, and scutellum are straw yellow, but that the "eyes, punctures on dorsum, and pleurites of pronotum just behind eyes, on anterior lobe of pronotum each side midline, on antenniferous tubercles and side of head before eye, and on apices of jugae (*sic*), rufescent to black." Also, the hemelytra are "pale vitreous, corium with numerous rufescent punctures," and the venter is "pale yellow with reddish tint." (p. 487). For *M. minor*, although not mentioning red coloration directly, he stated that the color in this species is "quite similar to *M. major* except on venter of abdomen."

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(p. 491). Finally, he noted (p. 482) that Jensen-Haarup (1922) had reported that *M. kristenseni*, a species he described from Eritrea based on a single female specimen, had "the inner part of corium brownish rose red." (p. 8). However, the 8 specimens of this species Sailer (1952) studied from Abyssinia did not have the brownish rose-red color (pp. 482 - 483). Therefore, Sailer's (1952) discussion of the red color in *Mecidea* was minimal, and he could not confirm Jensen-Haarup's (1922) report of red in *M. kristenseni*.

During 2003 and 2004, we found several reproducing populations of *M. minor* in the southern half of New Mexico, primarily in and around Las Cruces, feeding on various species of range grasses including Lehmann lovegrass, *Erogrostis lehmanniana* Nees; grama grasses, *Bouteloua* spp.; and tobosagrass, *Pleuraphis mutica* Buckley; and on noncultivated Bermuda grass, *Cynodon dactylon* (L.). The number of bugs and instars suggested that the populations were large enough for a life history study. Since that time, we have collected specimens, primarily weekly, for this study as well as for detailed descriptions of the immature stages. Although most adults have been straw-colored, several have had red markings. Because the presence of red coloration in *Mecidea* has been mentioned only briefly, and never specifically for *M. minor* (see summary above), we here present information about this red morph in *M. minor* including seasonal occurrence, sexual influence, and variation in color pattern and intensity.

Materials and Methods

Samples of adults from our life history study were separated into two groups: (1) those with the typical straw-colored appearance and (2) those with distinct red or pink markings or intermediate between the two extremes. These data were supplemented with similar data taken from New Mexican specimens housed in the New Mexico State University Arthropod Museum. Comparisons of the frequency of males and females with the red or straw (normal) color were made with a chi-square test of independence using contingency tables (SAS Institute 2002-2008).

Results and Discussion

A total of 616 adults was examined, including 468 straw-colored and 148 red to pink specimens (red morph) (Fig. 1A-C). The red color was confined to specific areas of the body. Of the 148 red morphs, 81 specimens (10 field, 71 museum) had red color on the corium/clavus, posterior 1/2 of the pronotum, and antennomeres 4 and 5 (occasionally 3). Of the 67 remaining specimens, 14 (3 field, 11 museum) and 17 (7 field, 10 museum) had red to pink only on the corium/clavus or pronotum, respectively; the other 36 specimens (recorded as "red") were not collected and, thus, it was impossible to accurately categorize their specific red color pattern.

Several of the red morphs also had areas of green color (2 field, 62 museum), most evident in individuals heavily pigmented with red. The extent of the green area varied from covering much of the dorsum (i.e., basal 1/2 of the scutellum, anterior 1/2 of pronotum [except for calloused areas]), legs (femora, tibia, tarsi), head (except for calloused circle adjacent to compound eyes, and ocelli) and antennomeres 1 - 3; to being represented only by faint speckling on the legs (i.e., distal ends of femora, bases of tibiae, and tarsomeres 1 and 2); green speckled legs were found only on a single straw-colored specimen.

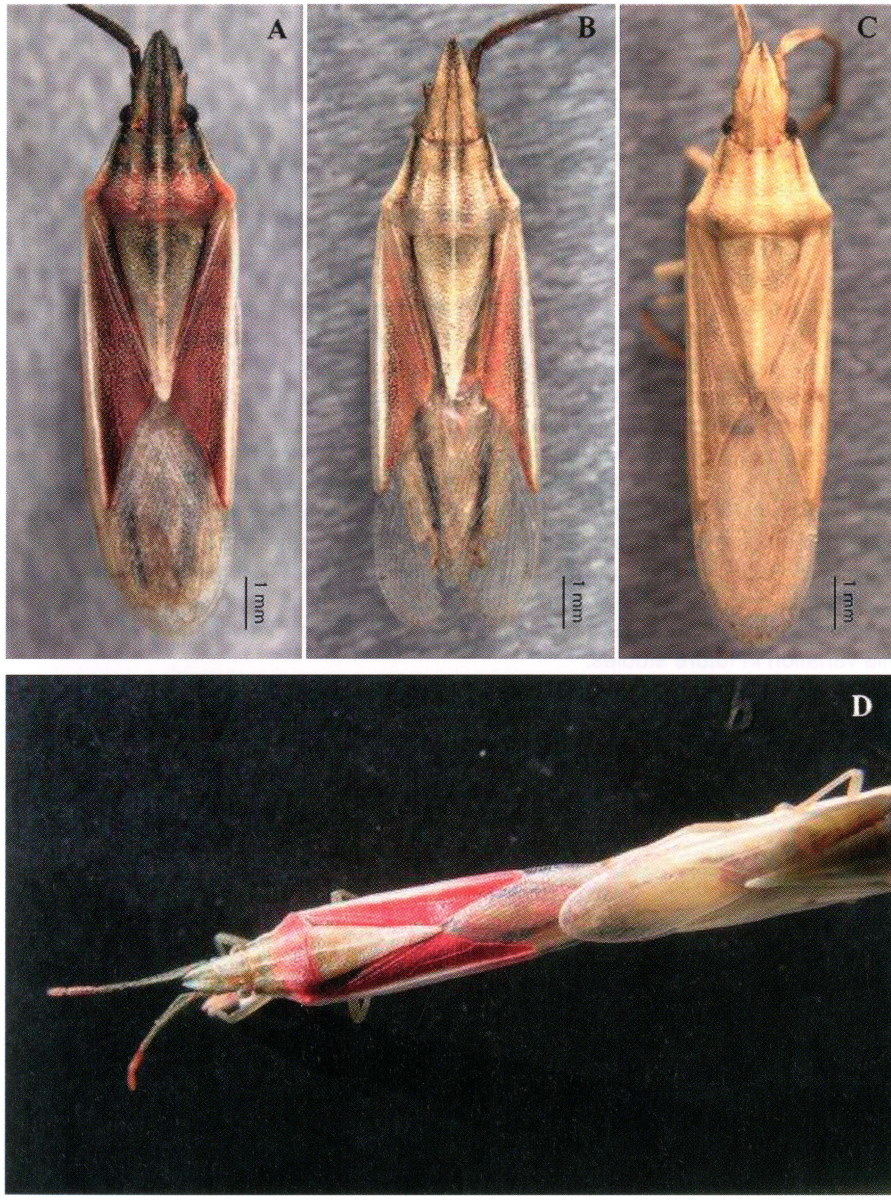

Fig. 1. Adult *Mecidea minor* showing color variation. (A) Red morph. (B) Intermediate or light red morph. (C) Straw-colored morph. (D) Red morph male mating with straw-colored female in field.

There was no difference between sexes in the frequency of individuals exhibiting red or straw color ($\chi^2 = 3.74$; df = 1; $P = 0.053$). In fact, we found red morphs

mating with straw-colored morphs (Fig. 1D). Note that in Fig. 1D, which involved living individuals, the red is even more evident than in dead specimens (Fig. 1A-C).

Both the red (n = 148) and straw-colored (n = 468) morphs were found throughout most of the year. The red morphs were found from mid-April to the third week of December with most (n = 136, 91.9%) found between early August and mid-November (Fig. 2). Straw-colored adults were found throughout the year with most (n = 290, 62.4%) between the third week of August and early December. Interestingly, the higher numbers of both color morphs followed the advent of the monsoon rains, which typically begins in early July (Fig. 2) and occurs through August (or September) (NWS 2009). The grasses usually are dormant from late November to May. Bermuda grass tends to become green earlier than lovegrass. Plant growth is most evident in July and August (or September), with subsequent drying down approximately in November; however, beginning growth dates can vary markedly depending on when the rains begin in a particular year (CSB, pers. obs.)

At this point, we do not know the significance or cause of the red color. Some possibilities are food [e.g., Knight 1922, 1924; *Perillus biocultus* (F.)], photoperiod [McPherson 1982; *Euschistus tristigmus* (Say), *Thyanta calceata* (Say)], and reproductive diapause (McPherson and McPherson 2000; *Nezara viridula* (L.)]. However, it is clear, at least from the standpoint of the human eye, that the red and straw-colored morphs are more difficult to see when the plants are more mature and lighter or younger and more green and red, respectively. We hope to investigate the cause of this variation in future studies.

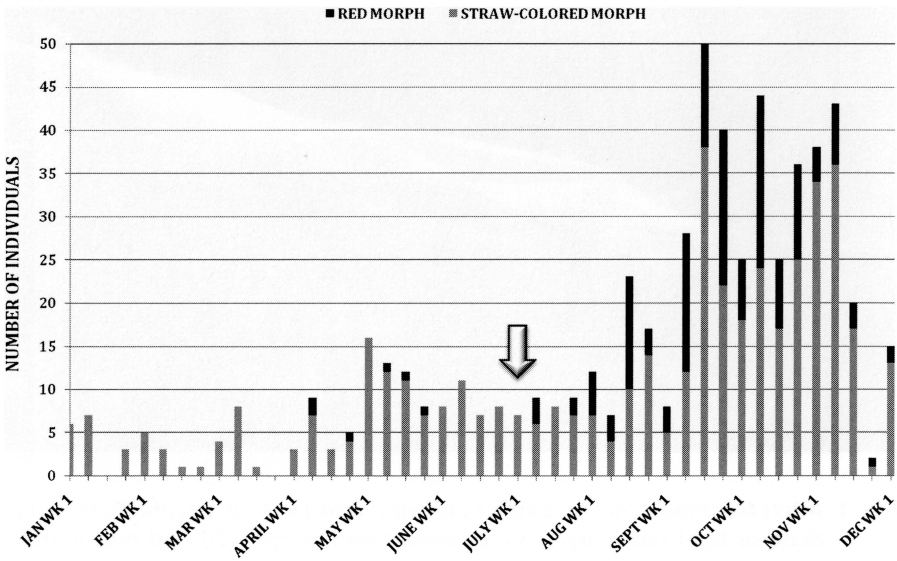

Fig. 2. Seasonal abundance of adult *Mecidea minor* red (n = 148) and straw-colored (n = 468) morphs in southern New Mexico. The arrow indicates the average start of monsoon rains.

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