

# Sexual Dimorphism and Mate Choice in the Ambush Bug (*Phymata americana*)

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## INTRODUCTION

> The ambush bug, *Phymata americana*, is a cryptic, predatory insect that can be easily found on flowers in August and September. Ambush bugs are "sit and wait" predators, capturing their insect prey with large, raptorial forelegs (Readio 1927, Balduf 1941).

Left image:  
Female ambush  
bug feeding on  
prey.



Right Image:  
Male (top) in  
guarding  
position.

> Male ambush bugs remain with a female for several hours after mating (Dodson and Marshall 1984). Extended post-copulatory mate guarding is uncommon in hemipteran insects.

> Males grasp females with their middle pair of legs during mating and sometimes repel rival males with the hind legs (McLain and Boromisa 1987), suggesting that males may compete for females.

> Females sometimes try to "shake off" males that attempt to mate, suggesting that females may engage in mate choice.

Males invest a lot of time in each mating attempt compared to most insects. Sexual selection may occur in males to:

- accentuate morphological structures that allow males to compete with other males for mating opportunities either directly or in "scramble competition" when males are searching for potential mates and/or the ability of males to identify reproductively valuable females.

> Females also invest a lot of time in each mating attempt because male mate guarding reduces the females opportunity to re-mate, and guarding may interfere with the female's ability to capture prey.

> In addition, guarding males will feed on prey captured by females possibly reducing the amount of energy available to females for survival and egg production.

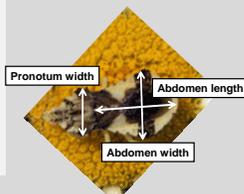
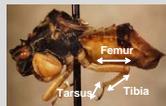
## OBJECTIVES

1. Do guarding (paired) males differ from single (unpaired) males in mass, pronotum width or melanistic pigmentation of the lateral thorax (darkness)?
2. Do guarded (paired) females differ from single (unpaired) females in mass, pronotum width, or abdomen length or abdomen width?
3. What is the degree of sexual dimorphism in ambush bugs?
4. Do ambush bugs display assortative mating?
5. Do the same patterns hold in different populations?

## METHODS

> Paired (coupled) and unpaired (single) ambush bugs were collected in abandoned fields on the inflorescences of rigid goldenrod (*S. rigida*) (Roseville, MN population-2006) or tall goldenrod (*Solidago altissima*) (North Hennepin Community College campus, NHCC population-2007) in late August.

> After determining the dry mass of each insect (0.1 mg), we measured the maximum pronotum width between the tubercles, abdomen length, abdomen width, and length of the segments of the right hind leg (2006 only). A dissecting microscope with an ocular micrometer was used in 2006, and a digital microscope and camera with image-analyzing software were used in 2007. The data were normally distributed, which allowed us to use two-sample *t*-tests.



## RESULTS

**Table 1. Comparison Between Genders and Populations In Different Locations.**

Total Males and Females	NHCC 2007		Roseville 2006	
	♂	♀	♂	♀
Dry mass (mg)	8.4 ± 1.4	14.8 ± 2.8	8.6 ± 1.2	16.0 ± 2.3
Pronotum width (mm)	2.9 ± 0.1	2.9 ± 0.0	3.1 ± 0.2	3.4 ± 0.2
Abdomen length (mm)		5.1 ± 0.3		5.7 ± 0.3
Abdomen width (mm)		4.9 ± 0.4		4.6 ± 0.4

Guarded and single males combined; Guarded and single females combined.  
Mean ± standard deviation. (2006, n = 99-160; 2007, n = 40-48)  
♂ = male; ♀ = female.

**Table 2. Comparison Between Paired and Unpaired Females.**

Paired and Unpaired Females	NHCC 2007		Roseville 2006	
	Paired	Unpaired	Paired	Unpaired
Dry mass (mg)	15.2 ± 2.7	14.2 ± 2.7	16.5 ± 3.2	15.4 ± 1.8
Pronotum width (mm)	3.2 ± 0.0	3.3 ± 0.1	3.4 ± 0.2	3.4 ± 0.1
Abdomen length (mm)	5.1 ± 0.1	5.1 ± 0.1	5.7 ± 0.3	5.7 ± 0.2
Abdomen width (mm)	4.9 ± 0.2	4.9 ± 0.1	4.7 ± 0.5	4.4 ± 0.4

Mean ± standard deviation.  
(2006, n = 26-78; 2007, n = 17-25)

**Table 3. Comparison Between Paired And Unpaired Males.**

Paired and Unpaired Males	NHCC 2007		Roseville 2006	
	Paired	Unpaired	Paired	Unpaired
Dry mass (mg)	8.4 ± 1.3	8.3 ± 1.7	8.7 ± 1.2	8.5 ± 1.0
Pronotum width (mm)	2.9 ± 0.1	2.9 ± 0.0	3.1 ± 0.2	3.1 ± 0.1

Mean ± standard deviation.  
(2006, n = 54-78; 2007, n = 25)

### Range of melanistic pigmentation of lateral thorax (1-5 scale)

1. Do guarding males differ from single males? **NO.**

> Dry mass and pronotum width of paired and single males were not significantly different in either year ( $P > 0.05$ ). None of the other parameters were statistically different.

> In contrast to Punzalan et al. (2008), we did not observe a statistically significant color difference between paired and unpaired males (1-5 scale; paired  $2.92 \pm 1.7$ ; unpaired  $2.80 \pm 0.8$ ;  $n = 25$ ;  $P > 0.05$ ). See examples below.

2. Do paired females differ from single females? **YES.**

> In 2006 (Roseville), paired females had significantly wider abdomens than single females ( $P < 0.05$ ). The mass of paired females was marginally greater ( $P = 0.062$ ). None of the other parameters that we examined were statistically different.

> In 2007 (NHCC), paired females were heavier than unpaired females ( $P < 0.05$ ), but none of the other parameters were statistically different.

3. Does sexual dimorphism occur? **YES.**

> Females were heavier and had wider pronotums than males, whether paired, single or combined ( $P < 0.05$ ).

4. Does assortative mating based on size occur? **NO.**

> The correlation between the mass or pronotum width of paired males and females was not statistically significant at either location ( $P > 0.05$ ,  $r < 0.1$ ).

5. Do the same patterns exist in both populations? **YES and NO.**

> Roseville females were larger than NHCC females, but the difference was not significant ( $P < 0.05$ ) possibly due to inadequate sample size. The apparent difference may be due to genetic variation or temporal and/or geographical differences.

## LITERATURE CITED

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## ACKNOWLEDGMENTS

This project was made possible because of generous financial support provided by grants from GenMab Incorp., the Eric and Elizabeth Emery Foundation, and North Hennepin Community College.