

Causes and consequences of female-biased sex ratios in *Aphthona* flea beetles

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Abstract:

All North American populations of *Aphthona nigriscutis* examined to date (N=121 populations) have strongly female-biased sex ratios (79-100% female). In contrast, North American populations of *A. lacertosa* (N=13), *A. flava* (N=3) and *A. cyparissiae* (N=1) have approximately equally sex ratios (41-62% female). Sex ratios do not vary across the approximately 3-month summer period during which adults are active in each of the four species. One possible cause of the biased sex ratios in *A. nigriscutis* is infection by *Wolbachia*, an intracellular parasitic bacterium that is known to cause female-biased sex ratios in other arthropods. Consistent with this hypothesis, *Wolbachia* has been detected by an imperfect PCR assay in most populations of *A. nigriscutis* (85%, N=68) but not in populations of *A. lacertosa* and *A. flava* (0%, N=27). *Wolbachia* infections in *A. nigriscutis* are detected in females (42% infected, N=635 ind.) but not males (0% infected, N=247). Unfortunately, antibiotic experiments that would demonstrate the causative role of *Wolbachia* have not been successfully executed at this time. One possible consequence of female-biased sex ratios is reduced population growth rate due to the rarity of males and reduced female insemination rates. We tested this hypothesis by examining female insemination rates across the period of adult activity in two high density populations of *A. nigriscutis* and one high density population of *A. lacertosa*. In both species, female insemination rates were low at the beginning of the season but rapidly increased to nearly 100%. We are currently testing this hypothesis in both high- and low-density populations to determine if density and density X sex ratio effects on female insemination rates are present.