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Abstract

Fluctuating Asymmetry and Sexual Selection: Integrating Cross- and within-Population Tests of Key Predictions †

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Abstract: The relationship between morphological symmetry and mating success in animals varies dramatically across species and populations. The reasons for this heterogeneity in effect size are poorly understood; which has lead to intense debate among evolutionary biologists. I will evaluate the general hypothesis that differences in the level of developmental instability (DI) across populations accounts for heterogeneity in the effect of symmetry on sexual selection. According to this hypothesis; most populations have levels of DI insufficient to propel adaptive processes such as mate selection; only when DI levels surpass a critical threshold will selection operate and be detectable. I will test this hypothesis using results of our work with *Drosophila bipectinata* Duda (Diptera: Drosophilidae); focusing on fluctuating asymmetry (FA) and size of the male sex comb; a model secondary sexual trait for animal studies. The following key predictions will be tested: (1) Intensity of sexual selection depends on the level of DI in the population. Data from nine distinct populations sampled throughout Australasia and the South Pacific will be evaluated for this test; (2) the level of DI in a population; in turn; is the result of the particular history of directional selection for trait size experienced by that population. This prediction will be evaluated using comparative data as well as the results of artificial selection for increasing trait size under laboratory conditions. This study will provide a framework for understanding the dramatic variation in effect size across FA-sexual selection studies.