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Appendix B from N. Anthes et al., "Bateman Gradients in Hermaphrodites: An Extended Approach to Quantify Sexual Selection"

(Am. Nat., vol. 176, no. 3, p. 249)

Setup and Analysis of the *Biomphalaria glabrata* Sample Data Set

The data reported in the main text originate from an unpublished experiment (N. Anthes, J. Beninde, T. Gerlach, C. Gümpel, and D. Sprenger, unpublished manuscript) that investigated how alternative experimental designs and measurements of MS affect Bateman gradients. The data subset we present here contains measurements of 30 adult focal snails that were each maintained within an independent and size-matched background population of five snails. To obtain information on mating frequencies, focal snails were grouped and observed during 4 h in a mating arena on five consecutive days. In between mating trials, the snails were housed individually. All background snails could copulate unrestrictedly during each observation interval to simulate a common sperm competition background but were housed individually outside the mating trials. The focal snail was allowed to enter the mating arena only at predefined frequencies (i.e., one to five times) and was otherwise kept separate from its background snails in the same water. This procedure imposed an upper limit to mating frequency on focal snails, revealing Bateman gradients that are less affected by traits that make individuals achieve more copulations than in experiments with completely free-ranging individuals (extensive discussion of alternative empirical approaches in preparation).

The data set for each focal snail contains (1) mating success as the number of copulations in the male or female sex role (i.e., mating-number promiscuity; "How Definitions of Mating Success Affect Bateman Gradients"), (2) female reproductive success as the number of eggs laid during the subsequent 14-day period, and (3) male reproductive success as the number of eggs sired by the focal in its background population. Paternity assignment was based on a single-locus pigmentation phenotype (Newton 1954; Richards 1967). Focals were homozygous for the dominant wild-type pigmentation, whereas background snails belonged to the recessive albino phenotype. Male reproductive success could thus be scored as the number of pigmented embryos within albino egg masses. For analysis, data on reproductive success are expressed relative to RS within each replicate population and between all 30 focal snails.

Statistical analyses were performed using JMP (ver. 7.0.2; SAS Institute). Regression and principal component analyses followed the procedures and formulas outlined in the main text. Comparisons of variance between male and female measures of mating success and reproductive success used the Levene's test. Tests for significance of within-sex regression slopes (i.e., Bateman gradients) are based on ANOVA F-tests. Comparisons of slopes between male and female functions were performed using Student's t-test for comparison of slopes. An Excel file containing the original measurements of mating success, relative reproductive success, and principal components of mating success is available in Dryad (http://hdl.handle.net/10255/dryad.1481).