Beyond orchids and dandelions: Testing the 5HTT "risky" allele for evidence of phenotypic capacitance and frequency dependent selection

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Abstract

The persistence of behaviorally deleterious genes in the human population poses an interesting question from the perspective of population genetics: If certain alleles at these loci are deleterious, why have they survived in the population? Possible answers include the dissociation of psychological deleteriousness from reproductive disadvantage; over-dominance; linkage disequilibrium (hitchhiking with a strongly advantageous allele); plieotropy; frequency dependent selection; and phenotypic capacitance. In the present study we consider evidence for phenotypic capacitance and/or frequency dependent selection for an allele that has been putatively shown to have negative associations with human behaviors (the VNTR in the promoter region of 5-HTT) yet which has persisted in human and non-human primate populations. In support of the "orchid / dandelion" hypothesis, we find evidence that the short VNTR allele increases variation in phenotypes in response to environmental (or genetic) differences (i.e. acts as a perturbation of a phenotypic capacitor). Further, we also find some evidence that the effects of allelic variation at this locus are moderated by the genetic environment of the sibship unit (i.e. may be susceptible to frequency dependent selection). We discuss implications of these findings for genetic models in general, specifically with respect to stable unit treatment value assumption (SUTVA) violations (i.e. independence of units of analysis).