

## Discussion questions for Drent et al. -- Friday, January 25, 2008

Rosalie

In the introduction, the authors cite an earlier study (Falconer and Mackay, 1996), saying that "a population is able to react in an adaptive way, only in the presence of genetic variation; at what rate this happens is dependent on the amount of genetic variation." Explain why this makes sense. If there were no genetic variation among a species, why couldn't their behaviors change over generations to adapt to their environment? And how is the rate dependent on the amount of genetic variation - are they implying that rate of adaptation is directly proportional to the amount of genetic variation, meaning if one goes up the other does as well?

Ian

In their introduction, the authors write that "Heritability estimates obtained in the laboratory do not automatically predict responses to selection in the wild." Why would these results on heritability differ from those gathered in the wild?

Britta

1. What potential drawbacks exist for quantifying exploration behaviors on a scale of 1-5 or 1-10 as the authors did in their analysis? (p.46) Does the reader miss out on anything?

Indrani

The authors convert the results for the standard tests to a linear scale. On what basis should such a linear scale be established? And what is the biological significance of such scales?

Chloe

Though the results are statistically significant, the testing methods of 'fast' and 'slow' generalizations for reaction times of *Parus major* seemed arbitrary. What was the significance of the 0-10 and 0-5 scales, and how could this have been improved?

Carlie

My discussion question has to do with up-selection and down-selection. Are these selections towards "fast" and "slow" responses to novel environments/novel objects? What do the differences in the slopes (in graph 1b) between the two show?

Neal

What was the importance of the speed of change in "personality" between successive generations?

Curran

The authors mention unlikely but possible environmental maternal effects. What are some examples of how maternal effects transmitted through egg characteristics could influence behavioral traits? (pg. 47)

Charlie

Drent and his colleagues studied heritability of environmental exploration differences in the great tit under laboratory conditions. How would natural selection explain the two drastically different behaviors exhibited in birds with different genes (quick to explore vs. slow to explore)? Might the study have turned out differently if the birds were raised in a more environmentally accurate environment instead of a lab? An answer might be, for example, that the environment might "dull" the effects of genes and cause the two groups of birds to appear only slightly different in their exploratory behavior due to survival pressures.

Christine

If the two extremes of responses to novel environments and objects are present (and even common), and if they both have consequences for fitness, then why is one behavioral response not more common?

In other words, if both aggressiveness and passiveness have their own merit, than why are they both being selected for in the same environment, and quite strongly in the example of this study.

Britta

2. On p.49 of their study, the authors cite determining the source of genetic behavioral variation as one of the "three key questions in understanding the presence of different behavioral traits within one natural population." What are some possible sources of this variation, and does behavior evolve at a slower or faster rate than physiology?

Hannah

In what ways would environmental variability change the behavior of these birds? As opposed to birds raised and observed in captivity.

Jeff

I was wondering how this study can be applied to other species. I guess my question is: Does this study apply to most species? Are such behavioral traits heritable in most animals? Or should I only consider this a studies findings significant for the great tit?

Zach

I was particularly interested in the discussion on behavioral strategies evolving as a "package", and my question is: could acquiring a new behavior through social learning or individual learning have an observable influence on other behaviors in the organisms overall strategy?

Thor

My questions are a) how much does the young Great Tit depend on learning from its parents for survival, and b) how much does the amount of time a species spends learning from parents affect the heritability of a complex behavioral trait?

Heidi

Drent, Oers, and Noordwijk's (2002) study found that as few as four generations of artificial selection could result in profound differences in early exploration behavior. What do such findings suggest about how the trait is genetically encoded and expressed in these birds?