ANSWERS TO FIRST MIDTERM:

First, a few general comments about the exam. Few people completely missed the answer(s) to one or more questions. Instead, the loss of a few points here and there tended to add up to reduce final scores. Common reasons for losing small number of points per question were (1) failing to answer all parts of the question, (2) providing answers that weren't really different (e.g., when asked to give several reasons for something), and (3) failing to provide enough detail in your answer. Since most people seemed to have plenty of time to finish the exam, one suggesting for improving your score would be, once you've finished the exam, to go back over it and add more detail to your answers – it's hard to give too much detail!

OK. Following are the answers that we were aiming for on the exam. Other answers were acceptable if they were logical and consistent material presented in lecture. Thus, in some cases, you may need to consult with us to understand why you lost points on a particular question.

1a. 5 points for each difference between the curves in the figure and the classic Bateman curves. The two intended differences were (a) the female curve is higher than the male curve (indicating that the number of mates has a greater effect on female rs) and (b) the male curve plateaus rather than continuing to increase in a linear fashion (indicate that male rs doesn't increase indefinitely with the number of mates)

1b. 4 points for indicating that the intensity of sexual selection should be greater for females. 6 points for explaining that because the curve for females has a steeper slope (rises more quickly), each additional animal mated with has a greater effect on female rs than on male rs. Consequently, selection to compete for access to mates (intrasexual selection) should be stronger among females.

2a. 2 points for indicating that Remo should do better at competing for females. 4 points for indicating that fluctuating asymmetry is the critical concept in this question. Given that Nemo's fins are very different in size, if FA reflects male quality, then Remo, who is more symmetric, should be more successful at attracting females. 4 points for defining FA as random deviations from bilateral symmetry that are thought to reflect the ability of an organism (i.e., the genotype) to handle environmental challenges during development. Higher quality males are better able to handle these challenges, leading them to have more symmetric phenotypes than lower quality males.

2b. 5 points for providing a reasonable test of the hypothesis. 5 points for the overall design of the experiment, meaning does it really test the hypothesis in questions. 5 points for describing adequate controls. 5 points for indicating the type of observational data to be collected. 5 points for describing the expected outcome of the experiment.

A number of possible experiments were acceptable. In writing the question, we were thinking of a study similar to that used by Moller in his studies of male tail length and female mate choice. In this case, we would experimentally alter the symmetry of the pectoral fins by augmenting (or reducing) the size of 1 fin on some of our male study subjects. A female would be given the choice between a highly symmetric and an asymmetric male using a standard 3-chamber aquarium set up. Focal animal sampling would be used to record female interest in each male, measured as time spent near each male or something similar. For controls, some males would be handled and their fins manipulated without changing the symmetry of their pectoral fins. The predicted outcome is that females will prefer (spend more time near) the more symmetric male in each pair of males tested.

3a. 5 points for indicating that this is a non-adaptive hypothesis (hypotheses in behavioral ecology are generally adaptive). 5 points for indicating that this is a proximate level explanation (most explanations in behavioral ecology are ultimate level explanations).

3b. 5 points for indicating that the high costs of giving birth through masculinized genitalia must be offset by some substantial (but as of yet unidentified) benefit to this masculinization.

4a. 3 points for predicting that the EPC male should be more immunocompetent than the social partner male. 3 points for predicting that the EPC male should be more colorful than the social partner male. 4 points for indicating that there must be some cost to male color that prevents all males from being highly colorful. Given this cost, only the best males can be immunocompetent and afford the cost of being highly colorful. In other words, the high cost of color keeps this an honest signal, since only high quality males can afford to express this trait.

4b. 4 points for indicating that the EPC male should be more heterozygous at MHC loci. 6 points for explaining that MHC genes are associated with the immune response in vertebrates. The expected pattern in that greater heterozygosity at MHC genes leads to a better ability to detect and to respond to pathogens. As a result, greater heterozygosity at MHC genes should be associated with greater immunocompetence.

4c. 5 points for your prediction. 5 points for your explanation. We would predict that immunocompetence should be more important in hi fungal populations. This parallels the original Hamilton-Zuk hypothesis in that, if fungal infections are common, members of a species should be subject to stronger selection to advertise pathogen resistance and immunocompetence. Accordingly, females in these species should pay more attention to male signals of immunocompetence, since fungal infections are likely to be a common source of poor male health and quality.

Bonus question. It’s a lifestyle!