BIOL683 – In Class Exercise, Week 2

This week's dataset is from a study of the rough-skinned newt, *Taricha granulosa*. The experiment involved laboratory-based breeding populations of newts with 8 males and 8 females per population. The newts mated, the females laid eggs, and the eggs were allowed to develop and hatch. After hatching, the larvae were genotyped and assigned to parents on the basis of their genotypes. These genetic data allowed a determination of the number of successful mating events and the number of offspring produced by each adult in each population. Here are the meanings of the columns for the datasets:

Dataset: MaleNewtSampleData.xlsx

MaleID: An arbitrary ID assigned by the researcher

PITtag: The code of the PIT (passive integrated transponder) tag injected into the newt

FemNum: Number of females in the tank – it's 8 for all tanks

Tank: The tank in which the male resided. Males in the same tank were in the same population.

svl: Snout to vent length

tl: tail length

tht: tail height

mass: mass

legs: Thickness of the legs, scored on an arbitrary scale from 0 to 3.

np: Nuptial pad development, scored on a scale of 0 to 3.

cs: Cloacal swelling, scored on a scale of 0 to 3.

numberofmates: The number of females with whom the male produced offspring

numberofoffspring: The number of offspring inferred to have been produced by this male

Dataset: FemaleNewtSampleData.xlsx

FemaleID: An arbitrary ID assigned by the researcher

PITtag: The female's PIT tag number

Tank: The tank in which the female resided during the experiment.

svl: snout-vent length

tl: tail length

tht: tail height

initial_mass: The female's mass at the start of the experiment

mass: The female's mass at the end of the experiment

delta_mass: The female's change in mass during the experiment

numberofmates: The number of males with whom the female produced offspring

totalnumbereggs: The number of eggs the female laid (her total possible number of offspring)

fungused_eggs: The number of eggs that died (subtract from total to get surviving offspring)

amplexus: The number of times the female was observed in amplexus with a male

partners: The number of unique partners with which she was observed in amplexus

number_inseminations: The number of visible inseminations for the female

days_with_pp: The number of days she was in amplexus with the male she was with most often

Follow these steps for this exercise:

(1) Get the two datasets, **MaleNewtSampleData.xlsx** and **FemaleNewtSampleData.xlsx**
(2) Open them in a program like Excel, and save them as ".csv" comma-delimited text files.
(3) Create a table (or tables) comparing summary statistics (mean, standard deviation, SEM, interquartile range) for males and females. Compare the traits svl, tl, tht, mass, number of mates, and numberofoffspring/totalnumbereggs.
(4) Create histograms comparing the distribution of mating success between males and females.
(5) Create histograms comparing the distribution of numberofoffspring in males to totalnumbereggs in females.
(6) Calculate the mean and standard deviation of male and female svl, tl, and tht for each category of mating success (i.e., the mean for males with 0 mating success, 1 mating success and so forth), and make a table.
(7) Plot numberofoffspring as a function of numberofmates for males. Plot totalnumbereggs as a function of numberofmates for females.
(8) Create a custom function in R to calculate the opportunity for sexual selection in males and females. The opportunity for sexual selection is the variance in mating success divided by the square of mean mating success.

Use your analyses to answer these questions:

(1) Are newts sexually dimorphic? If so, which sex is bigger and which traits show the biggest differences?
(2) Do the distributions of mating success and reproductive success differ between the sexes? What are the differences?
(3) Are there any obvious differences among individuals in different categories of mating success?
(4) Do the plots of numberofoffspring/totalnumbereggs versus numberofmates look different between the sexes? If so, why?
(5) Does the opportunity for sexual selection differ between the sexes?

Homework:

(1) Produce a nice document with all of the figures and tables from above.
(2) Include a script with the commands you used and your custom function for the opportunity for sexual selection.
(3) Use your new statistical and graphing skills to find one other pattern in the data, not covered above, and produce a table or figure demonstrating this pattern. Briefly describe your interpretation of the pattern.