Herpetology Bio143 **Name___________________**
Midterm

Answer questions as completely as possible. Write *only* in the space provided on the front of the page.

Answer questions 1-3 completely. For questions 4-6 you must answer only **two** (be sure to clearly indicate which question you do not wish to answer)

1. Compare and contrast endotherms and ectotherms with regards to efficiency of assimilation, and what impact does this have on energy flow in ecosystems?

Endotherms – High metabolism. Most energy used to maintain homeostasis, with very little left for tissue growth.

Ectotherms – Low metabolism. Most energy used to convert into tissue and growth.

•Most non-usable or minute biotic resources are capable of being transferred into tissue (especially amphibians – salamanders) so they can be integrated into the energy flow in ecosystems.

2. Describe salient biogeographic patterns for *Ensatina* and *Taricha*. Are the evolutionary histories of the two species linked? In what way?

•Both genera can be described as ring species (*Ensatina* more so than *Taricha*).

•*E. e. xanthoptica* mimics *Taricha torosa*.

•In areas where *Taricha* are particularly toxic (due to an evolutionary arms race with *Thamnophis sirtalis*) *Ensatina* populations resemble the newts the most (have the most vivid coloration ventrally, dorsally, and eye color).

3. Write down the energy balance equation and discuss each term with regards to ecotherm energy balance. Which terms are likely to affect amphibians and which are more likely to affect reptiles?

Heat energy gained = $Q_{abs} + M \pm R \pm C \pm LE \pm G$

Q_{abs} = absorbed from sun (mainly reptiles, but amphibians to some degree)
M = Metabolic (standard metabolic rate, specific dynamic action) (reptiles)
R = Radiation (surface properties – porous and shiny) (reptiles)
C = Convection (air currents, etc.) (reptiles)
LE = Evaporation (energy liberated in H_2O loss) (Amphibians > reptiles)
G = Conduction (thigmothermy) (reptiles and amphibians)

•You should explain how these effect reptiles and amphibians

4. Draw a phylogeny of the major groups of tetrapods and include all major tetrapod lineages. On your phylogeny also include the following outgroups: Actinopterygii (Ray finned fish), Actinista (Lobefin that are not lungfish), Dipnoi (Lungfish). Your phylogeny must include the proper cladistic relationships. On your phylogeny use lines or brackets to demarcate the following sub groups of tetrapods: Lissamphibia, Amniota, Reptilia, Diapsida, Anapsida, Lepidosauria, Squamata.

•Look at the phylogeny on page 24 of your textbook.

5. Why are reptiles and amphibians larger in the northern part of their range, or at high elevation? Why do life history traits change in response to the thermal environment (e.g., latitude)? What limits the range of a species of lizard? Give a detailed example of a California herp that is limited with respect to northern latitudes. Be sure to elucidate any prominent selective forces responsible for its northern range limitations.

•They are larger in northern parts of their range because of surface area ratios. Larger animals experience slower rates of heat loss and lose less H_2O to evaporation.

•Thermal environment dictates whether an organism should evolve viviparity or other means to deal with shorter seasons (greatly shortened when you increase in latitude or elevation). Organisms become restricted as to when they can functionally be active.

•Successful reproduction (eggs) – this is the main answer we were looking for, but if you defend another one extremely well…great!

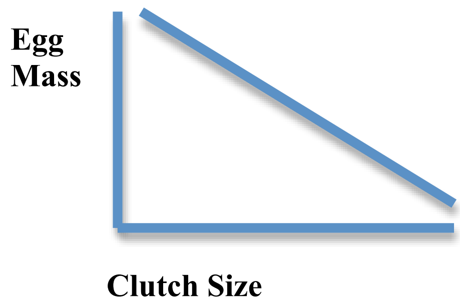
•An example would be the Desert Iguana (*Dipsosaurus dorsalis*). There are areas in Washington and Nevada state with habitat that could be used by *D. dorsalis*, however, they are absent from these areas. This is because the shortened season does not support proper egg development.

•Other examples will be accepted if you support them with adequate information.

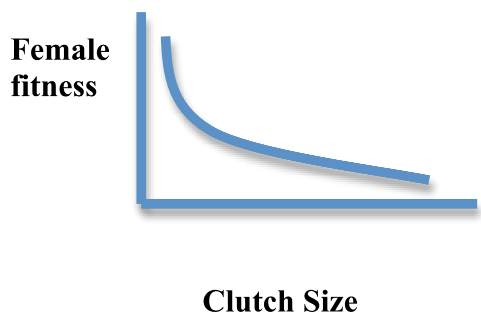
6. Describe the trade-off between the number versus size of offspring. Include graphs relating the life history traits (clutch size, egg mass) and the fitness of the female parent and another graph relating life history traits with fitness of her progeny. Describe an experiment discussed during lecture that manipulates the size of the progeny. Be sure to discuss the life history parameters that can be tested with such an experimental method.

•Describe the trade-off with respect to maternal allocation of resources.

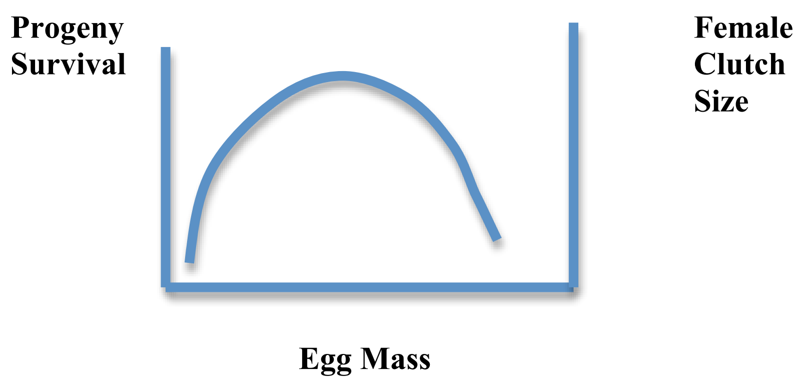
1. Graph of clutch size and egg mass



2. Graph of female fitness and clutch size



3. Graph relating life history traits with fitness of progeny



•An ideal example would be Barry's follicle oblation and FSH experiments with *Uta*.

•The life history parameters are 1) egg size, and 2) clutch size

•This deals with both progeny and parent survival