

Name: _____

Herpetology
Fall 2015
Exam 1

Question	Points	Score
1	20	_____
2	20	_____
3	20	_____
4	20	_____
5	20	_____

Total 100 _____

1. A. Did tetrapod limbs first evolve for walking on land? How do you know? (10 points).

B. Did tetrapod lungs first evolve in land-dwelling creatures? How do you know? (10 points).

(20 points)

2. You wake up from a bad dream and look around. The sun beats down, and there is no water for miles.

You are a desert reptile.

How can you get enough water to survive? Give an example of a specific adaptation you might have, and state which real herp inspired your idea. (10 points)

You survive due to your brilliant herpetologizing. However, you soon encounter your best friend Bob. He is in bad shape, gasping on the ground. *He is a desert amphibian.*

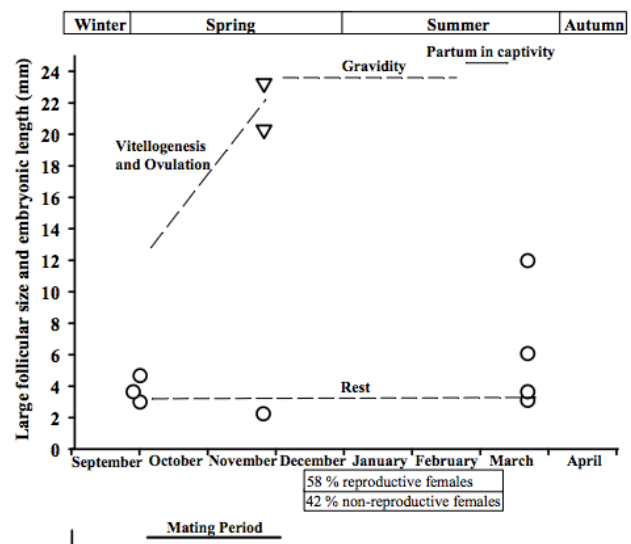
You suspect Bob might be overheating because he skipped my lecture on thermal equilibrium. Give Bob some strategies to survive before it is too late! (10 points)

(20 points)

3. In a recent paper (Herp Conserv. Biol. 9: 170), Jorgelina Boretto and colleagues studied the reproductive ecology of the climber lizard, *Phymaturus spectabilis* (right; photo from iNaturalist.org). This lizard species that lives in harsh, cold environment in Patagonia, Argentina. This species (in the family Liolaemidae) is restricted to a very small area in south-western Argentina and lives in a very physiologically challenging environment that is both cold and dry.



Scientists studying this species noticed that during the time when females should be gravid (that is, creating eggs), only about half of the females that they caught had eggs in any given year. So they collected data on reproductive biology of this species over several collecting trips between 2006 and 2011. As a part of their study, they evaluated reproductive status of male and female lizards through a variety of methods. Their main results for follicular size in females are included here.



What did the scientists find? Hypothesize a potential physiological mechanism for this phenomenon based on what you learned about hormonal control of reproduction in class. (20 points)

Here are two hints:

(i) large follicular size reflects the stage of egg development in females, and between 2 and 6 mm means that the female is not producing any eggs at all; (ii) this paper did not include measurements of hormone levels so feel free to speculate.

(answer to Q3)

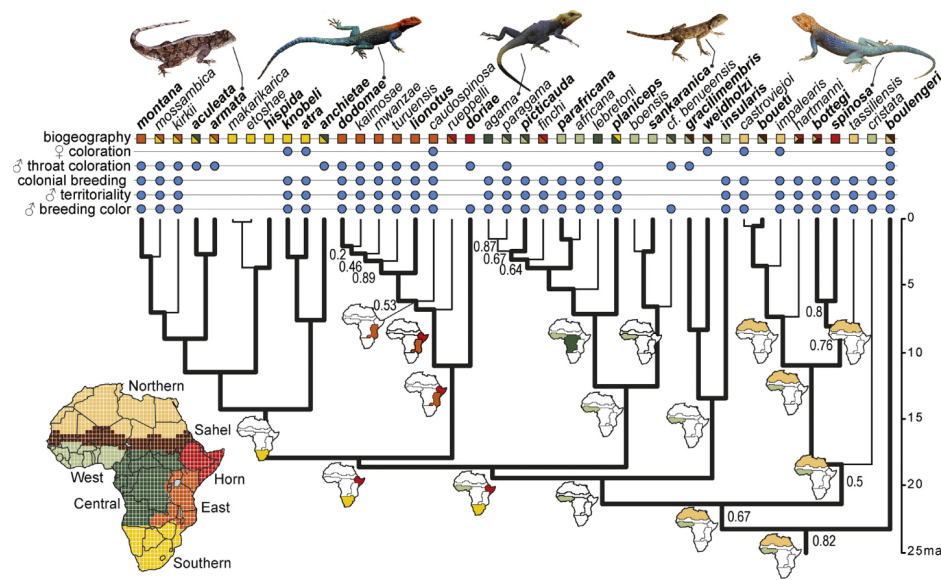


Fig. 6. Hybrid phylogenetics–phylogenomic species tree for African Agama, and biogeographic relationships across the continent. The Sanger data (mtDNA and four nuclear genes) were used to estimate a time-calibrated species tree using *BEAST (Fig. 2). This posterior distribution of species trees was then filtered using the anchored phylogenomics tree (215 loci; Fig. 5 “Filter Tree”) as a backbone constraint. The branches connecting the 23 species with anchored phylogenomics data are highlighted in bold. Bayesian posterior probabilities for clades ≥ 0.95 are not shown.

4. The figure above is taken from Leaché et al. 2014, which we discussed in class.

A. Explain, in general terms, how phylogenetic trees like this one can be constructed from DNA sequences. (10 points)

B. The maps embedded in the figure show a biogeographic reconstruction of Agama species over the past 25 million years. Do these results show vicariance, dispersal, or a mixture of the two? Explain how you can infer this from the figure. (10 points)

(20 points)

5. A. How do geckos stick to surfaces? (10 points)

B. Travis mentioned six capabilities of gecko toe pads that make them ideal for adhering to surfaces. Two are listed below. For each, explain how it works and why this capability is significant for geckos in their natural environment. (10 points)

(i) stick to wet and dry surfaces

(ii) Not self adhere

Extra Credit: Please help me solve a family controversy. IS THIS A TURTLE OR NOT?

