Herpetology.
Amphibians and reptiles from the field to genomic age

Do you like animals? Do you like natural history? If you look animals and wonder how do they differ from each other? And what forces influence their evolution and lead them to be who they are? This is the workshop for you!! This workshop is focused in amphibians and reptile's biology and evolution.

Instructor information

Itzue W. Caviedes Solis – PhD Student in the Biology Department at University of Washington under professor Adam Leache
Email: itzuecs@uw.edu

Workshop description

In this science club the students will understand the importance of amphibians and reptiles diversity and some methods to study the relationships among species. They will learn the general biology of organisms, where and how to find amphibians and reptiles in the field and to identify species with taxonomic keys (traditional taxonomy). The students will review the process of species delimitation with morphology and molecular approaches and will learn computational tools.

The course will integrate lectures, exercises, practical laboratories, student projects and presentations. They will chose a group of study, and read a paper to make a presentation and report. Each day will include a session of questions related with chose an academic and scientific career.
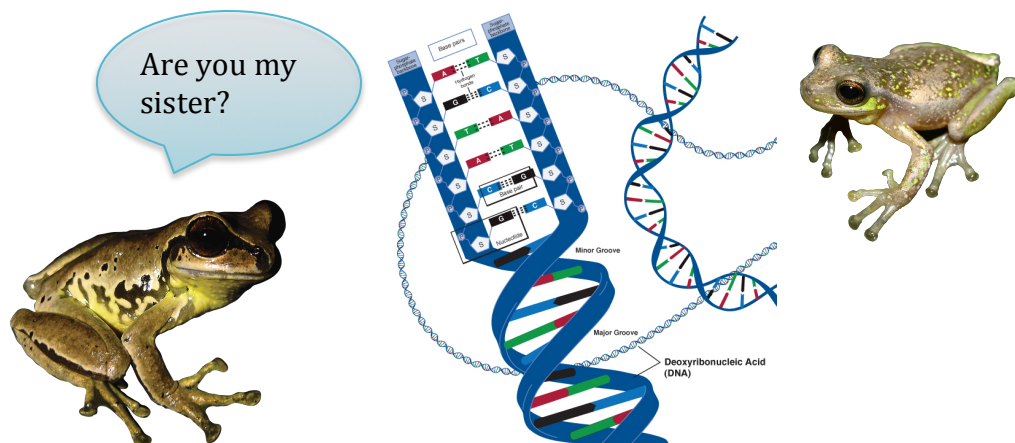
Syllabus

27 July Introductions [**30 min**]

Reasons to become a scientist. What do a scientist do? [**30 min**]

Biology of amphibians and reptiles. Lecture and exercises [**3 hours 30 min**]
Morphology. Who they are? How do they look?
Ecology. Interactions and adaptations to their environment
Physiology. How do they function in the world?
Diversity of species in Mexico
Importance of systematic in conservation

Student presentations [**1 hour 30 min**]
Choose a team, topic and read a paper to present

28 July   Reasons to become a scientist. In which domain can you find a job? [**30 min**]

Fieldwork and taxidermy [**1 hour 30 min**]
Where can we find them and how can we preserve them?
Collecting and preservation techniques (*Lab practical*)
Species concept [**30 min**]
What is a species?
Types of characters [**1 hour 30 min**]
Quantitative Vs. qualitative
Morphological data and taxonomic keys (*Practical exercise*)

Student presentations [**1 hour 30 min**]
Teams discussion of the paper and work assignments

Museum visit (Museo Duges de Historia Natural)
[**1 hour during the afternoon after class**]

29 July Reasons to become a scientist. Publication process! [**30 min**]

Schools of systematic (species relationships) [**1 hour 30 min**]
Evolutionary systematic, Phenetics, Cladistics
Authority? Similarity? Common ancestry? (*Practical exercise*)

Molecular data management [**2 to 3 hours**]
What kind of molecular data can you obtain?

Labwork how to obtain molecular data (from genes to genomes (*Lab practical DNA extraction*)

Student presentations [**1 hour**]
Time to work in first draft and presentation

30 July Reasons to become a scientist. Funding! [**30 min**]

Species delimitation [**4 to 5 hours**}
Online sources for molecular data (*Practical exercise*)
How to delimit species? (Morphological and molecular approach)
Computational methods (*Lab practical*)
Edit and Align sequences (Mesquite)
Gene trees (Mr Bayes)
Species tree (*Beast)

Student presentations [**1 hour**]
Time to work on draft and presentation

31 July Reasons to become a scientist. Steps to apply for grad school [**30 min**]

Next-Gen Sequencing [**3 hours**]
RadSeq, UCE, Genomes
Computational tools (Pyrad, SNAP, Structure) (*Lab practical*)

Student presentations [**3 to 4 hours**]
Review of final report and presentations to the group
(30 min each team)

References

Pough, F. Harvey, Robin M. Andrews, John E. Cadle, Martha L. Crump, Alan H. Savitzky, and Kentwood D. Wells. 2004. Herpetology, Third Edition. New York: Prentice Hall. 726 pp.

Rojas-Soto, Octavio R., et al. La colecta científica en el Neotrópico: el caso de las aves de México. Ornitología Neotropical 13 (2002): 209-214.

Holder, Mark, and Paul O. Lewis. Phylogeny estimation: traditional and Bayesian approaches. Nature reviews genetics 4.4 (2003): 275-284.

Grummer, Jared A., Robert W. Bryson, and Tod W. Reeder. Species delimitation using Bayes factors: simulations and application to the Sceloporus scalaris species group (Squamata: Phrynosomatidae). Systematic biology (2013): syt069.