

Ecol 483/583 – Herpetology
Lab 1: Introduction to Local Amphibians and Reptiles
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Lab objectives

The objectives of today's lab are to:

1. Familiarize yourselves with some common local amphibians and reptiles.
2. Learn to use a field guide.
3. Learn the external anatomy of the specimens (this will help with 1 & 2).
4. Learn how to use library resources to conduct literature searches for term papers.

These skills will set a foundation for all future labs, so are important to get a grasp of early on. You will hopefully find that #4 will help you in all of your classes.

Tips for learning the material

As well as having concrete objectives, this lab serves as an introduction to some of the material that you will be dealing with in future labs. Get started by learning to identify the animals on display, but don't get frustrated or overwhelmed – you will see this material again in labs devoted to each taxon (e.g. the lizard lab, turtle lab, etc.).

For this lab and all the following labs, make sure that you **read the lab before coming to the lab session**. This will allow you to make the best use of your time in the lab. Also refer to the course study guide, available on the course website, for many other tips on learning the material.

Work through this lab and answer the questions that are posed in it. The questions are in **bold** text. The questions should help guide you through the material and get you to think about what you are looking at. The questions will always be discussed at the beginning of next lab, so be prepared to answer and talk about them. It is important that you look at the specimens and other material on display to answer the questions.

Make sure that you look at *all* the material on display; don't skip or gloss over any of it. Take additional notes that will help you when studying. Take digital photographs of the specimens and note the scientific name of each. Find the species that you are looking at in the field guide to see how drawings and photographs compare to the specimen. The field guide describes many characteristics that can be used to distinguish species, so is a valuable resource. If you are unsure of what you are looking at or the answer to a question, discuss it with a fellow student. Working in partners is a productive way to reason through difficulties. Your instructors are also excellent resources that will be able to help you (although they won't just answer all the questions for you).

Exercise 1: Library resources

During this course, you will have to write a lab report and a longer term paper. For both of these assignments, you are expected to identify, obtain, read, and cite relevant primary literature. With the millions of scientific papers that are being published, it can be a daunting task to do these things. During today's lab you will learn how to do at least some of these things. There will be a short presentation and demonstration on using library resources to identify and obtain relevant papers on any topic you might choose. Unfortunately, there is no easy way out of reading and citing the papers, you just have to get to work... Answer the following questions during the library tutorial.

What is meant by primary literature?

What resources are available to you online to help you identify papers that are relevant to your research topic?

What resources are available to you online to obtain papers that you identify?

If a paper is not available online, how would you obtain it?

Why is it important to cite literature?

Exercise 2: An introduction to local herps

A. Field Guide to Amphibians and Reptiles in Arizona

Much of today's lab will be spent getting familiarized with some of the local species of amphibians and reptiles. You will see many of the species on display today both in future labs and in the field. Work to learn these species throughout the course, but start early and keep studying them until you can identify them while walking in the field. Ultimately, you will be able to identify many of these species in nature without even having to catch them. Don't worry about knowing all of them by next week's lab, as you will see them again (over and over).

Notice that your field guide is divided into sections on salamanders (Urodela), Frogs and Toads (Anura), Turtles (Testudines), Lizards and Snakes (Squamata). This is how the local herps on display to today are arranged as well. Make sure you look at all of them, but note that, in the field, mainly lizards and maybe some snakes will become active first. More and more species will become active as the semester progresses.

Also notice that for each species your field guide gives you the common and scientific names, a range map, and information on identification and some natural history facts. Particularly useful are the pictures, which have identifying features labeled on them. Often, these pictures will be enough to make a positive ID. If not, or you are unsure, and are in the field, make sure that you are within the species range (check the map). If this still doesn't help, consider things like the habitat that each species inhabits, times and dates of activity, and other natural history information. Practice identifying specimens in the lab, but note that a preserved specimen looks quite different from a live one in the field. Use your field guide to answer the following.

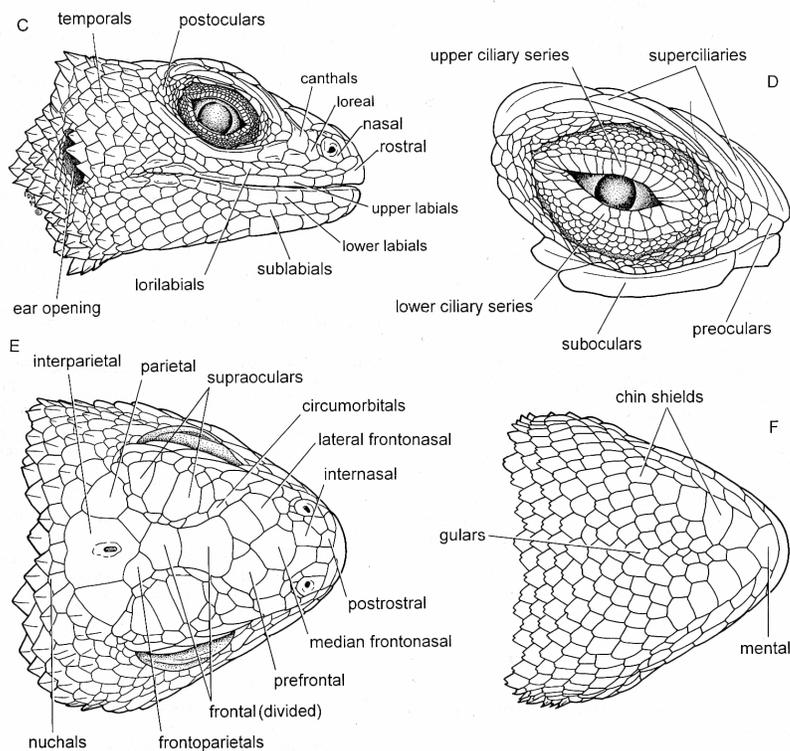
You are visiting Yuma (in the southwestern corner of Arizona) for the weekend, shopping for dates and oranges, you notice that the place is crawling with these extremely fast, long-legged lizards. When they stop, they sometimes wave their tails in the air and the undersides have black transverse stripes. You also notice that they have colorful stripes on the sides of their bodies. What are they and why?

Upon returning to Tucson, you are jogging along the Rillito River Park, trying to look attractive, when you almost trip over a very similar looking lizard. At first you think it is the same species, but something is not quite right – there are no dark stripes on the ventral side of the tail. What are two possible species that you might be seeing?

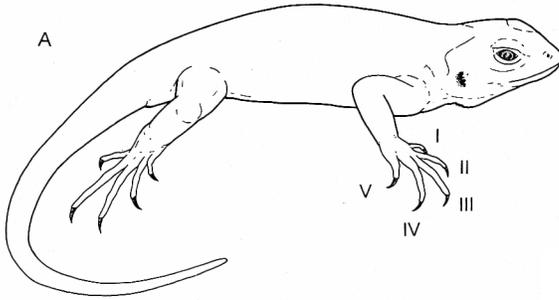
How would you distinguish between these two species?

B. External anatomy of Amphibians and Reptiles

Another important skill for identifying amphibians and reptiles using field guides and taxonomic keys is knowing the external anatomy of the animals. Different scales, grooves, and other structures are frequently referred to in descriptions. At the beginning of each major taxon section in your field guide, you will find labeled anatomical diagrams. On the first and last two pages of the Peterson Field Guide, which is another guide available in the lab (and in bookstores) has more diagrams. You should learn all of them. Some more detailed views are shown below (from Powell et al. 1998, Fig. 137).



In addition to all of these structures, you should be familiar with the anatomical locations: **dorsal, ventral, lateral, anterior, posterior, cranial, caudal** and **medial**. Identify these on the figure below.



Powell et al. 1998, Fig. 137.

Which anatomical location is not visible in the diagram above?

In addition to looking at the terms on these pages of your field guide, identify the structures on a number of specimens. Pick different looking species to do this on, as the scales can look quite different from one to another. Note their relative positions, and notice that their names often refer to their relative positions. For example, the postocular scales are behind the eyes, exactly where you would expect to find them. Similarly, the interparietal is between the parietals.

Use the specimens that are available today to help you answer the following questions.

How many costal grooves does *Ambystoma tigrinum* have?

How many marginal shields does *Kinosternon sonoriense* have?

How many dorsal scale rows does a *Crotalus cerastes* have?

How many upper labials does *Elgaria kingii* have?

What type of scales does a *Crotalus atrox* have?

What type of scales does the lizard *Aspidoscelis tigris* have?

Name a species that has femoral pores.

Name one that doesn't.

Below are some additional comments on some of the external anatomical structures to help you better understand what they are. Some of these terms are also new.

Axilla – this is the arm pit.

Pores – many lizard species have some sort of pores on the ventral side. These may be preanal pores, as seen in *Coleonyx*, postanal pores, as seen in some other geckos, or femoral pores, as seen in many iguanids (check on *Dipsosaurus dorsalis*). Quite often these pores are better defined in males and can be an imprecise way of sexing a lizard.

Enlarged postanal scales – these also appear on the ventral side of many iguanian lizards. These are a good way to determine the sex of individuals from species that possess them. Males have them, females don't. Look at some specimens of *Callisaurus* to see which ones are male and which are female. **Draw a diagram of these scales.**

Lamellae – these are the scales on the ventral side of the digits of the **manus** (hand) and **pes** (foot). The term is most commonly used when describing geckos that have adhesive pads on their toes, but can validly be used with other lizards as well. In pad-bearing geckos, the lamellae are specialized for adhesion. Lamellae are enlarged and composed of small hairs that facilitate adhesion through van der Waals forces with the substrate. In these geckos, the pads are also called **scansors**. **Examine the scansors and lamellae of *Hemidactylus turcicus***, an introduced gecko that lives on houses in Tucson.

Use all of these terms when talking to other students or the instructors, whether in lab or in the field. This will get you accustomed to using precise anatomical terms instead of referring to a structure as “that thing”. It will also help you learn the terms without having to rely on pure memorization.

C. The local species

Following is a list of the more common or particularly interesting amphibians and reptiles that live in southern Arizona that are on display, organized by higher taxon. Work through these, looking at the specimens and try to identify them. Take notes and pictures. Try to get an appreciation for how diverse the herpetofauna of Arizona is. Try to write down identifying features that allow you to distinguish between similar looking species. Also, keep in mind that the color of the specimens fades with preservation – they will look different in life, so compare what you are seeing in the lab with the pictures in your field guide.

Salamanders and newts (Urodela)

Ambystoma tigrinum (nebulosum) – Barred Tiger Salamander

Frogs and toads (Anura)

Bufo alvarius – Sonoran Desert Toad

Bufo punctatus – Red-spotted Toad

Hyla arenicolor – Canyon Treefrog

Scaphiopus couchii – Couch's Spadefoot

Rana catesbeiana – American Bullfrog

Considering what a word means in Latin or Greek can help you remember all of these names. For example, *bufo* is Latin for “toad”, *rana* is Latin for frog, and *hyle* refers to the woods in Greek. Hence, *Bufo* are toads, *Rana* are stereotypical frogs, and *Hyla* are tree frogs.

What are two ways to distinguish *Bufo alvarius* from *Bufo punctatus*?

Why is *Rana catesbeiana* a concern for conservation in Arizona?

Turtles and tortoises (Testudines)

Terrapene ornata – Ornate Box Turtle

Kinosternon sonoriense – Sonora Mud Turtle

Gopherus agassizii – Desert Tortoise

Apalone (Trionyx) spinifera – Spiny Softshell Turtle

What kind of habitat would you find *Apalone spinifera* in ?

What are two adaptations to this habitat and how are they used?

Lizards and snakes (Squamata)

These are the most diverse in Arizona, so pay close attention to them.

Elgaria kingii (*Gerrhonotus kingii*) – Madrean Alligator Lizard

Coleonyx variegatus – Western Banded Gecko

Heloderma suspectum – Gila Monster

Crotaphytus collaris – Eastern Collared Lizard

Dipsosaurus dorsalis – Desert Iguana

Callisaurus draconoides – Zebra-tailed Lizard

Cophosaurus texanus – Greater Earless Lizard

Phrynosoma modestum – Round-tailed Horned Lizard

Phrynosoma solare – Regal Horned Lizard

Sceloporus magister – Desert Spiny Lizard

Sceloporus undulatus – Eastern Fence Lizard

Urosaurus ornatus – Ornate Tree Lizard

Uta stansburiana – Common Side-blotched Lizard

Aspidoscelis tigris – Tiger Whiptail

What are two features that are shared by *Phrynosoma modestum* and *Phrynosoma solare* that are not seen in any of the other species of lizard on display?

What is one difference between these two species?

How would you distinguish *Urosaurus ornatus* from *Uta stansburiana*? Give two features.

***Callisaurus draconoides* are fast, bipedal runners. What is one adaptation that this species has for this type of locomotion?**

Lampropeltis pyromelana – Sonoran Mountain Kingsnake
Masticophis flagellum – Coachwhip
Pituophis catenifer – Gophersnake
Thamnophis cyrtopsis – Black-necked Gartersnake
Leptotyphlops humilis – Western Threadsnake
Crotalus atrox – Western Diamond-backed Rattlesnake
Crotalus cerastes – Sidewinder

What are four traits that distinguish *Crotalus atrox* and *C. cerastes* from the other snakes on display today?

Which of the snakes on display do you think moves the fastest? What traits does it have that make you think this?

There are about 100 species of amphibians and reptiles that live in southern Arizona, 31 of which are listed above. The list has been restricted to some of the more common or more special species that live in southern Arizona, and it demonstrates just how diverse the herpetofauna in this region is. The prospects of learning to identify all of these species may seem daunting, but don't panic – here are some suggestions:

1. You will see all of these specimens again. Future labs will make all of these specimens available to you again. Next week this exact set of specimens will be out on display. There will be three diversity labs and a review on “reptiles” and two on amphibians, plus a review lab. During those labs, you will see a greater range of species, but they will include subsets of the ones you see today.

2. Don't worry about learning to ID all of these today. It can be helpful to start by using a top-down approach. Notice that we have 2 species of *Bufo* on display, as well as 2 species of *Sceloporus* and 2 species of *Crotalus*. A good way to start is by figuring out how to identify these genera and concentrate on the species later. Be able to identify a toad, fence lizard or rattlesnake before worrying about whether it is a Sonoran Desert toad or a Red-spotted Toad.

3. Take notes and draw or take pictures. This has already been mentioned but is important. Active learning by is more effective than passive learning (just looking).