Vertebrate Biodiversity

"Reptiles"

Fall 2020

Amniota

Egg equipped with amnion, chorion, and allantois membranes- adaptation for fully terrestrial living

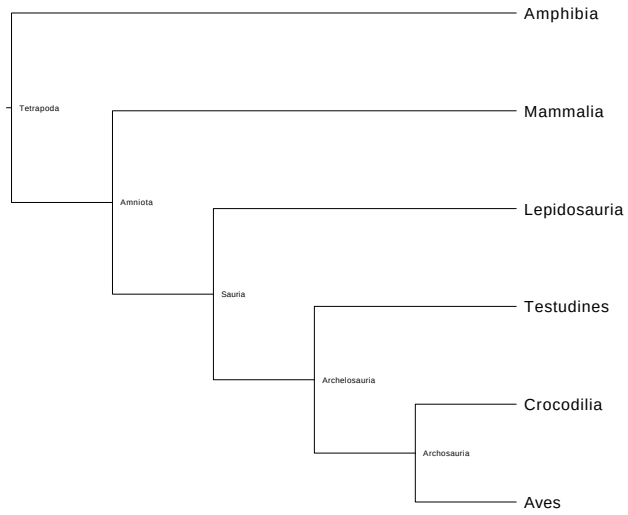

Figure 1: Amniote Relationships

Lepidosauria

Lab Reading: Simões et al., 2018. (Nature Letters) - Know Fig. 2
Transverse cloacal slit, regular cycles of shedding, tongue distally notched, paired copulatory organs, well-developed quadrate conch, ectepicondylar foramen in the humerus (median nerve and brachial artery passage), pleurodont dentition

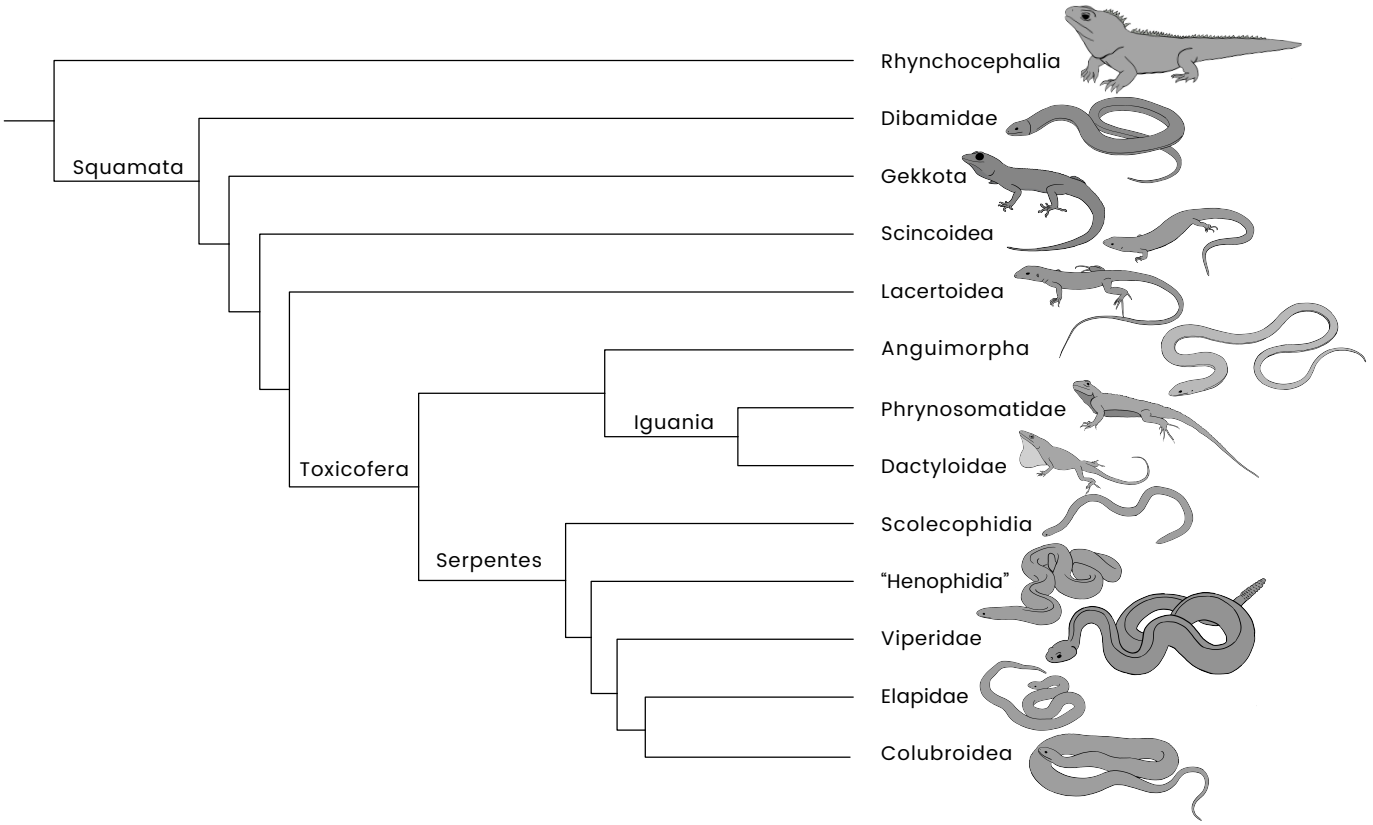

Figure 2: Lepidosaur Relationships

Rhynchocephalia

Once distributed globally (most abundant group in South America during Cretaceous). No well defined hemipenes- paired copulatory organs are slight outpushings of cloacal walls. Gastralia present.

- Family **SPHENODONTIDAE** (tuatara)
  Only extant Rhynchocelphalian (one genus, two species). Ancestral diapsid skull (two temporal fenestra on either side of skull). One or both of these holes have been lost in lizards and snakes, respectively. Highly developed pineal gland (regulates circadian rhythm). Teeth fused to skull (sphenodont dentition), and become dull with time. A single row of teeth on the lower jaw fit between two rows on the upper jaw, a trait unique among all tetrapods. Tuatara can live upwards of 100 years. * No alcohol-preserved specimen, just skull replicate.

Squamata

Highly developed hemipenes (paired copulatory organs), Jacobsen's organ separated from nasal capsule, femoral and preanal glands, no gastralia, triradiate squamosal

- Family **DIBAMIDAE** (blind skinks)
  In these elongate lizards, males have tiny flap like hindlimbs and females are completelylimbless. They also lack external ear openings. All of these features are likely adaptations totheir fossorial lifestyle. They are found in Mexico and in Southeast Asia. Largely limbless (small flap-like hindlimbs in males). * No specimen.
- **Gekkota** (geckos)
  - Family **GEKKONIDAE** (spectacled geckos)
    Two species have been introduced to Alabama. They are readily identified by

their lack eyelids and setae-covered toe pads. Toe pads with tiny hair like structures called setae.. These toe pads enable them to climb vertical surfaces.

- **Scincoidea**
  - Family **SCINCIDAE** (skinks)
    Dorsal scales smooth, shiny, and cicloid
- **Lacertoidea**
  Includes amphisbaenians, racerunners/whiptails, and tegus
  - Family **TEIIDAE**
    Have velvety textured dorsal scales and large, rectangular ventral scales, Pointed snout, Forked tougue, tail over 2x SVL, highly active foragers
- **Anguimorpha**
  Group that contains the only venemous lizards (Helodermatidae and Varanidae) and Anguids.
  - Family **ANGUIDAE**
    Elongate lizards with reduced limbs or limbless. Scales usually rectangular. Lateral fold in most taxa.
- **Iguania**
  Diverse group that includes acrodonts (Agamidae, Chamelonidae) and pleurodonts (Iguanidae, Corytophanidae, Crotaphytidae, and the following families)
  - family **DACTYLOIDAE**
    Have subdigital lamallae bearing setae much like gekkota. Males have prominent dewlaps.
  - family **PHRYNOSOMATIDAE** (spiny lizards)
    A number of species in this group have become important model species for ecology and physiology research. Many instances of viviparity.
- **Serpentes** (snakes)
  - grade **LEPTOTYPHLOPIDAE**
    Burrowing snakes that eat termites. They are usually worm-like in appearance and cannot open their mouths widely.
  - grade **"Henophidia"**
    Paraphyletic grade that includes boas and pythons (which are also paraphyletic) along with several other groups of snakes.
  - family **VIPERIDAE** (vipers)
    Crotalinae (restricted to Eurasia & Americas; all snakes listed below) have heat-sensing pit between eye and nostril; paired single tooth on maxilla (mobile fang) that functions to deliver potent venom (many species possess neurotoxic, hemotoxic, and cytotoxic venom- some with a cocktail), broad head, vertical pupil. Many species are viviparous.
  - family **ELAPIDAE** (elapids)
    Venomous snakes endemic to tropical and subtropical regions. Some snakes are aquatic (e.g., kraits). Longest venemous snake (king cobra). Fixed fangs at front of upper jaw for injecting venom, which is largely made up of neurotoxic compounds.
  - family **COLUBRIDAE**
    Lack heat-sensing pits; have multiple teeth onmaxilla. Make up 78% of world's snakespecies.

Archelosauria

While phylogenetic conclusions from morphological analyses conflict with those from genetic analyses, most systematists place testudines as sister to the group encompassing crocodylians and aves (archosauria). This larger group (archelosauria) lacks diagnostic anotomical characters, but thorough molecular data consistently recover the three groups together.

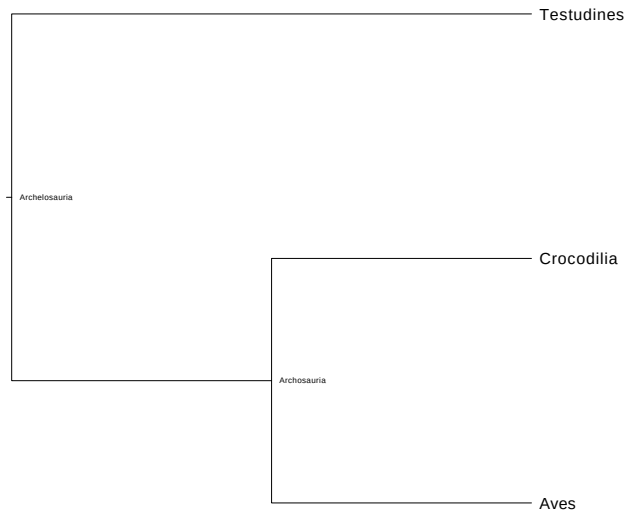

Figure 3: Archelosaur Relationships

Testudines

Reptilian tanks- no other tetrapod with bony shell that encloses the pectoral and pelvic girdles. The carapace (dorsal portion of the shell) is made up of 8 trunk vertebrae fused with ribs and overlying dermal bones. The plastron (ventral portion of the shell) is made up of the sternum and gastralia fused with external dermal bones. The neck is made up of 8 cervical vertebrae. All turtles are oviparous with internal fertilization, and many have temperature-dependent sex determination.

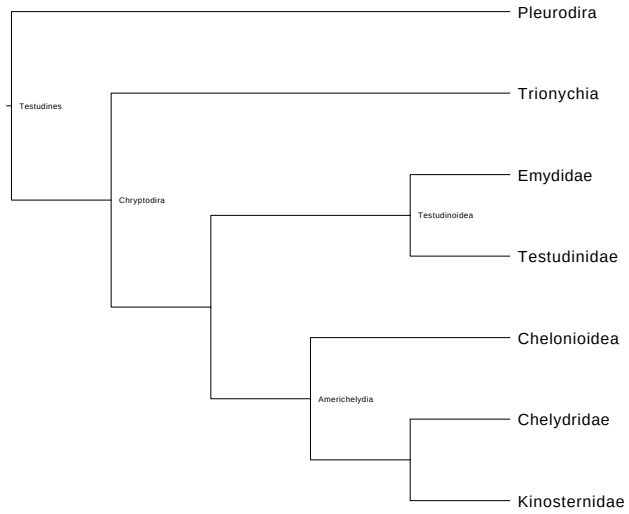

Figure 4: Testudine Relationships

- **Pleurodira** (side-neck turtles)
  Withdraw head and neck laterally within the outer margin of the shell
- **Cryptodira** (S-neck turtles)
  Withdraw head and neck within shell in S-shape

- **Trionychia** (softshell turtles)
  Flat, pancake shells, no epidermal scutes
- Family **EMYDIDAE** (pond turtles)
  Moderately domed carapace, tear-drop shaped carapace
- Family **TESTUDINIDAE** (tortoises)
  Terrestrial; forelimbs shovel-like for digging, hind feet elephantine for walking.
- **CHELONIOIDEA** (sea turtles)
  Limbs modified into flippers, streamlined shell
- **CHELYDRIDAE** (snapping turtles)
  Large head, flattened carapace, long tails (about as long as carapace)
- **KINOSTERNIDAE** (mud and musk turtles)
  Plastron with 10 or 11 scutes, defined overhanging beak, potato-like (oblong) shape

Crocodilia

Robust skull, long snout, strongly toothed jaws, short neck, robust cylindrical trunk, laterally compressed tail, short but strongly developed limbs with webbed feet. Largest living reptiles. Bony plates (osteoderms) covered by keratinou skin provide armor to neck, trunk, and tail. All crocodylians are oviparous with internal fertilization, and have temperature-dependent sex determination.

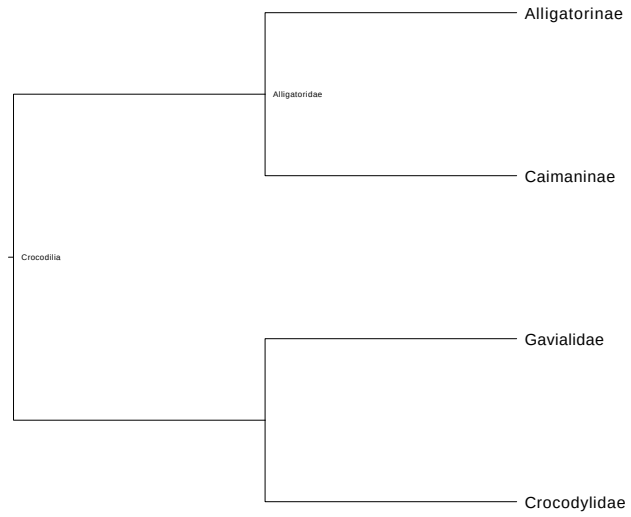

Figure 5: Crocodilian Relationships

- Family **ALLIGATORIDAE**
  Broad snout, mostly new world distribution (one exception in alligatorinae)
  - **Alligatorinae** (alligators)
    Two extant species (Eastern China and North America)
  - **Caimaninae** (caiman)
    New world distribution (Central and South America). Fourth mandibular tooth exposed when mouth closed. * No specimen
- Family **GAVIALIDAE** (gharials)
  Long, slender snout (fish eaters). Asian distribution. * No specimen
- Family **CROCODYLIDAE** (crocodiles)
  Global distribution, relatively narrow snout.