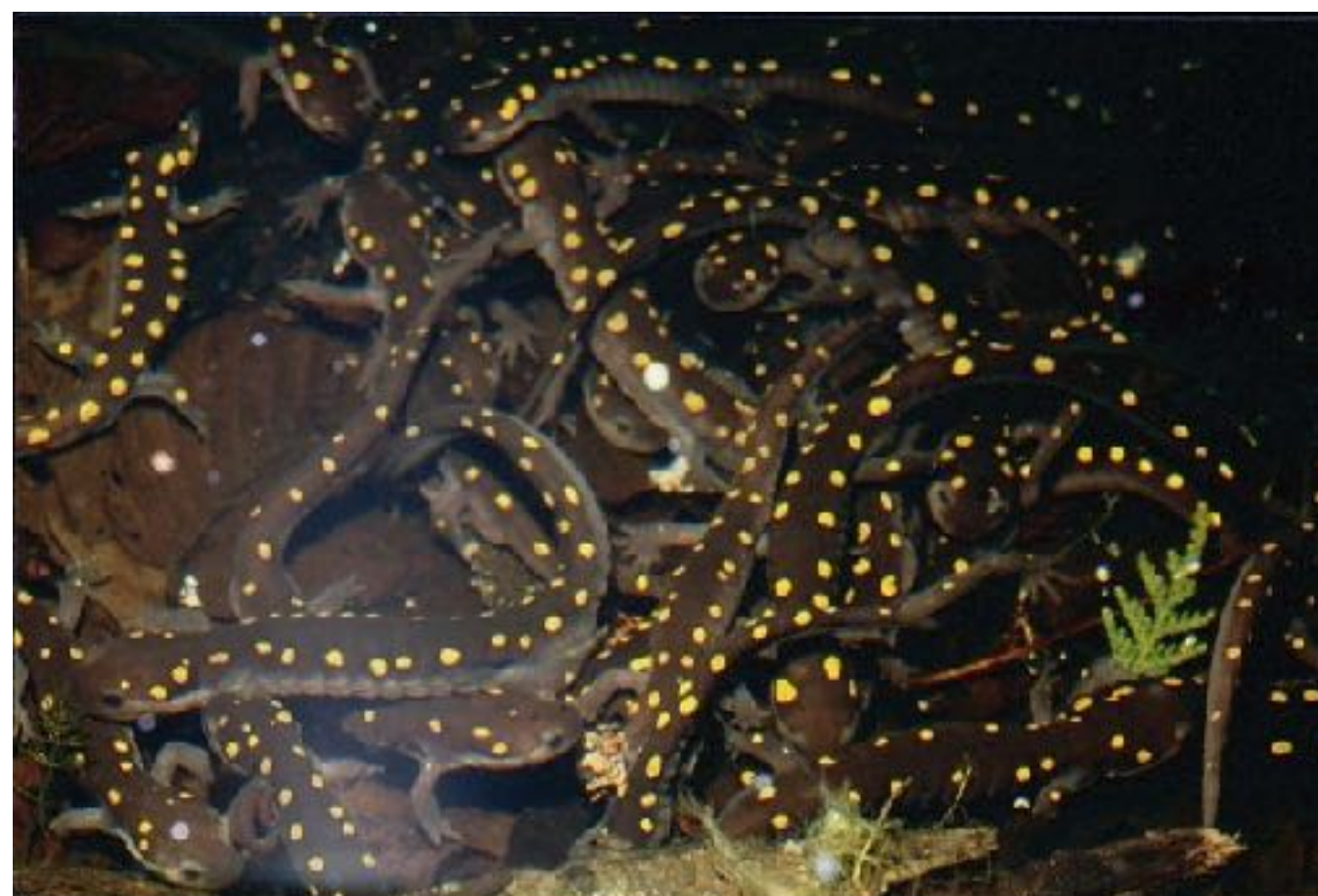


Behavior and Reproduction



Announcements

- Final exam study guide: going out right after class today
- Should have everyone's results by today, expect feedback this afternoon after class
- Tomorrow: possible guest lecture from Annette Evans, *Plethodon cinereus* expert!
- Discussion: due tomorrow at 9am
 - Email (as usual):
 - Subject: Field Herpetology Discussion
 - File name: LastName_Discussion.docx

Discussion Section Guidelines

- Important Sections (paragraphs)
 - A restatement of your research question and hypothesis, followed by a statement of whether or not your data supported this hypothesis
 - A section here for every section of your results, talk about your **reasoning for why** you observed your results: interesting biological phenomenon, or error in experimental approach?
 - If interesting biological phenomenon, cite any other papers that support your experimental outcome
 - Talk about any other **alternative biological explanations** for your results, if any, and argue for/against this alternative biological explanation
 - If error, talk about how your experimental setup could have led to your results
 - End with a paragraph explaining logical follow-up experiments to further pursue your hypothesis (either correcting errors, gathering more data, or both), and argue why it's scientifically worth it

Social Behavior

- We don't think of amphibians and reptiles as being “social”
 - Ants, bees, meerkats
 - Even lions
- For most reptiles and amphibians, social behavior revolves around reproduction



Amphibian Social Behavior

- We are familiar with frog calls, but the purpose of the call varies with each species
- Advertising self or territory?



Spring Peepers

- *P. crucifer* males call to attract females
- The calls serve to advertise males.
- With so many males calling, the loudest is the fittest.



Bullfrogs



- Male bullfrogs compete with each other for territory
- Larger frogs can acquire larger and better suited territories

Bullfrogs

- Satellite males sit on the edge of territories
 - Smaller territories
 - Try to catch females as they come to the larger male territories



American Toads

- Redefines “free-for-all”
- Males call, then physically fight for females



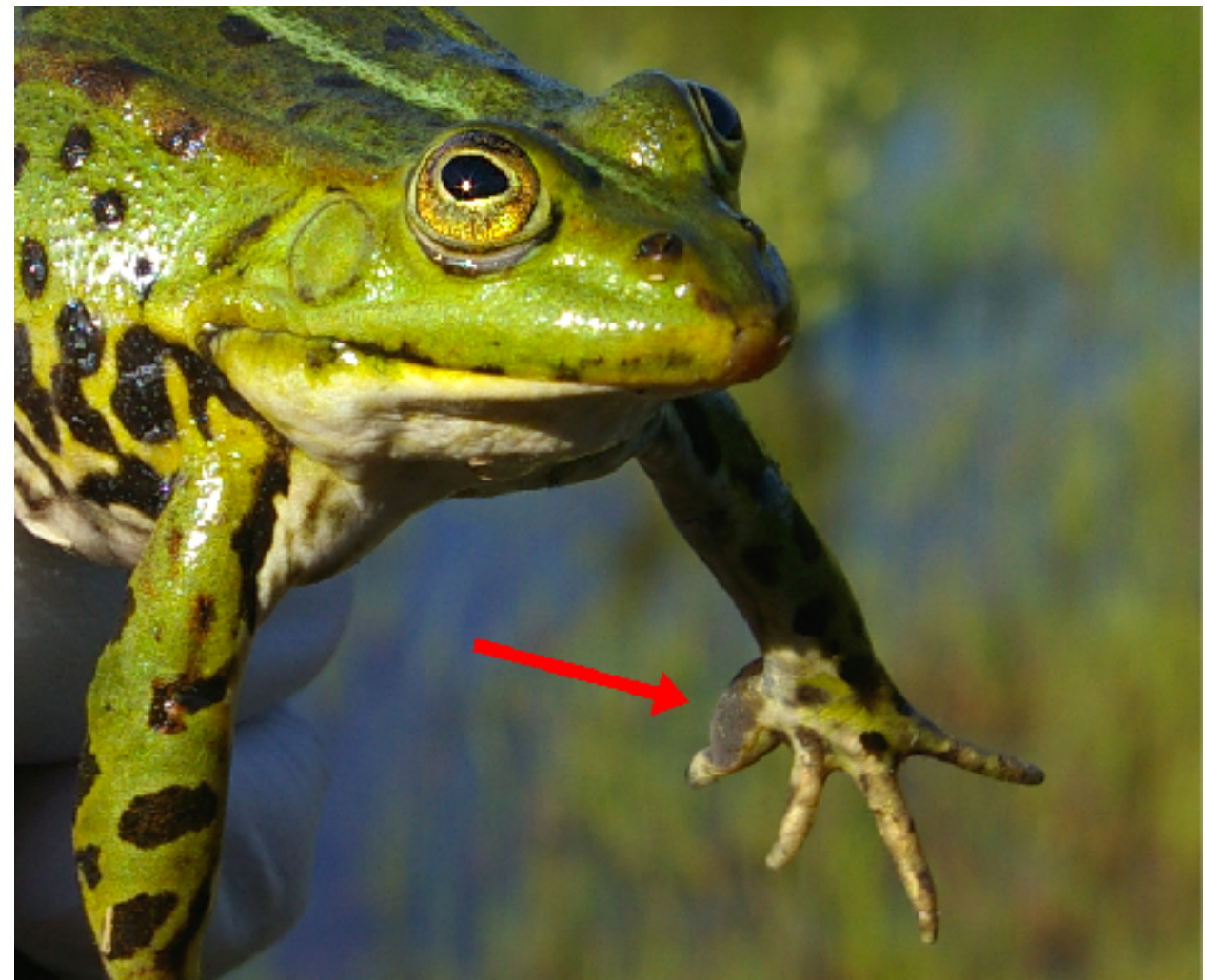
Mating in Frogs

- Amplexus
- Fertilization is external
- Males clasp the female behind her armpits



Nuptial Pads - Frogs

- Use nuptial pads to grasp the females (and stay on!)
- Can use this to sex frogs during mating season



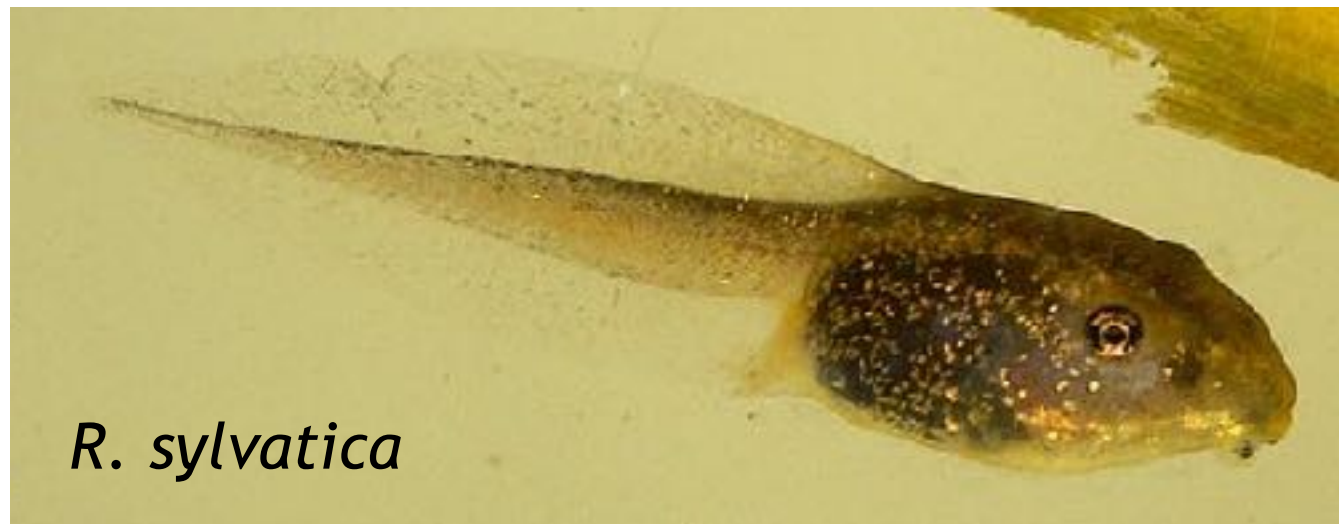
Mating in Frogs

- As the female lays her eggs, the male releases the sperm.
- The eggs are laid in masses or strings.
- Species can be identified by how the eggs are laid, and where they are laid.



Mating in Frogs

- Eggs hatch into tadpoles, completely aquatic larva.
- Tadpoles develop, grow, then metamorphose into frogs





P. crucifer



R. clamitans



R. sylvatica

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R. catesbeiana

© Gary Nafis

Mating in Salamanders

- Early spring is marked by the migration of many species of salamander
- Connecticut salamander courtship, copulation, and egg laying varies between clades
 - *Salamandridae*: aquatic courtship, aquatic eggs
 - *Ambystomidae*: aquatic courtship, aquatic eggs
 - *Plethodontidae*: both terrestrial and aquatic courtship (depending)

Salamandridae

- Similar to frogs, nuptial pads, or “sexual excrescences” used by newts to grasp the female
 - Only seen in red spotted newts among CT salamanders
 - On their hind limbs! ...why?
- Newts firmly grasp female pectoral girdle, stroke their face, waft pheromones, and eventually lay spermatophore for female to pick up



Video

Ambystoma

Plethodontidae

- Many of the plethodontids have elaborate courtship rituals
 1. Male approaches, slaps head on female tail / head
 2. Female tail-straddle walk
 3. Male turns, continues head slapping
 4. Male deposits spermatophore packet
 5. Female picks up packet with cloaca



Video

Plethodontidae

- Eggs may be laid in the stream (*Eurycea*), next to stream (***Desmognathus***) under moss (*Hemidactylium*), or within logs (*Plethodon*)







Plethodon

- Young may be aquatic larva or direct developers
 - Switches often throughout the family



Reptiles

- Social behavior is primarily mating
- The turtles basking together?
- Not buddies, just a good place to be



Turtles

- Some turtles do exhibit some forms of territoriality
- **C. serpentina** has a home territory absent of other males, and males generally avoid entering one another's territory



Mating in Turtles

- Male *C. picta* approach and retreat females, brushing them with elongated claws
- Male wood turtles will fight for position
- Larger males end with more matings



Turtle Egg Laying



- All turtles lay eggs in nest
- Nesting turtles often travel away from their home habitat
- *S. odoratus* shares nesting sites with multiple females

Chrysemys picta

- Nest in sandy areas, often exhibiting remarkable site fidelity over many years
 - Often killed crossing roads reaching these sites
- Females are particularly picky about nest temperature
 - May dig false nests



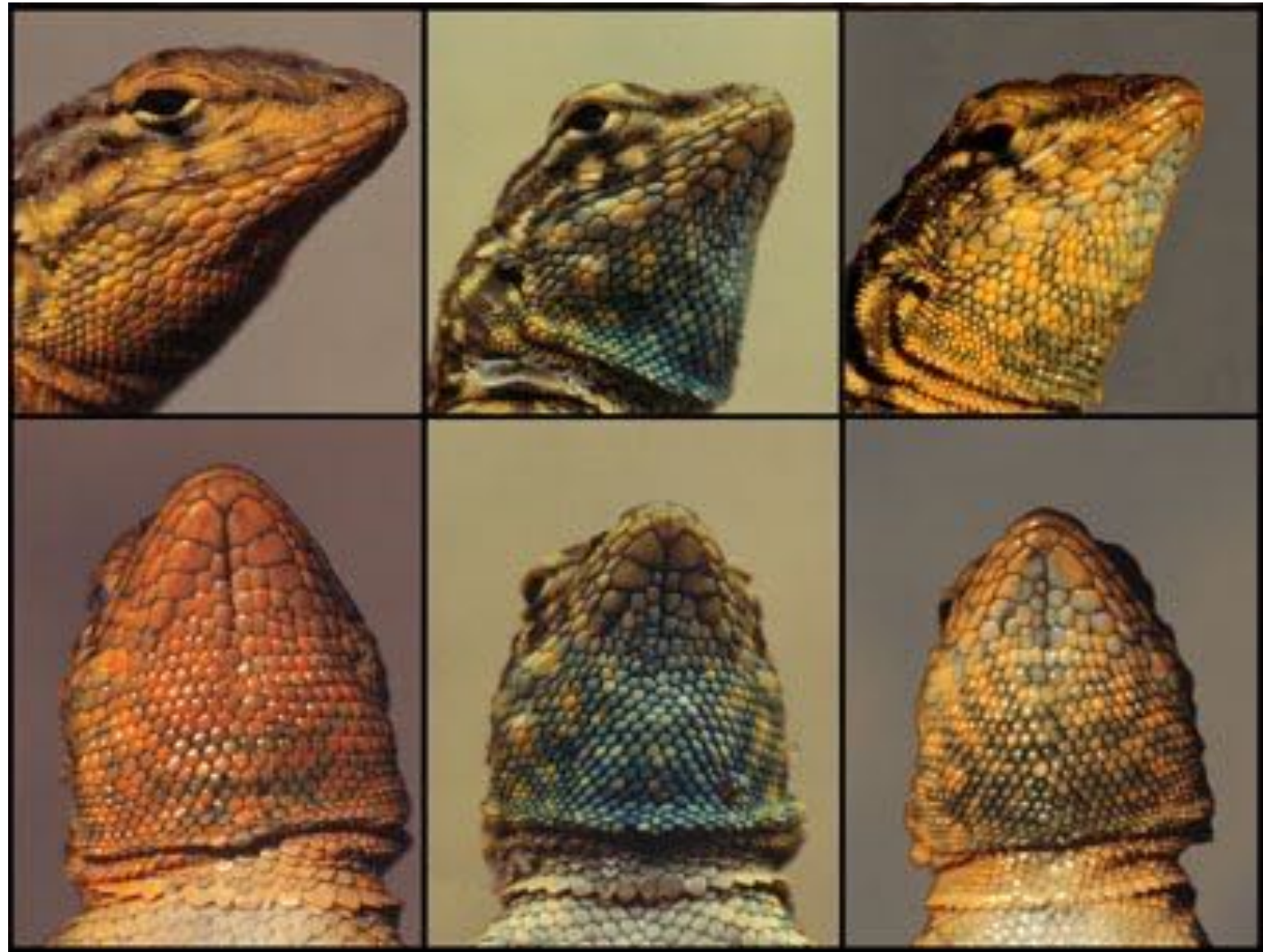
Turtles

- Our other local turtles bury their eggs in various locations, typically softer soils near lakes/ponds



Lizards

- Lizards have a diverse array of behaviors and mating strategies
 - Male/male combat
 - Territories
 - Displays



Rock, Paper, Scissor Lizards

Plestiodon



- Large males develop territories in prime display habitats, fight off other males
- Males bite the female's neck and coil around her, until their cloacas are in contact for spermatophore exchange via **hemipene**
- Eggs are laid under logs



Snakes

- Snakes are also known for a variety of mating strategies and behaviors
- Remain squamate mating strategy, the male coils around the female, often biting her, until their cloaca are aligned for passage of a sperm packet via **hemipenes**



Colubridae

- Our colubrid snakes, *Thamnophis sirtalis*, *Nerodia sipedon*, *Coluber constrictor*, *Storeria dekayi*, and *Diadophis punctatus* all mate soon after emerging from the hibernacula.
- Coluber and [Nerodia](#) are the easiest to observe

Garter Snakes

- *Thamnophis* in Canada are famous for the large “[mating balls](#)”.
- Males emerge first, awaiting females
- Upon emergence, males rush the female
 - The first to mate with her inserts a copulation plug
- Females can drop this plug days after mating, whereupon she mates with a second male away from the hibernaculum



Viperidae

- Copperheads
 - Females emerge first from the hibernacula, begin feeding right away
 - Males emerge some time later, then search out and find the females
- Timber Rattlesnakes
 - Males fight for dominance and opportunity to mate during the height of their summer activity, July - August



FIGHT!!!!