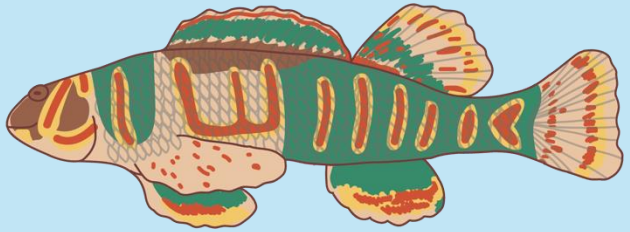
Tales of Freshwater Fish Speciation: Build Your Own Dichotomous Keys



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VA SEA Lesson Plan 2025

High School Biology, Life Science, and Environmental Science

VA SEA

VIMS | William & Mary

Virginia Institute of Marine Science

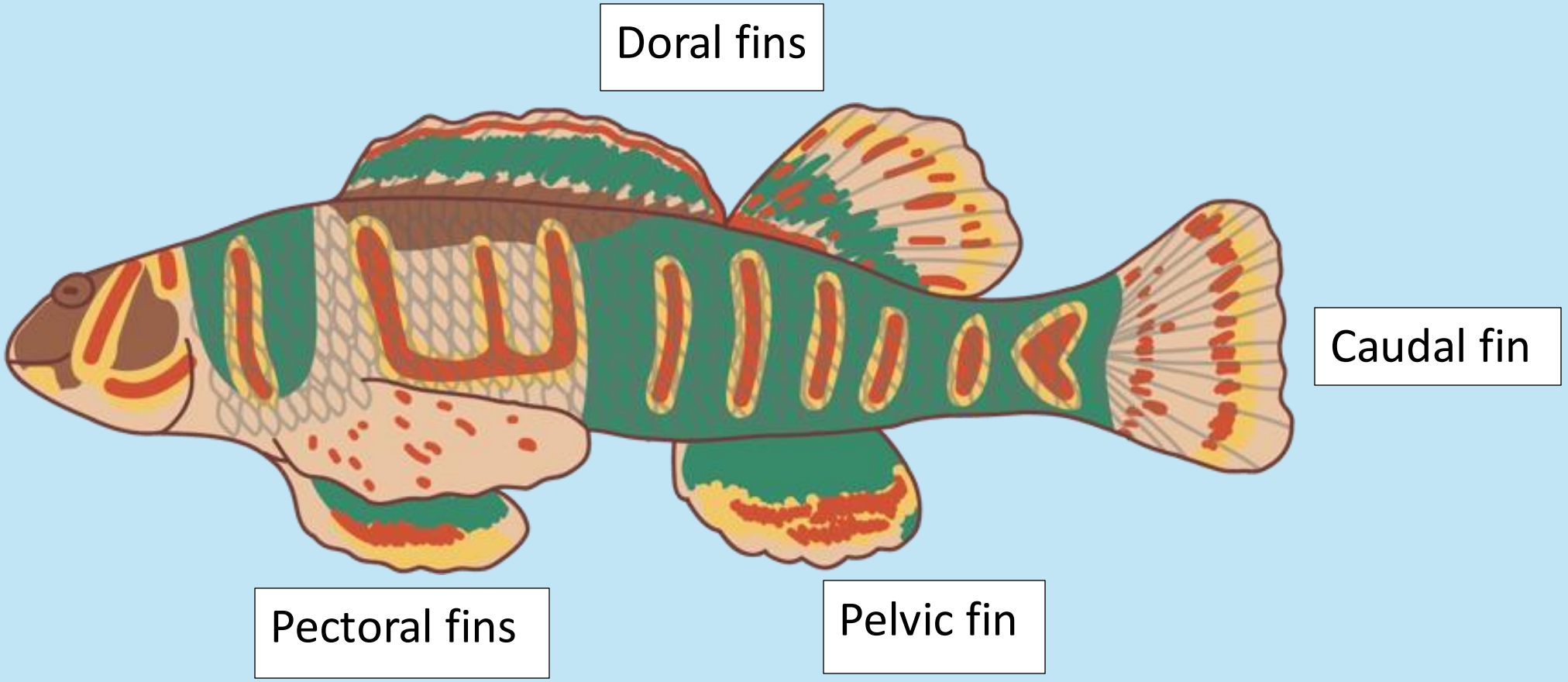
Meet the scientist!

- My name is Kaitlyn but I like to go by Kaite. My name rhymes with my study species: skates!
- I am a 3rd year PhD student at the Virginia Institute of Marine Science (VIMS).
- At VIMS I explore questions about skate speciation, DNA, teeth, and even ecology.
- When I am out field collecting skates, I am very lucky that VIMS has the Nunnally Collection for thousands of fish to live, like a library.
- Although my research revolves around skates, every year, I collect fish water fishes from Virginia to add to the collection. Today we are going to learn more about those fishes.

Key Vocabulary:

- **Speciation (four types: allopatric, sympatric, parapatric, and peripatric speciation)**: the process by which new species arise (mutations, geographic distancing, etc.) across generations.
  - **Allopatric speciation** - a physical barrier leads to new species arising.
  - **Sympatric speciation** - adaptations occurring within the same region leads to a new species arising.
  - **Parapatric speciation** - partially separated geographical barriers (i.e., habitat loss) limiting gene flow leading to new species arising.
  - **Peripatric speciation** - isolation from the main grouping of the species across space and time leads to new species arising.
- **Dichotomous key**: an identification tool used by scientists to identify organisms based on a series of grouped categories that lead the user to the correct classification, or name.
- **Characters**: traits, used to best identify organisms.

Activity 2: ***REVIEW – How to select "good" characters?***



Flow of Activity 3: Jigsaw – **Build Your Own Dichotomous Key**

Step 1:
Students break into 7 groups and become ”experts” on their fish, figuring out key characters.

Step 2:
At least one representative from each group joins a new group to discuss the different fishes.

Step 3:
Students determine key differences and similarities among and between the different fishes.

Step 4:
Students build a dichotomous key!

Step 5:
Students swap dichotomous keys and see if they work.

Step 6:
Reflection. What did you learn?

Slides for students - online photographs:

Fish A: **Snubnose Darter, *Etheostoma simoterum***

Image Credit: Miguel Montalvo & Larson Palmgren

Fish B: **White Shiner, *Luxilus albeolus***

Image Credit: Miguel Montalvo & Larson Palmgren

Fish C: **Wounded Darter, *Etheostoma vulneratum***

Image Credit: Miguel Montalvo & Larson Palmgren

Fish D: **Rainbow Darter, *Etheostoma caeruleum***

Image Credit: Miguel Montalvo & Larson Palmgren

Fish E: **Cutlips Minnow, *Exoglossum maxillingua***

Image Credit: Miguel Montalvo & Larson Palmgren

Fish F: **Bluehead Chub, *Nocomis leptocephalus***

Image Credit: Miguel Montalvo & Larson Palmgren

Fish G: **Banded Darter, *Etheostoma zonale***

Image Credit: Miguel Montalvo & Larson Palmgren

Thank you!

If you have any questions, please feel free to contact me, Kaitlyn Cisz, at krcisz@vims.edu