# Anderson Academy

## BIO 140 B · Binomial Nomenclature
## Extracurricular: Biology
## Lecture 1: Genus and Species from Zero: Linnaeus and the Rules of a Binomial

Anderson Academy

1.1



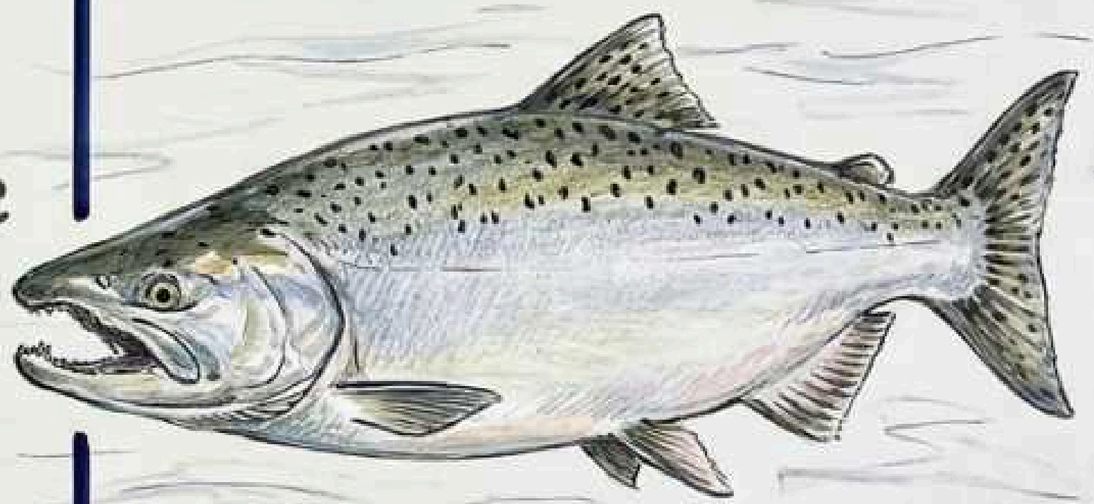
# SPECIES

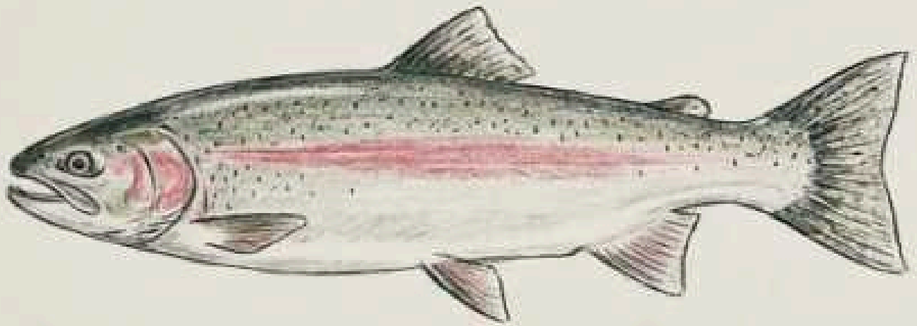
- One particular kind of living thing (plant, animal, or fungus)
- Members look broadly alike
- Animals can breed & produce healthy young
- Examples: Great blue heron, orca, live oak

# GENUS (jee-nus) | Plural: Genera

- A small group of closely related species
- They share a family resemblance (e.g., Pacific salmon and trout are all *Oncorhynchus*)
- Think of it like a surname

  (Note: Biology writes the surname first!)





## THE BINOMIAL = Genus + Specific Epithet

Oncorhynchus = The group (close cousins)

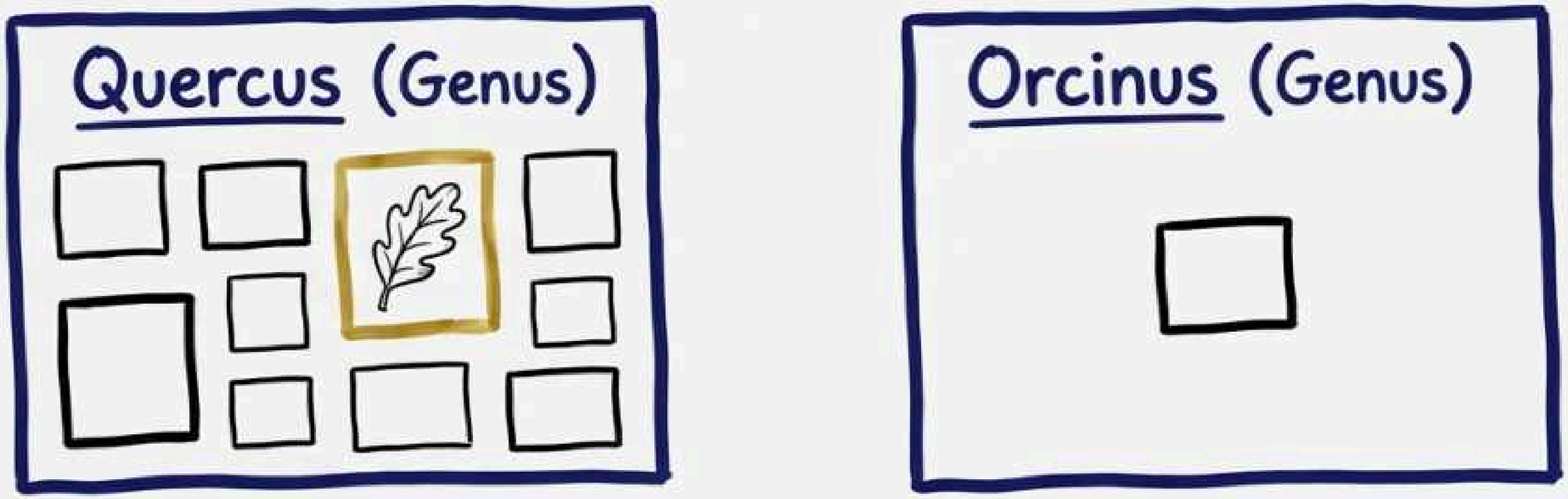
mykiss = The exact species (Rainbow trout/Steelhead)

*Crucial Rule: The second word alone means nothing! tshawytscha by itself is not a name.*

# THE FAMILY TREE (Nested Boxes)

1st Word = The Group (Bigger box)

2nd Word = The Member (Smallest box)



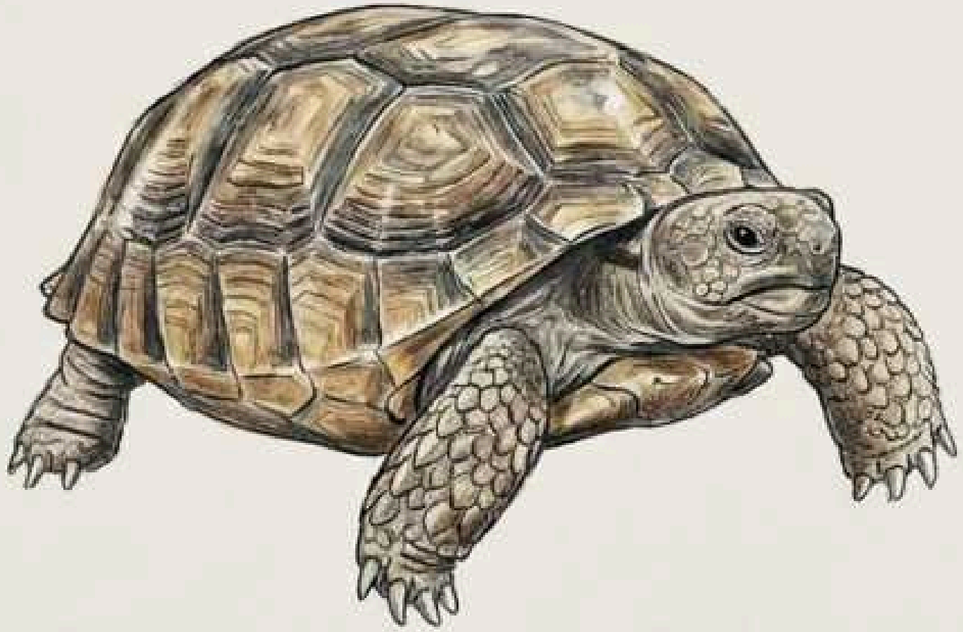

- Orcinus = Only 1 living species (orca)
- Quercus = Hundreds of species (oaks)

*A scientific name is always a group plus a member, in that order.*

# WHY NOT COMMON NAMES?



**Problem 1**: One name means different creatures.



Gopher

Florida Gopher
= Gopher tortoise
(reptile)

Western US Gopher
= Burrowing rodent
(mammal)

# WHY NOT COMMON NAMES?

## Problem 2: The name is simply wrong.



NO! NO!

- Spanish moss: Not a moss, not from Spain. (It's a pineapple relative, Tillandsia usneoides)
- Western red cedar: Not a true cedar. (It's a cypress relative, Thuja plicata)
- Douglas-fir: Not a true fir.

# WHY NOT COMMON NAMES?

**Problem 3:** One creature wears many names.

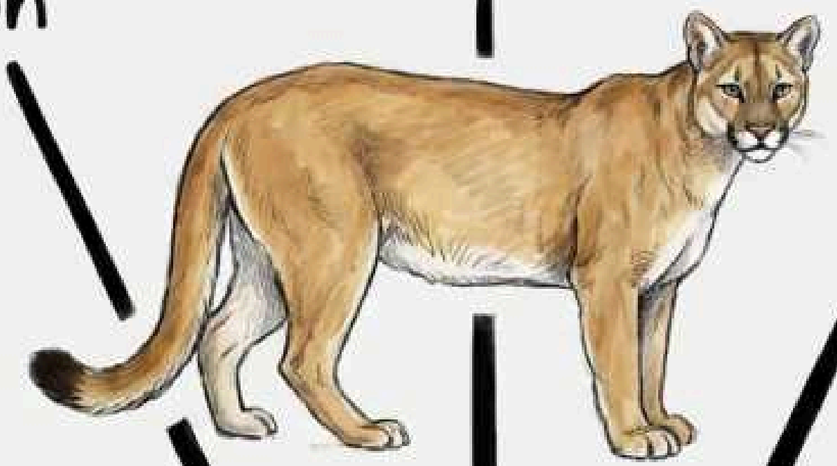
Cougar

Mountain lion

Puma

Panther

León (Argentina)

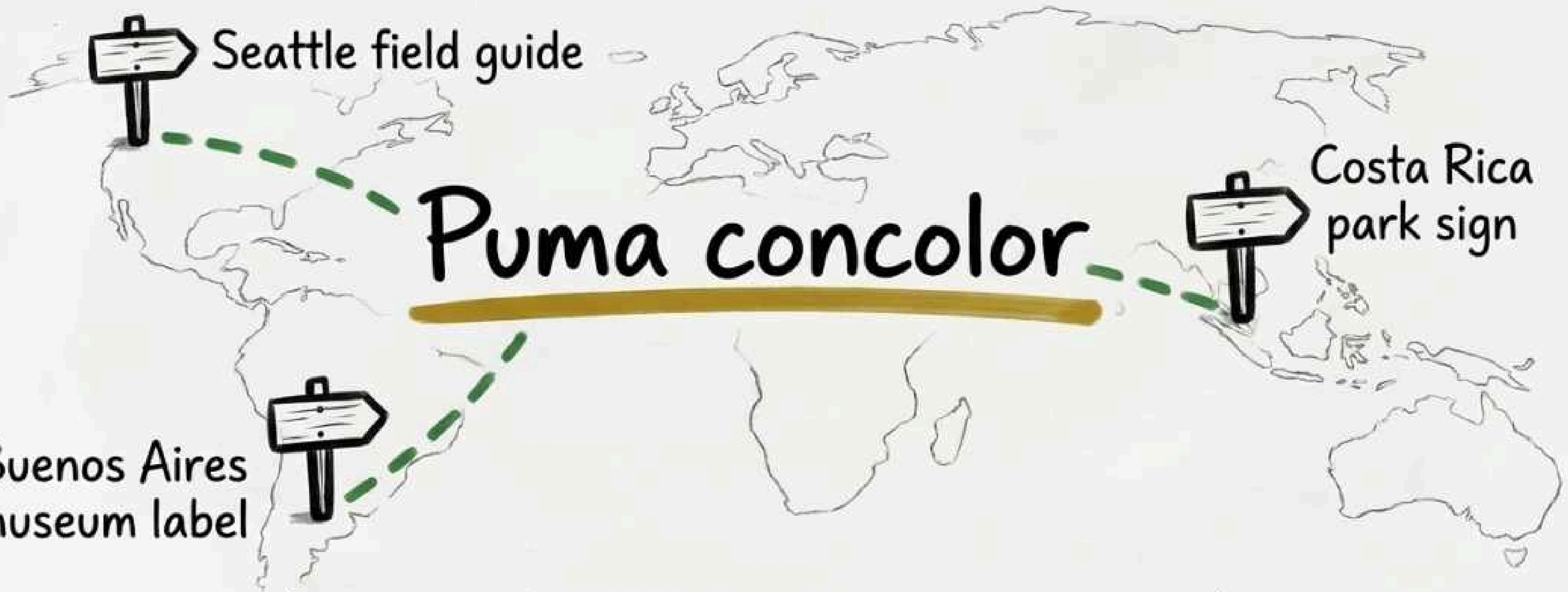


**Puma concolor**

*Also beware of near-twins across borders (e.g., Costa Rican ceiba tree vs. Argentine ceibo tree).

# THE SOLUTION

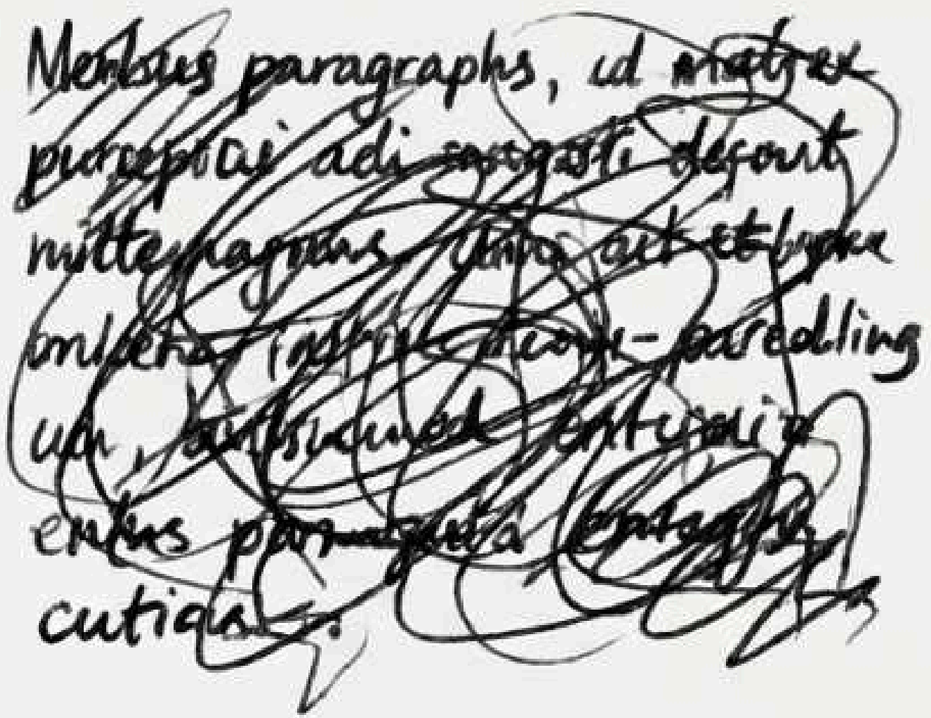
- Exactly one correct name under the rules.
- The same in every language.




*Travelers with a little Latin can read signs anywhere.*

# THE HISTORY

## Before 1750s:



Long, unstable Latin paragraphs.

## The Fix:

**Genus species**

Carl Linnaeus (Swedish naturalist) introduces a short, 2-word handle.



*It caught on because it was easy to remember.*

# THE STARTING POINTS

The two Linnaeus books that still anchor the rulebooks today:

- Plants: *Species Plantarum* (1753)
- Animals: *Systema Naturae* 10th ed. (Jan 1, 1758)

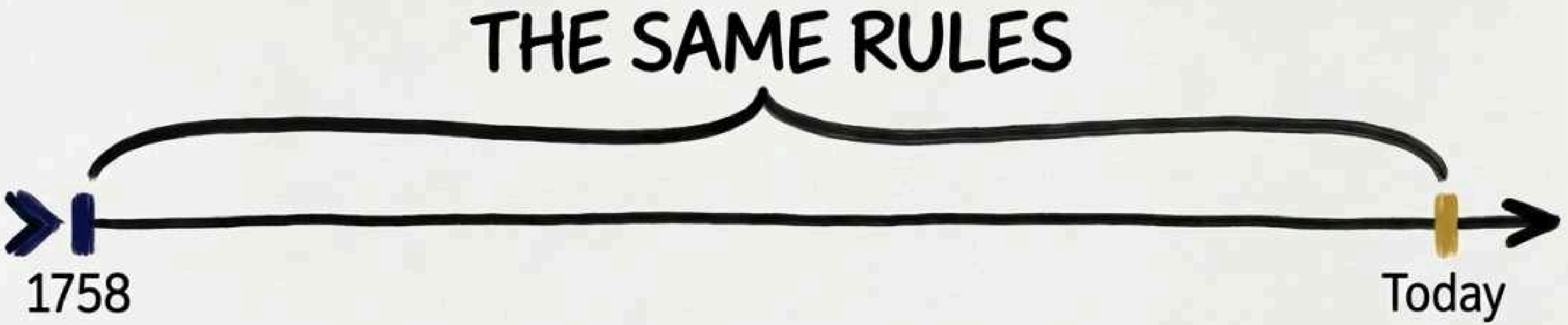


*Many travel species were named by Linnaeus himself: Orca, Great blue heron, Andean condor, and Scarlet macaw.*

# THE GENIUS OF CONTINUITY

- Linnaeus reused old words (*Quercus*, *Ardea*) & coined new ones.
- Today: Over 1 million animals and hundreds of thousands of plants named.

  *A new species from Costa Rica named last month obeys the exact same pattern set in 1758.*



# RULE 1: FORMATTING

*Ardea herodias*

In print:
Set in italics

Ardea herodias

Handwritten:
Underlined

- The slanted type signals a formal name from another language.

*Speech Rule: Nobody says abbreviations aloud. It is purely a writing convenience.*

# RULE 2 & 3: CAPITALIZATION

- Rule 2: Genus ALWAYS begins with a Capital letter.
- Rule 3: Epithet ALWAYS begins with a small letter.
  - * (Even if named for a person like Steller or a river like the Mississippi!)

**Cyanocitta stelleri** (Steller's jay)

**Alligator mississippiensis**



# RULE 4: ABBREVIATING

Once written in full, you may shorten the genus to its first letter + a full stop.

**Orcinus orca** → **O. orca**

- NEVER shorten the epithet!
- Spell out completely if two genera share the same starting letter on the same page.



O. orca

# RULE 5: GUIDEBOOK SHORTHAND

- sp. = One unidentified species in a genus
- spp. = Several species

Example: *Atta* sp.
(Some leafcutter ant, exact species unknown)

NO underline here!



# RULE 6: THE TRINOMIAL

Sometimes a 3rd word appears for a geographic subspecies or race.

1. *Oncorhynchus*
   Genus
2. *mykiss*
   Species
3. *irideus*
   Subspecies – Coastal form

} The Trinomial

- *Plants:* May use 'var.' (variety).
- *Note:* The extra word is italicized/underlined, but the abbreviation 'var.' is not.

# RULE 7: AUTHOR & YEAR

Scientific writing may add the person who first published the name (and year for animals).

*Ardea herodias* Linnaeus, 1758

Brackets mean the species was later moved to a different genus:

*Orcinus orca* (Linnaeus, 1758)

Moved!
Originally named
*Delphinus orca*.

# FOUNDATION BUILT

- *Species* = One kind of living thing
- *Genus* = Group of close relatives
- *The Binomial* = Genus + Epithet

[*Capital Genus*] + [*small epithet*] + [*Plain text Author*]

(all underlined or italicized)

*Next up: Opening the words up to read what what is hidden inside them.*