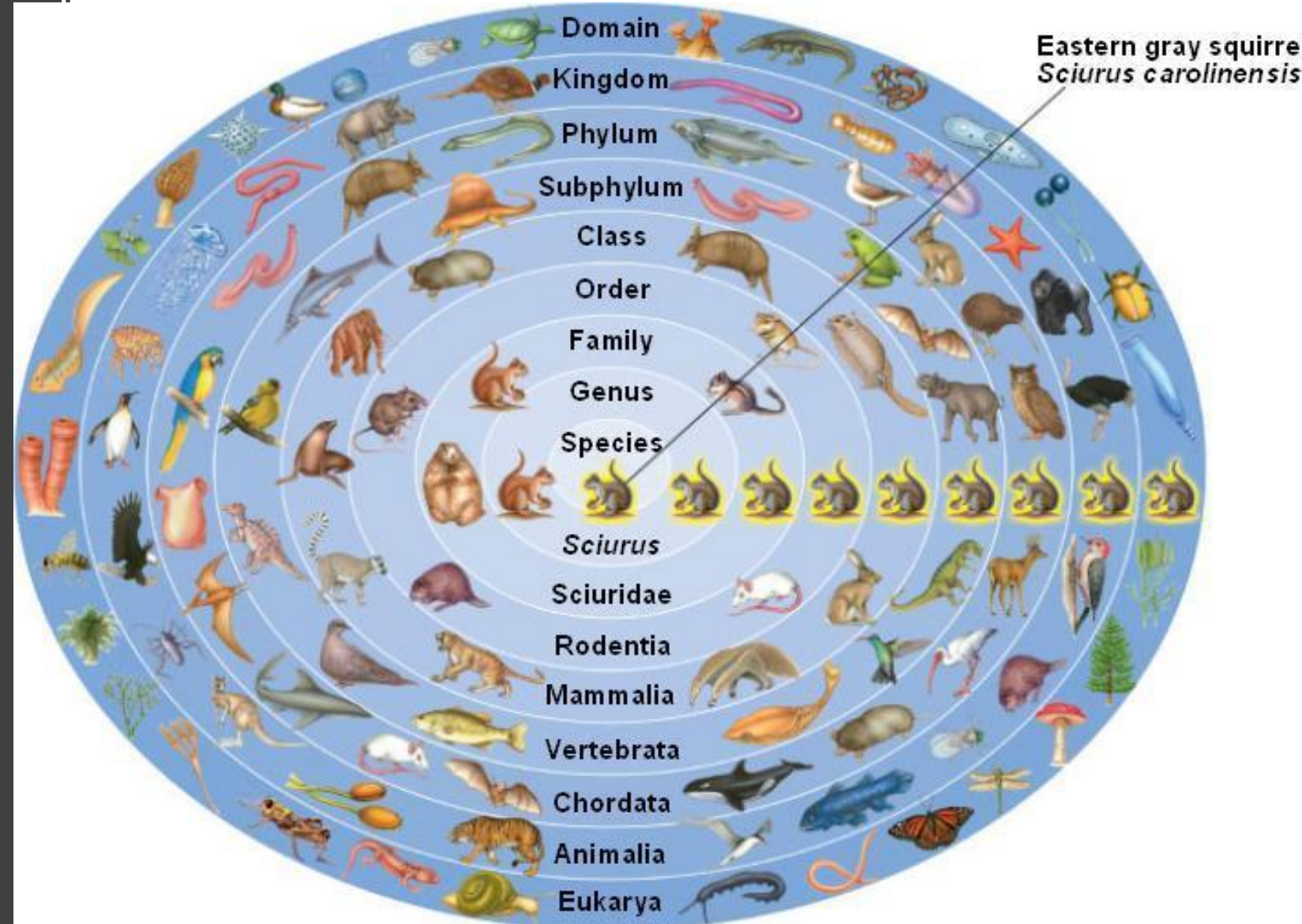
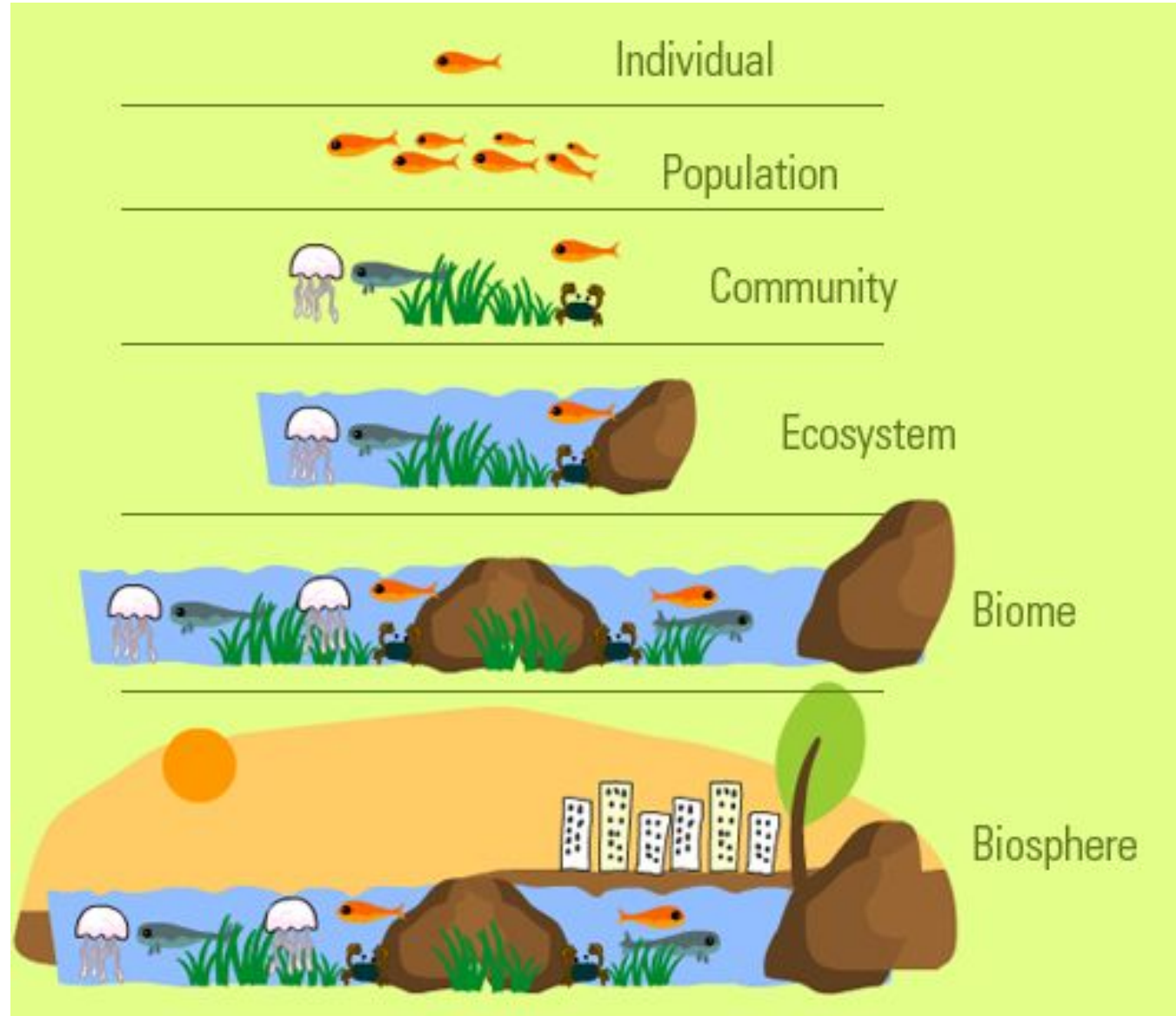


Species and Taxonomy



Everything starts with an individual that belongs to one species...



But what does “species” mean?

Myriophyllum spicatum



Ceratophyllum demersum



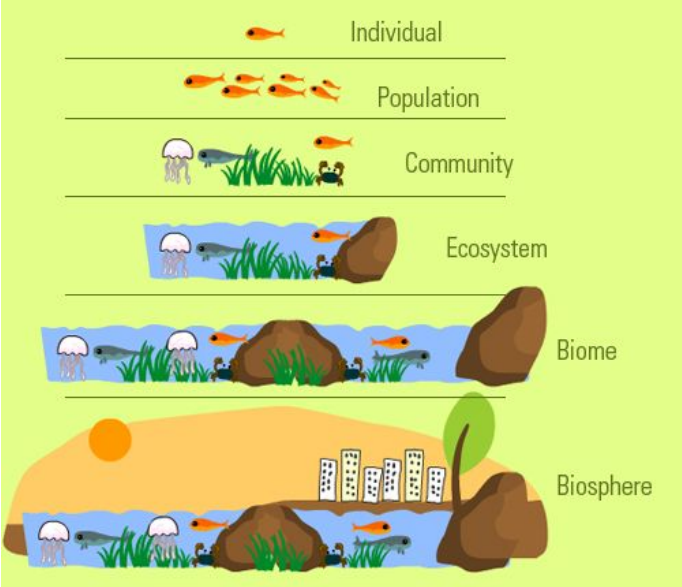
Homo sapiens



**What
species do
you already
know?**

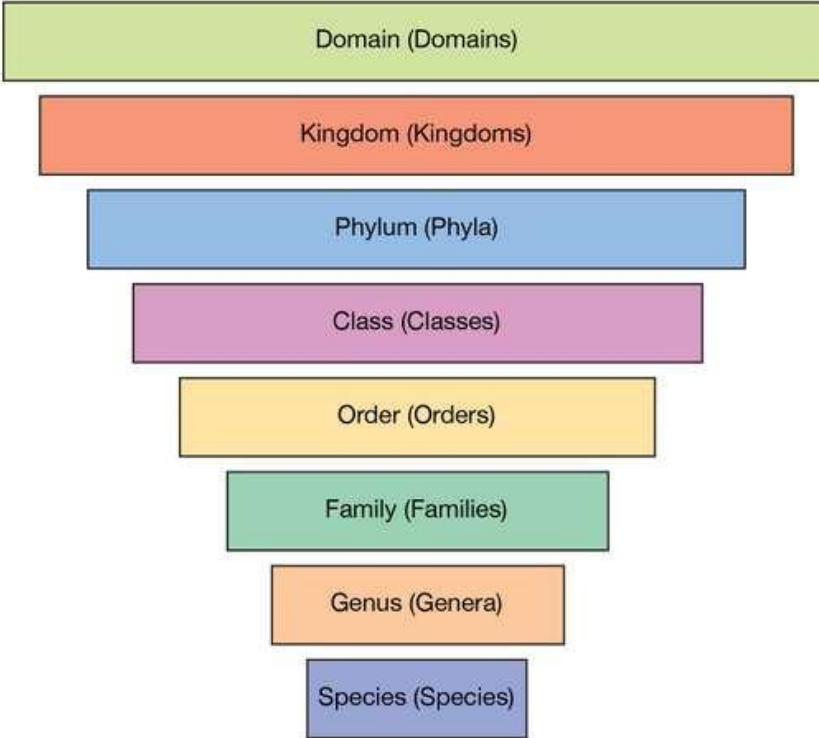


Biological species



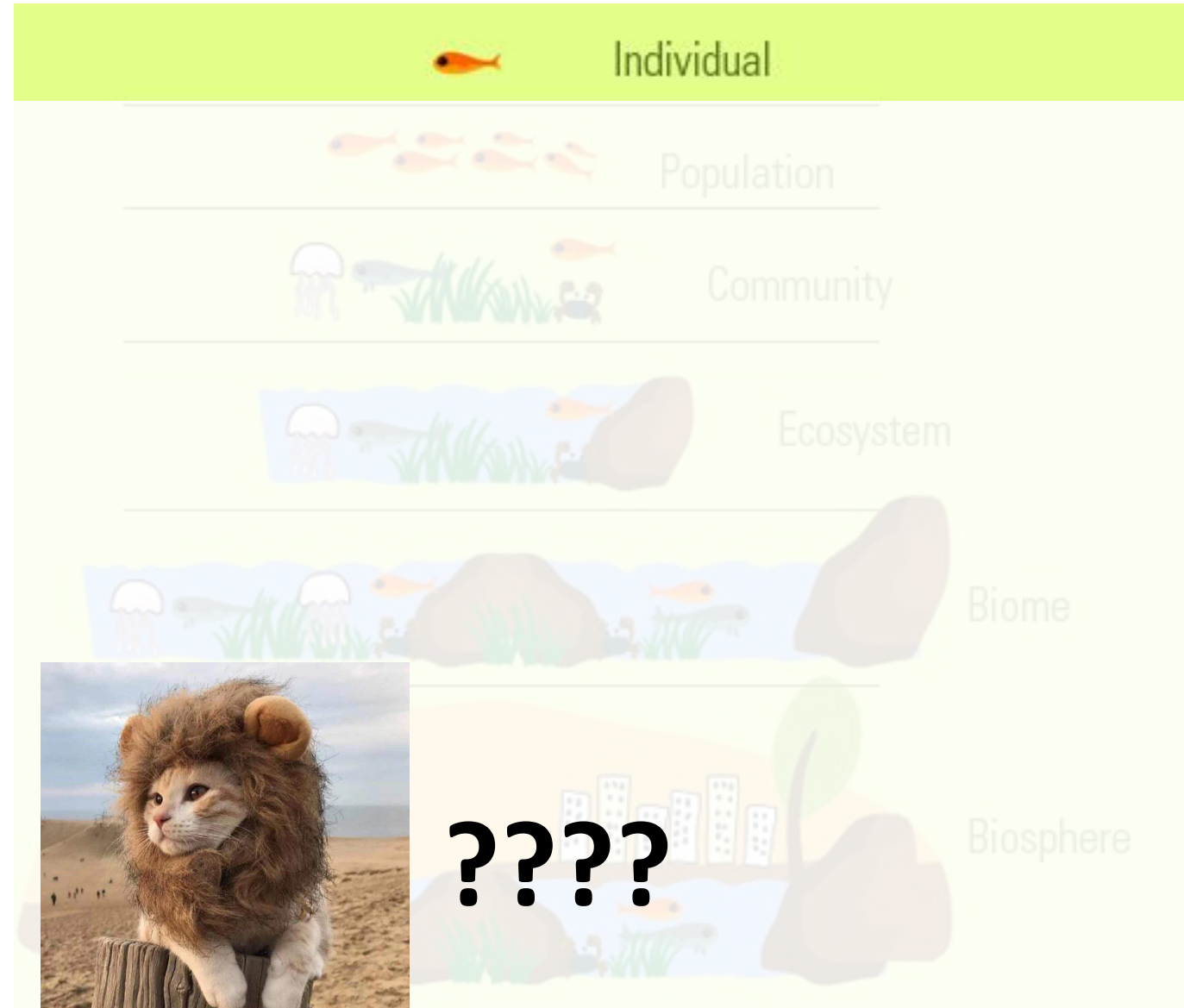
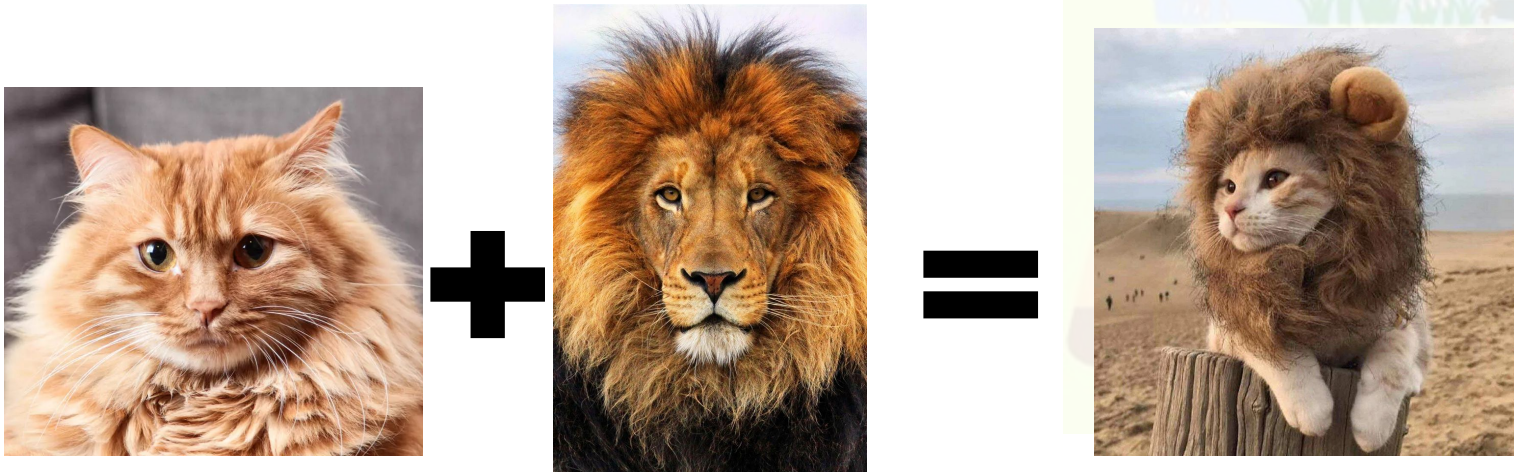
Taxonomic species

How animals are classified



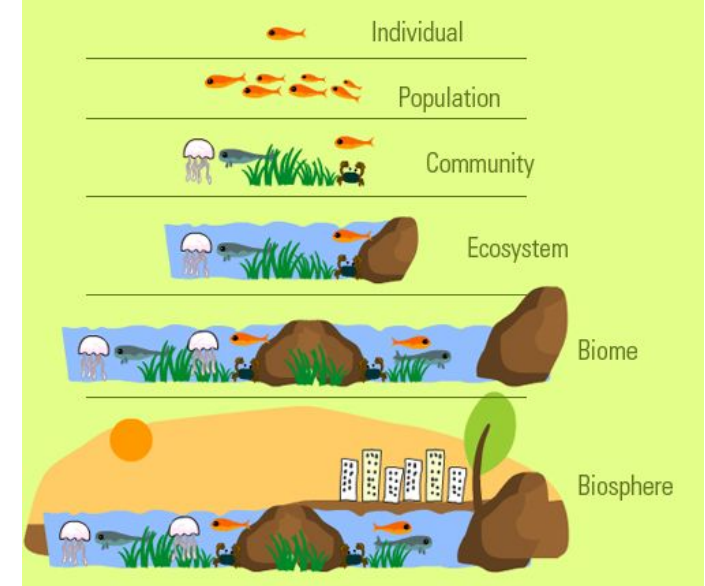
Biological species

Any living thing or organism.
Individuals do not breed with
individuals from other groups.



Biological species

- Group of organisms that **are reproductively isolated from other groups**, which means that the organisms in one species are incapable of reproducing with organisms in another species.

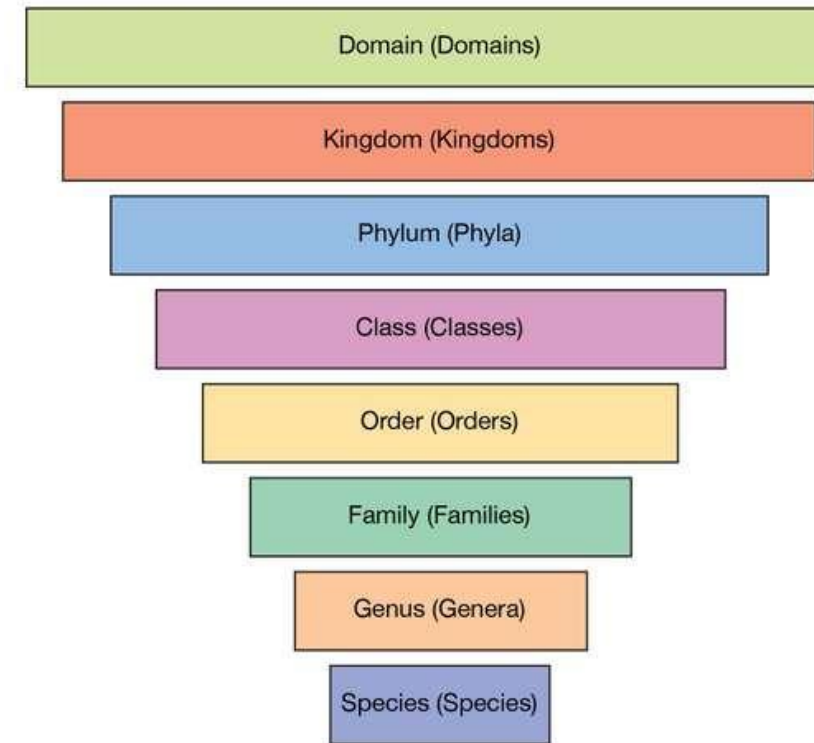


Taxonomic species

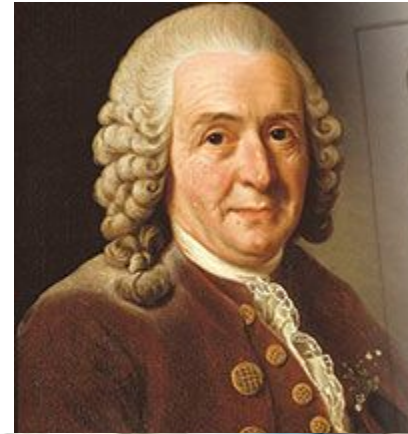
- It is the **most basic category** in the **system of taxonomy**

What is taxonomy??

How animals are classified



Taxonomist



Taxonomy

- Derived from the Greek *taxis* (“arrangement”) and *nomos* (“law”)
- Taxonomy is the “science of classification”
- Taxonomy classifies organisms into categories based on their biological characteristics.
- The system created by Swedish naturalist Carolus Linnaeus in the 1750s is internationally accepted: **Linnaean system** of **binomial nomenclature**



Benefits of Classifying (taxonomy)

- Accurately and uniformly names organisms
- Prevents misnomers such as “starfish” or “jellyfish” that are not really fish!
- Uses same language (Latin or some Greek) for all names



Sea “horse”

Confusion in Using Different Languages for Names



Latin Names are Understood by all Taxonomists



Binomial nomenclature = Two-word name (Genus & species)

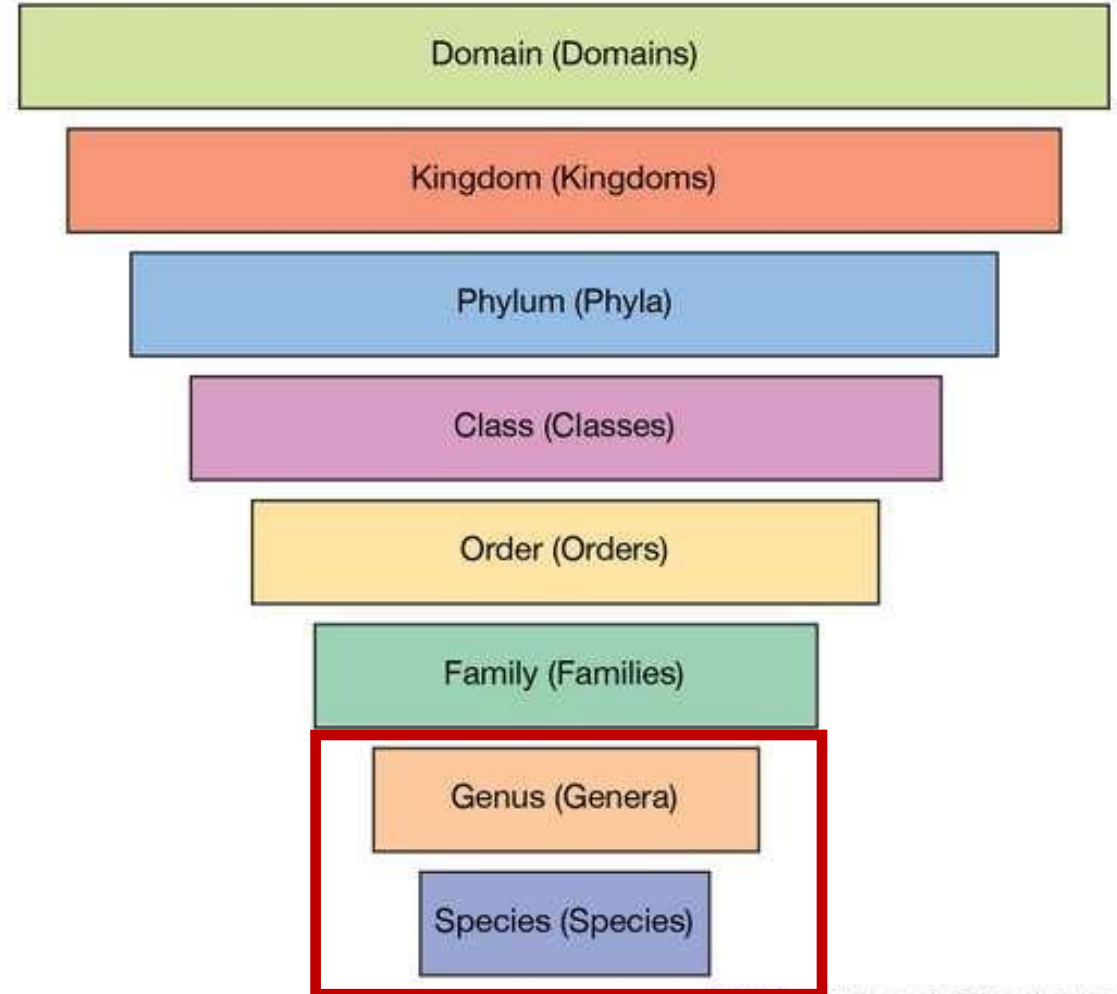
Paloma

In Spain 31100 “Palomas”

Paloma Lucena-Moya

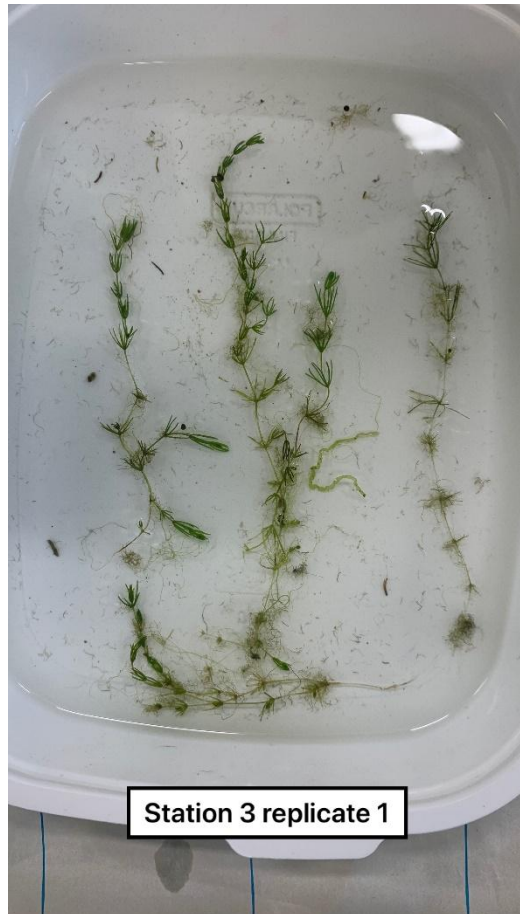


How animals are classified



Pojo Bay: Baseline study – species lists of macrophytes

Chara aspera □ *Chara* = **genus** *aspera* = **species**



Chara aspera

Chara baltica

Chara canescens

Chara connivens

Chara globularis

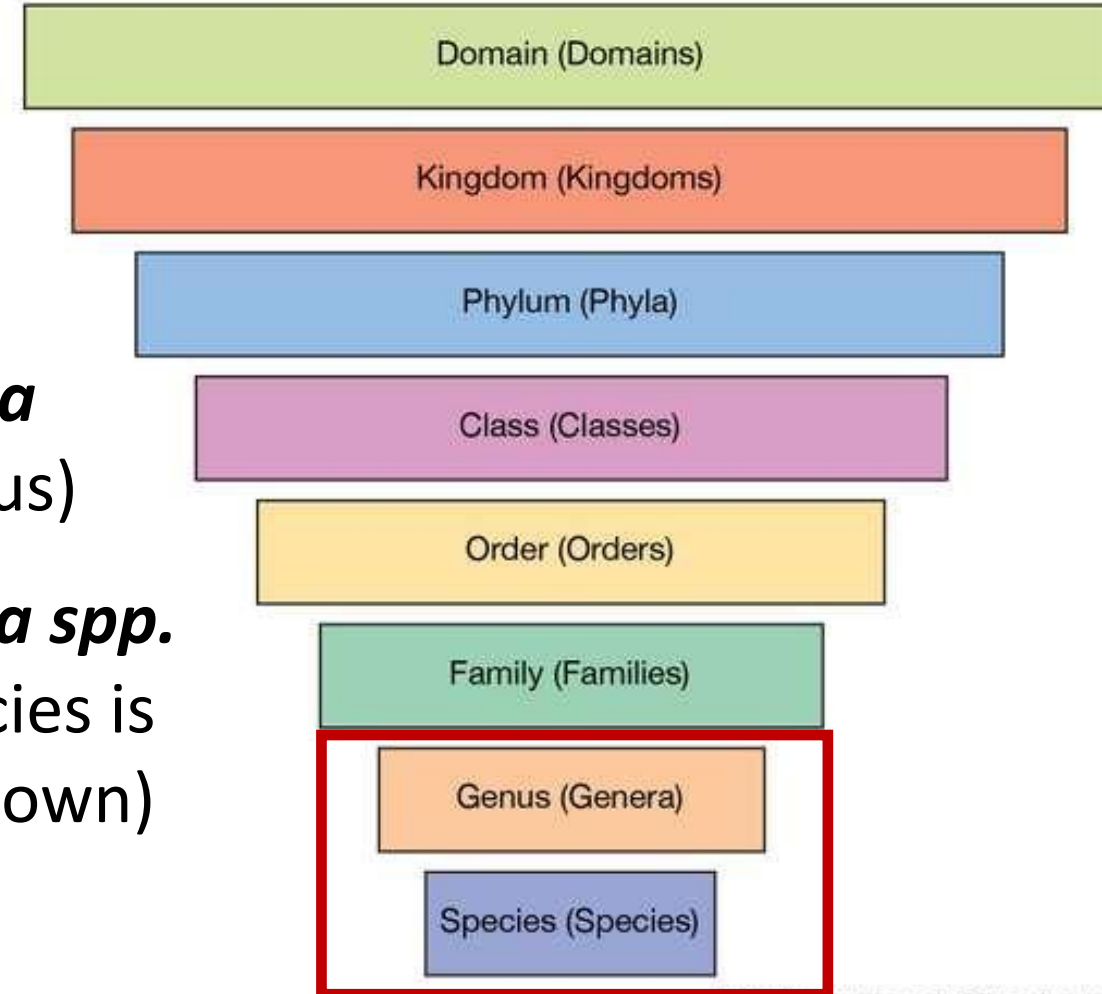
Chara tomentosa

Chara virgata

Chara
(genus)

Chara spp.
(species is unknown)

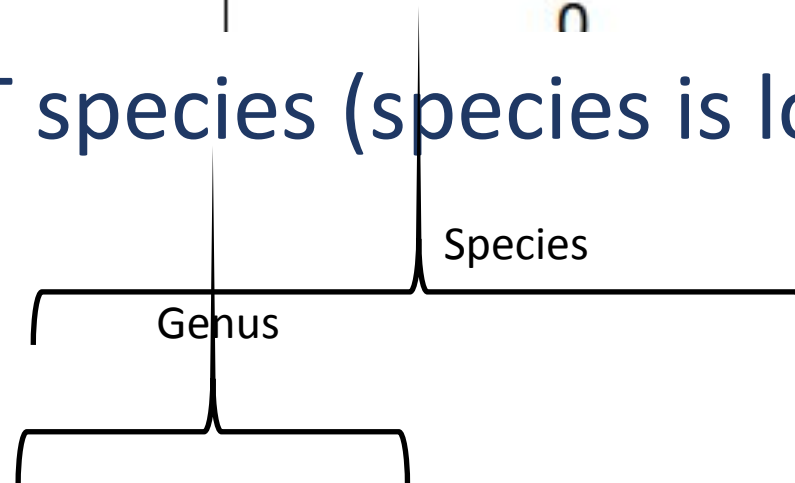
How animals are classified



Standardized Naming

- Binomial nomenclature used
- *Genus species*
- Latin or Greek
- *Italicized in print*
- Capitalize genus, but NOT species (species is lower case!)
- Underline when writing

Myriophyllum Spicatum	Chara Aspera
0	0
0	0
0	0
1	1
n	n



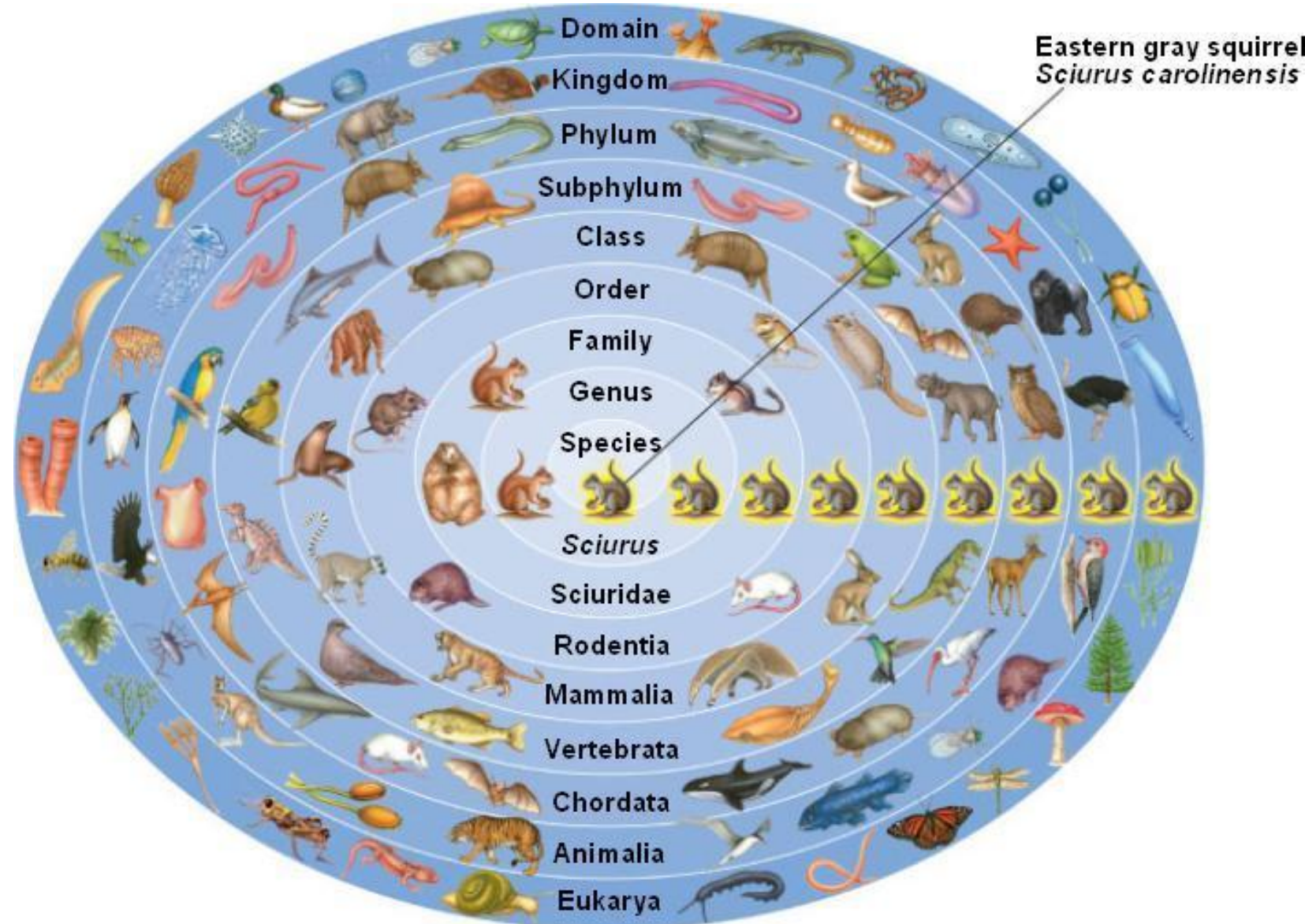
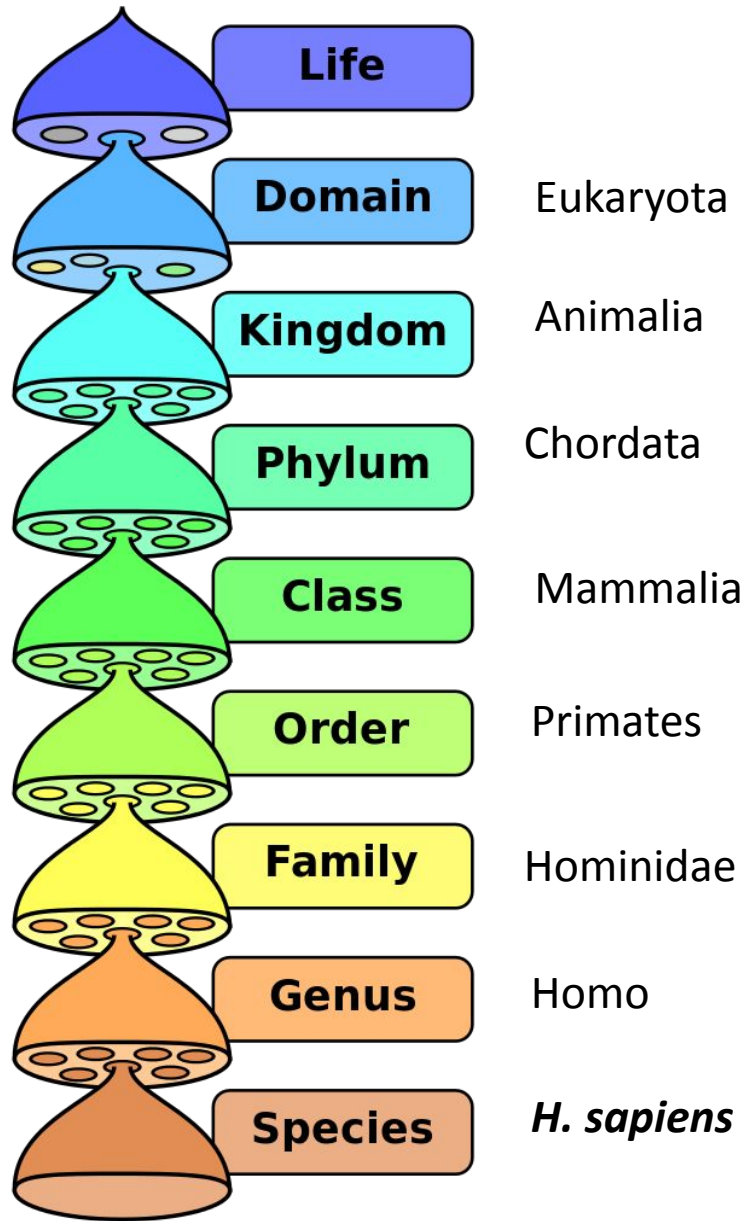
Myriophyllum Spicatum ✘

Myriophyllum spicatum ✔

Chara Aspera ✘

Chara aspera ✔

Taxonomic level



Taxonomy of Red-throated Diver – *Gavia stellata*



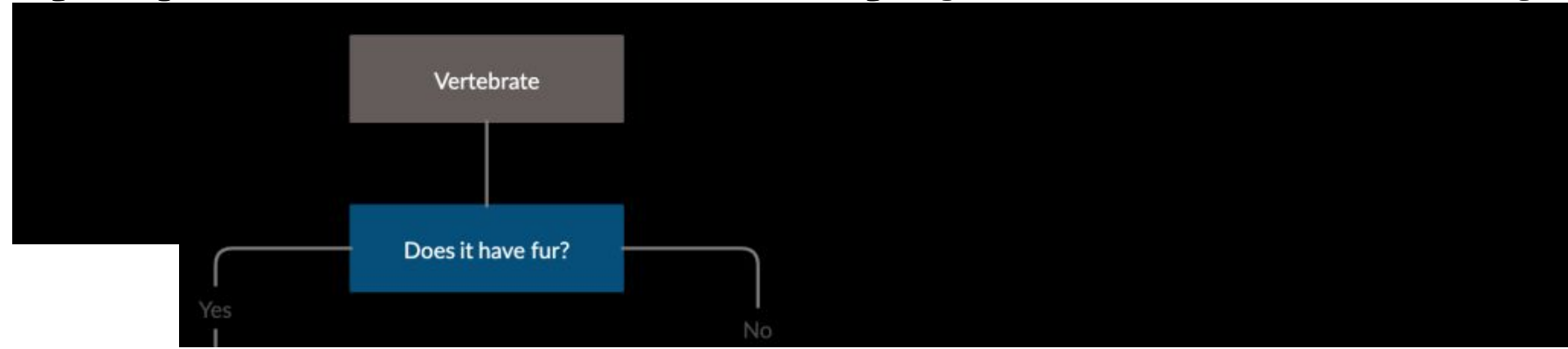
Kingdom	Animalia
Phylum	Chordata
Subphylum	Vertebrata
Superclass	Tetrapoda
Class	Aves
Subclass	
Infraclass	
Cohort	
Superorder	
Order	Gaviiformes
Suborder	
Infraorder	
Superfamily (-oidea)	
Family (-idae)	Gaviidae
Subfamily (-inae)	
Tribe (ini)	
Subtribe (-ina)	
Genus	<i>Gavia</i>
Subgenus	
Species	<i>stellata</i>
Subspecies	

<http://www.marinespecies.org/aphia.php?p=taxdetails&id=137188>

To identify species: Taxonomy (dichotomous) key

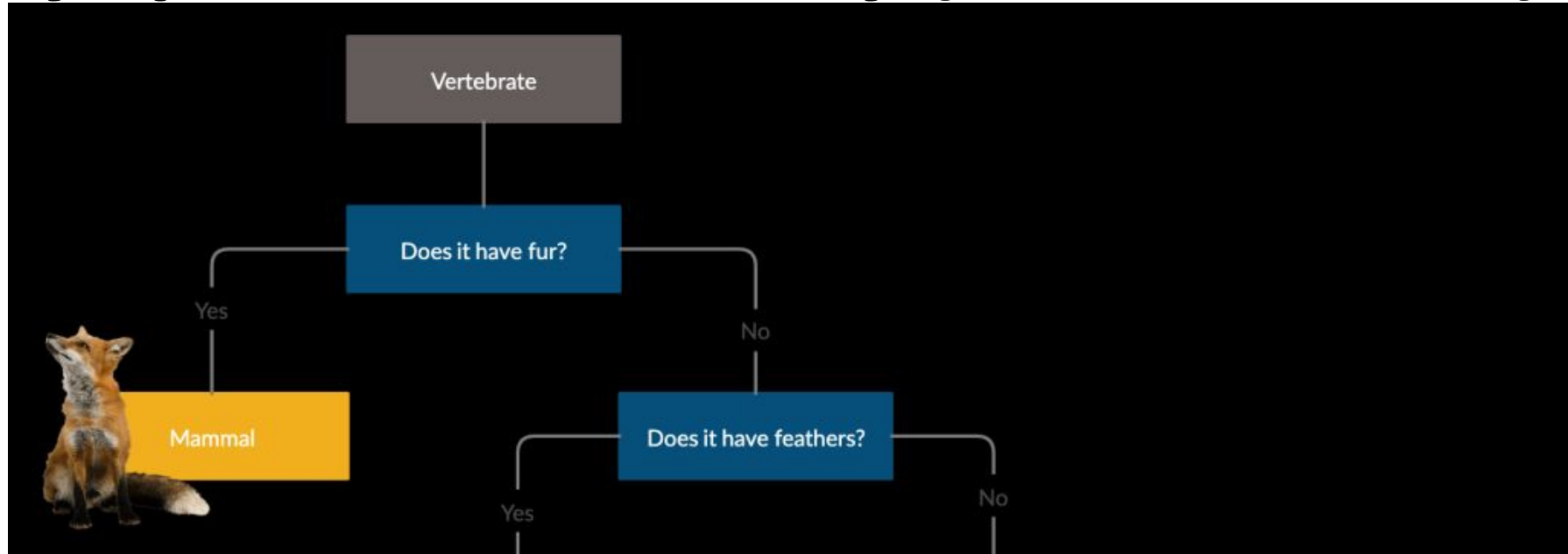
**Please think in one vertebrate animal !!
(keep in mind!)**

To identify species: Taxonomy (dichotomous) key



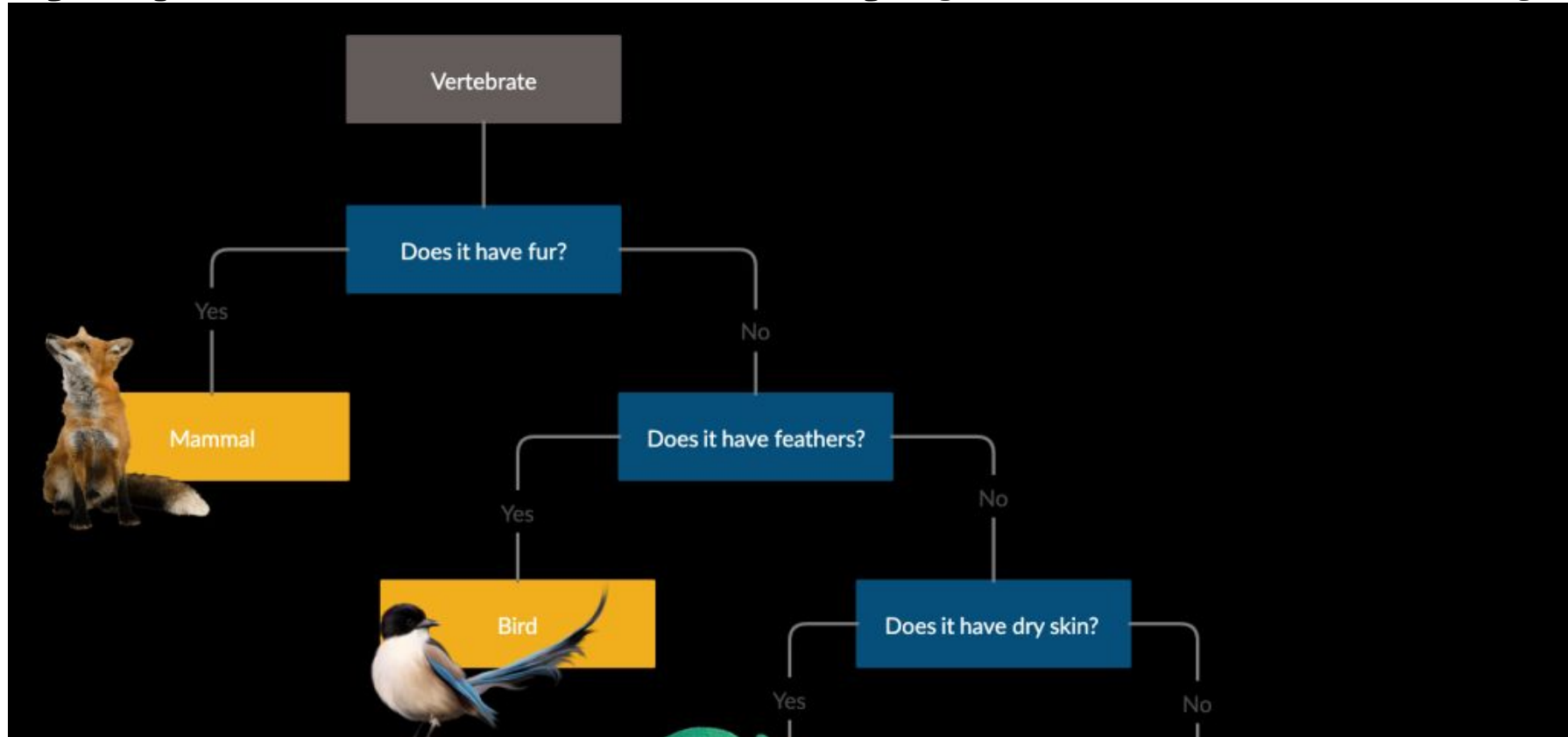
Dichotomous key 1

To identify species: Taxonomy (dichotomous) key



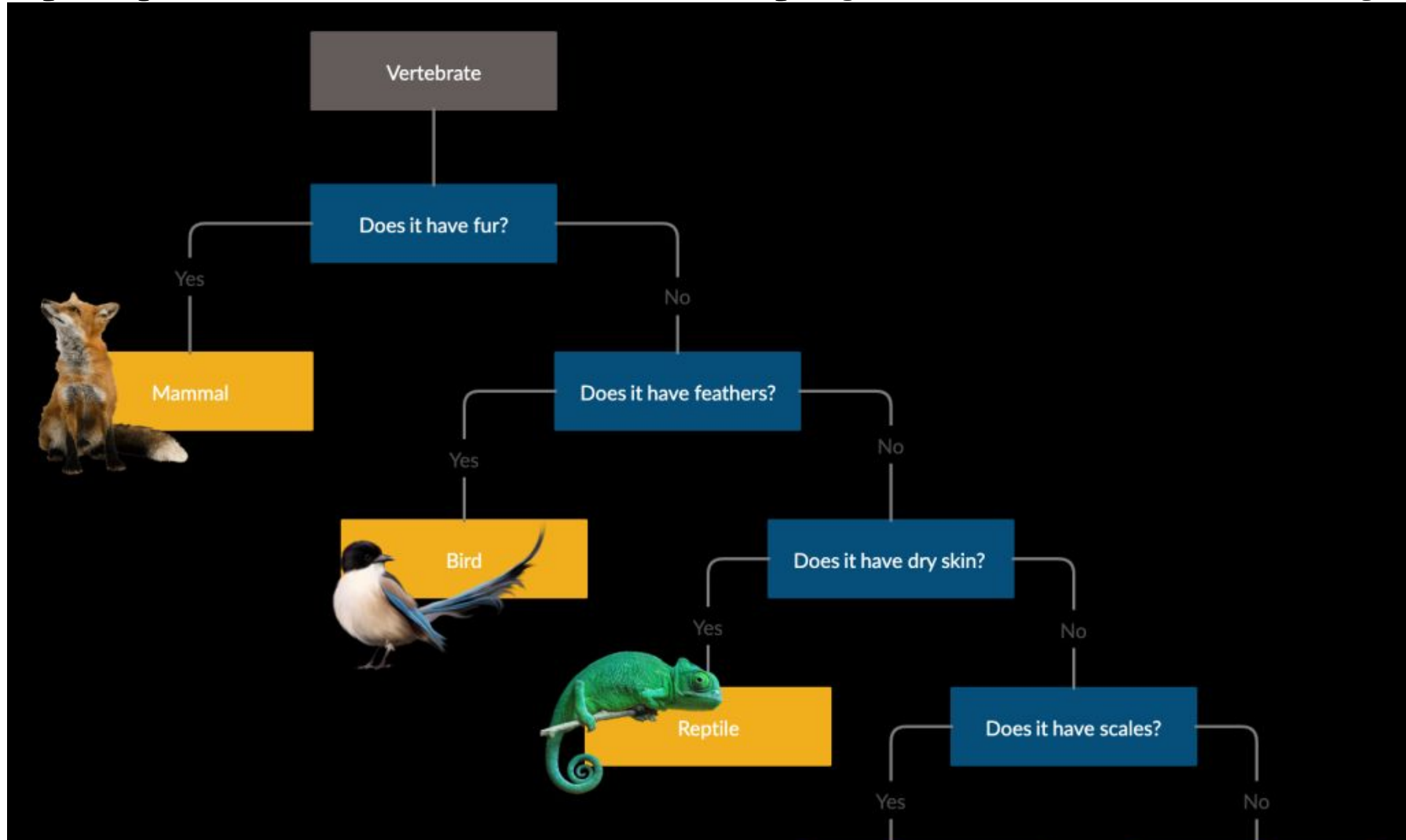
Dichotomous key for

To identify species: Taxonomy (dichotomous) key



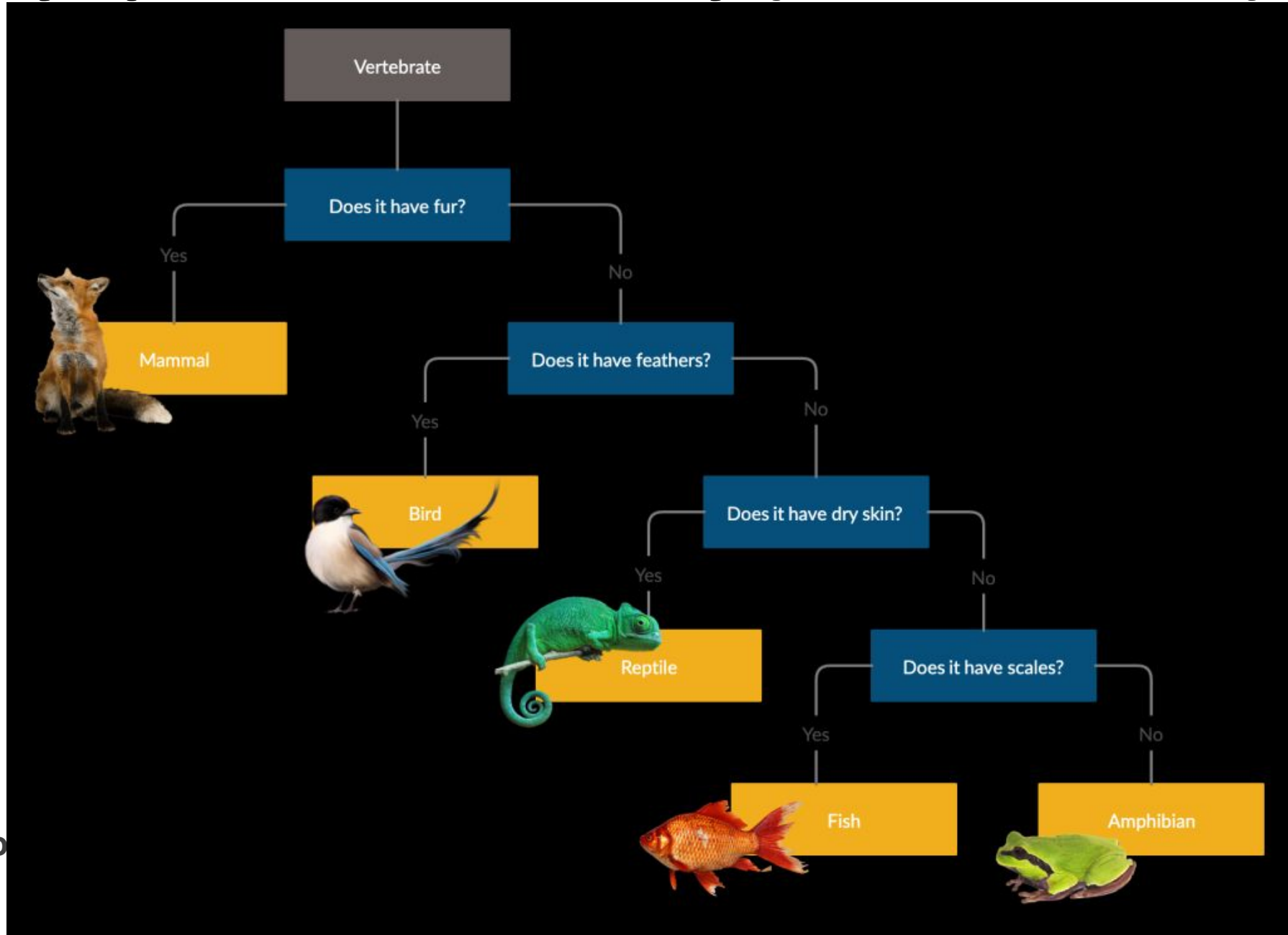
Dichotomous key for

To identify species: Taxonomy (dichotomous) key



Dichotomous key for

To identify species: Taxonomy (dichotomous) key



Dichotomous key for

To identify species: Taxonomy (dichotomous) key

- “Dichotomous” means “divided into two parts”
- dichotomous keys always give **two choices** in each step
- In each step, the user is presented with two statements based on characteristics of the organism
- If the user makes the correct choice every time, the name of the organism will be revealed at the end



Why do we need to learn about species?

- **Threatened species**
- **Indicator species**
- **Species lists**
- **Management, Habitat Directive...**



How to find information about species?

HMAP Project: History of Marine Animal Populations

CENSUS OF MARINE LIFE



Results & Publications ▾

Census Resources ▾

Census Projects ▾

Media Resources ▾

Gallery ▾

About the Census ▾

Making Ocean Life Count

Search

Home

Census

- ▶ Results & Publications
- ▶ Census Resources
- ▶ Census Projects
- ▶ Media Resources
- ▶ Gallery
- ▶ About the Census

History of Marine Animal Populations (HMAP)

in Oceans Past and Future

An interdisciplinary research program that used historical and environmental archives to analyze marine population data before and after human impacts on the ocean became significant.



Poul Holm



Brian MacKenzie



Anne Husum Marboe



<http://www.coml.org/history-marine-animal-populations-hmap/>

BALTIC MARINE ENVIRONMENT PROTECTION COMMISSION

ACTION AREAS



HELCOM State of the Baltic Sea report:

Despite improvements, the Baltic Sea is not yet in a good state.

[Read more](#)

[Agriculture](#)

[Fisheries](#)

[Industrial and municipal releases](#)

[Marine litter and noise](#)

[Marine protected areas](#)

[Maritime spatial planning](#)

[Monitoring and assessment](#)

[Response to spills](#)

[Shipping](#)

[Species and biotopes](#)

European Register of Marine Species



Marine Biodiversity and Ecosystem Functioning
EU Network of Excellence

Main Menu

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- **MarBEF Open Archive**
- **Network Description**
- Outreach
- **Photo Gallery**
- **Quality Assurance**
- **Register of Resources**
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- Training
- **Weekly News Bulletin**
- Wiki
- **Worldconference**

Welcome to the MarBEF site



MarBEF, a network of excellence funded by the European Union and consisting of 94 European marine institutes, was a platform to integrate and disseminate knowledge and expertise on marine biodiversity, with links to researchers, industry, stakeholders and the general public. On the [network description](#) pages you will find more detailed information of MarBEF. **The project has ended in 2009**



The general co-ordinator was [Carlo Heip](#), Director of NIOO-CEME & Royal NIOZ

EMBC – Call for research lines open until 1 February 2012

Posted on 23 January 2012 16:32:20 (6401 reads)

We are happy to inform you that also for this year there is a possibility to collaborate in the Erasmus Mundus Master programme on Marine Biodiversity and Conservation (EMBC) through thesis work.

[\(Read More...\)](#)

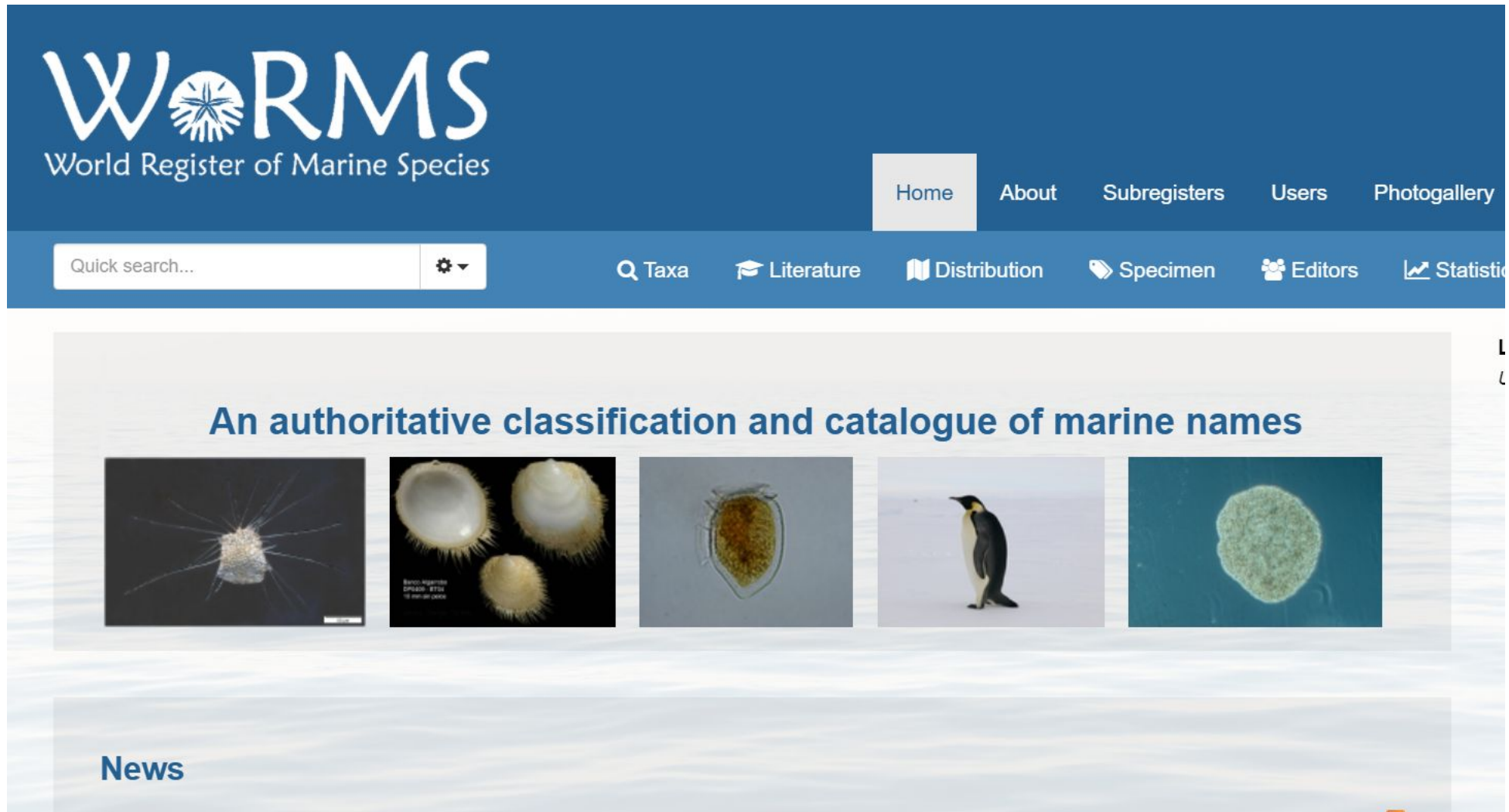
Proposal for a Doctoral School in "Marine Environmental Sciences"

Posted on 19 October 2009 14:42:05 (8413 reads)

The EMBC is inviting people to participate in a workshop on the establishment of a doctoral school in 'Marine environmental sciences', held November 23rd in Ghent, Belgium

<http://www.marbef.org/data/erms.php>

WoRMS: World Register of Marine Species



The image shows the homepage of the WoRMS (World Register of Marine Species) website. The header features the WoRMS logo, which consists of the letters 'WoRMS' in a stylized font with a starburst icon inside the 'o', and the full name 'World Register of Marine Species' below it. To the right of the logo is a navigation menu with links for 'Home', 'About', 'Subregisters', 'Users', and 'Photogallery'. Below the header is a search bar with the placeholder text 'Quick search...' and a settings icon. To the right of the search bar are several icons representing different categories: 'Taxa' (magnifying glass), 'Literature' (graduation cap), 'Distribution' (book), 'Specimen' (tag), 'Editors' (group of people), and 'Statistics' (line graph). The main content area features a large banner with the text 'An authoritative classification and catalogue of marine names' in blue. Below this text is a row of five images: a microscopic organism with long, thin appendages; three spherical organisms with spiky surfaces; a microscopic organism with a central mass and a surrounding shell; a penguin standing on a snowy surface; and a large, green, spherical organism with a textured surface. Below the banner is a section titled 'News' in blue text.

<http://www.marinespecies.org/index.php>



Maps and statistics | Forms, permits and environmental impact assessment

Home | Waters | Sea | Nature | Climate and air | Consumption and production | Living environment and planning | Building | Housing

- VELMU
- › Organisation
- › Survey methods
- › VELMU Inventories
- › VELMU research projects
- › Photos
- › Contact information
- › Documents

[Home](#) > [VELMU](#)

The Finnish Inventory Programme for the Underwater Marine Environment, VELMU



VELMU MAP SERVICE



<http://www.ymparisto.fi/en-US/VELMU>

Marine identification key

Identification key to marine invasive species in Nordic waters

Invasive alien species are considered the second biggest threat to biodiversity globally. Correct identification of alien species is a key issue for preventing the spread of these species as well as monitoring the effects on local ecosystems. Marine organisms are considered especially difficult to identify, and also, once established in a new marine region, almost impossible to get rid of. The NOBANIS identification key to marine invasive species is a Nordic project based on expert taxonomic knowledge. It is aimed at users in management of invasive species and marine biodiversity who are not

Assignment 2

- Choose one species from the **Baltic area** and one species from your **home country** (does not need to be aquatic) and describe its characteristics habitat and other additional information that you find relevant e.g., IUCN classification, taxonomy categorisation...
- Maxima extension 1 page per species (= 2 pages maximum)
- Deadline: 5.10 (23:00, Helsinki time)
- Moodle: Download and Submission

Status of Biodiversity in the Baltic Sea

Henn Ojaveer^{1*}, Andres Jaanus², Brian R. MacKenzie³, Georg Martin², Sergej Olenin^{4,5}, Teresa Radziejewska⁶, Irena Telesh⁷, Michael L. Zettler⁸, Anastasija Zaiko⁵

1 Estonian Marine Institute, University of Tartu, Pärnu, Estonia, **2** Estonian Marine Institute, University of Tartu, Tallinn, Estonia, **3** National Institute for Aquatic Resources, Technical University of Denmark, Charlottenlund, Denmark, **4** Uni Miljø, Uni Research AS, Bergen, Norway, **5** Coastal Research and Planning Institute, Klaipeda University, Klaipeda, Lithuania, **6** Palaeoceanology Unit, University of Szczecin, Szczecin, Poland, **7** Zoological Institute, Russian Academy of Sciences, Saint Petersburg, Russian Federation, **8** Department of Biology, Leibniz Institute for Baltic Sea Research, Warnemuende, Germany

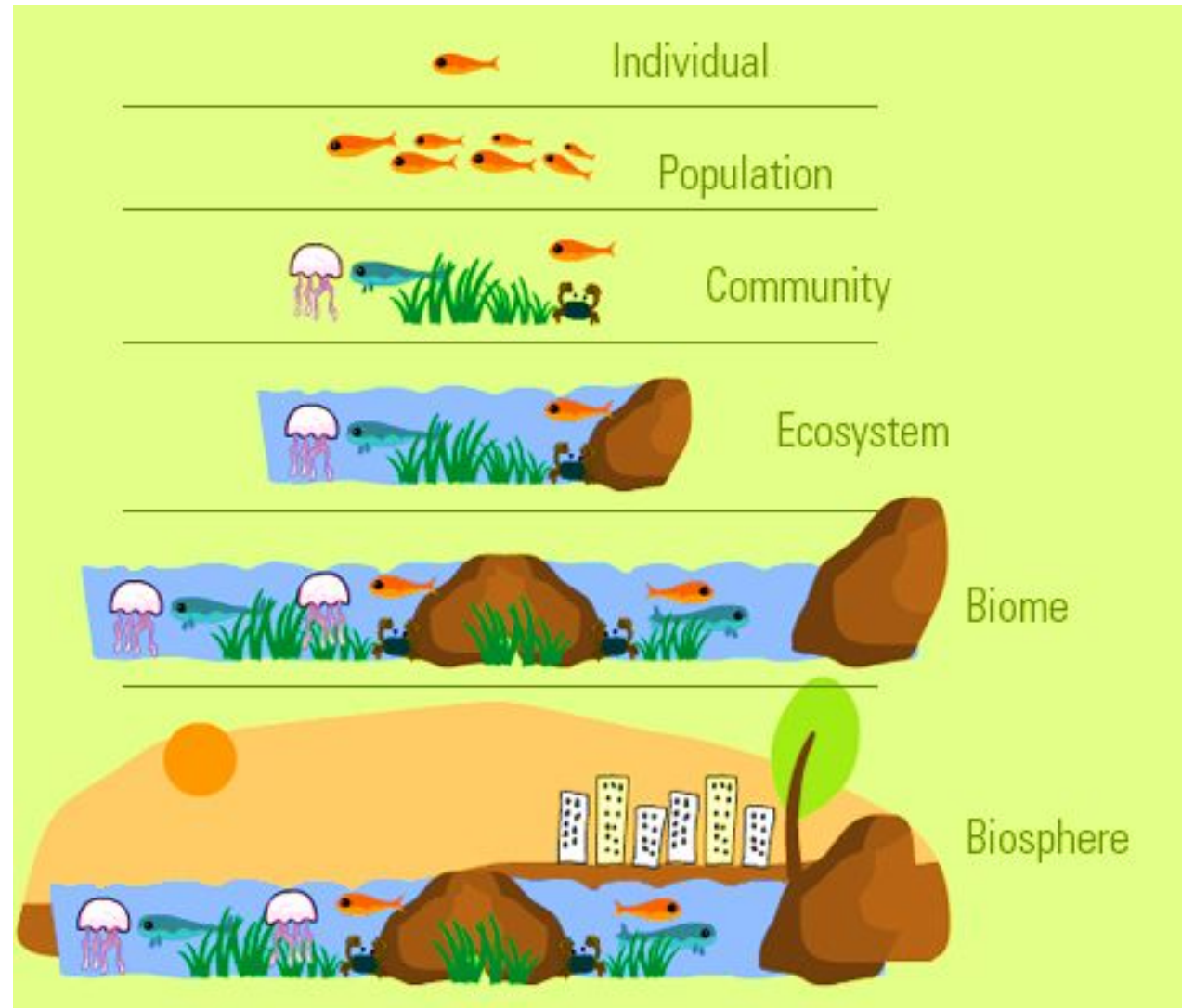
Synecology:

the ecological study of **communities** of plants and animals

vs.

Autoecology:

the branch of ecology that deals with the biological relationship between **an individual organism or an individual species** and its environment.



Phytoplankton

- From the Greek words **phyto (plant)** and **plankton (made to wander or drift)**
- Phytoplankton are **microscopic organisms** that live in watery environments, both salty and fresh.
- Some phytoplankton are **bacteria**, some are **protists**, and most are **single-celled plants**.
- Among the common kinds are **cyanobacteria**, **diatoms**, **dinoflagellates**, **green algae**, and chalk-coated **coccolithophores**.

cyanobacteria



diatom



dinoflagellate



green algae



coccolithophore



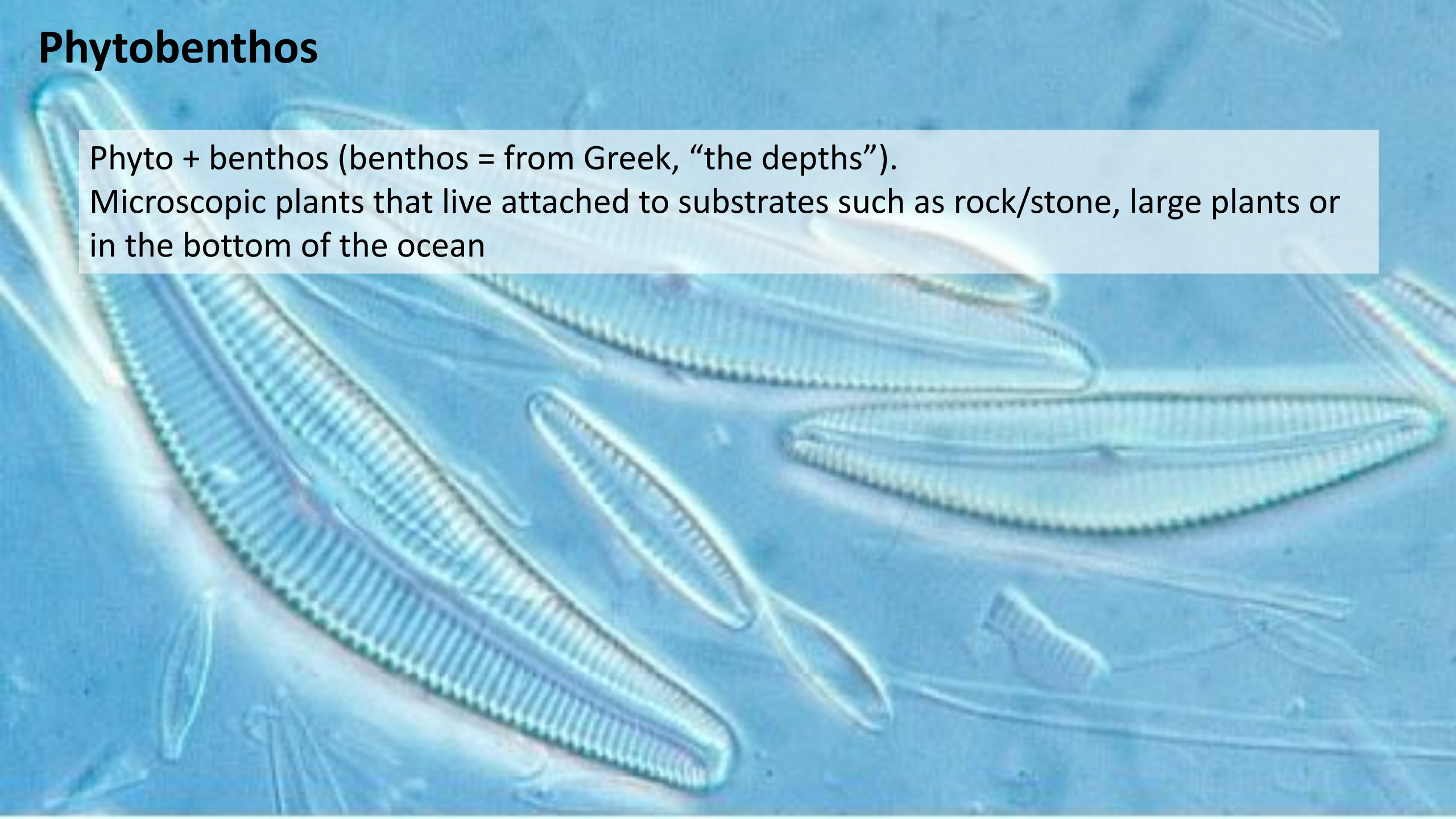
Like land plants, phytoplankton have chlorophyll to capture sunlight, and they use photosynthesis to turn it into chemical energy. They consume carbon dioxide, and release oxygen.



When conditions are right, phytoplankton populations can grow explosively, a phenomenon known as a **bloom**. Blooms in the ocean may cover hundreds of square kilometers and are easily visible in satellite images. A bloom may last several weeks, but the life span of any individual phytoplankton is rarely more than a few days.

Phytobenthos

Phyto + benthos (benthos = from Greek, “the depths”).
Microscopic plants that live attached to substrates such as rock/stone, large plants or in the bottom of the ocean



Zooplankton

- From the Greek “zoo” = "animal" + plankton.
- Plankton that consists of animals, including **copepods**, **rotifers**, **larvae** (e.g. **jellyfish**, larvae of sessile animals such as coral and sea anemones), fish eggs



Copepod



Rotifer



Jellyfish larvae

© SPL / Barcroft Media

Zoobenthos

Gammarus sp.
(Crustacean, Amphipod,)

- Zoo + “benthos” □ Benthos is the community of organisms that **live on, in, or near the seabed**, also known as the **benthic zone**.
- Animals living in the benthos
 - Meiozoobenthos: benthic invertebrates < 0.5 mm
 - Macrozoobenthos: benthic invertebrates > 0.5 mm (benthic animals that are big enough to be seen with the naked eye)

Polychaeta
(bristle-worm)

Chironomus sp. (nonbiting
midges, diptera)

Bioinvasions (in the Baltic Sea)

- **Alien species** (=nonnative, nonindigenous, exotic, introduced)
- **Invasive species** □ alien species for which “populations has undergone an exponential growth and is rapidly extending its range”
Its introduction does, or likely to, cause economic or environmental harm or harm to human health



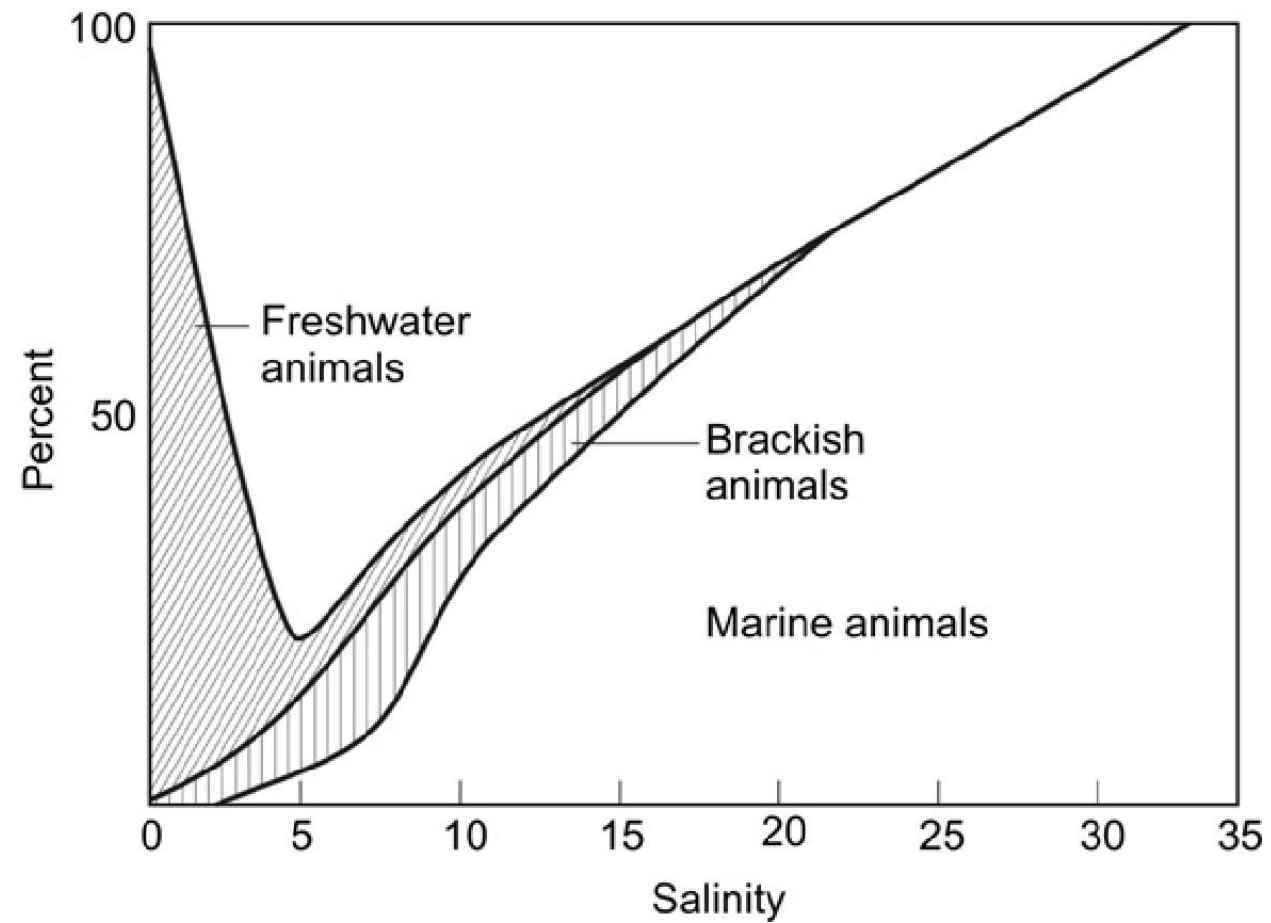
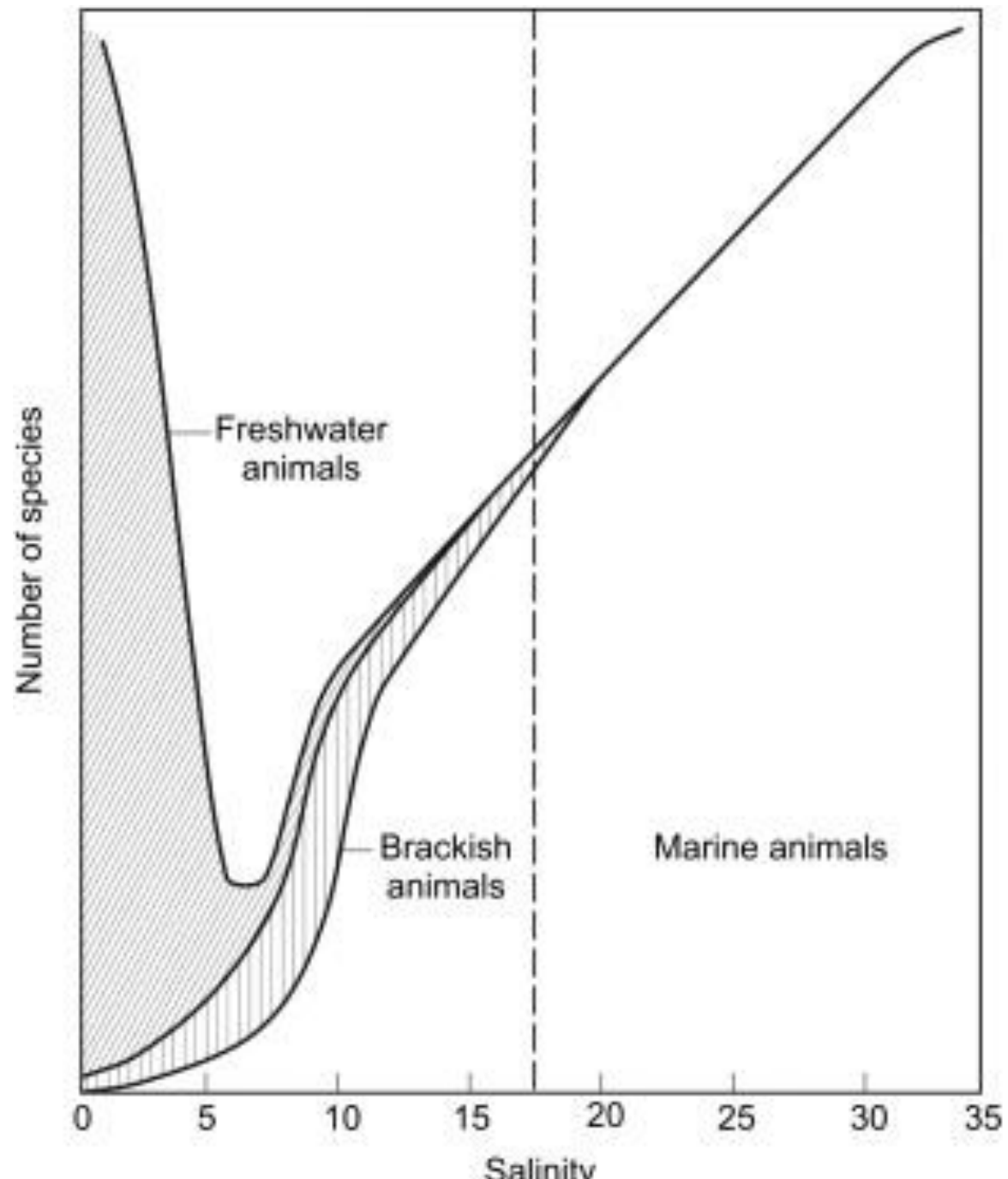
Marenzelleria spp.



Zebra mussel (*Dreissena polymorpha*)



Chinese mitten crab (*Eriocheir sinensis*)



[Whitfield et al 2012](#)

Freshwater: Brackish: Euryhaline: Stenohaline

