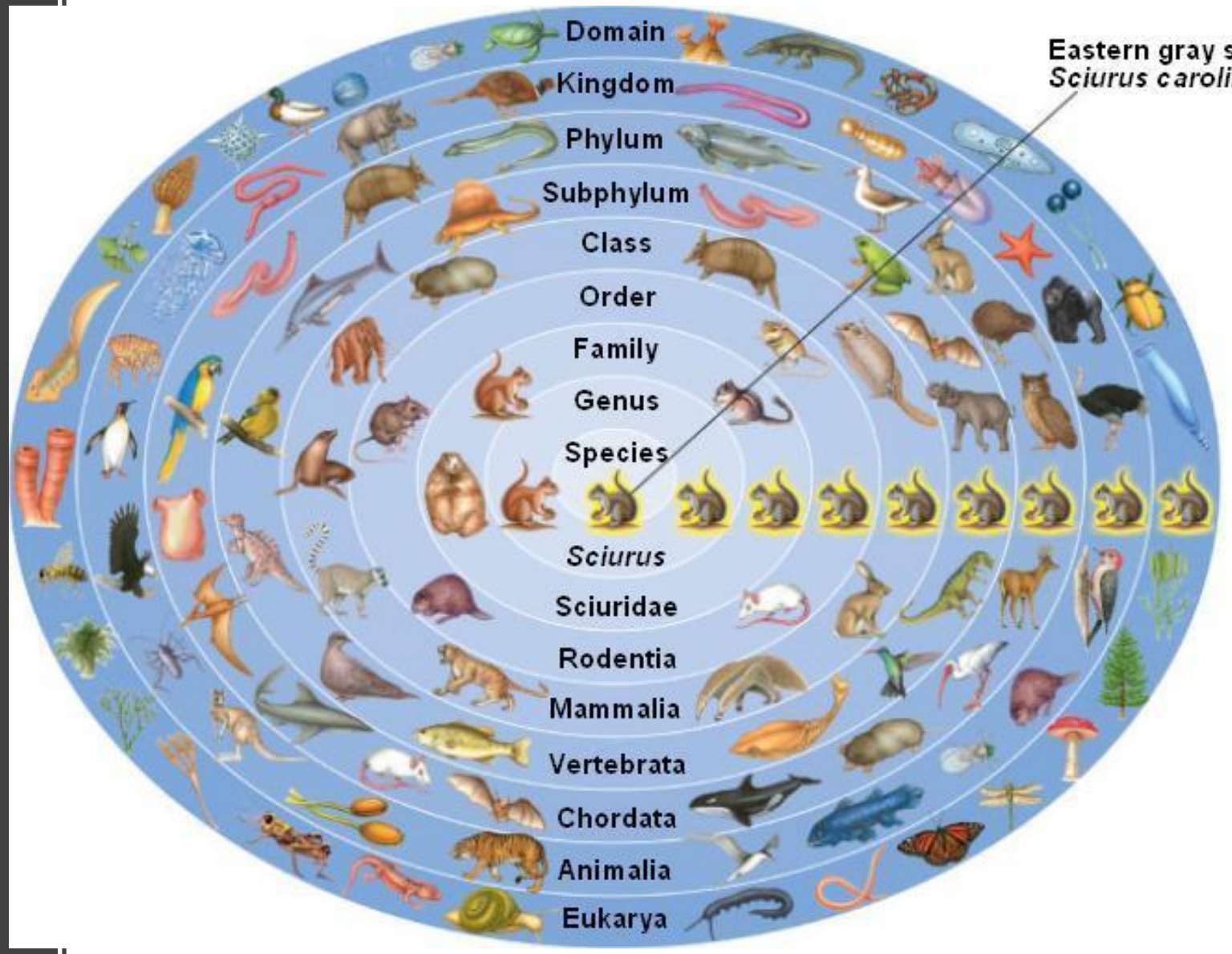
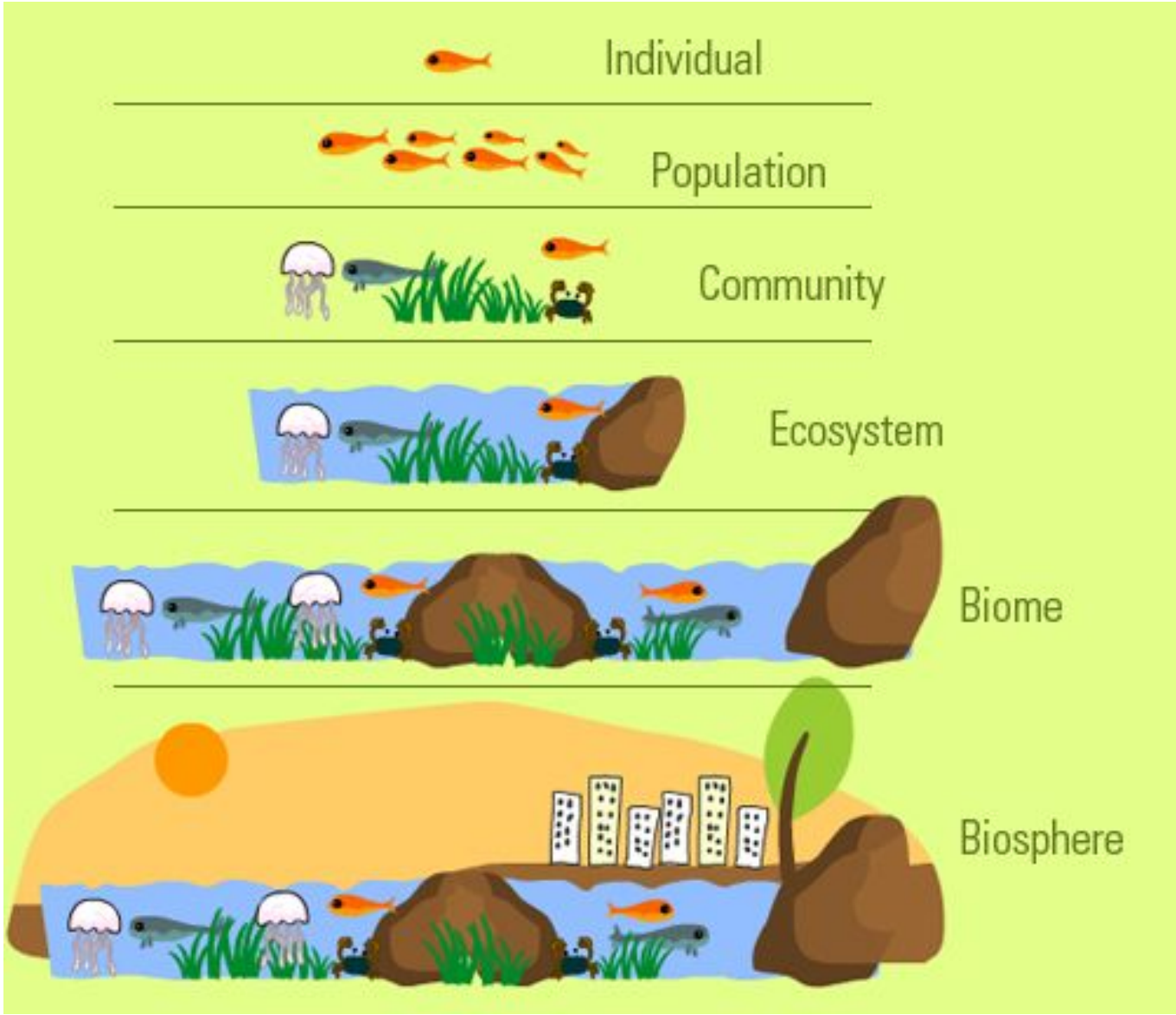
Species and Taxonomy



Everything starts with an individual that belongs to one species…



But what does “species” mean?

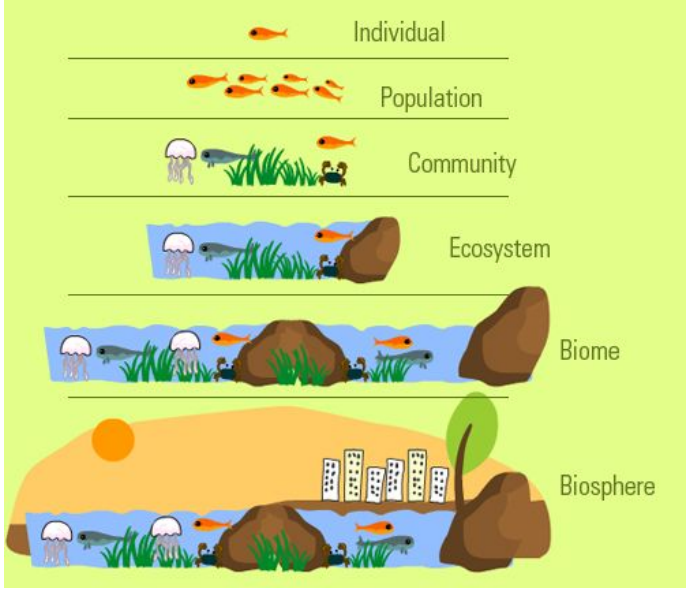
Myriophyllum spicatum

Ceratophylum demersum

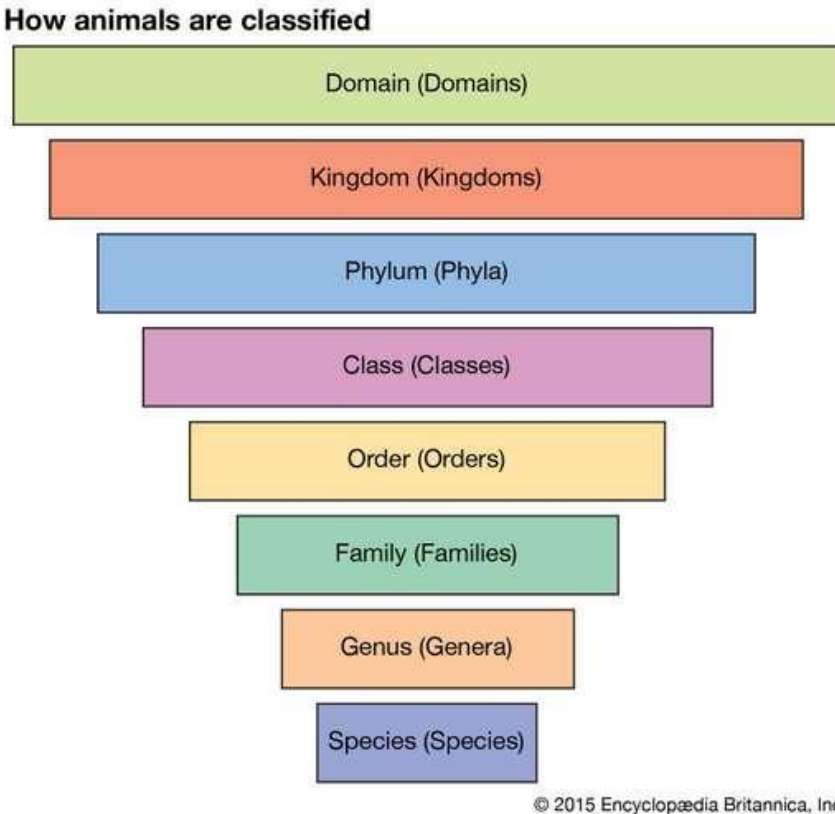
Homo sapiens

What species do you already know?

Biological species

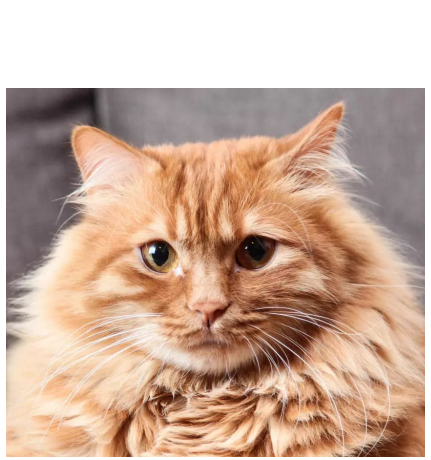


Taxonomic species



Biological species

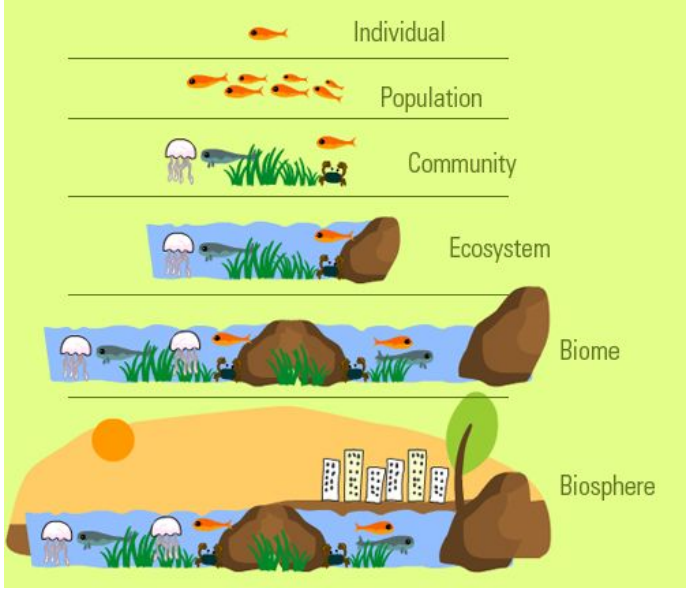
Any living thing or organism.
Individuals do not breed with individuals from other groups.



????

Biological species

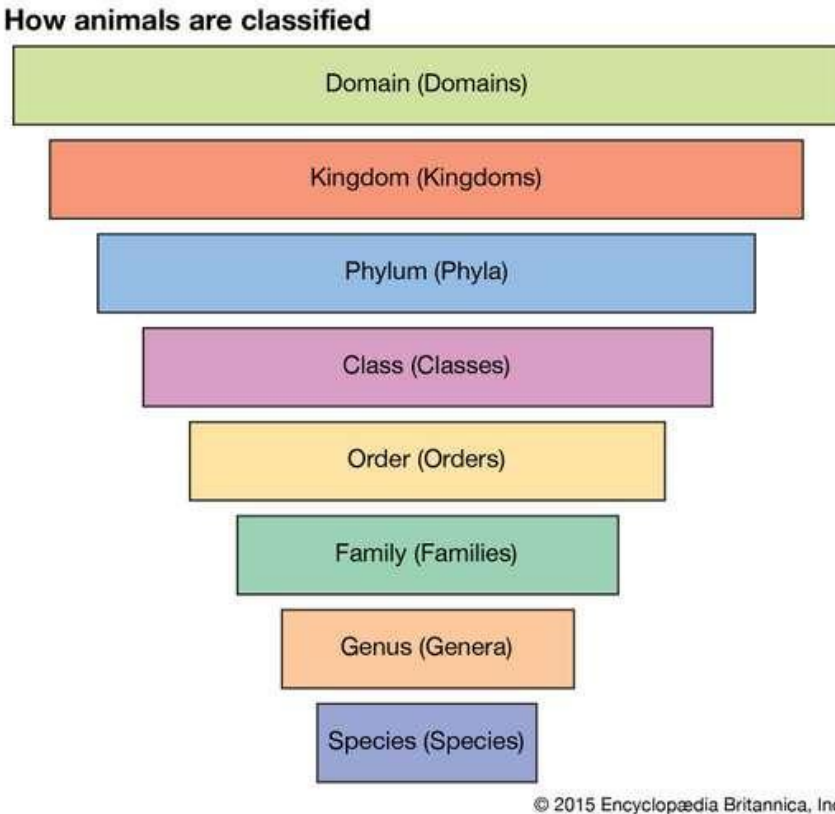
- Group of organisms that **<u>are reproductively isolated from other groups</u>**, which means that the organisms in one species are incapable of reproducing with organisms in another species.



Taxonomic species

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

What is taxonomy??



Taxonomist


Plate IV.
Fig. 1. Orbicular.
2. Roundish.
3. Ovate.
4. Oval.
5. Oblong.
6. Lanceolate.
7. Linear.
8. Subulate or awl-shaped.
9. Reniform or kidney shaped.
10. Cordate or heart-shaped.
11. Linear or ensiform-shaped.
12. Triangular.
13. Sagittate or arrow-shaped.
14. Heart-arrow shaped.
15. Hallate or halbert-shaped.
16. Cheerdate or interfoly heart-shaped.
17. 3 lobed.
18. Premorse or as if bitten.
19. Lobed.
20. 5-angled.
21. Eroded or gnawed.
22. Palmate.
23. Pinnatifid or wing-cleft.
24. Lacinate or jagged.
25. Sinuate or indented.
26. Tooth-fixate.
Fig. 35. Acutely crenate or
36. Obtusely crenate.
37. Plaited.
38. Pandæriform or fi
el.
39. Spatulate or
batiolate.
40. Ovate.
41. Acute.
42. Acuminate or p
43. Obtule with a
44. Acutely emarg
el.
47. Cuneiform or w
48. Retuse.
49. Hairy.
50. Downy.
51. Hispid or coa
52. Rhombic.
53. Veined.
54. Nerved.
55. Papillous or
56. Parabolic.
57. Acinaciform
shaped.
Dolabriform
shaped.

Taxonomy

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

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

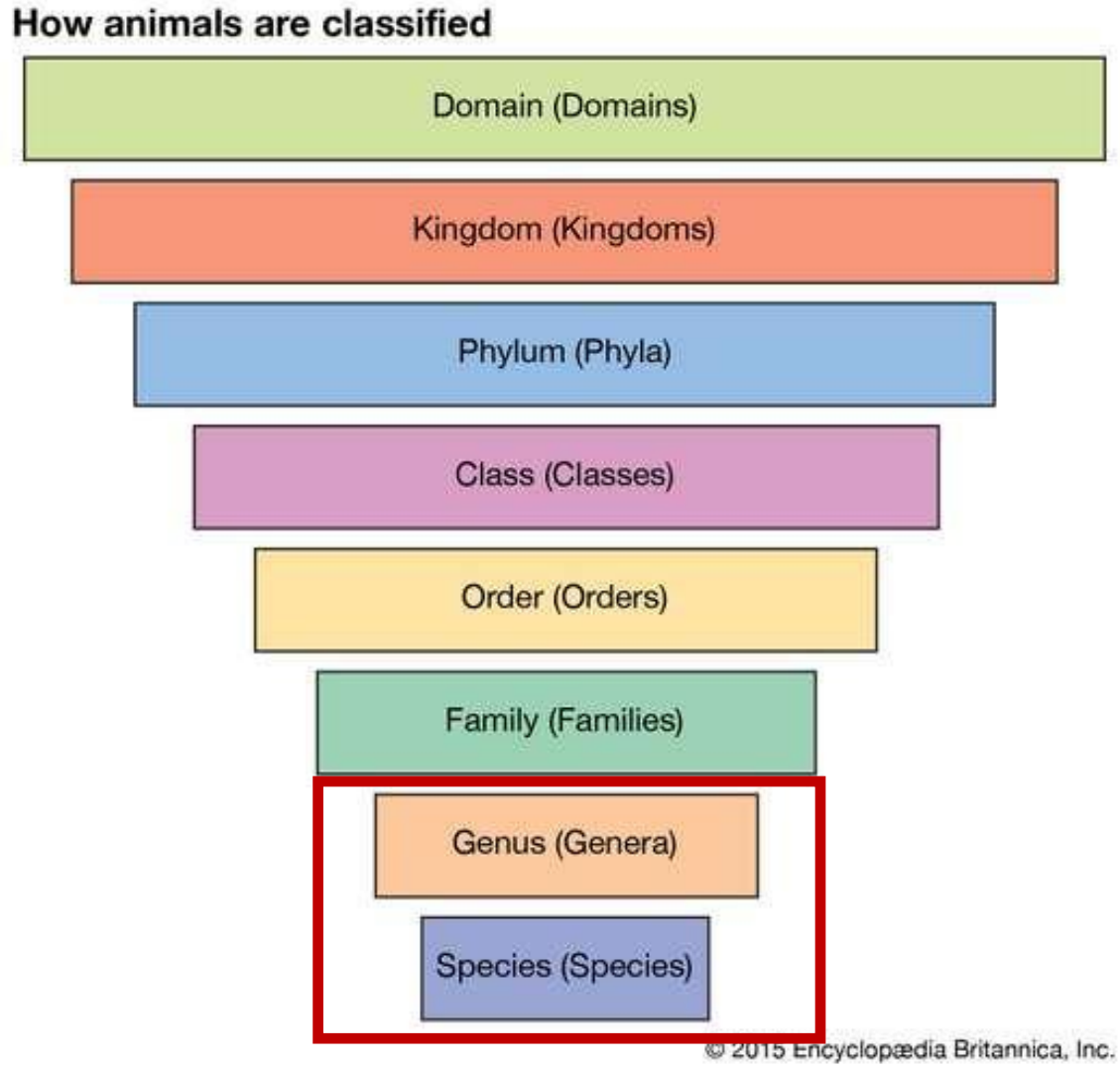
Latin Names are Understood by all Taxonomists

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

Paloma

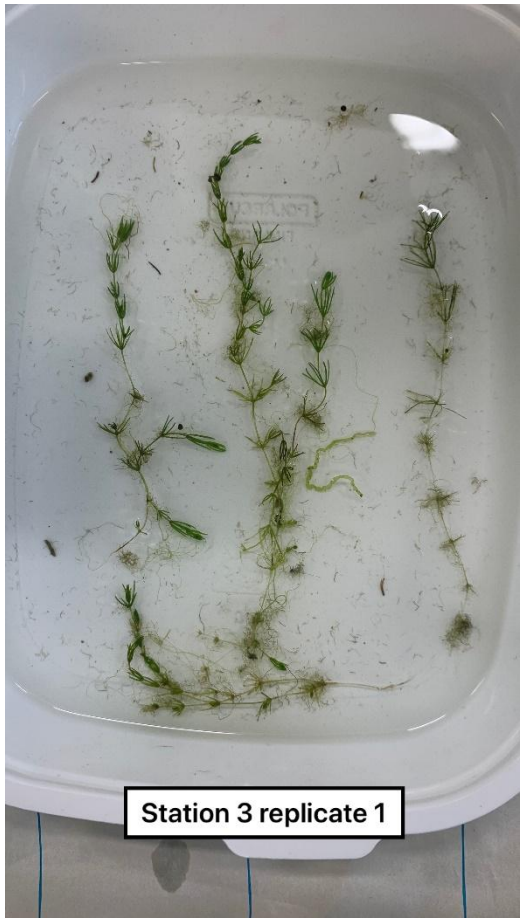
In Spain 31100 “Palomas”

Paloma Lucena-Moya



Pojo Bay: Baseline study – species lists of macrophytes

Chara aspera → *Chara* = ***genus*** *aspera* = ***species***



Chara aspera

Chara baltica

Chara canescens

Chara connivens

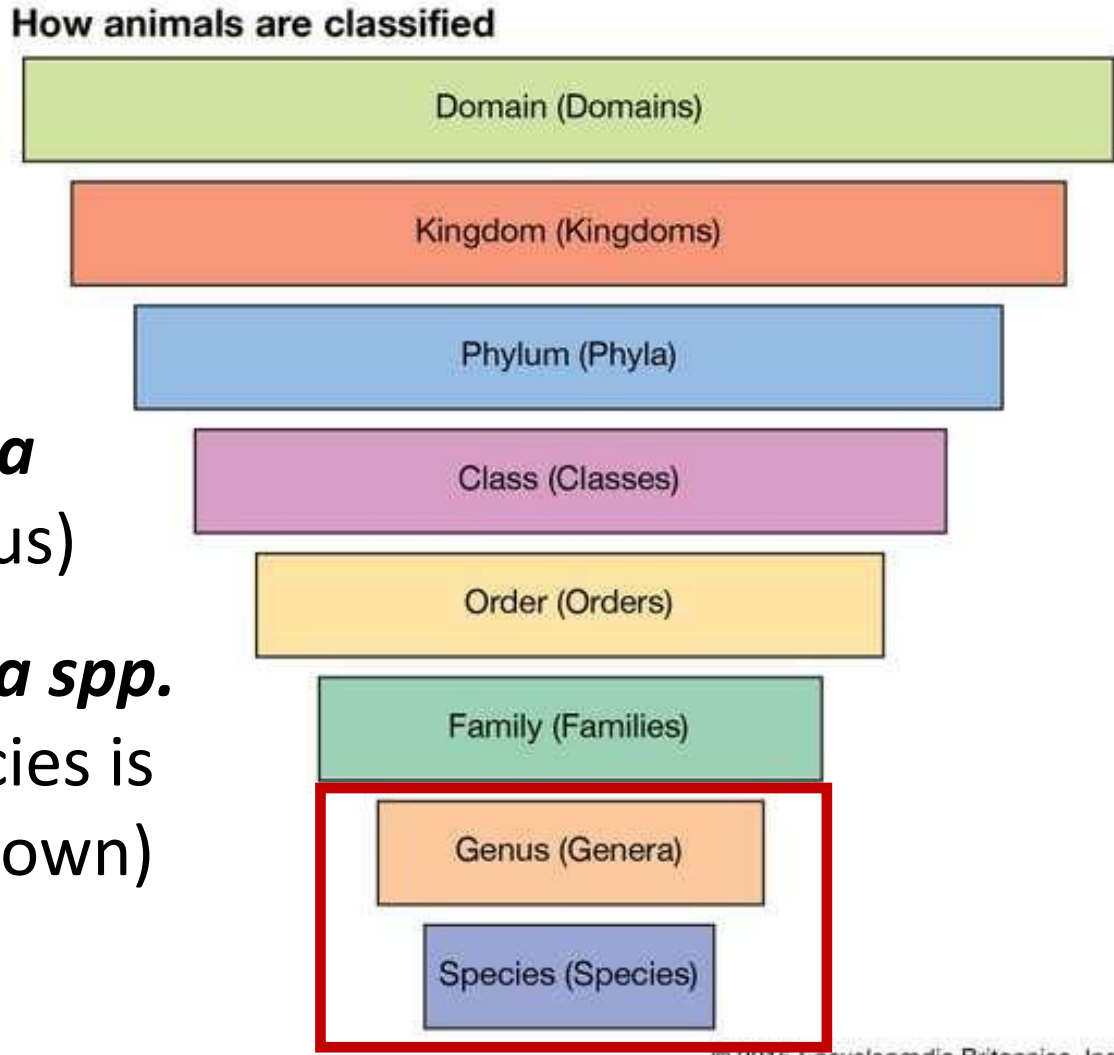
Chara globularis

Chara tomentosa

Chara virgata

Chara (genus)

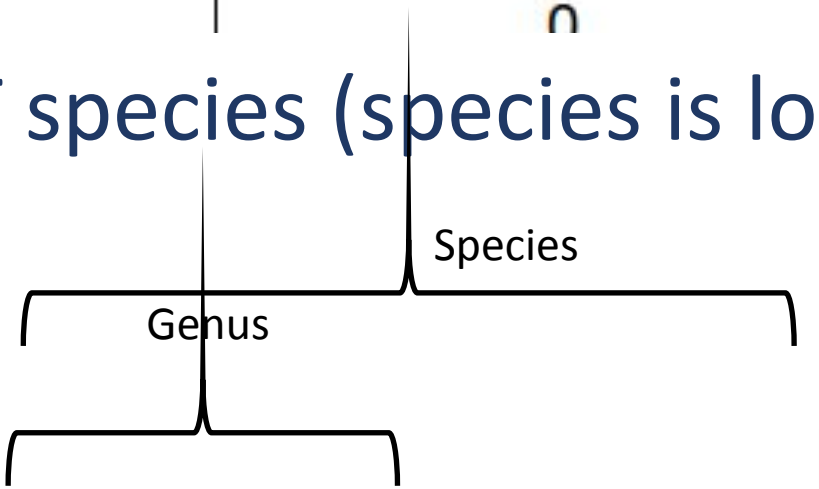
Chara spp. (species is unknown)



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

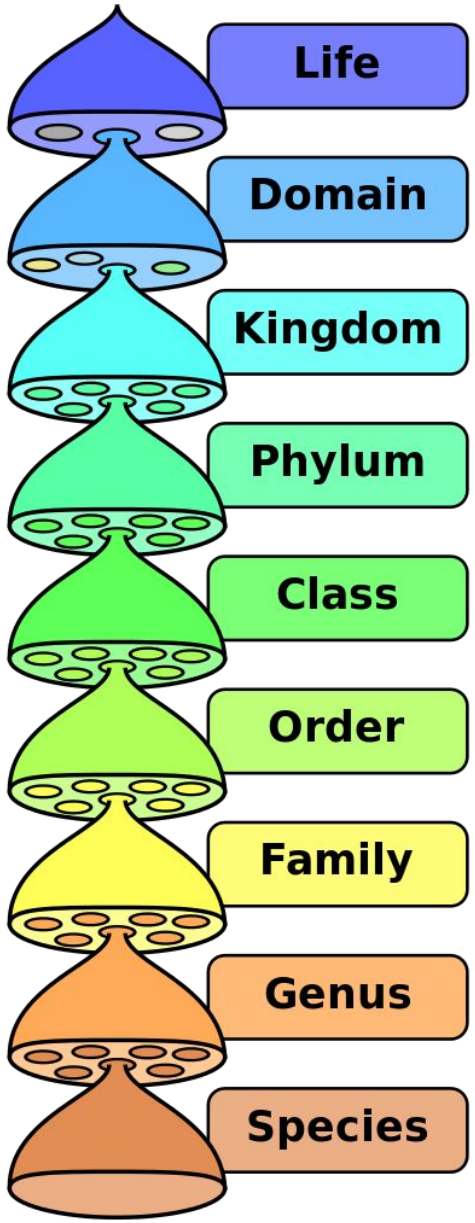
Myriophyllum Spicatum	Chara Aspera
0	0
0	0
0	0
1	1
0	0



Myriophyllum Spicatum ✖ ***Myriophyllum spicatum*** ✓

Chara Aspera ✖ ***Chara aspera*** ✓

Taxonomic level



Eukaryota

Animalia

Chordata

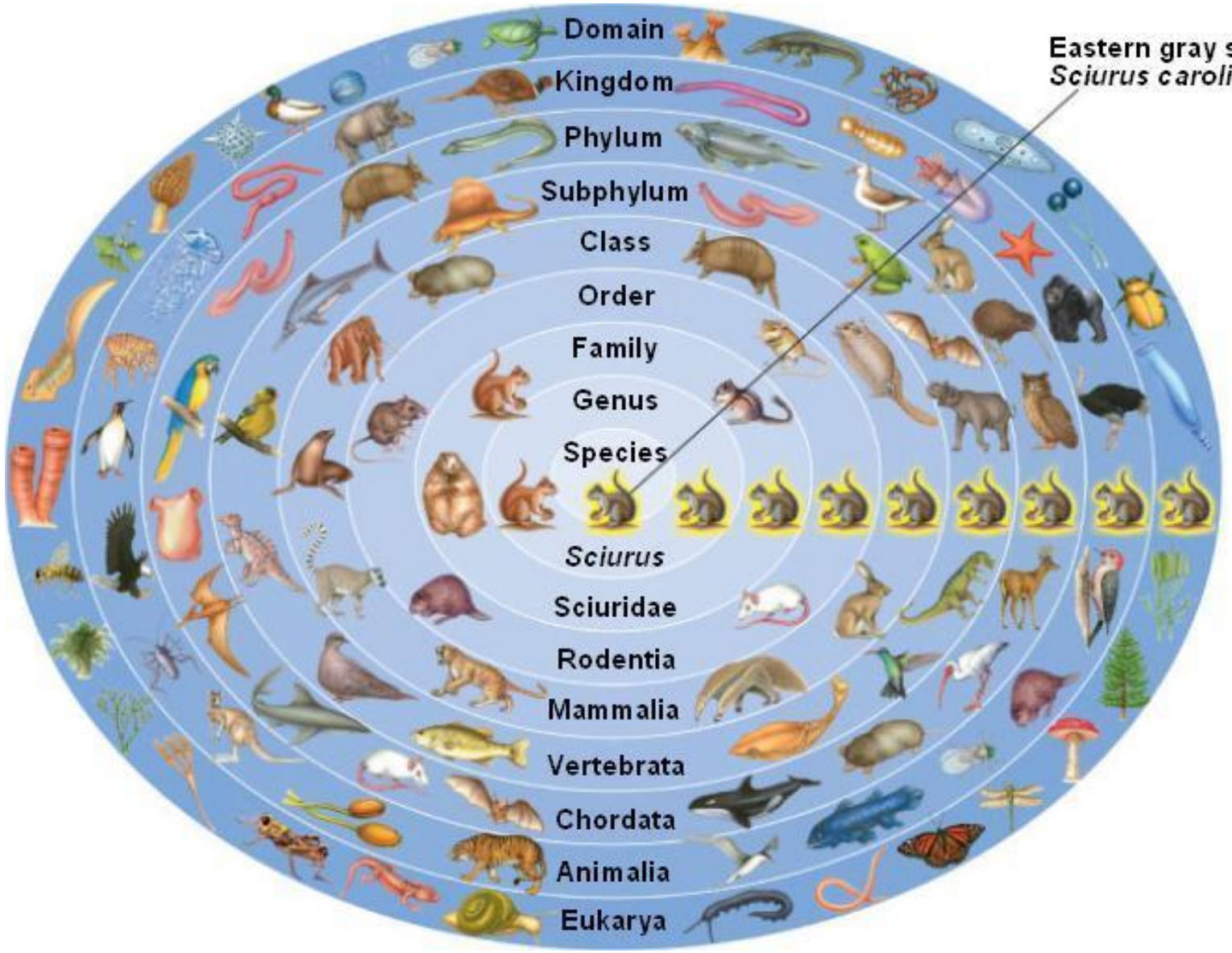
Mammalia

Primates

Hominidae

Homo

H. sapiens



Taxonomy of Red-throated Diver – ***Gavia stellata***

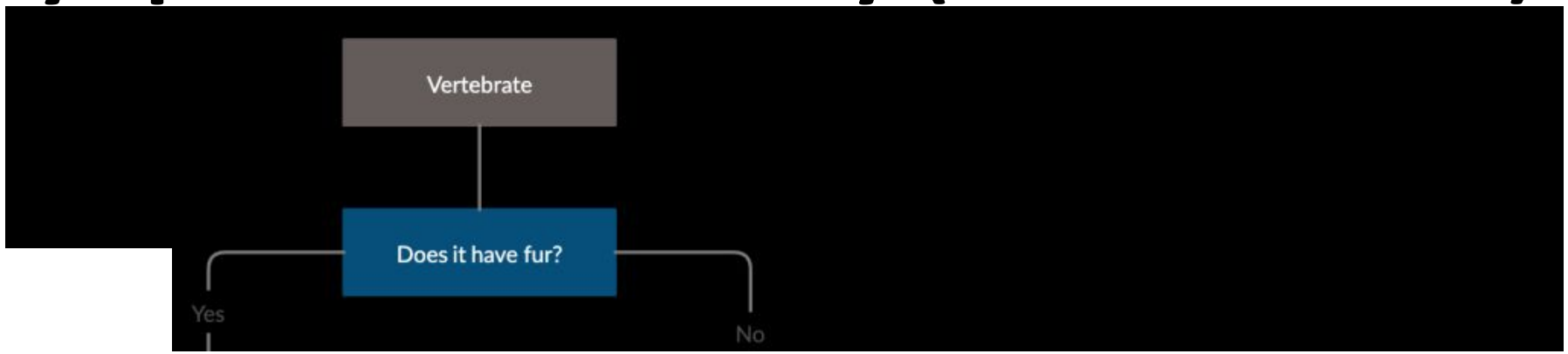
Kingdom	Animalia
Phylum	Chordata
Subphylum	**Vertebrata**
Superclass	Tetrapoda
Class	Aves
Subclass	
Infraclass	
Cohort	
Superorder	
Order	Gaviiformes
Suborder	
Infraorder	
Superfamily (–oidea)	
Family (–idae)	Gaviidae
Subfamily (–inae)	
Tribe (ini)	
Subtribe (–ina)	
Genus	*Gavia*
Subgenus	
Species	*stellata*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

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

To identify species: Taxonomy (dichotomous) key

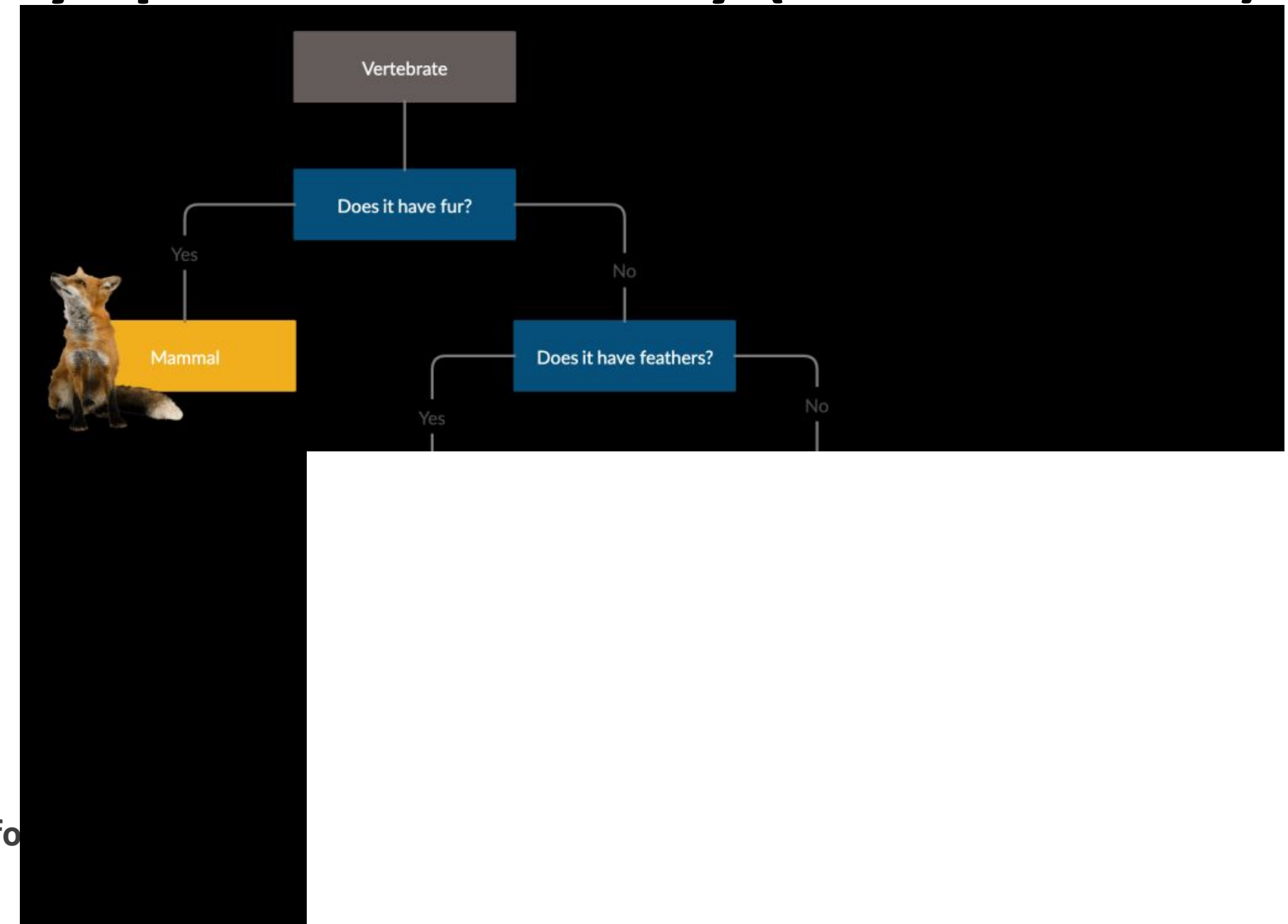
Please think in one vertebrate animal !!
(keep in mind!)

To identify species: Taxonomy (dichotomous) key



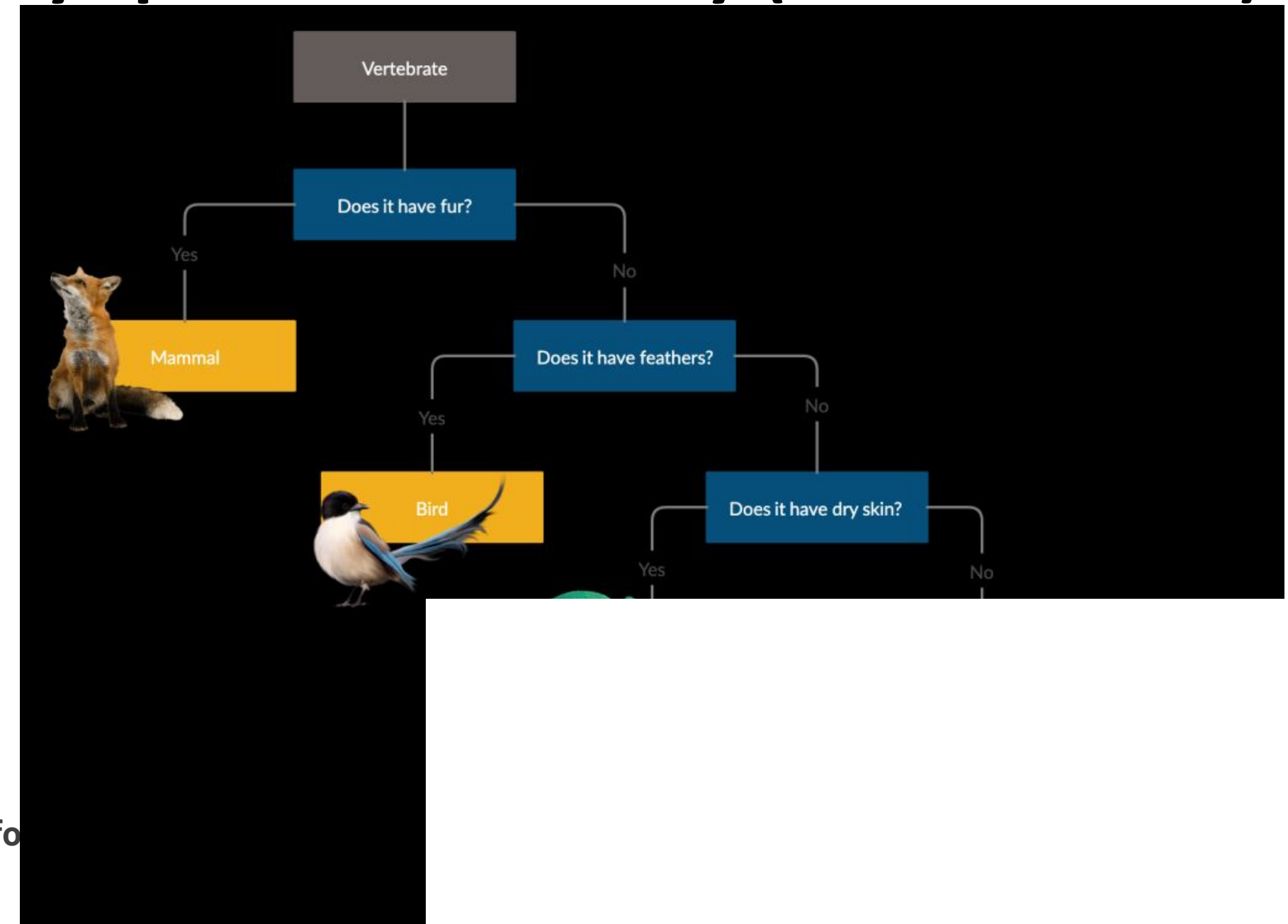
Dichotomous key f

To identify species: Taxonomy (dichotomous) key



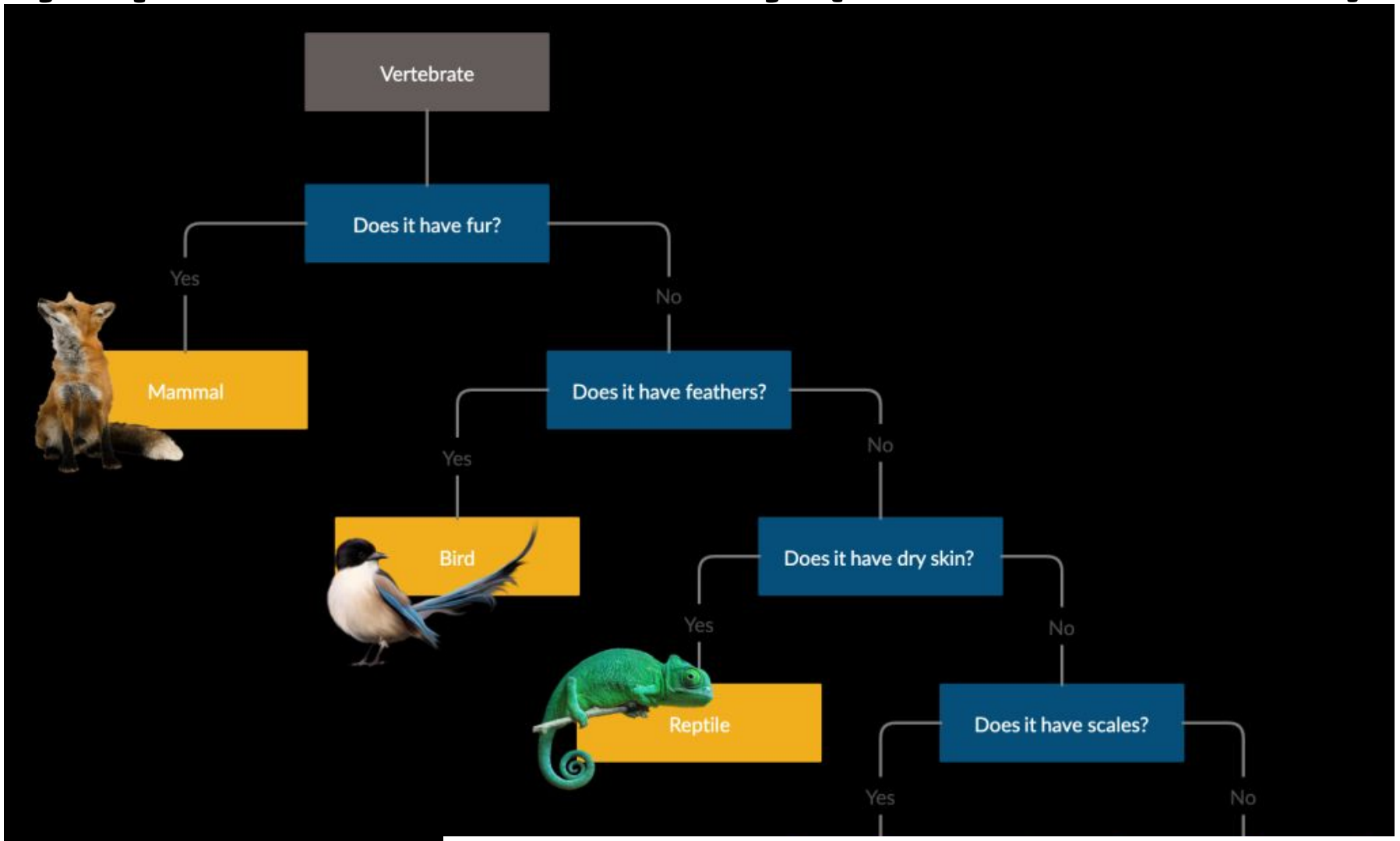
Dichotomous key fo

To identify species: Taxonomy (dichotomous) key



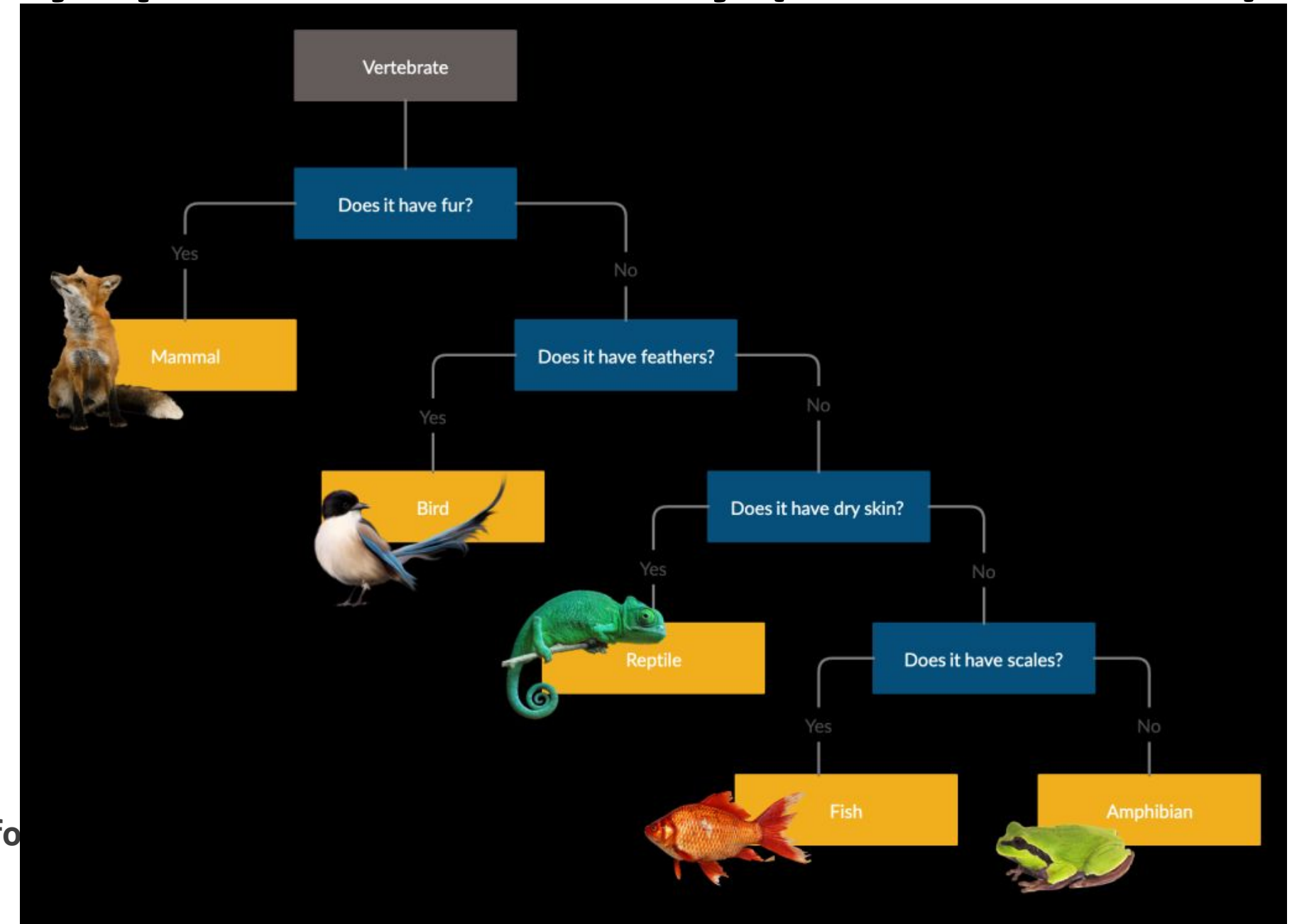
Dichotomous key fo

To identify species: Taxonomy (dichotomous) key



Dichotomous key fo

To identify species: Taxonomy (dichotomous) key



Dichotomous key fo

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

What is a Dichotomous Key?

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

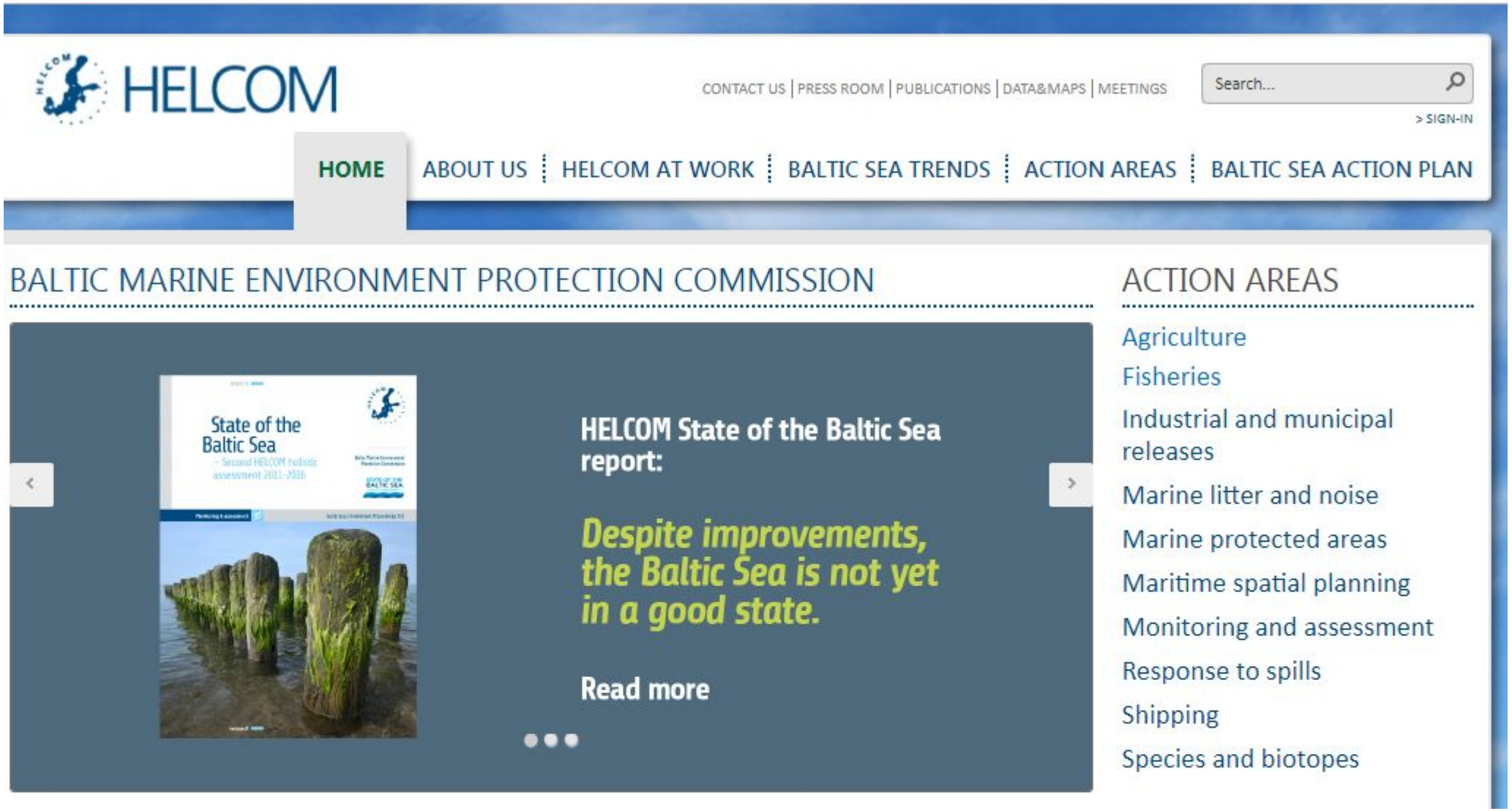
An interdisciplinary research program that used historical and environmental archives to analyze marine population data before and after human impacts on the ocean became significant.

Poul Holm

Brian MacKenzie

Anne Husum Marboe

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



http://stateofthebalticsea.helcom.fi/

European Register of Marine Species

marbef

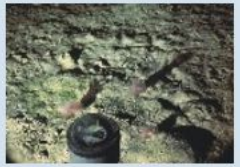
Marine Biodiversity and Ecosystem Functioning
EU Network of Excellence

Main Menu

- Home
- Contacts
- Data System
- Documents
- Events Calendar
- FAQ
- Forums
- Job M@RKET
- Links
- MarBEF Open Archive
- Network Description
- Outreach
- Photo Gallery
- Quality Assurance
- Register of Resources
- Research Projects
- Rules and Guidelines
- 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**

NIOO

The general co-ordinator was **Carlo Heip**, Director of NIOO-CEME & Royal NIOZ

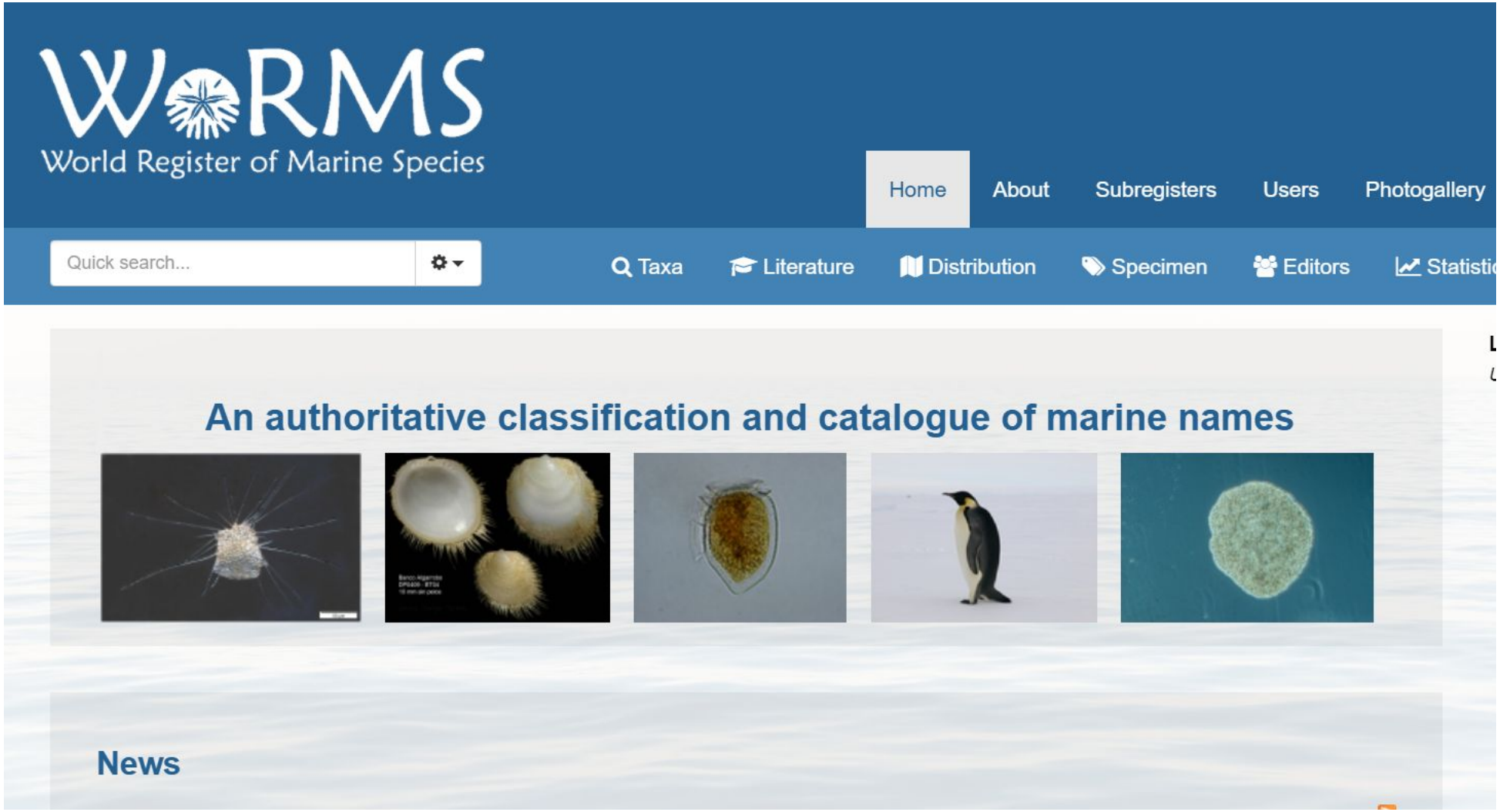
EMBC – Call for research lines open until 1 February 2012
Posted on 23 January 2012 16:32:20 (6401 reads)
We are happy to inform you that also for this year there is a possibility to collaborate in the Erasmus Mundus Master programme on Marine Biodiversity and Conservation (EMBC) through thesis work.

(**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



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

VELMU

ENVIRONMENT.fi
Joint website of Finland's environmental administration

Search the site | Search
Advanced search

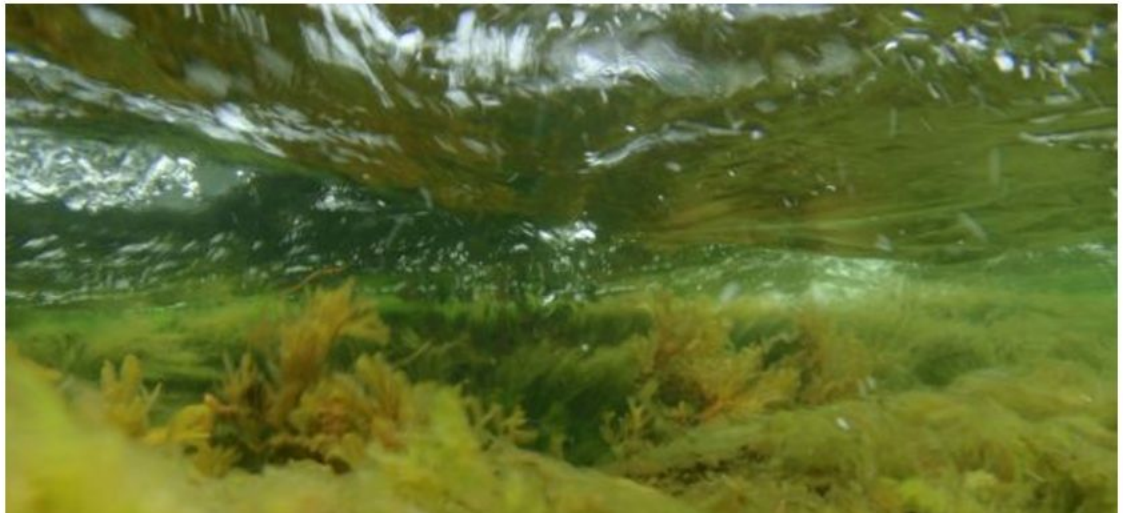
Maps and statistics | Forms, permits and environmental impact assessment

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

VELMU MAP SERVICE

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

European Network on Invasive Alien Species

https://www.nobanis.org/

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

Review

Status of Biodiversity in the Baltic Sea

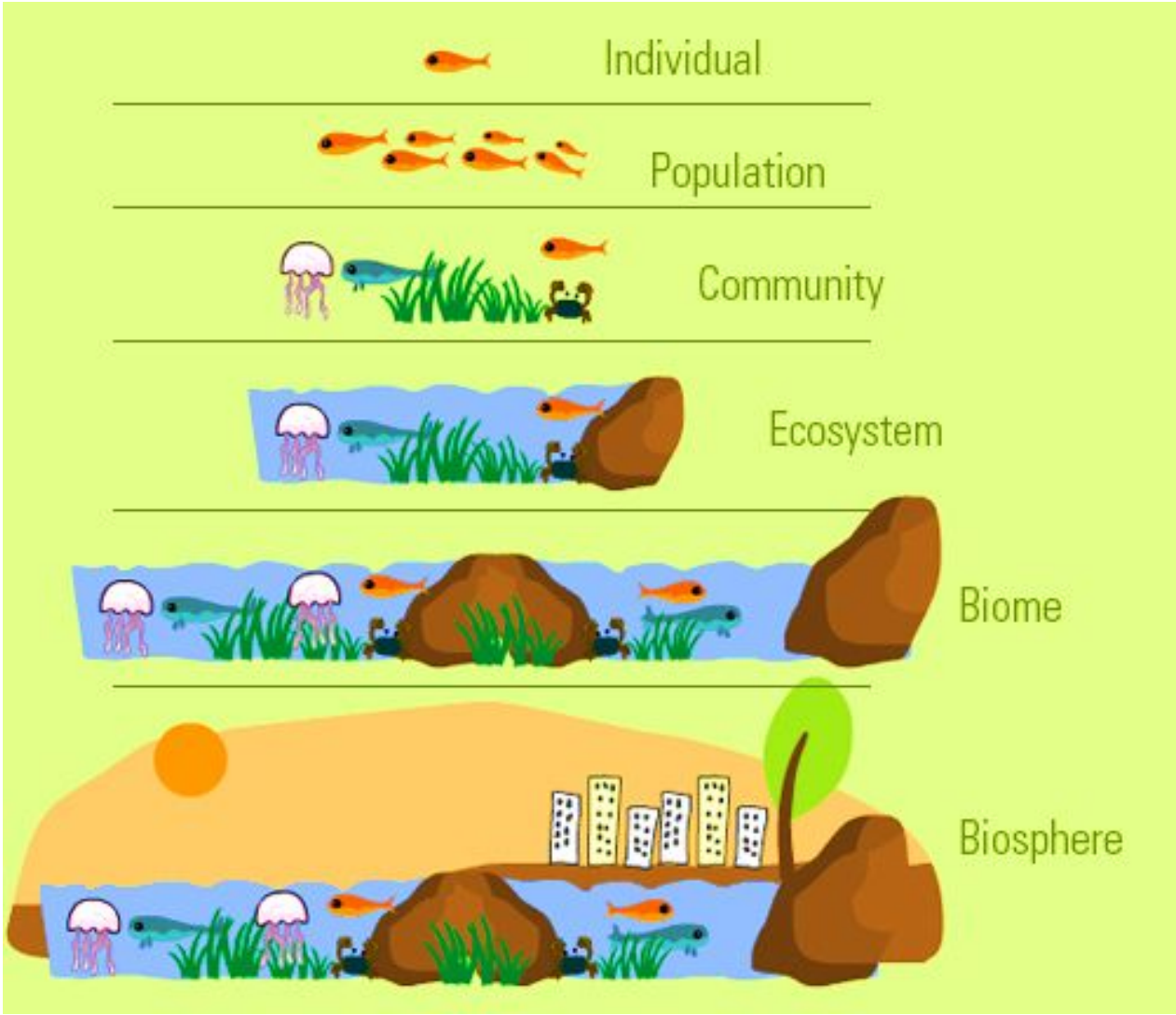
Henn Ojaveer[1]*, Andres Jaanus[2], Brian R. MacKenzie[3], Georg Martin[2], Sergej Olenin[4,5], Teresa Radziejewska[6], Irena Telesh[7], Michael L. Zettler[8], Anastasija Zaiko[5]

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 Miljo, 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.

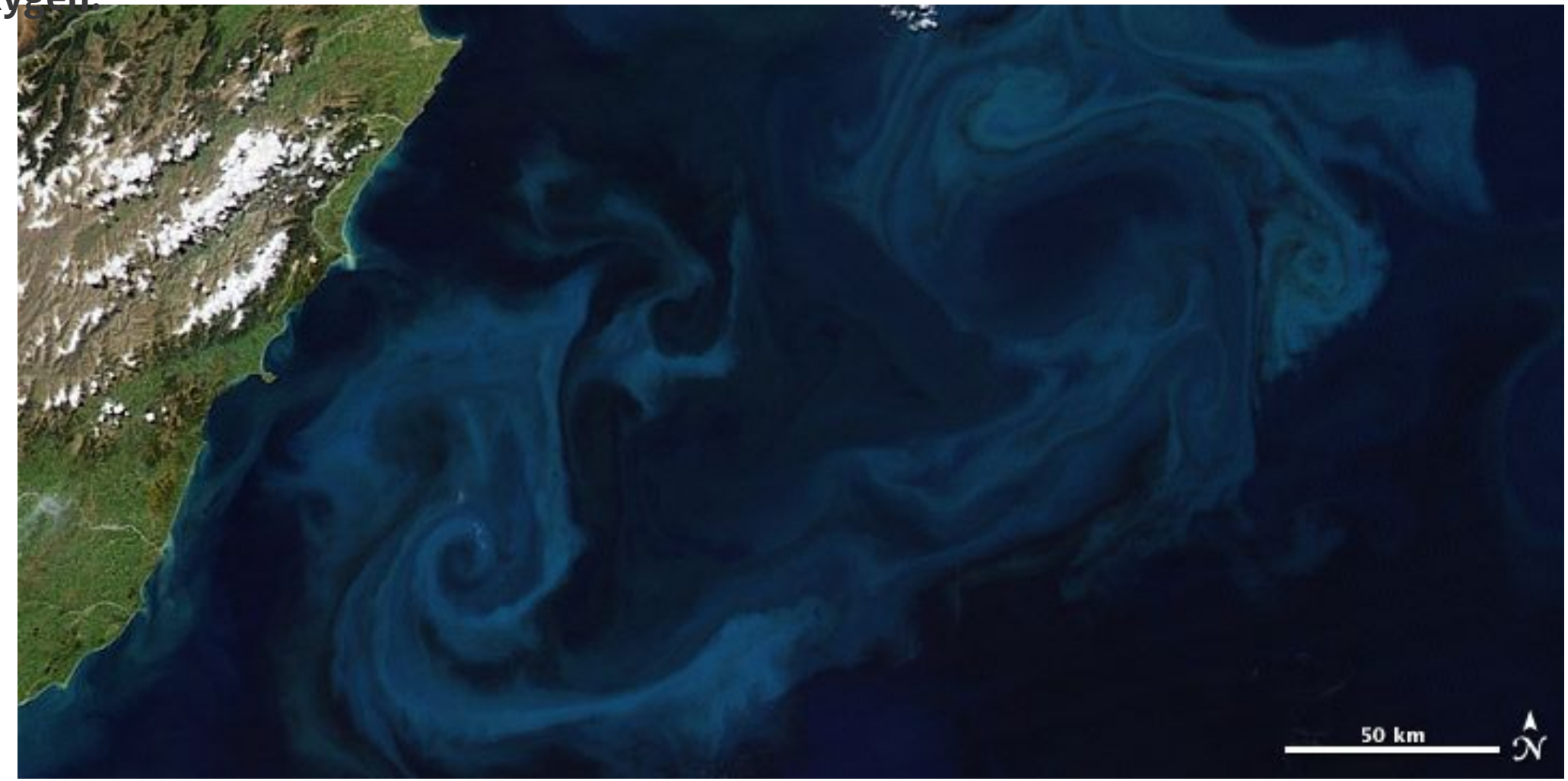
Autoecology:
the branch of ecology that deals with the biological relationship between **an individual organism or an individual species** and its environment.



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**.

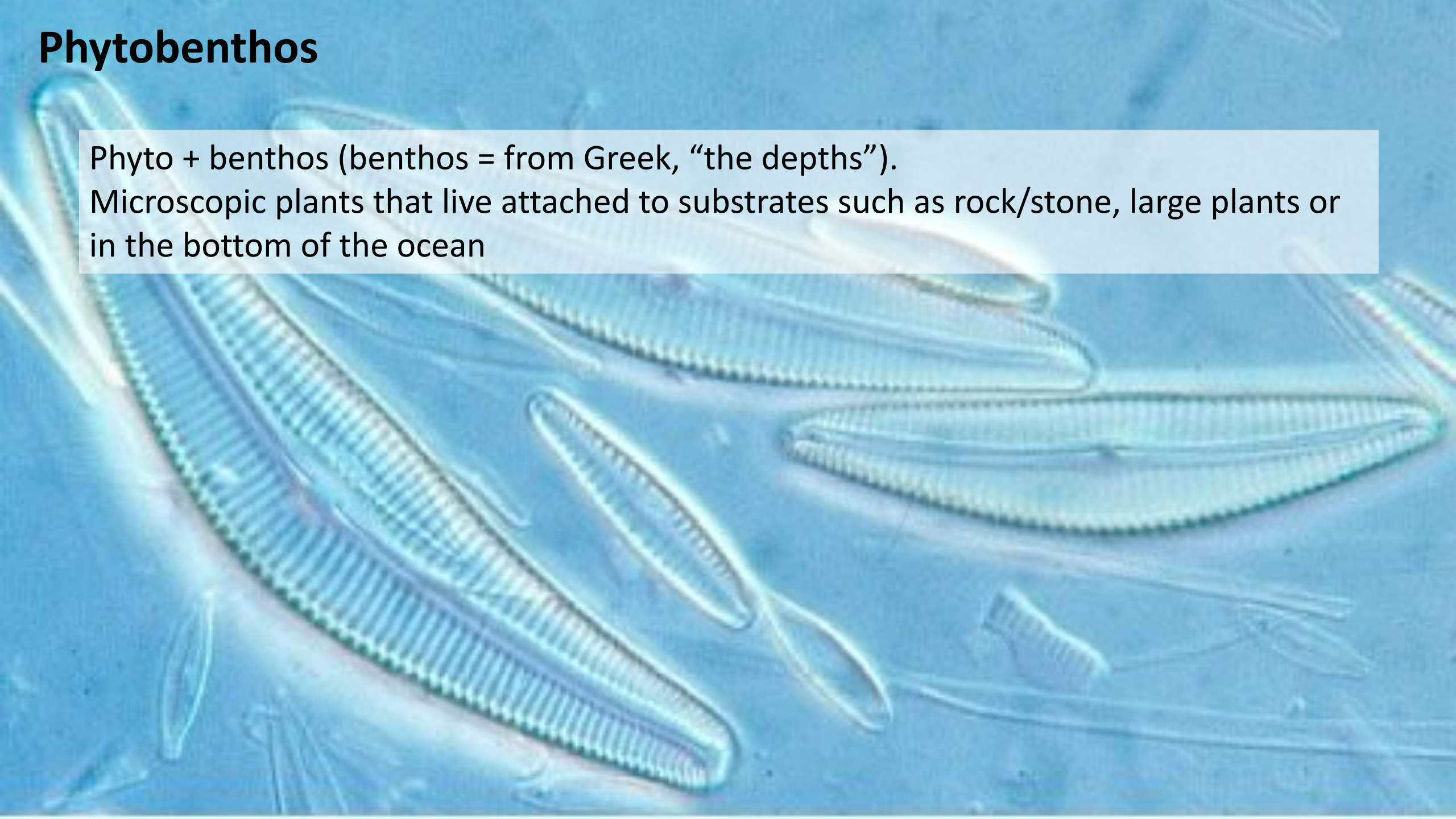
Like land plants, phytoplankton have chlorophyll to capture sunlight, and they use photosynthesis to turn it into chemical energy. They consume carbon dioxide, and release oxygen.



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

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

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)

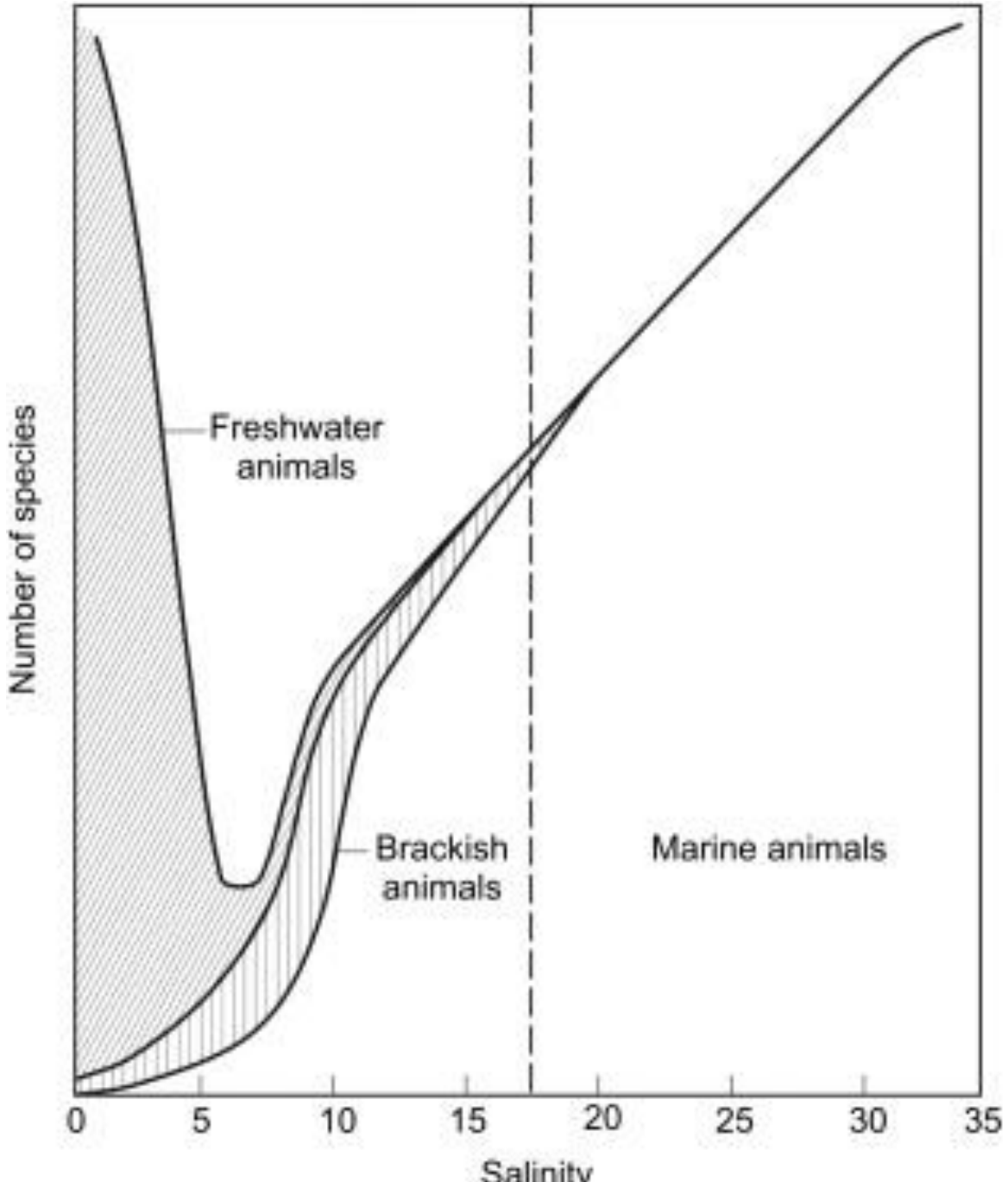
- **Alien species** (=nonnative, nonindigenous, exotic, introduced)

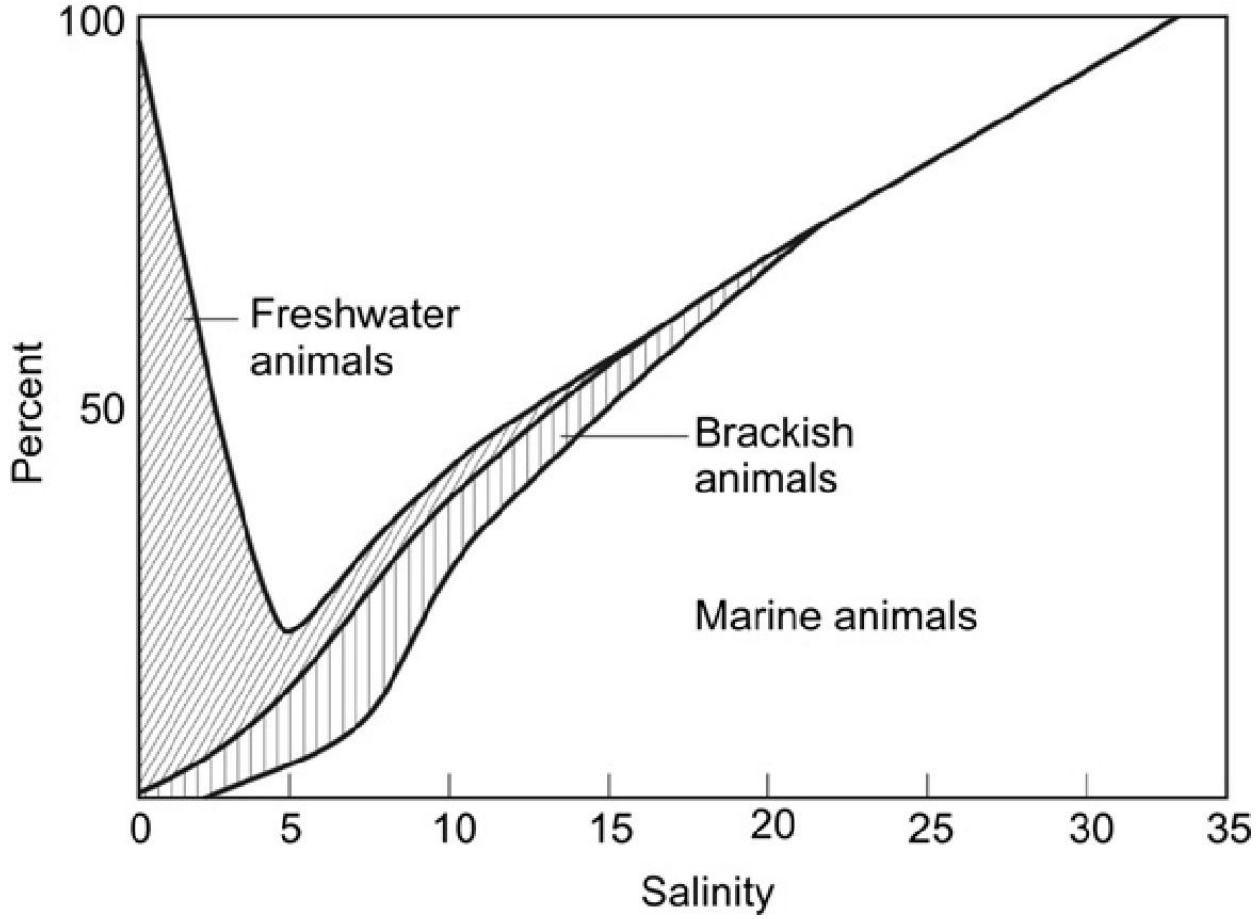
- **Invasive species** □ alien species for which "populations has undergone an exponential growth and is rapidaly extending its range"
  Its introduction does, or likely to, cause economic or environmental harm or harm to human health

Marenzelleria spp.

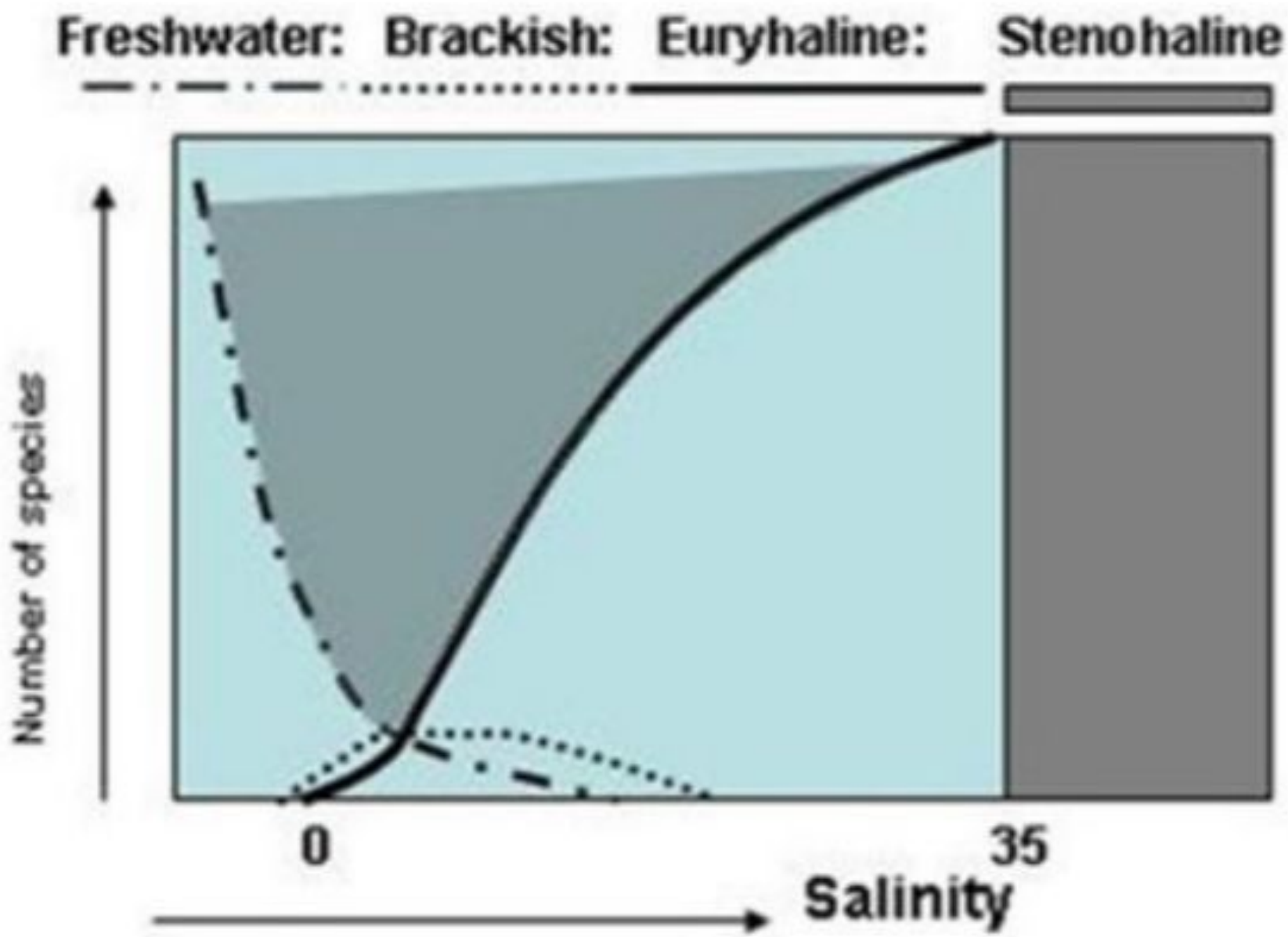
Zebra mussel *(Dreissena polymorpha)*

Chinese mitten crab *(Eriocheir sinensis)*





Whitfield et al 2012


Freshwater:
Brackish:
Euryhaline:
Stenohaline
Number of species
0
35
Salinity