

Exercise walk-through

Classification ■ 18.1

eXercise

You must be able to

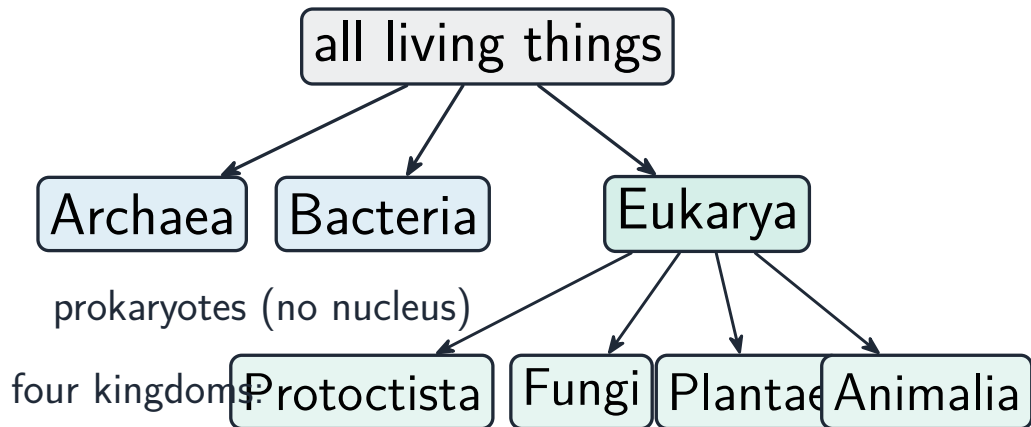
- discuss the biological, morphological and ecological species concepts
- describe the three domains and the taxonomic hierarchy
- outline the four eukaryotic kingdoms and how viruses are classified

Method — Species and domains

A **species** can be defined by the **biological** (can interbreed to give fertile offspring), **morphological** (look alike), or **ecological** (same niche) concept.

Archaea 古菌 and **Bacteria** 细菌 are prokaryotes but differ in membrane lipids, ribosomal RNA and cell-wall make-up. **Eukarya** have a nucleus.

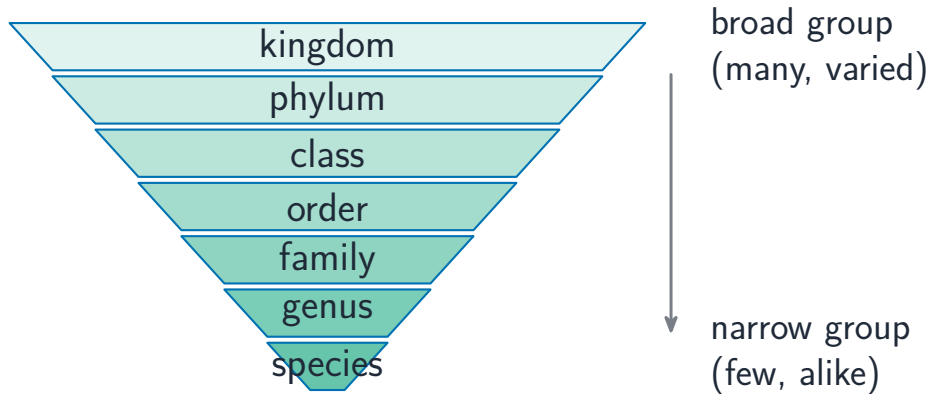
Method — Species and domains



Method — The taxonomic hierarchy

The four eukaryotic kingdoms: **Protocista** (mostly single-celled), **Fungi** (absorb food, chitin walls), **Plantae** (photosynthesise), **Animalia** (feed on others). **Viruses** are classified by their **nucleic acid** (DNA or RNA) and whether it is single- or double-stranded.

Method — The taxonomic hierarchy



A funnel of seven bands from kingdom down to species, getting smaller and more alike

Practice 2.1 ■ 1 mark

State the biological species concept.

Solution 2.1

Method: Species and domains

Worked steps

a group of organisms that can interbreed to produce fertile offspring **B1**.

Practice 2.2 ■ 2 marks

Put these in order from largest to smallest group: family, kingdom, genus, order.

Solution 2.2

Method: The taxonomic hierarchy

Worked steps

kingdom → order → family → genus **B1** **B1** *for order, fully correct.*

Exam-style 3.1 ■ 1 mark

To which domain do organisms with a nucleus belong?

- A** Archaea
- B** Bacteria
- C** Eukarya
- D** Protocista

Solution 3.1

- A** Archaea
- B** Bacteria
- C** Eukarya
- D** Protocista



Worked steps

C. Organisms with a nucleus are in the Eukarya domain.

Exam-style 3.2 ■ 1 mark

Viruses are classified according to:

- A** the kingdom they belong to
- B** the type of nucleic acid and whether it is single- or double-stranded
- C** their cell wall composition
- D** the number of chromosomes

Solution 3.2

Method: The taxonomic hierarchy

- A the kingdom they belong to
- B the type of nucleic acid and whether it is single- or double-stranded** 
- C their cell wall composition
- D the number of chromosomes

Worked steps

B. Viruses are classified by nucleic acid type and strandedness.

Exam-style 3.3 ■ 2 marks

- (a) State **two** features that distinguish the kingdom Fungi from the kingdom Plantae.
- (b) Explain why Archaea and Bacteria are placed in separate domains even though both are prokaryotes.

Solution 3.3

Method: Species and domains

Worked steps

- (a) Fungi feed by absorbing food (not photosynthesis) **B1**; Fungi have chitin cell walls (Plantae have cellulose) **B1**.
- (b) they differ in their membrane lipids, ribosomal RNA and cell-wall composition **M1**, showing they are only distantly related **A1**.

Exam-style 3.4 ■ 2 marks

Explain a limitation of the biological species concept.

Solution 3.4

Method: Species and domains

Worked steps

it cannot be applied to organisms that reproduce asexually / to extinct/fossil species / where two groups rarely meet to test interbreeding **B1** **B1**.