

# 18.1 Classification

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

**Total: 11 marks****KEY WORDS** class 纲 • taxonomic hierarchy 分类层级 • kingdom 界 • species 物种 • domain 域

## Objective

Build the skills to answer exam questions on **classification** — the meaning of **species** 物种, the three **domains** 域, the **taxonomic hierarchy** 分类层级, the four **kingdoms** 界, and how viruses are classified.

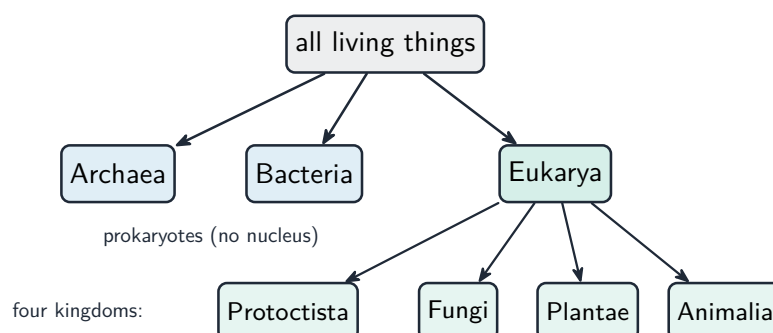
**You must be able to:**

- 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

## 1 Worked examples

### ■ Species and domains

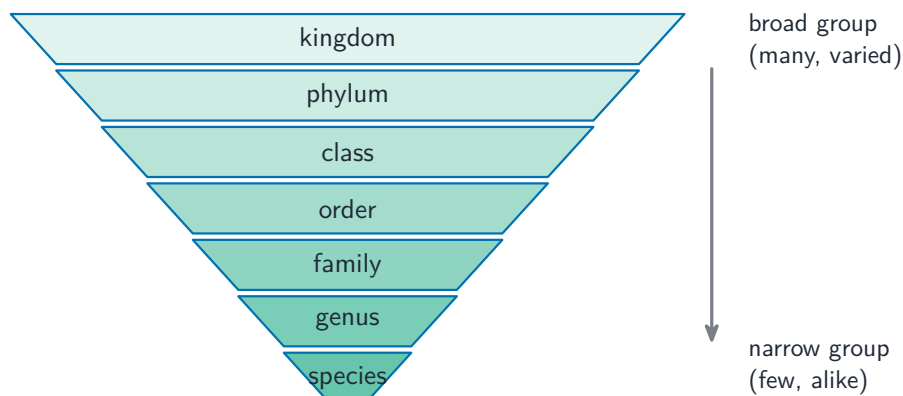
A **species** can be defined by the **biological** (can interbreed to give fertile offspring), **morphological** (look alike), or **ecological** (same niche) concept.



*Three domains: Archaea and Bacteria are prokaryotes; the Eukarya split into four kingdoms*

**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.

## ■ The taxonomic hierarchy



*Kingdom → phylum → class → order → family → genus → species*

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.

## 2 Practice

2.1 State the biological species concept. [1]

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2.2 Put these in order from largest to smallest group: family, kingdom, genus, order. [2]

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## 3 Exam-style questions

3.1 To which domain do organisms with a nucleus belong? [1]

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

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3.2 Viruses are classified according to: [1]

- A the kingdom they belong to

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- **B** the type of nucleic acid and whether it is single- or double-stranded
  - **C** their cell wall composition
  - **D** the number of chromosomes
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**3.3** (a) State **two** features that distinguish the kingdom Fungi from the kingdom Plantae. [2]

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(b) Explain why Archaea and Bacteria are placed in separate domains even though both are prokaryotes. [2]

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**3.4** Explain a limitation of the biological species concept. [2]

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## Solutions

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

**2.2** kingdom → order → family → genus.

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

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

**3.3** (a) Fungi feed by absorbing food (not photosynthesis); Fungi have chitin cell walls (Plantae have cellulose).

(b) they differ in their membrane lipids, ribosomal RNA and cell-wall composition, showing they are only distantly related.

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