

Classification & Biodiversity

A-Level Biology ■ Topic 18

A-Level Biology



Classification & Biodiversity

What we will cover

- 1 Species & the three domains
- 2 The taxonomic hierarchy
- 3 Biodiversity
- 4 Sampling an area
- 5 Conservation



grouped by shared features

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Classification

Classification & Biodiversity

└─ Classification

Species and the three domains

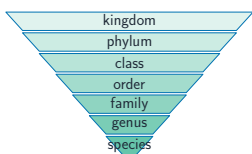
A **species** 种 is a group that can interbreed to give fertile offspring. The three **domains** 域 are Bacteria, Archaea and Eukarya – based on rRNA, not just cell type.

Archaea look like bacteria under the microscope but are genetically closer to eukaryotes.

Classification & Biodiversity

└─ Classification

The taxonomic hierarchy



broad group
(many, varied)

narrow group
(few, alike)

Smaller, more closely related groups:

kingdom → phylum → class → ... → species

Eukarya's four kingdoms:

Protoctista 原生生物界,
Fungi 真菌界, **Plantae** 植物界,
Animalia 动物界.

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Biodiversity

Biodiversity



Biodiversity 生物多样性 is measured at three levels:

- the range of **ecosystems** 生态系统 & **habitats** 栖息地
- the number of species & their **abundance** 丰度
- the genetic variation within a species

Sampling an area

Random sampling 随机取样 avoids bias:

- **quadrats** 样方 & **transects** 样带 – fixed plants
- **mark-release-recapture** 标志重捕法 – moving animals

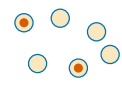
Simpson's index 辛普森多样性指数 gives diversity as one number.



quadrat
count species
in a square



transect
record along
a line



mark-recapture
mark some (red), release,
then re-catch

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Conservation

Conservation

two ways to conserve a species

in-situ (in the wild)
national parks,
marine reserves

ex-situ (away
from the wild)
zoos, botanic gardens,
seed banks,
frozen zoos

Species go **extinct** 灭绝 from climate change, hunting & habitat loss.

- **in-situ** 就地保护 – national & marine parks
- **ex-situ** 迁地保护 – zoos, **seed banks** 种子库

IUCN 世界自然保护联盟 lists threat; **CITES** 濒危物种贸易公约 controls trade.

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Recap

Worked example – measuring biodiversity

Why can two woods with the same number of species have very different biodiversity?

- Species **richness** counts species but ignores how many of each there are.
- A wood where one species dominates is **less** diverse than one with even numbers.
- Simpson's index uses **both** richness and **evenness** 均匀度.
- $D = 1 - \sum (n/N)^2$, so **higher** D = more diverse.

Richness alone is not biodiversity – **evenness** matters too. Random sampling with quadrats avoids bias; a large N makes the estimate reliable.

Topic 18 – key takeaways

1 Domains

Archaea, Bacteria, Eukarya

2 Hierarchy

kingdom → phylum → ... →
species

3 Biodiversity

ecosystems, species, genetic
variation

4 Conservation

in-situ vs ex-situ; IUCN & CITES

Check yourself

- 1 Name the three domains.
- 2 Which taxonomic level is the smallest?
- 3 Which method samples moving animals?
- 4 What does “in-situ” conservation mean?



Answers 1. Archaea, Bacteria, Eukarya 2. species 3. mark-release-recapture
4. protecting species in their own habitat