

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

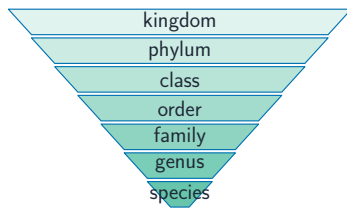
1 Classification

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.

The taxonomic hierarchy



broad group
(many, varied)

narrow group
(few, alike)

Smaller, more closely related groups:

kingdom → phylum → class → ... → species

Eukarya's four kingdoms:

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

2

Biodiversity

Biodiversity



Biodiversity 生物多样性 is measured at three levels:

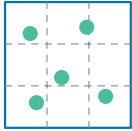
- the range of **ecosystems** 生态系统 & **habitats** 栖息地
- the number of species & their **abundance** 丰度
- the genetic variation within a species

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

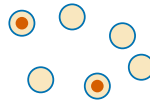
Simpson's index 辛普森多样性指数 gives diversity as one number.



quadrat
count species
in a square



transect
record along
a line



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

3

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.

4

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