Exercise walk-through

6.5
Classification of living organisms (4.6.4)

AQA · GCSE · Biology

Reproduction and meiosis

- **Sexual reproduction** involves the joining of male and female sex cells, each called a **gamete** : sperm and egg cells in animals, pollen and egg cells in flowering plants.
- It mixes genetic information from two parents, so the offspring vary. **Asexual reproduction** involves only one parent and no gametes.
- Its offspring are genetically identical to the parent, a **clone** (apart from any mutations).
- In plants and animals it uses cell division by **mitosis** .

Selective breeding, genetic engineering and cloning (2)

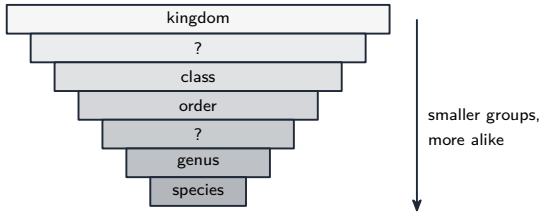
- **Embryo transplants** : cells are split apart from a young animal embryo before they specialise, and each one grows into an identical embryo, which is placed in a host mother.
- **Adult cell cloning** : the nucleus is removed from an unfertilised egg; the nucleus from an adult body cell is put in its place; an electric shock makes the egg divide into an embryo; the embryo is placed in the uterus of a host mother. Dolly the sheep, born in 1996, was cloned in this way.

Sources for this lesson (2)

- C. R. Woese, O. Kandler and M. L. Wheelis, "Towards a natural system of organisms: proposal for the domains **Archaea**, Bacteria, and Eucarya", *Proceedings of the National Academy of Sciences* 87 (1990), pages 4576 to 4579.
- AQA, *GCSE Biology* Paper 2 Higher (June 2024), the insecticide, **polydactyly** and GM soya questions, adapted.

Exercises 2.1·2.2

2.1 The diagram shows the levels of classification. Name the **two** missing levels. [2]



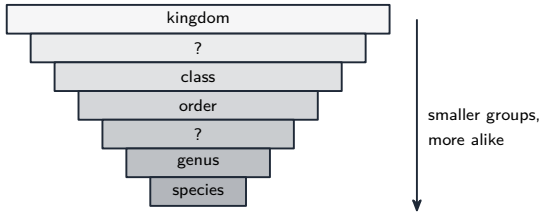
2.2 Lions are *Panthera leo* and leopards are *Panthera pardus*. What does the word *Panthera* tell you? Give **one** reason why scientists use binomial names. [2]

lion
Panthera leo

leopard
Panthera pardus

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2.1

- **phylum**; **family**

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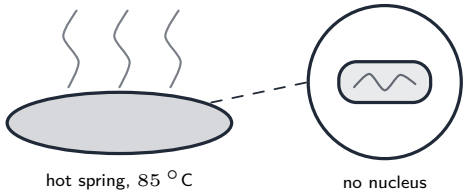
2.2

- they are in the same genus, so they are closely related
- one name is used by scientists in every country, so there is no confusion between common names

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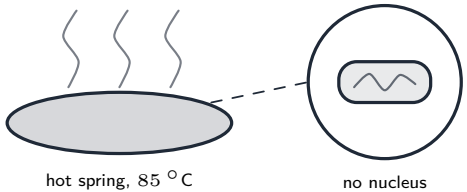
Exercise 3.1

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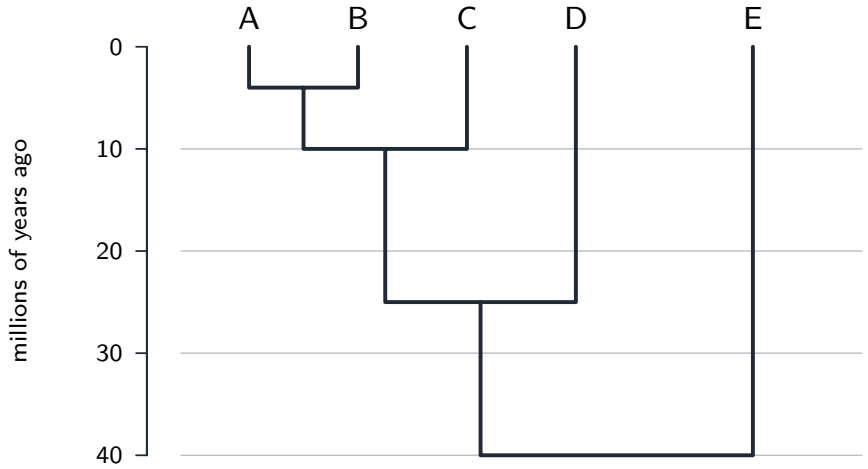
3.1

- **Archaea**
- it has no nucleus, so it is not in the Eukaryota
- its chemistry is different from bacteria, and archaea often live in extreme places such as hot springs

Exercise 3.2 (a)

3.2 The evolutionary tree shows how five species, A to E, are related.

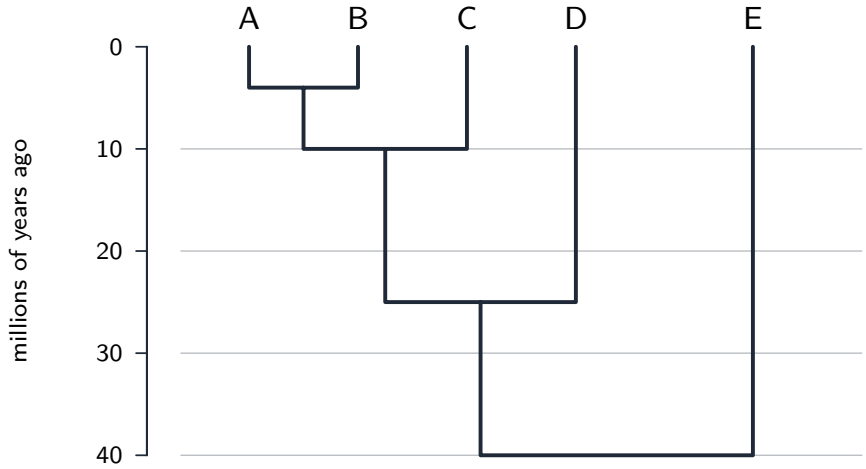
(a) Name the **two** most closely related species. Give a reason. [2]



Exercise 3.2 (a)

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(a) **A and B**; they have the most recent common ancestor, about 4 million years ago

Exercise 3.2 (b)

3.2 The evolutionary tree shows how five species, A to E, are related.

(b) Species A, B and C are in the same genus. Species D is in the same family but in a different genus. Explain how the tree supports this. [3]

Exercise 3.2 (b)

3.2 The evolutionary tree shows how five species, A to E, are related.

(b) Species A, B and C are in the same genus. Species D is in the same family but in a different genus. Explain how the tree supports this. [3]

(b) A, B and C share a common ancestor about 10 million years ago; D split off earlier, about 25 million years ago; species with a more recent common ancestor are more closely related, so they are put in a smaller group

Exercise 3.2 (c)

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(c) Later, scientists compared the DNA of species C and D. The DNA was more similar than the tree suggests. Suggest what the scientists should do, and why. [2]

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(c) redraw the tree with C and D more closely related, sharing a more recent common ancestor; DNA evidence shows relationships more accurately than features you can see

Exercise 3.2 (d)

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(d) Describe how the classification of living organisms has changed since Linnaeus, and explain why. [6]

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(d) Describe how the classification of living organisms has changed since Linnaeus, and explain why. [6]

(d) points to include:

- Linnaeus used features you can see, in seven levels from kingdom to species
- he gave each species a binomial name
- better microscopes showed the inside of cells
- the study of chemicals such as DNA and RNA showed how closely organisms are related
- Woese used this to add the three domains: Archaea, Bacteria and Eukaryota
- evolutionary trees, from living and fossil data, show common ancestors

Levels: **5–6** a full, logical answer with correct biology and correct terms; **3–4** several correct points, partly linked; **1–2** one or two relevant points.