

18.2 Adaptive features

Name: _____ Class: _____ Date: _____ **Total: 21 marks**

KEY WORDS adapted 适应 • adaptive feature 适应特征 • xerophytes 旱生植物
• hydrophytes 水生植物 • survive 生存

Objective

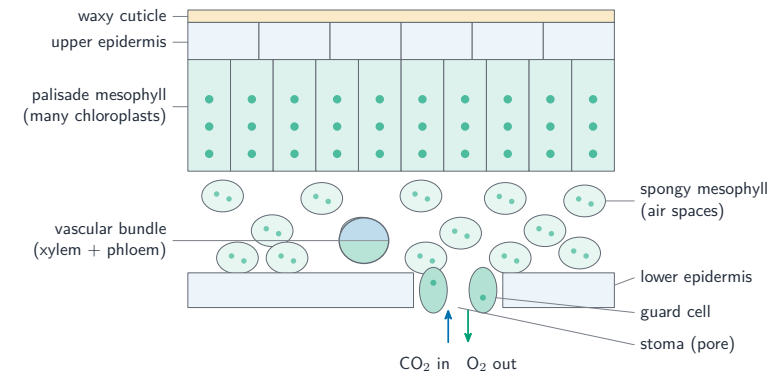
Build the skills to answer exam questions on **adaptive features** 适应特征 — what they are, and the features of **xerophytes** 旱生植物 and **hydrophytes** 水生植物.

You must be able to:

- define an adaptive feature
- describe the adaptive features of a xerophyte (desert plant)
- describe the adaptive features of a hydrophyte (water plant)

1 Worked examples

■ Adaptations



An adaptive feature is an inherited feature that helps an organism survive and reproduce in its environment



over many generations the population becomes better adapted

Adaptive features arise through natural selection

- **xerophyte (desert):** thick waxy cuticle, few small stomata, water storage → reduce water loss.
- **hydrophyte (water):** air spaces to float; stomata on the upper surface.

2 Practice

2.1 Define an adaptive feature. [1]

2.2 State one adaptive feature of a desert plant. [1]

3 Exam-style questions

3.1 A thick waxy cuticle helps a desert plant by: [1]

- **A** increasing water loss
- **B** reducing water loss
- **C** trapping more light
- **D** attracting insects

3.2 Xerophytes live where water is scarce.

(a) Describe two adaptive features that reduce water loss, and how each helps. [4]

3.3 Marram grass grows on dry sand dunes. Water lily grows with its roots in mud and its leaves floating on the surface.

(a) State what is meant by an *adaptive feature*. [2]

(b) Describe **three** adaptive features of a xerophyte such as marram grass, and explain how each reduces water loss. [6]

(c) Describe **two** adaptive features of a hydrophyte such as water lily, and explain each. [4]

(d) Explain why a xerophyte would not survive if planted in a pond. [2]

Solutions

2.1 an inherited feature that helps an organism survive and reproduce in its environment.

2.2 any of: thick waxy cuticle; few/small stomata; water storage.

3.1 B. A thick waxy cuticle reduces water loss.

3.2 (a) a thick waxy cuticle reduces evaporation from the leaf surface; few/small stomata reduce water lost by transpiration.

3.3 (a) An adaptive feature is an inherited characteristic that makes an organism better suited to its environment, so it is more likely to survive and reproduce there.

(b) A **thick waxy cuticle** — water cannot evaporate through wax, so loss from the leaf surface is very low. **Rolled leaves with stomata on the inside** — this traps a pocket of humid air next to the stomata, so the concentration gradient for water vapour is small and less diffuses out. **Hairs around the stomata (or sunken stomata)** — they trap still, humid air and shelter the pores from the wind, again reducing the gradient. (Also accept: long roots reaching deep water; a small surface area to volume ratio.)

(c) **Large air spaces in the leaves and stems** — these hold the leaf up at the surface so it reaches the light, and store oxygen for the roots in airless mud. **Stomata on the upper surface only** — the lower surface is in contact with water, so gases can only be exchanged from above.

(d) Its features are all for saving water, which is not scarce in a pond; its roots are not adapted to airless waterlogged mud, so they would not get enough oxygen for respiration and would die.