# Lab 11: Adaptations Response Form

## Part A. Life in Water

List some challenges of living in an aquatic environment e.g., what might make it difficult for life to survive in water?

#### A.1 Research and Present

Notes:

#### A.2 Observe and Analyze

Stomata/cm2 lower leaf surface =

Stomata/cm2 upper leaf surface =

1. Are the stomata most abundant on the upper or lower surface of the leaf?
2. Percentage difference of stomata between the lower and upper leaf surfaces=
3. Develop a hypothesis to provide a possible explanation for a difference, if observed.
   1. Hypothesis:
   2. How could your hypothesis be tested?
4. Sketch the appearance of air pockets in the water lily cross section.
5. What difference in the number of air pockets would you expect to see in an aquatic plant like a water lily compared to a terrestrial plant? Explain your reasoning.

#### A.3 Observe and Analyze

1. Describe the location and appearance of the vacuoles.
2. Within each vacuole there are barium sulfate (gypsum) crystals, the purpose of which is unknown. They are hypothesized to be statoliths (involved in balance/orientation of the body), like what one might find in the human ear.
3. Use your observations to come up with a hypothesis explaining the arrangement, position, and structure of the vacuoles and their relationship to the gypsum crystals.
4. How would you test this hypothesis?

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#### A.4 Research and Present

Notes:

#### A.5 Observe and analyze

1. Describe the gill structures. How are these structures like or different from those found in fish?

#### A.6 Research and Present

Notes:

#### A.7 Research and Present

Notes:

#### A.8 Research and Present

Notes:

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#### A.9 Observe and analyze

1. What function does the contractile vacuole play?

#### A.10 Research and Present

Notes:

## Part B. Life on Land

List some challenges of living in a terrestrial environment that might be solved by adaptations. Compare the list of terrestrial constraints to the aquatic constraints you documented in part A.

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#### B.11 Observe and analyze

Stomata/cm2 lower leaf surface =

Stomata/cm2 upper leaf surface =

1. Are the stomata most abundant on the upper or lower surface of the leaf?
2. Percentage difference of stomata between the lower and upper leaf surfaces=
3. Develop a hypothesis to provide a possible explanation for a difference, if observed.
   1. Hypothesis:
   2. How could your hypothesis be tested?
4. Sketch the appearance of air pockets in the inch plant cross section.
5. Is there a difference in the percentage of stomata between the aquatic water lily and terrestrial inch plant you observed?
6. How do the structure of air spaces compare between the tissues of the aquatic and terrestrial plant?

#### B.12 Observe and analyze

1. Describe the shape and arrangement of lenticels. Do they appear to be adaptive for gas exchange? Why or why not?
2. View the cortical (cortex) tissue, which lies between the epidermis (surface cells) and vascular (conducting) tissues. Are the cortex cells just inside the lenticels loose with small air spaces?

#### B.13 Observe and analyze

1. If not directly for photosynthesis, why do you think trees have stems? Does the microscopic cross section offer any clues?
2. How might stems contribute to photosynthesis even while lacking the capacity to perform photosynthesis directly?

#### B.14 Research and Present

Notes:

#### B.15 Research and Present

Notes:

#### B.16 Research and Present

Notes:

#### B.17 Research and Present

Notes:

## Part C. Adaptations to Variable Environments

How might variation in seasonality, habitats, predators, and competitors pose significant challenges to an organism’s survival?

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#### C.18 Research and Present

Notes:

#### C.19 Research and Present

Notes:

#### C.20 Research and Present

Notes:

#### C.21 Research and Present

Notes:

## Summary Table

**Table 11.1: Summary of adaptations.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Organism / Species | Type of Adaptation | Adaptation Category | Description | Environment | Variable Environmental Condition | Notes / Comments |
| Example: *Daphnia* | Structural | Gas exchange | Gills adapted for countercurrent exchange for efficient oxygen uptake | Aquatic | Oxygen availability (variable) | Saltwater species, requires low oxygen levels for proper function |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

## Part D. Field Observation

D.22 Observe and Analyze

Specimen:

Hypothesis:

Sketch:

D.23 Observe and Analyze

Specimen:

Hypothesis:

Sketch:

D.24 Observe and Analyze

Specimen:

Hypothesis:

Sketch:

## Summary Questions

1. Identify and describe any two characteristics that may be adaptive in some situations but harmful (maladaptive) in others.
2. Reproduction is a vital process for all organisms. List and briefly describe a few common adaptations in plants and animals that promote successful reproduction.
3. Could it be argued that every trait in existence has some potential adaptive value? Explain.
4. Explain whether the following statement is correct or incorrect: “Giraffes evolved longer necks to promote food acquisition.”
5. If a trait is adaptive, what might prevent a species from becoming increasingly specialized for that trait over time? What is this called?