Summer EXERCISE 11/12

PROTIST, FUNGAL AND PLANT DIVERISTY

LEARNING OBJECTIVES

- Describe the diversity that exists among the protists.
- Identify the characteristics of fungi.
- Explain the alteration of generations in plants.
- Outline the divers features of plant structure and reproduction.
- Explain the features that allow land plants to successfully inhabit the terrestrial environment

PROTISTA

This group includes a number of quite different organisms, which have been placed together because a few basic similarities they share: they are all eukaryotic with more than one chromosome and with a clearly defined nucleus and organelles, and divide by mitosis and meiosis. Most are single celled but there are also many multi-cellular species. These organisms have been placed together (for convenience?) in a group between prokaryotes and more complex eukaryotes and in many cases there is no true genetic relationship between many of the species. Hence the differences between them abound.

Differences between protists:

1. Method of feeding: autotrophs, predators, parasites and decomposers are all members of this group.

2. Method of locomotion: Members utilize, flagella, cilia and pseudopods.

3. Size: Both microscopic and macroscopic species exist.

4. Cell wall: Some species have cell wall (made of cellulose) and others are wall-less.

5. Habitat: Habitats include fresh water, the marine environment and parasitic associations.

Exercise 1: Macroscopic protists

Observe the brown, red and green marine algae and make drawings of at least two types, to show their body form.

Exercise 2: Microscopic protists

Use your microscope (x 40 objective) to make drawings of the following protists: *Euglena, Paramecium, Amoeba,* and *Spirogyra*. Note the presence of the following structures wherever they occur and label them on your drawing: cell wall, plasma membrane, nucleus, chloroplast, pseudopod, cilia, food vacuole.

Euglena

Paramecium

Amoeba

Spirogyra

FUNGI

The fungi are spore-bearing, heterotrophic with absorptive nutrition, which reproduce both sexually and asexually. Most of them are saprobes but many parasitic species also exist. The group includes both microscopic types and macroscopic types. In terms of body form, most are made up of thread-like filaments called ***hyphae***. The mass of hyphae is called ***mycelium***. Yeasts are unicellular fungi (microscopic). They include species that are used in the making of bread and alcoholic beverages as well as parasitic ones that cause yeast infections.

Exercise 3: Filamentous fungi

Use your microscope to draw portions of the slides of *Rhizopus* (the bread mold) and *Penicillium*. Note the following structures and label them on your drawing; hyphae, spornagia, spores.

Rhizopus

Penicillium

Exercise 4: Unicellular fungi: yeasts

Make drawings of some yeast cells from the slides provided.

Exercise 5: Macroscopic fungi

Observe the specimens of macroscopic fungi on display: mushrooms, puff balls, shelf fungi, etc.

PLANT DIVERSITY

Plants are photosynthetic organisms which all contain chlorophyll. Apart from those unifying features, plants display a number of differences:

1. Some plants have a body plan in which roots, stems and leaves are present. Less complex plant do not have this differentiation.

2. Some plants are vascular which means that they have transport tissues. Phloem transports manufactured carbohydrate and xylem transports water. Other plants are non-vascular.

3. Some plants need water for the fertilization of the female gamete by the male, others use agents such as wind or insects to transport the male gamete.

4. Some plants produce seeds and others do not.

5. Some seed-bearing plants, produce flowers and fruit and so the seed development takes place inside the fruit. Other seed-bearing plants produce naked seed.

6. Plants display a life cycle which alternates between two phases known as generations. The gametophyte generation produce gametes and the sporophyte generation produces spores. In some plants the gametophyte generation is dominant and in others the sporophyte generation is dominant. Dominant means that this is the part of the life cycle which is physically larger and the stage in which the plant spends most of its life.

Exercise 6: Bryophytes e.g. mosses

Make a drawing of the plant body of the moss. Label the following structures on your diagram: rhizoid, stem-like structure, leaf-like structure, gametophyte, sporophyte, capsule.

Drawing of moss

Which generation is dominant? _____

Is the dominant haploid or diploid? _____

What is the function of the rhizoids? _____

Why are these plants found only in moist shady areas?

_____

_____

Exercise 7: Ferns

(a) Draw a part of the underside of a fern frond.

What are the brown structures called? _____

(b) Use a needle and tease out one of the brown structures onto a microscope slide and observe under the dissecting microscope.

What are these individual structures you teased out called? _____

What do they produce? _____

Which generation does the fern frond represent? Gametophyte or sporophyte?

_____

Gently remove one of the fern prothalli (gametophyte) from the jar. Place it on a microscope slide in a drop of water from the jar and cover with a cover slip. Observe using the low power of your microscope and draw.

Which generation of the fern plant is this? _____

Is it haploid or diploid? _____

Describe what happens on the prothallus (gametophyte).

_____

_____

_____

_____

Exercise 8: Gymnosperms e.g. pine

Make a drawing of a male and female pine cone.

What is the function of the male cone? _____

What happens on the 'leaves' on the female cone?

_____

_____

Explain why these plants are called 'gymnosperms'?

_____

_____

Exercise 8: Angiosperms: Flowering plants

(a) Make a drawing of the half flower and label all the parts. Give the **function** of each of the parts you have labeled.

What part of the flower becomes the seed? _____ The fruit? _____

Exercise 9: Summary of Plant Characteristics

Indicate whether a plant group has a particular characteristic by putting a check mark in the relevant column.

Characteristic	Moss	Fern	Gymnosperm	Angiosperm
Water needed for fertilization				
Plant body has distinct roots, stems, leaves				
Rhizoids present				
Sporophyte generation dominant				
Vascular				
Seeds: naked				
Seeds: enclosed				
Flowers				
Fruit				

EXERCISE 12

Animal Diversity

LEARNING OBJECTIVES

- Compare and contrast the body plan of different animal groups.
- Assign animals to their correct phylum based on their characteristics.
- Identify those characteristic that are important for successful terrestrial life.

INTRODUCTION

Animal bodies display a number of features that can be used in the identification of the different animal groups.

Cephalization: a concentration of nerve and sensory cells in one area (anterior or head region). This is the area of the animal that first encounters the stimuli in the environment.

Symmetry: Animals display **radial** or **bilateral symmetry**. In **radial symmetry**, the body parts of the animal are arranged around a central point e.g. star fish. There are several axes that can divide the body into mirror images of each other. Animals with **bilateral symmetry** have only one axis that can produce mirror images. They are usually cephalized, with a definite head region at the anterior of the body, a posterior region and dorsal (back) and ventral (underside or belly) regions e.g. earthworms.

Segmentation: Many animal bodies are divided into **interconnecting sections** that are repeated one after the other along the body. This is very obvious in earthworms.

Type of gut: The gut or digestive system may be incomplete or sac-like with only one opening fo feeding and getting rid of waste. **A complete or tubular gut**, has two openings, a mouth at one end and an anus at the other.

Coelom: A **coelom** is a cavity or space between the body wall and the digestive system. The coelom protects and cushions the internal organs of the animal.

Exercise 1: Identify examples of different animal groups.

Fig. 1 is a chart which shows a simplified classification of the major animal groups. Use the specimen display to locate examples of each of the groups listed on the chart. Write in at least one example of each group.

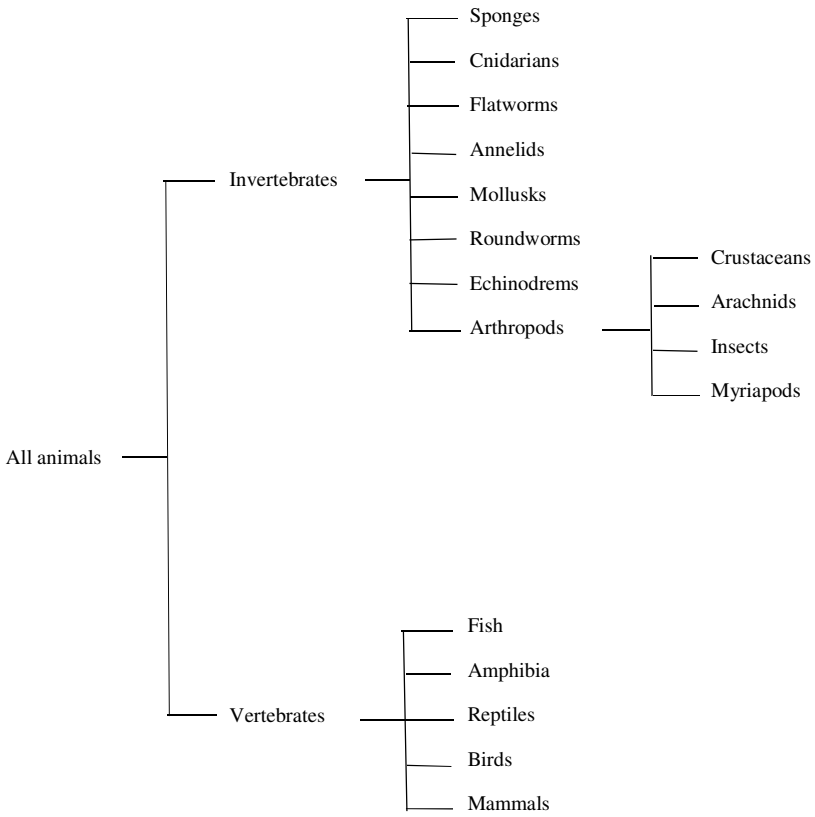

Figure 1: Classification of Animals

Draw one animal belonging to each of the invertebrate groups.

Sponge	**Cnidarian**
Flatworm	**Roundworm**
Annelid	**Mollusk**
Arthropod	**Echinoderm**

INVERTEBRATES

Exercise 2: Characteristics of Invertebrates

Some of the characteristics listed in the **Table 1** are visible when viewing an animal externally and others are not. Observe the specimen display and check off the features characteristic of each group. (Use your textbook to get information about features that can only be seen visible internally).

Characteristic	Sponges	Cnidarians	Flatworms	Annelids	Mollusks	Roundworms	Echinoderms	Arthropods
Cells organized into tissues								
Organ systems								
Coelom								
Cephalization								
Segmentation								
Appendages								
Symmetry: bilateral								
Symmetry: radial								
Type of gut: sac								
Type of gut: tubular								

Table 1: Characteristics of Invertebrates

VERTEBRATES

All vertebrates have the following features in common: a coelom, a circulatory system and an internal skeleton. The skeleton consists of a backbone or vertebral column which encloses the spinal cord and a skull or cranium which houses the brain. Apart from these unifying features, vertebrate groups display some marked differences in their other characteristics.

Exercise 3: Characteristics of Vertebrates

Observe the vertebrate specimens on display and compare Table 2 with their characteristics (for those features that are not visible externally, use your textbook to get the information).

Characteristic	Fish	Amphibia	Reptiles	Birds	Mammals
Type of body covering					
Breathing organs					
Habitat					
Type of appendages					
Amniote egg?					
Internal or external fertilization?					

Table 2: Characteristics of Vertebrates