

TOPIC 1 : BIODIVERSITY

Learning Outcomes:

1.1 Introduction to Biodiversity and Taxonomy: The Classification of Biological Diversity

- a) Define biodiversity
- b) Explain the biological classification and nomenclature based on the Linnaean System.
- c) State Three-domain system
(Carl Woese, 1977):
 - i. Bacteria
 - ii. Archaea
 - iii. Eukarya

1.2 Domain Bacteria and Domain Archaea

- a) State the two domain of prokaryotes, Bacteria (*E. coli*) and Archaea (*Sulfolobus* sp.)
- b) Describe the diversity of bacteria (based on cell shapes: coccus, bacillus, spirillum and vibrio)
- c) State the roles of bacteria:
 - i) recycling of chemical elements in ecosystem (nitrogen fixation, e.g. *Rhizobium* sp.)
 - ii) symbiotic (enterobacteria, *E. coli* in human intestine)
 - iii) pathogenic (*Salmonella* sp.)
 - iv) in research and technology (bacterial plasmid).

1.3 Domain Eukarya: Kingdom Protista

- a) State the unique characteristics of Protista.
- b) State the classification of Protista based on:
 - (i) algae (plant-like): (*Chlamydomonas* sp.)
 - (ii) protozoa (animal-like): (*Amoeba* sp.)
- c) State the roles of Protista
 - (i) food source (*Chlorella* sp.)
 - (ii) pathogenic (*Plasmodium* sp. causes malaria)
 - (iii) sewage treatment (Protozoa)

1.4 Domain Eukarya: Kingdom Fungi

- a) State the unique characteristics of Fungi
- b) State the classification of Fungi phyla based on the spore bearing structure.
 - i. Zygomycota (*Rhizopus* sp.)
 - ii. Ascomycota (*Penicillium* sp.)
 - iii. Basidiomycota (*Agaricus* sp.)
- c) State the roles of Fungi:
 - i. decomposer
 - ii. symbionts
 - iii. pathogens

- iv. commercial important in food production (yeast in fermented food)
- v. pharmaceutical (*Penicillium sp.* Produce penicillin)

1.5 Domain Eukarya: Kingdom Plantae

- a) State the unique characteristics of Plantae
- b) State the classification of Plantae into four groups:
 - i. Bryophytes (e.g.: *Polytrichum sp.*)
 - ii. Pteridophytes (e.g.: *Dryopteris sp.*)
 - iii. Gymnosperms (e.g.: *Pinus sp.*)
 - iv. Angiosperms (e.g.: *Hibiscus rosa-sinensis*)
- c) Describe evolutionary relationship in Kingdom Plantae (Bryophytes → Angiosperms) in terms of dominancy and dependency.

1.6 Domain Eukarya: Kingdom Animalia

- a) State the unique characteristics of Kingdom Animalia
- b) State the classification of Animalia into nine phyla:
 - i. Porifera (e.g.: *Leucosolenia sp.*)
 - ii. Cnidaria (e.g.: *Obelia sp.*)
 - iii. Platyhelminthes (e.g.: *Taenia sp.*)
 - iv. Nematoda (e.g.: *Ascaris sp.*)
 - v. Annelida (e.g.: *Pheretima sp.*)
 - vi. Arthropoda (e.g.: *Valanga sp.*)
 - vii. Mollusca (e.g.: *Achatina sp.*)
 - viii. Echinodermata (e.g.: *Asterias sp.*)
 - ix. Chordata (e.g.: *Amphioxus sp.*)

- | | |
|---|---|
| <p>1. The worldwide variety of organisms and ecosystem is termed</p> <ul style="list-style-type: none"> A. Biodiversity B. Ecodiversity C. Organisms diversity D. Biomixtures | <p>3. Three taxon that are put upper than Order:</p> <ul style="list-style-type: none"> A. Kingdom – Family – Species B. Genus – Class – Family C. Family – Genus – Species D. Class – Phylum – Kingdom |
| <p>2. The binomial system of nomenclature is a product of the work of:</p> <ul style="list-style-type: none"> A. Charles Darwin B. Carolus Linnaeus C. Gregor Mandel D. Paul Hebert | <p>4. Which of the following consist of taxon that are lower than order?</p> <ul style="list-style-type: none"> A. Family, class, genus B. Family, species. Genus C. Species, class, family D. Class, family, genus |

5. Which is true about taxonomic hierarchy?
 - A. The broadest taxon is phylum or division.
 - B. Order is a taxon within a class and it consist of several families.
 - C. Different organism within a class are from the same family
 - D. Different organism within an order may belong to different classes
6. A chain of round bacteria would be called:
 - A. spirilla
 - B. diplococci
 - C. bacilli
 - D. streptococci
7. Bacteria:
 - A. are incapable of locomotion
 - B. move by means of pili
 - C. move by means of cilia
 - D. move by means of a rotating flagella
8. Rod-shaped bacteria are called
 - A. bacilli
 - B. diplococci
 - C. vibrio
 - D. spirochete
9. The most common mode of reproduction in bacteria is:
 - A. binary fission
 - B. transformation
 - C. transduction
 - D. conjugation
10. Most protozoa may be characterized as:
 - A. autotrophic
 - B. heterotrophic
 - C. photosynthetic
 - D. chemotrophic
11. The plant-like protista are called
 - A. protozoans
 - B. algae
 - C. fungi
 - D. diatoms
12. Most protists are:
 - A. aquatic
 - B. parasitic
 - C. terrestrial
 - D. arboreal
13. Which of the following is FALSE for protists?
 - A. They can be autotrophic or heterotrophic.
 - B. They can be prokaryotic or eukaryotic
 - C. They can be single-celled or multi-celled.
 - D. They can be mobile or immobile.
14. Algae gets its food by
 - A. photosynthesis
 - B. capturing prey
 - C. decomposition
 - D. osmosis
15. Fungi are...
 - A. consumers.
 - B. parasites.
 - C. decomposers.
 - D. producers
16. A _____ is a filament that makes up the vegetative body of most fungi
 - A. thallus
 - B. protonema
 - C. fruiting body
 - D. hypha

17. A _____ is a tangled mat of hyphae
- A. sporocarp
 - B. sporangia
 - C. zygosporangium
 - D. mycelium
18. Which of the following is incorrectly matched?
- A. Basidiomycota – club fungi
 - B. Ascomycota – sac fungi
 - C. Ascomycota – yeast
 - D. Zygomycota – lichens
19. Which of the following do all fungi have in common?
- A. Meiosis in basidia
 - B. Coenocytic hyphae
 - C. Sexual in life cycle
 - D. Absorption of nutrients
20. All fungi share which of the following characteristics?
- A. Symbiotic
 - B. Heterotrophic
 - C. Pathogenic
 - D. Flagellated
21. Each of the following is a general characteristic of bryophytes except
- A. a cellulose cell wall
 - B. vascular tissues
 - C. chlorophylls a and b
 - D. being eukaryotic
22. Which of the following was an evolutionary adaptation vital to the survival of the bryophyte?
- A. The switch from the gametophyte to the sporophyte as the dominant generation of the life cycle.
 - B. The development of branched sporophytes.
 - C. The birth of pollination.
 - D. The packaging of gametes into the gametangia.
23. Which of the following statements are true about plants in group gymnosperms?
- I Have cones as reproductive organs
 - II Ovules are not protected by ovary
 - III Seed is not protected by pericarp
 - IV Spores are dispersed by wind
- A. I, II and IV
 - B. I, III and IV
 - C. II, III and IV
 - D. I, II, III and IV
24. Which of the following is not a characteristic that distinguishes gymnosperms and angiosperms from other plant?
- A. Alternation of generation
 - B. Ovules
 - C. Integuments
 - D. Pollen
25. Bryophytes are the simplest group of terrestrial plants. What adaptations have taken place to adopt life on land?
- I. Their gametes develop within gametangia.
 - II. They have well-developed structural system.
 - III. They are covered by a waxy cuticle.
 - IV. They produce seed that protected by their fruits.
- A. I and II
 - B. I and III
 - C. II and III
 - D. II and IV

26. Which of the following phyla of the animal kingdom has the following characteristics: no symmetry, no coelom and no segment?
- A. Porifera
 - B. Nematoda
 - C. Cnidaria
 - D. Annelida
27. Which animal phyla is associated with pseudocoelomate?
- A. Nematoda
 - B. Porifera
 - C. Cnidaria
 - D. Platyhelminthes
28. The most successful phylum in the animal kingdom, in terms of number and diversity of distributions is
- A. mammals
 - B. aves
 - C. annelids
 - D. arthropods
29. Individuals in a coelenterate colony that have different body forms is an example of
- A. radial symmetry
 - B. polymorphism
 - C. morphogenesis
 - D. polyploidy
30. What are the cells in the sponge that are primarily responsible for trapping food particles from circulating water?
- A. Amoebocytes
 - B. Choanocytes
 - C. Mesohyl cells
 - D. Epidermal cells
31. A cross section of the body of animal has the following structures from the outer layer to the inside, chaetae, cuticle, epidermis, circular muscles, longitudinal muscles, nephridium, gut muscles and gut. This animal is from the phylum
- A. Coelentrata
 - B. Nematoda
 - C. Mollusca
 - D. Annelida
32. Amphibia, Reptilia and Mammalia have similarities because all of them
- A. are unable to control their body temperature
 - B. have hearts with four chambers
 - C. have pharyngeal gill slits at an early stage of their development
 - D. produce eggs that have shells.
33. Water exits a sponge through
- A. choanocytes
 - B. amoebocytes
 - C. spicules
 - D. osculum
34. An animal is diploblastic, radially, symmetrical, has a single opening for ingestion and egestion and it is dimorphic. How is this animal classified?
- A. As a porifera
 - B. As a cnidarian
 - C. As a platyhelminth
 - D. As a protozoan
35. As a group, how do poriferans, cnidarians and platyhelminths differ from other animal phyla?
- A. They are radially symmetrical
 - B. They do not have body cavity
 - C. They are diploblastic
 - D. They lack true tissues

36. Which of the following is diploblastic phylum of aquatic predators?
- A. Cnidaria
 - B. Annelida
 - C. Mollusca
 - D. Echinodermata
37. Nematodes and arthropods are superficially alike in that they
- A. moult a resistant cuticle
 - B. have larvae that differ in appearance from adults
 - C. show evidence of previous radial symmetry
 - D. depend on a body cavity for locomotion
38. Which characteristic is shared by both cnidarians and flatworms?
- A. Dorsoventrally flattened bodies
 - B. Flame cells
 - C. A digestive system with a single opening
 - D. Radial symmetry
39. Polymorphism in life cycle is a unique feature of the phylum
- A. Cnidaria
 - B. Echinodermata
 - C. Platyhelminthes
 - D. Porifera
40. Which of the following is not a characteristic of most members of the phylum Annelida?
- A. Hydrostatic skeleton
 - B. Segmentation
 - C. Pseudocoelom
 - D. Metanephridia
41. What is true of echinoderms?
- A. They have an endoskeleton of hard calcareous plates
 - B. Tube feet provide motility
 - C. They have a pseudocoelom
 - D. A and B
42. Nematode worms and annelid worms share which of the following features?
- A. Use of the fluid in the body cavity as a hydrostatic skeleton
 - B. Presence of circulatory system
 - C. Presence of segmentation
 - D. Absence of species with parasitic nutrition

1. **FIGURE 1** shows various types of organism.

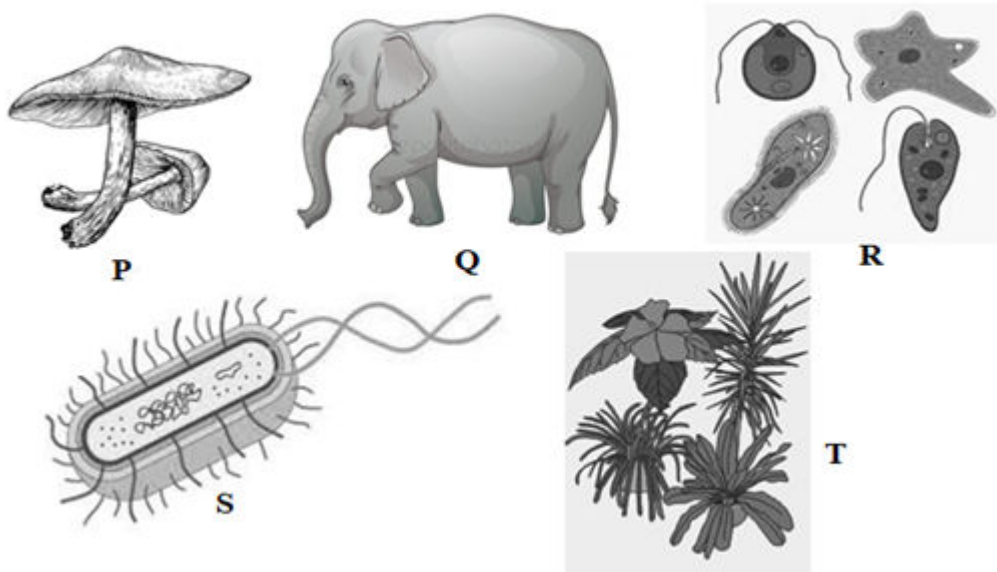


FIGURE 1

a) State Kingdom **P**, **Q**, **R**, **S** and **T**.

- P:** _____
Q: _____
R: _____
S: _____
T: _____

b) According to **1(a)**, complete the table below.

Kingdom	Example
P	
Q	
R	
S	
T	

c) On each line, write the term from the word bank that correctly completes each sentence. Some terms may be used more than once.

binomial nomenclature	domains	genus	kingdoms
scientific name	species		

- i. The current system classifies organisms into three _____ and five _____.
 - ii. Scientists still use Linnaeus's naming system called _____ to give each organism a name.
 - iii. *Ursus arctos* is the _____ for a brown bear.
 - iv. *Ursus* is the brown bear's _____.
 - v. The word *arctos* is the brown bear's _____ name.
2. Draw the three shapes of bacteria and write the specific name for each.

3. State the importance of bacteria.

4. **FIGURE 2** shows the unicellular organisms.

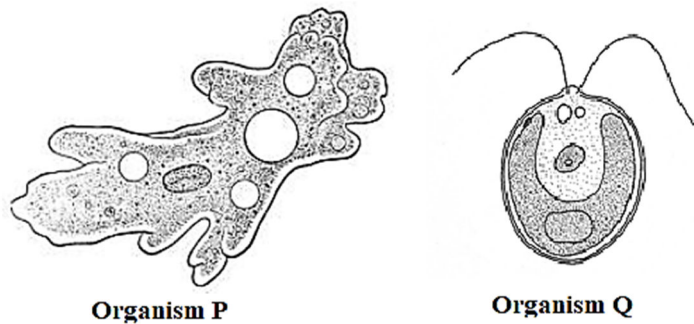


FIGURE 2

b) Name the **organism P** and **Q**.

c) State the importance of Protista.

5. **FIGURE 3** shows the classification of Kingdom Fungi.

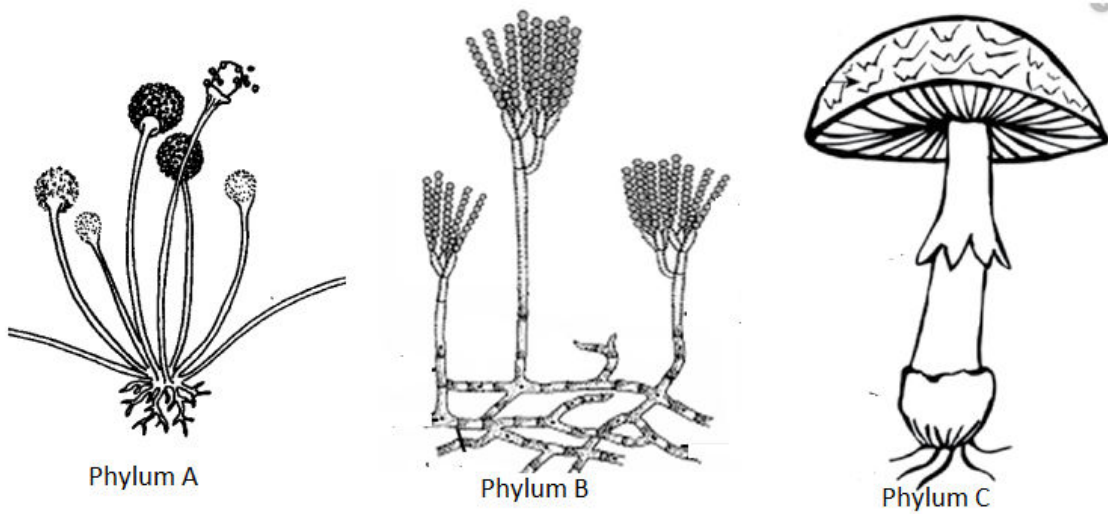


FIGURE 3

a) State the phyla **A, B** and **C**.

b) Give **THREE** unique characteristics of the Kingdom Fungi.

c) State the importance of fungi.

6. **FIGURE 4** below shows **TWO** types of plant that may be found in the same habitat.

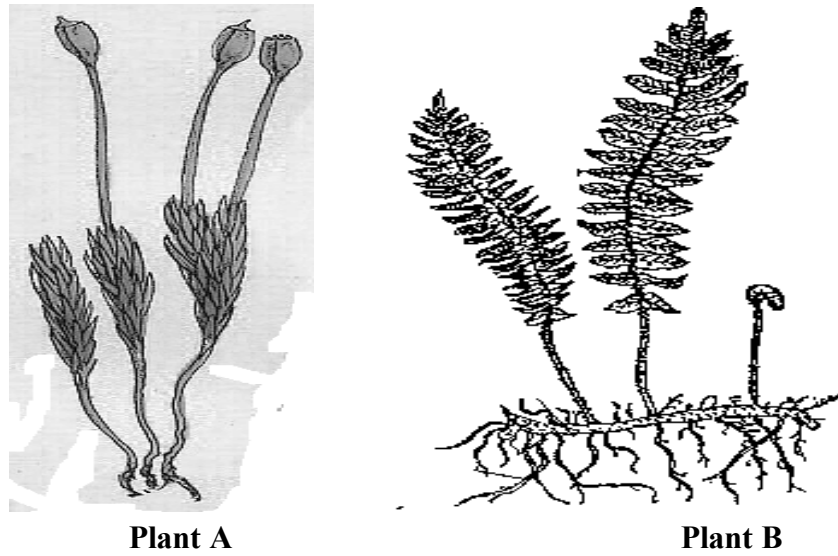


FIGURE 4

a) State the name of each plant and its phylum.

b) Compare **Plants A and B**.

7. **FIGURE 5** shows two type of plants.

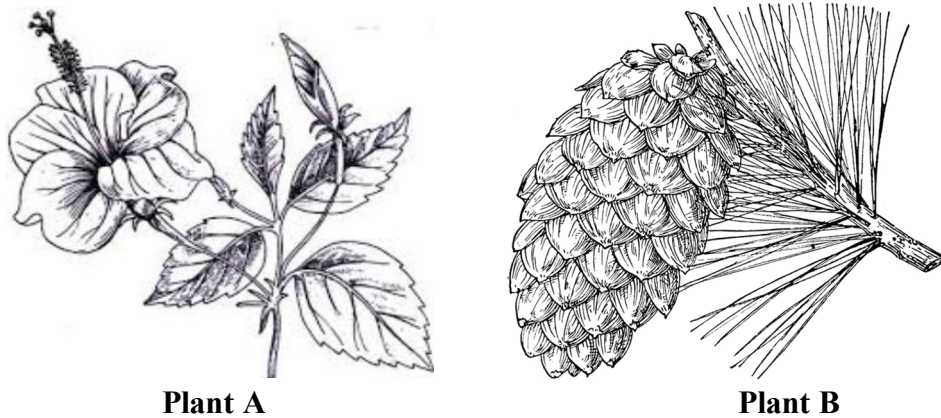


FIGURE 5

a) Name the phyla and give an example for each.

b) Which plant is considered as more advanced? Explain.

8. Complete the table below with a tick/ if the statement is true or a cross × if it is not true

Characteristics	Bryophytes	Pteridophytes	Gymnosperms	Angiosperms
Contain vascular tissue				
Gametophyte generation dominant				
Sporophyte generation dominant				
Contain free swimming sperms				
Homosporous				
Heterosporous				

9. Complete the table below for differences between angiosperms and gymnosperms.

Characteristics	Angiosperms	Gymnosperms
Ovule		
Phloem		

Xylem		
Reproductive structure		
Double fertilization		
Seed		

10. **FIGURE 6** shows two organism from different phylum.

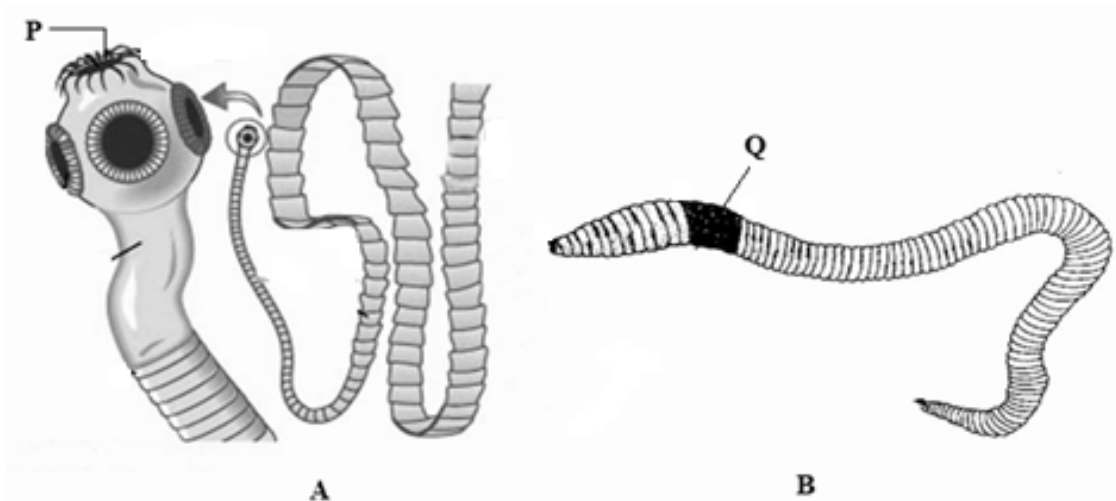


FIGURE 6

a) State the phylum for organism above.

b) Name structure **P** and state the function.

c) Organism **A** and **B** are hermaphrodites. Explain.

d) Name **Q** and explain the function.

e) Differentiates organism **A** and organism **B**.

10. **FIGURE 7** shows the life cycle of an organism under Kingdom Animalia.

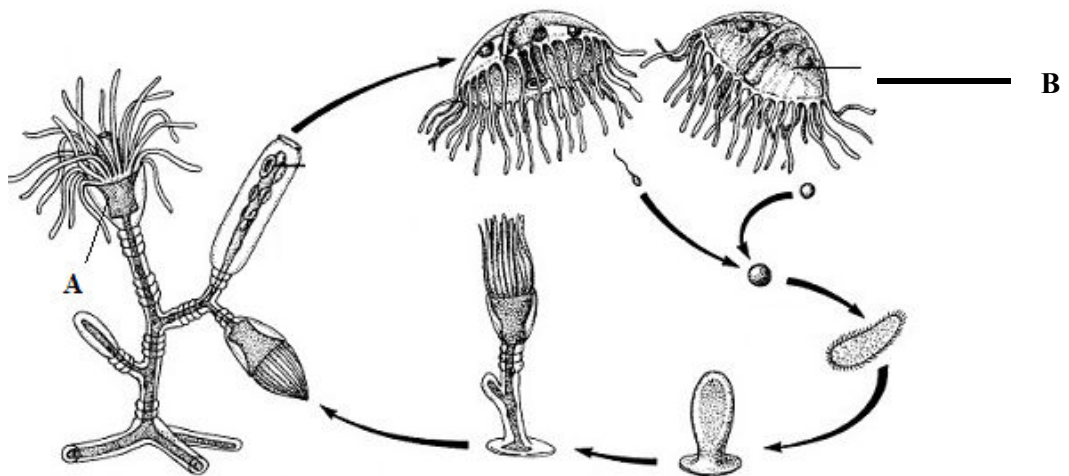


FIGURE 7

a) Identify the species and state its phylum.

b) State structure labelled **A** and **B**.

c) Why this organism is considered as dimorphism?

d) Give **TWO** differences between the two body forms of this organism.

11. Complete the table for differences between phyla Platyhelminthes, Nematoda and Annelida.

	PLATYHELMINTHES	NEMATODA	ANNELIDA
Embryonic Germ Layers			
Symmetry			
Segmentation			
Body cavity (coelom)			
Digestion			
Circulation			
Respiration			
Excretion			

12. Compare between the phylum Annelida and phylum Platyhelminthes based on the features given.

Features	Annelida	Platyhelminthes
Body cavity		
Segmentation		
Digestive system		
Circulatory system		
Body		
Respiration		
Muscle		
Excretory organ		
Chaetae		