

ZOOLOGY CONTENTS

Zoology-I (ANIMAL DIVERSITY-I (INVERTEBRATES))

3(2+1)

1. INTRODUCTION

a. Classification of Animals:

2. ANIMAL-LIKE PROTISTS: THE PROTOZOA

a. Characteristics.

b. Classification up to class

c. Symbiotic Life-styles.

d. Locomotion in protozoa

e. Nutrition and Reproduction;

f. Economic importance of protozoa

3. MULTICELLULAR AND TISSUE LEVELS OF ORGANIZATION

Phylum Porifera

a. Characteristics and classification. Cell Types, Body Wall, and Skeletons;

b. types of canal system;

c. Reproduction.

Phylum Cnidaria (Coelenterate)

a. Characteristics.

b. Classification up to Class.

c. The body Wall and Nematocysts

d. Reproduction: Alteration of generations

f. Corals and coral reefs

4. THE TRIPLOBLASTIC ORGANIZATION

PHYLUM PLATYHELMINTHES (ACOELOMATE)

a. Characteristics.

b. Classification up to class

c. The Free-Living Flatworms (Planaria) and Tapeworms (Taenia Solium and Liver Fluke) parasitic adaptations in Platyhelminthes

5. PHYLUM ASCHELMINTHS (PSEUDOCOELOMATE)

a. General Characteristics

b. Classification up to class

b. Type: *Ascaris lumbricoides*

c. Economic importance of Nematodes

COELOMATIC ORGANIZATION

6. PHYLUM ANNELIDA

a. General Characteristics

b. Metamerism and Tagmatization,

c. Classification up to Class.

d. Detail account of earth worm

7. PHYLUM MOLLUSCA

a. General Characteristics

b. Classification up to class.

c. Detail account of snail

d. Economic importance

8. PHYLUM ARTHROPODA

a. General Characteristics

- b. Classification up to class.
- c. The Exoskeleton;
- d. Brief description of cockroach, Spider, Crabs and Centipede, Millipede
- f. Metamorphosis in insects
- g. Economic importance of crustaceans and insects.

9. PHYLUM ECHINODERMS

- a. General Characteristics
- b. Classification up to class.
- c. Brief account of starfish
- d. Reproduction; Regeneration, Larval forms and phylogeny

SOME LESSER-KNOWN INVERTEBRATES;

- a. Introduction of Minor Phyla

Practical:

1. Study of Euglena, Amoeba, Entameba, Plasmodium, Trypanosome, Paramecium as representative of animal like Protists.
2. Study of prepared slides of sponges, spicules of sponges, and their various body forms. Study of representatives of classes of Phylum Porifera.
3. Study of principal representatives of classes of Phylum Coelenterate.
4. Study of principal representatives of classes of Phylum Platyhelminthes.
5. Study of representatives of phylum Rotifer, Phylum Nematode.
6. Study of principal representatives of classes of Phylum Mollusca.
7. Study of principal representatives of classes of Phylum Annelida.
8. Study of principal representatives of classes of groups of Phylum Arthropoda
9. Study of representatives of classes of phylum Echinodermata.
10. Preparation of permanent mount of Leucosolenia, Obelia, Hydra, Proglottid of Tapeworm, Parapodia of Nereis and Daphnia. Drawing and labeling.
11. Preparation of permanent slide of mouthpart of insects (after dissection). Drawing and labeling.
12. How to make grade-wise series for preparation of temporary and permanent slides.

Recommended Principal Reference Book:

1. Miller, A.S. and Harley, J.B. ; 1999 , 2002., 2007, 2009, 2012 & 2016 Zoology, 4th, 5th, 6th, 7th, 8th, 9th & 10th Edition (International), Singapore : McGraw Hill. Additional Readings:
2. Hickman, C.P., Roberts, L.C/, AND Larson, A., 2018. INTEGRATED PRINCIPLES OF ZOOLOGY, 15th Edition (International), Singapore: McGRAW-Hill.
3. Hickman, C.P., Roberts, L.C/, AND Larson, A., 2007. INTEGRATED PRINCIPLES OF ZOOLOGY, 12th & 13th Edition (International). Singapore: McGraw-Hill.
4. Pechenik, J.A., 2015. BIOLOGY OF INVERTEBRATES, 7th Edition, (International), Singapore: McGraw-Hill.
5. Kent, G. C. and Miller, S., 2001. COMPARATIVE ANATOMY OF VERTEBRATES New York: McGraw-Hill.
6. Campbell, N.A., 2002; BIOLOGY 6th Edition, Menlo Park, California; Benjamin ummings Publishing Company, Inc.

BOOKS FOR PRACTICAL

7. Miller, S.A., 2002. GENERAL ZOOLOGY LABORATORY MANUAL. 5th Edition International), Singapore: McGraw-Hill.
8. Hickman, C.P. and Kats, H.L., 2000. Laboratory Studies in integrated principal of zoology. Singapore: McGraw-Hill.

1. Protochordates

- a. Classification of chordates.
- b. Brief account of Hemichordates, Urochordates and Cephalochordates

2. Fishes:

- a. Vertebrate Success in Water.
- b. Classification of Chondrichthyes, Osteichthyes, c. Locomotory adaptations, nutrition and the digestive system, circulation, gas exchange, nervous and sensory functions, excretion and osmoregulation, reproduction and development fishes

3. Amphibians:

- a. The first terrestrial vertebrates.
- b. Characteristics of amphibians
- c. Classification of amphibians and characteristics of order Caudata, Gymnophiona, and Anura.
- d. Description of frog, salamander and caecilian
- e. Parental care in amphibia

4. Reptiles:

- a. The First Amniotes and cladistic interpretation of the amniotic lineage. General characteristics of reptiles.
- b. Characteristics of Order Testudines or Chelonia, Rhynchocephalia, Squamata, and Crocodilia
- c. description of snake, crocodile, tautara and turtle

5. Birds:

- a. Classification, Feathers, flight.
- b. Ancient birds and the evolution of flight and volant adaption.
- c. Diversity of modern birds.
- d. the digestive system, circulation, gas exchange, reproduction and development.
- e. Migration and navigation.

6. Mammals:

- a. Classification, Specialized teeth, endothermy, hair and viviparity.
- b. Diversity of mammals.
- c. Description of Rabbit

Practicals:

1. Classification and study of lab specimens of hemichordates, fishes, amphibians, reptiles, birds and mammals.
2. Visit to PMNH for the study of diversity of chordates.

Text and Reference Books:

1. Campbell, N.A. Biology. 9th Ed. 2011. Menlo Park, California Benjamin/Cummings Publishing Company, Inc.
2. Miller, S.A. and Harley, J.B. 2010. Zoology, 8th Edition (International) Singapore: McGraw Hill.
3. Miller, S.A. 2002. General Zoology Laboratory Manual. 5th Ed. (International), Singapore: McGraw Hill.
4. Hickman, C.P., Roberts, L.S. and Larson, A. Integrated Principles of Zoology, 14th Edition (International), 2009. Singapore: McGraw-Hill.
5. Pechenik, J.A. Biology of Invertebrates, 4th Edition (International), 2000. Singapore: McGraw Hill.

1. Protection, Support, and Movement:

- a. Protection: the integumentary system of invertebrates and vertebrates;
- b. Movement and support: the skeletal system of invertebrates and vertebrates;
- c. Movement: non-muscular movement; an introduction to animal muscles; the muscular system of invertebrates and vertebrates

2. Communication I:

- a. Nerves: Neurons: structure and function.

3. Communication II:

- a. Senses: Sensory reception: baroreceptors, chemoreceptors, georeceptors, hygrometers, phonoreceptors, photoreceptors, proprioceptors, tactile receptors, and thermoreceptors of invertebrates
- b. Lateral line system and electrical sensing, lateral-line system and mechanoreception, hearing and equilibrium in air and water, skin sensors of mechanical stimuli, sonar, smell, taste and vision in vertebrates.

4. Communication III:

- a. The Endocrine System and Chemical Messengers: Chemical messengers: hormones chemistry; and their feedback systems; mechanisms of hormone action
- b. Hormones with principal function each of porifera, cnidarians, platyhelminthes, nemertans, nematodes, molluscs, annelids, arthropods, and echinoderms invertebrates; an overview of the vertebrate endocrine system; endocrine systems of vertebrates, endocrine systems of birds and mammals

5. Circulation and Immunity:

- a. transport systems in vertebrates; characteristics of vertebrate blood, blood cells and vessels; the human heart: blood pressure and the lymphatic system; immunity: nonspecific defenses, the immune response

Practicals:

1. Study of insect chitin, fish scale, amphibian skin, reptilian scales, feathers and mammalian skin.
2. Study and notes of skeleton of Labeo (Labeo rohita), Frog (Hoplobatrachus tigerinus), Varanus (Varanus bengalensis), fowl (Gallus gallus domesticus) and rabbit (Oryctolagus cuniculus).

Note: Exercises of notes on the adaptations of skeletons to their function must be done.

3. Earthworm or leech; cockroach, freshwater mussel, Channa or Catlacatla or Labeo or any other local fish, frog, pigeon and rat or mouse and rabbits dissections as per availability.
4. Study of heart, principal arteries and veins in a representative vertebrate (dissection of representative fish/mammals).

Books Recommended:

1. Pechenik, J.A. 2013. Biology of Invertebrates, 4th Ed. (International), Singapore: McGraw-Hill.
2. Hickman, C.P., Roberts, L.S., Larson, A. 2004. Integrated Principles of Zoology, 11th Ed. (International), Singapore: McGraw-Hill.

3. Miller, S.A. and Harley, J.B. 2002. Zoology, 5th Ed (International),Singapore: McGraw-Hill.
4. Campbell, N.A. 2002. Biology, 6th Ed. Menlo Park, California:Benjamin/Cummings Publishing
5. Kent, G.C., Miller, S. 2001. Comparative Anatomy of Vertebrates. New York: McGraw-Hill.
6. Hickman, C.P., Kats, H.L. 2000. Laboratory Studies in Integrated Principles of Zoology. Singapore: McGraw-Hill.

1. Nutrition and Digestion:

- a. Animal strategies for getting and using food
- c. The mammalian digestive system: gastrointestinal motility and its control
- d. Oral cavity, pharynx and esophagus, stomach, small intestine: main site of digestion; large intestine; role of the pancreas in digestion; and role of the liver and gall bladder in digestion.

2. Temperature and Body Fluid Regulation:

- a. Homeostasis and Temperature Regulation; The Impact of Temperature on Animal Life; Heat Gains and Losses; Some Solutions to Temperature regulation in Fishes, Amphibians, Reptiles, Birds and Mammals; Heat Production in Birds and Mammals
- b. Excretory Systems; How Vertebrates Achieve Osmoregulation; Vertebrate Kidney Variations; Mechanism in Metanephric Kidney Functions

3. Reproduction:

- a. Types of asexual reproduction in animals, disadvantages of asexual reproduction;
- b. Sexual reproduction in invertebrates; advantages and disadvantages of sexual reproduction; sexual reproduction in vertebrates; reproductive strategies; examples of reproduction among various vertebrate classes;
- c. The human male reproductive systemd. The human female reproductive system; hormonal regulation in gestation; the placenta; milk production and lactation.

Practicals:

1. Study of excretory system in an invertebrate and a vertebrate representative (Model).
2. Study of dissection system in invertebrate and a vertebrate representative (Dissection).
3. Dissection and study of male and female reproductive system in vertebrates and invertebrates.

Note: *Prepared slides and preserved specimen and/or projection slidesand/or CD ROM computer projections may be used.*

Books Recommended

1. Pechenik, J.A. 2013. Biology of Invertebrates, 4th Ed. (International),Singapore: McGraw-Hill.
2. Hickman, C.P., Roberts, L.S., Larson, A. 2004. Integrated Principles of Zoology, 11th Ed. (International), Singapore: McGraw-Hill.
3. Miller, S.A., Harley, J.B. 2002. Zoology, 5th Ed. (International), Singapore: McGraw-Hill.
4. Campbell, N.A. 2002. Biology, 6th Ed. Menlo Park, California: Benjamin /Cummings Publishing Company, Inc.
5. Kent, G.C., Miller, S. 2001. Comparative Anatomy of Vertebrates. NewYork: McGraw-Hill.
6. Hickman, C.P., Kats, H.L. 2000. Laboratory Studies in Integrated Principles of Zoology. Singapore: McGraw-Hill