THIRD SEMESTER:

ZOOL/301: COMPARATIVE ANATOMY OF VERTEBRATES

UNIT I

1. Origin of Chordata: Concept of Protochordata
2. Origin and classification of vertebrates
3. Vertebrate morphology: Definition, scope and importance
4. Development, structure and functions of vertebrate integument and its derivativ (glands, scales, feathers and hairs)

UNIT II

5. Respiratory system: Characters of respiratory tissue, external and internal respiratio comparative account of respiratory organs
6. Evolution of heart
7. Evolution of aortic arches and portal systems
8. Blood circulation in various vertebrate groups

UNIT III

9. Form, function, body size and skeletal elements of the body
10. Comparative account of jaw suspensorium and vertebral column
11. Comparative account of limbs and girdles
12. Evolution of urinogenital system in vertebrates

UNIT IV

13. Comparative account of organs of olfaction and taste
14. Comparative anatomy of brain and spinal cord (CNS)
15. Comparative account of peripheral and autonomic nervous system
16. Comparative account of lateral line system

UNIT V

17. Comparative account of electroreception
18. Comparative account of simple receptors
19. Flight adaptations in vertebrates
20. Aquatic adaptations in birds and mammals

Suggested Readings:

Young, J.Z. **Life of Vertebrates.** Oxford University Press, London.
Young, J.Z. **Life of mammals.** Oxford University Press, London.
Colbert, E.H. **Evolution of the Vertebrates.** John Wiley and Sons Inc., New York.
Kent, C.J. **Comparative Anatomy of Vertebrates.**
Wolstenholnf, E.W. and Knight, J. (Ed.) **Taste and Smell in Vertebrates.** J & A Churchill, London.
Walters. H.A. and Sayles. L.D. **Biology of Vertebrates.** Macmillon & Co., New York.
Waterman, A.J. **Chordata Structure and Function.** Macmillon Co., New York.
Montagna, W. **Comparative Anatomy.** Clarenden Press, Oxford.
Weichert, C.K. and Presch, W. **Elements of Chordate Anatomy.** 4th edn. McGraw Hill Book Co., New York.

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ZOOL/302: DEVELOPMENTAL BIOLOGY

UNIT I

1. Basis concepts of Development: Cell division and the cell cycle, Chromosomal puffs and gene activation, Cell commitment and differentiation (Specification, determination, induction competence, differentiation)
2. Morphogen gradients, cell fate, cell potancy and morphogenesis
3. Gametogenesis: Origin and migration of primordial germ cells; Production of male gametes (Spermatogenesis), Gene expression during spermatogenesis and sperm maturation,
4. Production of female gametes (oogenesis) (Previtellogenesis, vitellogenesis and maturation phase in development of amphibian egg); Gene expression during amphibian oogenesis; Ovulation and ovum transport in mammals

UNIT II

5. Fertilization and early development: Pre fertilization events (sperm penetration of egg and acrosomal reaction, binding of sperm to the egg, Blocks to polyspermy), Biochemistry of fertilization (metabolic activation of egg, penetration of spermatozoa into the egg, union of gametes), Post – fertilization events
6. Establishment of polarity in amphibians and birds
7. Gastrulation and formation of germ layers in mammals
8. Multiple ovulation and embryo transfer technology: In vitro oocyte maturation and super ovulation

UNIT III

9. Hormonal regulation of ovulation, pregnancy and parturition
10. Hormonal regulation of development of mammary glands and lactation
11. Endocrinology and physiology of placenta
12. Collection and cryo preservation of gametes and embryos

UNIT IV

13. Teratological effects of xenobiotics on gametes
14. Wolfian lens regeneration
15. Melanogenesis
16. Differentiation and development of gonads

UNIT V

17. **Cell diversification** in early embryos, xenopus blastomeres, totipotency & **pleuripotency**
18. **Embryonic** stem cells, chord-blood cells & their significance
19. **Hemopoetic** stem cells, formation of blood cells
20. **Connective** tissue cell family

Suggested Readings:

D. ENTOMOLOGY

Zool. 303 (D): General Entomology & Insect Morphology

Unit I

1. Introduction, history and scope of Entomology
2. Fossil insects and origin and evolution of insects
3. Insect diversity and their outline classification
4. Coloration and mimicry in insects
5. Light production in insects

Unit II

6. Insect collection: Significance and insect nets and traps
7. General organization of a typical insect body
8. Structure of insect head, structure and functions of antennae
9. Head segmentation and its theories
10. Different types of mouth parts and relationship with feeding habits of insects

Unit III

11. Structure of typical wing bearing thoracic segment
12. Structure of insect legs, their modifications and functions
13. Structure of insect wings, their modifications and wing coupling apparatus
14. Hypothetical wing venation

Unit IV

15. Wing venation in grasshopper, housefly and honeybee
16. Structure of flight muscles and flight mechanisms in insects
17. General structure of insect abdomen and its appendages
18. Male and female genitalia in grasshopper

Unit V

19. Sound production in insects
20. Sound reception in insects
21. Phase theory of locusts
22. Polymorphism in aphids
23. Methods of insect communication

Zool. 304 (A): Insect Anatomy and Physiology

Unit I

1. Structure and functions of insect integument
2. Mechanism of moulting and sclerotization of cuticle
3. Structure and types of spiracles
4. Tracheal system in a generalized insect and mechanism of respiration
5. Respiration in aquatic and parasitic insects

Unit II

6. Structure of Malphigian tubules including cryptonephridia
7. Physiology of excretion and significance of cryptonephridia
8. Structure of brain and ganglia
9. Variation in central nervous system in different insect orders

Unit III

10. Structure and functions of mechanoreceptors
11. Structure and functions of chemoreceptors
12. Photoreceptor organs: Simple and compound eyes, formation of image
13. Structure and functions of fat body

Unit IV

14. Composition and functions of haemolymph
15. Insect circulatory system
16. Digestive system: Structure and modifications of alimentary canal and associated glands
17. Histology of alimentary canal, salivary glands and peritrophic membrane
18. Physiology and regulation of digestion

Unit V

19. Neuroendocrine system and its variations in different insects
20. Chemistry and functions of hormones
21. Structure of male and female reproductive systems
22. Types of insect reproduction
23. Insect pheromones