PARVATHANENI BRAHMAYYA
SIDDHARTHA COLLEGE OF ARTS & SCIENCE
Autonomous
Siddhartha Nagar, Vijayawada–520010
Re-accredited at 'A+' by the NAAC

Course Code				**23ZOMAP231**			
Title of the Course				**ANIMAL DIVERISTY-II BIOLOGY OF CHORDATES**			
Offered to: (Programme/s)				**BSc Hons ZOOLOGY**			
L		**T**	**0**	**P**	**2**	**C**	**1**
Year of Introduction:	**2024-25**			**Semester:**			**3**
Course Category:	**MAJOR**			**Course Relates to:**	**GLOBAL**		
Year of Revision:	**NA**			**Percentage:**	**NA**		
Type of the Course:				**SKILL DEVELOMENT**			
Crosscutting Issues of the Course :				**GENDER**			
Pre-requisites, if any				Basic knowledge on Vertebrates in intermediate			

Course Description:
This practical course provides an immersive experience into the study of chordate organisms, focusing on their anatomical structures, physiological processes, and evolutionary significance. The course is designed for students with a foundational understanding of biology and aims to enhance hands-on skills through dissections, microscopy, and experimental investigations.

Course Objectives:

S. No	COURSE OBJECTIVES
1	To understand the importance of preservation of museum specimens
2	To identify animals based on special identifying characters
3	To understand different organ systems through demo or virtual dissections
4	Facilitate an in-depth understanding of the anatomical features and physiological systems of chordates
5	To maintain a neat, labeled record of identified museum specimens

Course Outcomes

At the end of the course, the student will / will be…

NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Understanding the overview of chordate diversity and classification	**K1**	**1**	**1**
CO2	Understanding evolutionary history and key characteristics of chordates.	**K2**	**1**	**1**
CO3	Using of microscopes to study tissue and organ structures in chordates.	**K2**	**1**	**1**
CO4	Analyzing and Identifying distinguishing features across different chordate subgroups	**K4**	**1**	**1**
CO5	Analyzing the locomotion, feeding mechanisms, and reproductive strategies	**K4**	**1**	**1**

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-PO-PSO MATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1	2							**2**	
CO2	2							**2**	
CO3	2							**2**	
CO4	3							**3**	
CO5	3							**3**	

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSOrespectively

Course Structure:

Practical 1

Protochordata: *Herdmania, Amphioxus, Amphioxus* T.S through pharynx.

Common Characteristics of Protochordates:

- **Presence of a Notochord:** A flexible, rod-like structure present at some stage of development (larval or adult).
- **Pharyngeal Slits:** Openings in the pharynx that serve in filter-feeding or respiration.
- **Dorsal Nerve Cord:** A nerve cord running along the dorsal side of the body.
- **Post-anal Tail:** An extension of the body beyond the anus, present in the larval stage or throughout life in some groups.

These characteristics distinguish protochordates from other chordates and highlight their evolutionary significance as a bridge between invertebrates and more complex vertebrates.

Practical 2

Cyclostomes: *Petromyzon and Myxine.*

Cyclostomes are characterized by their jawless condition, cartilaginous skeleton, presence of a notochord throughout life and lack of paired fins.

Their skeleton is composed mainly of cartilage rather than bone, making it flexible and less mineralized.

Cyclostomes have multiple gill pouches or openings that allow for respiration. Their simple body structure and primitive features offer valuable insights into early vertebrate evolution.

Practical 3

Pisces: *Pristis, Torpedo, Hippocampus, Exocoetus, Echeneis, Labeo, Catla, Clarius, Channa, Anguilla.*

Pisces generally have a streamlined body shape that reduces water resistance and facilitates efficient swimming.

Pisces are characterized by their aquatic habitat, gill respiration, scales or skin, fins for locomotion, streamlined body, lateral line system, and various reproductive strategies.

These features are adapted to their life in the water and help them thrive in diverseaquatic environments.

Practical 4

Amphibia: *Ichthyophis, Amblystoma, Axolotl larva, Hyla*

Amphibians are tetrapods (four-limbed vertebrates) with typically four limbs (two pairs of legs). They use their limbs for locomotion on land and in water.

Webbed Feet: Many amphibians have webbed feet to aid swimming

Amphibians generally have a slender, elongated body that aids in their movementthrough both aquatic and terrestrial environments.

Practical 5

Reptilia: *Draco, Chamaeleon, Uromastix, Testudo, Trionyx, Russels viper, Naja, Bungarus, Hydrophis, Crocodilus.*

Reptiles are characterized by their scaly skin, reliance on lungs for respiration, ectothermic temperature regulation, internal fertilization and amniotic eggs, and a three-chambered heart (except for crocodiles).

They occupy a wide range of terrestrial and aquatic habitats and exhibit diverse adaptations that allow them to thrive in various environments.

Most reptiles have four limbs with toes or claws, although snakes have evolved a limbless body form. Reptiles have a well-developed bony skeleton

Practical 6

Aves: *Psittacula, Eudynamis, Bubo, Alcedo.*

Feathers are a defining characteristic of birds. They provide insulation, enableflight, and play roles in mating displays and camouflage.

Birds have beaks or bills instead of teeth. The shape and size of the beak areadapted to their feeding habits and diet

Birds lay amniotic eggs with hard shells made of calcium carbonate, providingprotection and a stable environment for the developing embryo

Practical 7

Mammalia: *Ornithorhynchus, Pteropus, Funambulus.*

Mammals are characterized by their hair or fur, mammary glands, warm-blooded metabolism, and the presence of three middle ear bones. They have differentiated teeth, typically give birth to live young, and possess a highly developed brain. They also have specialized skin structures like sweat glands and a variety of reproductive adaptations depending on their subclass (monotremes, marsupials, or placental mammals). These features collectively define mammals and contribute to their adaptability and diverse lifestyles.

Practical 8

Scoliodon IX and X, Cranial nerves

Note: 1. Dissections are to be demonstrated only by the faculty or virtual.

The dissection of cranial nerves IX (Glossopharyngeal nerve) and X (Vagus nerve) in a **Scoliodon** (a type of shark) is an advanced anatomical procedure that requires precision and care. Here's a step-by-step guide to help with the dissection process:

Materials and Tools Needed:

- Dissection kit (scalpel, forceps, scissors, probes)
- Dissection tray
- Scoliodon specimen (preserved)
- Anatomical diagrams of Scoliodon (optional but helpful)
- Gloves and safety goggles

Dissection Procedure:

Preparation:

1. **Safety First:**
   Wear gloves and safety goggles to protect yourself.
   Ensure that your dissection area is clean and well-organized.
2. **Position the Specimen:**
   Place the Scoliodon on the dissection tray in a ventral (belly-up) position for better access to the head and neck area.

Step-by-Step Dissection:

Initial Incision:

Make a longitudinal incision along the midline of the head, starting from the snout and extending to the base of the skull. This will expose the internal structures of the head.

Expose the Cranial Cavity:

Carefully lift and reflect the skin and underlying muscles away from the head to expose the cranial cavity.

Identify Key Structures:

Locate the brain and spinal cord. Cranial nerves IX and X emerge from the brainstem and travel to various regions.

Identify Cranial Nerves IX and X:

Glossopharyngeal Nerve (IX): Look for this nerve emerging from the medulla oblongata. It generally appears as a smaller nerve traveling towards the pharynx.

Vagus Nerve (X): Locate this nerve near the glossopharyngeal nerve. It is usually larger and travels down towards the gills and other organs.

Dissection of Nerve IX:

Gently use a probe or forceps to separate the glossopharyngeal nerve from surrounding tissues.

Trace the nerve's path to identify its branches and connections. Be cautious not to damage the nerve or surrounding structures.

Dissection of Nerve X:

Similarly, use the probe or forceps to carefully isolate the vagus nerve from the surrounding tissues.

Follow the path of the vagus nerve to observe its branches, especially as it travels to the gills and other parts of the body.

Remove and Observe:
Once isolated, carefully remove the nerves for closer observation if needed. This step may involve gently cutting the nerve at its base of attachment.
Compare the isolated nerves with anatomical diagrams to verify their identification and structure.
Documentation:
Take notes or make sketches of the nerves' positions and branches for reference.
Document any observations related to the anatomy and variations in nerve structure.

Post-Dissection Care:
Clean Up:
Dispose of or properly clean all used materials and specimens.
Wash your hands and dissection area thoroughly.
Review Findings:
Review the anatomical features observed during the dissection to reinforcelearning and understanding.

Practical 9
Mounting fish scales for observation involves a series of steps to prepare and preserve them so that they can be examined under a microscope or used for other educational purposes. Here's a detailed procedure for mounting fish scales:

Materials and Tools Needed:
Fish scales (from a fish specimen)
Dissection kit (scalpel, forceps)
Microscope slides and coverslips
Clear mounting medium (e.g., Canada balsam or glycerin jelly)
Tweezers
Scalpel or fine scissors
Staining solutions (optional, for enhancing visibility)
Deionized water (for cleaning)
Paper towels or filter paper
Labeling materials (for slide labels)

Procedure:
Preparation:
Safety First:
Wear gloves and safety goggles to ensure protection during the dissectionprocess.
Prepare Work Area:
Set up your dissection tray and organize your tools. Ensure your work area isclean and well-lit.

Collecting Fish Scales:

Obtain Scales:
Using forceps or a scalpel, carefully remove a few scales from the fish. Typically, scales from the sides of the fish are used, as they are usually larger and easier to handle.
Clean Scales:
Rinse the scales in deionized water to remove any mucus or debris. Gently pat them dry with a paper towel or filter paper.

Mounting the Scales:

Prepare the Microscope Slide:

Place a small drop of the mounting medium (e.g., Canada balsam or glycerin jelly) onto the center of a clean microscope slide.

Place the Scale:

Using tweezers, carefully place the fish scale onto the drop of mounting medium. Ensure the scale is flat and spread out. If needed, use a scalpel or finescissors to trim the edges of the scale to fit the slide.

Add Mounting Medium:

Add a small amount of mounting medium on top of the scale, ensuring it covers the entire surface of the scale.

Apply the Coverslip:

Gently place a coverslip over the scale. Avoid trapping air bubbles between the scale and coverslip by lowering the coverslip at an angle or using a slide holder.

Final Touches:

Seal the Slide:

If using a permanent mounting medium like Canada balsam, allow the slide to dry completely. This may take several hours to overnight, depending on the medium used. For temporary mounts, the slide can be used immediately.

Label the Slide:

Use a labeling material to mark the slide with relevant information, such as thespecies of fish, type of scale, and date of preparation.

Observing the Mounted Scale:

Microscopic Examination:

Place the mounted slide under a microscope. Adjust the light source and focus to observe the scale's structure, including its pattern, ridges, and any unique features.

Documentation:

Take notes or photographs of your observations for documentation and analysis.

Additional Tips:

Handling Scales: Handle the scales gently to avoid damaging their delicate structures.

Clean Tools: Ensure that all tools and slides are clean to avoid contamination or damage to the scales.

Staining (Optional): For better visualization, consider staining the scales with appropriate dyes or stains before mounting. Ensure that the stain is compatible with your mounting medium.

Laboratory Record work shall be submitted at the time of practical examination.

Specific Web Links :

https://nt7-mhe-complex-assets.mheducation.com/nt7-mhe-complex-assets/Upload-20190715/InspireScience6-8CA/LS15/index.html
https://themammallab.com/ http://abacus.bates.edu/acad/depts/biobook/LabConCh.htm
https://virtualzoology.wordpress.com/scoliodon/

SEMESTER END LAB EXAMINATION

23ZOMAP231: Animal diversity – Biology of Non chordates — Offered to B.Sc. Hons Zoology

Semester: III — Max.Marks: 35M

Time: 3 Hrs.

(A) SEE Evaluation Procedure

Answer all the questions

1. Dissect, display and draw neat, labelled diagram of 'A' **10M**
2. Identify the given spotter and write about the phylum to which it belongs mentioning the general characters of that phylum ' B or C ' (roll number wise) **1x5=5M**
3. Identify and write comments upon the given spotters **2x2$^{1/2}$=5M**
   d.
   e.
4. Identify and write comments upon the given spotters **2x2$^{1/2}$=5M**
   f.
   g.
5. Identify and write comments upon the given spotters **2x2$^{1/2}$=5M**
   h.
   i.
6. Practical Record **2M**
7. Viva voce **3M**

(B) CONTINUOUS ASSESMENT(Internal) 15 MARKS

15 marks for the continuous assessment (Day to day work in the laboratory shall be evaluated for 15 marks by the concerned laboratory teacher based on the regularity/ record/viva). Laboratory teachers are mandated to ensure that every student completes 80%-90% of the lab assessments.

TOTAL: (A)+(B) = 50 MARKS