**Quadrant II – Transcript and Related Materials**

**Programme: Bachelor of Science (Second Year)**

**Subject: Zoology**

**Course Code: ZOC 103**

**Course Title: Anatomy of animal body system**

**Unit 07: Nervous system**

**Module Name: Comparative account of brain – Part 2**

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Notes:

The midbrain or mesencephalon, originally a centre for coordinating reflex responses to visual output, has taken an added function related to touch (tactile) and auditory (hearing) input. The roof of the midbrain is called **optic tectum,**which is a thickened region of gray matter that integrates visual and auditory signals. The lateral outgrowths from it form the optic lobes.

The midbrain is a simple part of the brain with walls thickened ventrally and laterally. The roof forms the tectum. The cavity of the midbrain becomes narrow and is known as the aqueduct of Sylvius. In the lower vertebrates, fishes and amphibians, the tectum serves as the primary center of the visual organ as optic lobe/ optic tectum.

Amphibians and reptiles, however, the posterior part of the optic tectum acquires connections with nerve fibers coming in from the ear. In the amniotes the tectum develops four thickenings, the corpora quadrigemina, of which the two anterior thickenings are concerned with the sense of vision( optic lobe), while the two posterior ones are related to the sense of hearing. In mammals, the ventrolateral parts of the mesen­cephalon are much enlarged, due to the number of nerve fibres passing through it from cerebral cortex to spine. These enlarged parts are cerebral peduncles.

The anterior part of cerebral peduncle is crura cerebri/ cerebral crus.

 The most important flexure, and the one found consis­tently in all vertebrates, is that at the level of the midbrain, known as the cephalic flexure.

* Shark- Optic lobes is made of two large hollow lobes. Crura cerebri is poorly developed.
* Amphibia – Dorsal surface of optic lobe is made of two large uncovered, latera, round and hollow lobes. Crura cerebri is covered by pituitary.
* Reptile- Optic lobe is medium, oval hollow and uncovered.
* Aves - Optic lobe is very large, spherical, hollow and connected together by optic commissure. Thick crura cerebri.
* Mammal -Optic lobes divided into four lobes called corpora quadrigemina. Crura cerebri well developed.

Hindbrain

Hindbrain, also called rhombencephalon, is the region of the developing vertebrate brain that is composed of the medulla oblongata, the pons, and the cerebellum ( 2nd largest part of brain).The rhombencephalon gives rise to the metencephalon (cerebellum and pons) and the myelencephalon (medulla oblongata).The cavity of the rhombencephalon expands especially anteriorly, just behind the midbrain, and becomes the fourth ventricle.

The roof of the fourth ventricle thins out and is converted into the posterior choroid plexus (secretes cerebrospinal fluid).A ventral floor plate extends along the whole length of the rhombencephalon, forming a median groove, the median sulcus. The dorsolateral part of the metencephalon (embryonic part of the hindbrain), gives rise to the cerebellum (‘little brain’).

Thecerebellum, although a mid-dorsal organ in its final form, develops from two swellings (rhombomeres) of the brain tissue to the right and left of the anterior end of the roof of the fourth ventricle. Later the two swellings fuse, producing the Vermis /Wulst of the cerebellum, in the midline, while the lateral parts become the cerebellar hemispheres.

The nerve cells migrate in the cerebellum from their place of origin near the cavity of the brain toward the external surface, producing the cortex of the cerebellum/ cerebellar grey matter layer. The Arbor vitae (Latin for "tree of life") is the cerebellar white matter, so called for its branched, tree-like appearance.

It brings sensory and motor information to and from the cerebellum.

Pons varolli is situated in front of the cerebellum below the midbrain and above the medulla oblongata (myelencephalon). It consists mainly of nerve fibres which form a bridge (pons = bridge) between the two hemispheres of the cerebellum and of fibres which pass between the higher levels of the brain and the spinal cord. Pneumotaxic centre is present in pons varolii.

Medulla oblongata extends from the pons varolii above and is continuous with the spinal cord below. In the medulla oblongata, the main mass of gray matter lies adjacent to the fourth ventricle. In this mass lies the centers of cranial nerves entering and leaving the medulla oblongata.

At its posterior end, the medulla oblongata gradually merges into spinal cord.

* Shark – Cerebellum is large, elongated, overlapping midbrain, diencephalon and medulla oblongata. It has three lobes. Arbor vitae and pons are absent. Medulla oblongata is large, hollow, triangular concealed under cerebellum. Ventral flexure is absent.
* Amphibia – Cerebellum is small, narrow placed behind optic lobes. It is undivided. Arbor vitae and pons are absent. Medulla oblongata is small, conical and hollow. Ventral flexure is absent.
* Reptile – Cerebellum is small, flat, semi-circular ridge and undivided. Arbor vitae and pons are absent. Medulla oblongata is small, triangular and hollow. Ventral flexure present.
* Aves – Cerebellum is large, elongated. Divided into 3 lobes. Arbor vitae and pons are absent. Medulla oblongata is small, hollow, and concealed beneath cerebellum. Ventral flexure present.
* Mammal – Very large cerebellum, overlapping the medulla oblongata and midbrain. Divided into 5 lobes. Arbor vitae and pons are present. Medulla oblongata is broad, triangular and partly covered by cerebellum. No ventral flexure.