

Quadrant II – Transcript and Related Materials

Programme: Bachelor of Science (Third Year)

Subject: Zoology

Course Code: ZOC 108

Course Title: Developmental Biology

Unit: Unit 03 – Early Embryonic Development of Chick

Module Name: Development of Chick embryo upto day 1 of incubation – Part 1

Name of the Presenter: Mrs. Vishwal B. Sinai Kunkolienkar

Notes

Development of Chick embryo upto day 1 of incubation – Part 1

Development of Fertilized Egg and Incubation

Passage of Hens egg through the oviduct takes about 24 hours.

The Cleavage is carried through 32 cell stage in isthmus and completed in uterus. Early steps of gastrulation occur in the uterus.

At the time of laying of egg, the embryo is in hypoblast stage i.e. epiblast and hypoblast has been formed.

Further development of the embryo resumes only if the fertilized egg is incubated by the fowl. The Incubation temperature is 37°C to 40°C, approaching the body temperature of fowl.

First day of Incubation of chick embryo

During the initial period of incubation on the first day, the process of gastrulation is completed. Primitive Streak is formed by 19 hours of Incubation.

Head process is formed in front of the Hensen's node of primitive streak at about 18 hours of incubation. This is the primordia for notochord and some of the mesoderm. As Head process develops further and increases in size, the size of primitive streak decreases.

Endoderm in Area opaca

Infiltration of cells from margin of the blastoderm into area opaca gives rise to layer of endoderm in area opaca. These endodermal cells lie just above the yolk. It is referred to as **Yolk sac endoderm**.

Formation of blood islands in Area opaca

Cells from postero-lateral margins of mesoderm in area pellucida wander into upper part of germ wall of area opaca. Here, they form small masses of cell aggregates which anastomose to form a network.

Lacunae develop within anastomosing network of these cell aggregates. The wall of the Lacunae get flattened to form endothelial cells, forming inner lining of blood vessels. Cells within the Lacunae are destined to form blood corpuscles.

These Splotches of forming corpuscles and surrounding endothelial cells constitute **blood islands**.

Mesoderm in area opaca arises as a result of budding off cells from developing blood islands, between the islands and overlying ectoderm. Thus, the inner margin of the mesoderm in area opaca becomes continuous with mesoderm in area pellucida.

Regions of area opaca

Thus, area opaca is differentiated into Area opaca vasculosa having presence of blood island and area opaca vitellina which is extending over the yolk.

Peripheral boundary of area opaca vasculosa is marked by a sinus termed **Sinus terminalis**.

Early differentiation of Mesoderm

Mesoderm gets differentiated into

- Dorsal mesoderm / Segmental mesoderm / Epimere.
- Lateral plate of mesoderm / Hypomere
- Unsegmented intermediate mesoderm

Lateral plate of mesoderm spreads from sides of notochord, forward and laterally across area pellucida to germ wall. Each wing is continuous posteriorly to peristomial mesoderm formed from primitive streak. Unsegmented intermediate mesoderm is present between dorsal mesoderm and lateral mesoderm.

Dorsal Mesoderm and Formation of somites

Mesoderm next to notochord is several cell thick – Dorsal mesoderm / Segmental mesoderm / epimere. It gets segmented by transverse grooves leading to formation of somite. The first furrow is at short distance anterior to primitive streak and marks posterior boundary of first somite.

First pair of somites is formed at 21st Hour of incubation. The succeeding furrow is in linear order after first furrow. Every hour, one pair of somite formed after 21st hour of incubation. At the end of first day of incubation (24 hours of incubation), four pairs of somites.

Lateral Plate mesoderm and development of Coelom

A space develop between the layers of mesoderm splitting it into two layers - Somatic or parietal mesoderm [**Somatopleure**] and Splanchnic or visceral mesoderm [**Splanchnopleure**]. The space between the two is called the **Coelom**.