Extraembryonic Membranes

EXTRAEMBRYONIC MEMBRANES

The formation of organs and organ system progresses rapidly after the body segmentation development. Extensive inductive interactions are involved in the development of an organ like in vertebrate eye. The embryos of vertebrates (**reptile, bird,** and **mammal**) are surrounded by several **extraembryonic membranes,** which originate from the embryo but are not part of it. Nutrition, gas exchange, and removal are the functions of extraembryonic membrane.

Extra-embryonic membranes form with contributions from all germ layers

Extra-embryonic membranes of chicken are form from the germ layers created during gastrulation.

1. **Yolk sac (Splanchoplure):** Extension of the **endodermal** tissue of the hypoblast layer along with some adjacent **mesoderm** produce first extraembryonic membrane i.e., yolk sac. The entire body of yolk in the egg is enclosed by yolk sac. It constricts at the top to create a tube that is continuous with the gut of the embryo, but yolk does not pass through this tube. Yolk is digested by the endodermal cells of the yolk sac, and the nutrients are then transported to the embryo through blood vessels that from the mesoderm and line the outer surface of the yolk sac.
2. **Allantois (Splanchoplure):** The allantoic membrane is an outgrowth of the extraembryonic **endoderm** plus adjacent **mesoderm**. Allantois is a sac for storage of metabolic **wastes**.
3. **Amnion (Somatoplure): Ectoderm** and **mesoderm** combine and extend all along the inside of the eggshell, both over the embryo and below the yolk sac. Where they meet, they fuse to form the inner amnion. The amniotic cavity is formed by amnion surrounding the embryo. The amnion provides a **protective environment** for the embryo by secreting fluid into the cavity.
4. **Chorion (Somatoplure):** Ectoderm and mesoderm combine and extend all along the inside of the eggshell, both over the embryo and below the yolk sac. Where they meet, they fuse to form the outer chorion. It **limits water loss** from the egg and work along with allantoic membrane to exchange respiratory gases between the embryo and the outside world.

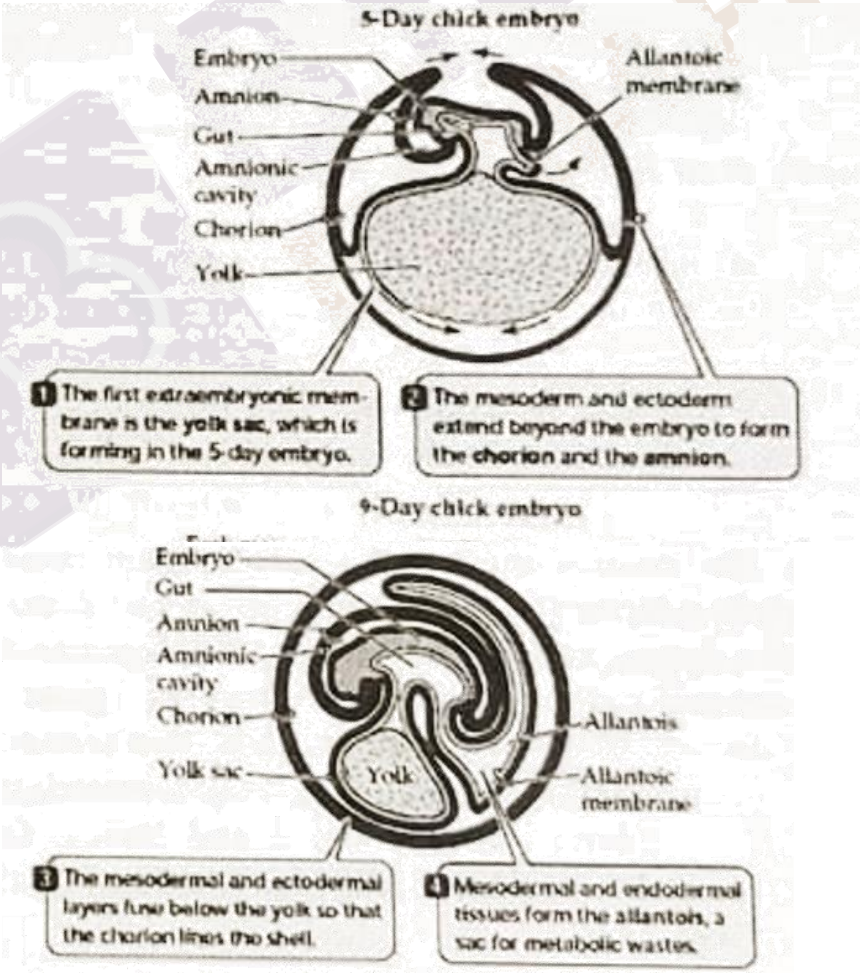

Figure 1. The Extraembryonic Membranes

Summary

- In the development of sea urchin embryos, each blastomere of a 4-cell stage possesses a portion of the original animal-vegetal axis and if isolated and allowed to develop will form a complete but smaller size larva.
- In sea urchins, a group of cells at the vegetal pole becomes specified as the large micromere cells. These cells are determined to become skeletogenic mesenchyme cells that will leave the blastula epithelium to ingress into the blastocoel.
- This specification is controlled by the expression of Pmar1, which is a repressor of **HesC**. HesC represses the genes encoding transcription factors activating skeleton forming genes.
- Pluripotency of inner cell mass is maintained by a core of three transcription factors Oct 4, Sax 2 and nanog.
- Prior to blastocyst formation, each blastomere expresses both Cdx 2 and the Oct 4 transcription factors and appears to be capable of becoming either ICM or trophoblast.
- From the endoderm layer alveolar cells of the lung arise and Bones of vertebrates embryonic are derived from mesoderm.
- Allantoin stores urinary waste and helps mediate gas exchange. It is derived from splanchnopleure at the caudal end of the primitive streak.
- Amnion is a water sac protects the embryo and its surrounding amniotic fluid. This epithelium is derived from somatopleure.

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