DSE-1BT: Developmental aspects of embryo

Gametogenesis:

❖ Egg Membranes

Protective formations varying in structure that surround the eggs of most animals. Egg membranes are absent only in the few animals whose eggs are capable of ameboid movement, for example, sponges and certain coelenterates. There are three types of egg membranes.

1) **The primary, or vitelline, membrane** is produced by the egg itself during the growth period (oocyte). It usually consists of a thin transparent layer; sometimes it attains considerable thickness and is multilayered (*Ascaris* and c ertain vertebrates). In most vertebrates the vitelline membrane is striated by numerous radial canals and is hence known as the zona radiata (the zona pellucida in mammals). The canals develop during membrane formation at the points where the villi extend to meet the outgrowths of the surrounding follicle cells. Some biologists believe that the zona radiata is formed by matter secreted not only by the oocyte but also by the follicle cells; for this re ason, they maintain that it is incorrect to regard the membrane as primary. The vitelline membrane is almost always present. Many eggs have an additional, usually secondary, membrane. Some eggs have primary, secondary, and tertiary membranes.
2) **The secondary membrane, or chorion**, is secreted by the auxiliary cells of the ovary or is formed by the conversion of the auxiliary cells into the materi -al of the membrane. In insects and other arthropods the chorion is permeated by chorionin, a substance similar in composition to keratin; the chorionin imparts toughness to the membrane.

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3) **The tertiary membranes** are secreted by cells of the female's genital tract when the ovum moves through the oviduct. Tertiary membranes include the gelatinous membranes of the eggs of echinoderms, mollusks, fish, and amphibians. They also include the tough protein membranes that are clad in the horny shells of cephalopods and selachians, the fibrous and calcareous-shells of reptiles, and the undershell membranes and the calcareous shells of birds. In many invertebrates a tough tertiary shell, called a cocoon, surrounds several eggs. The cocoon contains protein fluid, which serves as a fluid tertiary membrane. If the tough membranes form before the egg cell and the spermatozoon unite, special canals known as micropyles form. The micropyles enable the spermatozoon to reach the cytoplasm of the ovum without obstruction.

❖ Egg membranes protect eggs from physical injury, penetration by microorganisms and parasites, and desiccation. In many animals the sticky membranes or their appendages also serve to attach the egg to the substrate. Fluid protein membranes are used by developing embryos as nutrient matter . The separation of the membrane from the surface of the egg during fertiliza tion plays an important protective role against penetration by too many sper matozoa (cortical reaction).

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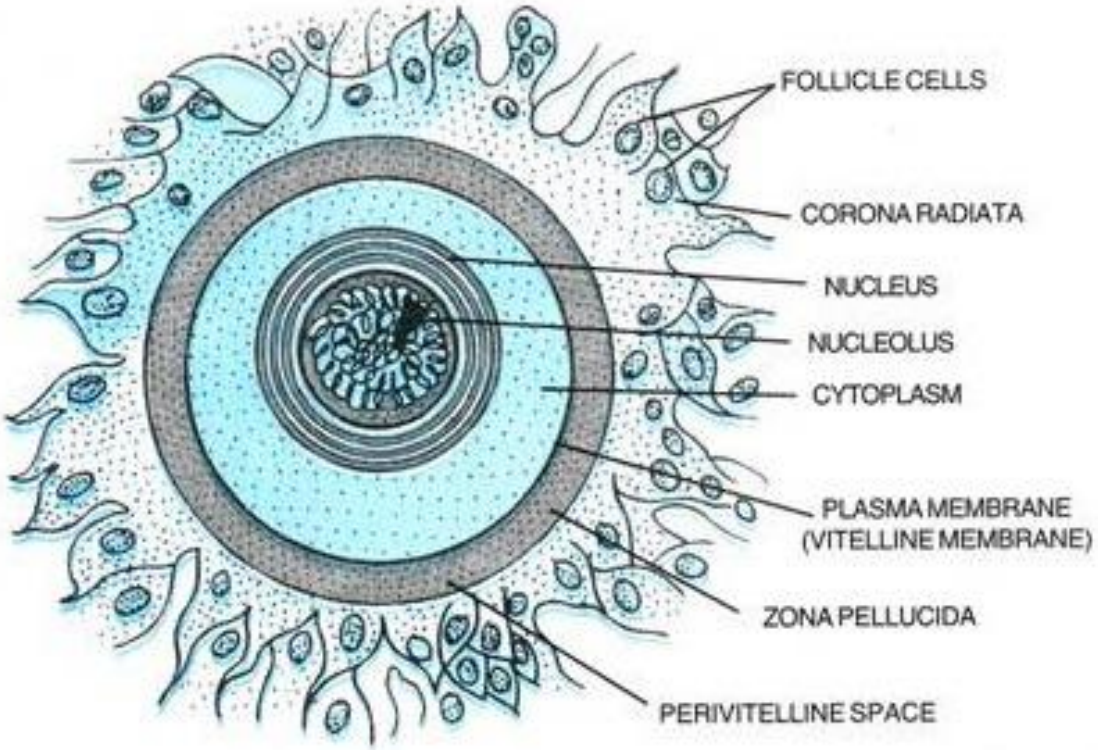

Fig. 3.17. Structure of ovum.

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