

## B.SC - Semester 2

(Core course – Theory)

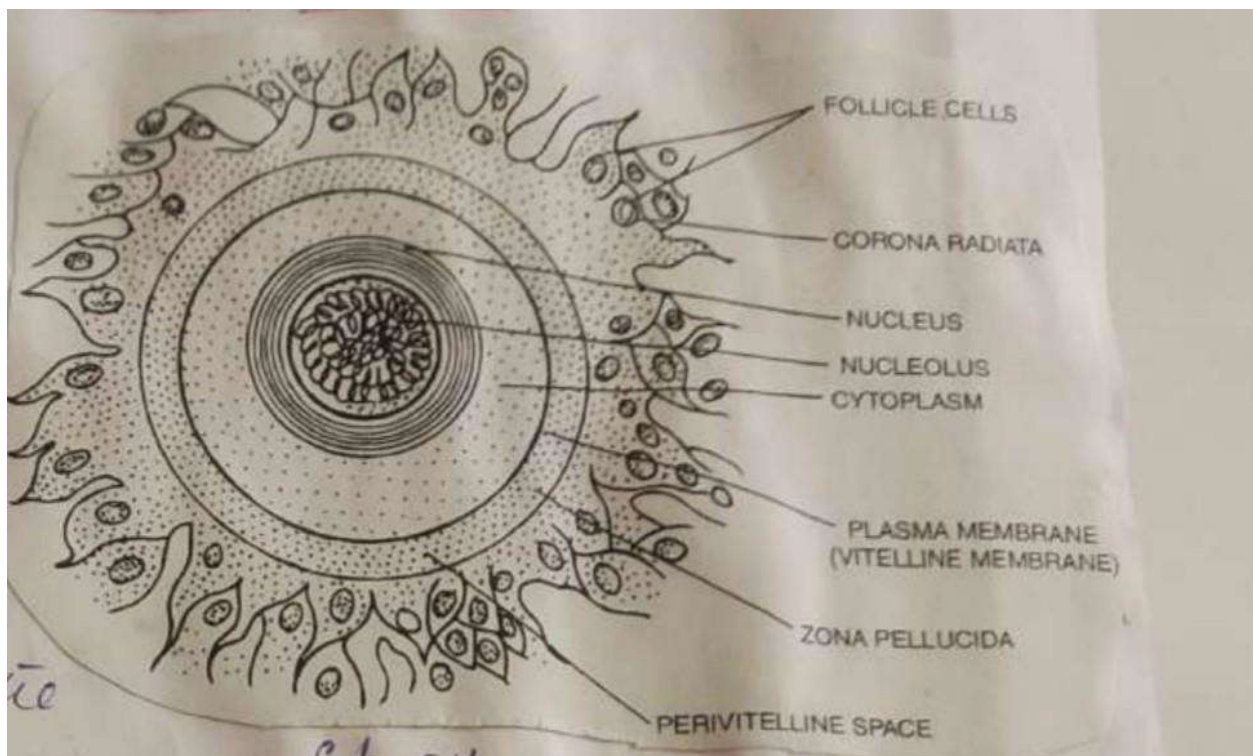
Course Code – 1ZOOTC0201

Course Title - Comparative anatomy and developmental biology of vertebrates

### UNIT: 5

#### Topic : Structure of mature ovum

Ovum (fig) is a spherical or oval non-motile cell. Its size varies in different animals, but it is much larger than the other types of cells in the animal's body.



**Fig. Structure of Mature Ovum**

Though spherical the ovum has polarity. During its maturation polar bodies are given off at a particular pole. This called the animals pole. It is always free of yolk. The opposite pole is termed by the vegetal pole. It

may contain yolk. the line passing through the two poles is known as the primary axis or animal-vegetal axis of the ovum. The ovum is enclosed by a plasma membrane and contains a large nucleus. The plasma membrane gives off microvilli to absorb food materials from the follicle cell. The nucleus lies in the yolk-free region of the cytoplasm near the animal pole. A prominent nucleolus is often present in the nucleus. Centrosome is absent. The cytoplasm of the ovum is called ooplasm. It often contains food materials in the form of **yolk**,

Lipids, glycogen etc; for the nourishment of the developing embryo. Peripheral region of the ooplasm is called the cortex, it contains cortical granules derived from the Golgi complex. These granules play a role in fertilization. The ovum is often surrounded by one or more protective covering called egg membrane which may be soft gelatinous coats (as in echinoderms and some amphibians) or thick membranes (as in fishes, insects and mammals). The jelly coats of echinoderm and amphibian eggs consist of complex carbohydrates called as sulfated mucopolysaccharides. The envelope of a mammalian egg is more complex. The egg is surrounded by a thick coat composed of a carbohydrate protein complex called zona pellucida. The zona is surrounded by an outer envelope, the corona radiata, which is many cell layers thick and formed by follicle cells adhering to the oocyte before it leaves the ovarian follicle,

**Type of egg-** Egg can be divided into many types based on different properties of yolk in them (Fig). Some of the important criteria for classification of eggs based on various properties of them are

**A. Based on presence of yolk.**

- I) **Alecithal egg.** In the metatherian and eutherian mammals, egg is almost free and is called as alecithal
- II) **Lecithal.** If yolk is in the cytoplasm, egg is said to be lecithal, e.g. insects, birds, reptiles etc.

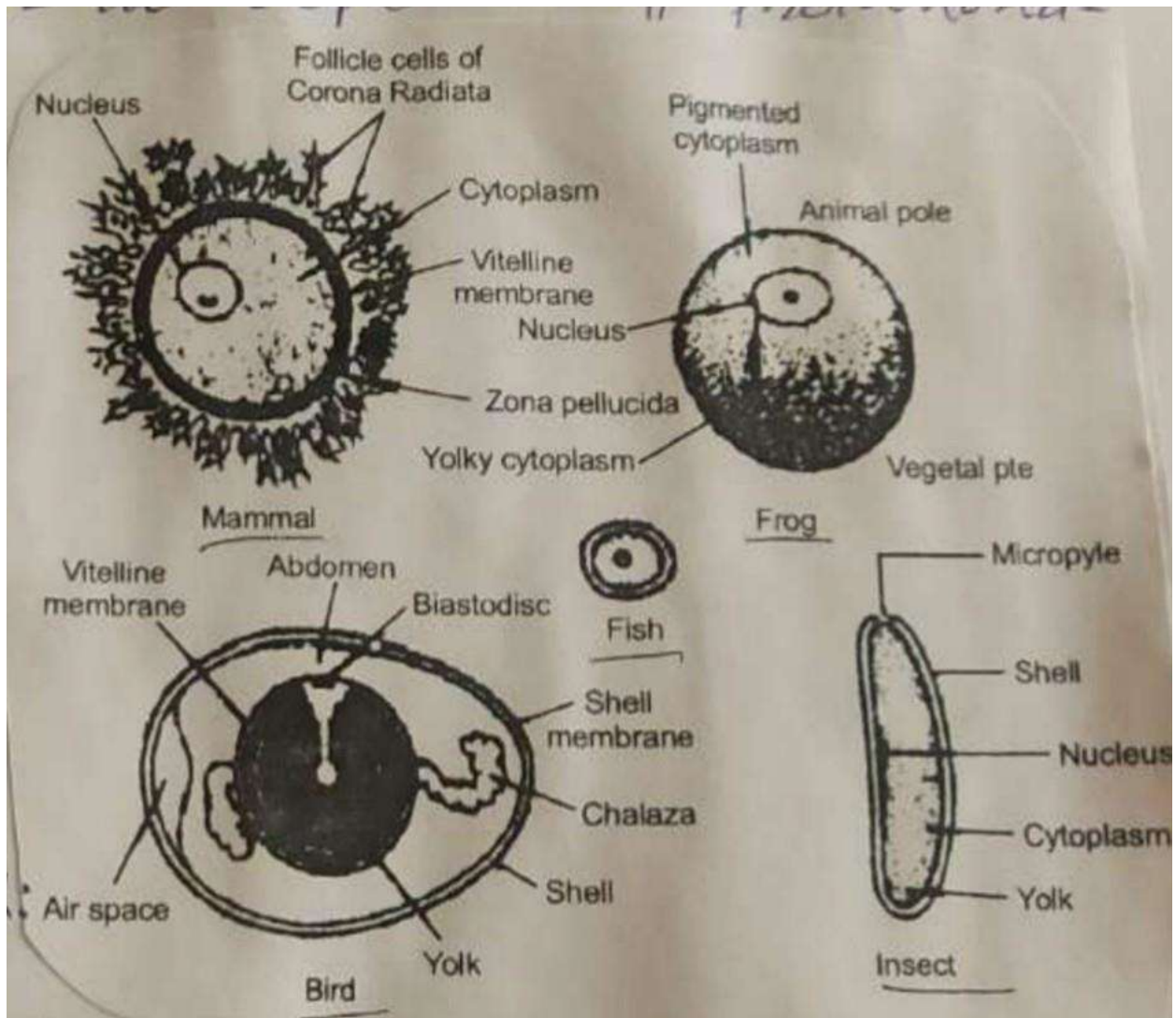
**B Based on the amount of yolk:**

- 1) **Microlecithal eggs:** These eggs have a small amount of yolk and are quite small in size, e.g. in sea urchins, tunicates and Branchiostoma
- 2) **Mesolecithal eggs:** These eggs contain a moderate amount of yolk and are fairly large in size e.g. in amphibians.

**3) Macrolecithal eggs:** Contain a large amount of yolk and are consequently, very large in size, e.g. in insects, sharks, bony fishes, reptiles, birds and prototherian mammal.

**C) based on the distribution of yolk in the cytoplasm.**

**a) Homolecithal or icolecithal eggs.** The yolk in these eggs is uniformly distributed all over the ooplasm e.g. protochordate and



**FIG2. Representative types of eggs in animals.**

**b) Heterolecithal eggs:** The yolk in these eggs is localized rather than evenly distributed in the ooplasm, e.g. in amphibians, reptiles, birds and insects. The heterolecithal eggs are further of following three kinds regarding the location of the yolk.

**a) Telolecithal eggs.** The yolk in these eggs is concentrated in the vegetal half of the egg, e.g. in amphibians. The animal half contains the active cytoplasm with nucleus.

**b) Meiolecithal egg.** The amount of yolk in these eggs is very large and occupies nearly the entire ooplasm, leaving free only a small disc-like area of cytoplasm for the nucleus e.g. in reptiles, birds and egg-laying mammal.

**c) Centrolecithal eggs:** The yolk in these eggs is localized at the centre and cytoplasm forms a thin layer on the surface. In addition, there is an island of cytoplasm at the centre of the egg where the nucleus lies e.g. in insects.