

Quadrant II – Transcript and Related Materials

Programme: Bachelor of Science (Third Year)

Subject: Zoology

Paper Code: ZOC-108

Paper Title: Developmental Biology

Unit: 1- Introduction

Module Name: Types of eggs

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Notes

Types of eggs

Introduction to egg/ ovum

The female gamete, the egg or ovum is a unique cell, it is the cell fated to segregate from the organism and develop into a new individual. Larger than most somatic cells, the ovum is a non- motile and food laden cell. It derives its developmental potential from a rich dowry of organelles and organisation of its outer cortex and plasmalemma. An ovum acquires its developmental potential during oogenesis, a period of growth and maturation occurring in the female gonads, the ovaries. Compared to sperms, eggs are larger. Their size varies from being microscopic to few inches in diameter. In Vertebrates, they range in size from being 0.06mm in diameter in the mouse to about 85mm in the ostrich. The size of the egg depends on the amount of nutritive substance(yolk) stored in the egg. If the eggs are smaller in size, a large number of eggs are produced; if larger in size, only a few are produced. Eggs are usually spherical in shape, but in a few animals such as insects they are elongated and cylindrical. Eggs of hagfish, *Myxine* and ganoid fishes are oval in shape; eggs of birds are oval in shape but their egg cells are spherical in shape.

TYPES OF EGGS

Eggs are classified mainly on the basis of: a) amount of yolk b) distribution of yolk c) presence or absence of shell d) type of development.

a) On the basis of amount of yolk

Eggs are grouped into three types based on the amount of yolk present in them: 1) Microlecithal / Oligolecithal eggs 2) Mesolecithal eggs 3) Megalecithal / Macrolecithal / Polylecithal eggs

1) Microlecithal / Oligolecithal eggs:

These are small sized eggs which contain very small amount of yolk.

Such eggs are found in certain marine invertebrates such as *Hydra* and sea urchin and in various chordates such as *Amphioxus*, tunicates and marsupial and eutherian mammals.

Kent (1969) described these eggs as Alecithal eggs, but this term is not appropriate as there are no eggs without yolk.

2) Mesolecithal eggs:

These are eggs which contain moderate amount of yolk.

Such eggs are found in annelid worms, molluscs, Petromyzontia (*Petromyzon*), Dipnoi (lungfishes) and Amphibia.

3) Megalecithal / Macrolecithal / Polylecithal eggs:

These eggs contain enormous amount of yolk.

Such eggs are found in insects, Myxinoidea (*Myxine*), Chondrichthyes, reptiles, birds and Monotremata (prototherian mammals).

b) On the basis of distribution of yolk

Eggs are grouped into three types based on the distribution of yolk present in them:

1) Homolecithal / isolecithal eggs

2) Telolecithal eggs

3) Centrolecithal eggs

1) Homolecithal / isolecithal eggs:

The amount of yolk is so little that it is found scattered almost uniformly throughout the egg cytoplasm.

Such microlecithal eggs with evenly distributed yolk in ooplasm are called homolecithal or isolecithal eggs.

Some examples include *Amphioxus*, echinoderms and eutherian mammals.

2) Telolecithal eggs:

These eggs have a polarised distribution of yolk in the ooplasm and are found in mesolecithal and macrolecithal eggs.

The yolk, due to its gravity, is concentrated more in one hemisphere than the other. The concentration of yolk is greatest at the vegetal pole and least at the animal pole. In macrolecithal eggs, the amount of yolk is so massive that it occupies most of the space of animal pole and active cytoplasm and nucleus remain confined to a small cap at the animal pole.

Such eggs may be either moderately telolecithal (eggs of Amphibia, Petromyzontia and Dipnoi) or highly telolecithal (cartilaginous and bony fishes, reptiles and birds) eggs.

3) Centrolecithal eggs:

The yolk is concentrated in the centre of the egg.

The active cytoplasm forms a thin peripheral layer around the yolk.

Example, insects.

c) On the basis of presence or absence of shell

Eggs are grouped into two types based on the presence or absence of shell:

1) Cleidoic eggs

2) Non-cleidoic eggs

1) Cleidoic egg

These eggs contain a thick and hard outermost shell.

This hard shell is permeable for gases. Yolk, salts and water is present in large amount in cleidoic eggs.

Examples- Birds & Reptiles, Prototheria mammal and insects.

2) Non-cleidoic eggs

These eggs are not protected by a shell. Egg membranes are soft in these eggs.

All viviparous animals and in oviparous animals which lay eggs in water

d) On the basis of the type of development

Lastly eggs are grouped into two types according to their potentiality of development.

1) Determinate / Mosaic eggs

2) Indeterminate / Regulative eggs

1) Determinate / Mosaic eggs

The fate of every portion of the egg is pre-determined. If a particular portion of the egg is removed, the developing embryo will be lacking in a particular organ.

Examples- Polyclads, nemertines, annelids , molluscs and ascidians.

2) Indeterminate / Regulative eggs

The developmental potentialities are not pre-determined in these eggs.

Removal of a small portion of the egg, or even one or two early blastomeres will not affect the normal development.

Examples- echinoderms and vertebrates.