A presentation on

Chemical composition of yolk

For B.Sc.-II, Semester-IV

Zoology-I

(Developmental Biology)

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Chemical composition

The chemical analysis of yolk shows that main components of yolk are proteins, phospholipids and neutral fats. Their proportion is varies in the oocytes of different animals. There are two types of yolk, based on their proportion in the oocytes. These are:

1. Protein yolk, and
2. Lipid yolk.

Both varieties of yolk are present in the eggs of many animals.

1. Protein yolk: The yolk which contains more proportion of proteins, such yolk is called as ‘Protein yolk’. The protein yolk is present in the eggs of many invertebrates and lower chordates (Amphioxus). It occurs in the form of yolk granules. In mature amphibian oocyte, protein yolk constitutes roughly 45% of the dry weight and lipids 25%.

2. Lipid yolk: The yolk which contains more proportion of lipids, such yolk is known as ‘Lipid yolk’. The lipid yolk is also called as ‘fatty yolk’. It is abundant in oligolecithal eggs of bony fishes, reptiles and birds. According to Romanoff (1949), in these eggs, the percentage of phospholipids and fats is 32.6% and proteins are 16.6%.

Beside, the above two types of yolk, there are again two types of yolk, based on their nature. These two types are: I. Granular yolk, and II. Yolk platelets.

I. Granular yolk: In the cytoplasm of oocytes, the yolk occurs in the form of fine granules. Such yolk is known as ‘granular yolk’. The egg of invertebrates and lower chordates like Amphioxus and Tunicates contains granular yolk. In them, the yolk is present in less amount and distributed uniformly in the cytoplasm. Such egg or ovum is called as ‘Isolecithal egg’.

II. Yolk platelets: In oocytes of most of the vertebrates, the yolk is found in the form of large granules. These large granules are called as 'Yolk platelets'. The cytoplasm of these oocytes is packed with yolk platelets. The yolk platelets are found in the oocytes of vertebrates like cyclostomes, cartilaginous and bony fishes, lung fishes, amphibians, reptiles and birds.

From the above explanation, it may be concluded that-

1. The main components of yolk are proteins, phospholipids and neutral fats.

2. Based on the proportion of yolk in the oocyte of different animals, there are two types of yolk: viz., Protein yolk and Lipid yolk. Both protein and lipid yolk concentration is more or less in each oocytes.

3. Based on the nature of yolk, there are two types of yolk. viz., Granular yolk and Yolk platelets. The granular yolk is fine granular in nature and the yolk platelets are large sized granules of yolk.

Functions of yolk

The yolk performs following functions:

1. Yolk supplies energy to the developing embryo.
2. It provides material for the synthesis of those substances which are necessary for the elaboration of the embryo's body.
3. The yolk influences on size of egg, the differentiation of ooplasm, pattern of cleavage, morphogenetic movements of the blastomers during gastrulation and on the type of development (direct or indirect).

Thank you!