

Hello I'm doctor Suphala Pujari,

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And I welcome you all to this module on

Oogenesis from Unit 1 - Introduction of

paper ZOC108 Developmental Biology.

In this module I will be discussing

definition of oogenesis,

phase of multiplication,

phase of growth,

phase of maturation. At the end

of this module you will be able

to define oogenesis, understand

when primary oocytes are made,

Know difference between.

oocytes and ova, differentiate among

the different stages of oogenesis in

the female and describe the different

stages of oogenesis in the female.

The production of egg or ova

is called oogenesis.

The process of oogenesis is  
different than Spermatogenesis.

Besides the production of four  
unequal sized haploid cells,

there is acquisition of food

reserves in the egg cytoplasm

for the development of embryo.

Further, before the occurrence of meiosis,

enormous amount of growth and

differentiation of egg cytoplasm takes place.

The oogenesis is more or less

similar in all vertebrate groups.

During oogenesis,

the cells of germinal epithelium

detach from the surface epithelium

and enter the cortex of the ovary.

These germinal cells are diploid and

are called primordial germ cells.

They pass through the three

stages to form fully formed egg.

These are - first one is Phase of multiplication.

The primordial germ cells become the oogonia or the egg mother cell.

The oogonial cells eventually undergo proliferation by repeated mitotic divisions, giving rise to the eggs and become primary oocytes when cell division ceases.

Now they enter into a period of growth.

Second is Phase of growth. Owing to the fact that the egg contributes the greater part of the substance used in the development, growth plays a much greater role in oogenesis than in spermatogenesis.

The period of growth in the female gametes is very prolonged and tremendous.

Growth of oocyte occurs during this phase.

Most of the primordial germ cells are approximately 10 micrometer.

That is 0.01 millimeter in diameter.

The young oocyte of amphibians,

May be about 50 micrometer,

that is 0.05 millimeter,

and the mature amphibian egg is rather large

about 1000 to 2000 micrometer.

That is 1 to 2 millimetre in diameter.

In birds,

the diameter of ovum is as large as

40,000 micrometer and in mammals

it is only 200 micrometer.

The rate of growth of oocytes also varies;

it may be slow or fast.

The progressive growth increase

in nuclear as well as cytoplasmic

substances of oocytes may

be divided into two stages-

Previtellogenesis growth period

and Vitellogenesis growth period.

3rd is a phase of maturation.

The nucleus of primary oocyte

remains in a prolonged meiotic  
prophase. After the oocyte  
completes its growth and differentiation,  
the oocyte nucleus resumes meiosis.

Due to some type of stimulation,

the nuclear membrane breaks down,

the chromosomes,

which have become greatly contracted

and concentrated toward the

centre of germinal vesicle,

are carried to the periphery

of animal pole of the oocyte.

A bulge now appears at

the surface of oocyte.

Due to the equal nuclear division but

with unequal cytoplasmic division,

two unequal sized cells are formed.

The small cell is the haploid polar

body or polocyte and the large sized

cell is the secondary oocyte or ootid. The secondary

oocyte is of the same size as that

of primary oocyte. The secondary oocyte undergoes equal nuclear division by meiosis II in the same way as that of meiosis I, so that a haploid secondary polocyte and a haploid large sized, fully mature ovum as functional female gamete is formed. only the ovum remains functional, while the three polocytes later die off.

This second meiotic division takes place after the second oocyte is discharged from the ovary, and sometimes only after the sperm has fused with the egg cell.

The egg thus formed will contain most of the cytoplasm and reserve food material, which may be quite sufficient for the developing embryo.

These are the references for

this module. Thank you.