

O O G E N E S I S

Meiosis of sex cells in the ovaries

In other words

- How mams prepare their sex cells (oocytes or eggs) to be ready for fertilization?
- Sex cells (oocytes or eggs) are not ready for fertilization at the time of birth!!!!!!
- They (Sex cells, oocytes or eggs) need to wait until the girl becomes **mature so she can physically carry the baby (get pregnant)**
- Girls become mature at time **of puberty**, the main sign of Puberty is **menstrual cycle**

This means that oocytes undergo a long journey to become ready for fertilization!!!!!!

1-INTRA-UTERINE (BEFORE BIRTH)

2-AT BIRTH

3-DURING CHILDHOOD

4-AT PUBERTY

Before birth



Here we are talking about a female who's pregnant with a girl, and we just describing the oogenesis in this girl while she is in the uterus

1-Intra-uterine

WHAT IS THE ORIGIN OF SEX CELLS (REPRODUCTIVE CELLS) OR **GAMETES?**



Gametes originate from the Epiblast as **primordial germ cells**

(PGCs)

Then they move temporarily To the wall of the **yolk sac** of the embryo

Then they settle down in The **ovaries** of the embryo

Gametes are derived from
Primordial germ cells

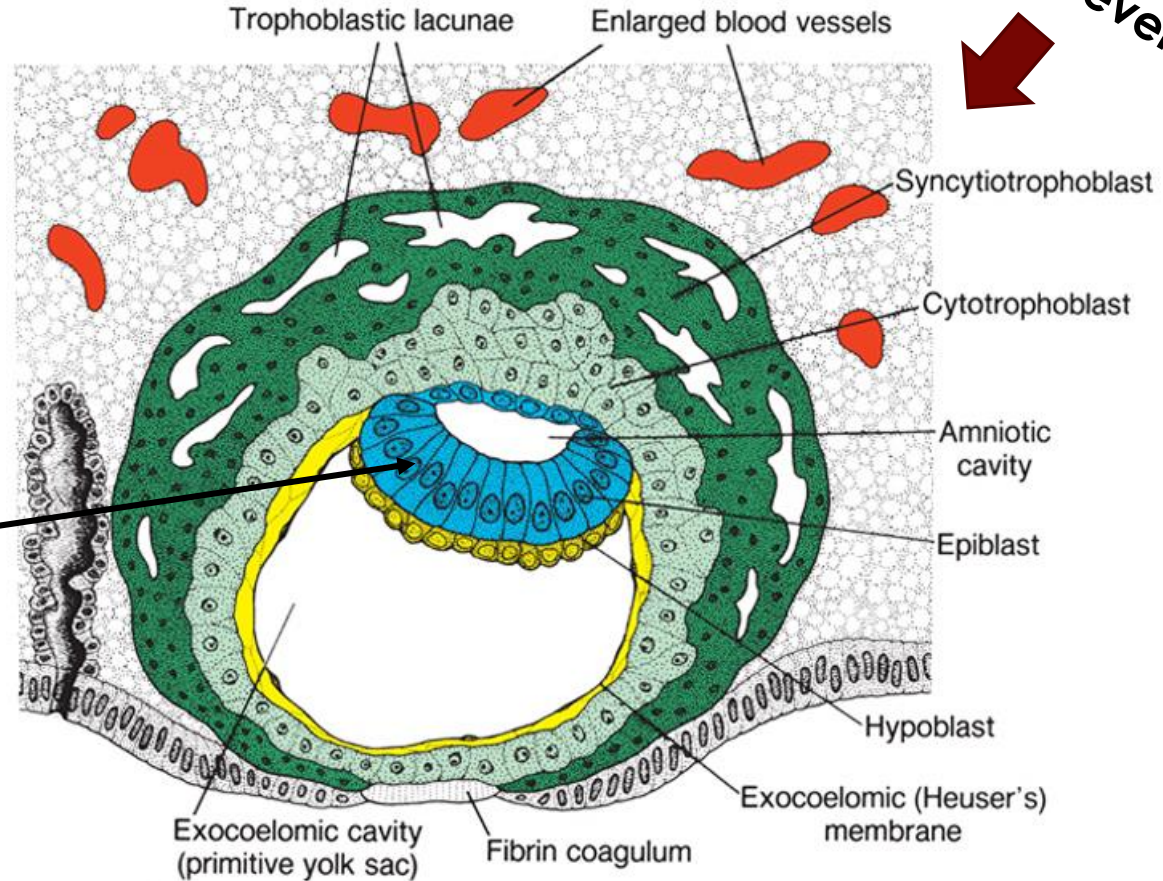
Formed
In

A

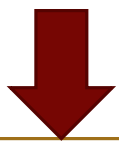
Epiblast
Of the
embryo

THEN

The embryo during its Second
week of development

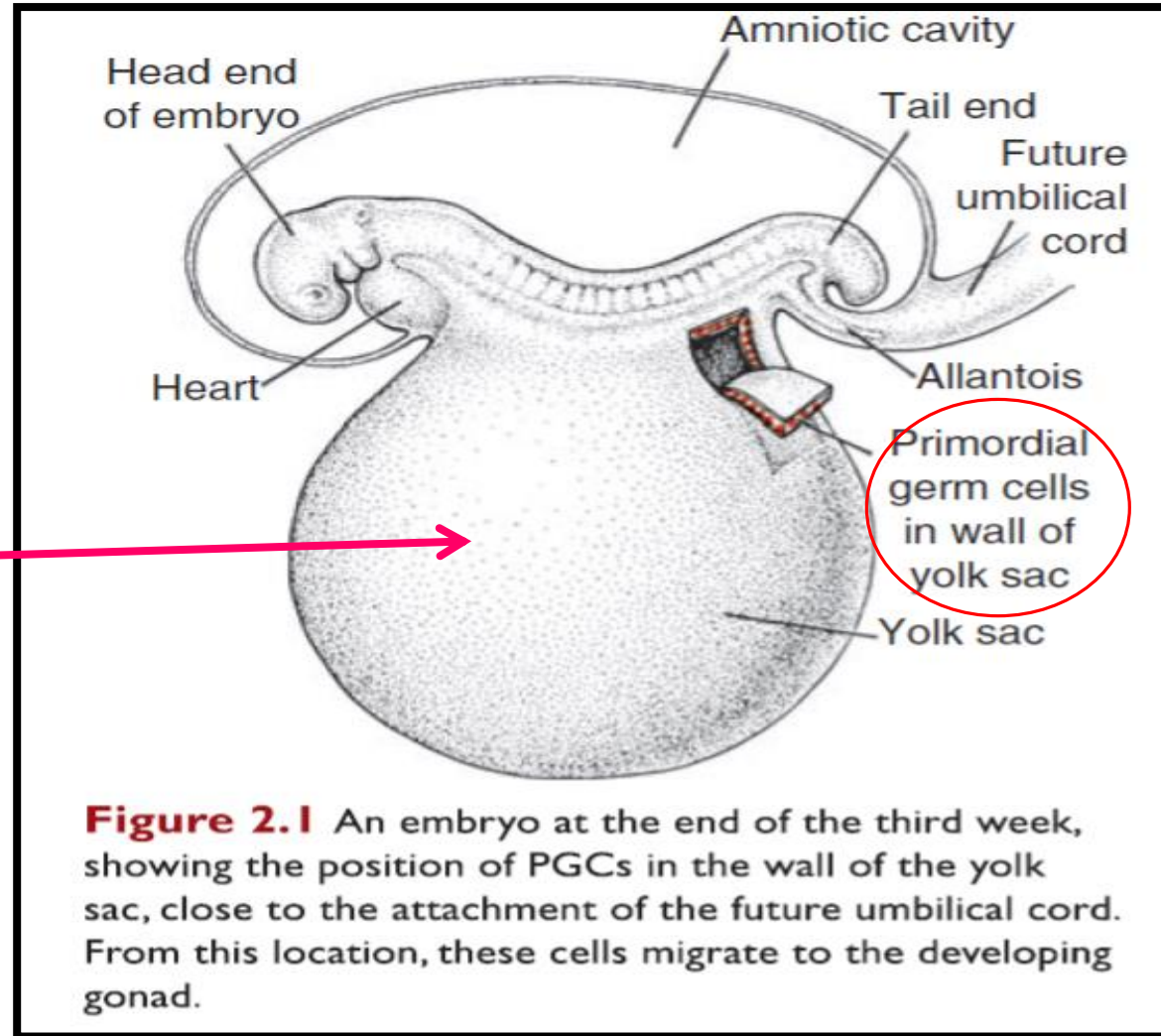


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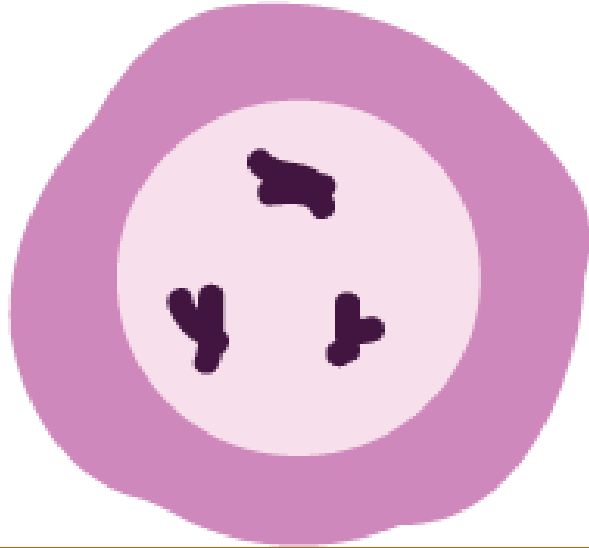


During the second week of development

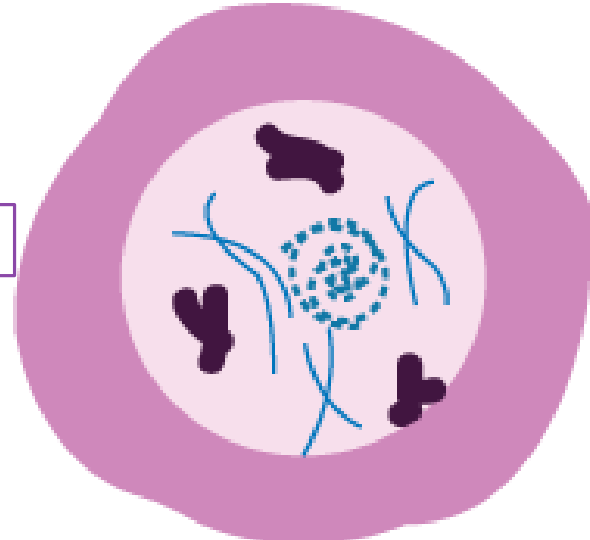
B Primordial germ cells move to the Wall Of Yolk Sac



C During Fourth week till the end of Fifth week



mitotic divisions

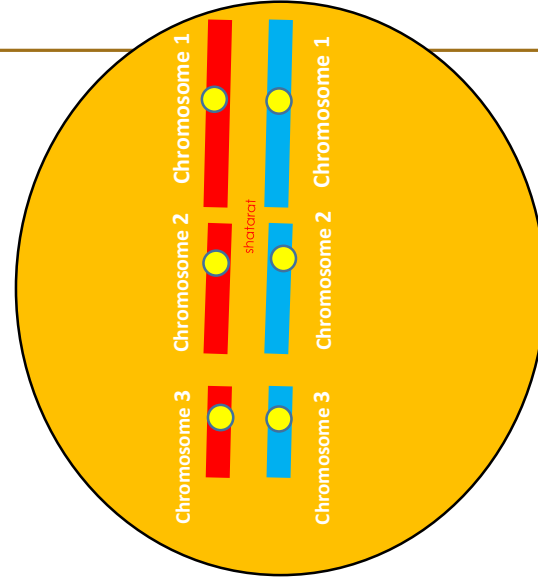


Cells begin to migrate toward
(**Developing Gonads**)
< Gonads of genetic females / ovaries >

PGC's differentiate into
by mitotic divisions

Oogonia

Oogonium
Is a diploid
cell
2n, single
structured



diploid cell
2n, **Single** structured

Remember, in this example
We using none human cells,
and the chromosome's number
Is not 46

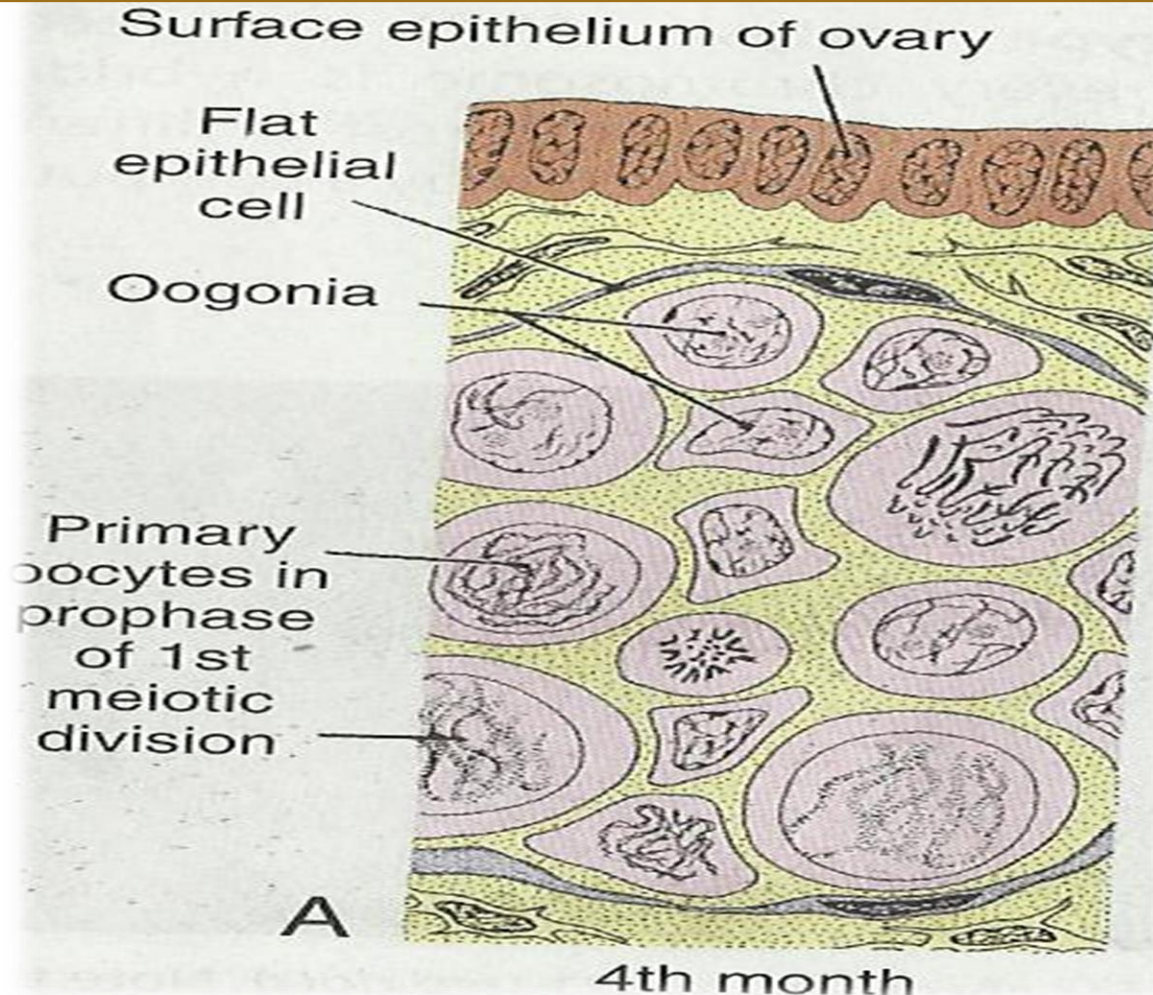
WHAT WOULD OOGONIA DO IN THE OVARIES?



By the End of Third Month

Oogonia arranged in clusters surrounded by
Large Flat epithelial cells
(Follicular Cells)

The appearance of follicles



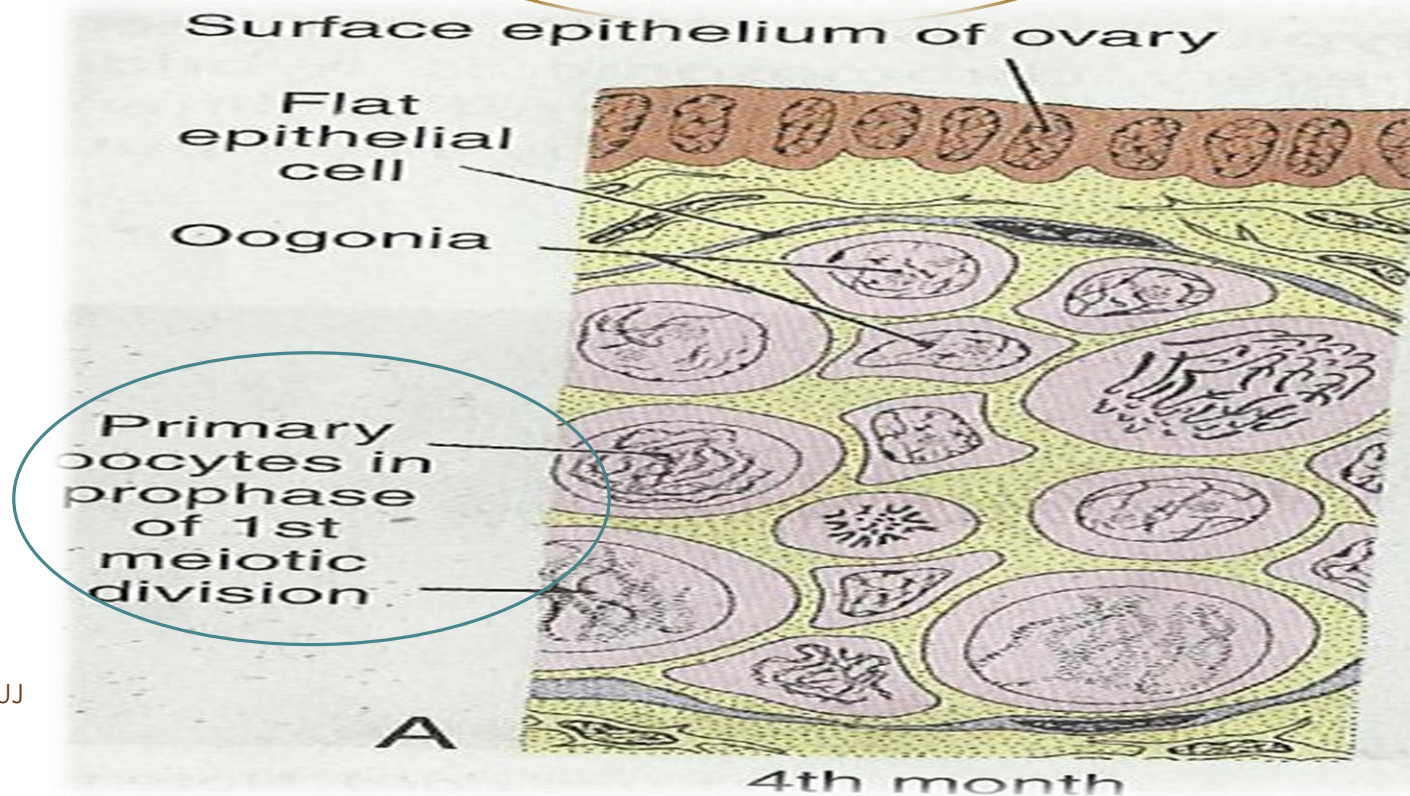
Why do oogonia need follicles??

Oogonia continue to divide by
Mitosis

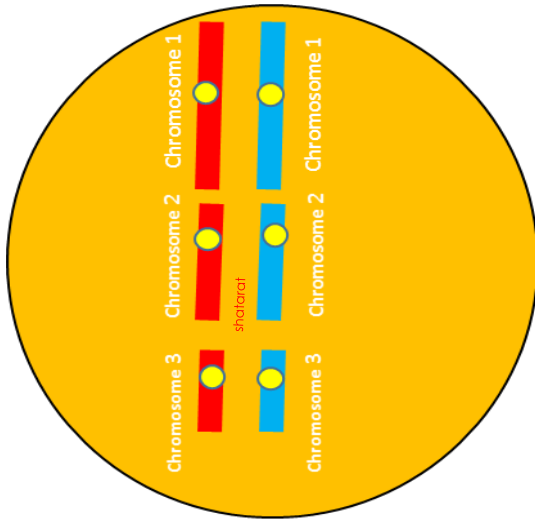
But some of them enter meiosis and arrest in their cell divisions in
(Prophase Meiosis 1)

And form

**PRIMARY
OOCYTE**



Oogonium
Is a diploid cell
 $2n$, single structured



diploid cell

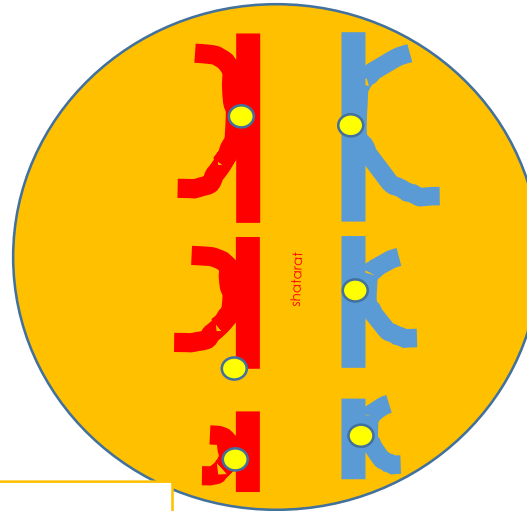
$2n$, **Single** structured

Primary oocyte

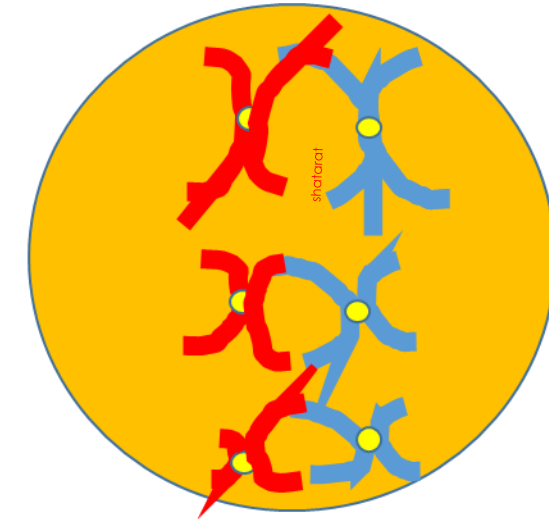
meiosis

$2n$, **Double** structured

A primary oocyte
(with 23 double structured chromosomes)



Primary oocyte



*Chromosomes come together and cross each other by certain segments of their bodies forming what we called **CHIASMATA**:*

X-shaped structure

Formed by the junction of two chromatids of the for chromatids

(tetrad)

Then In The

Next few months

Oogonia increase rapidly in numbers



By the end of Fifth month



**Total number of germs cells
in ovary reaches maximum**

**Estimated 7
Millions**

At this time

Many Oogonia and primary oocyte become atretic



By Seventh Month

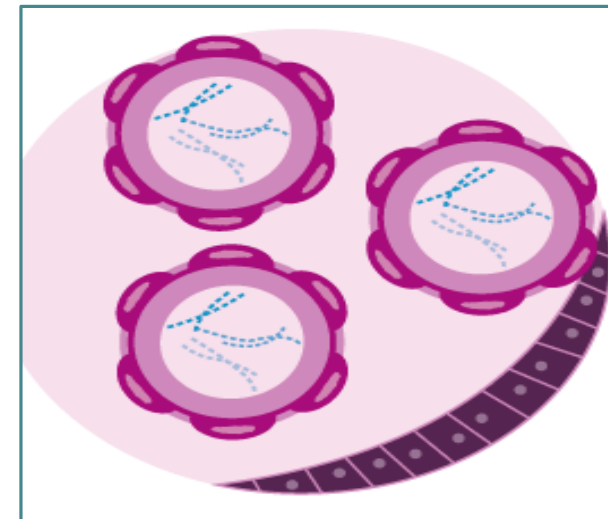
Majority of oogonia have degenerated except for few near surface

All surviving primary oocytes
WILL

Enter prophase of meiosis 1

Individually surrounded by a layer of
flat cells (Follicular epithelial cells)

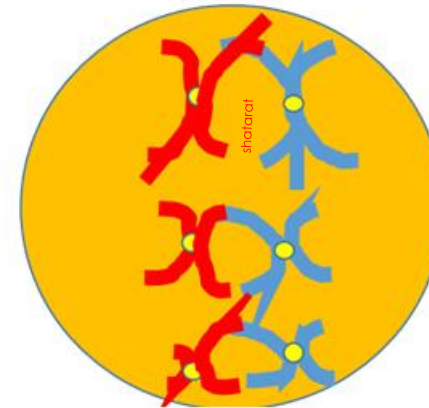
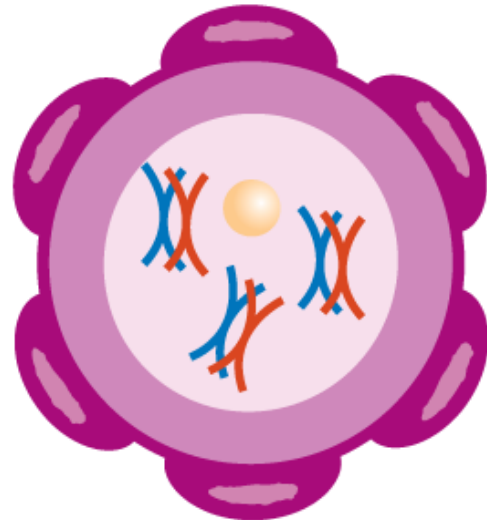
**This structure is named
(Primordial Follicle)**



Near the time of birth

all primary oocytes have
started prophase of meiosis I

but instead of proceeding
into metaphase, they enter the
(diplotene stage)

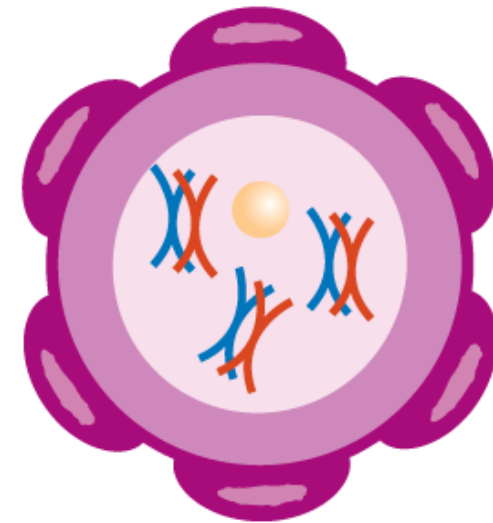


2n, **Double** structured

Primary oocytes remain arrested
in prophase of meiosis I diplotene stage
and do not
finish their first meiotic division
before puberty is reached.

This *arrested state* is produced by
oocyte maturation inhibitor
(OMI)

a small peptide secreted by follicular cells



At BIRTH

The **total number of primary oocytes at birth** is estimated to vary from **600,000 to 800,000**

Note 1: primary oocyte and flat epithelial cells known as (primordial follicle).
Note 2: It's still "primary oocyte" rested in (diplotene stage in meiosis 1)

During childhood

most oocytes become atretic; only approximately ***40,000 are present by the beginning of puberty***

Fewer than 500 will be Ovulated during life time

During childhood

most oocytes become atretic; only approximately 40,000 are present by the beginning of puberty

Fewer than 500 will be ovulated

At Puberty

Next time