OVULATION

It is the release of a secondary oocyte from the ovarian follicle. Around the middle of ovarian cycle, the secondary follicle few days before ovulation under the influence of FSH and LH grows rapidly to a diameter of about 5mm to become a mature secondary. Coincident with the final development of the secondary follicle there is an abrupt increase in LH that causes the primary oocyte to complete meiosis 1 and the follicle to enter the preovulatory mature secondary stage. Meiosis 2 is also initiated but the secondary oocyte is arrested in metaphase approximately 3 hours before ovulation. In the meantime, the surface of the ovary begins to bulge locally and at the apex an avascular spot(stigma) appears. For the oocyte to be release two events must occur which are caused by LH surge:

1. it increase collagenase activity resulting in the digestion of collagen fibers(connective tissues) surrounding the tissues
2. prostaglandin levels also increase and cause local muscular contractions in the ovarian wall.

These contractions extrude the oocyte together with its surrounding follicular cells from the region of the cumulus oophorus and this causes ovulation. Some of the cumulus oophorus cells then rearrange themselves around the zone pellucid to form corona radiata. Ovulation usually follows the LH peak by 12-24 hours.

DIFFERENCES BETWEEN MEOSIS 1 AND

MEOSIS 2

MEOSIS 1	
1. Homologous chromosomes separate	1. Si
2. Produces 2 diploid daughter cells	2. Pr
3. Crossing over occurs	3. Cr
4. Preceded by S-phase and G-phas	4. Pr
5. Reductive division occurs	5. Ec
6. Starts as diploid and ends at haploid	6. St

STAGES INVOLVED IN FERTILIZATION

1. **PASSAGE OF THE SPERM THROUGH CORONA RADIATA-** Dispersal of the follicular cells of the corona radiata surrounding the oocyte and zona pellucida appears to result mainly from the action of the enzyme hyaluronidase released from the acrosome of the sperm but the evidence of this is not unequivocal. Tubal mucosal enzymes also appear to assist the dispersal. Movements of the tail of the sperm are also important in its penetration of the corona radiata.

2. **PENETRATION OF ZONA PELLUCIDA-** Passage of a sperm through the zona pellucida is the important phase in the initiation of fertilization. Formation of a pathway also results from the action of enzymes released from the acrosome. The enzymes esterase, acrosin, and neuraminidase appear to cause lysis (dissolution or loosening) of the zona pellucida, thereby forming a path for the sperm to enter the oocyte. The most important of these enzymes is acrosin, a proteolytic enzyme. Once the sperm penetrates the zona pellucida, a zone reaction change in the properties of the zona pellucida, occurs that makes it impermeable to other sperms. The

composition of this extracellular glycoprotein coat changes after fertilization. The zona reaction is believed to result from the action of lysosomal enzymes released by cortical granules near the plasma membrane of the oocyte. The contents of these granules, which are released into the perivitelline space also cause changes in the plasma membrane that make it impermeable to other sperms.

3. **FUSION OF PLASMA MEMBRANE OF THE EGG AND SPERM**-The plasma or cell membranes of the oocyte and sperm fuse and break down in the area of fusion. The head and tail of the sperm enter the cytoplasm of the oocyte, but the sperm's cell membrane (plasma membrane) and mitochondria remain behind.

4. **COMPLETION OF SECOND MEIOTIC DIVISION OF OOCYTE AND FORMATION OF FEMALE PRONUCLEUS**-Penetration of the oocyte by a sperm activates the oocyte into completing the second meiotic division and forming a mature oocyte and a second polar body. Following decondensation of the maternal chromosomes, the nucleus of the mature oocyte becomes the female pronucleus.

5. FORMATION OF MALE PRONUCLEUS- Within the cytoplasm of the oocyte, he nucleus of the sperm enlarges to form the male pronucleus and the tail degenerates. Morphologically, the male pronucleus and female pronucleus are indistinguishable. During the growth of the pronuclei, they replicate their DNA 1 and 2. The oocyte containing 2 haploid pronuclei is called an ootid, as the pronuclei fuses into a single diploid aggregation of chromosomes turning the ootid to a zygote. The chromosomes in the zygote become arranged on a cleavage spindle in preparation for cleavage of the

zygote.

DIFFERENCES BETWEEN MONOZYGOTIC AND DIZYGOTIC TWINS

MONOZYGOTIC TWINS	DIZYGOTIC TWINS
1. They are genetically identical	1. They are not genetically identical
2. They look alike	2. They do not look alike
3. They arise from one sperm	3. They arise from different sperms and different eggs
4. They are the same sex	4. They are not the same sex. One is male while the other is female
5. They share the same placenta, amnions and choronoins but different umbilical cord	5. They share the same placenta, amnions, choronions and umbilical cord