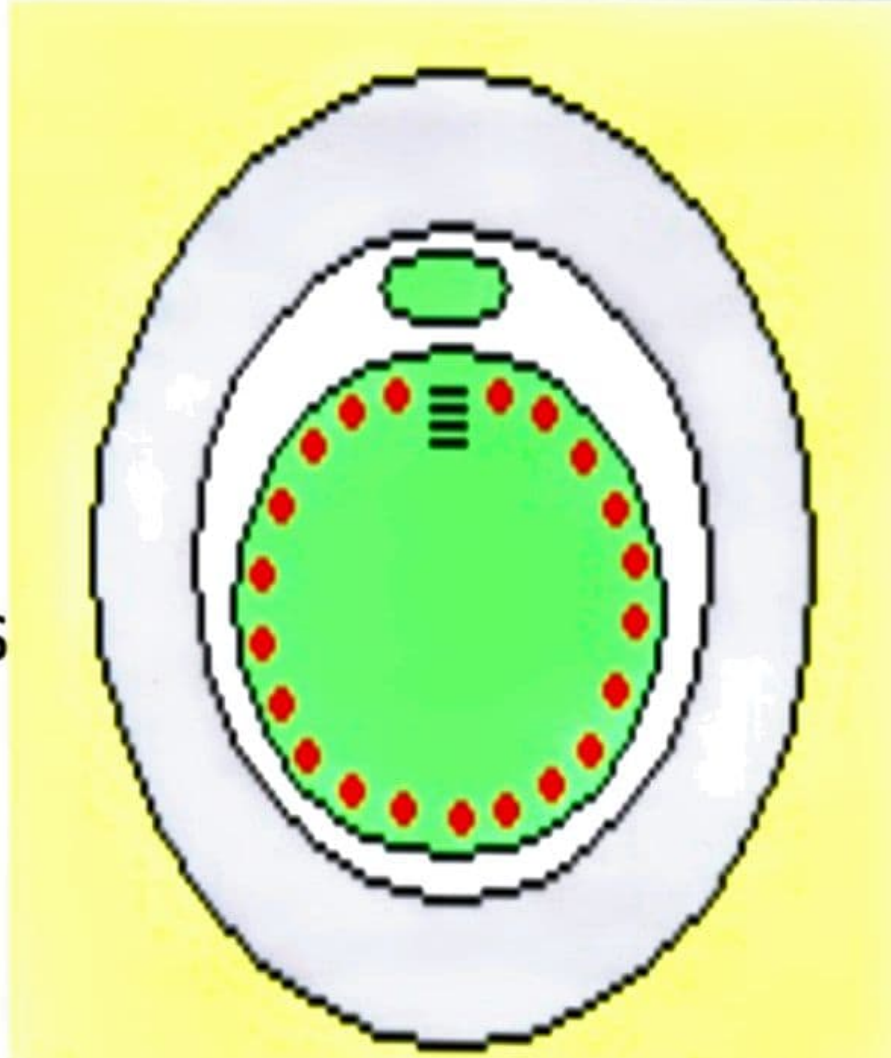
B. Cortical Reaction

- Once sperm penetrates zona pellucida, the **zona reaction** occurs:
  - This reaction makes the zona pellucida impermeable to other sperms.
- Egg Activation
- Cortical Reaction
  - exocytosis of cortical granules
- Zona block

-biochemical changes eliminates sperm binding

This prevents fertilization of an egg by more than one sperm.



Cont...

Mechanisms:

Two mechanisms can operate to ensure that only one sperm fertilizes the egg.

1.*Primary block to polyspermy*

Rapid depolarization of the egg plasma membrane

prevents further sperm from fusing and

thereby acts as a fast *primary block to polyspermy.*

But the membrane potential returns to normal soon after fertilization, so that a second mechanism is required to ensure a longer-term, *secondary block to polyspermy*

CONT...

II. *Secondary block to polyspermy*

- A local increase in cytosolic Ca^{2+} (spreads in a wave).
- prolonged Ca^{2+} oscillations.
- Activate the egg to begin development,
- The cortical granules release their contents by exocytosis Proteolytic cleavage of ZP2 and the hydrolysis of sugar groups on ZP3
- The zona becomes "hardened," so that sperm no longer bind to it.

C. Nuclear Reaction

- Cortical reaction pulls the sperm nucleus.
- Loses the membrane that surround the head.
- Tail incorporated into the egg cytoplasm.
- Naked nucleus → male pronucleus
- Approaches haploid nucleus of the ovum → female pronucleus
- Male pronucleus + female pronucleus → diploid zygote
- GENOME of a NEW ORGANISM… mitotic process….