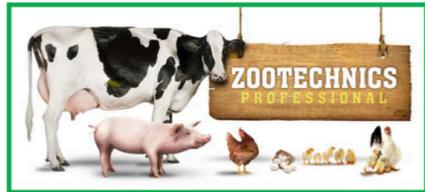
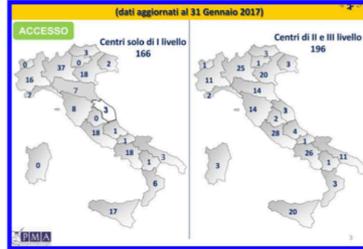
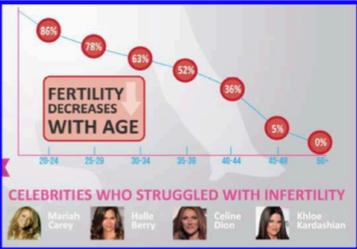


Why is it important to study the reproductive biotechnologies...

WORLD: 50-80 MILLION PEOPLE AFFECTED BY INFERTILITY

25 July 1978



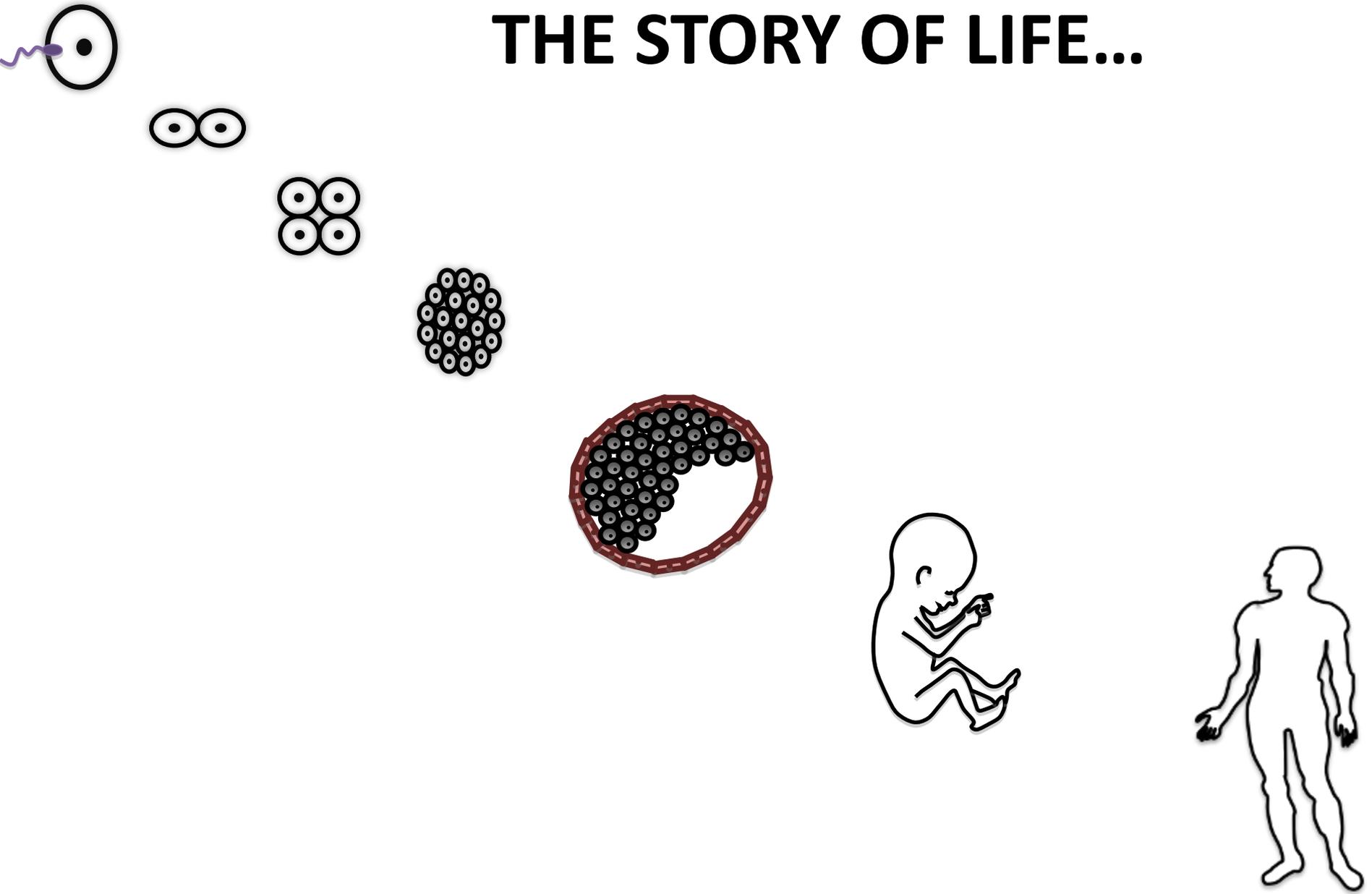
- 10-15% couples (50 millions couples) are infertile and turn to IVF/ART
- OMS: Increase of 6.5 millions of infertile couples in 20y
- In 40y, 8 millions babies were born through ART
- 500.000 newborns/y using ART; 13.000 in Italy
- 370 centers of ART in Italy
- 71% of all cycles of ART in Europe

- Zootecnics
- Global populations of vertebrates declined by 58% (1970-2012)
- Endangered animal species (>3000)

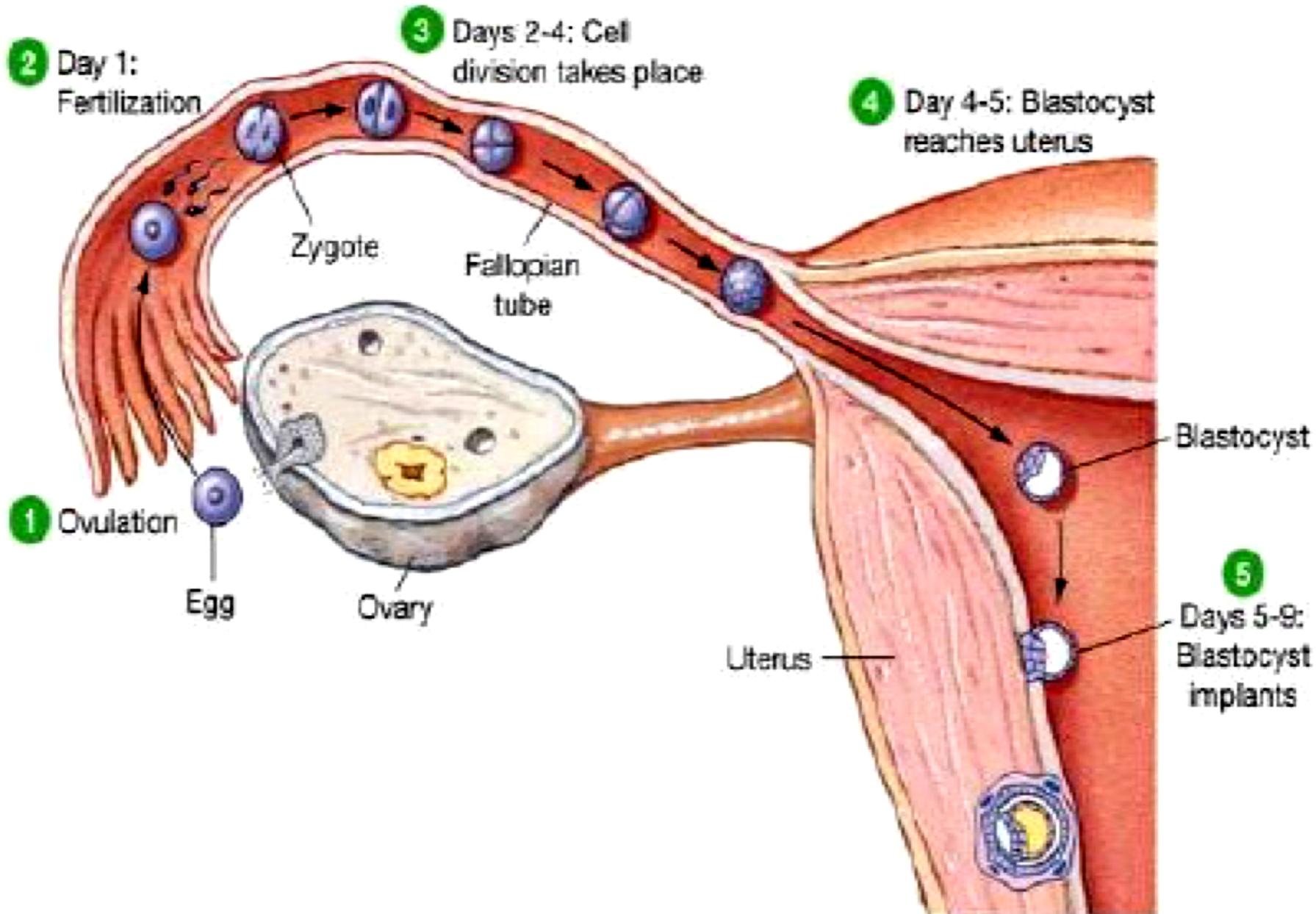
“Here we adapt existing Assisted Reproduction (ART) Techniques to fertilize Southern White Rhinoceros oocytes with Northern White Rhinoceros spermatozoa (from dead animals)”

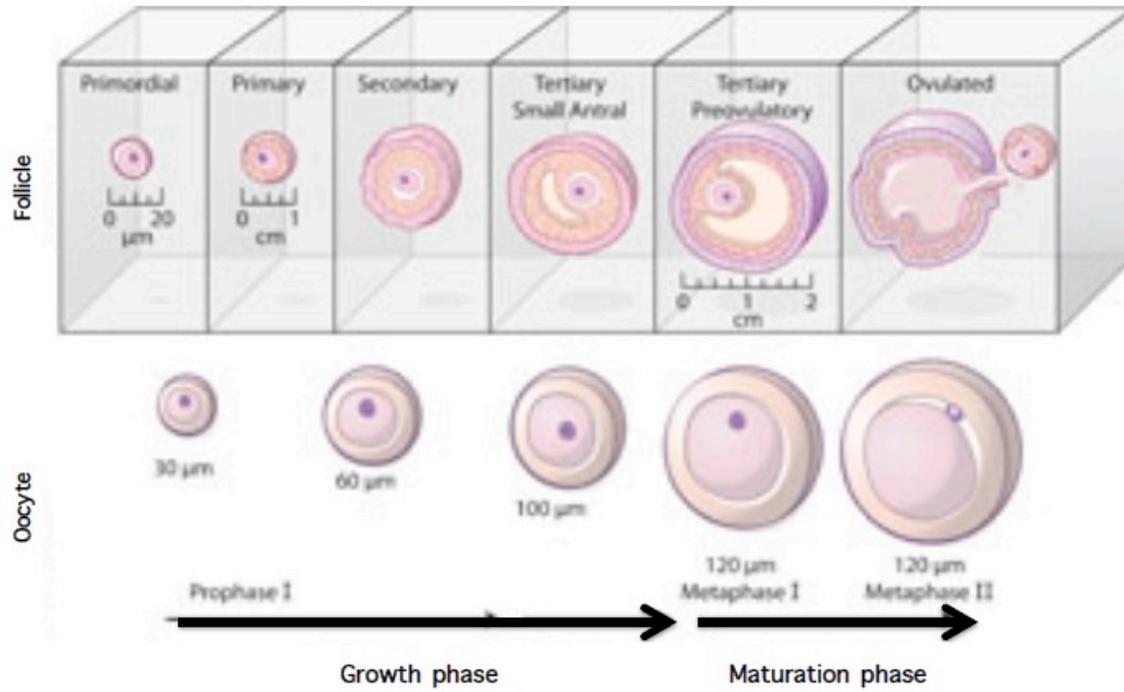


THE STORY OF LIFE...



Accomplishing Fertilization

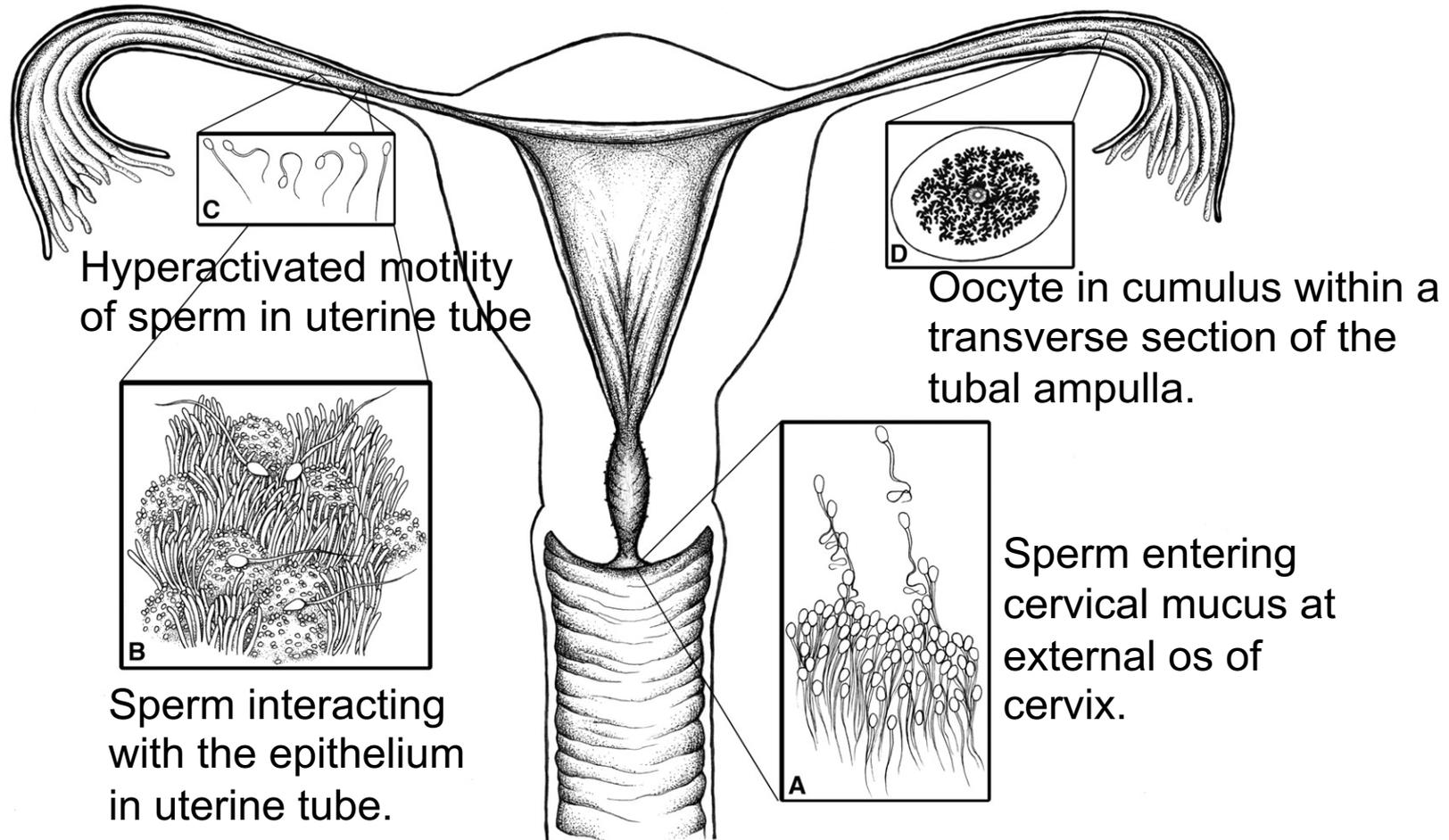




The mature oocyte is the unique cell of the body able to become a totipotent stem cell if properly activated.



Sperm Transport



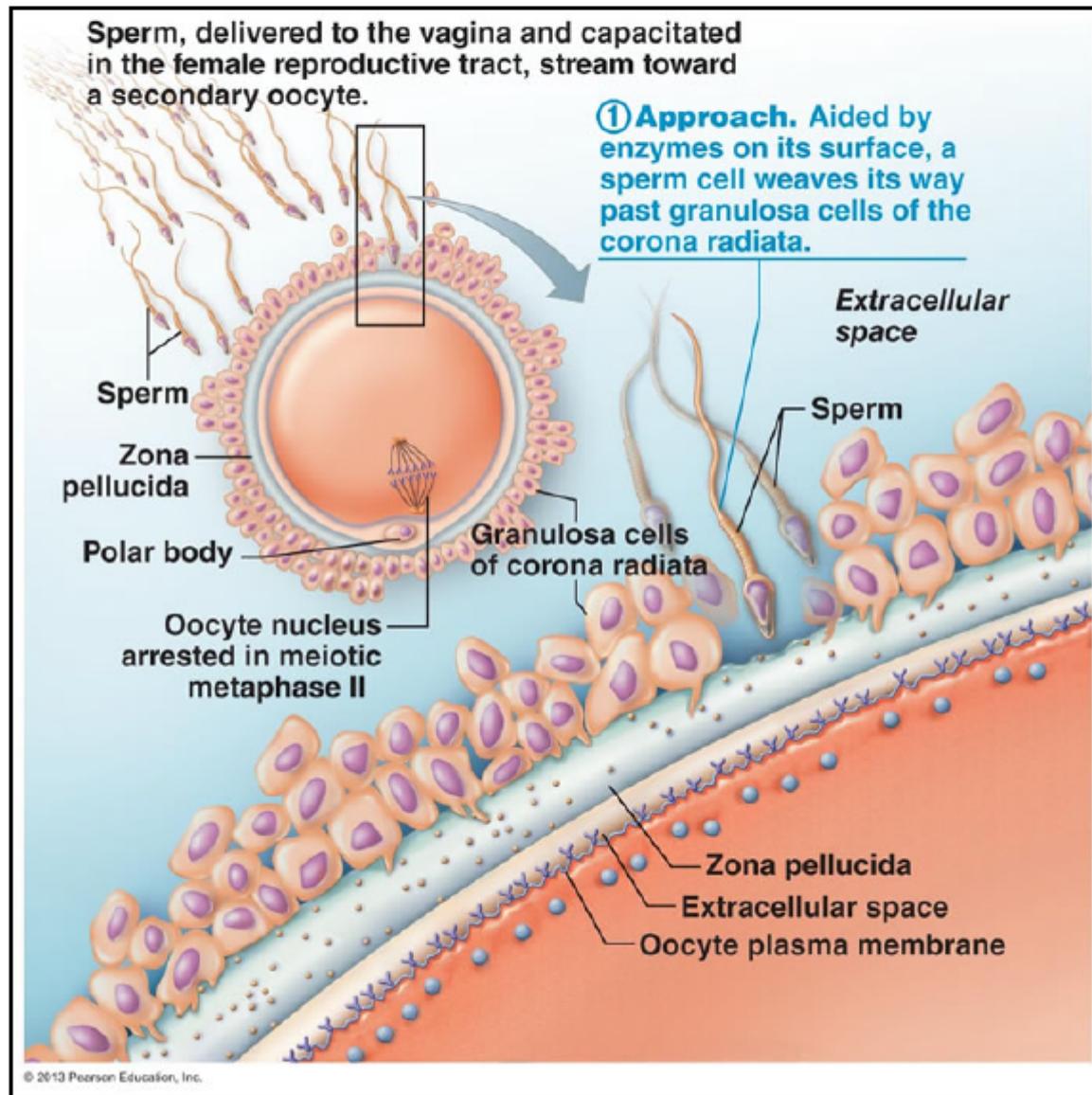
Human female reproductive tract illustrating stages of gamete transport

- **Capacitation:** the process in the femal reproductive tract whereby the ejaculated sperm become capable of fertilizing the egg
 - Acrosomal membrane must become fragile

Acrosomal Reaction and Sperm Penetration

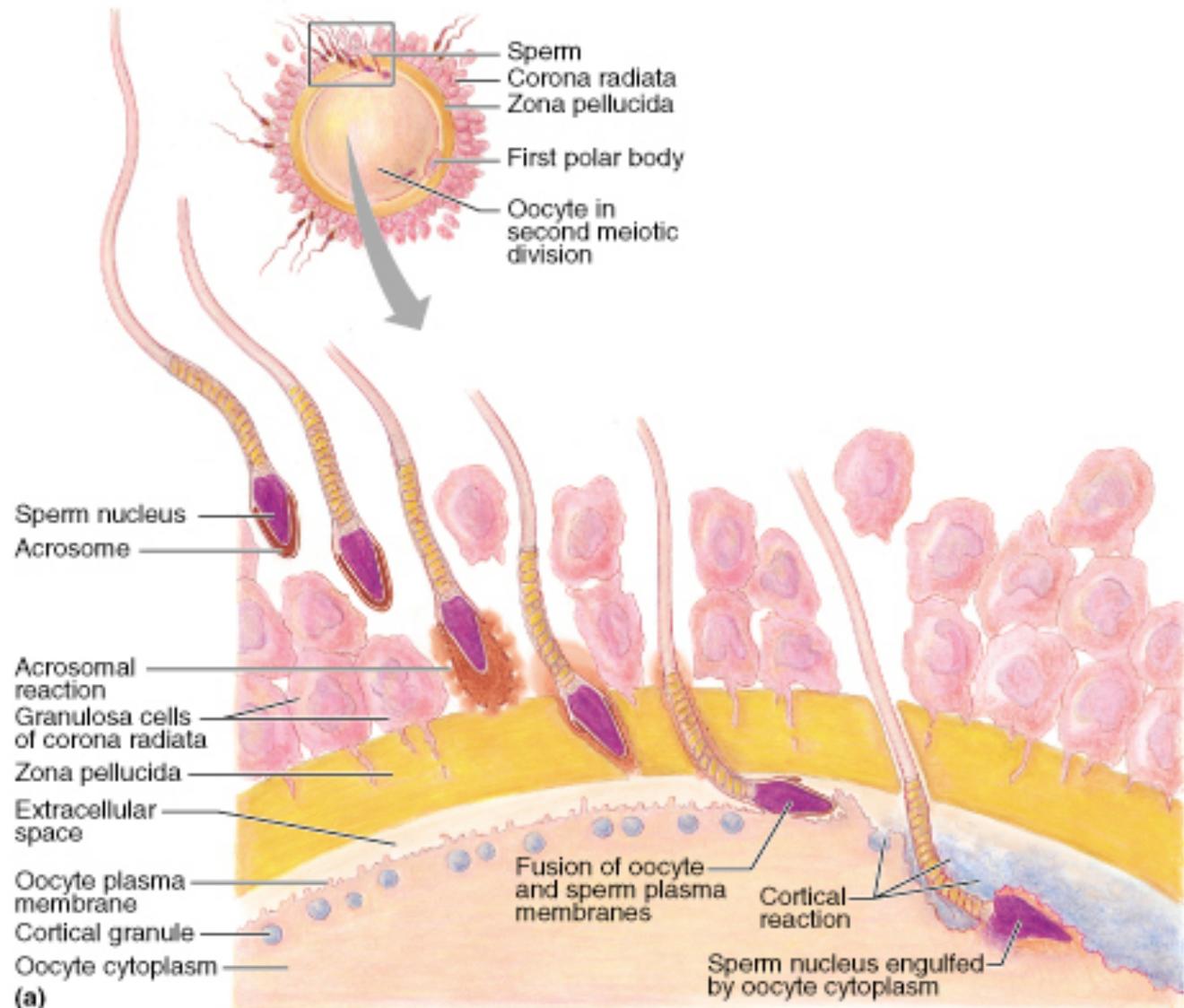
- Acrosomal reaction: release of the digestive enzymes (acrosin, other proteases) from the sperms' acrosome
 - Hundreds of sperm must participate

Acrosomal Reaction and Sperm Penetration



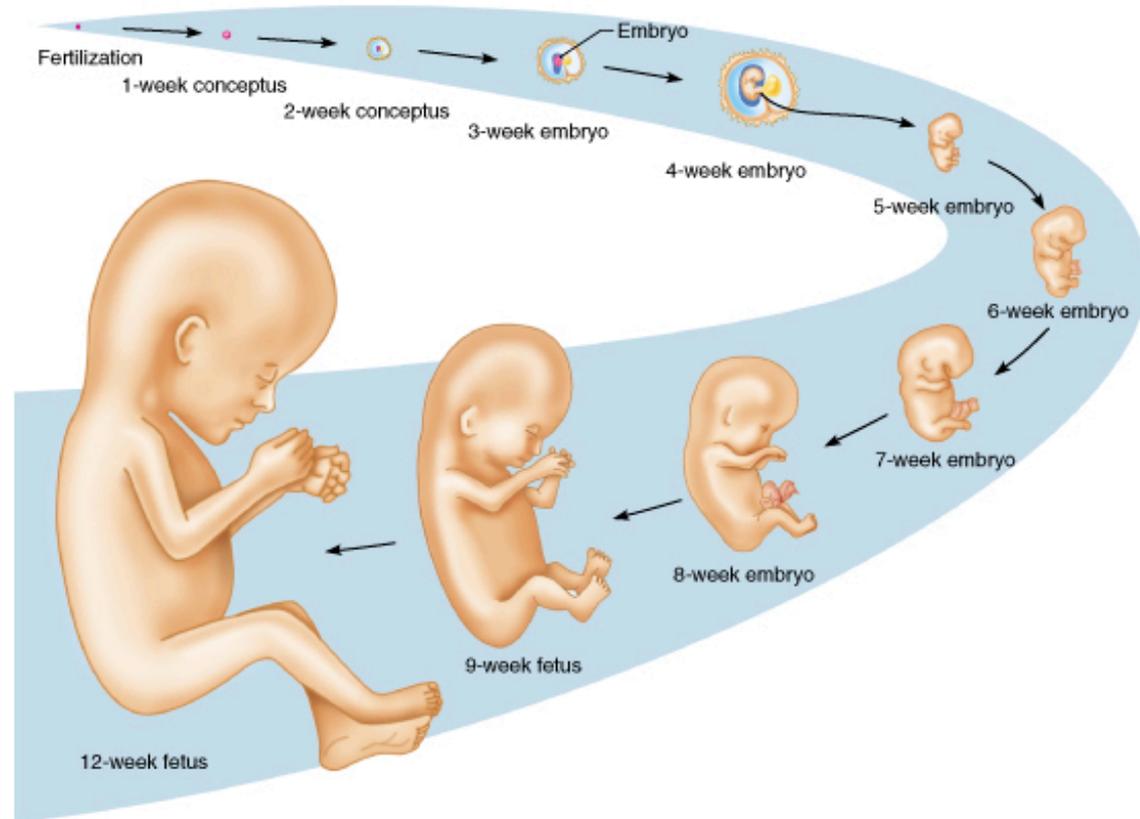
Fertilization

- If timing is ideal, sperm reach the oocyte in the ampulla of the uterine tube
- Sperm move by flagellar action but also receive an assist from uterine tube peristalsis



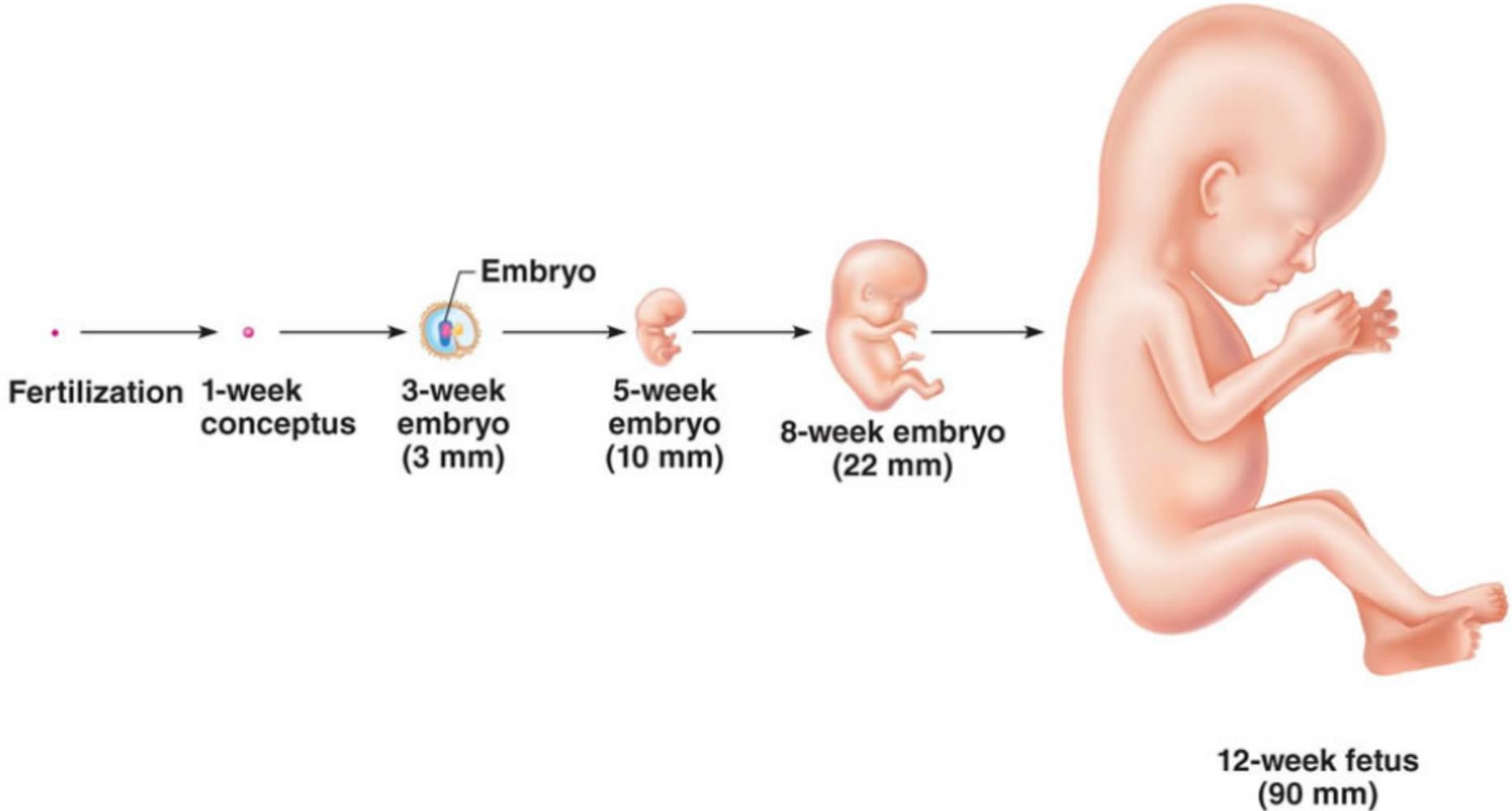
Pregnancy

- Events from fertilization to birth
- Conceptus → Embryo → Fetus : the developing offspring
- Gestation period: the time during which development occurs



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Pregnancy

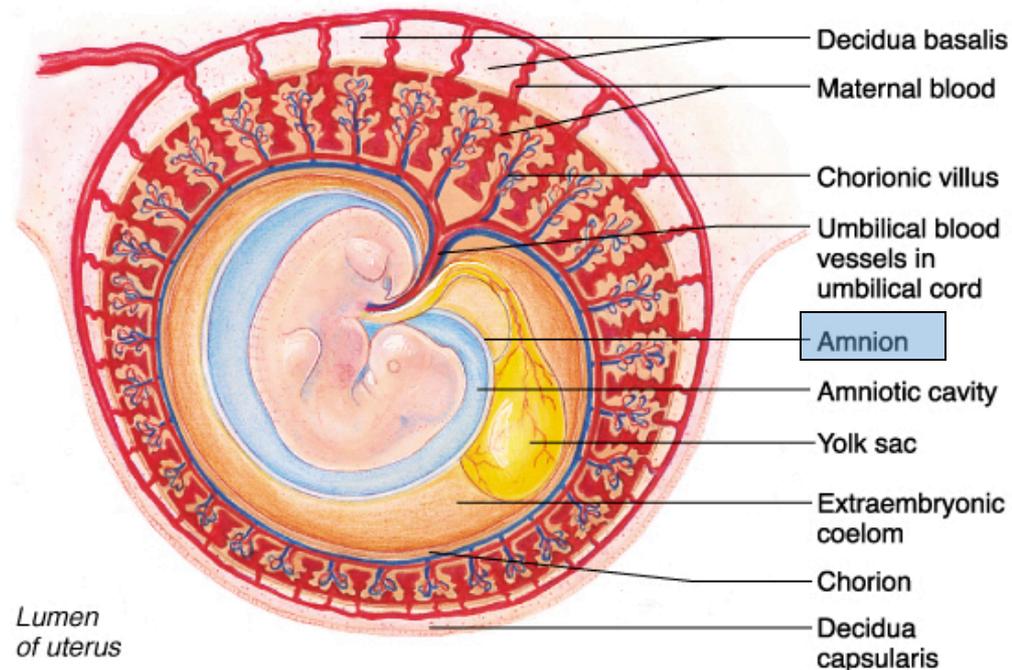


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<https://www.youtube.com/watch?v=DGyRD9HnXVs>

Amnion (inner membrane) envelops and protects embryo

- amnion – epiblast cells form a transparent membrane filled with amniotic fluid – a maternal plasma filtrate
- amniotic fluid comes from maternal blood, and, later, fetal urine adds to it
- amniotic fluid acts as a liquid shock absorber to protect the fetus
- helps maintain uterine internal homeostatis
- amniotic fluid may be sampled to determine certain aspects of fetal health



(d) 4½-week embryo

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