

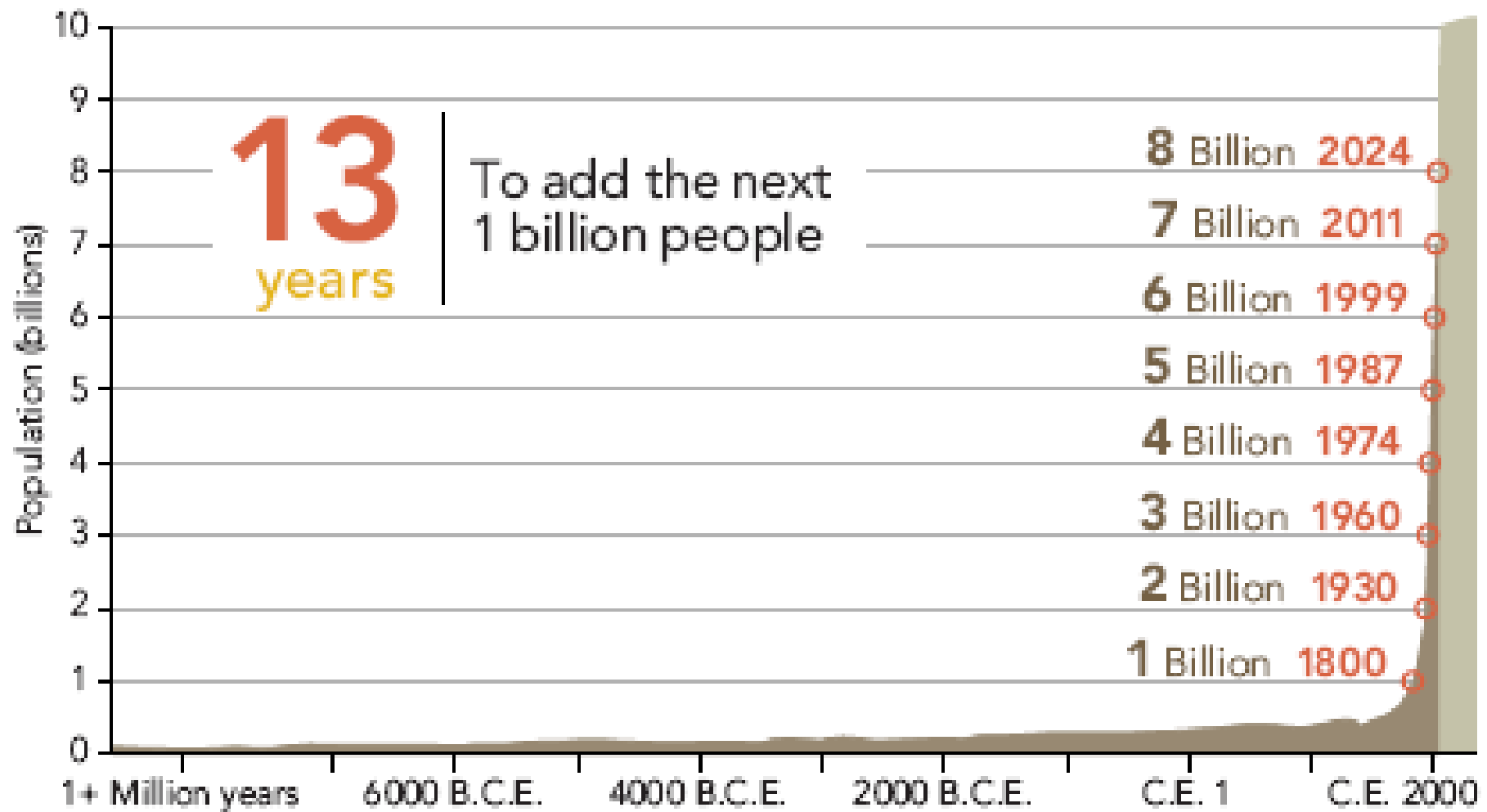
Population, Fertilization, & Reproductive Technologies

Barry Bean

for BioS 10 & 90

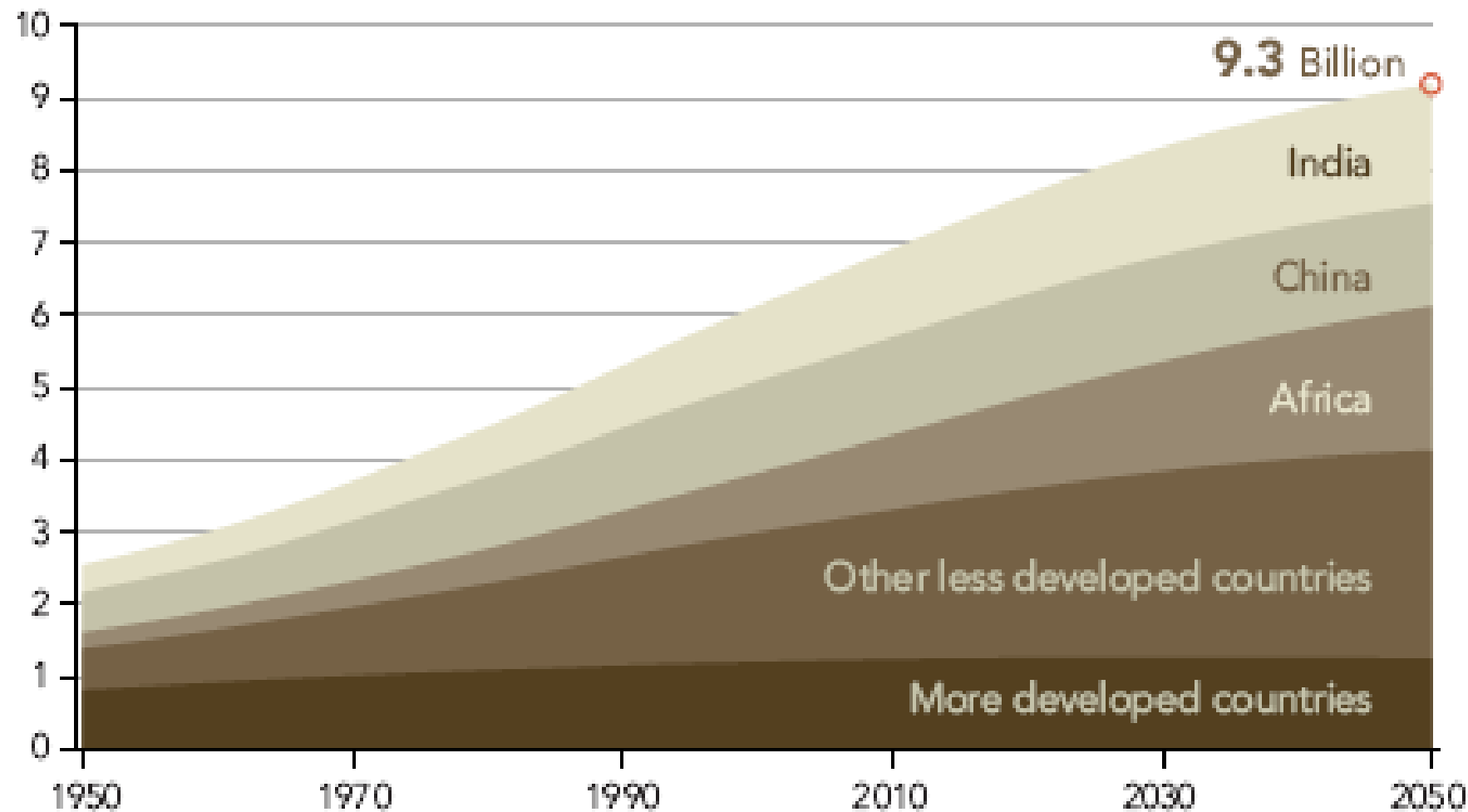
5 October 2011

Historic and Projected Population Growth



SOURCES: CARL HAUB, POPULATION REFERENCE BUREAU (PRB), 2010; U.N. POPULATION DIVISION (UNPD), 2011

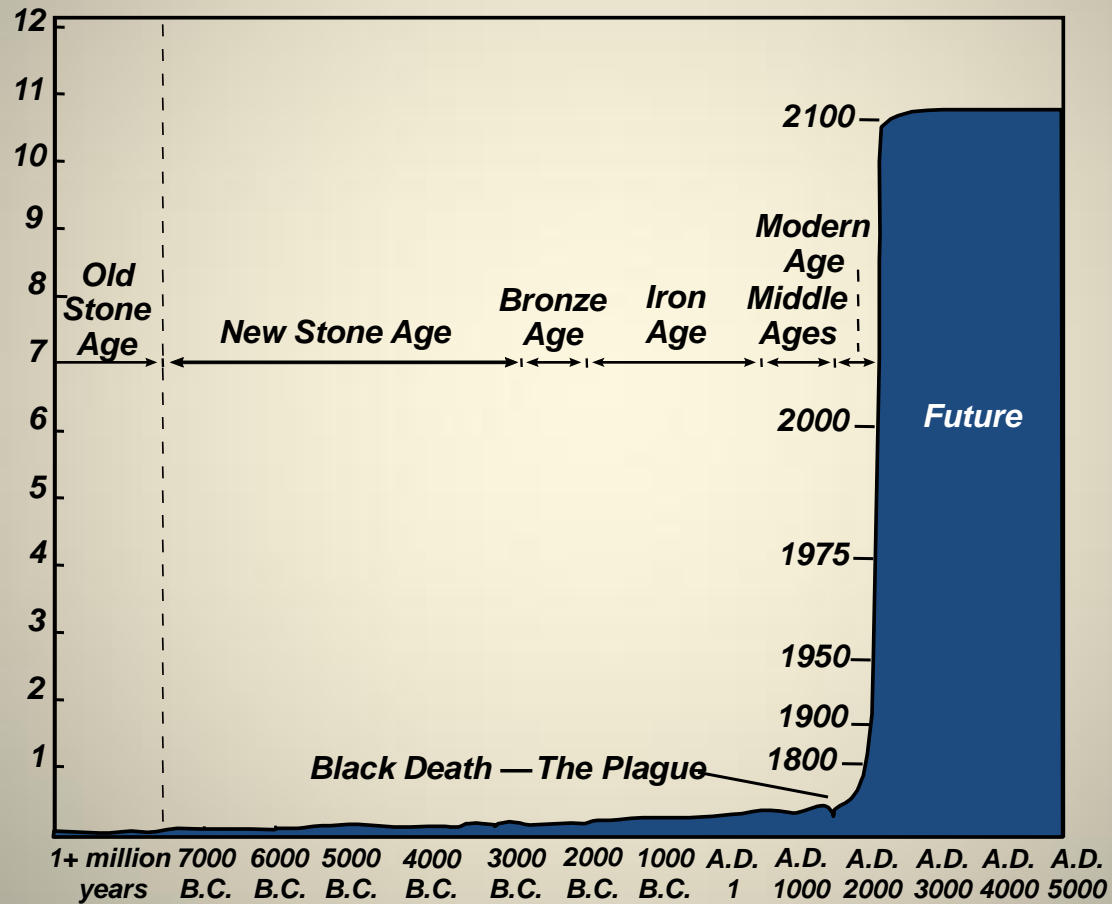
World Population Growth, 1950–2050 (medium variant)



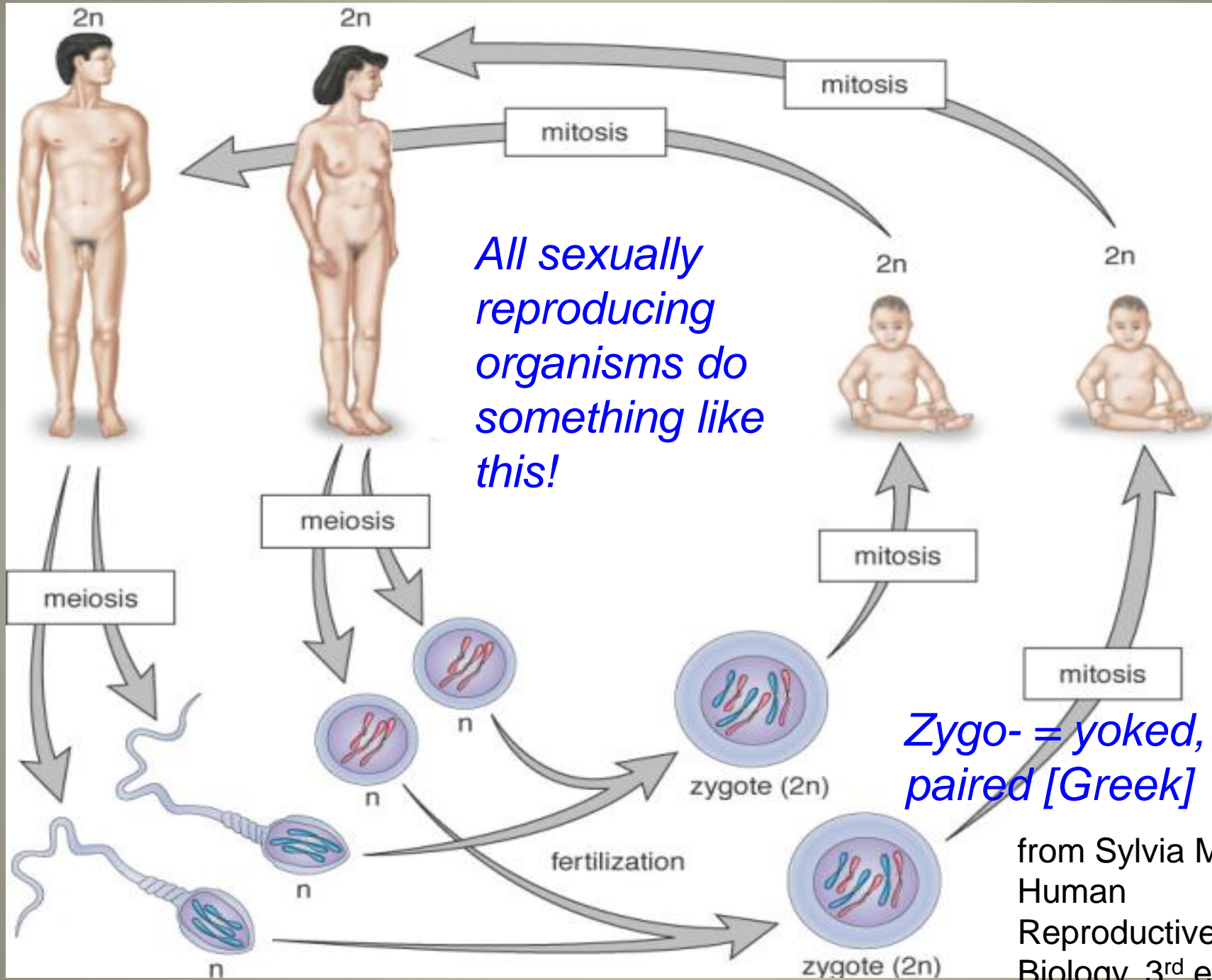
SOURCES: UNPD, 2011

World Population Growth Through History

Billions



Source: Population Reference Bureau; and United Nations, World Population Projections to 2100 (1998).



All sexually reproducing organisms do something like this!

Zygo- = yoked, paired [Greek]

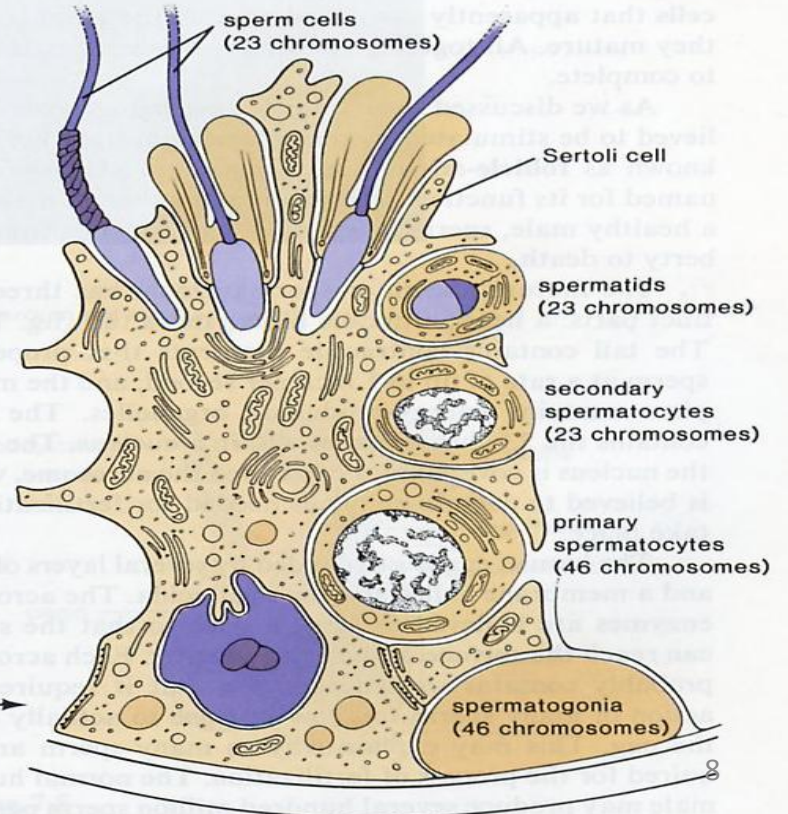
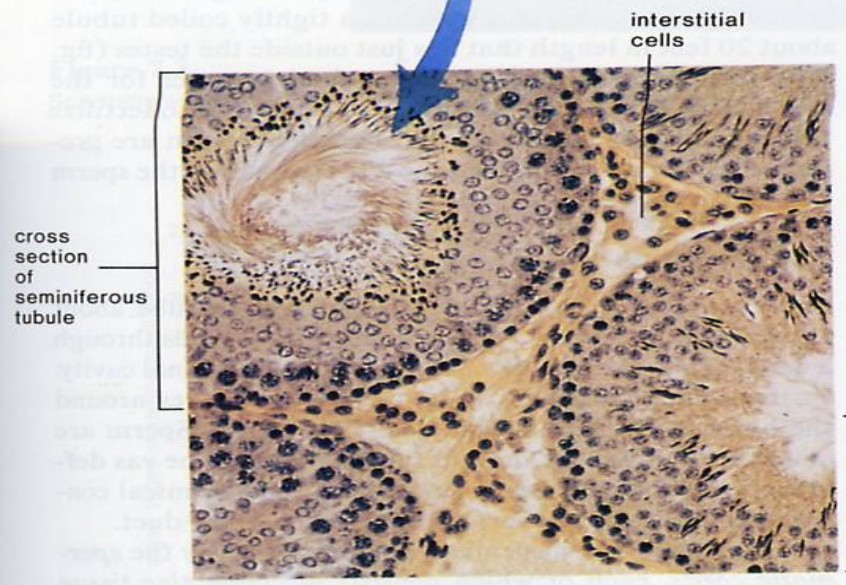
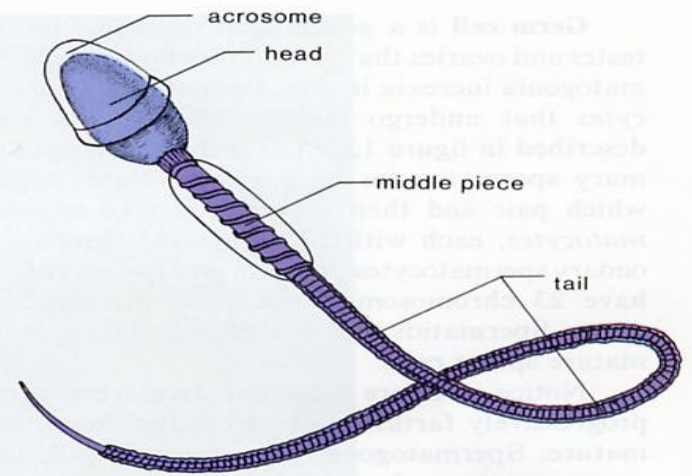
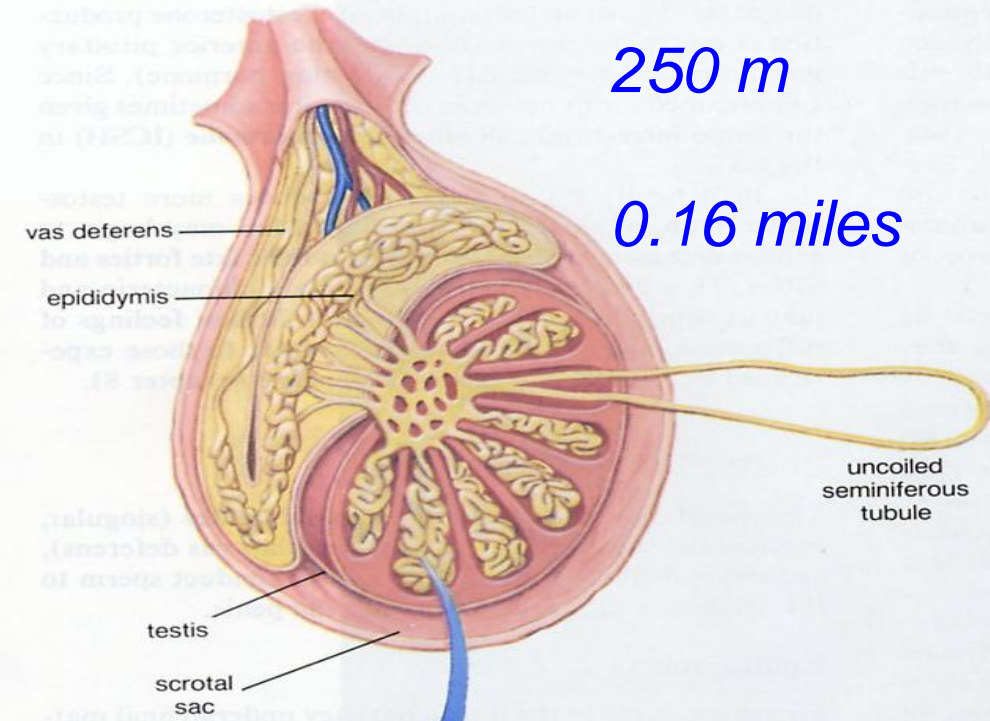
from Sylvia Mader, Human Reproductive Biology, 3rd ed.⁵

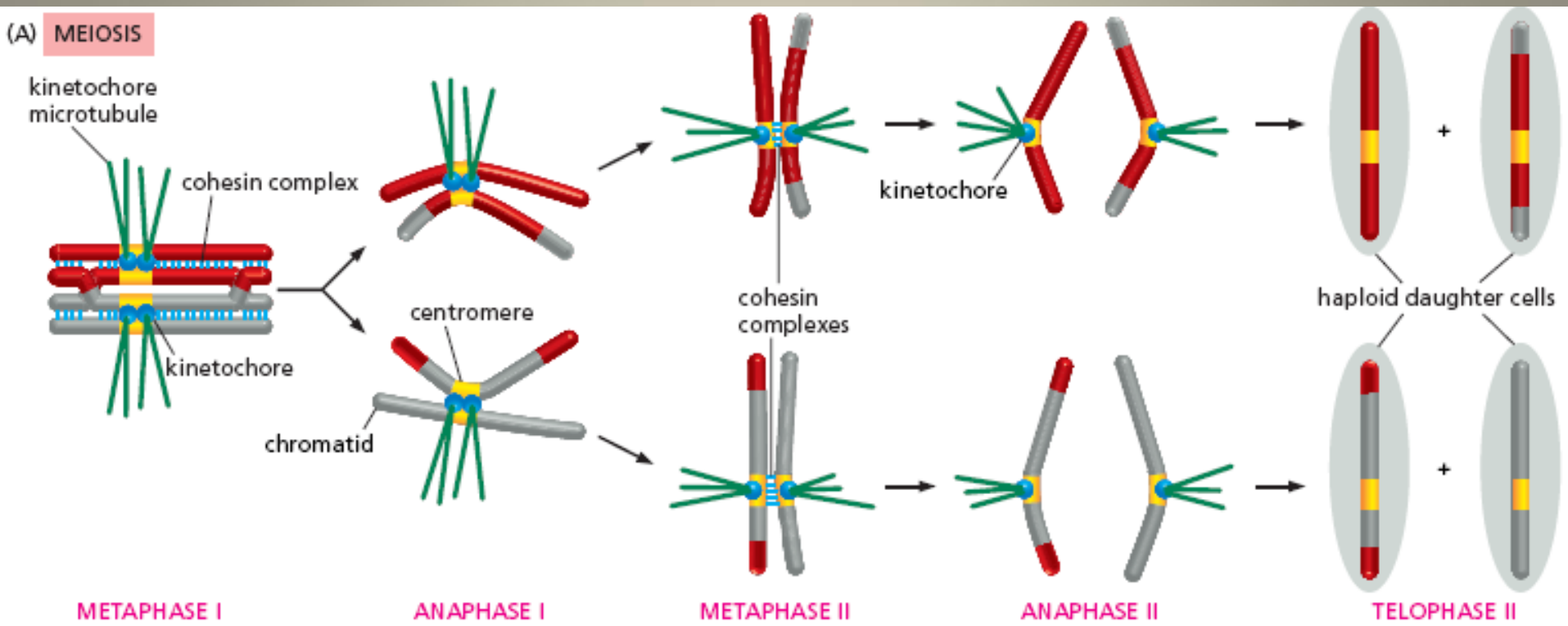
*The most **important** day of your life...*

World Population Clock

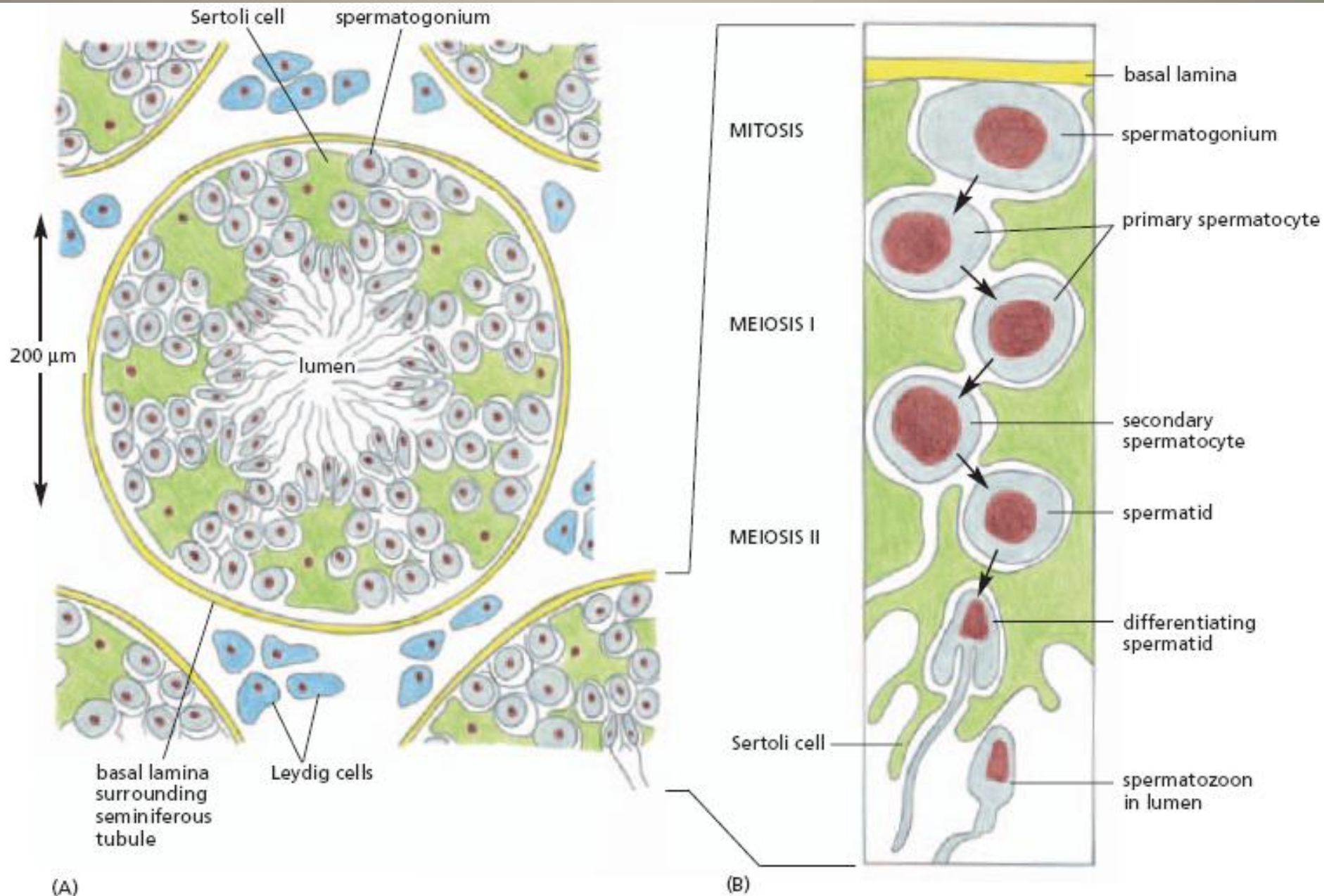
math.berkeley.edu/~galen/popclk.html

from Sylvia Mader, Human Reproductive Biology





From Alberts et al., Molecular Biology of the Cell, 5th ed., 2008



Duration of spermatogenesis

Mean: 74 days 95% CI: 69 - 80 days

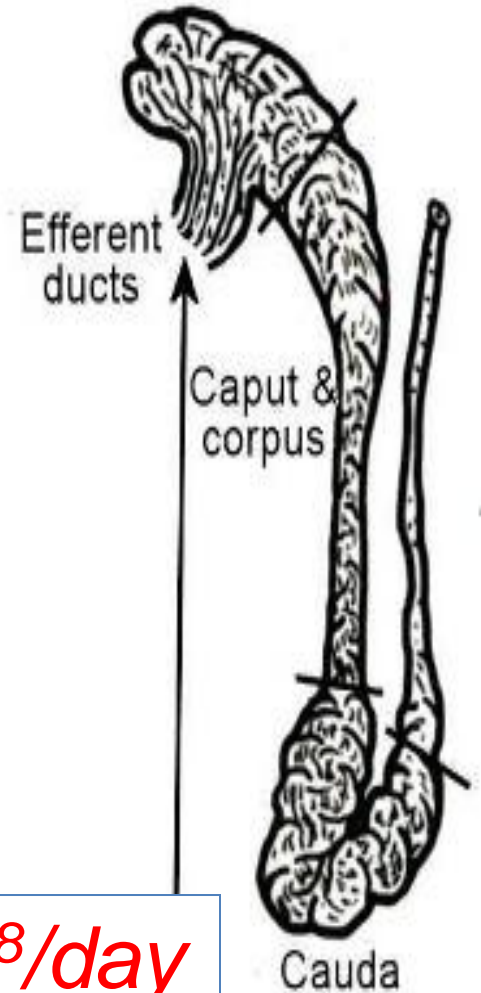
Not affected by DSP/g
or frequency of emission

Epididymal transit time

Caput+corpus: 0.7 - >3.5 days

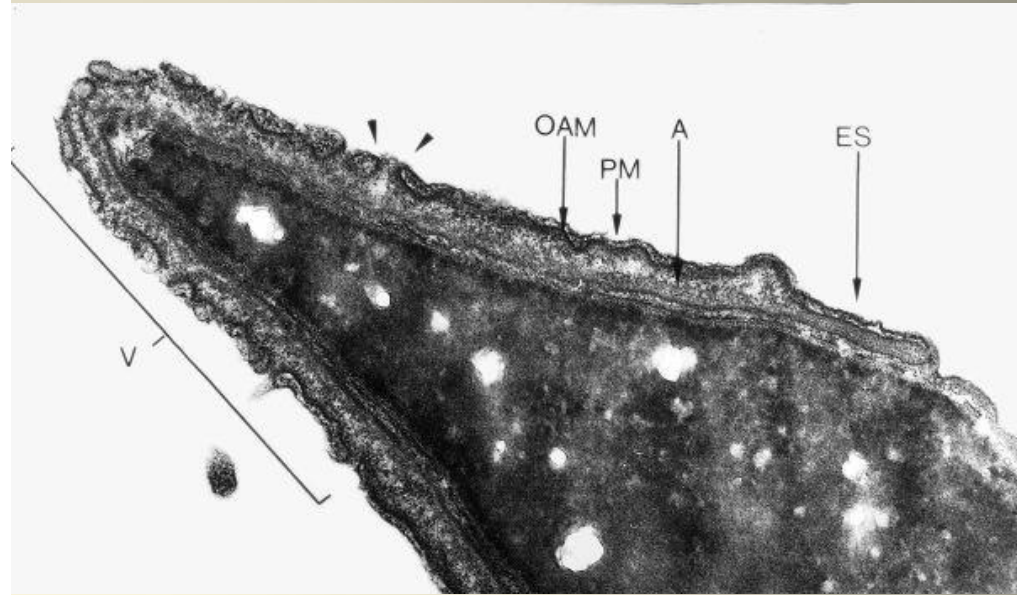
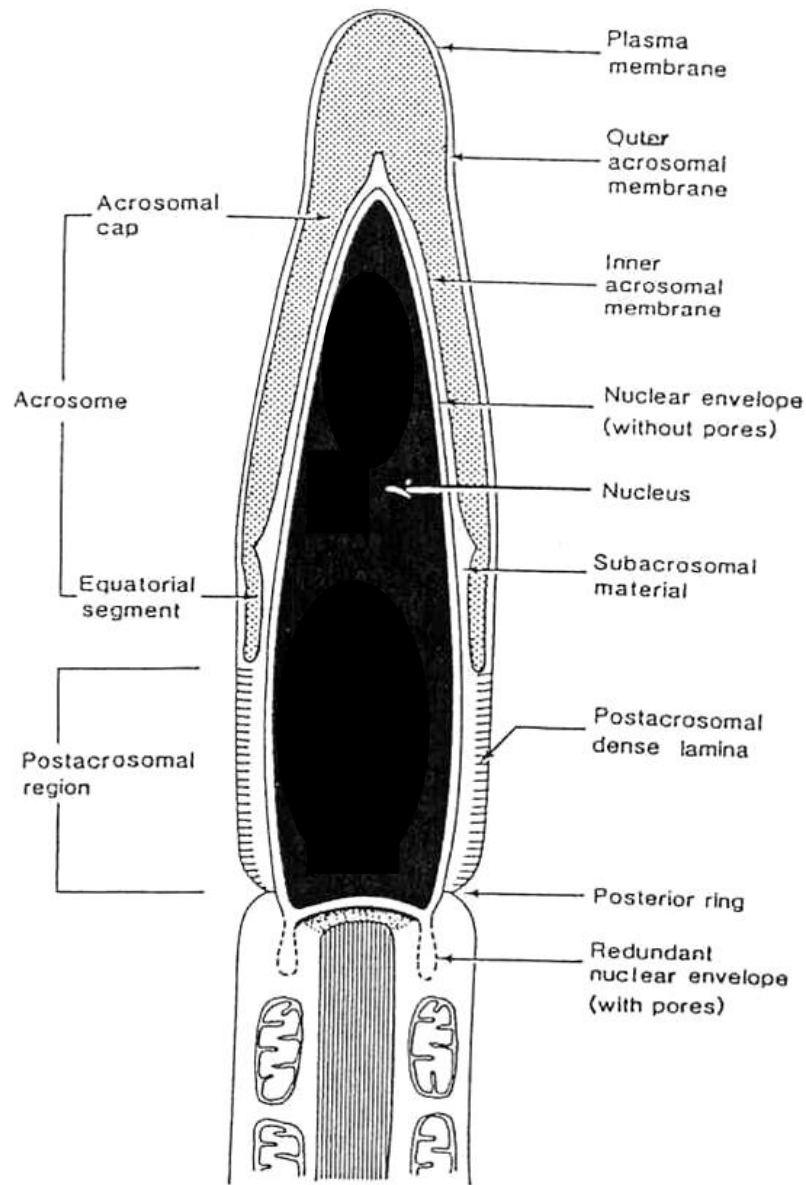
Cauda: 1.5 - >4.5 days

Transit time varies with DSP/testis



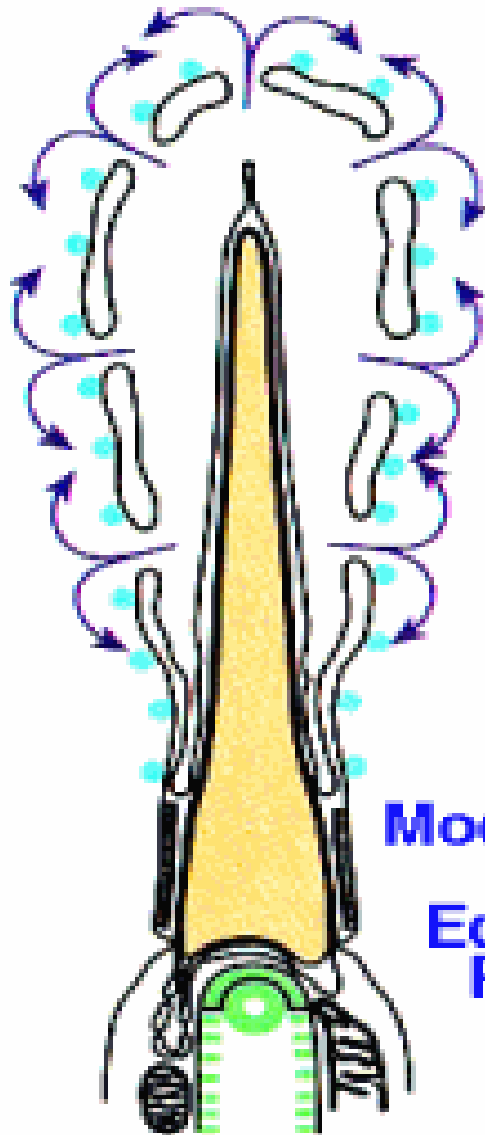
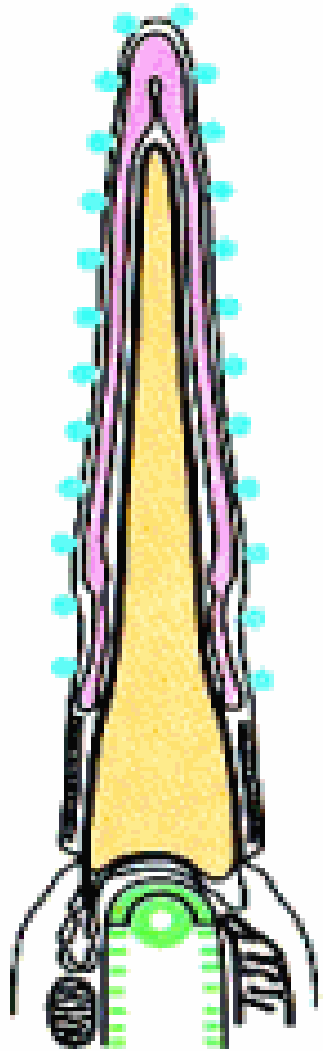
DSP = daily sperm production ~10⁸/day

*From: Rupert Amann, Journal of Andrology,
Vol. 29, No. 5, September/October 2008*

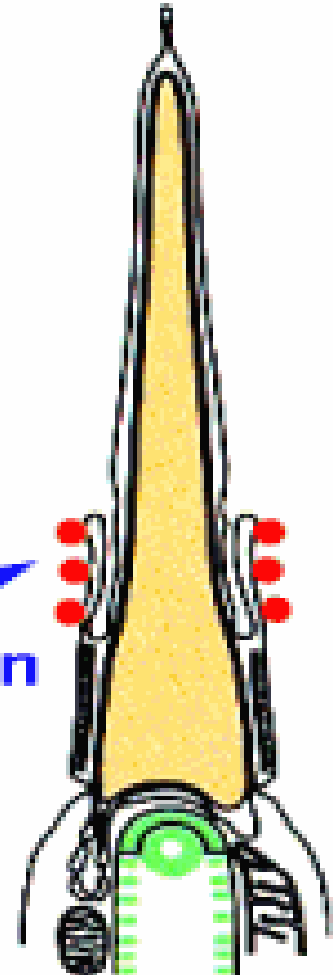


http://usuarios.lycos.es/biologiacelular1/Aparato%20reproductor%20masculino8_archivos/532047.jpg

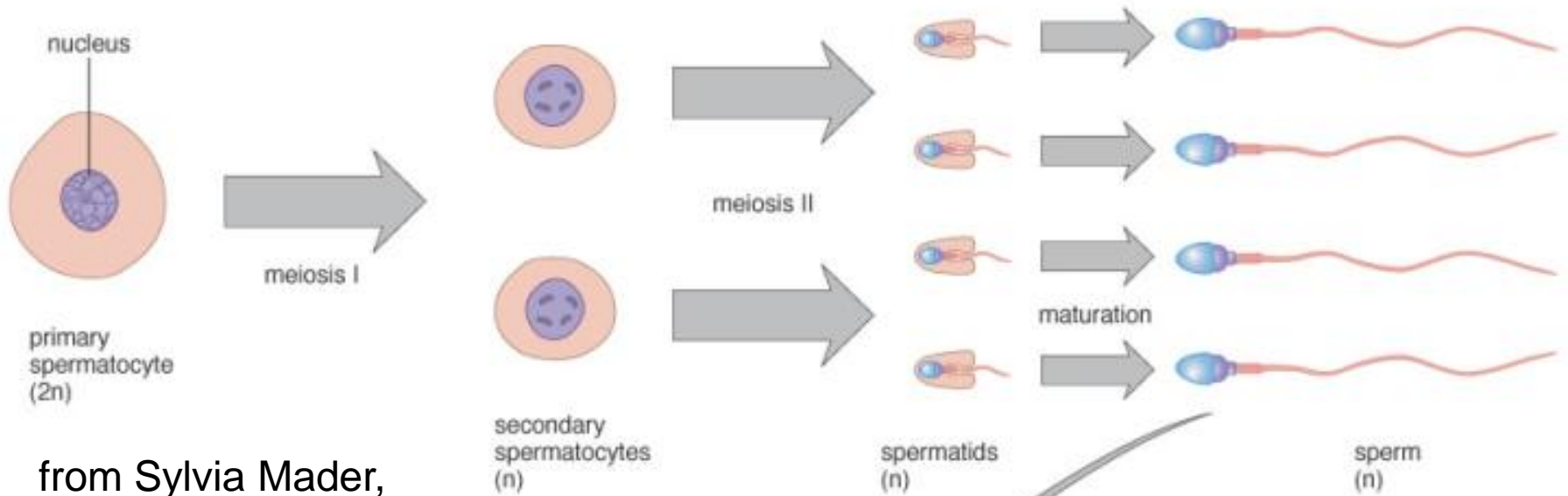
Consider the role of each compartment...



Modification
of the
Equatorial
Region

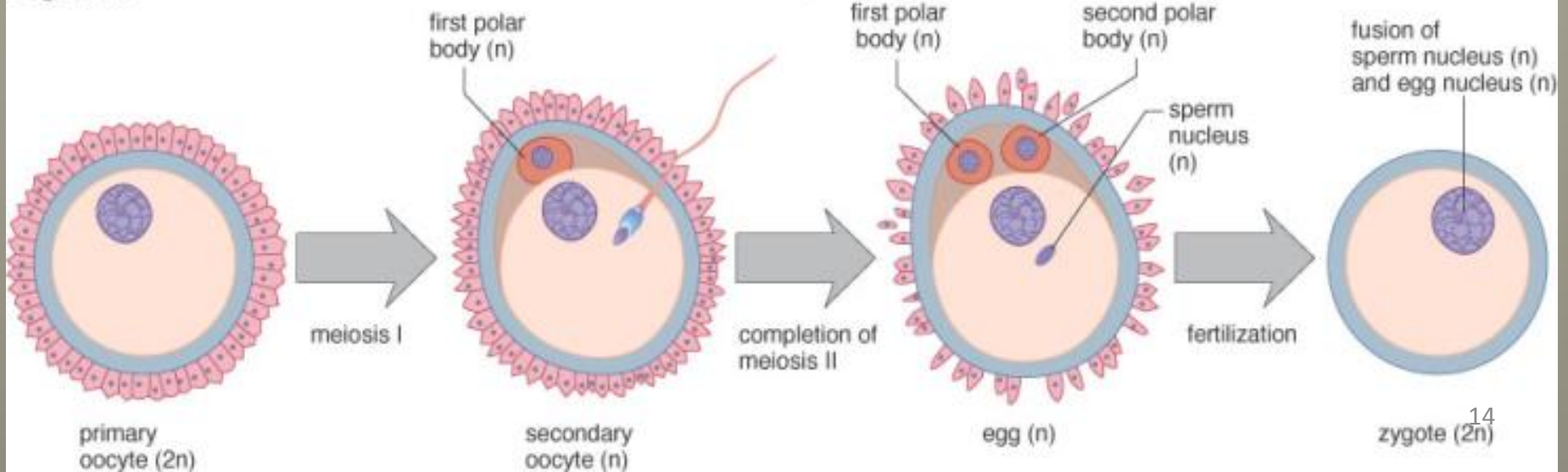


Spermatogenesis



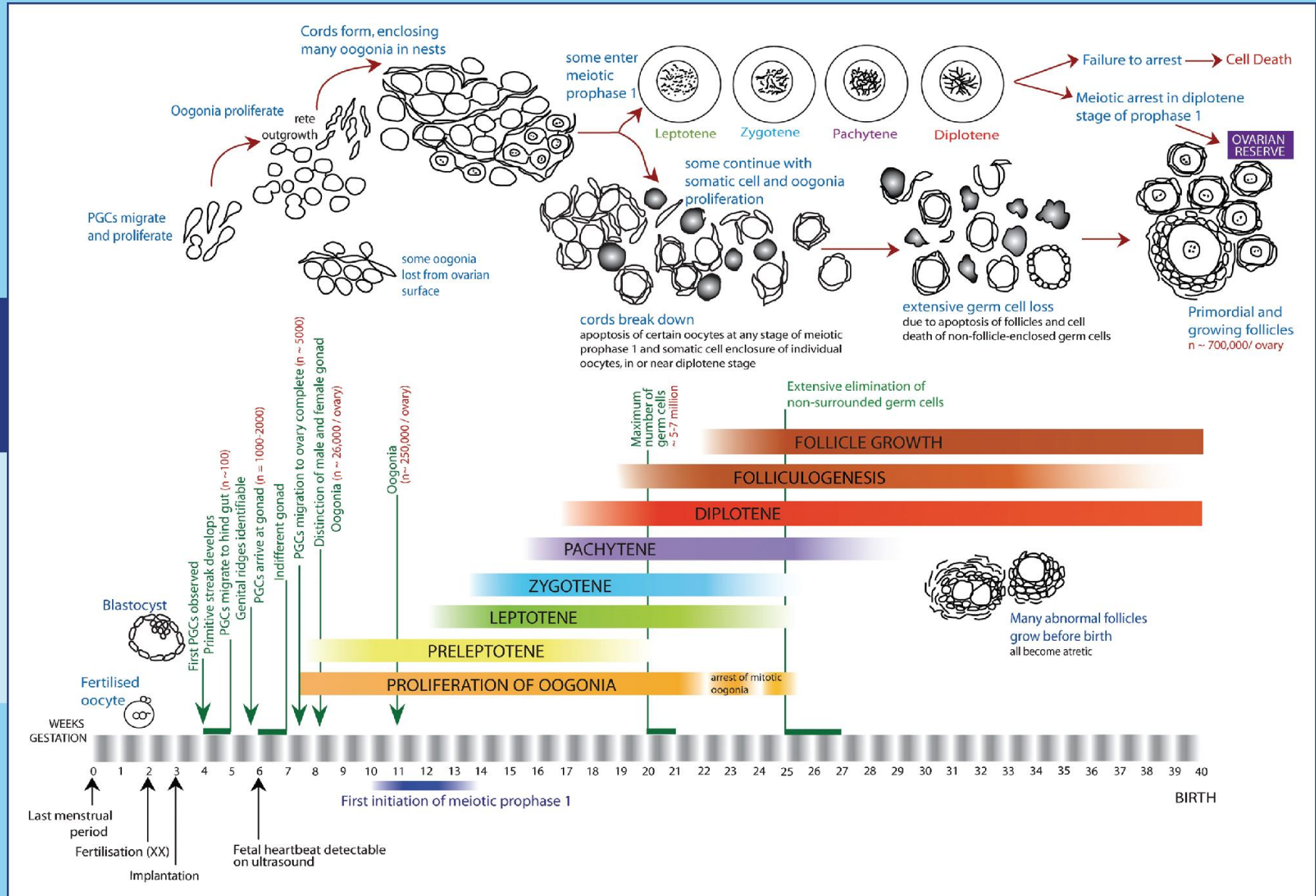
from Sylvia Mader,
Human
Reproductive
Biology, 3rd ed.

Oogenesis



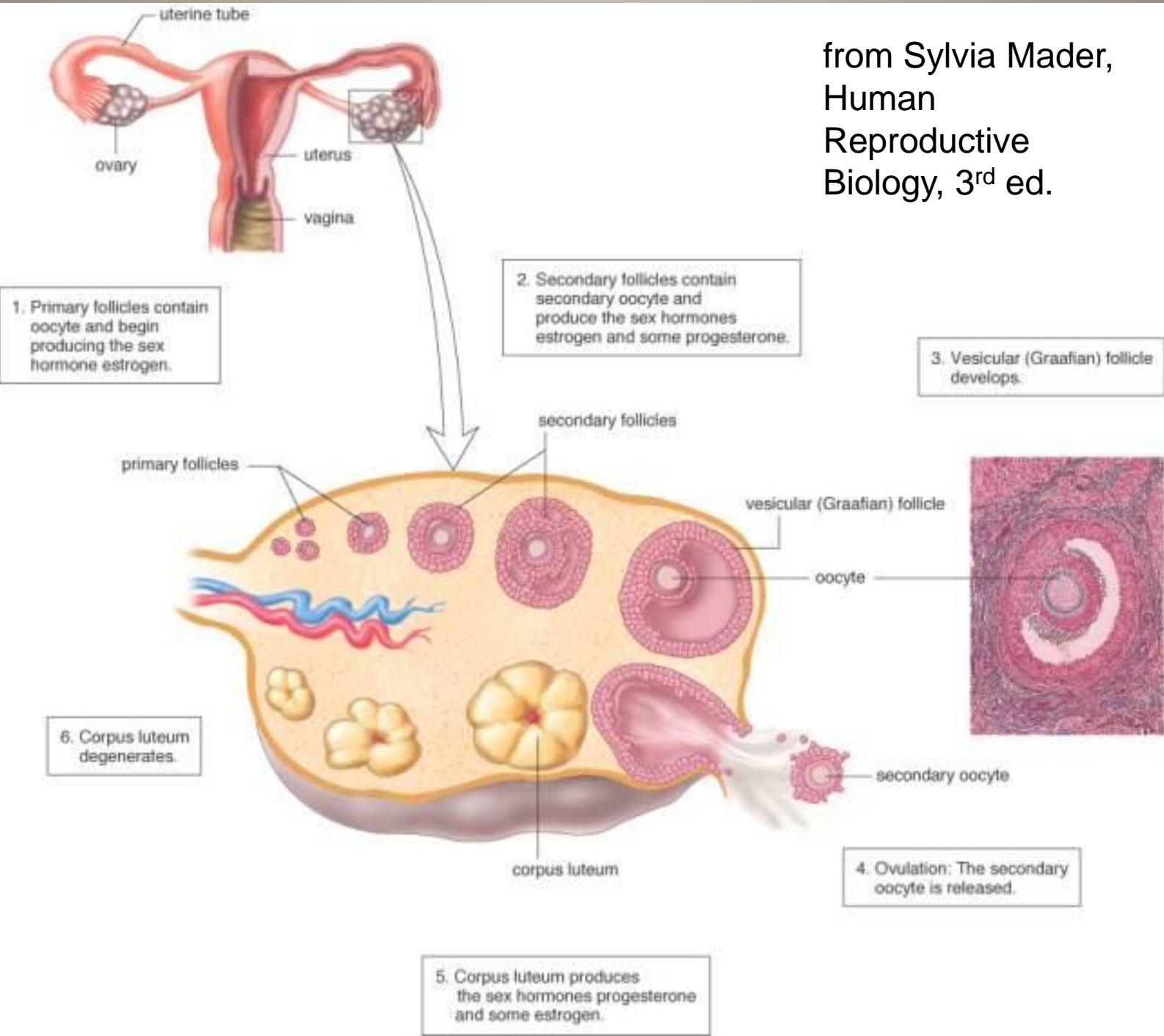
Timeline for human prenatal oogenesis

Oogenesis and cell death in human prenatal ovaries: what are the criteria for oocyte selection?





from Sylvia Mader,
Human
Reproductive
Biology, 3rd ed.



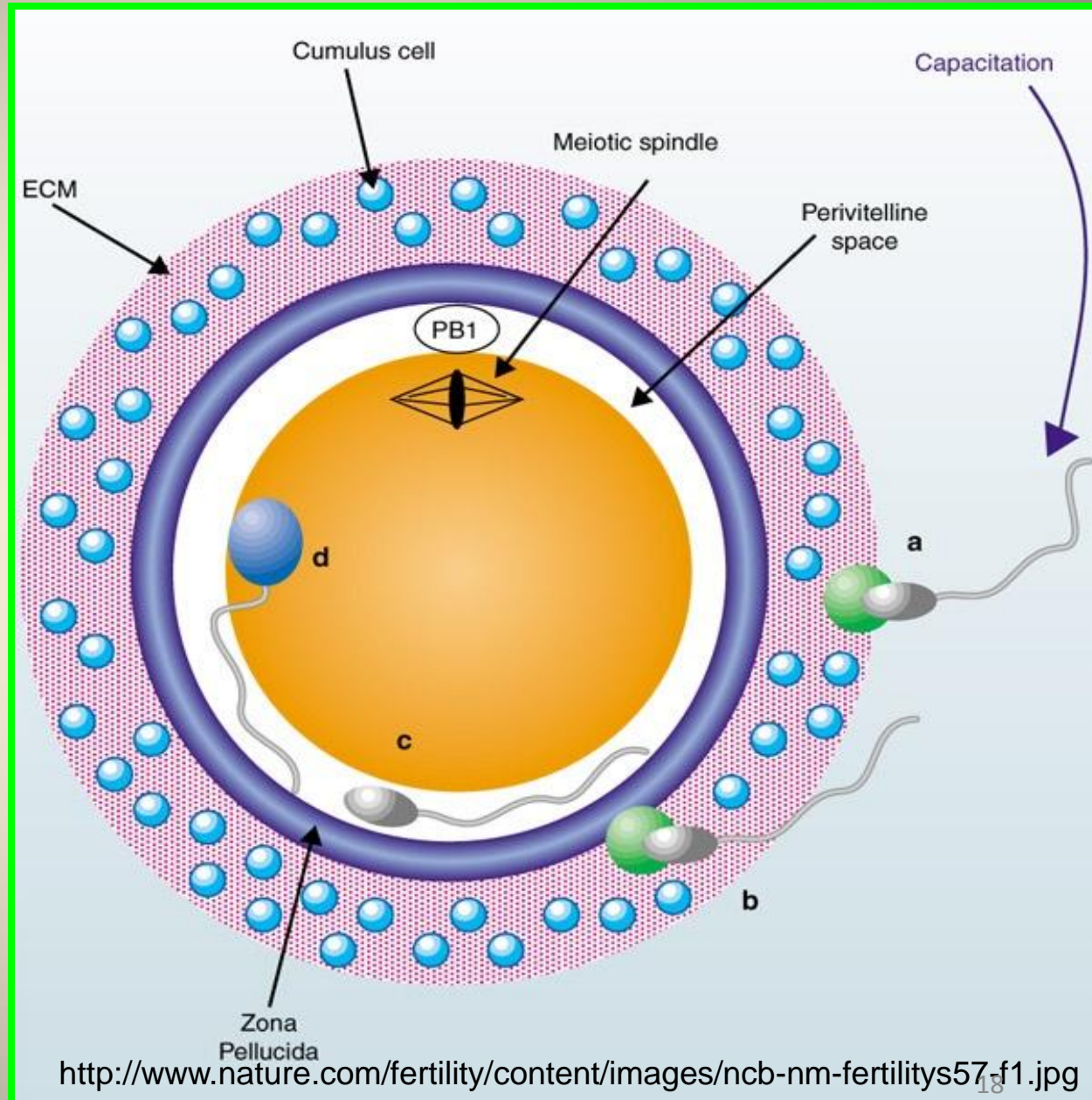
Fertilization

Green=Acrosome

Purple=*Zona Pelludica*

Gray= Sperm w/out
Acrosome

**note that the
acrosome
compartment
opened after contact
with the *zona pellucida*

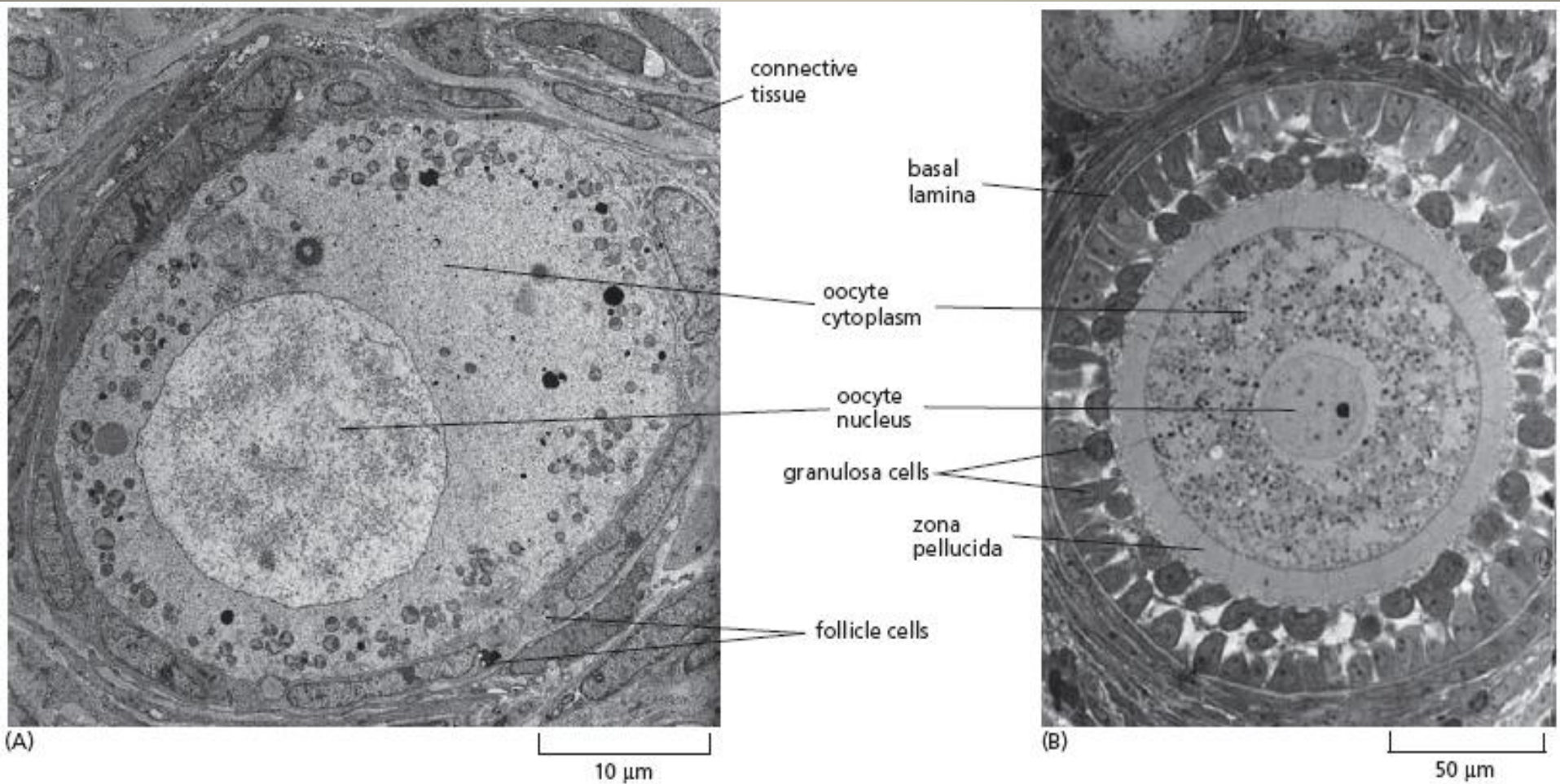


Gametes are prefabricated for action, a cascade of functions.

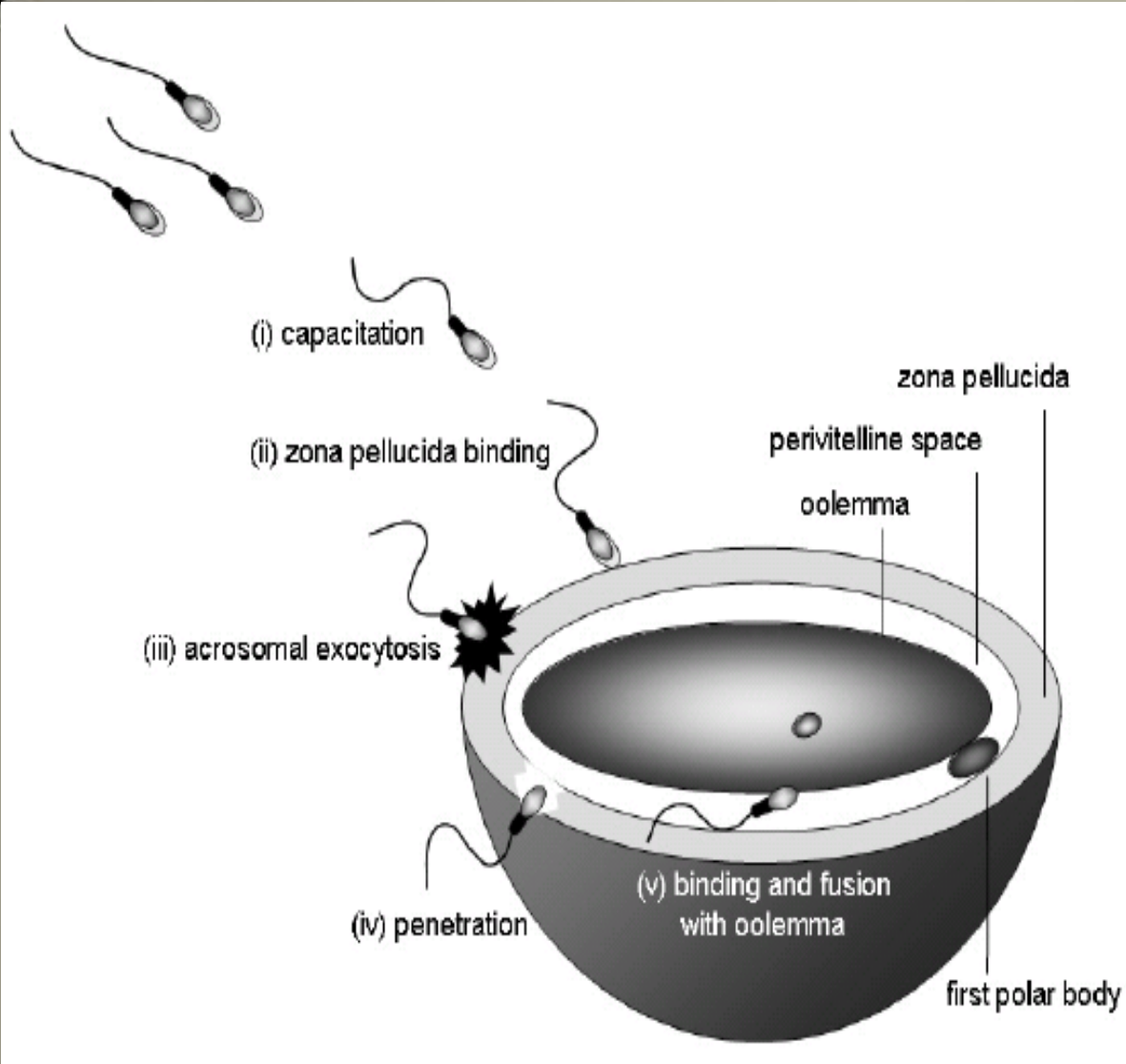
Gamete production includes unique patterns of gene expression and regulation.

Gametes have complex structure and many phenotypes.

Every Gamete is a genetically distinct human individual!



From Alberts et al., Molecular Biology of the Cell, 5th ed., 2008

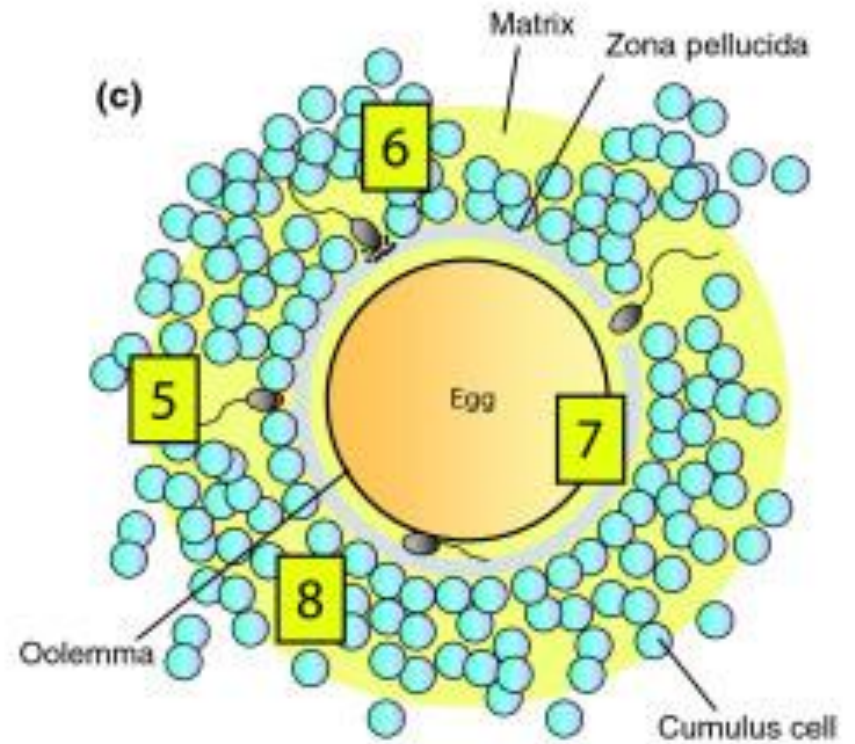
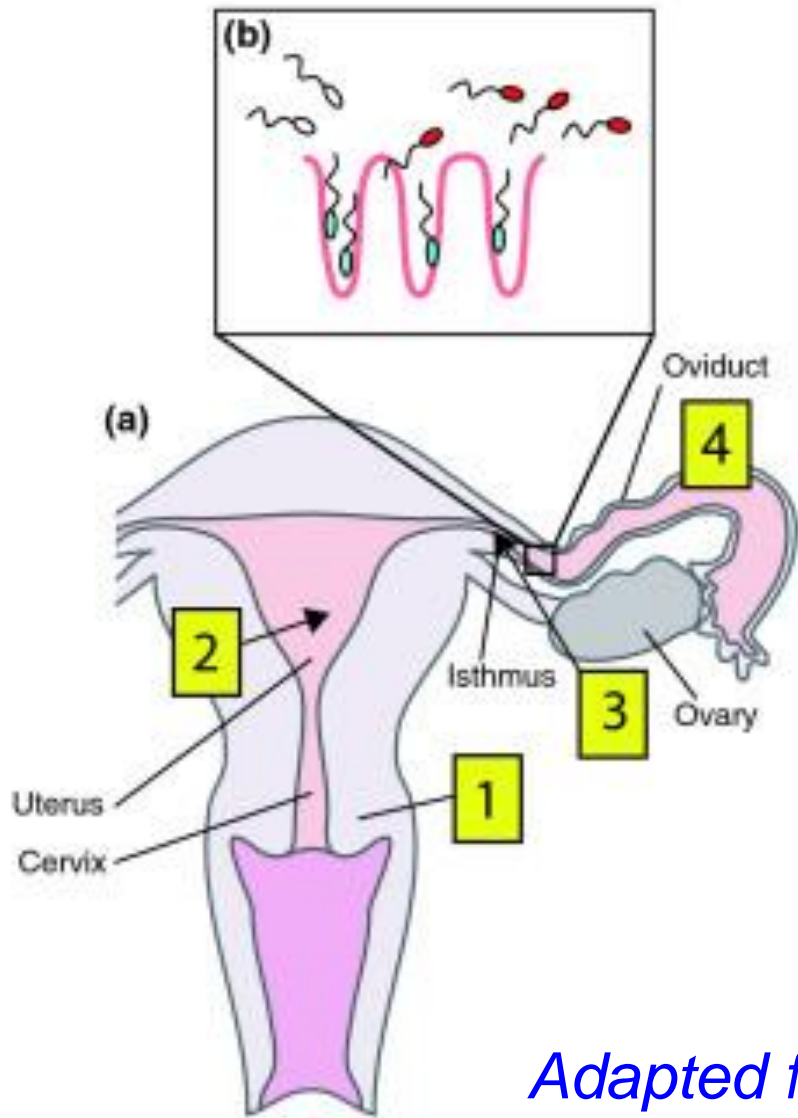


Try to remember...

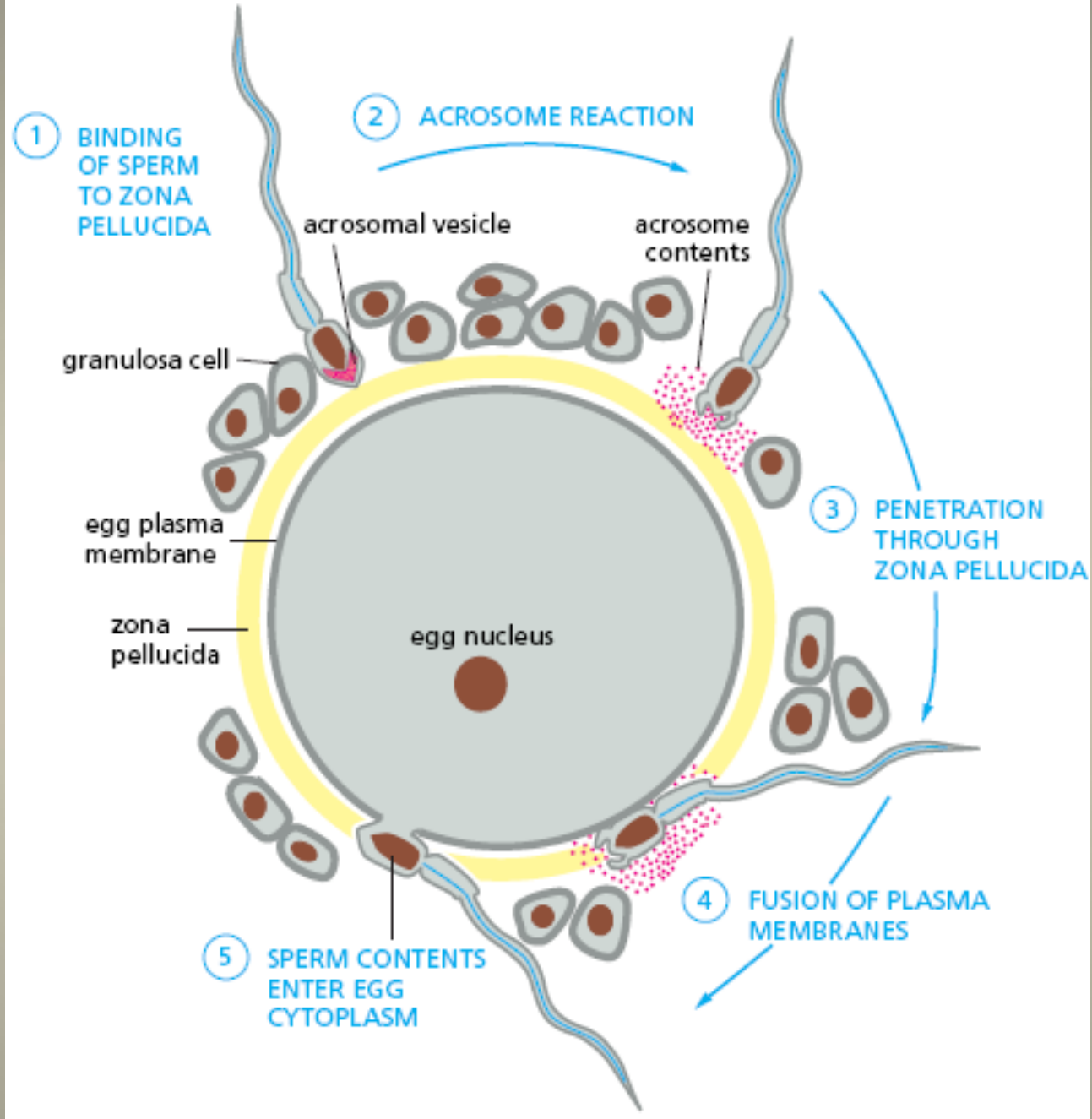
when you were gametes !

Think like a sperm...

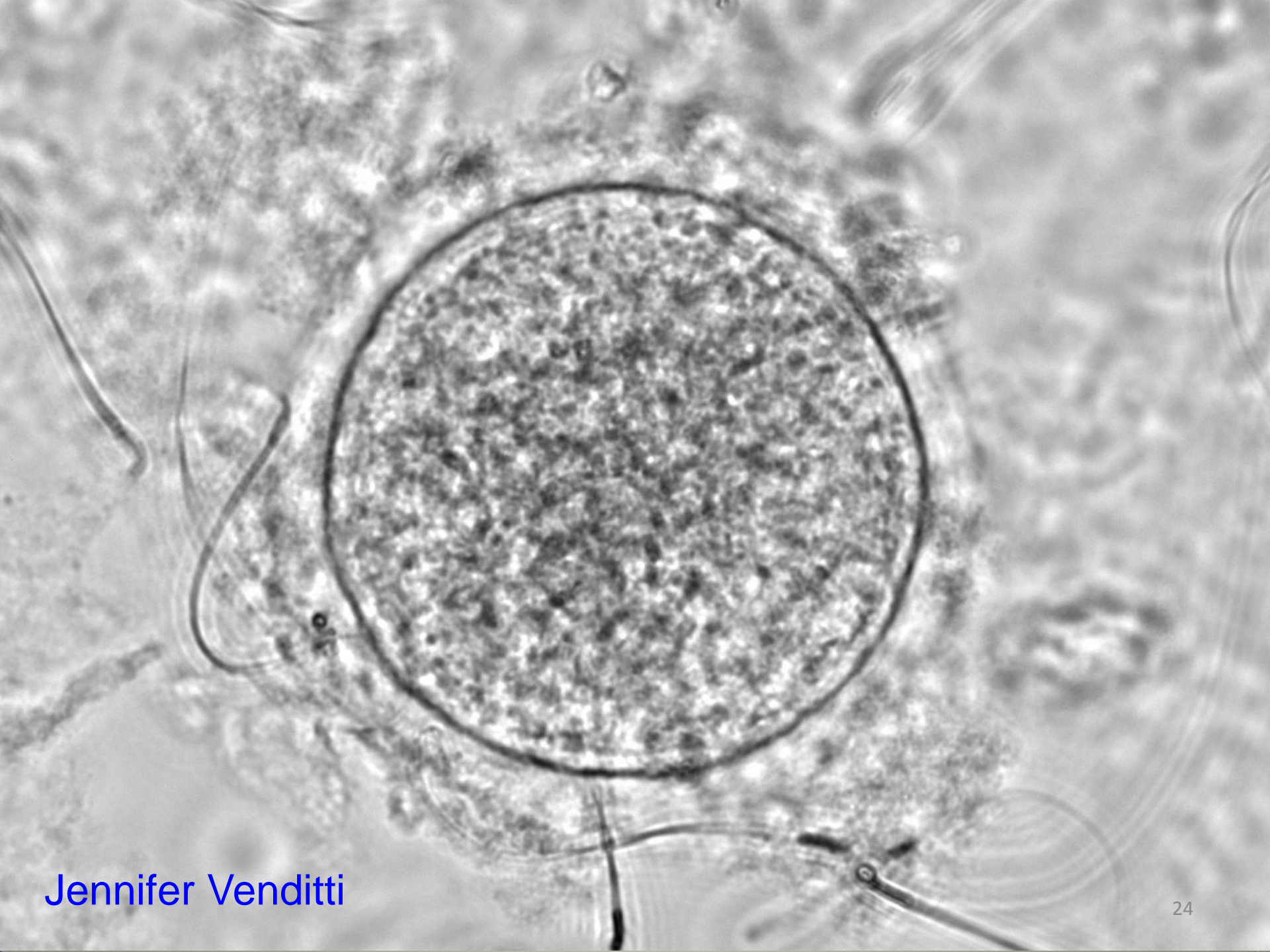
Think like an oocyte...



*Adapted from
Barratt et al. Journal of Biology 2009 8:63*

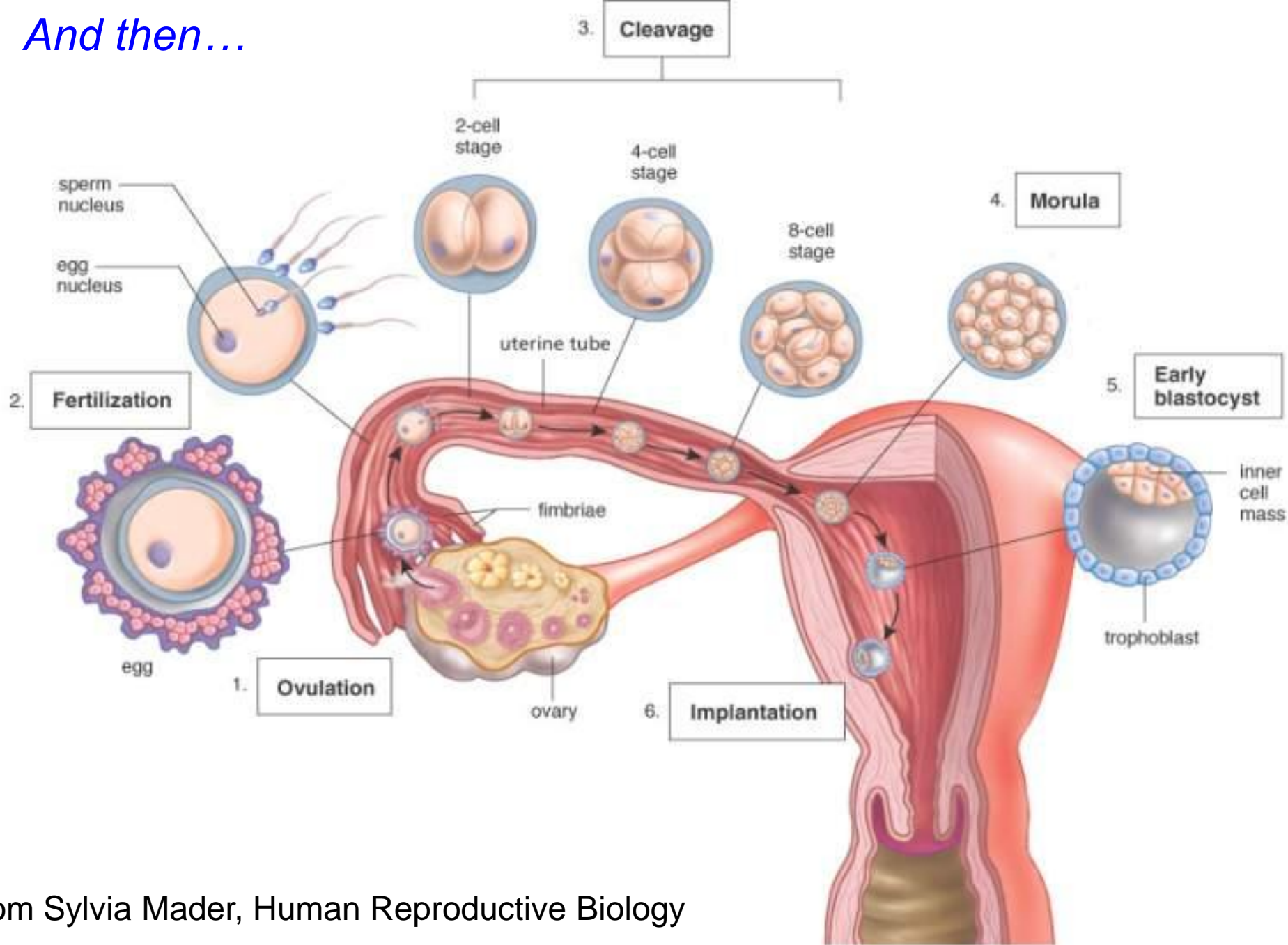


From Alberts et al., Molecular Biology of the Cell, 5th ed., 2008



Jennifer Venditti

And then...



from Sylvia Mader, Human Reproductive Biology

Reproductive Technologies

Half of Pregnancies are Unwanted...

Contraception

Infertility

Subfertility

Reproductive Technologies

Donor or husband insemination

Intrauterine insemination

Sperm cryopreservation

Embryo cryopreservation and now, oocyte cryopreservation

In Vitro Fertilization & Embryo Transfer

Intracytoplasmic sperm injection

Ethics & Controversies