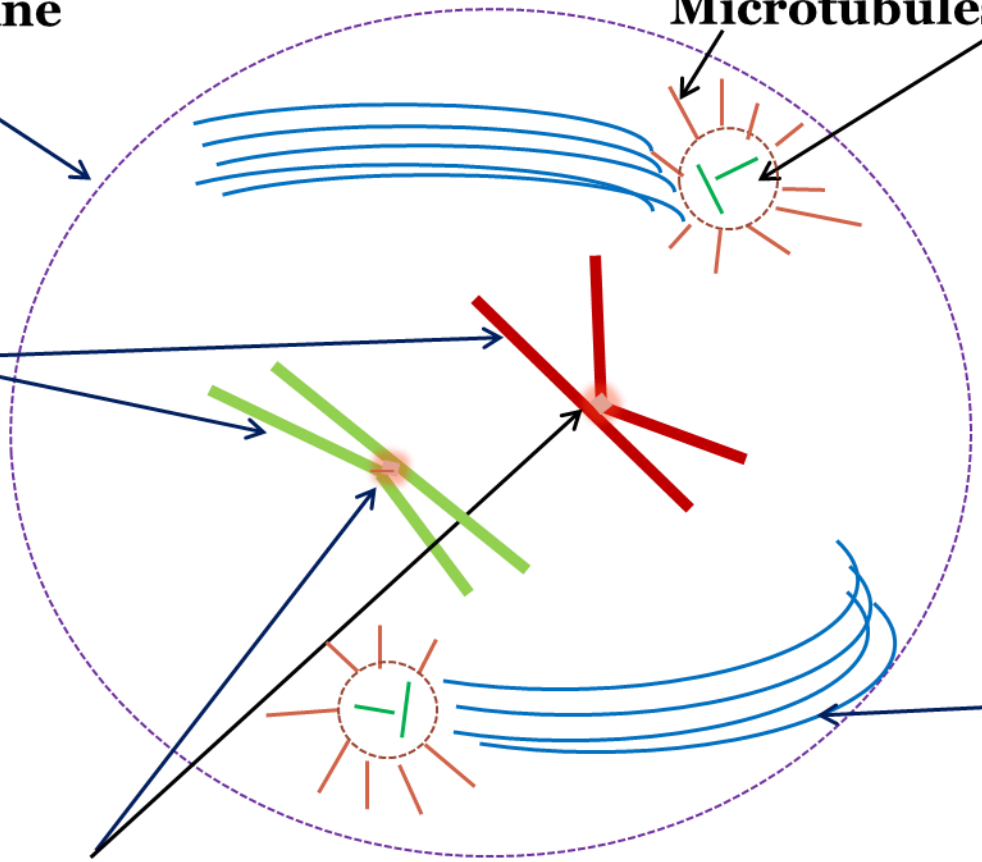
Meiosis

A REDUCTION DIVISION TO PRODUCE GAMETES WHICH ULTIMATELY MAINTAINS A CONSISTENT CHROMOSOME NUMBER IN THE SPECIES

PART 2

Prophase in Meiosis



Cell Membrane

Aster Microtubules

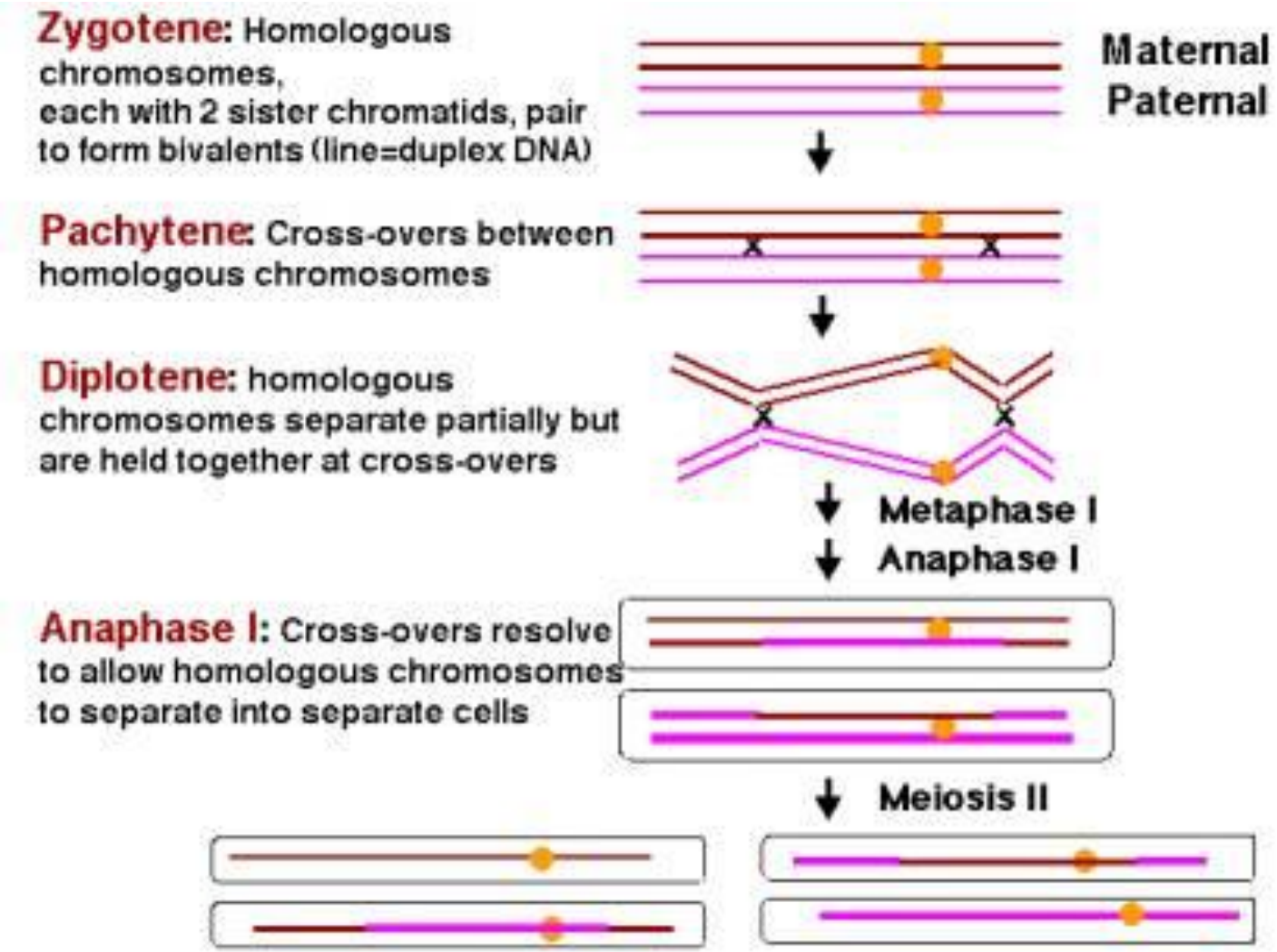
Centrosomes containing a centriole pair. The centrosome that divided in G2 now has two copies and each migrates to opposite poles of the cell and forms spindle fibers.

Chromatid pairs (replicated DNA of the paternal (green) and maternal (red) homologous chromosomes)

Spindle Fiber Microtubule

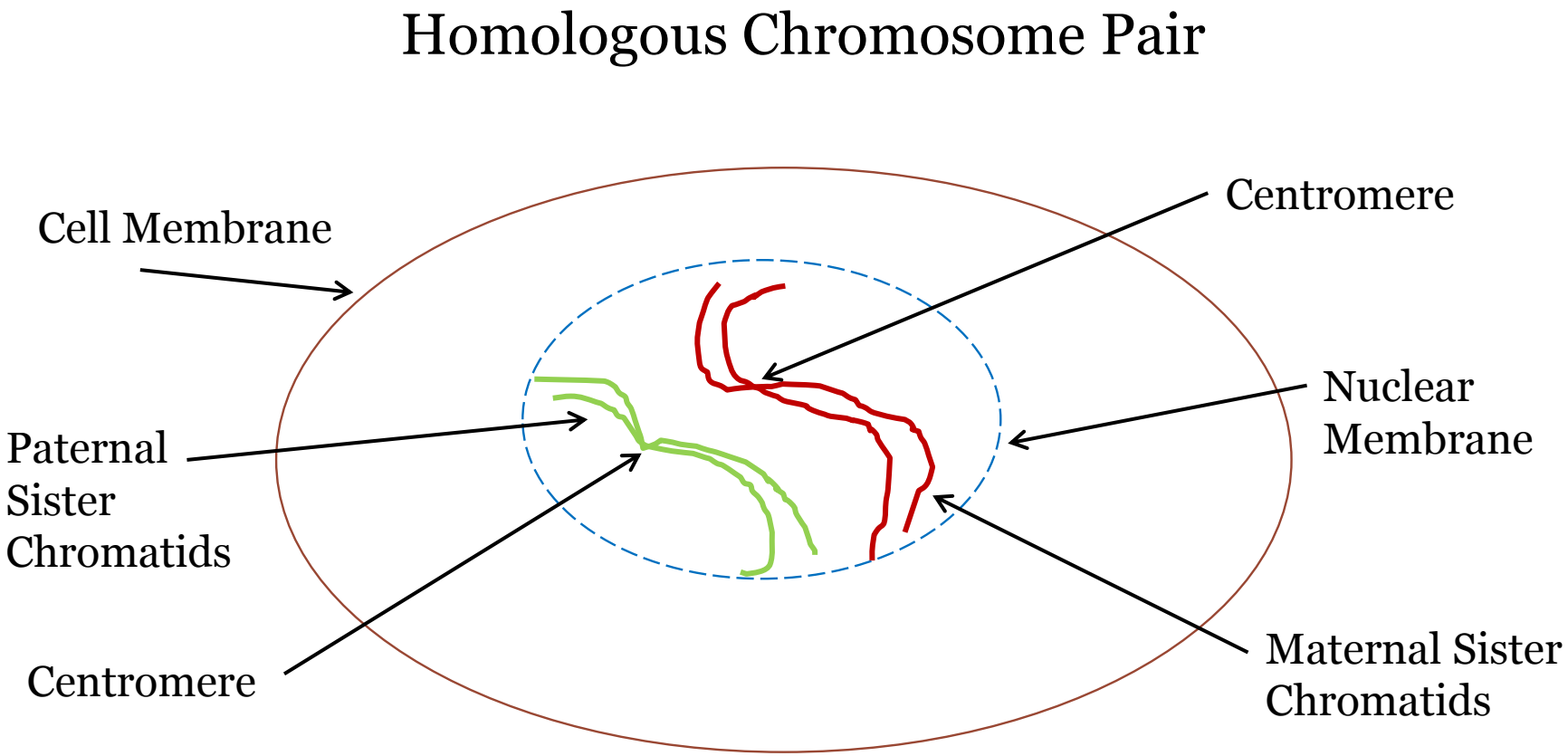
Centromeres with kinetochore on either side where the spindle fiber will attach.

Drawing: Lynda Jones, MS, ONPRC



http://biowiki.ucdavis.edu/Genetics/Unit_II%3A_Replication,_Maintenance_and_Alteration_of_the_Genetic_Material/8._Recombination_of_DNA/Meiotic_recombination

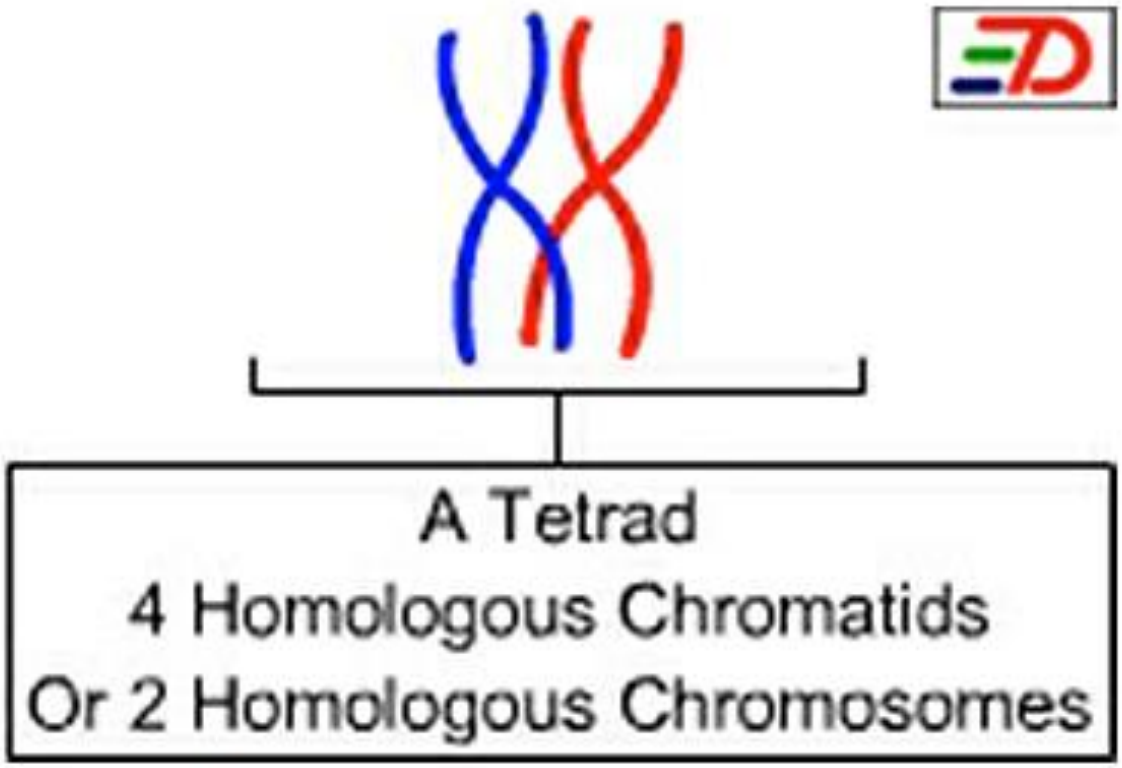
Leptotene Stage of Prophase I in Meiosis



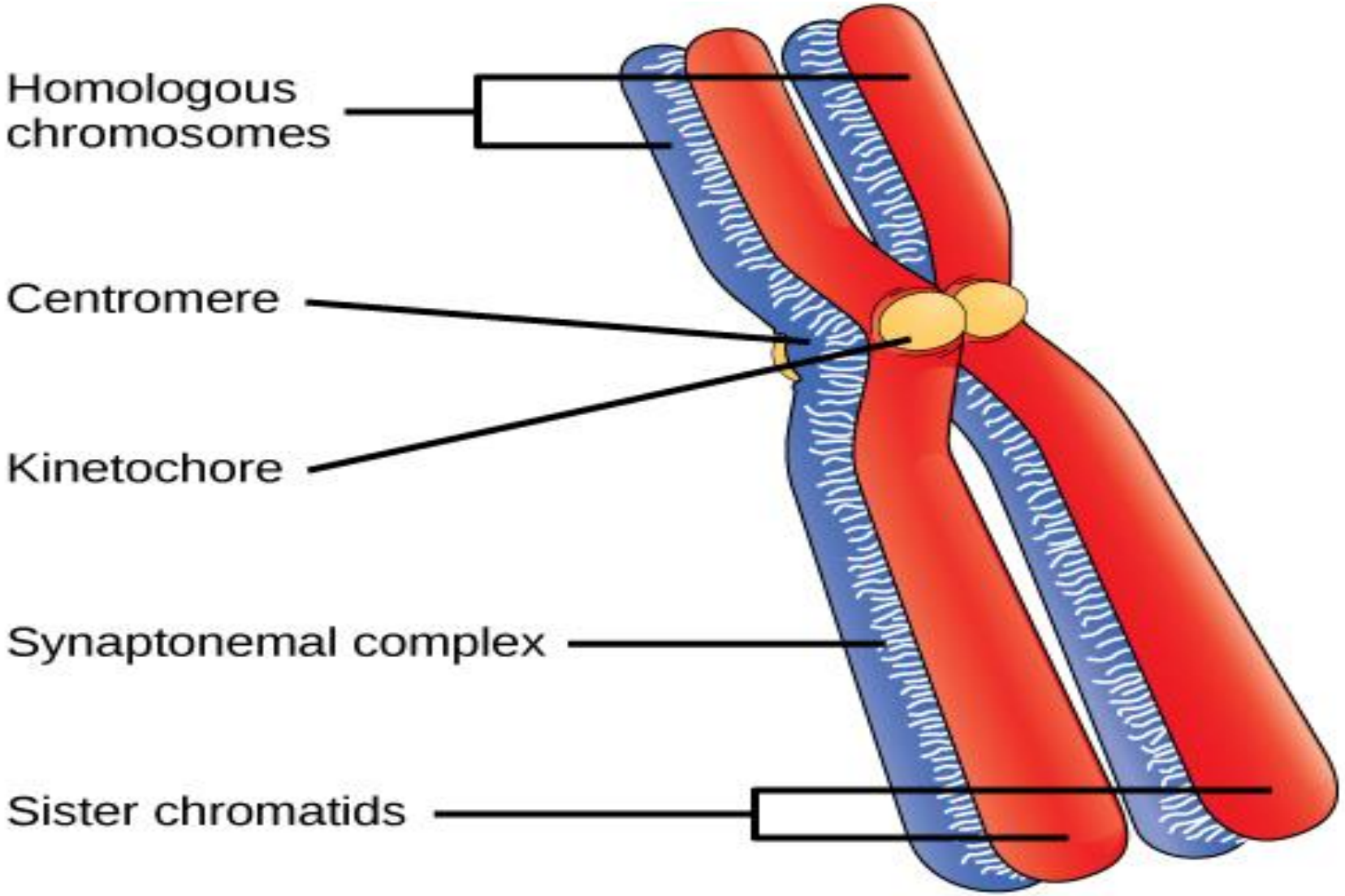
Drawing: Lynda Jones, MS, ONPRC

Zygotene Stage of Prophase I of Meiosis

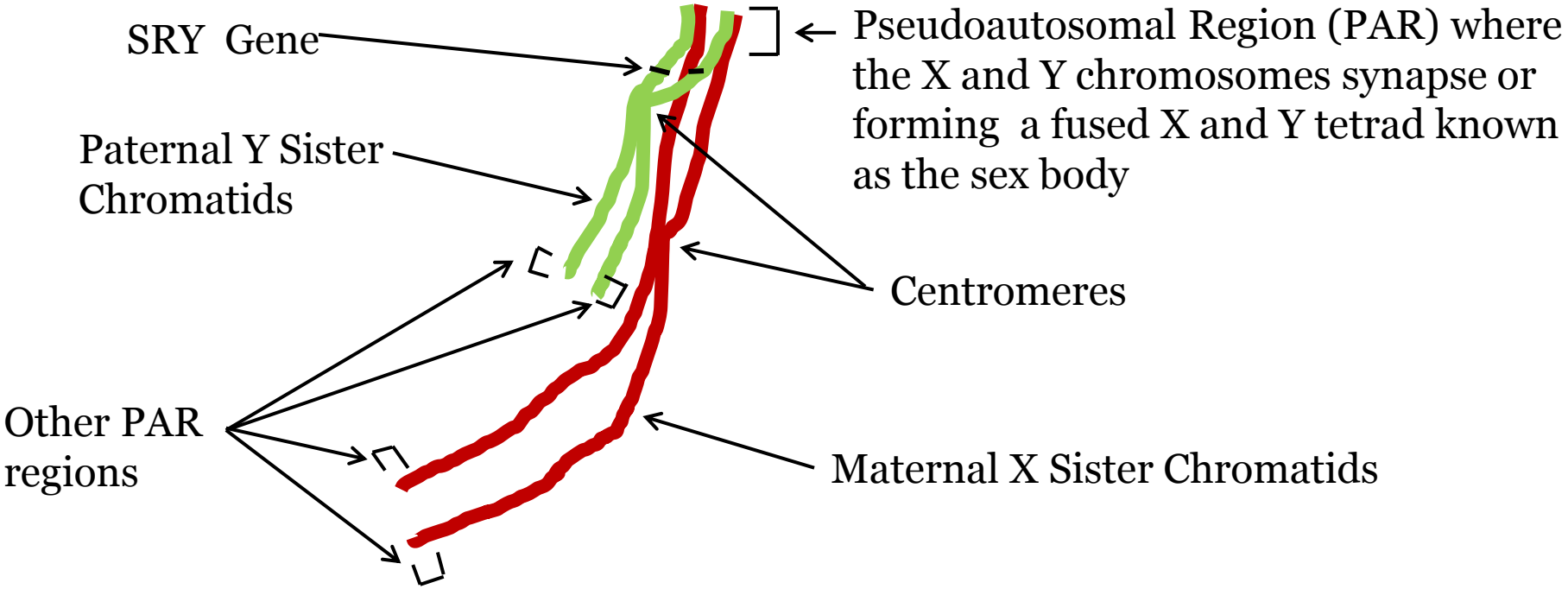
Synapsis



Synapsis



Formation of the Sex Body in the Late Zygotene-Early Pachytene Stage of Prophase I of Meiosis in the Testes



SRY is the Sex-determining Region Y gene
(also known as the TDF or Testis-Determining Factor gene).

Drawing: Lynda Jones, MS, ONPRC

Crossing Over - Pachytene Stage of Prophase I of Meiosis

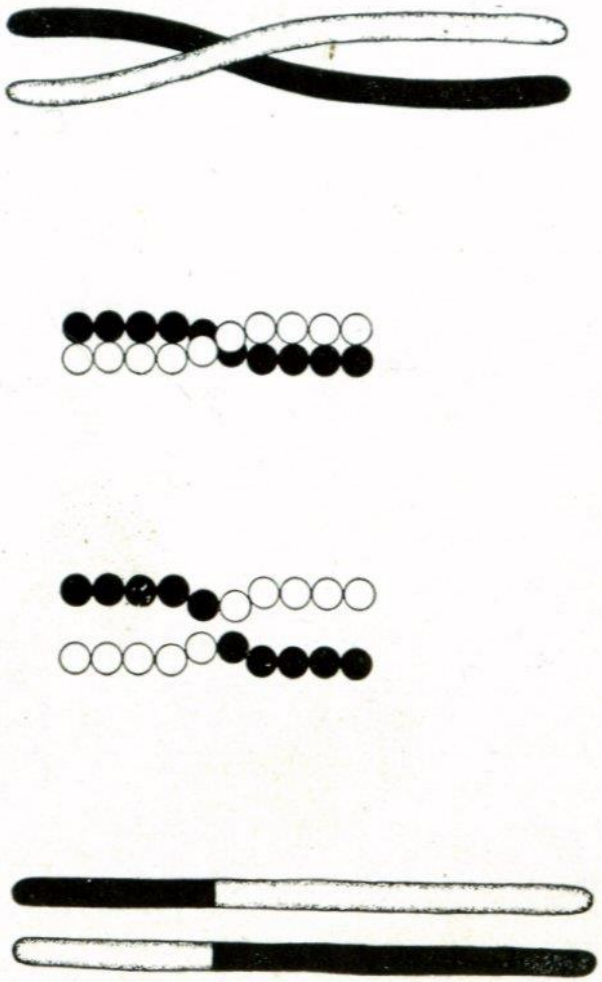


FIG. 64. Scheme to illustrate a method of crossing over of the chromosomes.

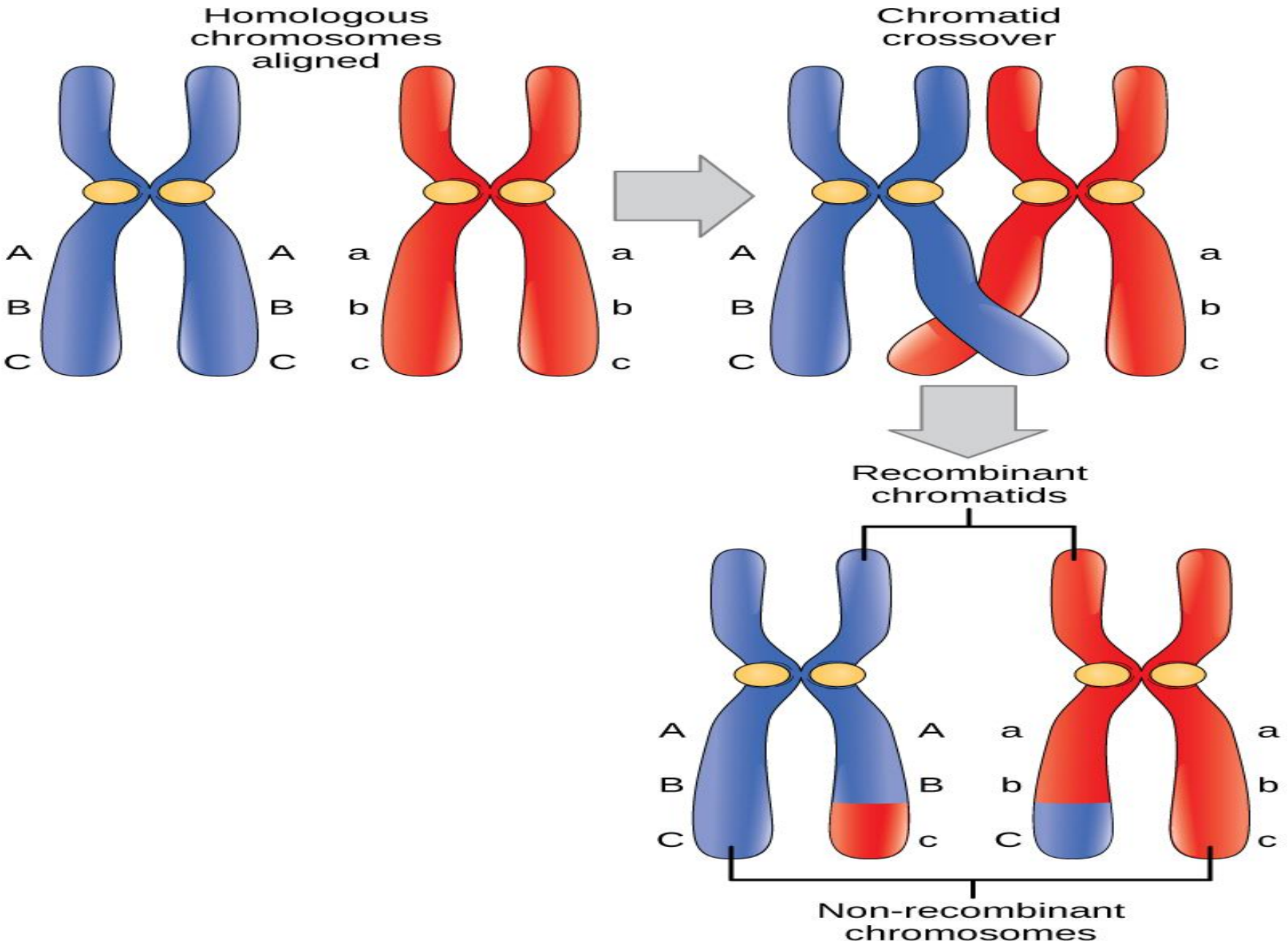
Frans Alfons Janssens (1865 – 1924)

Discovered and described crossing- over in chromosomes during meiosis which he called ‘chiasmatypie’ - 1909

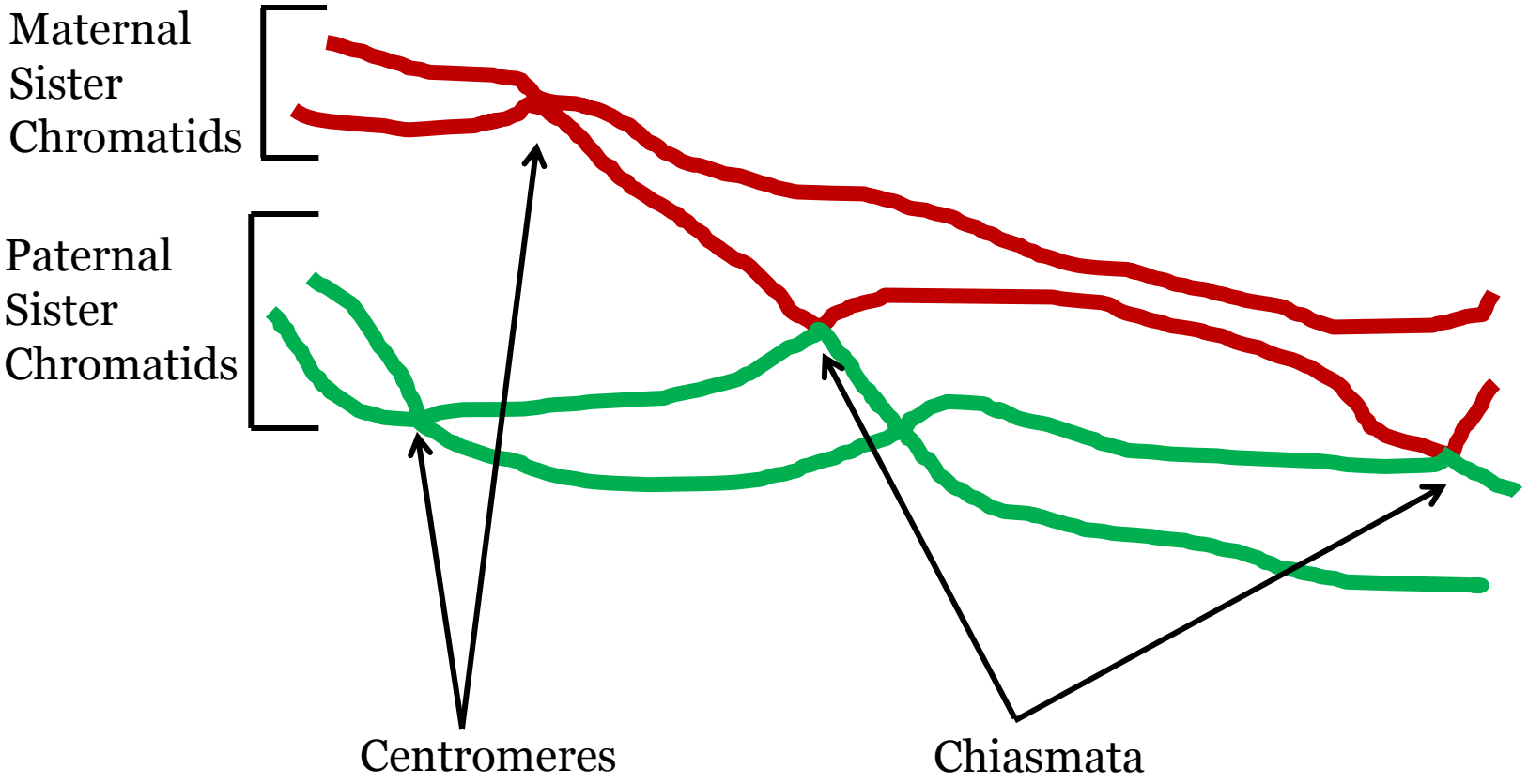
Thomas Hunt Morgan (1866-1945)

- Discovered sex-linked genes and did further work on crossing over based on Janssens' work and provided the first true genetic interpretation of meiosis

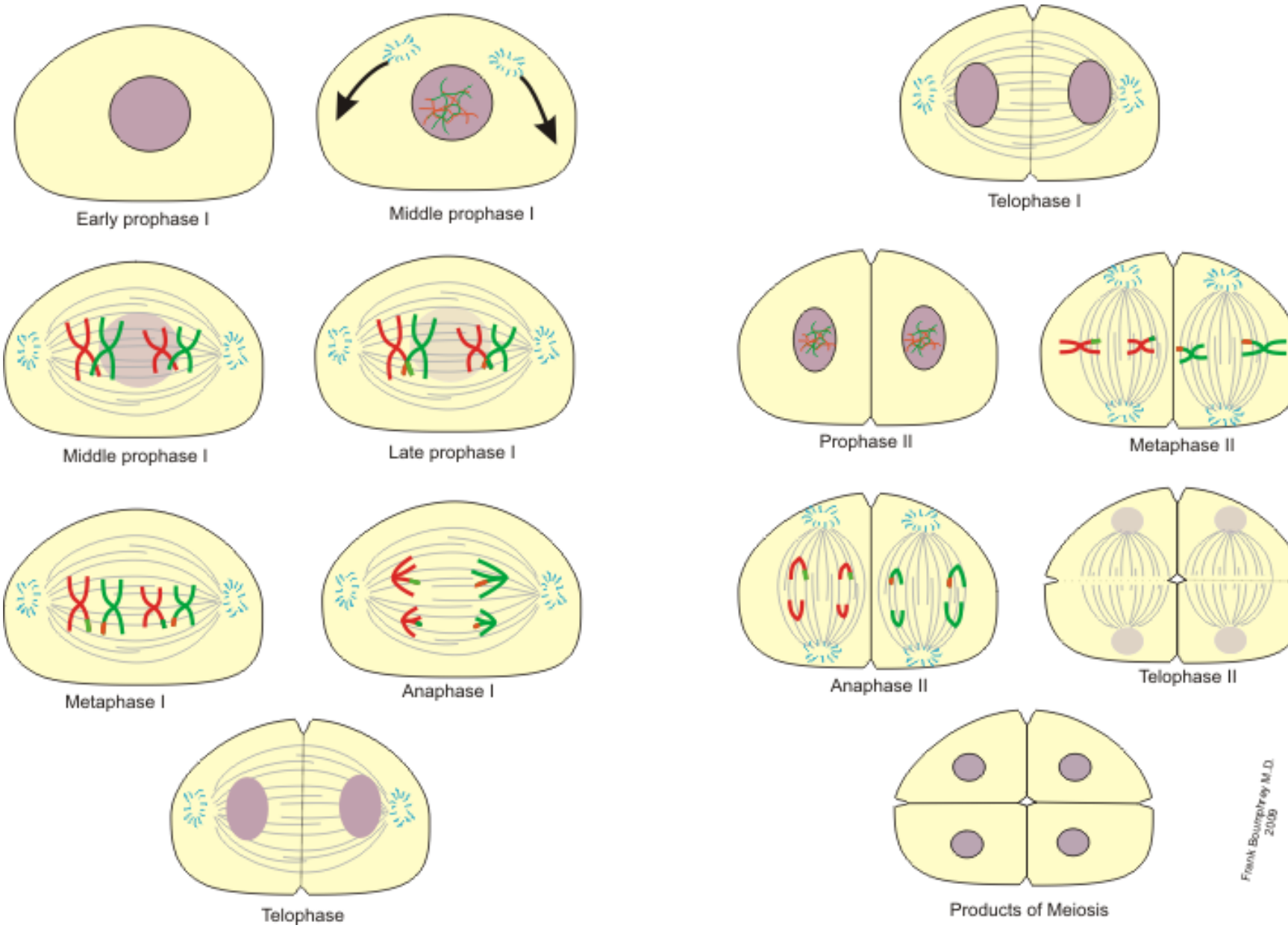
- Won Nobel Prize in Physiology or Medicine in 1933 "for his discoveries concerning the role played by the chromosome in heredity"
  http://www.nobelprize.org/nobel_prizes/medicine/laureates/1933/

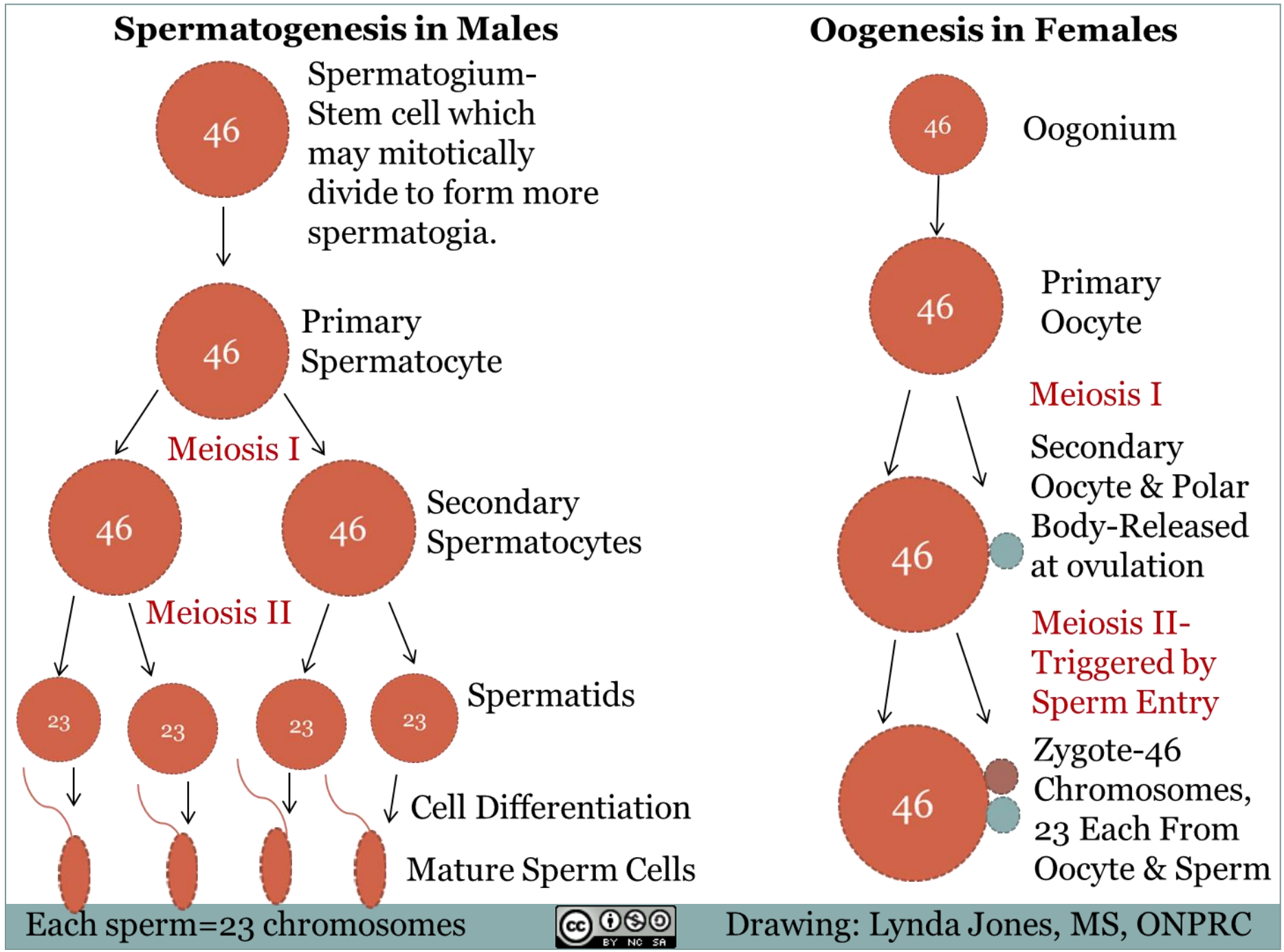


Homologous Chromosomes in the Diplotene Stage of Prophase I of Meiosis

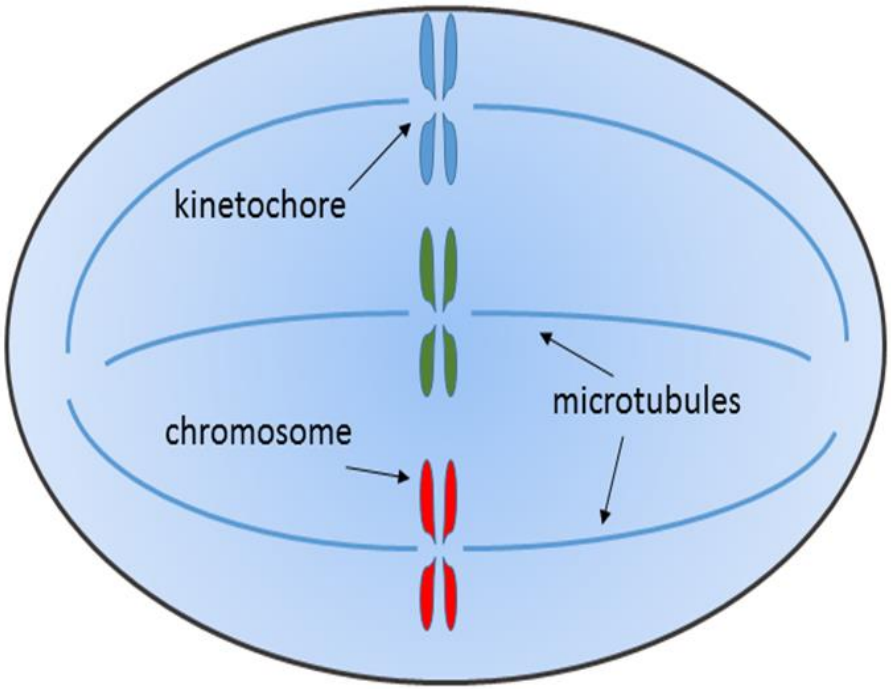


Drawing: Lynda Jones, MS, ONPRC

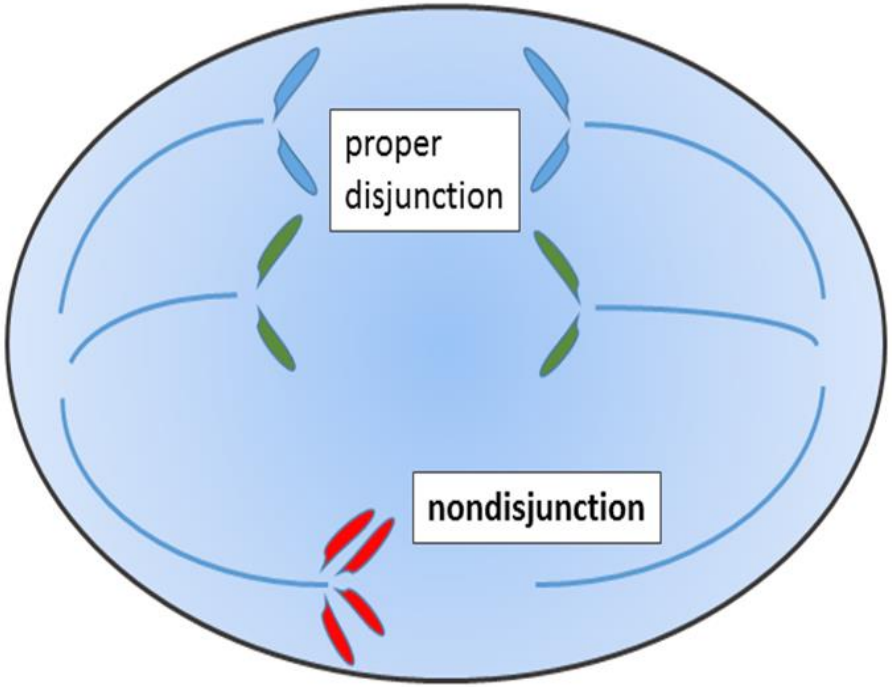



Spermatogenesis in Males
46
Spermatogium-
Stem cell which
may mitotically
divide to form more
spermatogia.
46
Primary
Spermatocyte
Meiosis I
46
46
Secondary
Spermatocytes
Meiosis II
23
23
23
23
Spermatids
Cell Differentiation
Mature Sperm Cells
Each sperm=23 chromosomes
Oogenesis in Females
46
Oogonium
46
Primary
Oocyte
Meiosis I
Secondary
Oocyte & Polar
Body-Released
at ovulation
46
Meiosis II-
Triggered by
Sperm Entry
46
Zygote-46
Chromosomes,
23 Each From
Oocyte & Sperm
Drawing: Lynda Jones, MS, ONPRC

The Origin of Aneuploidy Gametes by Nondisjunction in Meiosis



metaphase



anaphase

The Origin of Aneuploidy Gametes by Nondisjunction at the First or Second Meiotic Division