

Chapter 13-MEIOSIS

In animals and plants **GAMETES** = reproductive cells

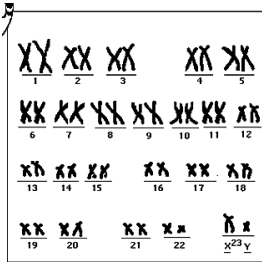
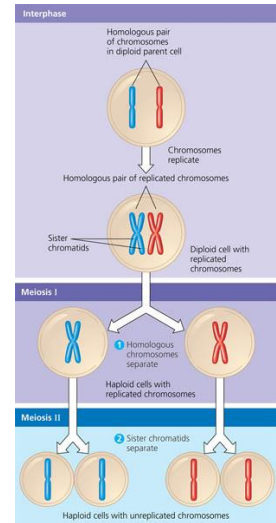
ASEXUAL reproduction =

ONE parent → offspring genetically identical to parent

CLONE = group of genetically identical individuals

SEXUAL reproduction =

TWO parents → offspring genetically different from parents and other offspring



KARYOTYPE = picture of an organism's chromosomes

Human **SOMATIC** (body) cells have 46 chromosomes (23 pairs)

2 **SEX CHROMOSOMES** (X and y)

MALES = Xy **FEMALES** = XX

44 **AUTOSOMES** = non-sex chromosomes

GAMETES (sperm & eggs) have 23 chromosomes

SPERMATOGENESIS (in TESTES)

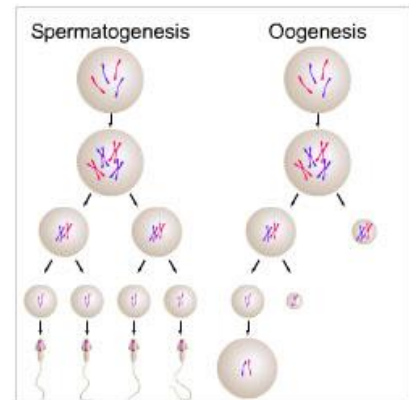
Meiosis produces 4 cells; maturation adds tails → 4 spermatis

OOGENESIS (in OVARIES)

Cytoplasm divides unevenly during meiosis

produces 1 egg and 3 **POLAR BODIES** (which degenerate)

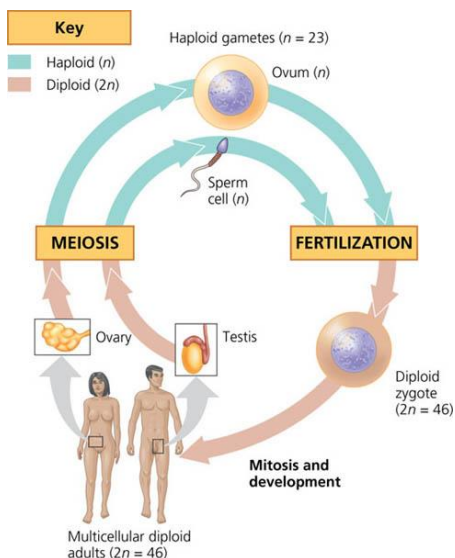
Gives egg the best start



DIPLOID cell (2n) - has TWO copies of each chromosome

(one **MATERNAL** and one **PATERNAL**)

HAPLOID cell (1n) - has ONE copy of each chromosome



In ANIMALS:

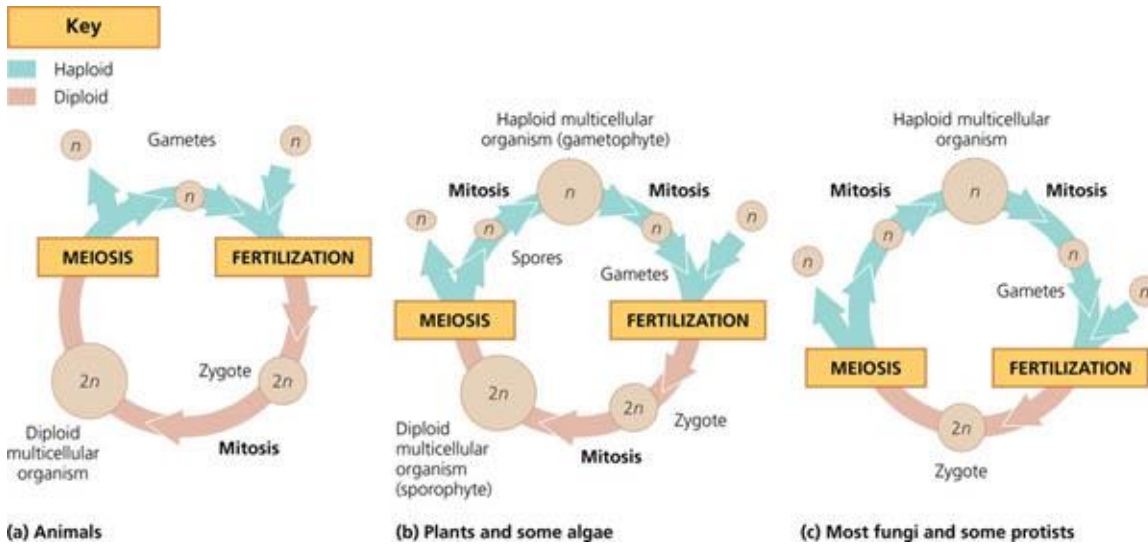
MEIOSIS produces **HAPLOID GAMETES**

Gametes join to make **ZYGOTE** = **FERTILIZATION**

DIPLOID ZYGOTE divides by **MITOSIS** → multicellular mature adult

Doubling of chromosomes during fertilization is offset by reduction in chromosome number during meiosis

3 TYPES OF SEXUAL LIFE CYCLES



ALTERNATION OF GENERATIONS -

life cycle includes both **DIPLOID** and **HAPLOID MULTICELLULAR** stages

MULTICELLULAR DIPLOID organism = **SPOROPHYTE** which makes spores by **MEIOSIS**

MULTICELLULAR HAPLOID organism = **GAMETOPHYTE** which makes **GAMETES** by **MITOSIS**

HOW ARE MITOSIS AND MEIOSIS DIFFERENT?

MEIOSIS I = Reduction division; chromosome number is cut in $\frac{1}{2}$

Results in genetic **VARIABILITY**

PROPHASE I:

SYNAPSIS - pairing of homologous chromosomes

Forms a **TETRAD** (group of 4 sister chromatids)

Allows for **CROSSING OVER** = exchange of DNA between homologous pairs

CHIASMA (pl. **CHIASMATA**) = regions where crossing over has occurred

METAPHASE I - Homologous partners line up **TOGETHER**

ANAPHASE I - Homologous chromosomes **SEPARATE**

SEGREGATION = separation of homologous partner to different daughter cells

INDEPENDENT ASSORTMENT

= mixing up of **PATERNAL** and **MATERNAL** chromosomes in different combinations

TELOPHASE I -

Some (**BUT NOT ALL**) organisms nuclear envelope reforms/chromosomes → chromatin before 2nd division

MEIOSIS II - steps just like **MITOSIS**

*Chromosomes are **NOT COPIED** between divisions

