Cheatography

AP Bio Unit 5: Heredity Cheat Sheet

by julescrisfulla via cheatography.com/122651/cs/22888/

Allele

alternative forms of a gene found on the same locus on a chromosome

Homozygous

2 identical alleles

BB (homozygous dominant)

bb (homozygous recessive)

Law of Segregation (Random Fertilization)

two copies of each hereditary factor (allele) segregate

offspring acquire one factor from each parent

Crossing Over

the reciprocal exchange of genetic material between nonsister chromatids during prophase I of meiosis

Codominance

blood groups

both alleles are expressed in the heterozygote

neither is dominant or recessive, but there is no blending

Pedigree Analysis

pedigree: family tree

males: squares

females: circles

shaded: showing exhibited trait

half shaded: carrier

Nature vs. Nurture

nature: genetically determined

nurture: environmentally determined

Genes Inherited Located on Sex Chromosomes

in humans:

~ females: XX

~ males: XY

examples of sex linked disorders:

~ duchenne muscular dystrophy

~ hemophilia

~ colorblindness

Calculate Recombination Frequency

if RF is >50%, the traits are considered to be independently assorted and on DIFFERENT chromosomes

if RF is <50%, the traits are on the SAME chromosome (any variants from the parent type are due to crossing over)

Asexual Reproduction

two identical cells

"clones"

Examples of Asexual Reproduction

Fission: bacteria

Fragmentation: starfish

Budding: coral

Terms

haploid: cells that contain a single set of chromosomes in an egg or sperm cell (23 gametes)

diploid: two complete sets of chromosomes (46 somatic)

triploid: Extra set of chromosomes (69 chromosomes)

Why are triploid plants seedless?

3 sets of chromosomes make it very unlikely for meiosis to successfully produce spores and gametophytes. Uneven number of chromosomes that won’t pair correctly

Meiosis Results

4 haploid cells

not genetically identical

Mitosis vs. Meiosis

similarities:

~ prophase, metaphase, anaphase, telophase (pmat)

~ cell division

~ cytokinesis: complete division of cytoplasmic contents

differences:

~ mitosis: single set of divisions	~ meiosis: two divisions
~ mitosis: production of 2n cells	~ meiosis: production of 1 n cells
~ mitosis: production of 2 cells	~ meiosis: production of 4 cells

Vertical Gene Transfer

parent to daughter cell

Dominant

a trait is expressed when dominant allele is present

capital letter (B)

Heterozygous

one dominant and one recessive allele

aka hybrids or carriers

Bb

Law of Independent Assortment

hereditary factors (alleles) assort into gametes independently from one another (every combination)

Genetic Variation

crossing over

independent assortment

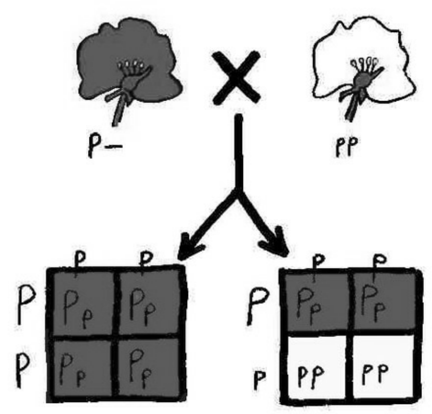
random fertilization

Epistasis

different genes can interact to control the phenotypic expression of a single trait

nonallelic genes affect one another

Test Cross Image



X-Inactivation in Females

barr bodies

DNA methylation

Gene Linkage (Linked Genes)

genes that are on the same chromosome

usually linked genes will be inherited together (unless separated by crossing over)

exhibit recombination frequencies less than 50%

Recombination Frequency Equation (x100%)

$$RF = \frac{\#ofRecombinants}{Total\#ofOffspring}$$

Sexual Reproduction

gametes (sperm and egg)

two parents

Examples of Sexual Reproduction

internal fertilization: humans, sharks, turtles

external fertilization: frogs, many fish

hermaphrodites: most worms, flowering plants

pollination: flowers

Meiosis

reduces the chromosome number

1) Interphase I

2) Prophase I

~ synapsis: the lining up of homologous chromosomes

~ chiasma: exchange of genes between non sister chromatids

~ crossing over: results in recombination of genes so they assort independently

3) Metaphase I

Meiosis (cont)

~ lining up of homologous chromosomes

4) Anaphase I

~ independent assortment

5) Telophase I and Cytokinesis I

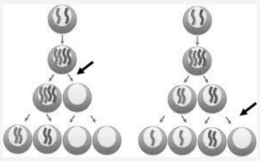
6) Prophase II

7) Metaphase II

8) Anaphase II

9) Telophase II and Cytokinesis II

Nondisjunction in Meiosis 1(left) and 2(right)



Horizontal Gene Transfer

donor to recipient cell

transformation (uptake of external DNA (plasmid))

transduction (virus -> bacteria)

conjugation (bacteria -> bacteria)

Recessive

a trait is masked in the presence of a dominant allele

lower case letter (b)

Phenotype

physical characteristic of a trait

color, size

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Genotype

genetic makeup of the chromosome

letters (B, b, G, g)

Incomplete Dominance

neither allele is completely dominant

hybrids are in between the homozygous traits

blending

Polygenic Inheritance

mode of inheritance in which additive effects of two or more genes determines a single trait

quantitative characters that vary in degree

AABBCC: dark

aabbcc: light

Disorders

Dominant disorders:

~ anchondraplasia (dwarfism)

~ huntington's (late acting lethals)

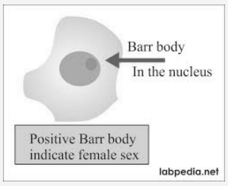
Recessive disorders:

~ cystic fibrosis

~ tay-sachs

~ sickle cell

Barr Bodies Image



Calculate Chi Square

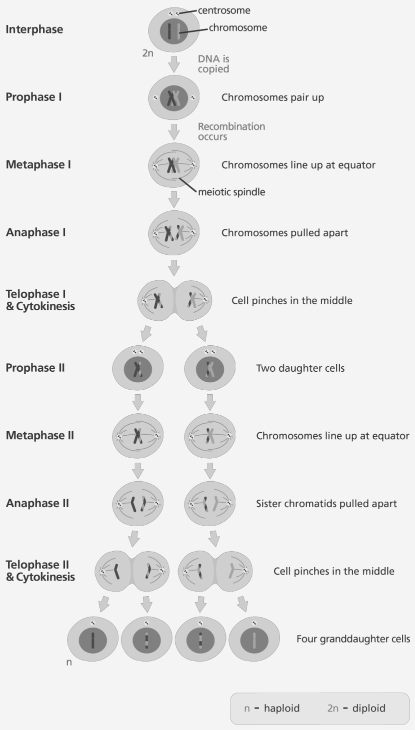
if we accept the null hypothesis (1:1:1:1), then the genes independently assort on DIFFERENT chromosomes

if we reject the null hypothesis (1:1:1:1), then the genes are on the SAME chromosome

Asexual vs. Sexual Reproduction

	Advantages:	Disadvantages:
Asexual:	do not have to find a mate or expend energy to find a mate	not much genetic variation
Sexual:	genetic variation	must find a mate and expend energy to find and/or court a mate

Meiosis Image



Crossing Over Image