

Survey of Biology

Week 7

Thripp
Survey

WED, 2009-10-14, 8-9:20AM Test Mon, 2009-10-19 Pg. 1

Nucleus, mitochondria, chloroplast = 2 membranes, DNA present

All other organelles = 1 membrane, no DNA

Not organelles: cell membrane, cell wall, cytoplasm, cytoskeleton
(microtubules, intermediate filaments, microfilaments),
free ribosomes, centrioles

Lysosome, centriole and cilia & flagella are in ANIMALS only

Cell wall, chloroplast, and central vacuole are in PLANTS only

All other structures/ organelles are in BOTH.

Sodium & hydrogen ions, glucose cannot pass through
the phospholipid bilayer without a transport protein.

Plants will grow faster when more carbon dioxide is provided (to a point). They will also put out more oxygen.

Growing wheat under blue or red light yields no sideshoots.

RNA builds life from DNA. DNA works for RNA.

DNA is locked in the nucleus. It gets copied to RNA & sent to cytoplasm. Ribosomes are like chefs - they prepare proteins for the cytoplasm & RER

Petunia experiment: added a purple DNA gene, got white flowers.

Cells have a police system to check RNA in case it is a virus. If it's wrong, the cop destroys it.

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Enzymes make carbohydrates, nucleotides, etc.

Bile is made in the liver, stored in the gallbladder,
and works in the sm. intestine. (not acidic?)

Ch. 8: Mitosis: ① cell division is precise: only 1 in 100,000 cell divisions result in error

a is the prefix to negate

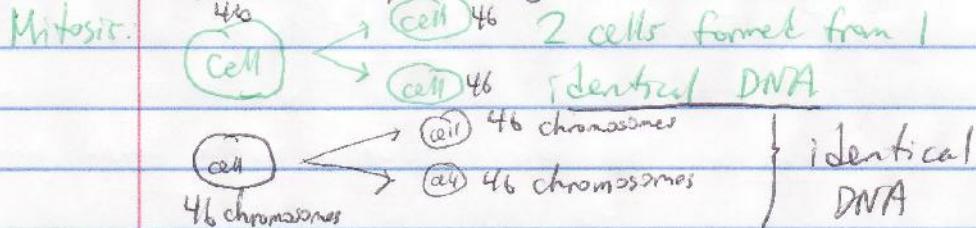
asexual reproduction = no sex: ex: cell division in not as diverse \rightarrow single-cell organisms

Some animals & many plants can grow back from a piece i.e. starfish & cactus.

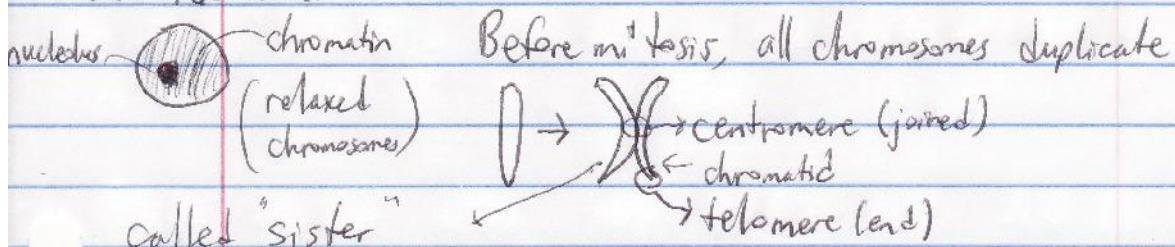
Genome = complete set of an organism's genes.

Genes are located on chromosomes in the nucleus.

② DNA is packaged by coiling & folding. "Beads on a string."

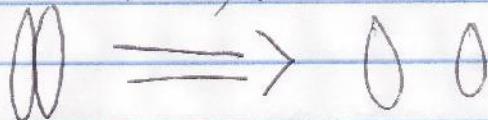


From the fertilized egg that made you, all cells in your body are identical.



chromatids for some reason Dr. Becker doesn't know when separated, the chromatids are called chromosomes

WED, 2009-10-14, 8-9:20 AM

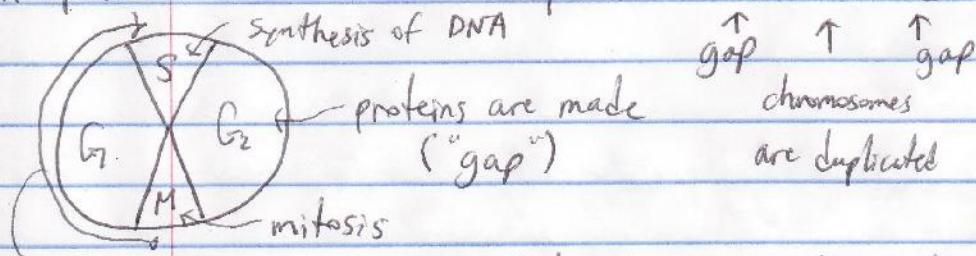


sister chromatid

now called chromosomes (after separation)

Mitosis = 10% of time = 4 parts: PMAT

Interphase = 90% of time = 3 parts: G₁ S G₂



(another gap)

Interphase is not a phase of mitosis.

— cell grows

— DNA is copied aka. doubled aka. replicated

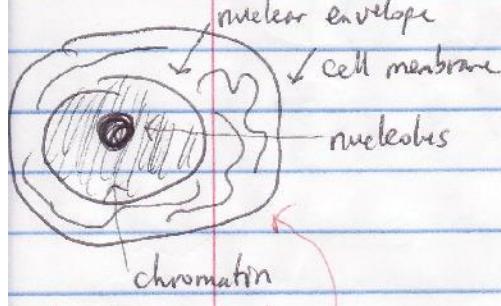
G₁ = gap 1 (protein synthesis and growth of cell)

S = DNA synthesis aka. copy

G₂ = gap 2 (same as G₁ + prep for cell division)

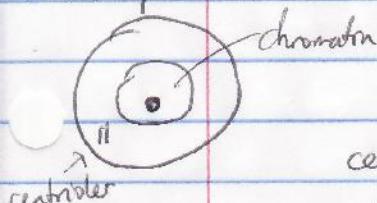
G₀ = "resting" (non-dividing) stage

before S — nerve & brain & spinal cord cells



Interphase Nucleus

Interphase



Prophase



centrosomes move to poles

chromosomes move

TOWARD equator

when they get to

the equator, we are

spindle fibers form

in METAPHASE

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Chromosomes at equator (middle) = **Metaphase**

Anaphase = chromatids move away from center & toward poles,
separating — now called **chromosomes**

Thu, 2009-10-15, 9:30-10:50 AM

① Central vacuole creates turgor pressure — plants
DNA never leaves the nucleus.

DNA is copied to RNA (mRNA) to send out of nucleus
to free ribosomes in the cytoplasm.

1986 experiment to alter petunia's DNA to make it purple,
made petunias white. RNAi is the "policeman" in the
cytoplasm, checking mRNA to make sure it's chemically
valid. If it's bad, the policeman chemically destroys it.
RNAi is inverse RNA (recently discovered — 1980s). Not on test.

② hydrophobic patches (i.e. nicotine) can go through skin.

measles protects stomach lining from acid chyme

In microvilli in small intestine, monomers, such as amino acids
& monosaccharides, are taken up.

Ch 8:

One error in 100,000 divisions of cells.

Simple cell division = asexual reproduction — one cell
divides into two with no assistance

Many plants & some animals (starfish, hydras etc.)
reproduce asexually.

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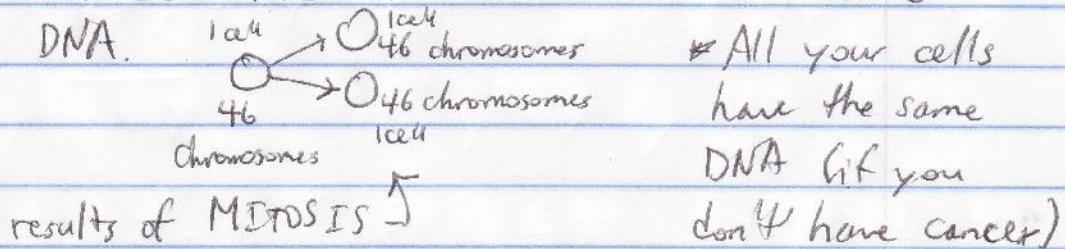
THU, 9:30-10:50 AM 2009-10-15

DNA codes for proteins. However, DNA is a nucleotide, not a protein. (Humans & pears have some very similar DNA.)

(2) DNA is coiled like balls on a string.

Mitosis: one cell divides into two cells.— both have

identical DNA.



All your cells

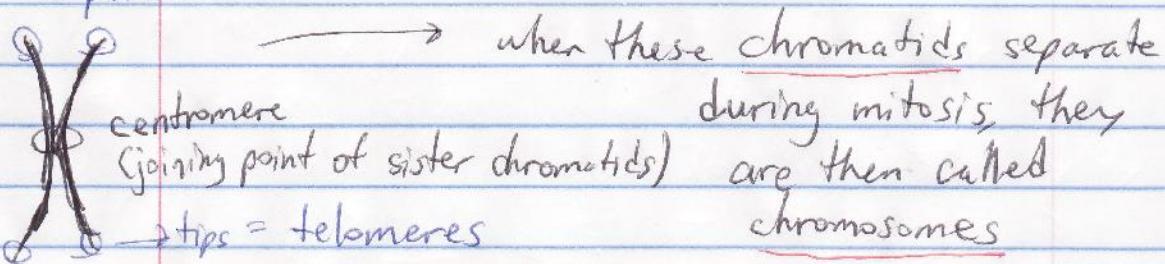
have the same

DNA (if you

don't have cancer)

* However, cells are different because they have different proteins. Chromatin is the relaxed chromosomes in the nucleus during Interphase (DNA + proteins).

Ribosomes & mRNA are made in the nucleus but get exported out.



2 chromatids
("sisters")

The cell has 92 chromosomes during the short period after the sister chromatids separate (becoming chromosomes) but before the cell completely divides.

Cell cycle: 2 phases w/ many sub-phases

centrioles are at

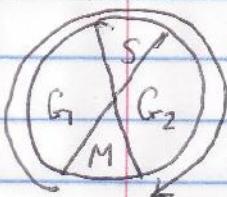
poles so each cell gets them important for sperm, fullerenes

90% of time: Interphase

10% of time: Mitotic Phase

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JHU, 9:30-10:50 AM, 2009-10-15



M = mitotic phase

G₁ = cell growth

S = DNA synthesis (duplication)

G₂ = cell growth

mitosis

In interphase (not a phase of mitosis),
cell grows. DNA is doubled a.k.a. copied a.k.a. replicated

Some cells have G₀ (gap 0) where they stop growing —
i.e. skin cells, nerve cells, brain cells, & spinal cord cells.

Skin cells can be coaxed out — skin cells will come out of

G₀ to repair a wound, but brain cells won't!

Brain damage is often important.

MITOTIC PHASES: MITOTIC PHASES:

Prophase: centrioles move to poles, nuclear membrane disassembles, chromatin condenses into chromosomes, chromosomes move toward equator while actually getting there, spindle fibers form.

chromosomes

Metaphase: ~~chromosomes~~^{attes} have reached the cell's middle (equator).

Anaphase: chromatids separate, now called chromosomes,
(duplicated) (unduplicated)

spindle fibers shorten by disassembly (like LEGO blocks)

— cool thing happening @ centromere

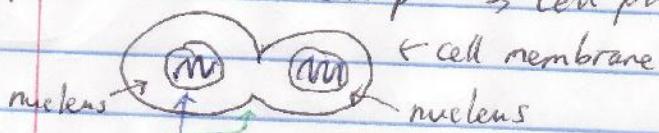
Cell gets larger, "daughter" chromosomes move to ends, chromatids centrioles are @ poles so each cell gets centrioles — no "cool" stuff happening



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THU, 9:30-10:50 AM, 2009-10-15

Telophase: cytokinesis = cell membrane pinches a furrow
in ~~proto~~ animals. In plants, cell plate forms



cell membrane

nucleus

chromosomes relaxing - becoming chromatin
furrow - one cell is about to split into
two cells but not yet

Interphase: chromatin now

fully relaxed so not
yet chromatin during

PMAT

Prophase: chromosomes condense

telophase

& move toward equator, nuclear membrane dis-assembles

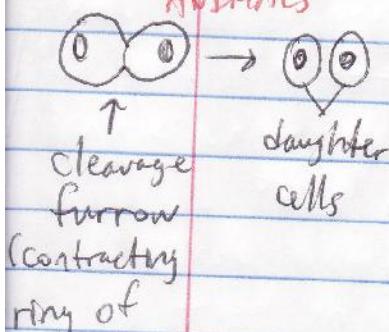
Metaphase: chromosomes are lined up at the equator

Anaphase: chromatids separate, now called chromosomes

Telophase: cytokinesis, chromosomes begin to relax
(chromatin in interphase)

② Muscle cells go through mitosis but condense afterwards
so muscle cells can work together to contract & expand

ANIMALS

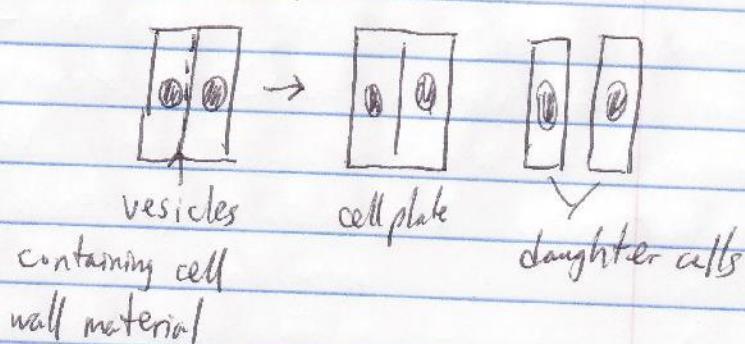


↑
cleavage
furrow

(contracting
ring of
micro-

filaments) phospholipid bilayer
(cell membrane)

PLANTS



vesicles

cell plate

Y

daughter cells

containing cell
wall material

Ions (sodium) & lipid-soluble (ethanol, fatty acids)
can go through the cell membrane unaided.
Glucose & aa's need a transport protein.

TTHU., 12:30 PM - 1:50 PM, 2009-10-15

DNA works for RNA. RNA copies DNA for free ribosomes (mRNA) — ribosomes copy ^{DNA}~~mRNA~~ as rRNA & * arrange amino acids to form proteins by blueprint from rRNA ← mRNA ← master DNA in nucleus

Since ribosomes ↗

RNAi = inverse RNA

are made in the nucleus and the nucleus is in the nucleus. DNA can be copied directly as rRNA for the ribosomes made in the nucleus.

Plants make ATP + NADPH from light & CO₂

50 questions

on Test 2

2 points each

mRNA is sent from nucleus to cytoplasm for free ribosomes to make special proteins.

Genome = complete set of an organism's genes. Genes are located on chromosomes in the nucleus.

→ Sister chromatids separate → then called chromosomes.



G₁ → S → G₂

G₁ → S → G₂ → M

↳ Synthesis (doubling) of DNA

\$ DNA is copied or doubled in the S-phase of Interphase.

G₁ → S → G₂

INTERPHASE gap — growth, cell functions

G₁ & G₂ = protein synthesis

90% of time cell is in Interphase — (0% in PMAT [mitosis])

Only animal cells stretch in anaphase — plant cells have a rigid cell wall so they form a cell plate — NOT a furrow.

Exam: Mon., Oct. 19, 2009 &

Richard X. Thripp END

Tue., Oct. 20, 2009

SI Leader: Survey of Bio. Daytona State