*Hydrogenation is the artificial addition of hydrogen atoms to an unsaturated fat. This can improve a food's taste, texture, and shelf-life.

*Hydrogenation allows them to pack better, which is bad because that can lead to the arteries.

*unsaturated fatty acid- cis form

*partially hydrogenated trans fatty acid- trans form) – avoid them

*Hydrogenation converts some double bonds to single bonds, but it adds hydrogens in the less healthful "trans" position, which changes the orientation of the double bond.

*Hydrogenation can increase the saturation of fats.

-Sterols

-Cholesterol

*important component of cell membranes in animals

*dietary cholesterol can attach to and thicken vessel walls and may cause serious health problems

*sterols are ball based on a structure featuring four fused carbon rings

-Steroid hormones

*regulate sexual development, maturation, and sex cell production

*estrogen influences memory and mood

*testosterone stimulates muscle growth

-Phospholipids

-Phospholipids align so that their hydrophilic heads extend toward the water, while their hydrophobic tails are directed away from the water.

-Phosphate group is polar; fatty acids are non-polar

-Phospholipid bilayer: plasma membrane, extracellular fluid, intracellular fluid

*Hydrophilic heads extend toward the intracellular and extracellular fluid, and hydrophilic tails are directed away from these watery fluids.

CHAPTER THREE

- Cell Theory:

1) All living organisms are made up of cells.
2) All cells arise from preexisting cells.

*parasites are often host specific, and may need >1 host

Life cycle

*Two-host life cycle of Plasmodium (causes malaria)

Host- mosquito Parasite- plasmodium

Host- human Parasite- Plasmodium (endo)/mosquito (ecto)

-symbiosis (bio- life/living; osis- process; sym- together): close association between 2 or more species

1) Parasitism

2) Commensalism- rare; one benefits; one unaffected

Ex (pg. 611): interaction in which one species benefits and the other neither benefits nor is harmed

3) Mutualism- interaction in which both species benefit; common; both benefit

1) Coral (made up of an animal called a cnidarian and an alga, which is a photosynthetic plant-like animal)—will not live on their own if separated

2) Lichens (made up of a fungus, which is a hyphae and also made up of an alga

3) Mycorrhizae

Mycorrhizae fungi grow in association with the roots of plants, receiving, sugar frothe plant and transferring nitrogen and phosphorus from the soil to the plant.

Ectomycorrhiaze- hyphae press closely against the outer side the the cell waslls of the roots hairs.

Endomycorrhiaze

- Change within communities

-change is common and on-going

-not all species have the same influence

-most influential= keystone species

*conservation biology- preserving a species

- Change > Succession

-gradual, continual

-not always catastrophic or sudden, but it can be

-causes:

1) Physical: flood, fire, volcanic eruption, free/ thaw

-bottom heavy due to low efficiency of energy transfer/ large numbers of organisms needed at lower trophic levels to support those at higher trophic levels

- Human implications:

  -Earth can support more people if they consume at lower trophic levels

  *10 kg grain > 1 kg per person

  *10 kg cow > 1 kg per person

  *100 kg grain > 10 kg cow

- Nutrient cycling (biogeochemical cycles) bio=living geo=earth
- Carbon C

  -basic constituent of living organisms

  -most on Earth in rocks (coal and fossil fuels); also oceans and standing biomass

  -most C that cycles is as CO_2 (gas in atmosphere)

  -trapped via photosynthesis

  -released via respiration (breathing), decomposition, and burning (fossil fuels and biomass)

  -the carbon cycle pg. 598

  1.) Plants use carbon molecules from atmospheric carbon dioxide and light energy from the sun to build sugars through photosynthesis.

  2.) Carbon moves through the food chains as organisms eat plants are themselves eaten. Organisms extract energy from carbon bonds and exhale carbon dioxide back into the atmosphere as a by-product.

  3.) When large numbers of organisms die, carbon accumulates in the ground. Over time, the organic remains can be transformed into coal, oil, and natural gas.

  4.) ?

  - ↑CO_2 in atmosphere > climate change
- Nitrogen N (nitrate and ammonia)

  -amino acids/proteins, nucleic acids, etc.

  -in atmosphere as N_2 (not available to most organisms)

  *atmosphere: 78% N_2, 21% O_2, rest: CO_2, etc.

  -plants get as NH_4^+ (ammonium) and NO_3^- (nitrate)

  -bacteria use N_2, NH_4^+, NO_3^-, and NO_2^- (nitrite)

  -animals get as organic compounds

-shaped by drought, fire, grazing

-soils good for agriculture

-include: savannahs (Africa), prairies (N. America), pampas (S. America), and veldts (S. Africa), steppes (Asia)

- Forests

-tropical

*within tropics of cancer and Capricorn

*23.5 degrees N and S latitude

*little daily temp or day length change

*rainfall high, seasonally variable (200-400 cm/year)

*stratification (stratum=layer)- lots of different kinds of plants all at different heights

*enormous diversity (the most diverse biome)

*soils poor

-temperate/deciduous (deciduous- refers to plants that drop leaves under adverse conditions such as winter)

*midlatitutdes

*wide seasonal temp variation (-30 to +30 degrees Celsius; 50-150 cm/yr)

*diverse

-coniferous/ boreal (coniferous- cone-bearin.g; boreal- northern)

*largest terrestrial biome

*latitudes between temperature forests and tundra

*long, cold, dry winters and short, wet summers

*montane forests at all latitudes

-tundra

*arctic (near North Pole) and alpine (as you're going up a mountain)

*permafrost

*low precipitation but wet soils

*low growing plants; animals migrate

(STUDY THESE ON THE MAP- forests relative to the map)

-vincristine and vinblastine= inhibit spindle formation

-side effects: vomiting/nausea, low iron/anemia, hair loss, weight loss, immune system weakened, tired/fatigue

	Asexual Reproduction	Sexual Reproduction
# of parents	1	2
Offspring and parents different?	No	Yes
Variation between generations?	No	Yes
Method/Processes?	Mitosis	Meiosis and fertilization/sex

- Sexual Reproduction

  -Diploid cells (have two copies of each chromosome; having both members (2) of a homologous pair)

  *adult female: 23 chromosome pairs (46 chromosomes total)

  *adult male: 23 chromosome pairs (46 chromosomes total)

  Meiosis

  -Haploid cells (have one copy of each chromosome; having only 1 member of each homologous pair)

  *egg (female gamete): 23 chromosomes total

  *sperm (male gamete): 23 chromosomes total

  Fertilization

  -Diploid Cells (have two copies of each chromosome)

  *fertilized egg: 23 chromosome pairs (46 chromosomes total)

  ****see other worksheet

- Meiosis: reducing the genome by half (pg. 240)

  -Interphase: Each chromosome in a homologous pair replicates to form a sister chromatid.

  -Meiosis 1: In the first division of meiosis, the homologous pairs separate.

-Mendel crossed true-breeding purple-flower plants with true-breeding white-flower plants. (Crossing=reproduce together)

-Then, Mendel crossed two of the purple-flower offspring. (purple was dominant, while white is recessive—dominant: a cross of true-breeders looks like the dominant trait; recessive: one that "disappears" in a cross of true-breeders)

-He found that most offspring have purple flowers, but some have white flowers (found a 3:1 ratio of purple to white or dominant to recessive).

- Mendel's Law of Segregation

-Adult Plant Adult Plant

*True-breeding Purple *White

*Got two genes from parent *Got two genes from parent

*Both of genes it inherited *Got two white genes from its parents

coded for purple *Make gametes

*Make gametes

Process of fertilization

One purple one white

(offspring of 2 true-breeding parents)

Heterozygote

- Figure 7.9

-According to his law of segregation, only one of two alleles for a gene is to put into a gamete. At fertilization, offspring receive from each parent one allele for each gene.

- Punnett Squares!!!!!!!!!!!!!!!!!!!!!!!!!!!

-a way to figure out the probability of the genetic composition of the offspring of two parents

-P is for purple

Dominant allele- capitalized

Recessive allele- lower-case

Pp*Pp

****See notebook!

- Ways to inherit traits

1.) Complete dominance- Mendel's peas (Heterozygote look like homozygous dominant.)

-Dominant alleles are not always the most abundant in a population.

Ex: Polydactyly (6 fingers), Achondroplastic dwarfism

2.) Incomplete dominance- heterozygote look like an intermediate between the dominant and the recessive; each allele is partly expressed

Ex: snapdragon; sickle-cell disease (homozygous recessive are sick; homozygous dominant are fine; heterozygote (carriers) (combination of dominant and recessive) have problems under extreme bodily stress—protected from malaria)

3.) Co-dominance- each allele is fully expressed

Ex: human blood types

4.) Multiple Allelism (more than 2 alleles)

Ex: human blood types

-3 alleles possible: A, B, and O

*A (dominant to O and co-dominant with B)

*B (dominant to O and co-dominant with A)

*O (recessive to A and B)

-blood type, antigens, and antibodies

5.) Polygenic traits—coded for by more than one gene

Ex: height, skin color

6.) Pleiotropy- one gene affecting many traits

Ex: sickle-cell disease (sickles cells which causes pain, stiffness, heart problems); protects you from malaria

7.) Linkage- the tendency for two genes on the same chromosome to be inherited together (Figure 7-29)

Ex: red hair and freckles

8.) Epistasis- one gene controls the expression of another gene

Ex: EeBb * EeBb

9.) Environmental Effects (nature vs. nurture)

1.) Intentionally: plant and animal breeding

-pets, livestock

-horticultural, agricultural plants

2.) Unintentionally:

-pest resistance to pesticides ("icide"= kill)

9.) Genetic drift: random change in allele frequency

-founder effect: founding members of a new population have different allele frequencies than the original source population

-bottleneck effect: occasionally, famine or disease or rapid environmental change may cause the deaths of a large, random proportion of the individuals in a population

- How do we get new genes?

mutations: change in an organism's DNA

-are the only source of completely new genes/alleles (raw material of evolution)

-rare: 1 per 100,000- 200,000 DNA replications

-can be in somatic or in sex cells (but can only affect gene pool if heritable)

-are random and unpredictable; but can be induced

-mostly bad (often lethal)

-some benign/neutral

-some good/advantageous to individual (rare unless there has been an environmental change)

Ex: antibiotic/insect resistance to drug/pesticide:

Environment of microbe/insect changed

If random mutation results in organism better able to survive that individual now favored by natural selection

Sexual reproduction also → variation:

Not by changing alleles but by allowing new combinations of existing alleles