Characteristics of living things

Movement
Respiration
Sensitivity
Growth
Reproduction
Excretion
Nutrions

The binomial system → Species → live same habitat → fertile offspring → DNA is used as a better way of classification

5 Kingdoms

- Plant kingdom
- Fungi kingdom
- Animal kingdom
- Prokaryote
- protoctists
- bacteria
- viruses

Are not cells so are not apart of kingdoms

Vertebrates

- fish
- mammals
- birds
- reptiles
- amphibians

Invertebrates

Arthropods

- Crustaceans
  - live in water
  - compound eyes antennae
  - cephalothorax
- Myriapods
  - conti / milli pedes
    - one pair
    - carnivores
    - two pairs
    - herbivores
- Insects
  - head, thorax abdomen
  - 3 legs
- Arachnids
  - cephalotho and abdo
  - 4 legs.

CELLS

Animal cells

- nucleolus
- cytoplasm
- nucleous
- cell membrane

Plant cells

- cytoplasm
- nucleous
- nucleous
- cell wall
- chloroplast
- vacuole
- nucleolus

Rough ER

- cytoplasm → Ribosomes
- makes protien

mitochondria

$$as = \frac{1.5 \cdot mm}{mag}$$

mm
x1000
= (Mm)

Specialised cells

- nerve
- root hair cells → sperm
- Palisade mesophyll
- Red blood → egg
- xylem vessels
- Cilliated cells

cells → tissue → organ → system → organism

Movement in & out of cells

Factors that affect diffusion
- the temperature
- Surface area
- distance
- the concentration gradient

diffusion in air is 300 000 X faster than water

Osmosis → water potential gradient
- Turgid
- partially permeable membrane → Diffusion of water
- flaccid → plasmolysed → in cell membrane peels away from cell wall

Active transport → respiration
- against concentration gradient
- carrier protien
- Anything which effects respiration effects active transport

Biological molecules

Carbohydrates → CHO

↓

plants = starch

↓

body turns to glucose

↓

goes to blood

↓

liver as glycogen

Protiens → CHON

↓ peptide bonds

↓ amino acids

↓

protien molecule

Fats → CHO

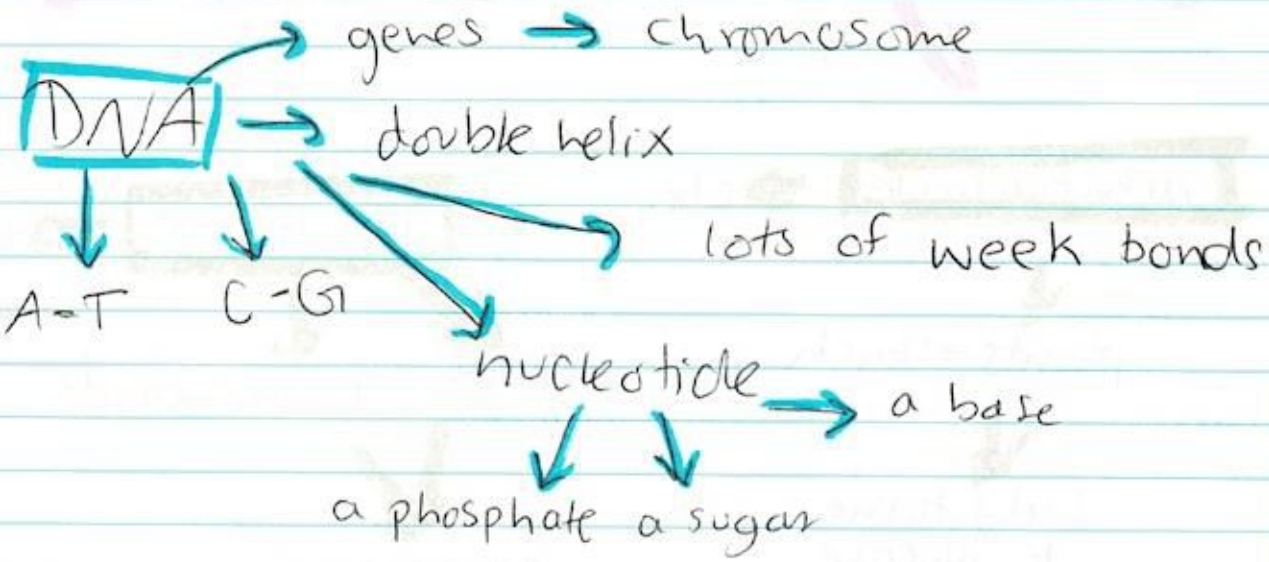
↓

1 glycerol

↓

3 fatty acids

- Starch → iodine → black - blue. → og yellow/brown
- Reducing sugars → Benedic's → green yellow orange → blue
- Protien → biuret → purple/lilac → og blue
- Fats → fat + ethanol + water → cloud white
- Vitamin C → DCPIP → clear → blue og.


DNA
genes
chromosome
double helix
lots of week bonds
A-T
C-G
nucleotide
a base
a phosphate
a sugar

Enzymes

Brakes down large molecules

Building large molecules from smaller ones

Converting one small molecule into another

properties

effected by PH

& temperature

can denature an enzyme breaking down it molecules.

used again

catalyses 1 reaction

all protein

catalyst
biological catalyst
substrate
product
complementary
active site
kinetic energy
optimum

active site
optimum temperature is the maximum rate of reaction.

Plant Nutrition

$$6CO_2 + 6H_2O \xrightarrow[\text{chlorophyll}]{\text{light \&}} C_6H_{12}O_6 + 6O_2$$

Oxygen is a by-product. Most foods originate from plants

* Starch leaf test

→ boil leaf → put in ethanol → put eth + leaf in hot water. 10

→ wash in cold water → iodine on it → blue = ✓

Photosynthesis → light → de-starched plant → Cover some with foil → leave in sun → test for starch

Photosynthesis → water

Photosynthesis → chlorophyll → de-starched leaf (variegated) → leave in sun → test for starch

Photosynthesis → carbon dioxide → put every thing it needs except CO_2. → Soda lime → test for starch

Glucose → cellulose → cell walls

Glucose → sucrose

Glucose → Starch → night

Glucose → sugar

Glucose → oil → seeds

Glucose → nitrate → amino acids

Inside a leaf :-

- cuticle reduces water lose
- upper epidermis layer of clear cells
- palisade mesophyll lots of chloroplast for photosy...
- Spongy mesophyll cells round lots of air space.
- Vein xylem phloem
- Guard cells open and close stomata
- Stomata pores allows gases out

lack of ~~high~~ magnesium → yellow leafs

* tightly packed
* many chloroplasts
* Leaves are thin → less travel
* Large spaces → fast diffusion
* Xylem brings water + ions
* phloem takes away sugar

Stomata

→ during day open
→ water osmosis
→ CO_2 in
→ O_2 out
→ H_2O out
→ Dry weather close

Animal Nutrition

Balanced Diet
- → minerals → metabolism
- → carbs → provide energy → BMR
- → fibre
- → vitamins → metabolism
- → protiens → growth
- → fats → provide energy
- → unsaturated fats → mono, poly

obesity
constepatio
Kwashior ko
marasmus

* Vitamin C → citrus → repair → scurvy
* Vitamin D → Sun, milk → immunity, bones → rickets
* Iron → liver, eggs → red blood cells → anaemia (tired)
* Calcium → milk, fish, green veg → bones → rickets + muscle weak.
* Fibre → corn cerals → adds bulk → reduces cholesteral

Ingestion
Digestion
Absorption
Assimilation
Egestion
} Stages

mechanical digestion
→ mouth, muscle contraction, in stomach, bile/emulsifica-ion in small intestine

Chemical digestion
→ enzymes, protien → protase
Starch → amylase
Fat → lipase

Teeth → incisors (8) → Chisel/bitting & cutting

→ Canines (4) → Pointed/tearing

→ premolars (8) → cusps/grinding

→ molars (12)

↓

= premolars → Chewing

→ Enamel

→ dentine

→ cement

→ pulp Cavity

Food → chewed with saliva → bolus → oesphagus → peristalsis

↓

pushes food down to stomach → gastric Juice

↓

protolease/ Pepsin

↓

HCL → best for Protease

→ kill bac

→ Chyme → pyloric sphincter → Small intestine

Salivary glands → mucus

→ amylace

Plant Transport

Xylem

- one direction
- root
  - absorbs water + mineral ions
  - → root cap
    - → phleom
    - → root tip
    - → xylem
    - → cortex
  - → up xylem to stem leaf flower
  - → cambium makes new x & p
  - → vascular bundle (3)
  - → epidermis reduce water lose

phloem

- sucrose → complex sugar
- amino acids
- hormones
- → from leaves to
  - roots
  - flower

ROOTS

- root hairs
  - water by osmosis
  - down wpg
  - minerals by active transport
- xylem
  - empty. water is pulled by evapouration
  - Transpira-tional pull
    - Wilting
    - light → stomat opens
    - potometer
    - humidity → no concentration gradient
- phloem
  - Translocatio
  - sucrose
    - respiration
      - Starch Storage
      - cellulose new cells
      - stored in fruits.

Translocation is the movement of sucrose amino acids from the leaves to places of growth

Transpiration is the evapouration of water at the mesophyll → diffusion of water through the stomata.

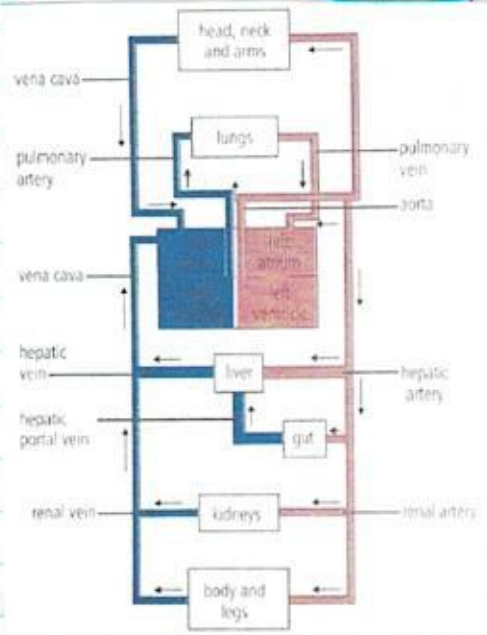
Transport in humans

HEART

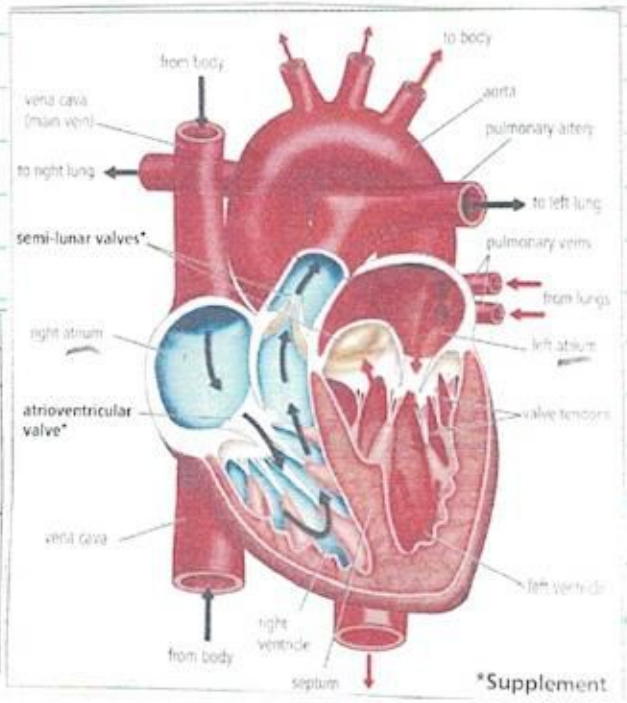
- arteries away from heart
  - thick outer layer
  - small space for blood flow
  - more pressure
  - muscle with elastic fibres.
  - Arterioles → Venules → Shunt vessels
- veins back to heart
  - semi-lunar valves → avoids blood flowing back
  - oxygenated blood comes from lungs
  - left side pumps to rest of body and back
- capillaries connect veins & arteries
  - one cell thick
  - to allow substances to pass
  - Close to cells to give oxygen and nutrients
  - Smallest blood vessels
  - from arteries

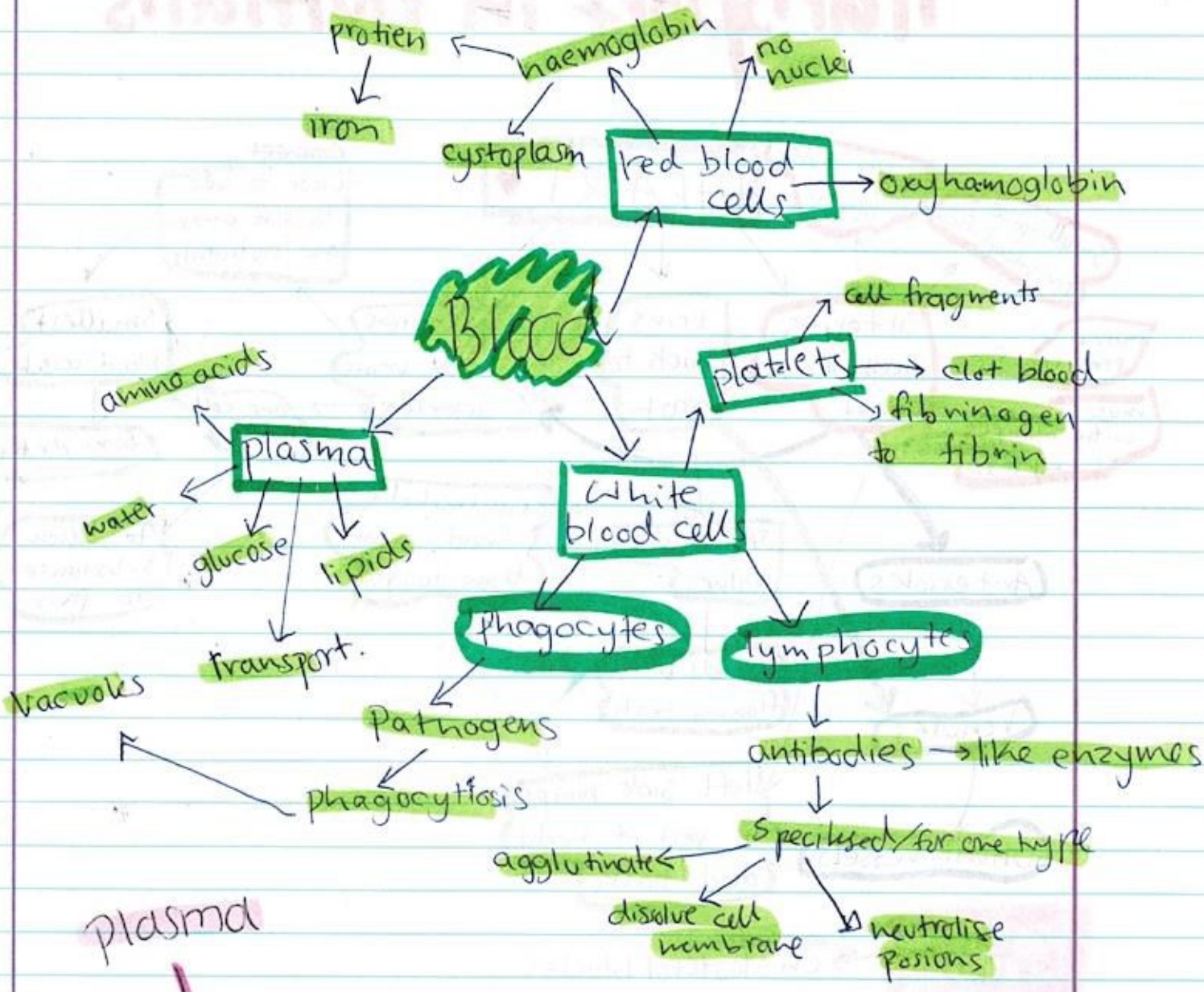
CHD

- → cholesterol blocks coronary arteries
  - → thrombosis → angina
- → cardiac arrest
- ← smoking
  - stress
  - gender
  - genes
  - age
  - diet



vessel	organs			
	heart	lungs	liver	kidneys
bringing blood to organ	vena cava to right atrium; pulmonary vein to left atrium	pulmonary artery	hepatic artery; hepatic portal vein (see page 144)	renal artery (see page 146)
taking blood away from organ	pulmonary artery from right ventricle; aorta from left ventricle	pulmonary vein	hepatic vein (see page 144)	renal vein (see page 146)





plasma

↓

tissue fluid → lymph capillaries → lymph

↓

tissue to heart → subclavian veins → vena cava

lymphocytes → antibodies

Disease & Immunity

pathogens → bacteria
→ viruses
→ protoctists
→ worms
→ fungi

Active

pathogens → antigens
lymocytes → antibodies

helps phagocytes find bacteria
→ bacteria group
→ stop from moving by flagella
→ Antitoxin neutral toxin
→ hole weak osmosis burst.

Active immunity → vaccination

Passive Immunity → neutralise toxins
→ Anti-venom from horse who have venom
→ isn't long term

hygiene
mass vaccination

outer skin
mechanical
chemical
→ hydrochloric acid in stomach

Blood defence
→ white be.
→ phagocytes
→ lymphocytes
→ anti-bodies

Autoimmune disease
→ diabetes
→ tiredness
→ weight loss
→ thirst
→ multiple Sclerosis

11

Gas exchange in humans

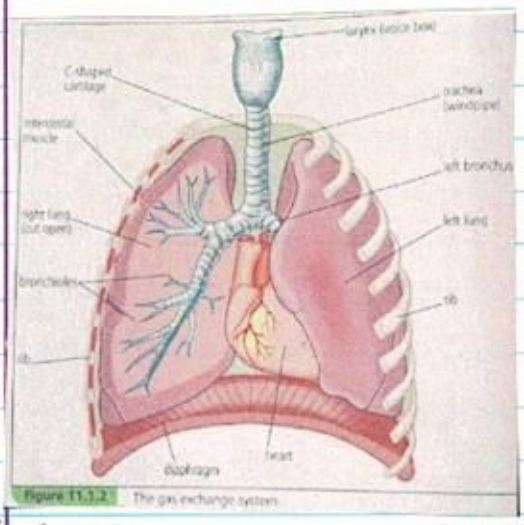


Figure 11.3.2 The gas exchange system

Alveoli
- surrounded by cappillaries
- Thin walls
- moist
- Large surface area
- cell thickness
- good blood supply

* Test for CO_2 is Limewater.

* Cilia & nose hair clean air going in.

* The lungs are spongy & are protected by the ribs & sternum.

* Oxygen dissolves in water lining alveoli and travel through capillary to haemoglobin.

* An increase in CO_2 triggers the brain to increase breathin in order to bring up th PH of the blood.

* The diaphram is a sheet of muscles which thorax from the abdomen.

* The intercostal muscles move the ribs

* larynx is your voice box

* Your trachea branches to form 2 bronchi. Then to smaller bronchioles. Alveoli.

* Epiglottis is a flap which covers the larynx.

* C-shaped cartilage.

Breathin in	Breathing out
- internal intercoastal relax - external contract & lifts ribs. - Diaphram contracts & flattens. - more volume less pressure. - Air goes in.	- internal intercoastal contract - external relax - lowers ribs - Diaphram relax bulges up. - Decrease volume. - Air out.

12

Respiration

Aerobic respiration

* glucose + oxygen → carbon dioxide + water + energy

* $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + energy

18

Energy

- muscle contraction
- cell division & growth
- absorption of nutrients ingut by a.t.
- sending impulses along nerves
- protein synthesis. enzymes antibodies
- Regulate body temperature

mitochondria
↓
stores
our energy

Anerobic respiration → no oxygen, less energy

↓

energy remains in L.a. & alcohol.

↓

not completely broken down

* glucose → lactic acid + energy

* $C_6H_{12}O_6 \rightarrow CH_3CH(OH)$ + energy
yeast ↓ COOH

* $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$ + energy
Alcohol

regulate temp
growth and cell division
muscle contraction

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + H_2O$ + energy

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + H_2O$ + energy

$C_6H_{12}O_6 \rightarrow 2C_2H_5OH$
$2C_2H_5OH$
$2C_2H_5OH$

Excretion

* Excretion is the removal from the body of the waste products of metabolism, toxic material & substances in excess.

* The 2 main excretory products are Carbon dioxide and Urea.

- CO_2 in the lungs during respiration
- Urea in liver from amino acids. Goes to kidney. Leaves as Urine.

* Deamination is the breakdown of excess amino acids in the liver to form Urea.

* Assimilation food becomes cells. Absorbed. Liver does this a lot.

creates fat

glucose → glycogen

amino acid → protein
→ plasma P.
→ breaks down extras → fibrinogen

makes Cholesterol.

Lungs Liver Kindneys

Urea
amino acids

Blood enters kidneys through renal arteries

Renal vein carries it away from the kidney

capillaries called glomerulus

Coordination & response

human nervous system

- central nervous system
- peripheral nervous system
  - Spinal nerve
  - cranial nerve

neurones are the cells...

- Sensory → impulses from sense organ to brain
- motor → impulses from the brain to effector organ
- relay → connect motor & sensory

* reflex arc

* Stimuli is a change that happens that causes a change in your body

* Receptors are the cells that detect stimuli.

* Effectors are the organs that detect & respond to stimuli.

* Simple reflex is an involuntary action.

- cell body → dendrites
- axon (really long)
- myelin sheath
- neurons end by connecting to another or a ~~neu~~ effector.

* The gap between 2 neurons is called synapse. 20nm

chemical transmiter substance carries the impulses between the gap.

* Gives → presynaptic
  recives → postsynaptic

DRUGS

* A Drug is any substance taken into the body which alters or influences chemical reactions in the body.

- medical drugs (for pain...) Aspirin, & antibiotics
- mood enhancing drugs (alter sensory perception) Paracetamol, morphine, Alchohol, nicotine & caffeine (s.a.)

Interferes with the nervous system

* Illegal drugs are called recreational drugs (severe effects).

Urine tests → check for drugs (from liver)

e.g.
- cocaine
- ecstasy
- amphetamines
- Heroin

→ feeling of well being & energy

Interferes with the nervous system

* Antibiotics are a group of chemicals made by microorganisms that are used to kill pathogens. (fungi & bacteria).

* Pericillin was the first antibiotic to be discovered. (Stops cell wall formation), many bacteria have become resistant to them.

* heroin is a compound modified from morphine. → depressant (alchohol) slows nervous system

* Morphine → opium poppies smoking similar to endorphins
* Body gets used to drugs, making body not produce any of its own pain-killers.
→ get a tolerance to it.

snifting which provides relif injecting from pain. Euphoria.

HIV gangrene

* Alchohol is absorbed into the blood quickly. Liver cells break it down and slowly decreases it concentration.

men > women

* Causes crime.

withdrawal → sleepless vomiting cramps hallucinations

- loss of coordination
- Slower reaction times
- loss of self-control

Anabolic steroids
→ testoterone
→ protein building effect
→ mute muscle growth
→ agression / baldness
→ kidney liver damage

Women
→ male features
→ facial hair
→ irregular

* Smoking is associated with diseases such as bronchitis, heart disease & lung cancer

* Tobacco smoke consists of nicotine, tar, carbon monoxide & smoke particles

addicts → tolerence
↓
need more
↓
Social problems ←
↓
health
↓
Stomach ulcers
brain damage
heart dieases
fatty liver

16a

Reproduction

* Asexual reproduction is when there is only 1 parent. Offsprings are genetically identical → bacteria → fungi → plants

Xylem → water ions
phoem → sugars...

→ any varration is due to the effectos of the bacteria → fast → species can survive (s) varrotic → Compete etition for resources

* Pin mold fungus reproduces Asexually by making spores which spread to a damp surface. → seeds wasted in unsuitible place (Sexual reproduction) → no varration in Asexual reproduction (diesease)

fungus → spores → hypha → mycelium → sporangia

* Potatoes reproduce asexually by means of stem tubers. The parent grows them underground. Potatoes also can produce sexually.

crop monoculture → just 1 plant in 1 field.

Pollen grains are spikey & sticky.

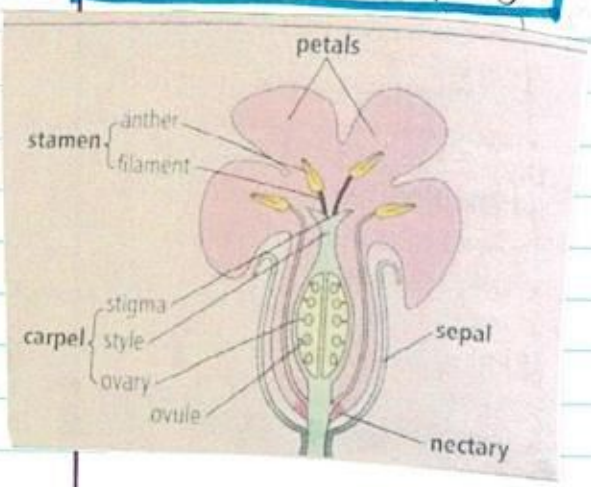
* Sexual reproduction is when there are 2 parents. They are not identical to the parents. Half from mother half from father. Varration in offspring.
- Sperm cell
- egg cell
- gametes
- nucki in pollen grain
- fertalisation

wind pollenated

→ wind transports pollen grains. Pollen small & Soft
→ winds pollenated are smal
→ no scent or nectar
→ Loads of pollen.
→ Stigmas outside feathery so more surface a.

Incect pollenation

* Pollen grains from anther of 1 flower to the stigma of another flower.
→ ~~feathery~~ large
→ bright colour Sented
→ Stamen → male organ (& con growth)
→ Carpels → female organ
→ ovules in overy → egg cells present



* Self pollination occurs when pollen is transfered from anther to a stigma of the same plant

* Cross Pollination

* When pollen grain is placed on the stigma, it grows down towards the ovule reaching the egg. (pollen tube contains anther & filament)

* Seeds need to germinate
  - Water to swell breaking the seeds coating. Cells absorb it to, they develop vacuoles
  - Oxygen for aerobic respiration (embryo needs energy)
  - Warm temperature

* Nucleous enters the ovule & fuses with ~~with~~ the egg cell nucleous.

- results in zygote
- Zygote devides & forms an embryo
- & ovule forms seeds with the embryo
- Seed grows...

Male reproductive

* Testis → produce gametes
  → testosterone (hormone)

↓

located in scrotum (outside) (decreases temp)

* Sperm duct carries

Prostate glands → Sperm cells ~~Sperm cell~~ ~~Sperm~~ → urean or semen

Sugors
mucous
(pro energy)

+ mucus
+ sugors

- Sperm cell
- egg (ovum) cells

16 c

Reproduction

* Sperm cell is a specillised cell that is adapted by having a flagellum. → head of sperm contains dna & enzymes

* An egg cell is bigger than a sperm cell as it stores food required to grow. → A fertilised cell contains half of the mothers & fathers Chromosomes

Once a sperm cell enters, the jelly coat changes so no more sperm can enter

ova * eggs are released every 28 days If fertalisation occurs the egg becomes a zygote, then embryo which attaches to the uterus & develops it a fetus

* 23 chromosome from each parent (haploid) * fertilase cell is diploid * cells can survive 2-3 days in the oviduct. * pregnency is the time between fertilisation & birth

* female reproductive system
- oviduct
- ovary
- uterus lining
- uterus wall
- cervix (neck)

* enzymes on the sperm cell digest a pathway thought the jelly coat.

* Impantation is when the embryo implants itself into the lining of the uterus. The embryo gets nutrients & oxygen from blood vessles from by diffusion.

* umbilical cord gets nutrients

* The embryo causes the developing of the placenta

* Amniotic fluid protects it from movement. placenta is similar to lungs & small intestine. fetus gets all food

Progesterone prepar uterus

* Oestrogen is a hormone that develops the body

* Only head enters the egg. Millions of sperm cells are produced due to the few chances that fertalisation happens.

1) looks like a tadpol, no arm formation heart beating
2) face limbs & looks human, most organs are formed
3) herves & muscles
5 (4) fingernails hair eybrows develop
7) can feel movement (almost complete)
7-9) size increases

Reproduction

* Ante-natal care & birth

- calcium → growth of bones
- iron → red blood cells
- carb → energy for the mum
- proteins → new tissues

* No smoking & no alcohol. No drugs since everything crosses the ~~pa~~ placenta. → underweight or premature
* Mother's milk provides anti-bodies for the baby. This is called passive immunity.
* Bottle / powerded milk isn't as beneficial as mothers milk.

* Baby turns with its head above the cervix. Oxytocin is relased that stimulates contractions. Labour. Baby is birthed.
* Umbilical cord is tied & cut.
* placenta comes out after.
* Epidural stops pain receptors to the brain.

* 10 - 14 follicks ~~Stra~~ start to develop & sperms are made

Produced pituitary gland ↓ hormones

SSC

* Hormones coordinate activity of ovaries & uterus.

* Males → testosterones
- male organs
- sperm cells
- hair on face
- deeping of voice
- muscles

→ ends at 18years

Folicks develop in ovaries ↘ bursts it relases egg cells & they come out of our body with menstrual cycle.

* Female → oestrogen
- female organs
- menstrual cycle
- hair growth
- hips & breasts

* If pregnancy doesn't occur lining breaks down. If it does a hormone causes it to thicken further

follicle remains in ovary duct & reserve more eggs.

menopause → cycle stops 45-55

* Follicle stimulating hormone → pituitary gland
* Luteinisting hormone
* Oestrogen → ovary
* progesterone

they reach ovaries through blood.

FSH → Oest

Oestrogens → repair of lining (thickening) → Stops FSH

LH → yellow body forms

Oestrogen → increase at 14
progesterone → increase at 21
slowly → stimulates p.g to secreate LH

Methods of Birth control

- Natural methods
  - rhythm method
- Chemical methods
  - the pill
  - UDI → contains hormones
  - IUS → mucus becomes thick
  - contraceptive implant → 13-8 weeks; relases progesterone (3 years)
- Barrier methods
  - cap /diaphram
  - femidom
  - condom
  - Spermicides
- Surgical methods
  - vasectomy
  - Sterilisation

Fertility → fertility drugs (FSH) for eggs

- In virto fertilisation → eggs & sperms mixed together → placed back after fertalisation
- Artifical insemination → donor

* HIV's are composed of protein & DNA. It could lead to AID. It weakens the immune system. HIV destroys lymphocytes. It reduces the T lymphocytes which relase anti-bodies. AIDs is the disease brought on by the weakening of the immune.

* HIV is transfered throught blood & Semen. Unborn babies are at risk of HIV from her blood or milk.

* No cure for HIV/AIDS. (AZT)
Contact tracing
- educate
- use protection
- use clean needles
- eliminate contaminated blood

Inheritace

* The transmission of features from one generation to the next is called inheritance
Chromosomes are made up of a long molecules called deoxyribonucleic acid (DNA)

* 46 chromosomes in the human body are diploid. (each cell) → carries genetic information
→ 23 male
→ 23 female
(hiploid)
haploid (23)
diploid (46)

* Genses are lengths of DNA.
Chromosomes → DNA
↓
proteins ← Genes → alleles

DNA → mRNA → to cytoplasm → mRNA + ribosomes → proteins determains characteristics
(converted)

Process of making proteins

* your DNA determains what enzymes to use.
* 3 are paired for amino acids

* DNA
- Adenine
- Thaymine
- Cytosine
- Guanine

* RNA
- Adenine
- Uracil
- Cytosine
- Guanine

Mitosis is genetically identical
Meiosis is not genticlly identical due

* Mitosis is a type of nuclear division that occurs during growth & Asexual reproduction.
→ growth
→ repair
→ replacement

dominant
BB → homozygous
Aa → ~~homozygous~~ heterozygous
dd → homozygous
AB → heterozygous

* Meiosis gametes. It is a nuclear division that gives a daughter cell which isn't geneticly identical.
→ ovaries & testes
anters & ovules

pedigree show how features are inherited in families
Captials repersent dominant alleles

Monohybrid inheritance is the inheritance of a single characteristic.

Male → Xy
Female → XX

Codominance occurs when both alleles are expressed in the phenotype as neither is dominant over the ~~over~~ other.

Varriation & Selection

* Varriation is the difference between (within) a species.

* Genetic varriation is the difference between genotypes (DNA/Genes)

* Continuous by genes & environment → range of phenotypes

* A mutation is a change in a gene or chromosome that may cause a change in phenotypic characteristics.

Benzpyrene in cigarettes → mutation

* An adaptive feature helps an organism to survive in its environment.
Fitness → chance of survival

Hydrophytes → no need for xylem
- extensive air spaces for O_2, CO_2.
- no cuticle (no need to stop water loss)
- roots for anchorage

hybrid vigour

* phenotypic varriation is the differences we cannot see like different types of haemoglobin.
- continuous → enviromental factors & genes.
- discontinuous.

* discontinuous by genes → blood groups.

Natural Selection
artifical Selection Selective breading

* Albinos have a genetic muteition causing ~~[illegible]~~ little to no melanin to be produced.

Sickle cell anaemia

Xerophytes
- shiny surface
- stomata close
- less s.a.
- shallow spreading roots
- swollen stems
- waxy cuticle
- pusto.. in stems
- spines

Organism & their Enviroment

producer → plants or bacteria

↓ light energy is ultimate source of energy

↓ exception is deep sea communities

↓ carbs fats protiens

Pyramid of numbers

Energy pyramids
the energy that is transfered is what is contained in the biomass

Food webs
Vegitarian diet can support more people than a diet that has meats.

Consumers → eat plants or other organisms

Herbivores → primary consumers
Carnivores → Secondary consumers (eat herb)
Tertiary consumers → eat carnivores.

Decomposers → fungi & bacteria
energy from waste.

95% → O_2, C, H, N, S, phosphorus

Bacteria & Fungi → feed → decay

Nitrifying bacteria
Nitrogen-fixing bacteria
N → b → die → plants
Denitrifying bacteria
Lightning
→ O_2 + N → N ions → rain → soil
leaching

animal waste → break down → absorb → respired

absorb → carbon, nitrogen

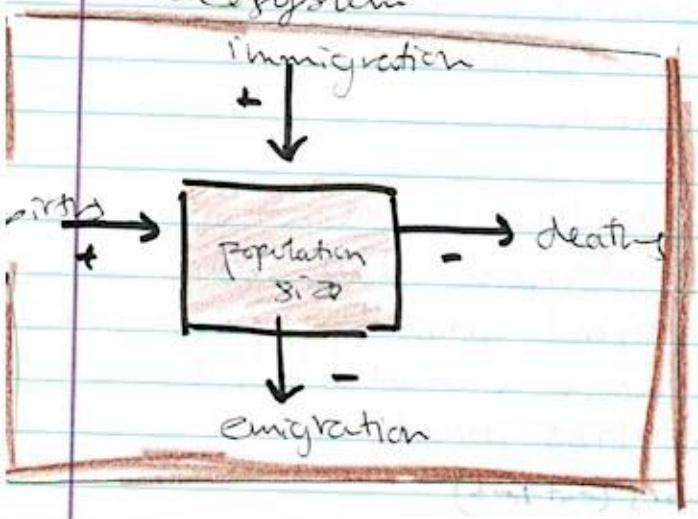
carbon → CO_2

nitrogen → ammonia

CO_2 & ammonia → plant → animal

population is a group of individuals of the same species living in the same habitat

community / ecosystem lives biotic (community) and abiotic (physical factors)



- food
- predation
- diesease

Lag phase → exponential (log) phase → Stationary phase → death phase

Sigmoid growth curve

* Competion for resources
* Predation
* Disease

Human population
- agriculture
- public Health
- Medical care

↓

decrease in Child mortality and death from saviation and malnutrition → increase life expectancy

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Biotechnology & Genetic Engineering

Biotechnology is the use of microorganisms, such as bacteria and fungi.

- B reproduce quickly
- B produce complex proteins
  - enzymes
    - protease → meat
    - pectinase → juice
    - amylase → glucose syrup
  - antibiotics

Bread → dough → ferment → bubble → light

Enzymes in laundry detergents
- protease
- lipase
- amylase
- cellulases
- pentinases → pectins → plant cell wall
- lactase → milk

B → plasmids → cut gene in → multiplies

yeast → no O_2 → fermentation

Ethanol → oil seed rape → biodiesel

biological material

brazil sugar cane juice

Fermentation is respiration without oxygen. Or to produce a useful product.

penicillin → penicillium chrysogenum

- sugar or starch
- Ammonia Nitrogen to make proteins
- Vitamin B complex for respiration
- Temp 30°C pH 6.5

Condition in fermenter

batch culture

Starts after exponential growth

Fermentation vessel → Stainless steel
filled with needed material (+ fugus)
Stirrer keeps microorganisms suspended & temperature constant
Air supply provides O_2

foam breaker harvesting drain

Water cooled jacket removes heat
Probes monitor the temperature & pH!

Genetic Engineering →

involves changing the genetic material of an organism.

Gene → section of DNA that codes for the production of specific proteins.

Herbicide resistance in plants → soil bacterium → h glufosinate → kills weed

→ doesn't kill plant

Human Medicines → insulin, human growth hormones, blood clotting agents

↓ produced by genetically modified bacteria

↙ mass produced

Insect resistance in Maize and cotton.

Additional vitamins in crop plants (Golden rice)

Restrictive enzymes cut the human insulin making gene. → DNA (plasmid) from bacterium

↓ exact match to plasmid (sticky ends)

ligase → recombinant plasmid.

↓ back to bacteria

→ fermenter → purified insulin

Pros	Cons
- Solving global hunger	- Environmental Safety
- environmentally friendly	- Food Safety
- Consumer benefits	- Bio-diversity

Human Influences in the Ecosystem

food production → Chemical fertilisers → Intensive farming → too much methane

↓ agriculture machines

pesticides

monoculture → Urine and feaces eutrophication

genetic.e.

Selective breeding

Herbicides kill unessaraly → ruins soil

Selective agents

~~bauxite~~ bauxite ore → aluminium

Coral reef

* Clearance of land for crop production.
* Clearance for livestock and cattle
* Digging mines
* + people = more housing
* human = waste
* Marine pollution

Deforestation
* extinction
* loss of soil
* + flooding
* + CO_2

Eutrophication
* leaching
* algeace grows
* Animals can't eat it all
* Covers surface
Plant ↓ die
* Algae die too
* Bacteria eats
* Uses O_2
* Kills fish

Influences on food chains
* Killing of Large predators
* Killing of large herbivores
* Over fishing
* Unbalance

Sulfur dioxide + nitrogen oxide = acid rain

non/ pollutant pollution biodegradable

Sewage → ↓ O_2 in [redacted] → growth of algae + toxins

CO_2 methan

industrial chemicals → fatal

fertilisers → eutrophication

Solid waste → *explosion* *void*

nuclear fallout → death.

~~Acid rain sulfur dioxide~~

~~Oseste~~ Oestrogen → male (intersex)

Green houses
enhanced G.h effect
They absorb infra-red radiation.
CO_2 & O_2 prevent ↑ returning to space

When acid rain falls on limestone no effect ~~alim~~ aluminiums ions toxic
Acidity is bad for fish.

To combat acid rain
* Low sulfur fuels
* flue gas desulferisation limestone
* Catalytic Converters nitrogen oxides
- All expensive

Resource sustainable resources
Non-renewable resources. → fossil fuels

- presurve fossil fuels
* use f.f. effiently
* reduce waste of energy
* reduce demand for f.f.
* Recycle

quotas ✓
Sustainable development ✓

Primary treatment → remaves large soild
↓
Secondary treatment → Trickle filters
→ air microorganisms break down ...
↓
Tertiary treatment → settling
→ large tank
get rid of sluge
↓
Kill mg.

Exc Extinct
endangered → climate
habitat destruction
hunting over killing
competition.