

Carbohydrates

- Carbohydrates provide us with energy...
- Which chemical elements do they contain? Carbon, hydrogen and oxygen
- All carbohydrates are made up of units of sugar
- What are complex carbohydrates? Complex carbohydrates such as starch and cellulose are made up of long chains of simple sugar units bonded together
- How are they made? They are made in a reaction in which a water molecule is released when the bond between sugar units is formed (a condensation reaction)
- Carbohydrate rich foods? Bread, potatoes, rice and pasta
- What is most of the carbohydrate food broken down into? Glucose
- Where is glucose used? Glucose is used in cellular respiration to provide energy for cells
- Used in plants...? Carbohydrates in the form of cellulose are a very important support material in plants

Lipids

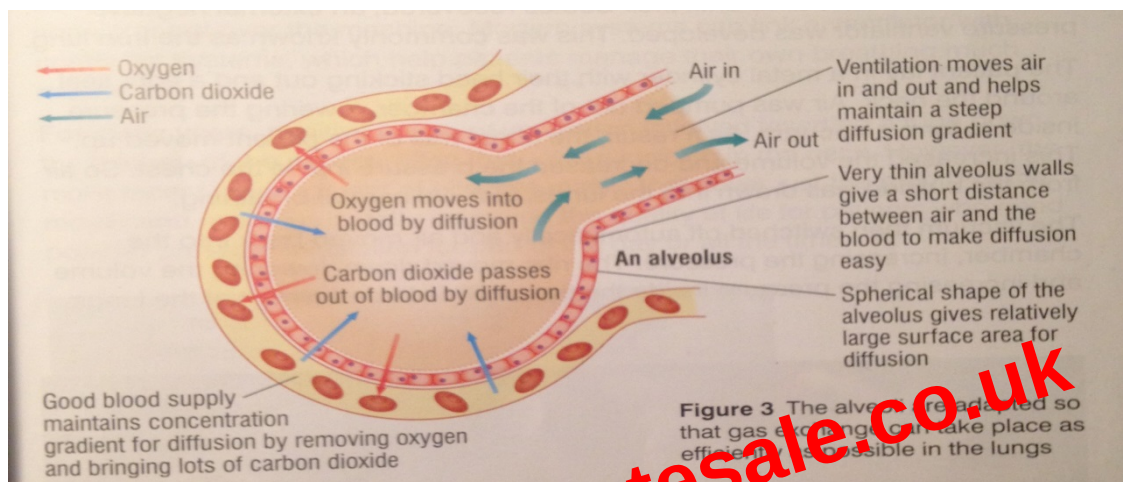
- What are lipids? Lipids are fats (solids) and oils (liquids)
- Lipids are the most efficient energy store in your body and an important source of energy in your diet
- Which chemical elements do they contain? Like carbohydrates, they also contain carbon, hydrogen and oxygen
- Insoluble or soluble in water? All lipids are insoluble in water
- What is the molecular structure? Lipids are made up of three molecules of fatty acids joined to a molecule of glycerol. Glycerol is always the same, but the fatty acids vary
- Lipid-rich foods? All the oils (olive oil etc) as well as butter, margarine, cheese and cream

Proteins

- What are proteins used for? Proteins are used for building up the cells and tissues of your body as well as all your enzymes
- What are they made up of? Carbon, hydrogen, oxygen, and *nitrogen*
- Protein-rich foods? Meat, fish, pulses and cheese
- What's the molecular structure? A protein molecule is made up of long chains of small units called amino acids
- The long chains of amino acids that make up a protein are folded, coiled and twisted to make specific 3-D shapes. These specific shapes enable other molecules to fit into that protein.
- Bonds that hold proteins in these 3-D shapes? The bonds are very sensitive to temperature and pH, and can be easily broken
- What happens if the bonds break? The shape of the protein is lost, and may not function any more in the cells

Adaptions of the alveoli

- What's the job of the alveoli? The alveoli provide a very large surface area and a rich supply of blood capillaries
- Why? This means gases can diffuse in and out of the blood as efficiently as possible
- Why do alveoli have a 'rich supply' of blood capillaries? This maintains a concentration gradient in both directions... the blood coming to the lungs is always relatively low in oxygen and high in carbon dioxide compared to the inhaled air
- Thickness of layer of cells? The layer of cells between the air in the lungs and the blood is very thin, which means diffusion can take place over the shortest distance possible



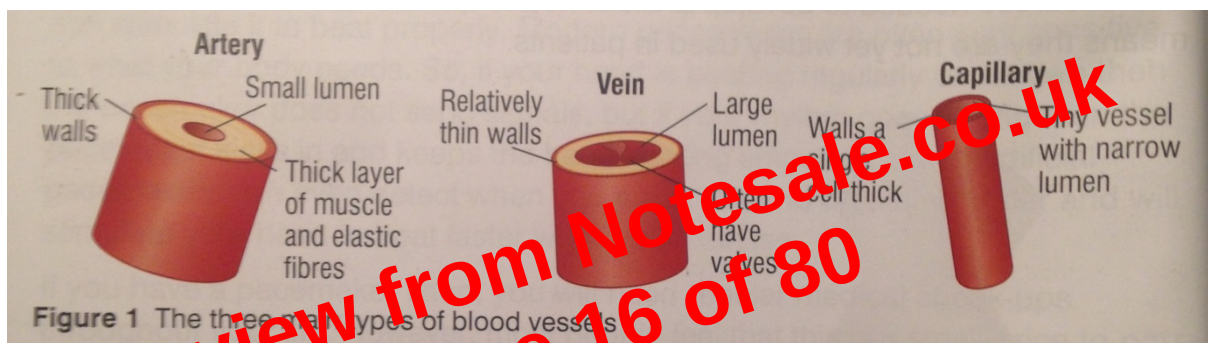
4.2 Artificial breathing aids

- Mechanical ventilation systems work in two main ways...
 - Negative pressure and positive pressure...
- **Negative pressure ventilators** Relative pressure ventilators cause air to be drawn into the lungs, and it is then exhaled passively as the chest collapses down
- Polio sufferers? Polio is a disease that can leave people paralyzed and unable to breathe. To keep polio sufferers alive until their bodies recovered, an iron lung is used...
- How does the iron lung work?
 - Metal cylinder from neck to abdomen
 - Air is pumped out of the chamber which lowers the pressure inside
 - As a result, air is forced into the lungs
 - The vacuum is then switched off automatically, the pressure increases again, and air is forced out of the lungs
- **Positive pressure ventilators?** A positive pressure ventilator forces a carefully measured 'breath' of air into the lungs under a positive pressure
- Benefits of positive pressure breathing?
 - Patients do not have to be placed inside an iron lung machine
 - The equipment can be used at home and the patient can move about
 - Patients can have some control over the machine; modern systems can link a ventilator with computer systems, which help patients manage their own breathing much more easily

- They carry the blood really close to every cell in the body to exchange substances with them
- Walls permeable? They have permeable walls so substances can diffuse in and out easily
- What is their job? They supply food and oxygen, and take away waste like CO_2
- Thickness of walls? Usually only one cell thick.
- Why only one cell thick? This increases the rate of diffusion by decreasing the distance over which it has to occur

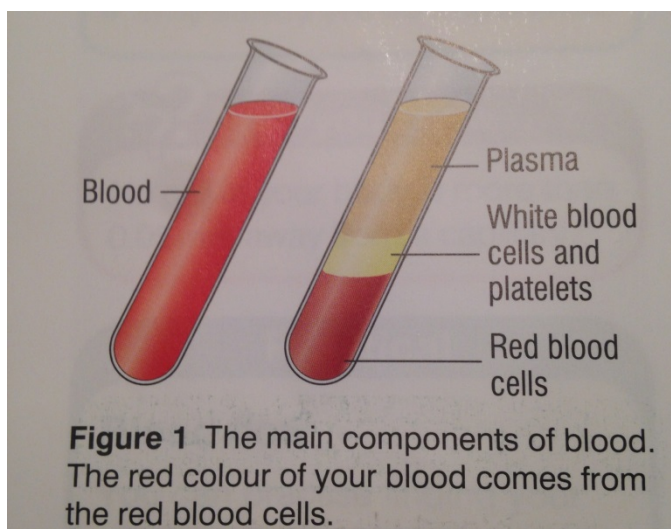
Problems with blood flow through the heart

- What's coronary heart disease? Coronary heart disease is the name for a heart disease caused by problems with the coronary arteries that supply the heart muscle with oxygenated blood, it's usually as a result of blockages caused by fatty deposits
- How problems are often solved? By using stents
- What is a stent? A stent is a metal mesh that is placed in the artery.
- How does it work? A tiny balloon is inflated to open up the blood vessel and the stent at the same time. The balloon is then deflated and removed but the stent remains in place, holding the blood vessel open

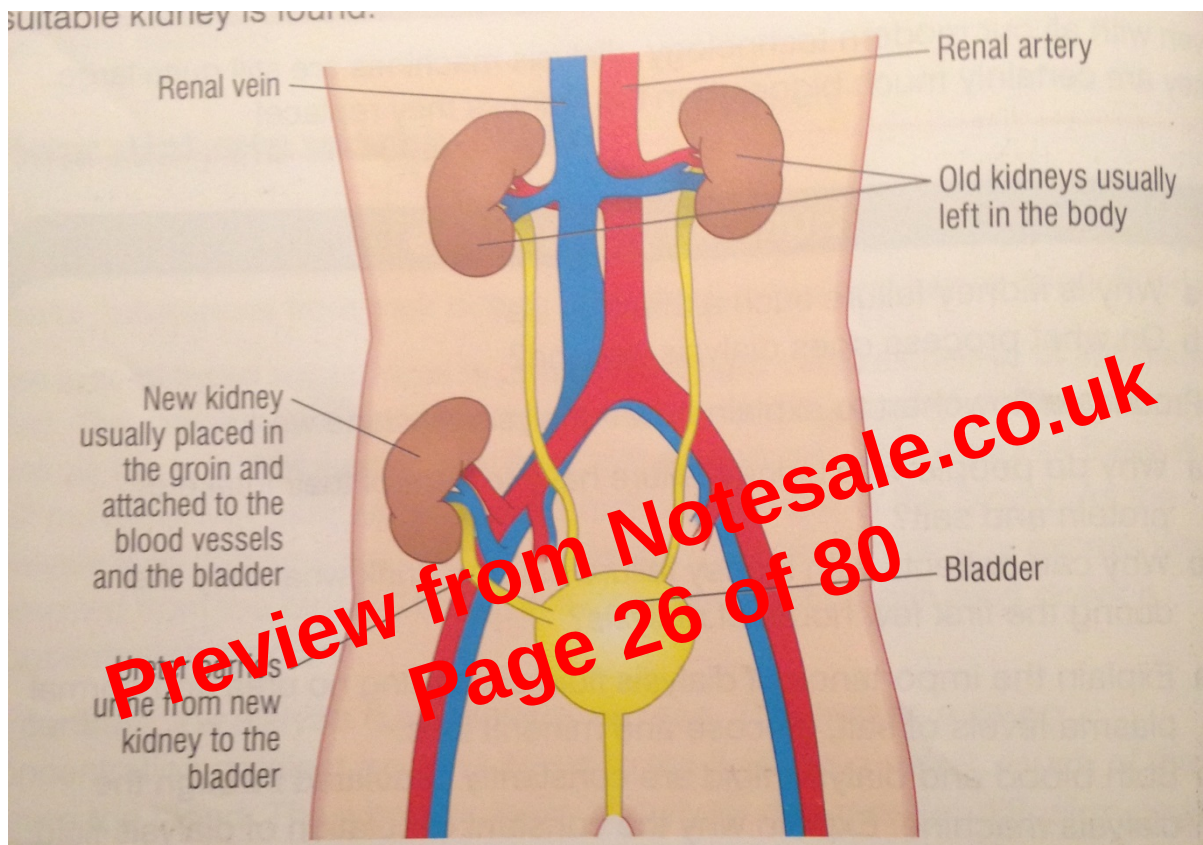


REST OF 5.3 NOTES IN FILE

5.4 NOTES IN FILE



- They prevent patients from dealing effectively with infectious diseases, so they have to take care they don't become ill...
- Transplanted organs don't last forever... The average transplanted kidney works for around nine years, although some last much longer...
- What happens once the organ starts to fail? The patient must return to dialysis
- Disadvantages of transplants?
 - You have to take medicine every day of your life in case the kidney is rejected
 - You need regular check-ups to see if your body has started to reject the organ
 - You may never get the chance of a transplant at all



7.6 Controlling body temperature

- What can affect your internal body temperature?
 - Energy produced in your muscles during exercise
 - Fevers caused by disease
 - The external temperature rising or falling
- What controls your core body temperatures? The thermoregulatory centre in the hypothalamus of the brain.
- What does the thermoregulatory centre consist of? It contains receptors that are sensitive to temperature changes in the blood flowing through the brain itself
- What temperature difference can the receptors detect? As little as 0.5°C
- What happens if your temperature starts to go up?

- If you are diagnosed with type 1 diabetes, what does this mean... It means your pancreas does not make enough (or any) insulin, so your blood glucose concentration is not controlled
- What are the effects of type 1 diabetes?
 - Your blood glucose levels get very high after you eat
 - Eventually, your kidneys excrete glucose in your urine
 - You produce lots of urine and feel thirsty all the time
 - Without insulin, glucose cannot get into the cells of your body, so you lack energy and feel tired
 - You break down fat and protein to use as fuel instead so you also lose weight
 - Type 1 usually starts in young children and teenagers
- If you are diagnosed with type 2 diabetes, what does this mean... The pancreas still makes insulin, although it makes less than your body needs. Also most importantly, your body cells stop responding to your own insulin
- Common or uncommon? Common, gets more common as people get older, and is often linked to obesity and lack of exercise

7.8 Treating diabetes

- What's happened in the past? In the past, there were no effective treatments for diabetes and people with the condition eventually died...
- How can type 1 diabetes be treated?
 - You need replacement insulin before meals, usually given in a injection
 - This injected insulin allows glucose to be taken into your body cells and converted into glycogen in the liver... this also stops the concentration of glucose in your blood from getting too high
 - As blood glucose levels fall, the glycogen is converted back into glucose...
- What do you also need to be careful of?
 - The levels of carbohydrates you eat
 - Eat regular meals
 - Regular exercise is needed, however this needs careful planning to make sure blood sugar levels stay steady

Using insulin from other organisms

- Insulin from pigs and cows was used to treat diabetics... however sometimes there wasn't enough insulin to go around...
- In recent years, genetic engineering has been used to develop bacteria that can produce pure human insulin. This is genetically identical to natural human insulin and the supply is constant

Curing type 1 diabetes

- Doctors can transplant a pancreas successfully however the operation is quite difficult and risky... also not enough donors available... also patient still has to take immunosuppressants
- Scientists hope that eventually they will be able to genetically engineer faulty human pancreatic cells so they work properly; then they will be able to return them to the patient with no rejection issues

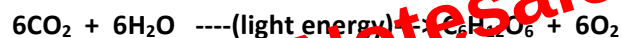
- Some antibiotics kill a wide range of bacteria, but others are very specific and only work against very specific bacteria. It is very important that the right antibiotic is chosen and used
- Why don't antibiotics kill viruses? Antibiotics do not destroy viruses because viruses reproduce inside your cells. It is difficult to develop drugs that can destroy viruses without damaging your body cells
- Why must new antibiotics be developed? Because of the development of antibiotic resistance

8.6 NOTES IN FOLDER

9.1 Photosynthesis

- What do chloroplasts contain? A green substance called chlorophyll
- What happens during photosynthesis? Light energy is absorbed by the chlorophyll in the chloroplasts. This energy is then used to convert carbon dioxide from the air plus water from the soil into the simple sugar glucose.
- What does photosynthesis also produce? Oxygen, which is released into the air
- EQUATION?

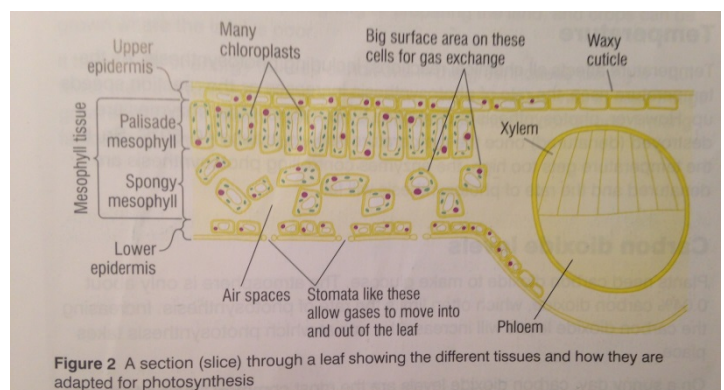
Carbon dioxide + Water ----(light energy)----> Glucose + Oxygen



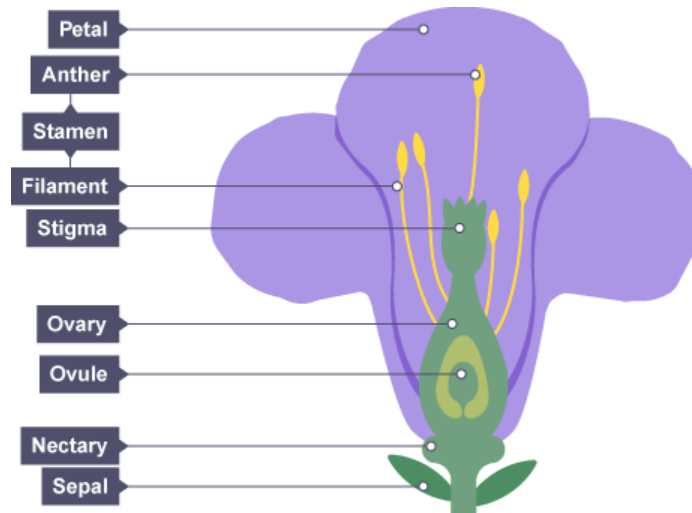
- How is the glucose produced used by the plant?
 - Some is used immediately by the cells of the plant for respiration
 - However a lot of glucose is converted into insoluble starch and stored

Leaf adaptations

- How are the leaves of a plant adapted for photosynthesis?
 - Most leaves are broad, giving a big surface area for the light to fall on
 - They contain chlorophyll in the chloroplasts to absorb the light energy
 - They have air spaces that allow carbon dioxide to get to the cells, and oxygen to leave them by diffusion
 - They have veins, which bring plenty of water in the xylem to the cells of the leaves and remove the products of photosynthesis in the phloem
- How are algae adapted for photosynthesis? Algae are aquatic.
 - They have large surface areas
 - They absorb carbon dioxide dissolved in the water around them



- **Stamens** – male part of the flower... made up of the **anther** (produces large quantities of small pollen grains containing the male gametes) and the **filament** (attaches the anther to the flower)
- **Carpel** – female part of the flower... made up of the **stigma** (where pollen lands during pollination) the **style** (transports the male sex cell to the ovary) and the **ovary** (produces a small number of relatively large **ovules** which are the female gametes). The ovary also often forms the fruit once the ovules are fertilised



Pollination

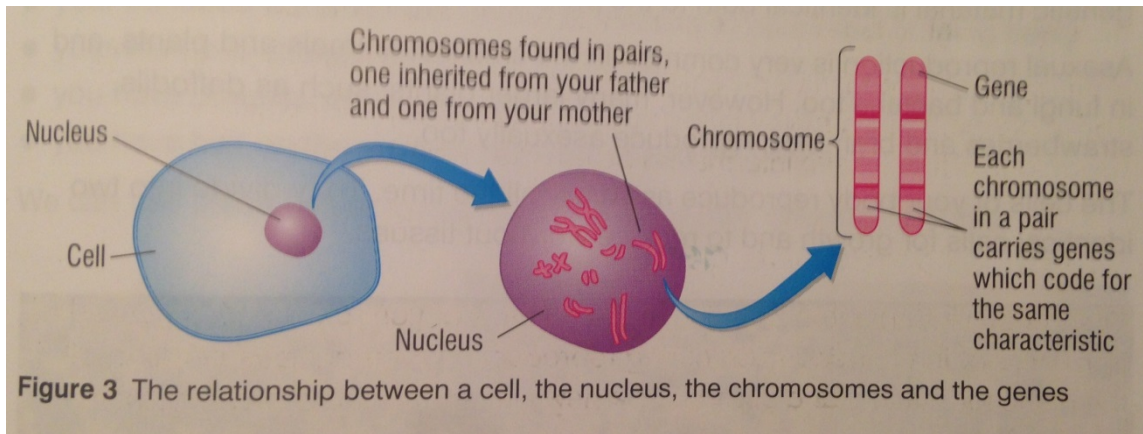
- What is pollination? Pollination is the process whereby the pollen grain is transferred from the anther of a flower to the stigma

Feature	Insect pollinated flowers	Wind pollinated flowers
Petals	Large, brightly coloured; many are patterned to guide insects in	Small, usually brown or green
Scent	Often scented to attract insects	Not scented
Nectar	A sugary liquid made to attract insects	No nectar
Stigma	Found inside the petals so insects brush against it on way to the nectar; may be sticky	Large, feathery; hangs outside the petals to collect pollen from the air; may be sticky
Anthers	Inside the petals so insects brush past on way to nectar	Hang outside petals so pollen blown away by wind
Pollen grains	Relatively few, large and sticky to attach onto the insects that visit the flower	Many, small and light to float easily in the wind

9.10 Fertilisation and fruit formation

- What has to happen for actual fertilisation to occur? The male nuclei from the pollen grain has to travel all the way down the style and into the ovary to fuse with the nuclei in the ovule

- This spiral known as? Double helix
- How many chromosomes in humans? 46 chromosomes... 23 pairs..
- So chromosomes contain? Thousands of genes joined together
- Why will identical twins never be exactly identical? Because of difference in their environmental influences...



- Difference in the characteristics of individuals may be due to?
 - Genetic causes (due to inherited genes)
 - Environmental causes (conditions they develop in)
 - Or both...

10.2 Types of reproduction

- What happens in asexual reproduction?
 - There is no joining of gametes
 - Only one parent
 - There is no genetic variety
- Offspring called? Clones – their genetic material is identical
- Cells in your body reproduce? Asexually
- What happens in sexual reproduction?
 - Male and female gametes join
 - This mixture of genetic information from two parents leads to genetic variety in the offspring
- Where are gametes for sexual reproduction found in plants? Within ovules and pollen
- Where are they found in animals? Called ova (eggs) and sperm
- Different forms of gene known as? Alleles
- Why is sexual reproduction so important? The variety it produces is a great advantage in making sure a species survives

10.3 Genetic and environmental differences

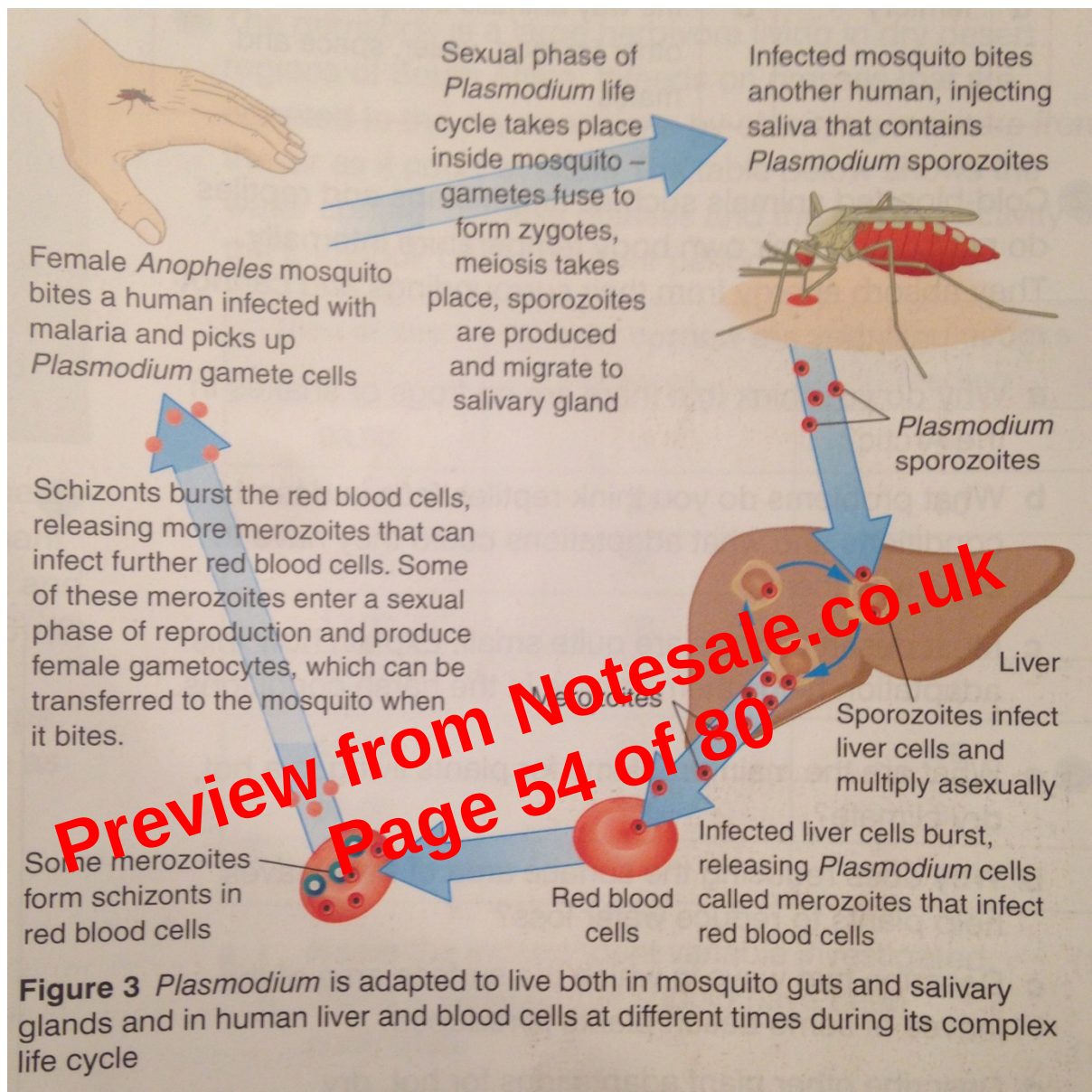
- Inherited human characteristics? Eye colour, your sex, dimples
- Conditions in which an organism develops in are important
- Example? Genetically identical plants can be grown under different conditions of light or soil nutrients, but the resulting plants do not look identical...

3. Gene probe is added to a mixture containing the DNA from embryo
4. UV light is used to detect probes attached to disorder genes
 - If there are no fluorescent responses...? The embryo or foetus does not have the affected allele and is healthy for that genetic disorder...
 - If the probes have attached to the faulty allele and fluoresce...? Then the embryo or foetus is affected by that condition
 - If the screening shows the foetus is affected, the parents have a choice...
 - Keep the baby knowing it will be born with genetic disorder
 - Abort the baby

For Embryonic Screening	Against Embryonic Screening
Helps stop suffering	It implies that people with genetic problems are 'undesirable'... could increase 'prejudice'
Treating disorders costs taxpayers lots of money	Screening is expensive
There are laws to stop or going too far... can't choose sex of baby	

Preview from Notesale.co.uk
Page 45 of 80

- They have hard bodies so they are not damaged when the animal scratches at the itchy places caused by fleas
- Their hind legs are very long and powerful so they can jump from host to host



Tapeworms – internal parasites

- What are tapeworms?
 - Tapeworms are parasitic flatworms, which live in the intestines of their host, and can grow many metres long.
 - They do not feed of the body of the host, but deprive them of their digested food
- How are they specially adapted?
 - They have a head with hooks and/or suckers that are used to attach the tapeworm firmly to the gut wall
 - A tapeworm does not need a mate to fertilise its eggs... the eggs are eaten by another animal such as a cow or pig and this is where their life cycle begins

Plasmodium falciparum – the malaria parasite

- What is malaria caused by in humans?
 - The single-celled parasite *Plasmodium falciparum*
 - Lifecycle? Takes place partly in animals (including humans) and partly in mosquitos
 - The parasite takes a different form in each different stage of its life cycle, and each form is adapted for living in a different place in the animal or mosquito host

The FOUR different forms of the malaria parasite

1. GAMETOCYTES

- When a mosquito sucks blood from an animal with malaria, it takes up *gametocytes*
- The *gametocytes* reproduce sexually inside the mosquito
- In the mosquito's salivary glands the gametocytes turn into a new form called sporozoites

2. SPOROZOITES

- When the mosquito bites another animal, it transfers the *sporozoites* into the animal's bloodstream.
- The *sporozoites* pass through the blood to the liver, where they enter the liver cells.
- Inside the cells, the *sporozoites* rapidly divide asexually to produce a new form - *merozoites*

3. MEROZOITES

- Thousands of merozoites are released from the liver cells into the blood
- They invade red blood cells
- TWO DIFFERENT PATHS (A&B) ARE POSSIBLE AT THIS STAGE...

A: The *merozoites* grows and its nucleus then divides asexually to produce a cell with many nuclei called a *schizont*

B: Some *merozoites* don't develop into *schizonts*. Instead they enter a sexual phase of reproduction which results in *gametocytes*. Red blood cells containing *gametocytes* can be sucked up if the animal is bitten by a mosquito. And so the life cycle begins all over again

4. SCHIZONTS

- The schizont divides to produce many merozoites
- The red blood cell bursts, releasing merozoites into the blood. Toxins are released too, triggering the fever attacks that are associated with malaria
- These merozoites go on to invade other red blood cells and the cycle is repeated
- Infected red blood cells all tend to burst at the same time – the cycles of bursting cells results in the cycles of fever attacks malaria victims get.

14.2 Land and water pollution

- How are humans polluting the land?
 - We use toxic chemicals for farming (e.g. pesticides and herbicides) which although are helpful for farmers, can severely damage the environment...
 - Toxic chemicals are also a problem in industrial waste; it can poison the soil for miles around... example?
 - After the Chernobyl nuclear accident in 1986, the soil was contaminated thousands of miles away from the original accident
 - Almost 30 years on, sheep from some farms in North Wales still cannot be sold for food because the radioactivity levels are too high

Eutrophication

Steps of eutrophication?

1. Nitrates and phosphates are sprayed onto fields as mineral fertilisers
2. The minerals in these fertilisers are easily washed into local sources of water like ponds
3. The nitrates and other mineral ions stimulate the growth of algae and water plants, which then grow rapidly
4. Although some plants die naturally, others will die because there is so much competition for light, and they aren't able to get enough to be able to photosynthesise
5. The dead plant matter provides more food for the microorganisms
6. The respiration of the microorganisms reduces the oxygen levels in the water
7. Aerobic organisms like fish will start to die because of the reduced oxygen concentration

Eventually, the oxygen levels in the water fall so low that all aerobic aquatic animals die, and the pond or stream becomes 'dead'. This is what we call **eutrophication**

- How is eutrophication being combatted in the UK?
 - There are now strict controls on the use of chemicals on farms
 - The same restrictions apply to the treatment of sewage and to landfill sites
- How can pollution levels in water be measured?
 - Oxygen and pH levels are measured using instruments. Water can be analysed to show the levels of polluting chemicals such as pesticides or industrial waste
 - Bioindicators – species such as salmon and bloodworms that can only be found in very clean or very polluted water – can be used to monitor pollution

CLIMATE CHANGE : As Earth's climate changes due to global warming, many scientists think that we will see an increase in severe and unpredictable weather conditions...

RISING SEA LEVELS; If the Earth warms up, the ice caps at the North and South Poles and many glaciers will melt. This will cause sea levels to rise, and there is already evidence to show this happening today. This will mean more flooding for low-lying shores, and eventually parts of countries, or even whole countries will disappear

CHANGES IN MIGRATION PATTERNS; As climates change, migration patterns of birds, insects and mammals may change

REDUCED BIODIVERSITY; As the climate changes, many organisms will be unable to survive and will become extinct, for example the potential loss of polar bears as Arctic ice melts.

- As sea temperatures rise, less carbon dioxide can be *sequestered* in the water, which makes the situation worse. Global warming is a big problem

14.6 Analysing the evidence

- To find out how our climate is changing, scientists are busy collecting data about the environment
- How?
 - Satellites are being used to monitor snow and ice cover, and to measure the temperature of the sea surface
 - The temperature and speed of ocean currents is being recorded to detect changes
 - Automatic weather stations are constantly recording atmospheric conditions
- How can its validity be assured?
 - Data must cover a **wide area**
 - Data must go over a long enough **time scale**
- Observations of a very small area aren't useful. Data taken from one glacier is not a valid way to show that global temperature is changing
- Also, you need to do your observations again and again, year after year
- Scientists can make mistakes, but if lots of scientists get the same result using different methods, it's more reliable, and so probably right. That's why most governments around the world are starting to take climate change seriously

15.1 Theories of evolution

- What does Darwin's theory of evolution by natural selection tell us?
 - It tells us that all species of living things alive today have evolved from the first simple life forms
- When were the first ideas of evolution started?
 - Up to the 18th century, most people in Europe believed the world had been created by God, however by the beginning of the 19th century, scientists were beginning to come up with new ideas