The human body is built of cells, which may be seen under a microscope. Different types of cell cooperate for whole body function. Bone-cells form hard materials for firmness + strength. Gland-cells make chemicals used to digest food and for other purposes. Muscles cells can shorten and lengthen. Shortening them moves bones together and so moves the body.. Nerve-cells carry nerve-currents to muscles, organs + cells.

Life begins as a single cell, an ovum, which is fertilised by another cell, the sperm.. About 200000 ova exist in the female body.. Sperms are made in the male body. The fertilised ovum grows, divides in two, then four, eight, sixteen, thirty two, and so on.

The fertilized egg takes about 280 days for its development in the mother's womb. There the child gets nourishment from its mother's blood,

The child's first act after birth is to cry. In order to take air into its lungs and start the breathing process which will continue throughout life. Soon after birth, the navel is cut because no longer needed

First food after birth is Mother's breast Milk. Gradually the child grows its first teeth (the milk teeth) of which it usually has twenty by the time the child is 2 or 3 years old. As teeth appear the child begins to eat solid food.

Food is needed for three purposes: to build the

body + grow; to replace body cells which wear out; and to repair organs; (2) to provide energy to warm and move the body; (3) to keep the body working + protect it from disease.

Food in a balanced diet is needed for maintaining good health: proteins (peas, beans, egg-white, cheese); Carbohydrates (Starches, Sugars, bread, potatoes, butter, margarine, egg-yolk), or fats; Vitamins + Mineral Salts (Fresh vegetables, fresh fruit, wholemeal bread.

Proteins are body-builders. Carbohydrates + fats are energy providers. Vitamins + Mineral salts are protectors. Milk contains proteins, Carbohydrates, fats, vitamins, + Mineral Salts, + so is an all-round food.

4

Food must be chewed, reduced to near liquid state + mixed with saliva to make it easy to swallow + digest. For this, good teeth are needed.

The permanent teeth are 16 in each jaw, 32 in all. Good food, especially Milk, maintains teeth in health. Brushing regularly is essential.

Three Kinds of teeth are named: Incisors (cutters) Canines (tearers); Molars, flat grinders. (I add 'Nutcrackers'). Each tooth has Pulp (soft centre), Dentine (hard layer) Enamel (very hard outer layer); An outer layer to the root, called Cement.

Chewed swallowed food is broken down into simpler chemicals, this is Digestion, done by digestive Fluids

In the mouth, carbohydrates are partly digested by saliva. Swallowed food goes down into the stomach via the gullet.

In the stomach, another digestive juice starts to digest proteins. The food becomes a semi-liquid paste and passes into the small intestine.

In the small intestine, other digestive juices complete breakdown of carbohydrates, proteins & fats. Digested food is then absorbed through the wall of the small intestine & carried by the blood to all body parts. The remaining liquid passes into the large intestine, where the intestinal walls absorb the water so that the liquid becomes less watery & changes into a semi-solid which passes out through the anus.

The body builds up a skeleton, which in the baby is soft, but hardens as the child grows. The skull is made of several bones, and houses and protects the brain from injury. The spine is made largely of rings of bone, + protects the spinal cord. The ribs 12 pairs are jointed to the spine and form a protective cage for the heart + lungs. The breast bone (sternum) is at the front centre of the rib-cage, + at the top is joined to the inner ends of the two collar bones; at the other end of these at the back are two shoulder blades. The pelvis is at the base of the spine and is jointed to the upper end of the thigh bones, below which are the bones of the lower leg.

The upper arm has one bone (humerus), the forearm two (ulna + radius). The upper leg has one bone (femur) and the lower leg has two (tibia + fibula). In wrist and ankle are a group of bones, and in the palm of the hand + foot, and bones in fingers + toes.

Bones are moved by muscles, which make up most of the flesh. To bend the arm the biceps is shortened + the triceps lengthened. To straighten it this is reversed. Movements of face muscles cause our "expressions". Some muscles control breathing + heart beat etc, during our whole life time. Tendons join muscles to bones. Bones are held together by tough fibrous bands (ligaments).

8

Where bones move over or on each other, they are covered with a soft pad of gristle (cartilage). Joints are enclosed in a bag (membrane) which produces a lubricant.

Nerves control muscles. Nerves have long hairs on one side and treelike processes (dendrites) at the other. Nerve impulses (electrons) pass down the nerves to work the muscles + organs, control digestive juices, etc. The whole nervous system is like a telephone exchange. Inside the spine is the spinal cord. The nerves run to the brain and from it.

In breathing the ribs + diaphragm are used. As

ribs left and diaphragm lowers breath enters the lungs. As reverse movements occur breath is let out. The lungs have millions of tiny air-sacs, these connect to the windpipe by tubes. Air goes in and out via nose and/or mouth. Oxygen breathed in is picked up by blood cells in the lungs and is carried to all parts of the body, + there goes with sugar from food to give energy to the body. Carbon dioxide is given off as waste and exhaled from the lungs.

Excretion of waste materials is via sweat glands in the skin's pores, and via the kidneys, through which blood passes. The kidneys have many small tubules which filter off the waste materials from the blood. Urine goes from the kidneys/to the bladder and is stored till expelled along two ureters

Urine leaves the bladder via a tube (urethra). which is normally closed by a ring of muscle below the bladder. When the bladder is full, this ring is relaxed to let out the urine.

A female's urethra opens to the outside between the legs. Behind this urethra is the vagina, through which a child passes to be born. The virgin female has a thin membrane (hymen) to close the vagina. Around the two openings are folds of flesh (lips) which form the vulva.

The blood system carries oxygen from the lungs and carbon dioxide to them. The heart pumps the blood. It has thick muscle walls. The heart has four chambers, two above (auricles) and two below (ventricle

From the left ventricle the blood goes to most of the body and returns to the right auricle. Then it passes down into the right ventricle & goes to the lungs. From the lungs it returns to the left auricle, then down to the left ventricle to repeat the journey.

Blood from the heart goes along arteries. The return to the heart is via the veins. Where the blood passes from arteries to veins are tiny blood vessels (the capillaries).

Blood has a very large number of red corpuscles (disc-shaped cells) which contain a purplish-red colouring matter (haemoglobin) which carries oxygen from the lungs to the rest of the body. For 500 red cells there is 1 white cell. The white cells attack

disease germs + also make antibodies against germs. Red + white cells float in a pale straw-coloured liquid (plasma) which carries dissolved foodstuffs, wastes etc. round the body.

Hormones are chemicals produced by glands in the body. Hormones act as chemical messengers. The Pancreas (near the stomach) makes a hormone to control use of sugar in the body. The adrenals (near the kidneys) make a hormone to speed the heart and prepare the body for vigorous action. The thymus (above the heart) regulates early growth in the child + adolescent + disappears gradually as we age. The Thyroid (in the neck) makes a hormone which increases energy release in body cells. The Pituitary (just

below the brain) is very important, makes many different hormones, influences body growth and helps change the child to the adult. All the hormones harmonize their work + help the nerves to keep the body healthy. All these glands are present in both sexes, but there are sex glands that differ in Males + females. Females sex-glands (ovaries) and Male sex-glands (testes) become active in Girls about 11 or 12 years old, + in boys a year or two later. Sex hormones pass all round the body + cause changes, hair-growth under the arms + around the genitals. Girls develop breasts, and gain woman-shape. Boys grow hair also on the

face, the voice breaks, their shape becomes more manly. Hormones affect emotions + create an interest in sexuality, make the person more independent in outlook. as adolescence appears. The sex organs grow. The female ovaries (walnut shaped) one on each side of the body, produce ova, one every 28 days (approx). This passes down the egg-tube. Every 28 days the womb lining is renewed. The old lining breaks down and leaves the body via the vagina. in the menstruation process.

The male has two testes in the scrotum between

the legs. The testes produce millions of sperms which are stored in a liquid (semen). The semen may pass along two sperm tubes and leave the body via the penis.

The five special senses sight, sound, touch, taste, smell are our most important senses.

The eye is like a camera which receives light and focuses it on the retina at the back of the eye to make an image. Nerves carry impulses to the 'eye centre' in the brain, and we then see an 'object'.

Sound-waves enter the ear, & vibrate the ear drum, which vibrates three little ear-bones. This sets up vibrations in a liquid in the shell-tube (Cochlea). This liquid sends

vibrations to the ear-nerves; these carry it to the brain + we 'hear' sounds.

The skin has 'touch' nerves just below the surface. The tongue has taste 'buds' sensitive to sweet, sour, bitter + salt substances. The nose has nerves sensitive to smells of all kinds.

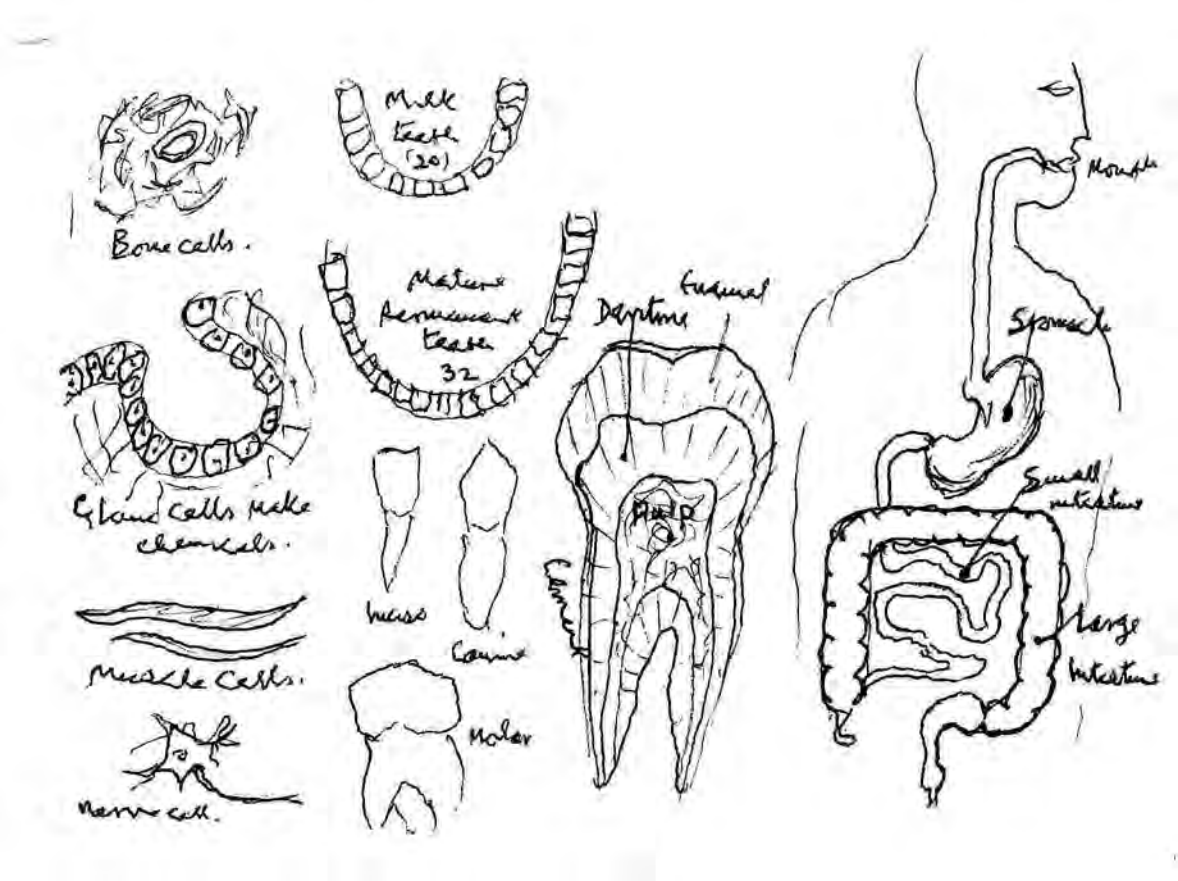
Nerves in joints tell us of our limbs' positions. Others tell us when we are hungry, thirsty, hot or cold. All day + night nerves carry messages all over our bodies.

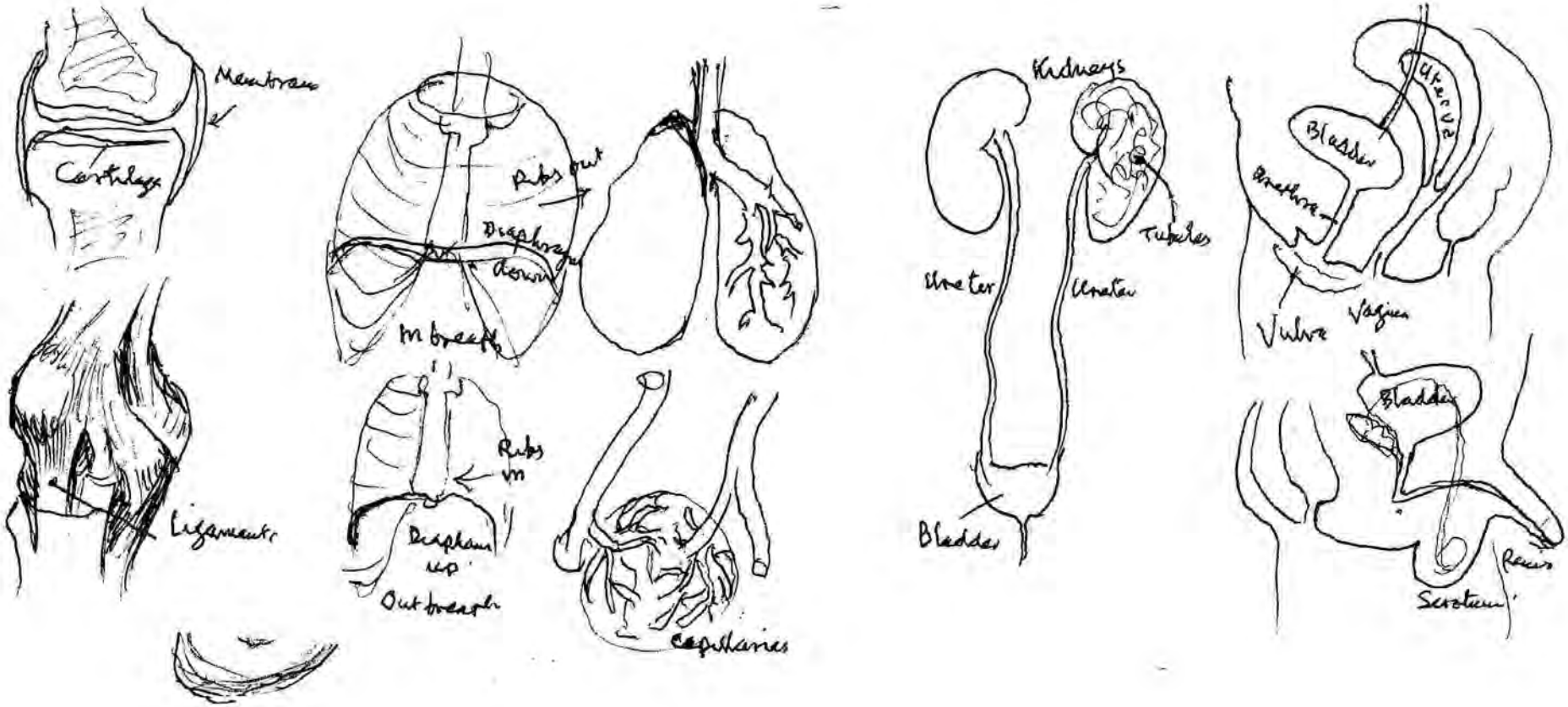
The brain has 12 000 000 nerve cells. Messages go from brain to body + body to brain via the spinal cord. The brain decodes messages received + gives orders

Each sense has its own special part of the brain. The front of the brain is mainly for thinking and remembering and is more developed in man than in animals. Nerve endings in the stomach sense lack of food + send messages to the brain via the spinal cord; the brain thinks 'I am hungry' and sends a message to the speech centre, which says, 'Give me food'; or a message goes to the eyes to tell them to look for food. The muscles are moved to grasp it. The mouth opens to receive it, chew it, and swallow it. The stomach gets the result of its message. The cycle is complete.

When a male + female of maturity wish to have

a child, the male inserts his penis in the vagina of his chosen female + ejects sperms which seek + fertilise an ovum released into the egg-tube by the female. The sperm fertilises the ovum while it is in the Fallopian tube. The fertilised ovum passes into the uterus, embeds itself in the womb lining. There it is nourished by the mother's blood via the child's placenta + umbilical cord. After 280 days development, the baby is born via the vagina. The cord is cut. The baby is fed on the Mother's milk, and later weaned onto other food.


Bone cells.
Milk teeth (20)
Mature permanent teeth 32
Gland cells make chemicals.
Muscle Cells.
Nerve cell.
Incisor
Canine
Molar
Enamel
Dentine
Pulp
Cavity
Mouth
Oesophagus
Small intestine
Large intestine


Membrane
Cartilage
Ligaments
Ribs out
Diaphragm down
In breath
Ribs in
Diaphragm up
Out breath
Capillaries
Kidneys
Tubules
Ureter
Ureter
Bladder
Uterus
Bladder
Urethra
Vulva
Vagina
Bladder
Penis
Scrotum