

CELLS - THE BUILDING BLOCKS OF LIFE

Parts 1, 2, 3

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PROGRAM OBJECTIVE :

To provide illustrated models of living structures in a sequenced format which foster concrete understanding of cells and cellular functions.

INTRODUCTION :

CELLS - THE BUILDING BLOCKS OF LIFE is a three-part series which explores life at the cellular level. The three programs provide Computer Assisted Instruction (CAI) in a sequenced format examining life from its' chemical origins as Protoplasm, to its self-continuation during Cellular Reproduction (Mitosis).

The three programs provide visual models which may be used as a teaching tool, an information resource, or as an independent learning center to reinforce previously learned material.

The CELLS series serves as an introduction to our Life Science Series. This series will feature in-depth CAI on each of the systems of the body, as well as follow-up interactive simulations designed to reinforce the instructional material.

INSTRUCTIONS :

Use the enclosed **LOADING INSTRUCTIONS** sheet to load and run the three programs. The programs are designed to be self-explanatory. A glossary provided with this documentation may be used while viewing the programs to provide additional information or alternate explanation of certain terms or processes. The outline which follows provides a brief summary of the material to be presented.

OUTLINE OF CELLS Part 1

I. Chemicals to Protoplasm

- A. Protoplasm is analyzed by the five main chemical groups that compose it.
- B. The composition of Protoplasm is graphed to show proportions of chemicals.
- C. The functions of the five chemicals is described.

II. Protoplasm to Cell

- A. Cells - the most basic form of life
- B. Cell types and general characteristics

III. Cell to Organism

- A. Relationship of Cells to Tissue
- B. Relationship of Tissue to Organ
- C. Relationship of Organ to System
- D. Relationship of System to Organism
- E. General appearance of cells within tissue.

IV. Plant and Animal Cells

- A. Common types
- B. Cell movement
 - 1. 'Drifting'
 - 2. Amoeboid movement
 - 3. Ciliary movement

OUTLINE OF CELLS Part 2

I. Parts of the Cell

- A. Cell Wall or Membrane
- B. Cytoplasm
- C. Nucleus
 - 1. Nuclear Membrane
 - 2. Nucleoplasm
 - 3. Nucleolus
 - a. Chromosomes
- D. Mitochondria
- E. Endoplasmic Reticulum (E.R.)

II. Internal functioning of cells

- A. Functions of the Cell Wall during cellular digestion
 - 1. Diffusion of food through Pores in the cell wall
 - 2. Active Transport of food through pores in the cell wall
 - 3. Pinocytosis
- B. Function of Lysosomes during Cellular digestion

OUTLINE OF CELLS Part 3

III. Cellular Reproduction - Mitosis

- A. Interphase
- B. Prophase
- C. Metaphase
- D. Anaphase
- E. Telophase

CELLS - THE BUILDING BLOCKS OF LIFE
Parts 1, 2, and 3
and
INSIDE FRANKIE STIEN

GLOSSARY

ACTIVE TRANSPORT - a process of food molecules being pulled through pores in the cell membrane, by other chemical molecules.

ALVEOLI - little 'air sacs' in the lungs where gases are exchanged. Oxygen is brought into the blood and carbon dioxide is removed from the blood.

AMEBOID MOVEMENT - a flowing type of movement common in one-celled animals.

ANAPHASE - the fourth of five phases in Mitosis, (cellular reproduction).

ANEMIA - a blood condition of having too few RBC in the blood. The body's cells begin to starve for oxygen (O₂).

ARTERY - a type of blood vessel that takes blood from the heart to the capillaries.

BLOOD VESSELS - a system of tubes or pipes, through which blood flows to deliver food and oxygen to all of the body's cells.

BONE CELL - Osteoblasts are the type of cells that secrete the hard substance of bones.

BONE MARROW - a spongy area in the center of some bones, where RBC are produced.

BRAIN - the major organ of the nervous system. The brain is made primarily of billions of nerve cells.

CAPILLARIES - the smallest blood vessels. The capillaries take the blood and its' food to all of the body's cells.

CARBOHYDRATES - types of sugars which the body's cells use for energy.

CARBON DIOXIDE (CO₂) - a waste gas carried in the blood which is removed from the body in the lungs.

CELL - the smallest living unit.

CELL MEMBRANE - the wall surrounding and containing the cytoplasm of the cell

CHROMOSOMES - chemical 'maps' which give complete instructions for the creation of an entire body. Every cell in a body has a complete set of identical chromosomes.

CILIARY MOVEMENT - a type of movement common among one-celled animals. The animals usually have one or more "flippers" (called cilia) which are used to propel the animal along.

CIRCULATORY SYSTEM - the system of blood vessels, heart, and blood, which transport food and oxygen to the cells and remove wastes from the cells.

CONTRACT - to shorten or become smaller. Muscle cells contract when stimulated by the electrical charge of a nerve cell.

CYTOPLASM - the protoplasmic mixture inside cells.

DIFFUSION - a process of very small "food" molecules drifting through the pores in the cell membrane. This brings in some food and removes some wastes.

DIGESTIVE SYSTEM - the system responsible for converting the food we eat into the foods our cells need.

ENDOPLASMIC RETICULUM (E.R.) - a system of tubes within the cell which transport materials in and around the cell and nucleus. Also used to repair broken cell membranes.

ENZYME - a type of protein which is responsible for regulating many of the cells functions.

EXCRETORY SYSTEM - the system responsible for cleaning the blood and conserving the body's water.

GLOMERULUS - filters water and other substances from the blood. Located in the kidneys, the glomerulus helps our body recycle water and remove waste products from the blood. Part of the excretory system.

GLUCOSE - the type of sugar which is the main food source for our body's cells.

H₂O - water

HEART - a part of the circulatory system which acts as a pump to push the blood throughout the blood vessels of the body.

INTERPHASE - the phase of Mitosis occurring before the cell actually begins to divide.

INTESTINES - the part of the digestive system where food particles are absorbed into the capillaries of the blood stream.

IONS - atomic particles which provide the material for many of the body's needed chemical reactions.

KIDNEYS - the main organ of the excretory system. Blood is cleaned and filtered in the kidneys.

LIPIDS - fatty substances in protoplasm.

LEUKEMIA - a disease which causes the body to stop producing WBC.

LUNGS - the main organs of the respiratory system. Pulls O₂ into the body and removes waste gases from the body.

LYSOSOMES - a type of organelle found in cells which the cell uses to digest food particles.

METAPHASE - the third of five phases of Mitosis.

MITOCHONDRIA - an organelle in cells which converts oxygen and nutrients into energy for the cell and body.

MITOSIS - one method of cellular reproduction.

MUSCLE CELL - a type of cell which contracts when stimulated by an electrical signal from a nerve cell. Muscles (muscle tissue) connected to and pulling on bones cause our body's movement.

NERVE CELL (NEURON) - the type of cell composing our nervous system. These cells pass electrical signals along nerves (nerve cells strung end-to-end).

NUCLEAR MEMBRANE - like the cell membrane. The nuclear membrane surrounds and contains the nucleoplasm of the nucleus.

NUCLEOLUS - found inside the nucleus. The nucleolus contains the material of the chromosomes.

NUCLEOPLASM - the protoplasmic mixture found in the nucleus of cells.

NUCLEUS - the part of the cell which acts as the "control center" and regulates the functions of the cell.

ORGAN - a collection of tissue types which work together to perform certain functions for the body. The heart is an organ composed of muscle tissue as well as blood vessel tissue and nerve tissue.

ORGANELLE - little 'mini-organs' in cells which perform certain functions for the cell.

ORGANISM - a complete living-being.

OXYGEN (O₂) - the gas our cells need to perform many of their functions. Our respiratory system brings O₂ into the blood and our RBC transports the O₂ to all of the body's cells.

PINOCTOSIS - a process of bringing large particles of food into the cell for digestion.

POLYCYTHEMIA - a condition of having too many RBC in the blood.

PROPHASE - the second of five phases of Mitosis.

PROTEIN - a wide group of substances making up 20% of protoplasm.

PROTOPLASM - a mixture of five main groups of chemicals that make up all living things.

RED BLOOD CELLS (RBC) - the most common type of blood cell. RBC transports oxygen to all of the body's cells.

RESPIRATORY SYSTEM - the lungs are the main organ of the respiratory system. The respiratory system is responsible for bringing O₂ into to blood and removing CO₂ (and other waste gases) from the blood.

SENSES - the parts of the nervous system which bring information into the brain. The five main senses are sight, taste, smell, hearing and touch.

STIMULATE - to excite or bring something to action.

STRUCTURAL PROTEINS - the types of proteins which build structures like muscle or hair.

SUPPRESS - the opposite of stimulate - to dull or stop action.

SYSTEM - a collection of cells, tissues, and organs which work together for a particular purpose within the body. The circulatory system, for example, is made up of heart, blood vessels, and many types of blood cells.

TELOPHASE - the final of five phases of Mitosis.

TISSUE - a collection of one type of cell which works together as a unit. For example muscle cells, grouped into muscle tissue, make up muscles.

UREA - a waste material dissolved in the blood and cleansed by the excretory system.

VALVES - one-way doors found in veins which keep the blood flowing towards the heart.

VEINS - the blood vessels which bring the blood from the capillaries, to the heart.

VILLI - hair-like structures in the small intestines which are full of capillaries for absorbing food into the blood. Part of the digestive system.

WHITE BLOOD CELLS (WBC) - types of blood cells which "fight" and "eat" invading germs.