

Life on Earth - Two Faiths – 3

Besides the two kinds of large molecules of **PROTEINS and NUCLEIC ACIDS**, there are also tiny components inside the cell called **organelles**. This is where **the analogy of a factory** will help us. Each of the **components** in a **cell** has its counterpart in many **factories**, except that the cell is not turning out dishwashers or motorcycles, but the **large molecules** essential for life.

Every cell must be enclosed in a **CELL MEMBRANE** to keep it separate from its surroundings. It is made of a **complex double wall** of several fat-like compounds. Fatty-acid chains **allow** many small, fat-soluble molecules, such as oxygen, to permeate the membrane, but they **repel** large, water-soluble molecules, such as sugar, and electrically charged atoms.

The NUCLEUS of the cell is the equivalent of the **management offices of a factory**, where the **decisions** are made about **what articles** need to be made on the shop floor, and **where** the manufacturing instructions for these articles are **made and kept**.

The nucleus also **controls** the activity of the rest of the cell. On its strands of nucleic acid are **encoded** all the **information needed** to produce any of the **substances** required by the cell for growth and reproduction. **As in any factory, there has to be production control** - it is no use building up **stocks** of one component of a machine while production of another lags behind. If a cell is **short** of a particular substance it will select the appropriate instructions and production will **proceed**. When stocks are built up to an adequate level it will **stop production** of that substance and divert the cell's machinery to producing **another component** the cell needs.

The **ENDOPLASMIC RETICULUM** is a network of fine channels, along which are tiny bodies called **ribosomes**. **It is in these ribosomes that the cell components are actually made, and so they correspond to the production line of a factory.**

It works something like this. A thread-like **messenger** substance aligns itself alongside the thread of nucleic acid **in the nucleus**, in a place that contains the appropriate **instructions** of the substance then needed by the cell. It then **copies** this coded information on to its own thread. This messenger substance then passes out of the nucleus and **goes to the ribosomes**. Here the code is **translated** to mean a certain **sequence** of amino acids that form a certain **protein**. **Another** substance collects these individual **amino acids** from within the cell, and the **ribosome** joins them all up **in the correct order as laid down by the code**. These joined-up amino acids form a protein which can either be used as it is for a **structural** component of the cell, or, more often, **control** the various chemical **processes** of the cell.

Every manufacturing process requires a **source of energy**. **Factories need energy, e.g., electricity to run their machines. The cell is no exception. The MITOCHONDRIA are the cell's power houses.** Within these little bodies **the energy** contained in foodstuffs such as sugar is **released** by a very carefully **controlled** process. The **multi-step complexity** of this process has been called **mind boggling**, and may be referred to later. This energy is used immediately to **produce** and **store** a special compound, which becomes the **portable** supply of energy within the cell.

It is analogous to **charging** up a battery so that we can have a power supply independent of the electrical power grid. This **energy-rich** compound leaves the mitochondrion and is then **available anywhere** within the cell to power the **hundreds of processes**, such as protein manufacture, that occur in it. More next time, God willing.