INQUIRY ABOUT LIFE

*an organisms adaptations to its environment are the result of evolution	***EXAMPLE** :a beach mouses light dapple fur allows the mouse to blend into its surroundings
*evolution is the process of change that has resulted in the astounding array of organisms found on earth	<-- fundamental principle of biology

BIOLOGY is the scientific study of **LIFE**

DNA - THE GENETIC MATERIAL

* a DNA molecule holds hundreds or thousands of genes, each a stretch of DNA along the chromosome

Genes: the units of inheritances that transmit information from parent to parent

* as cells grow and divide, the genetic information encoded by DNA directs their development

* a DNA molecule is made of 2 long strands arranged in a double helix

* each link of a chain is one of 4 kinds of chemical building blocks-**nucleotides**: **"A,T,C,G"**

* DNA provides blueprints for making proteins, the major players in building and maintains a cell

* genes control protein production indirectly using RNA as an intermediary

***Gene expression:** the process of converting information from a gene to its cellular product

EMERGENT PROPERTIES

* result from the arrangement and interaction of parts within a system

*they characterize non biological entities as well

EXAMPLE: a functioning bike emerges only when all of the needed parts connect in the right way

* biologists today complement reductionism with **systems biology**, the exploration of a biological system by analyzing the interactions among its parts

GENOMICS: LARGE SCALE ANALYSIS OF DNA SEQUENCES

* an organisms **genome** is its entire set of genetic information	* **genomics:** the study of sets of genes within and between species
* **proteomics** refers to the study of sets of proteins and their properties	* the entire set of proteins expressed by a cell, tissue of organism is called **proteome**
* "high-throughput" technology refers to tools that can analyze biological samples very rapidly	* **bioinformatics** is the use of computational tools to store, organize and analyze the huge volume of data

LEVELS OF HIERARCHY

1.) ORGANELLES

2.) CELLS

3.) TISSUES

4.) ORGANS

5.) ORGAN SYSTEMS

6.) ORGANISMS, POPULATIONS AND COMMUNITIES

7.) ECOSYSTEMS

8.) BIOSPHERE

STRUCTURE AND FUNCTION

* at each level of the biological hierarchy we find a correlation between structure and function	**EUKARYOTIC CELLS**	**PROKARYOTIC CELLS**
* analyzing a biological structure can give clues about what it does and how it works	*contain membrane enclosing organelles including DNA-containing nucleus	* lack a nucleus or other membrane bound organelles and are generally smaller than eukaryotes

- the **cell** is the smallest unit of life that can perform all activities required for life

* **some organelles like chloroplasts are limited only to certain cell types; those that carry out photosynthesis**

ENERGY AND MATTER

* energy flows through an ecosystem, usually entering as light and exiting as heat

* chemical elements remain within an ecosystem, where they are used then recycled

EVOLUTION

the concept that the organisms living today are modified descents of common ancestors

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NATURAL SELECTION

mechanism for evolution called natural selection because the "natural environment" selects for certain traits among those in population

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