Chapter 1: Invitation to Biology

- A. **Biology**: the study of life
- B. Organisms: any living creature either unicellular or multicellular.
 - a. Bacteria is unicellular
 - b. Human beings are multicellular
- C. **Taxon**: a group of organisms
 - a. Plural: taxa
- D. Organisms, Classified Based on Nutrition
 - a. Autotrophs: self-feeders
 - Organisms that can make their own food i.
 - 1. Ex: plants, green algae, some bacteria
 - **Photosynthesis:** plants make the food they need ii.
 - b. Heterotrophs: other feeders
 - tesale.co.uk Organisms that feed on other organisms i.
 - 1. Ex: human, animals (carnivores)
- E. A Pattern in Life's Organization
 - a. Hierarchy:
 - Atoms: smallest unit of a i.
 - Molecule (INAC) otein): chromesom ii.
 - **ON**: deoxyribonucleit acid; genetic material
 - Organelle (nicez, choroplast)
 - There are many organelles inside a cell
 - Cell: smallest unit of life iv.
 - 1. Can survive and multiply on its own
 - a. Ex: muscle cell, tissue cell
 - Tissue: made up of cells v.
 - 1. Ex: blood tissue, muscle tissue
 - vi. Organ: made up of tissue
 - 1. Ex: stomach, liver, intestine
 - 2. Plants are also made up of organs
 - vii. Organ system: made up of many organs
 - 1. Ex: digestive system
 - viii. Individual (body)
 - 1. Ex: animals, plants, human
 - Population: a group of individuals ix. 1. Ex: species of animals
 - Community: different populations in the same area х.
 - Ecosystem: communities + environments xi.

- a. Observation
- b. Hypothesis: a possible explanation of a specific phenomenon; an educated guess
- c. Prediction: a clam about what can be expected in nature, based on the premises of a theory or hypothesis
- d. Deductive reasoning: using a general idea to make a conclusion about a specific case
- e. Test: an attempt to produce actual observations that match predicted or expected observations
- f. Data: experimental results
- g. Report: a statement about whether a theory or hypothesis should be accepted, modified, or rejected, based on tests of predictions derived from it
- K. Some Branches of Biology
 - a. Molecular biology: structure and function of biological macromolecules
 - Notesale.co.uk b. Cell biology: study of cell structure and function
 - c. Taxonomy: classification and naming
 - d. Genetics: science of heredity
 - e. Zoology: study of animals
 - f. Botany: study of plants
 - g. Anatomy: study of plants h. Physiology budy of plant
 - h. Physiology, study of plant and/opanimal function
 - DEclogy: study of Declosed ction of living organisms with one another and their environment

- c. Structured materials in cell membranes (*phospholipids*) which protect body surfaces and surface coatings (wax)
- d. Fats and Fatty Acids
 - i. Fats have 1, 2, or 3 fatty acids attached to a glycerol
 - ii. Carboxyl group (–COOH)
 - iii. Fatty acid tails
 - iv. **Unsaturated**: vegetable oils
 - Saturated: butter, lard v.

e. Phospholipids

- Cell membrane is made up of phospholipids i.
- f. Waxes: another kind of lipid
 - i. Cover plant parts
 - ii. Animals:
 - 1. Protect
 - 2. Lubricate
- g. **Steroids** are lipids without fatty acid tails
- Cholesterol is a steroid; forms the precessor forms hormones: 1. Estrogen 2. Testosteloto An: Bolle steroids: 1. Syntheterol i.
 - ii.

1. Syntheti and of male hormone testosterone

G. Proteins

- a. Large biological polymers
- b. The most diverse of all the large biological molecules
- c. Consist of one or more chains of **amino acids** (which form polypeptides)
- d. The amino acid sequence is unique for each kind of protein and gives rise to its unique structure and function
- e. Cells build diverse proteins from a pool of only 20 kinds of amino acids
- f. Structural proteins: form the structural element of hair, nails (keratin) and bones, cartilage (collagen)
- g. Transport many cell activities like:
 - i. Oxygen transport (hemoglobin in red blood cells)
 - ii. Tissue defense (antibodies)
 - iii. Increase in rate of reactions (enzymes)
 - And control of glucose metabolism (insulin) iv.
- h. Nutritious proteins abound in milk, eggs, and many seeds.

H. Nucleic Acids

a. Nucleotides are the monomers

Chapter 11: Mitosis and How Cells Reproduce

A. Some Definitions

- a. Chromosome number: sum total of chromosomes
 - Ex: 46 in a human cell
- b. Diploid and haploid
 - Diploid cell: made of 2 sets of 23 chromosomes each, 2n i. 1. "diploid" (n=23)
 - ii. Haploid cell: have only one set of chromosomes (23 chromosomes)
 - iii. *n* number is the haploid number
- c. Sex cells: (gametes) of most animals are haploids
- **B.** Mitosis Definition
 - a. Mitosis is a nuclear division mechanism that maintains the chromosome number

replication

- b. A single parent cell becomes two, new, identical, daughter cells
 The Eukaryotic Cell Cycle and Mitosis
 a. The cell cycle: interphase + mitosise at Kinesis C. The Eukaryotic Cell Cycle and Mitosis
- D. Interphase
 - a. G1

- - "synthesis"-DNA replication i.
 - c. G2
 - "Gap 2" i.
 - ii. Preparation for division
- E. Mitosis
 - a. Division of the nucleus (Prophase, Metaphase, Anaphase, Telophase)
 - b. Cytokinesis
 - Division of cytoplasm i.
- F. Prophase
 - a. Chromatin threads to chromosomes
 - b. Nucleolus disappears
 - c. Nuclear envelope breaks down
 - d. Microtubules assemble
 - e. Chromosome Structure in Prophase
 - 2 sister chromatids make up one chromosome i.

- f. Galactosemia: accumulation of galactose in tissues: brain, eye damage; treatable
- g. Albinism: lack of pigments in skin, hair, and eyes; easily sun burned
- H. Dominant Disorders
 - a. Some disorders are nonlethal, many are harmful
 - b. Huntington's disease:
 - Mental deterioration and uncontrollable movements i.
 - ii. Strikes in middle age
 - c. Alzheimer's disease:
 - Mental deterioration i.
 - Strikes in middle age ii.
 - d. Family hypocholesterolemia:
 - i. Case of incomplete dominance
 - ii. Excess cholesterol in blood, heart disease
 - e. Achondroplasia:
 - i.
- Normal individuals are recessive fartice anele ii.
 - f. Marfan syndrome:
 - Abnormal or r i.
 - g. Achoo Syn lion
 - i. **P'Nh**oo": autosema minant compelling heliopthalmic

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- outbu 🔊 💋
- Chronic sneezing ii.
- h. Camptodactyly
 - Rigid, bent, little fingers i.
- Polydactyly i.
 - Extra fingers, toes, or both i.
- j. Neurofibromatosis
 - Soft tumors of nervous system, skin i.
- k. Progeria:
 - Drastic, premature aging i.
 - ii. May be due to gene mutation
- I. Genetic Disorders Are Also Due To:
 - a. Changes in the number of autosomes
 - One more or one less chromosome (aneuploidy) than the i. parent in a new individual
 - 1. Ex: 2n+1, 2n-1
 - Major cause of human reproductive failure ii.
 - 1. Edward syndrome

- Trisomy 18 iii.
- iv. Down syndrome:
 - 1. Syndrome: a set of symptoms that characterize a disorder
 - 2. Due to change in the number of autosomes
 - 3. These individuals show mental impairment, heart defects
 - 4. Trisomy 21
- b. Changes in the number of sex chromosomes
 - Turner syndrome: 44 + X0 (zero) i.
 - 1. One X in that person
 - 2. Characteristics as a female
 - 3. Affects only females
 - Klinefelter syndrome: 44 +XXY ii.
 - 1. Extra sex chromosome (X)
 - 2. Mildly retarded, phenotypically normal
 - 3. Only affects males
 - 4. Male features and characteristics
 - XYY syndrome: iii.
 - 1. 2 Y: will look like male
 - 2. Tall, thin
- tesale.co.uk mmitting cone (not proven, not 3. Pre-expo

pre} XXX SYNC.

- 1. Phenotypically female
- 2. Tall, heavy
- 3. "Megafemale"
- c. Alterations in chromosome structure
 - Deletion: part of the chromosome is deleted i.
 - 1. Cri-du-chat syndrome
 - a. Child cries like a cat
 - Duplication: ii.
 - 1. Repetitions od DNA sequence in a chromosome
 - iii. Inversion:
 - 1. Part of the chromosome becomes oriented in the reverse direction
 - Translocation: iv.
 - 1. A chromosome fragment attached to a non-homologous chromosome
 - 2. Leads to cancer, birth defects, and other abnormalities
- d. Linked genes