

7.013 Recitation 1 – 2013

Summary of Lecture 1:

Origin of life: its unity and diversity: It is thought that earth evolved about 5 billion years ago and was inhabitable for the first 1 billion years. As earth cooled down, organic molecules were formed and the first evidence of life (prokaryotes) appeared about 3.8 billion years ago in oceans. Photosynthetic organisms likely originated about 2.5 billion years ago. These organisms increased the oxygen concentration on earth and influenced the evolution of multi-cellular aerobic organisms about 1 billion years ago. The true multi-cellular organisms evolved about 500 million years ago. The organisms today are classified into three major domains; bacteria, archaea and eukarya. Of these bacteria and archaea are unicellular and prokaryotic (without nucleus) whereas eukarya are nucleated and mostly multi-cellular.

Because all living organisms have originated from a common ancestor they share a genetic makeup and are comprised of cells as their building blocks. Many of the processes that occur in the simplest of cells also occur in complex organisms. The examples of such processes are replication (making DNA from DNA), transcription (making RNA from DNA) and translation (making proteins from mRNA) etc. Thus, biologists can use model systems such as bacteria, yeast, flies and mice for their research knowing that they can extend their conclusions to other organisms including the human beings.

Questions:

1. Organisms such as bacteria, yeasts, flies, mice and rabbits are used as model systems for different biological experiments.

- i. Classify each of the above organisms as prokaryotic or eukaryotic.
- ii. Classify each of the above organisms as unicellular or multi-cellular.

2. Human beings are complex multi-cellular organisms made of different cell types each responsible for specialized function. Compare three cell types: retinal cells, skin cells and unfertilized ova.

- i. Do all these cell types have the same set of genes and same number of chromosomes?
- ii. Are the genes expressed in the unfertilized egg same as the genes in the retinal cells?
- iii. Are the proteins in the retinal cells the same as the proteins in the skin cells?

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7.013 Introductory Biology
Spring 2013

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