**Ch. 25: The History of Life on Earth**

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| **Question/Learning Criteria** | **Answer** | |
| 1. Describe conditions on **EARLY EARTH** | How old is Earth?  When did life first appear? | |
| 1. How did life arise? | 1. Small molecules 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **(proteins, nucleic acids)** 2. Packaged into **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (membrane-containing droplets)** 3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ molecules allow for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_    1. “RNA World”:    2. First catalysts = | |
| 1. How did organic molecules (possibly) arise? | 1920:  1953: | |
| 1. What are Key Events in Origin of Life? | Origin of Cells (Protobionts)   * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ → separate \_\_\_\_\_\_\_\_\_\_ from \_\_\_\_\_\_\_\_\_\_\_   → separate \_\_\_\_\_\_\_\_\_\_\_\_\_ from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | |
| Origin of Genetics   * \_\_\_\_\_\_\_\_\_\_ is likely first genetic material * multiple functions:   + makes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ possible   + makes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & evolution possible | |
| Origin of Eukaryotes   * + endosymbiosis | |
| 1. How do scientists date fossils? | Relative Dating:  Radiometric Dating: | |
| 1. What was the progression of the appearance of life on Earth? |  | |
| 1. How were **THE 1ST EUKARYOTES** different from prokaryotes? |  | |
| 1. What is the **ENDOSYMBIONT THEORY**? (Endosymbiosis) | Proposed by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  An explanation for how \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ evolved  http://www.goldiesroom.org/Multimedia/Bio_Images/21%20Evolution/24%20Aggregation%20of%20Cells.jpg | |
| ***1st Endosymbiosis Event:***   * origin of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * engulfed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, but  did not digest them * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ relationship | |
| ***2nd Endosymbiosis Event:***   * origin of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * engulfed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,  but did not digest them * mutually \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ relationship | |
| 1. What **EVIDENCE** do we have for **ENDOSYMBIOSIS**? | Structural   * mitochondria & chloroplasts resemble \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * mitochondria & chloroplasts have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * mitochondria & chloroplasts have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | |
| Genetic   * mitochondria & chloroplasts have their own… | |
| Functional   * mitochondria & chloroplasts \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * mitochondria & chloroplasts\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * mitochondria & chloroplasts have their own \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | |
| 1. Why are **MASS EXTINCTIONS** significant in Earth’s History? | Major periods in Earth’s history \_\_\_\_\_\_\_\_\_\_ with *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* & new ones \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* | |
| 1. Describe major life events in Earth’s history | **Precambrian:** microscopic fossils (stromatolites) | * Photosynthesis 🡪atmospheric \_\_\_\_ * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (endosymbiont theory) |
| **Paleozoic: *Cambrian Explosion*** | * \_\_\_\_\_\_\_\_\_\_\_ invade \_\_\_\_\_\_\_\_\_\_\_, many \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ appear * Permian Extinction (-96% species) |
| **Mesozoic:** “Age of Reptiles”, dinosaur, plants | * Formation of Pangaea supercontinent * Cretaceous Extinction – \_\_\_\_\_\_\_\_\_\_\_\_\_\_ off Mexico’s coast |
| **Cenozoic:** |  |
| 1. Define heterochrony | evolutionary change in \_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ events. This can affect how species evolve. | |
| 1. What are **HOMEOTIC GENES** | master \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ genes determine location and organization of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Ex: | |