

Midterm Study Guide - Historical Geology

Chapter 1-3: Intro to Earth History

Nicolaus Steno: **Superposition, Original Horizontality, Lateral Continuity**

James Hutton: **Uniformitarianism, Geologic Time**

Charles Lyell: **Cross-cutting Relationships, Inclusions**

William Smith: **Biological Succession**

Geologic Time Scale: Eon, Era, Period, Epoch

Relative and Absolute Age Dating Methods

Isotopic Age Dating: U-Pb, K-Ar, Rb-Sr, C-14, Fission Track

Chapter 4: Earth Materials

Minerals and Rocks

Common Igneous Rock Forming Minerals: **Quartz, feldspars, micas, ferromags (incl. olivine)**

Sedimentary Rock Forming Minerals: **Clay, quartz, calcite, gypsum, halite, dolomite**

Rock Cycle: Igneous (volcanic and plutonic), Sedimentary, Metamorphic

Igneous: **Basalt, andesite, rhyolite, gabbro, diorite, granite, peridotite**

Sedimentary: **clastic, chemical, biogenic**

Metamorphic: **foliated and non-foliated**

Chapter 5: The Sedimentary Archives

Environments of Deposition: **Marine, Transitional, Terrestrial**

Meaning of **color** in sedimentary rocks

Texture of SedRx: **Grain size, Angularity, Sorting, Maturity**

Sedimentary Structures: Paleocurrent Indicators, Geopetal Indicators, Environmental Indicators

Formation, Member, Group

Transgression (onlap sequence); Regression (offlap sequence)

Facies

Correlation Methods

Unconformities: **Nonconformity, Angular Unconformity, Disconformity**

Geologic Column, Cross-Section, Geologic Maps

Paleogeographic map, Lithofacies map

Chapter 6: The Fossil Record

Bias and incompleteness of the fossil record

Requirements for fossilization: hard parts and quick burial

Mode of fossilization: unaltered, permineralization, replacement, recrystallization, cast/mold, trace, carbonization

Use of Index Fossils and fossil assemblages in age dating and correlation

Use of fossils as environmental indicators: endemic and cosmopolitan species

Nektonic, planktonic and benthic life forms (infaunal and epifaunal)

Littoral, sublittoral, neritic, pelagic, abyssal environments

Marine ecosystems and food chain (paleoecology)

Linnaean System of Classification: Definition of genus and species

Organic Evolution:

Lamarckian evolution

Darwinian: Evolution by natural selection

1. Too many young 2. Natural variations 3. Best adaptations tend to survive

Mendelian genetics and mutations as source of variation

Phyletic Gradualism and Punctuated Equilibrium

Evidence concerning Evolution:

Biologic succession, branching organization of life (incl DNA), homology (use of same feature for different purposes, analogous structure (use of different features for same purpose), vestigial organs and structures, biogeography, currently observed evolution, transitional species and the fossil record.

Patterns of Evolution:

Divergent, convergent, iterative

Adaptive Radiation: birds in Galapagos and Hawaii, mammals after the dinosaurs died out

Micro-, macro-, and megaevolution

Creation-Science

Chapter 7: Earth Structure and Plate Tectonics

Divisions of the Interior of the Earth:

Core (Inner and Outer), Mantle, Crust (Oceanic, Continental)

Asthenosphere and lithosphere

Crustal Structures:

Faults (normal, reverse, strike-slip), Folds (anticline and syncline)

Plate Tectonics:

Evidence: Fit of continents, rock and structure similarities, fossil evidence, paleoclimates, Paleomagnetism (apparent polar wandering, polar reversals), Age and thickness of sediments on the seafloor, satellite measurements

Boundaries:

Divergence: Oceanic and Continental

Convergence: Ocean to ocean, ocean to continent, continent to continent

Accretionary wedge, forearc basin, magmatic arc

Transform

Hot Spots

Exotic Terranes