Life on Earth: Lessons for Astrobiology

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A Few Points to Ponder in the Search for Life

- Definition of Life
- Basic Biochemical Functions as Extraterrestrial Biomarkers
- Earth Analogs of Possible Extraterrestrial Habitats
Definition of Life - Philosophical

- “Self-sustained chemical system capable of undergoing Darwinian evolution”
- Replication
- Mutation
- Evolution
Definition of Life - Operational

- "Self-sustained chemical system" - out of equilibrium with environment
  - Chemistry
  - Structure
Basic Biochemical Functions as Extraterrestrial Biomarkers

- Energy production and use
  - Photosynthesis
  - Electron transfer
  - Membranes

- Catalysis

- Osmotic balance

- What about DNA?
Earth Analogs of Possible Extraterrestrial Habitats

- **Temperature**
  - Hydrothermal systems
  - Permafrost, Antarctic valleys

- **Water availability**
  - Deserts (hot and cold)

- **Chemistry**
  - High or low pH
  - High salt