

## Big History, the Universe, and When It All Began

### I. Big History: What is it and why?

#### A. Definition

#### B. Practitioners

1. David Christian, *Maps of Time: An Introduction to Big History* (2004)
2. Fred Spier, *The Structure of Big History: From the Big Bang until Today* (1996)  
– “How Big History Works: Energy Flows and the Rise and Demise of Complexity,” *Social Evolution and History* 4, no. 1 (2005): 87–135.
3. Eric Chaisson, *Cosmic Evolution: The Rise of Complexity in Nature* (2001)
4. John R. McNeill and William H. McNeill, *The Human Web: A Bird’s Eye View of World History* (2003)
5. N. S. Kardashev (Russian astrophysicist)  
–Levels of technologically developed civilizations  
I – energy consumption at the planetary level  
II – energy consumption at the solar system level  
III – energy consumption at the galactic level

### II. Theories of the Age of the Universe

#### A. Religious Interpretations

1. Cosmologies of various cultures = “Once upon a time. . . .”
2. The Bible = “In the beginning. . . .”
3. Hindu writers (ca. 400 B.C. to ca. 200 A.D.) = interminable cycles of 8.64 billion years each (*kalpa* = 4.32 billion years)

#### B. Calculations

1. Theophilus of Antioch, Christian writer (2nd cent. A.D.) = 5515 B.C.  $\pm$  200
2. Jewish writers—both lunar and solar calculations = 5763 years ago
3. Mayan Calendar = 1 million years ago
4. James Ussher, English Archbishop (1581–1656) = October 22, 4004 B.C.

### C. Estimates Based on Gathered Evidence

1. Georges Buffon, French Naturalist (1707–1788) = “at least 70,000 years ago”
2. Abraham Werner, German Geologist (1749–1817) = “a million years ago”
3. Charles Darwin, English Naturalist (1809–1882) = 300 million years
4. The Scientific View of Mid-20<sup>th</sup> to Early 21<sup>st</sup> Century = 6.4 – 20 billion years ago
  - a. Edwin Hubble, American Astronomer (1889–1953)
  - b. Milton Humason (1891–1957)
  - c. Red Shift, Doppler Effect,
  - d. “Big Bang” – term coined by Fred Hoyle in 1949
  - e. George Gamow, *One, Two, Three ... Infinity* (1947)
  - f. A Couple of Current Problems
    - (1) missing matter – dark matter? – and the problem of gravity
    - (2) type 1a supernovae indicate a speeding up some 5 billion years ago
5. Some Dissenting Views
  - a. Halton C. Arp—“The Most Feared Astronomer on Earth”
  - b. Hannes Alfen—plasma theory

### III. Creation Theories

#### A. Some Non-Scientific Theories

1. Chinese
2. Huichol (Mexico)
3. Navajo
4. Tantric Buddhism
5. Judeo-Islamic-Christian
6. Ancient Egyptian
7. Dogon

#### B. Scientific Theories

1. Steady State (Fred Hoyle)
2. Big Bang and the Expanding Universe

### IV. Relationship between Religious and Scientific Views

1. Flatland (Edwin Abbott) and The Fourth Dimension
2. Oscillating Universe and Universes within Universes (Hindu cosmology)

Video: Carl Sagan, “Cosmos,” no. 10: *The Edge of Forever* (excerpt)