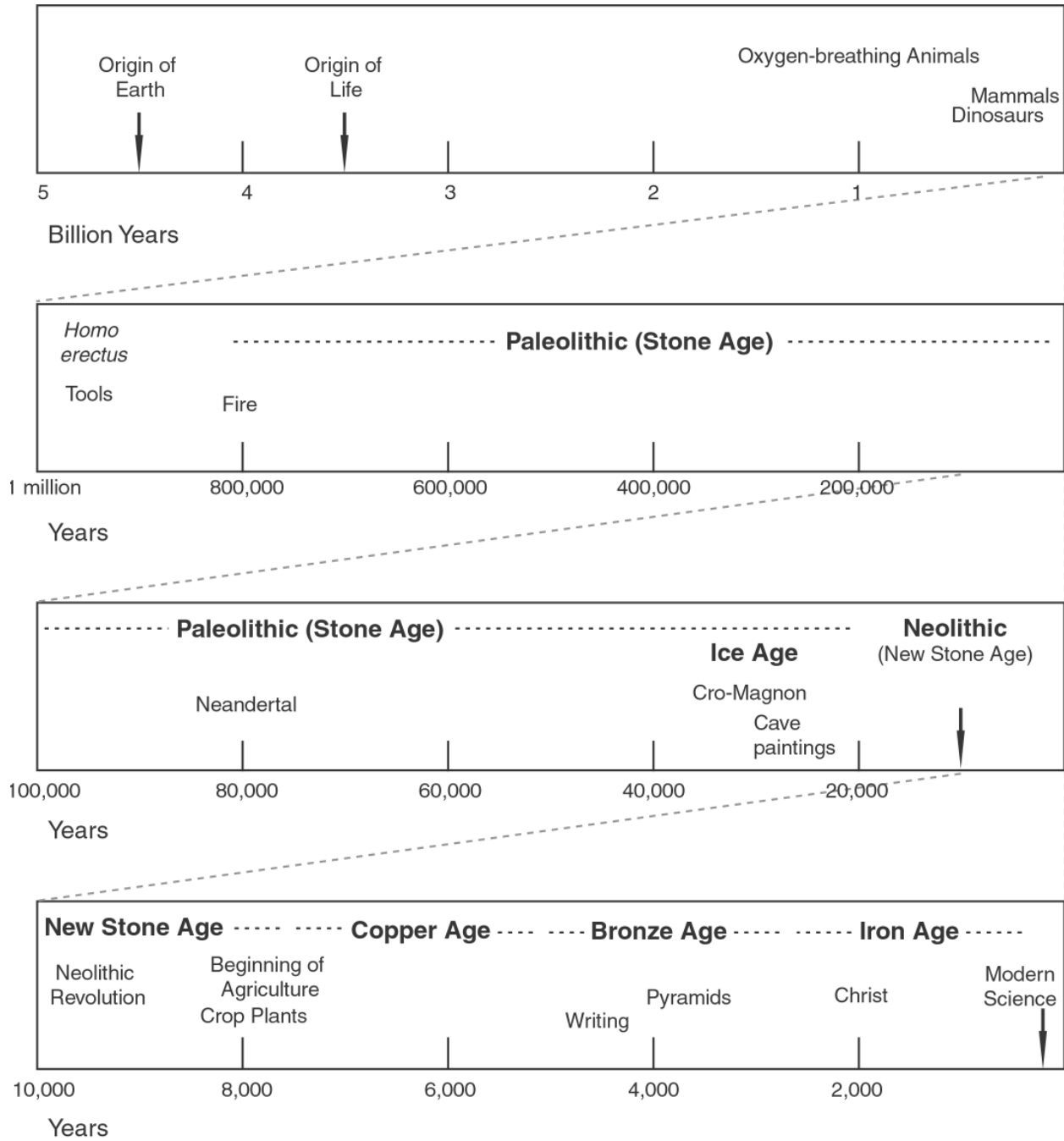


# Lecture 1

## Dating the Past: Geologic, Archeologic, Biologic, and Human Culture



## The Emergence of Man

Source: J.N. Leonard, 1973 *First Farmers, Time Life*

Geology	Archeology	Billions of Years Ago
<b>Precambrian</b> earliest era		<b>4.5</b> Creation of the Earth
		<b>4</b> Formation of the primordial sea First life, single-celled algae and bacteria, appears in water
		<b>3</b>
		<b>2</b>
		<b>1</b>
<b>Millions of Years Ago</b>		
<b>Paleozoic</b> ancient life		<b>800</b> First oxygen-breathing animals appear Primitive organisms develop interdependent specialized cells
		<b>600</b> Shell-bearing multicelled invertebrate animals appear Evolution of armored fish, first animals possess backbones
		<b>400</b> Small amphibians venture onto land Reptiles and insects arise Age of dinosaurs begins
<b>Mesozoic</b> middle life		<b>200</b> Birds appear Mammals live in shadow of dinosaurs Age of dinosaurs ends
		<b>80</b> Prosimians, earliest primates, develop in trees
<b>Cenozoic</b> recent life		<b>60</b>
		<b>40</b> Monkeys and apes evolve
		<b>20</b>
		<b>10</b> Ramapithecus, oldest known primate with apparently human-like traits, <b>8</b> evolves in India & Africa
		<b>6</b> Australopithecus, closest primate ancestor to humans, appears in Africa <b>4</b>

Geology	Archeology	Millions of Years Ago		
<b>Lower Pleistocene</b> oldest period of most recent	<b>Lower Paleolithic</b> oldest period of Old Stone Age	2	Oldest known tool fashioned by humans in Africa	
		1	First true human, <i>Homo erectus</i> , emerges in East Indies and Africa <i>Homo erectus</i> populates temperate zones	
<b>Middle Pleistocene</b> middle period of most recent epoch		<b>Thousands of Years Ago</b>		
		800	Humans learn to control and use fire	
<b>Upper Pleistocene</b> latest period of most recent epoch	<b>Middle Paleolithic</b> middle period of Old Stone Age	600	Large-scale, organized elephant hunts staged in Europe	
		400		Artificial shelters
		200	Neandertals emerge in Europe	
	<b>Upper Paleolithic</b> latest period of Old Stone Age		80	
			60	Ritual burials in Europe and Near East suggest belief in afterlife Woolly mammoths hunted by Neandertals in northern Europe
			40	Cro-Magnons arise in Europe Asian hunters cross Bering Land Bridge to populate New World Oldest known written record, lunar notations on bone, made in Europe Humans reach Australia First artists decorate walls and ceilings of caves in France and Spain
<b>Holocene</b> present epoch	<b>Mesolithic</b> Middle Stone Age	30	Figurines sculpted for nature worship	
		20	Invention of needle makes sewing possible Bison hunting begins on Great Plains of North America	
		10	Bow and arrow invented in Europe Pottery first made in Japan	

<b>Geology</b>	<b>Archeology</b>	<b>Years Ago</b>		
<b>Holocene</b> (cont.)	<b>Neolithic</b> New Stone Age	<b>11000</b>	Sheep domesticated in Near East Dog domesticated in North America	
		<b>10000</b>	Jericho, oldest known city, settled Goat domesticated in Persia	
		<b>9000</b>	Humans cultivate first crops, wheat and barley in Near East Pattern of village life grows in Near East Catal Huyuk, in what is now Turkey, becomes largest Neolithic city Loom invented in Near East	
		<b>8000</b>	Cattle domesticated in Near East Agriculture begins to replace hunting in Europe Copper used in trade in Mediterranean area Corn cultivated in Mexico	
		<b>6000</b>	Oldest known massive stone monument built in Brittany Sail-propelled boats used in Egypt First city-states develop in Sumer	
	<b>Copper</b> Age	<b>5500</b>	Cylinder seals begin to be used as marks of identification in Near East First potatoes grown in South America Wheel originates in Sumer Humans begin to cultivate rice in Far East Silk moth domesticated in China Egyptian merchant trading ships start to ply the Mediterranean	
		<b>5000</b>	First writing, pictographic, composed in Near East Bronze first used to make tools in Near East City life spreads to Nile Valley Plow is developed in Near East	
			<b>4800</b>	Accurate calendar based on stellar observation devised in Egypt Stonehenge, most famous of ancient stone monuments, begun in England Pyramids built in Egypt
			<b>4600</b>	Minoan navigators begin to venture into seas beyond the Mediterranean Variety of gods and heroes glorified in Gilgamesh and other epics in Near Ea

Geology	Archeology	Years Ago		
Holocene (cont.)	Bronze Age (cont.)	4500	Cities rise in the Indus Valley Earliest written code of laws drawn up in Sumer Herdsman of Central Asia learn to tame and ride horses	
		4000	Use of bronze in Europe Chicken and elephant domesticated in Indus Valley Eskimo culture begins in Bering Strait area	
		3500	Invention of ocean-going canoes; humans reach South Pacific Ceremonial bronze sculptures created in China Imperial government, ruling distant provinces, established by Hittites	
		3400	Iron in use in Near East First complete alphabet devised in script of the Ugarit people in Syria Hebrews introduce concept of monotheism	
		3000	Reindeer domesticated in Eurasia	
		Iron Age	2900	Phonicians develop modern alphabet
			2800	Celtic culture begins to spread use of iron throughout Europe Nomads create a far-flung society based on the horse in Russian steppes First highway system built in Assyria Homer composes <i>Iliad</i> and <i>Odyssey</i>
			2700	Rome founded  Wheel barrow invented in China
			2200	Epics of India's gods and heroes, <i>Mahabharata</i> and <i>Ramayana</i> , written Water wheel invented in Near East
			2000	Current era begins

## Current Era (CE)

- 1** Height of Roman Empire, birth of Christ  
Destruction of Pompei (79)  
Persecution of Christians  
Emperor Constantine, establishment of Christian dominance  
Decline of Roman Empire
- 500** Rise of Islam  
Dark Ages in Europe, plague  
Tang Dynasty in China  
Sung Dynasty in China  
Vikings
- 1000** Norman Conquest (1044)  
Cathedrals constructed  
Genghis Khan  
Ottoman empire in Turkey, Aztecs settle in Mexico  
Printing press
- 1500** BEGINNING OF MODERN ERA, Printed Herbals, Columbus  
Age of Exploration
- 1600** William Shakespeare, Francis Bacon  
Rembrandt, Cromwell
- 1700** Gardens of Versailles, Isaac Newton  
US Revolution (1776), Carolus Linnaeus
- 1800** Thomas Andrew Knight: Beginning of Horticultural Science  
Charles Darwin, Gregor Mendel; Birth of genetics, Morrill Act
- 1900** Liberty Hyde Bailey – Wright brothers flight – ASHS founded  
Rediscovery of Mendel's paper, beginning of Genetics
- 1910** Thomas Hunt Morgan & Drosophila, mechanization of Agriculture  
World War I
- 1920** Hybrid corn, vitamins  
Rise of tractor in agriculture
- 1930** World Depression  
Dust Bowl
- 1940** World War II  
VE, VJ day, Cold War
- 1950** DNA Structure, Watson Crick, Korean Conflict  
Genetic Code
- 1960** Herbicides  
Vietnam Era
- 1970** Man on the moon (1969), Green Revolution, plasticulture  
Tissue culture, micropropagation
- 1980** Gene transformation  
Molecular biology
- 1990** Gulf War, computers  
Information revolution – Internet
- 2000** Genomics, directed mutation

## Summary Lecture 1

### Dates to Remember

#### Years ago

<b>15 Billion</b>	Origin of universe
<b>4.5 Billion</b>	Origin of earth
<b>3.5 Billion</b>	Origin of life
<b>1 Billion</b>	Oxygen breathing animals
<b>200 Million</b>	Age of dinosaurs
<b>2 Million</b>	Tools used by early humans
<b>1 Million</b>	<i>Homo erectus</i>
<b>200,000</b>	Neandertal Cro-Magnon
<b>10,000</b>	Neolithic Revolution
<b>8,000</b>	Development of Agriculture
<b>5,000</b> centers	Bronze Age-pyramids-Stonehenge, cuneiform, writing, wchan
<b>4,000</b>	Sumerians
<b>3,000</b>	Iron Age
<b>2,500</b>	Golden Age of Greece
<b>2,000</b>	Common era, Roman Empire
<b>1,500</b>	Fall of Rome
<b>1,000</b>	Norman conquest
<b>500</b>	Modern Era–Columbus
<b>0</b>	Genetic code