

(2) REMARKS on ANCIENT HISTORY

(a) Prehistoric Man

Humans evolved from Apes- the finer details of this evolution are not yet known but DNA decoding is likely to clear much of this up in the next few decades. At the present time it looks as though the crucial evolutionary steps occurred in Africa. The fascinating story of how evolution proceeded from *Australopithecus* to *Homo Sapiens sapiens* will only be sketched here. It is perhaps worthwhile emphasizing just how much we still don't know. Almost nothing is known about what the evolutionary changes were that led to early Man. We have some information on how, eg., *Homo Erectus* lived, but the answers to even quite basic questions remain mysterious (eg., when did speech evolve, and what physiological changes did it involve?).

Australopithecus appeared some 4.5 million yrs ago, and continued for over 2 million yrs in one form or another- remains have been found in Ethiopia, Kenya, and the Transvaal. Already one sees the divergence between the Apes and the early hominids, and a feature distinguishing this species- as well as the oppositional thumb and binocular vision, one has the ability to walk upright- clearly of use in open savannah, which was appearing in Africa with climatic change. Already *Australopithecus* had a bigger brain than the apes.

Roughly 2 million yrs ago one sees the first signs of *Homo Habilis*, which shows the first signs of using tools of stone, and of some sort of construction (a windbreak or wall in the Olduvai gorge (Tanzania), 1.9 million yrs ago, behind which meat was eaten. This species spread rapidly across Africa, Asia, and Europe.

Roughly 1.5 million yrs ago one sees the beginnings of *Homo Erectus*, which reached its peak perhaps 250,000 yrs ago. This species already had a brain the size of modern man, and is distinguished by its use of the stone 'hand axe', which was probably not an axe, and was used to cut things ranging from food to skins. Important physiological and behavioural changes have accompanied the increase in brain size. Women have larger hips to allow the passage of large heads during birth- and there is no more oestral cycle, ie., women are now sexually active at all times (man being the only animal to have made this evolutionary change). Children are less well developed at birth and there is a long child-rearing period- this becomes a learning period in which physical and mental development is accomplished, and the beginnings of collective culture can be transmitted. One finds the earliest traces of wooden huts up to 15 metres long, and objects like spears, bowls, etc; one sees the construction of shapes like circles, ellipses, and triangles. Two other significant developments- the use of fire (although probably not the ability to make it), and hunting. This meant the development of new food supplies, cooperative behaviour which must have played some role in the development of language, and also the possibility of living in less hospitable climates (in caves); and of cooking).

During this time there were large climate swings on earth, with a long Ice Age from roughly 200,000-1000,000 BC, and extensive ice ages from 50,000-10,000 BC (with the worst period from 20,000-10,000 BC). Massive ice sheets spread down over Europe, Asia, and North America, down to the US-Canada border, southern France, and northern China. The records in these regions are of course seriously disturbed by these changes. One distinguishes the stone-using cultures by the Lower Paleolithic (from c. 2 million yrs ago to 50,000 yrs ago) and the Upper Paleolithic (to 10,000 yrs ago).

Roughly 250,000 yrs ago *Homo Sapiens Neanderthalis* (Neanderthal Man, named after the place in Germany where remains were first found) appeared. The most complete records of this species exist in Europe, but it spread over Asia and Africa as well. It survived the Ice Ages in Europe, but roughly 23,000 years ago, during the last great Ice Age, the competition between *Homo Sapiens sapiens* (modern man) and Neanderthal Man finished with the extinction of Neanderthal Man. None of this is simple- many of these species names are labels which will be revised as more remains are discovered, and DNA analysis reveals a more complete picture. Note also that there was clearly inter-breeding between Neanderthal Man and *Homo Sapiens*, and we know really very little about how these 2 groups interacted with each other. In any case Neanderthal man was able to use fire, and had clothes, and remarkably, a form of ritualized burial. This includes the construction of grave sites with plants and flower remains. There also appears to have been a form of warfare, involving cannibalism, possibly between tribes.

Some 100,000 yrs ago *Homo Sapiens sapiens* appeared, first in Africa; roughly 40,000 yrs ago it has reached Europe and North America (the latter by a land bridge across the Bering sea, caused by the withdrawal of the Oceans, with water taken up by the Ice caps). One now finds extensive tools, made from stone, bone, and flint (which also allowed the control of fire). There bone needles, knives, bows and arrows, spear throwers, and harpoons, in various parts of the world. Most striking of all is the appearance of the first early art. This apparently begins some 35,000 yrs ago in Europe (Cave painting is also found in Africa from 27,000 yrs ago, and in Australia from 20,000 yrs ago). There are stone, bone, and clay figurines, and most famously, the extraordinary cave paintings of SW France and Spain. The best known is Lascaux, in the Dordogne region, found by some boys in 1940. These paintings begin some 25,000 yrs ago, and abruptly disappear about 11,000 yrs ago, just before the end of the last Ice Age- the most important period was from roughly 23-18,000 yrs ago. They are very detailed, with themes mostly centred on animals- they often seem

to tell stories, but the animals in some cases seem to have a primitive religious significance. From very extensive archeological evidence we have acquired a detailed picture of how man lived in this period, which has animated many movies and books in recent years.

(b) Civilisation- from 8,000 BC- 600 BC

The end of the last ice age, 10,000 yrs ago, apparently heralded a new way of life for modern Man. The sea level rose again (the English channel, for example, made its reappearance around 7000 BC). This is the beginning of the Neolithic period.

There are very many books which give a detailed picture of the rise of different civilisations around the world in the time since then. Our purpose is not to go into this- it would take many pages even to summarize it. What is of more interest here is the fact that the remarkable edifice of modern science is actually the result of a small number of crucial advances, which were made in certain places at certain times. It is then worth noting just a few details of the rise of civilisation, with the following question in mind:

Why did these crucial advances only happen under very special circumstances- and what were these circumstances?

We will return briefly to this question at the end of the course- it is a difficult one, and the very nature of the question means that no firm answer can be given. It is clearly not worth even trying until we have seen how science did develop.

In the following I just give a brief digest of the history of the important civilisations, up to the first one of crucial interest to us (the Ancient Greek civilisation).

10,000-4,000 BC

8500 BC: Jericho- first walled town

7500 BC: 1st Cemeteries in North America

7000 BC: Çatal Hüyük (Anatolia, Turkey); farming, cattle herding

6500 BC: Greece, Aegean region- farming

Middle East- first metallurgy

6000 BC: Thailand- rice cultivation

5200 BC: Nile valley- barley and grass seed cultivation

5000 BC: Mesopotamia- Copper used for first time

China- Yanshao pottery

Mexico- Maize cultivation begins

Peru- Chumash indians build wooden plank fishing canoes

English Channel reforms as Ice melting continues

4000-3000 BC

4000 BC: Plough invented

Britain- first farming in Britain

Sahara region- domesticated animals

3500 BC: Sumerian civilisation begins in earnest in Mesopotamia- cuneiform script, food stores, etc.

Clay tokens used for money; Copper alloys, smelting of Gold, Silver

Crete- early civilisations already using oarships

Mesopotamia- wheel invented

3400 BC: Rice cultivation in Thailand

3200 BC: Beginning of civilisation at Ur

3050 BC: Egyptian provinces unified

3000- 2000 BC

Asia

- 3000 BC: China- first use of plough
- 2900 BC: China- beginning of period of 'Sage Kings'
Pakistan- Indus valley civilisation (Harrapan culture) begins
- 2700 BC: China- Bronze age, and beginning of silk weaving
- 2697 BC: China- reign of 'Yellow Emperor' begins
- 2200 BC: Japan- Middle Jōmon period
Hieroglyphic writing appears in Far East

Middle East, Mediterranean, Africa

- 3000 BC: Egypt, Mesopotamia- Unified weights and Measures, surveying methods
Mesopotamia- invention of wheeled chariot
Palestine- Bronze age begins. Molded Copper axes and knives
Crete- bronze age begins
- 2700 BC: Mesopotamia- huge irrigation networks
- 2686 BC: Egypt- Old Kingdom begins (runs from 2686-2160 BC)
- 2650 BC: Egypt- Building of great pyramids begins (Djoser pyramid)
- 2500 BC: Egypt- wooden boats, manufacture of oil by pressing, perfumes
Mesopotamia- fine metalwork
- 2300 BC: Mesopotamia- Sargon unites Sumerian civilisations
- 2040 BC: Egypt- Middle Kingdom begins (runs from 2040-1674 BC)

Europe

- 3000 BC: beginning of Megalithic culture in W. Europe.
England- first stages of building Stonehenge
- 2500 BC: English Channel- invasions of Britain across Channel
Scottish Neolithic culture
- 2200 BC: Ireland- beginning of Bronze age
England- 2nd stage of building of Stonehenge

Americas, Australasia

- 3000 BC: Ecuador, Columbia- pottery begins
- 2800 BC: Brazil- First Amazon villages

2000- 1000 BC

Asia

- 2000 BC: Siberian Neolithic culture begins
- 1766 BC: China- Shang dynasty begins; bronze age culture. First urban civilisations, bronze casting
- 1500 BC: India- European Aryans invade India
China- existence of Pythagorean triangles and mathematical permutations noted
- 1450 BC: India- Brahma worship begins
- 1100 BC: China- beginning of first Chinese dictionary (compiled 1100-900 BC, with 40,000 characters)
- 1045 BC: China- Zhou dynasty starts

Middle East, Mediterranean, Africa

- 2000 BC: Crete- Minoan civilisation begins (pottery)
Egypt- locks become commonly used
Aegean Sea- first sailing ships
- 1894 BC: Babylon (Mesopotamia)- first dynasty begins (runs from 1894-1595 BC)
- 1800 BC: Egypt- existence of Pythagorean triangles noted
- 1792 BC: Babylon- reign of Hammurapi begins. Elaborate astronomical observations, time-keeping.

- 1620 BC: Anatolia (Turkey)- Hittites (Indo-European culture) establish themselves. Cuneiform script soon after.
 1558 BC: Egypt- New Kingdom begins (runs from 1558-1085 BC)
 1550 BC: Syria- Hittites capture Aleppo
 1500 BC: Eruption of Thira (Santorini), Collapse of Minoan civilisation
 1450 BC: Greece- Rise of Mycenaean civilisation
 Iron weapons become common in Middle East
 Egypt- beginning of bondage for Hebrews (1500-1250 BC). Double ruddered sailing vessels used
 1400 BC: Alphabet devised by Phoenicians
 Greece- Beginning of construction of Acropolis in Athens (from 1400-1100 BC)
 1240 BC: Moses gives 10 Commandments to the Israelites
 1200 BC: Mesopotamia- Gilgamesh epic recorded
 1300 BC: Egypt- construction of Abu Simbel rock temples
 1193 BC: Turkey- Alliance of Mycenaean and other city states sacks and destroys Troy
 1182 BC: Egypt- Reign of Rameses III begins (from 1182-1151 BC)
 1140: Utica (Africa)- first Phoenician colonisation
 1120 BC: Mycenae destroyed- Greek 'dark age' begins

Europe

- 1700 BC: England- 3rd phase of building of Stonehenge begins

Americas, Australasia

- 2000 BC: Peru- settlements in Andes, with ceremonial centres; first metalwork, cotton growing
 New Guinea- first settlers
 1800 BC: Micronesia- first settlers
 1500 BC: Mexico- Olmec culture- gravel platforms
 1400 BC: Honduras- village life
 1300 BC: Fiji, Samoa, etc- first Polynesian settlers

1000-500 BC

Asia

- 900 BC: China- mathematics includes arithmetic, geometry, equations with 2 unknown quantities.
 800 BC: China- Planetary motions analysed
 650 BC: China- beginning of Iron-based technology
 605 BC: China- Lao-Tzu, founder of taoism, is born (lives 605-520 BC)
 563 BC: Nepal- Siddhartha Gautama, the future Buddha, is born (lives 563-483 BC)
 551 BC: China- birth of Confucius (551-479 BC)
 526 BC: China- first codes of law issued
 500 BC: India- caste system established. Susrata (surgeon) performs cataract operations. Rice cultivation begins

Middle East, Mediterranean, Africa

- 1000 BC: Israel- Hebrew alphabet developed
 922 BC: Israel- splits into Israel and Judea
 900 BC: Egypt- kingdom of Kush becomes independent of Egypt
 814 BC: Tunisia- Phoenicians found city state of Carthage
 800 BC: Greece- Homer writes the "*Odyssey*"
 Israel- subterranean sewage and water supply system functioning
 776 BC: Greece- first Olympic games in Athens
 753 BC: Italy- Rome founded
 604 BC: Babylon- Nebuchadnezzar claims throne
 581 BC: Israel- Nebuchadnezzar II burns Jerusalem
 558 BC: Persia- beginning of Persian empire- reign of Cyrus the Great (558-529 BC). Zoroaster begins to found his religion

539 BC: Mesopotamia- Persians conquer Babylon

536 BC: Greece- beginning of construction of Apollo's temple at Delphi

517 BC: Egypt- canal constructed from Nile to the Red Sea

509 BC: Italy- Roman Republic founded, Tarquin deposed

Europe

1000 BC: E Europe- Teutonic tribes move west as far as Rhine

Americas, Australasia

600 BC: Mexico- Mayan civilisation