

## 158. THE GREAT ICE-AGE:

(The Pleistocene glaciation of Europe).

It was during the Pleistocene epoch of the Quaternary period of the Cenozoic era, our earth experienced an abnormal climatic condition when the major part of the earth's surface was buried under ice. In whole of Western Europe, parts of England, the major part of North America, Northern, part of India, such arctic condition prevailed throughout thousands of years. Such icy-condition is normally expected in high altitudes or in polar regions. But during the Pleistocene epoch, the plain regions were affected with arctic condition.

The 'Great Ice-age' was not the only ice-age occurred in the past; in fact, there were several such 'ice-ages' in pre-Pleistocene periods of the past. But the last one, the Pleistocene Ice-age, was not only the longest and severest of all the ice-ages but it was contemporary with our Palaeolithic forerunners and their cultures. From this point of view, the study of Pleistocene Ice-age has become so important to the students of Pre-history.

The term 'Great Ice Age' is somewhat misnomer. The Pleistocene Ice-age was really not a single ice-age but several, "a series of glacial maxima between which warmer periods occurred."<sup>13</sup>



Taking lead from the remarkable studies of Dr. Albrecht Penck and his colleague, Dr. Obermaier, on the glaciation of the Alps, we could know that there were four *glacial maxima* (Glacial periods) and three intervening warmer phases in between two *glacial maxima* (Inter-Glacial periods) in Europe during the Pleistocene epoch i.e. altogether seven periods. The glacial periods were named GUNZ, MINDEL, RISS, WURM after the four small rivers "flowing down the northern side of the Alps into the basin of the Danube." The intervening Interglacial stages were named accordingly as GUNZ-MINDEL (1st INTERGLACIAL), MINDEL-RISS (2nd INTERGLACIAL), RISS-WURM (3rd interglacial). Again, the duration and severity of climate were not same in either of all the glacial or interglacial phases. It is generally accepted that the inter-glacial periods were comparatively longer in duration. The second inter-glacial (Mindel-Riss) was hotter and longer in duration than the other two. Moreover, further investigation suggests that the Wurm or the last glaciation can be divided into sub-phases; WURM I (Maximum) and WURM II. In between these two Wurmian phases there was the slight ameliorating ACHEN stage. Following on the Wurm II (BUHL stage), two further minor oscillations could be marked, they were GSCHNITZ and DAUN. On completion of Pleistocene, final retreat of ice-sheets could be marked as such, the climate was becoming normal (Post-Glaciation phase). No further significant oscillations of recession and advances of the ice could be marked.

The advances of ice during the Pleistocene caused the rain belts of the world to move in towards the equator. As a result, much of Africa and parts of Asia and North America received more rainfall during the glaciations than in the intervening interglacial periods. These alternating PLUVIAL and INTER-PLUVIAL PERIODS can only be tentatively correlated with the succession of glacial and inter-glacial.<sup>14</sup> Dr. Simpson's theory suggests the occurrence of a dry glacial stage that would allow the glaciers to be formed, between two warm inter-glacials which themselves are flanked by normal glacial maxima.<sup>15</sup>

Glaciation had its similar impact in North America too. There we find, *Nebraskan*, *Kansan*, *Illinoian*, and *Wisconsin* glacial stages approximately contemporary with the European glaciation. In India, the *Himalayan glaciation* started its influence on the climate of this sub-continent during the Pleistocene slightly later in comparison to European sequence. In fact, the first glacial maxima of the Himalayan glaciation occurred during the Mindel (2nd) glaciation of Europe.

Moreover, the minor oscillations as marked within a glacial phase, are termed as STADIAL (severe cold) and INTER-STADIAL (cold but not severe) periods.

The Great Ice age of Europe witnessed the cultural evolution right from the beginning of human civilization i.e. from Lower Palaeolithic stage which lasted upto the 3rd interglacial (Riss-Wurm) with its starting point rooted in the Gunz (1st) glaciation. In fact, the Lower Palaeolithic period was longest in duration in the whole of Prehistory (from 1,000,000 B.C to 150,000 B.C). *Pithecanthropus erectus* (*Homo erectus erectus*), *Pithecanthropus pekinensis* or *Pekin man*, *Heidelberg man* or *Homo heidelbergensis* and allied type of fossilmen lived during this period. They are held responsible for the *Core-biface* and *Flake Tradition* of Lower Palaeolithic cultural stage. Then, *Neanderthal race* (*Homo sapiens neanderthalensis*) appeared on the scene with their famous *Mousterian Culture* with evolved form of *Flake-Tradition* during the Wurm I (Maximum) or the 1st phase of the last glaciation i.e. between 150,000 and 20,000 B.C. They were closely followed by the *Cromagnon* and



allied races to introduce the Upper Palaeolithic culture in Europe. The *Cromagnon* race (*Homo sapiens sapiens*) appeared during the Wurm II phase of European glaciation i.e the tail-end of Pleistocene glaciation i.e between 20,000 and 12,000 B.C.

After this, we witness the final stage of *Glacial Retreat*. Warmer, ameliorating climate prevailed in Western Europe. This stage is known as *Post-Glacial period*, started approximately from 12,000 B.C.

**TABLE SHOWING:**

Major Cultural sequences of Western Europe during Pre-glacial, Glacial, and Post-glacial periods (Tertiary, and Quarternary (Pleistocene and Holocene epochs) periods of CENOZOIC ERA.

Era	PERIOD	Epoch	European Glaciation (acc. to Penck)	Beginnings (Years B. C.)	MAJOR CULTURES (Western Europe)
CENOZOIC	QUARTARNARY	Holocene	POST GLACIAL PERIOD.	1,000 3,000 6,000 12,000	MODERN AGE CULTURE METAL AGE CULTURE NEOLITHIC CULTURE MESOLITHIC CULTURE
		Pleistocene	DAUN GSCHNITZ WURM II WURM I ACHEN. 3rd INTER-GLACIAL RISS 2nd INTER-GLACIAL MINDEL 1st INTER-GLACIAL GUNZ	20,000 150,000 300,000 450,000 600,000 750,000 900,000	PALAEOOLITHIC CULTURE Upper → MAGDALENIAN Blade (stone) & AURIGNACIAN Horn, PERIGORDIAN Bone Tradition. SOLUTREAN Middle → MOUSTERIAN-LEVALLOISIAN Flake-Tradition (Side-scraper, Triangular point & discoidal core) Lower → ACHEULEAN LEVALLOISIAN Flake Tradition with faceted striking platform-TORTOISE Core technique. CLACTONIAN Flake Tradition CHELLEAN OR Abbevillon. PRE-CHELLEAN OR Cromerian Core-biface-flake Tradition Bolithic : Biface Core & Flake Tradition.
	TERTIARY		PRE-GLACIAL	1000,000	EOLITHIC CULTURE



### 15.9. CAUSES OF ICE-AGE :

Of the various explanations, it will be worthwhile to discuss the major two, like the *Geographical* and *Astronomical explanations* to account for the drastic oscillations in the Pleistocene climatic condition.<sup>16</sup>

#### GEOGRAPHICAL EXPLANATION :

It suggests that "drastic alternation in the levels of land and sea, the elevation of high mountain masses.....coupled with slight earth movement.....would be sufficient to produce the necessary fall in temperature." But this explanation fails to explain the periodicity within the Great Ice-Age.

*Astronomical explanation*, on the other hand, offers us two-fold reasonings for the causation of the Great Ice-age. The first one is known as Croll's hypothesis. According to this hypothesis, the precession of the equinoxes and the change in the length of the orbit of the earth round the sun could cause such oscillation of recessions and advances of ice during the Pleistocene Ice-age. In the past, our earth had a very elongated orbit in contrast to the circular orbit of the present day. "Croll's hypothesis is to-day somewhat under a cloud, but it must not be forgotten, even if it does not explain everything. It is quite likely that the Great Ice Age of Quarternary times was not the result of any one cause but was due to the concatenation of a variety of circumstances which chanced to be cumulative in their effect.....But there is little doubt that the shifting of the poles which seems within certain limits to have taken place, must have played a very important role in the formation of the Great Ice-age."<sup>17</sup> There is no doubt at present that these phenomena did sensibly affect the climate of Quarternary times, but the whole problem cannot be explained on Croll's hypothesis alone.

### 15.10. EVIDENCES OF THE GREAT ICE-AGE :

(i) *Boulder clay* : These are the most typical glacial deposits carried by on-moving glaciers. They mainly consist of "tough unstratified clays containing angular lumps of chalk, flint and various other fragments of rocks" torn off and carried over by forwardly directed ice-sheets. They ultimately formed what is known as a *moraine profonde*.

(ii) *U-shaped valleys and scratches on the valley floor* : On-moving glaciers and ice-sheets during the Pleistocene epoch formed several U-shaped valleys on their paths of movement and left scratch-marks and grooves on the rocks over which they had to pass. These scratch-marks and grooves are more or less parallel to each other and can be easily distinguished as the marks left over by on-rushing huge ice-sheets. The flint implements sometimes have been found to carry such scratch-marks.

(iii) *Loess* : These are wind-borne sandy materials deposited on hills and dales. Cold, dry, steppe conditions of the *glacial maxima*, in a way, was responsible for such type of deposition.

(iv) *River terraces* : The uneven terraces formed by the sides of an old river

16. Burkitt, M.C -op.cit.

17. Burkitt, M. C - op.cit.



offer us the direct evidences of the Great Ice-age. Such a river could be found in undivided India, namely, the *Sohan Valley* (a tributary of Indus) of West Punjab. During the *glacial maxima*, less flow of water is expected as the available moisture was solidified in the form of glaciers or ice-sheets. As a result, denudation work of the river will be less. The dimension of the terrace will be automatically less. But during the Inter-glacial times, the rapid melting of the ice caused the large volume of water to flow down the rivers and as such, the denudation work would be more. The terraces formed during Inter-glacial stages were of great height. In such a terrace-system, the bottom-most terrace would be the youngest while the top-most one should be the oldest because the river was initially in this stratum before it started its denudation works. The terrace-system tells us a reverse story in contrast to the stratigraphic geological sequence in which we find the bottom-most layer becomes the oldest and the top-most layer appears to be of recent origin.

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