

QUARTERNARY STRATIGRAPHIC SEQUENCE IN THE
POTWAR BASIN
AND ADJACENT NORTHWEST PAKISTAN

-0-

Dr. JOHN ELIOT ALLEN

-0-

Introduction: Prof. Ahmad Hassan Dani and Farzand Ali Durrani of the Department of Archaeology, Univ. of Pesh., kindly permitted the writer to accompany them upon a number of their trips to the remarkable Archaeology "digs" near Charsadda, Senghao and thana which were under investigation during 1963-64.

The problem faced by them in the dating of the formations within which artifacts occur at once aroused the writer's interest since they are in large parts geological problems in Quarternary stratigraphy. Nothing has been published on this aspect of the area, the nearest work has been in Kashmir (De Terra 1939) many miles to the north-west, and in Gujrat (Zeuner 1950-63) over farther to the south. Both are in different drainage systems, which might not correlate with Potwar System.

After a number of trips to various parts of the region, a pattern emerged in March of 1964, and tentative correlations appeared possible between similar sequences of unit found near the Swat River a mile south-east of Thana, along the Sher Garh nullah 17 miles north of Mardan and north of Katlang near Senghoa. Because of the absence of the previous publications, it seemed worthwhile to present the available data and some conclusions reached as a guide to further investigation, inspite their highly tentative and incomplete nature.

Geographic Setting: The Potwar basin and vale of Peshawar lie between the Indus River on the east and the foot hills of the Hindukush on the west. They occupy a structural basin south of the Himalayan foothills which has been cut off from the southern part of the West Pakistan by the rise of Salt Range and the line of hills which extends from Attock to North of Kohat. As this folding (and faulting) progressed during upper Cenozoics time, the basin was filled with alluvial materials from the surrounding hills, brought down by the Kabul River, Swat and Indus rivers and their many tributaries. Indeed, the evidence of high terraces around the periphery amply indicates the pre-Pleistocene topography was "drowned" during the lower Pleistocene by the accumulation of valley fill to an elevation several hundred feet above the present valley surface and that erosion during the Upper Pleistocene has removed much of this older fill and re-deposited a series of sediments which are the subject of this paper.

2
MORE.

The present valley floor is occupied by the braided courses of the few permanent (Kabul, Indus, Swat) and the intermittent streams and their interfluvial areas. Around the surrounding youthfully sculptured hills the alluvial plains and fans rise gradually, with alluvial valley straths extending in many cases for miles into the mountains between enclosing spurs and ridges. Occasional extensions of the spurs have been isolated far out in the plains by the alluvial fill. Terrace level at many locations have been cut in the fill during the period of erosion.

COMPOSITE SECTION:

The generalized section below represents a composite of a number of localities mentioned above. All of the units are not present in all of the localities, and it is believed that they do represent the same climatic epochs and therefore are correlative.

<u>UNIT</u>	<u>CORRELATIVE</u>	<u>CLIMATES</u>
Recent alluvium	Recent	Warm - Dry.
Shar Garh Lack Beds.	Late or post glacial.	Warm, moist
Younger loess in places red stained at base.	Last glaciation.	Cool Dry.
Cement, Gravel and Breccia.	Last interglacial.	Cool - Moist
Older loess, in places fine clay.	Penultimate glaciation.	Cool + Dry.
Laterite Zone.	Penultimate interglacial.	Warm - Moist.
The Archeological correlative might be considered as		
Neolithic	To 3000 B.C	Recent
Microlithic.	3000 to 15,000	Upper Wurm & Recent
Late Paleolithic.	15,000 to 50,000	Wurm or Wisconsin
Early Paleolithic.	50,000 to 250,000	Wisconsin and Last interglacial.
-do-	250,000 to 400,000	Mindel or Illinoian
-do-	400,000 to 550,000	Penultimate Interglacial.

Description and interpretation of units:

1. Recent alluvium. occupies erosion channels in older and bedrock, and consists of loose sand, gravel derived from the sediments and adjacent bedrocks and the upper parts of the drainage channels. It represents the erosion which has formed the stream courses and nullahs.
2. Shergarh Lake beds are found beneath the present surplains in the area between Dargai and Mardan, exposed in the Shergarh nullah lying above the Younger Loess. Some up to 30 alternating coarse and fine beds which constitute 8 inches thick. The sediment is gray clay, silt, and The beds are cut by numerous clastic dikes of silt, a commonly found in varved pro-glacial lake sediments. They represent the accumulation in a lake of fine sediment melting ice; in this case the ice of the Last Glacial post-glacial alpine glaciers. They may be from 3000 to old.
3. Younger loess-consisting of unbedded, fine-grained silts are probably dominantly collian in origin. The beds are sometimes red-stained. They underlie the lake beds in the basin and in the Swat Valley near Thana, where they sloping surfaces of terraces along the tributary stream overlain only along the margins by slope-wash from adjacent. They may be correlative with the thick "badlands" loess east of Campbellpore. Artifacts near Thana lie in but intrusions within the Younger Loess, artifacts at Sangha in cave deposits which also may be correlative. The Younger represents the cool and relatively dry period of steppe the Last Glaciation. They are probably from 15,000 to 1 old.
4. Cement Gravel and Bricks- lie between the Younger and Loess, their thickness ranging from a few feet in the valley to a few tens of feet near the hills. They are heterogeneous, completely unsorted as to size (up to boulders several diameter), and of angular shape. The valley sections are cemented by calcium carbonate, the limestone conglomerate cave is wholly cemented. These gravels represent a period of wet climate characterized by freezing and thawing and solifluction, mud flows and flooding. Their wide distribution that this was an important climatic change, the cemented gravels indicates excess flow from lime-bearing springs. The lack of sorting indicates freezing and thawing. It probably dates the Last Interglacial, dated at from 100,000 to 250,000 old.
5. Older Loess- is found beneath the Cement Gravel at Sangha. Its thickness is not known in the valley sections, it lies in the tributaries. At Sangha it may be represented by the layer beneath the Cement Gravel. In the field no differentiations between it and the Younger Loess has been noted, but work is being initiated to determine size range, degree of clay, minerals, etc. Like the Younger Loess, this represents a glacial period of cool dry steppe climate. If this is the Last Glaciation the Loess would be from 250,000 to 400,000 old.

6.-Laterite zone.

In a few places the lower part of the Older Loess is reddened and in a few other places it rests upon a more or less well-defined zone of lateritic soil, according to Dr. Dani. There is a red zone below the clay horizon at Sanghao Cave. If this laterite zone represents the Penultimate Interglacial it is from 400,000 to 600,000 years old.

Conclusions and suggestions for further work: The extremely tentative conclusions suggested in this paper need verification by further field work and detailed description and measurement of the mentioned sections and as many others as can be found over a still wider area. In addition laboratory work should be done on the various units to determine possible index heavy minerals, distinctive histograms, and other characteristics which would verify correlations made. Pollen for analysis should be searched for in the loess and lake beds; carbon for C^{14} analysis may be of value in the upper most units, lacustrine fossils or vertebrate remains may be found to add to the evidence.

The date we can only state that the "Power Loess" of wadia is no longer a single unit; a peri-or post-glacial lake once occupied a basin near Mardan; the loess is divided into two parts by a cemented gravel of widespread occurrence which represent a change in climatic conditions.