

DISCOVERY OF INVERTEBRATE AND VERTEBRATE FOSSILS FROM UPPER MURREE FORMATION OF PALKHAI SYNCLINE NEAR UDHAMPUR, JAMMU & KASHMIR STATE, INDIA*

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ABSTRACT—The Laren Bed, near Udhampur, Jammu and Kashmir State, contains well preserved invertebrate and vertebrate fossils. The assemblage of fossils, the associated environment and the problem of the age of the Upper Murree Formation in which they occur are discussed in this paper.

INTRODUCTION

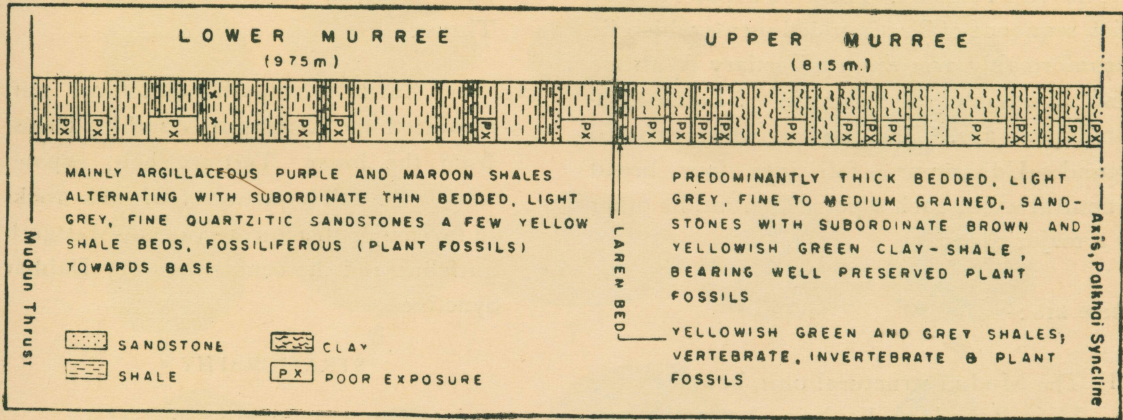
During the course of geological mapping in Jammu & Kashmir State in March, 1970 the authors collected invertebrate and vertebrate fossils in the lowermost section of Upper Murree Formation of the Palkhai Syncline. This record is significant in view of the fact that such fossils are being reported for the first time in this area, and throw some light on the age and environment of deposition of this formation. The occurrence of Mollusca was reported by E. Vredenburg in 1928 from Upper Gaj of Sind and Mekran Series of Northwestern India which he

called "the post-Eocene Tertiary Formation". Geological mapping in the J & K State was undertaken by the geologists belonging to various organisations. The Oil & Natural Gas Commission started systematic geological mapping in the Tertiary belt of J. & K. State in 1961-62. During the span of nearly a decade, almost the entire Tertiary belt has been mapped in considerable detail.

GEOLOGY

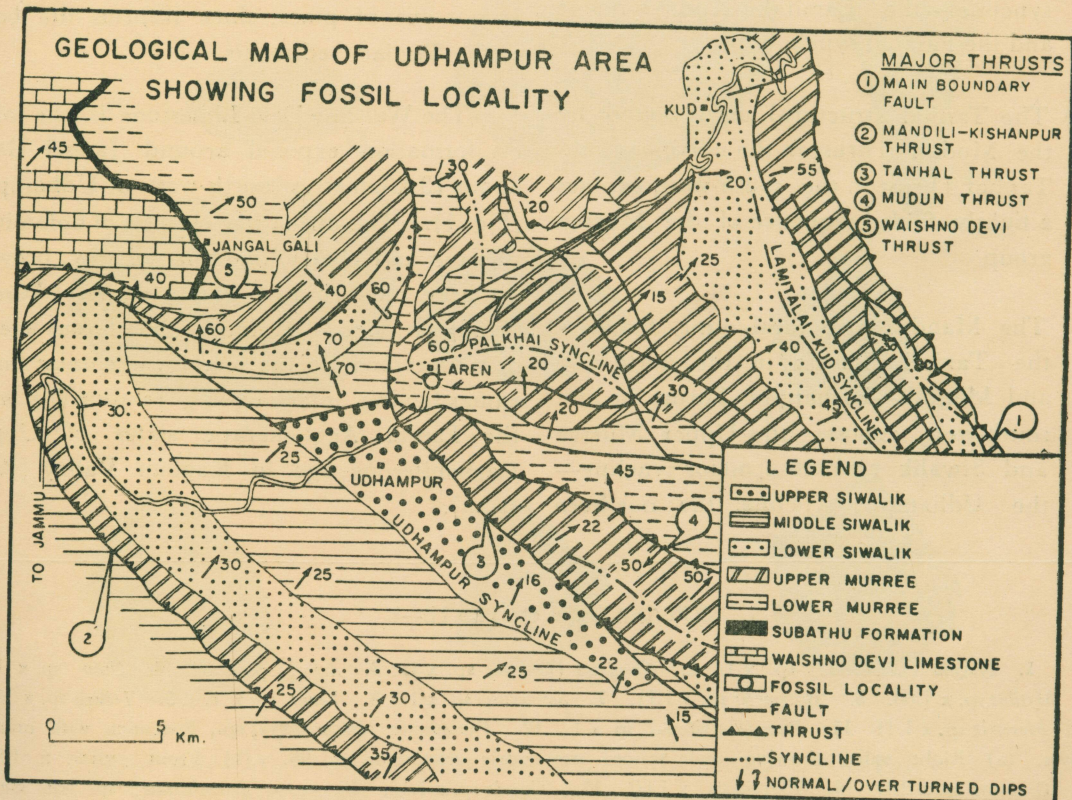
The Udhampur area forms a part of the inner Tertiary belt of Jammu and Kashmir State, which is contiguous with the Murree

* The views expressed in this paper are those of the authors and not necessarily those of the organisation to which they belong.



Text Fig. 1

Stratigraphic Column of the Murree group around Laren and the position of Laren bed.



Text Fig. 2

Geological map of Udhampur area, Jammu & Kashmir state, India. (Compiled after P. V. Krishnan et al., 1965, & 1966).

belt of West Pakistan. The area exposes a very thick sequence of Tertiary sediments which lie unconformably over the pre-Tertiary Waishno Devi Limestone of uncertain (? Permo-Carboniferous) age. The various units exposed around Udhampur, fall into four broad structural units, each separated from the other by a major thrust.

These are :—

- (1) The Mudun structural unit, bound by the Main Boundary Fault in the north-east and the Mudun Thrust in the south-west, exposes the Murrée group of rocks and the Lower Siwalik in two broad, major synclines—the Lamitalai-Kud syncline and the Palkhai syncline.
- (2) The Tanhal structural unit, bound by the Mudun Thrust in the north-east and Tanhal Thrust in the south-west, exposes a tightly folded sequence of the Murrée group.
- (3) The Mandili structural unit, between the Tanhal Thrust in the north-east and Mandili—Kishanpur Thrust in the south-west, exposes the Upper Murrée and Siwalik rocks in a major syncline—the Udhampur syncline, the northern

flank of which is offset by the Tanhal Thrust.

- (4) The Suruin-Mastgarh structural unit separated by Kissanpur-Mandili Thrust from the inner Tertiary belt, exposes almost the full sequence of Siwalik rocks in two major structures—Suruin-Mastgarh anticline and the complementary Dabbar Syncline.

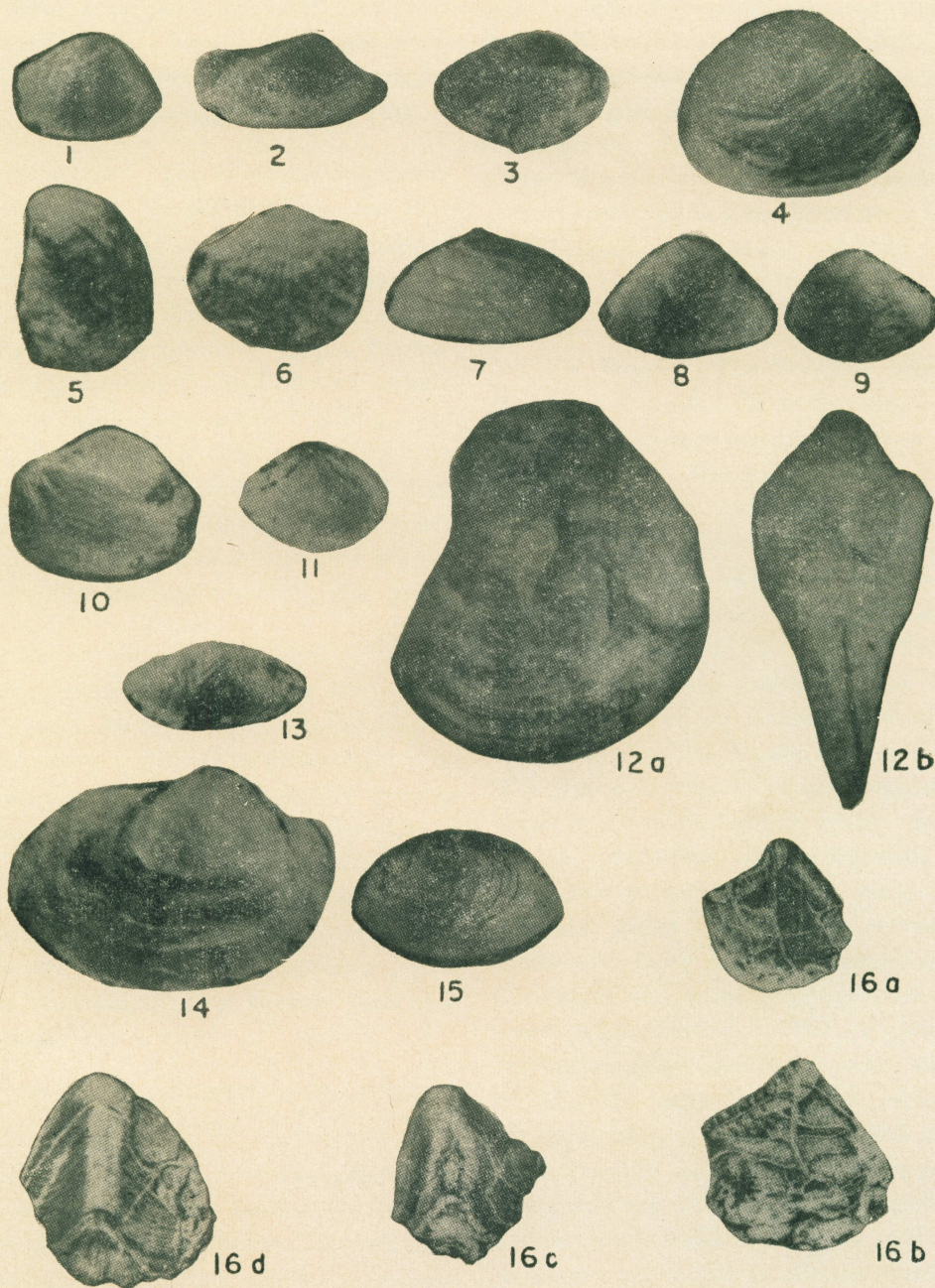
STRATIGRAPHY

All the sediments exposed in Udhampur area, with the exception of the Waishno Devi Limestone, belong to the Cenozoic Era. A brief description of Waishno Devi Limestone is not out of place, since it forms the base of the Tertiary sediments.

The Waishno Devi Limestone is the oldest formation exposed around Jangal Gali, about 13 kilometres north-west of Udhampur (Fig. 1). The formation consists of dolomitic, siliceous and cherty limestones of grey, brownish grey and bluish grey colours. Wadia (1966) assigned a Permo-Carboniferous age to this limestone on the analogy of similar limestones having intertonguing relationship with the Panjal Agglomeratic slates of Upper Carboniferous age in Kaghan Valley (Pakistan).

EXPLANATION OF PLATE--1

1. *Nucula (Leionucula)* sp. x 1. 2. *Nuculana (Ledella)* sp. x 1. 3. *Arca*? sp. x .87. 4. *Unio* sp. x .1.1
5. *Mytilus* sp. x 1.08. 6. *Apolymetis* sp. x 1.11. 7. *Solecirtus* sp. x 1. 8. *Venus* sp. x 1. 9. *Tellina* sp. x .93.
10. *Meretrix* sp. x 1.11 11. *Pitar (Calpitar)* sp. x 1. 12. *Pholadomya (Bucardomya)* sp., Specimen with united valves. (a) Right valve showing wide spaced concentric ornaments. x .96. (b) Front view. x 1.04.
13. *Goniomya* sp. x .94. 14. *Thracia* sp. x 1.60. 15. *Thracia* sp. x 1.12. 16. a—d *Dinotherium*? sp. two views of both the fragments of ridge crest. (a) x .88. (b) x .89. (c) x 1. (d) x 1. a and b side views; c and d top views.



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The lithological analogy, with Bilaspur limestone and Deoban limestone, suggests that the Waishno Devi limestone is likely to be much older in age than suggested by Wadia.

The Palaeogene. The Paleogene sediments of Udhampur can be divided into two formations on the basis of gross lithological characters. The Subathu formation of Paleocene to Lower Eocene age and Lower Murree formation of probable Upper Eocene to Upper Oligocene age. The Subathu formation unconformably overlies the Waishno Devi Limestone and consists of coal and black carbonaceous shales in the lower part and grey and highly fossiliferous olive green, papery shales, with few thin bands of brownish grey to buff Nummulitic limestone in the upper part.

The Lower Murree formation consists predominantly, of mauve, purple and brick, red claystones, siltstones, and pseudo-conglomerates alternating with subordinate, light grey to brownish grey and purple, fine grained sandstones. The basal part of the Lower Murree formation has yielded vertebrate fossils in the Kalakot area (A. R. Rao, 1971). The vertebrate fossils include several mandibles referable to Artiodactyla, fragments of a chelonian carapace and a broken skull of a juvenile crocodile.

UNCONFORMITY AT THE BASE OF LOWER MURREE

The occurrence of a fairly persistent and well marked conglomerate band at the base of Lower Murree with Nummulites derived from the underlying fossiliferous Eocene shales and limestones, and the Kalakot Ossiferous Zone containing rich vertebrate fauna, suggest a probable break in sedimentation after the Subathu, in the Tertiary succession in this

region. The Ossiferous Zone, consists of 10-12 metres of mauve and purple, silty nodular and concretionary claystones, conglomerate and bluish grey marl, which has thinned down to about two metres at Jangal Gali. The contact is a disconformity. The magnitude of the hiatus can be ascertained only after the identification and dating of the vertebrate fauna.

The Neogene. The Neogene sediments include the Upper Murree Formation and the Siwaliks, ranging in age from Lower Miocene to Pleistocene. The Upper Murree Formation rests conformably over the Lower Murree Formation; the lowermost unit being represented by a bed which yielded invertebrate and vertebrate faunas. This bed, named after the village Laren (32°57' 15"N ; 79°09' 30"E) consists of yellowish green and grey shale and claystone, two to three metres thick and occurs at the base of the Upper Murree Formation. The Upper Murree Formation consists, predominantly, of thick, light grey, fine to medium grained sandstones alternating with subordinate, brown and brick red claystones and yellowish green shales. The yellowish green shales are more frequently repeated in this Formation and bear well preserved leaf impressions (dicotyledons). The Upper Murree Formation passes gradually into the Lower Siwalik; the latter is composed predominantly of light grey, medium to coarse sandstone, often gravelly, with fewer claystones pseudo-conglomerates. The succeeding Middle Siwalik consists predominantly of light grey, medium to coarse and pebbly sandstones which are soft and friable with a peculiar salt-pepper texture. The fewer claystones observed are grey and greenish grey in colour. The Upper Siwaliks consist mainly of massive and loose sandrock

in the lower member and boulder conglomerate in the upper member with a few sand and clay lenses.

FOSSIL LOCALITY

The Laren Bed is exposed on the Jammu-Srinagar national highway, about 5 kilometres north-west of Udhampur and about 1 kilometre south-east of Laren village. This is a lenticular bed and occurs at the base of Upper Murree formation of Palkhai syncline. The Palkhai Syncline is a broad and gentle fold, covering an area of about 25 square kilometres. The trend of the syncline, in general, is NW-SE but it suffers a westerly swing west of Dhar Gaddian where the fold is offset by a major fault named after that village. The Syncline has a strong easterly plunge with fairly steep dips observed on the road, west of Tawi River. The flanks of the fold are, however, very gentle with dips ranging from 10°-20°. The lateral extent of Laren Bed is limited to a few metres only,

FAUNA

The fauna collected from the Laren bed, which is under study at present, consists of two fragments of ridge crest of a Proboscidean (? *Dinotherium*) molar and more than a dozen species of lamellibranchs. Since the hinge line and other diagnostic characters in the lamellibranchs are not observable and the requisite literature on fresh and brackish water lamellibranchs could not be consulted, it has not been possible to make definite identifications of these forms. However, the following tentative identification (Plate 1) of these forms were made after comparing the external characters with some collections in the Geolo-

gical Survey of India at Calcutta and by reference to published literature.

Nucula (Leionucula) sp., *Acila sp.*, *Nuculana (Ledella) sp.*, *Arca sp.*, *Mytilus sp.*, *Unio sp.*, *Tellina sp.*, *Apolymetis sp.*, *Solecortus sp.*, *Venus sp.*, *Meretrix sp.*, *Pitar (Calcpitaria) sp.*, *Pholadomya sp.*, *Pholadomya (Bucardomya) sp.*, *Lyonsia sp.*, *Thracia sp.*, *Dinotherium ? sp.*,

AGE OF THE LAREN BED

The tentative identification of lamellibranchs indicates a wide range of forms and it is difficult to assign a definite age at present. *Dinotherium* is known to occur only from Lower Miocene and younger formations. It is recorded from the Lower Siwalik and Middle Siwalik Formations. Since the base of Lower Swalik Formation is considered to be of Middle Miocene age, the stratigraphic position of the Laren Bed at the base of Upper Murree suggests a Lower Miocene age for this bed.

ENVIRONMENT OF DEPOSITION

During the deposition of Laren bed and the succeeding Upper Murree Formation, the area appears to have a predominantly deltaic or near shore environment. The fossil assemblage suggests that these strata were deposited in brackish water environment.

CONCLUSIONS

1. The tentative identification of the invertebrate and vertebrate fossils and the stratigraphic relationship of Laren Bed suggests a Lower Miocene age to the basal part of the Upper Murree formation.

2. The assemblage of faunas indicates predominantly a brackish water environment.

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