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The study of some gastropod fossils from Bradrar beds (Chorgali Formation), Nurpur area, Salt Range (Punjab), Pakistan

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ABSRACT: *The present studies were conducted for the identification of the fossil gastropods collected from the Chorgali Formation of Early Eocene age, locally known as the Bhadrar Beds and exposed at the Central Salt Range, Punjab, Pakistan. Palaeontological studies indicate that five species of the gastropods, representing five genera belonging to three families are present in the gastropod fauna.*

INTRODUCTION

The Eocene rocks exposed in the Salt Range are mainly the limestones, marls, clays and shales which are divided from base to the top into Nammal Formation, Sakesar Formation and the Chorgali Formation, respectively, and are highly rich in well preserved fossils. The fossil gastropods were collected from Chorgali Formation locally known as Bhadrar Beds. The Bhadrar beds are partly exposed at most of the places surrounding Nurpur village with the exception of deep gorges with vertical slopes just in the south of Nurpur. The present collection was carried out from a partly exposed ridge with the exposure of the marls and argillaceous limestones at its base, located about a kilometre east to south-east of the Nurpur village near the junction of the Choasaiden Shah - Nurpur Road and Bochhal Kalan Road. Figure 2 gives the generalised lithological log of the area with the exact lithological position of the gastropod fossils collected from the Bhadrar Beds. The gastropods were collected to study their taxonomy, variations in sizes, age relationship and other related events for understanding the marine regression before the deposition of the Kuldana Formation. The Kuldana Formation deposited in brackish to fresh water environment, lies on top of the Chorgali Formation in the Kala Chitta Range and Margalla Range and was most likely eroded away from the Salt Range and Southern part of the Potwar Plateau

PREVIOUS WORK

Several workers reported the presence of various fauna from Bhadrar Beds (Chorgali Formation) such as; Pinfold (1918), Davies (1926) and Gee and Even (in Davies Pinfold, 1937). Eames (1952ab) reported 96 species of gastropods from Zindapir and other localities. Gill (1953) carried out detailed studies on the facies and fauna in the Bhadrar beds of the Salt Range and correlated the lithological units exposed in lower Indus basin and Kohat-Potwar basin

on the basis of their fauna. He assigned a lower Eocene age to the Bhadrar beds on the basis of their fauna.

Iqbal (1969) carried out detailed investigation on the Tertiary gastropods and Pelecypods fauna from the Drug and Zindapir area (District Dera Ghazi Khan) and the Jhallar and Chharat areas (District Campbellpure). He described the lower Eocene gastropods and correlated these fauna" from the Chorgali Formation exposed in Salt Range and Khair-e-Murat Range. These fauna are *Chondrocreithium, Pakistanicum, Volutocorbis soriensis, Ringicula pseudopunjabensis,* and *Turritella (Stiracolpus) harnaiensis.* He assigned a lower Eocene age to the above gastropodes fauna and the Chorgali Formation.

Fatmi (1973) provided the details about the fauna and respectivee age of the Bhadrar beds. He quoted foraminiferal, Ostracodes and Molluscan fauna from the Chorgali Foramtion indicating an Early Eocene age. He described the molluscan fauna after Earnes, (1952) and reported the presence of *companile gigantum,* Euspirocromium, *Gosavia humberti, velates perversus, vicetia, verdenburgi, Discors sp., Euphenax coxi, Trachycardium cotter Deltiodnautilus sp.* and *Nautilus labechi.* Shah (1977, 1980) described the Chorgali Formation and stated an Early Eocene age on the basis of fauna.

Baqri et al. (1997) investigated some gastropods from the Nurpur area of Salt Range and reported 14 species of 8 genera, of 8 families and of 3 orders. They also described six speices, *Conus mahmoodi, Euspira cosmanni Gosavia fatmi, Harpa archiaci,harapa mufti and Tibia nurpurensis* new to science. *Crommium polybathra, C. rouaulti, Gisortia murchisoni, Tibia nurpurensis, Euspira adela, E cosmanni, Architectonica mainwaring, Conus mahmoodi, Gosavia humberti, G. fatmi, Harapa (Eocithara) morgani, H. archiaci and H. mufti.* They indicate a Lower Eocene age for these beds.

MATERLALS AND METHODS

These fossils were collected from the basal marly beds of the Chorgali Formation exposed at about ½ Km East to South East of Nurpur village, Salt Range Punjab (Fig. 1). The fossils were gently washed, curated, labelled and preserved in the reference collection of the Earth Sciences Division (ESD) at PMNH. Each fossil was measured according to its height and breadth. The fossils recovered are internal moulds. The external moulds could not be recovered as the argillaceous limestones and marls are fairly soft and the external moulds turn into small pieces due to erosion and weathering. Therefore, the present identifications are based on the preserved structures of the internal moulds only.

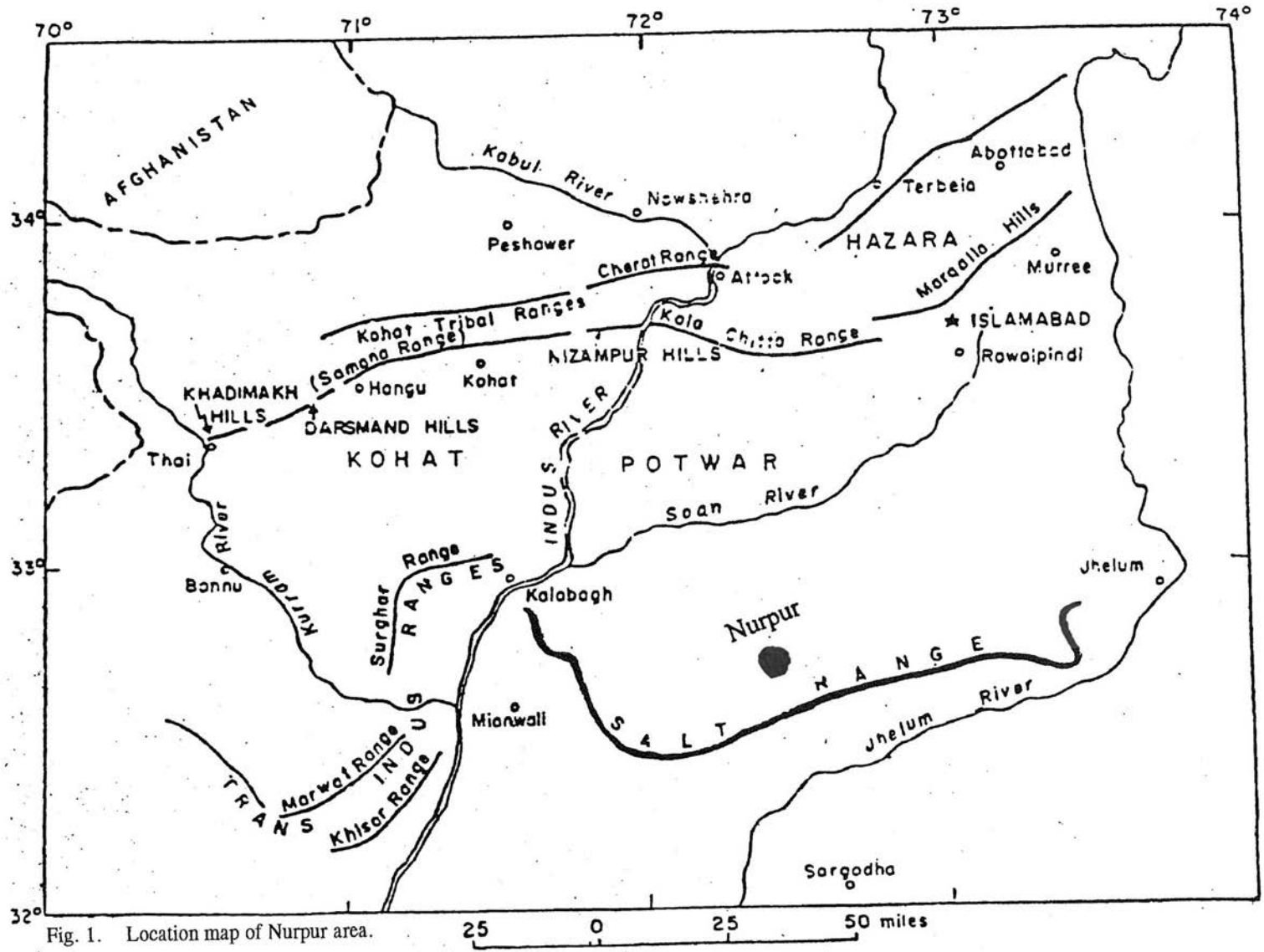

Fig. 1. Location map of Nurpur area.

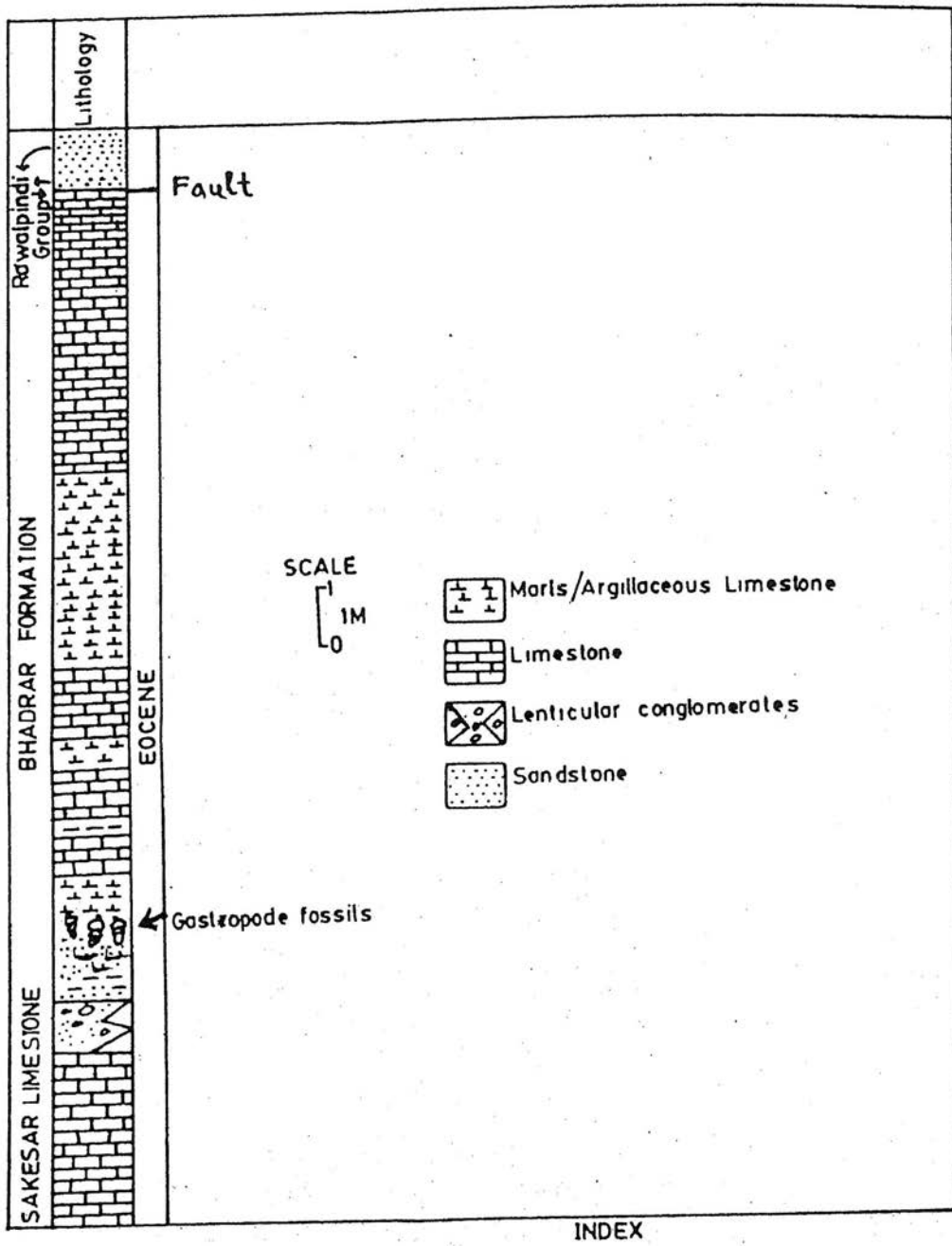

Fig. 2. The generalized lithological log of the Bhadrar Formation exposed in the Nurpur area Salt Range. The Bhadrar Formation consists of marls, orgillaceous limestones and lomestones.

SYSTEMATIC PALAEONTOLOGY

The identification of each gastropod fossil was carried out after detailed taxonomic study and measurements as follows:

Phylum	Mollusca
Class	Gastropoda
Subclass	Prosobranchia
Order (Ctenobranchiata)	Mesogastropoda
Super Family	Cerithiacea
Family	Cerithidae

Description:

Campanila giganteum (302/95, 310/95; Figs 3a-b; Lamarck): The specimens are well preserved. Large number of whorls, which are flattened from above form the side like steps, with a conspicuous suture. The dimensions of the figured specimens (a, b) are: height (incomplete) 14cm and 19.4cm; breadth 10.8cm and 13cm.

Prazus octogonus (192/95; Fig. 3c: Cox): The specimen is complete with many whorls. Columellar lip is dilated and thickened. The fossil specimen is turreted in shape. The dimensions of the figured specimen (c) are height 4.4cm and breadth 2.8cm.

Clava angystoma (164/95; Fig. 3d; Arch & Haime): Fossil specimen is ovate with weak striation. Apex depressed and embedded within the body whorl forming disk like structure. Whorls encircle with three rows of tubercles, which are rounded in shape. Aperture is small and oval. The dimension of the figured specimen (d) is height 4.5cm and breadth 3.9cm.

a)

b)

c)

d)

Fig. 3. Photographs of the fauna (a) campanile gigantium (302/95), (b) campanile giganteum (310/95), (c) pyrazus octogonus (192/95) and (d) clava angystoma (164/95).

Super Family	Strombacea
Family	Strombidea

Description:

Tibia nurpurensis (121/95: 235/95, 309/95; Fig. 4a-c; Baqri): Specimen figured c is partially embedded in the rock. Whereas apical portion is slightly damaged in all the specimens. Fossil specimens are tapering with spiral form. Mouth whorl is wide. The dimension of the figured specimens a, b, c are height (incomplete) 10. 1 cm, 11.8cm and 8.8cm breadth 8.8cm, 9cm, 6.9cm.

Super Family	Cypraecea
Family	Cypraedea

Description:

Gissortia murchisoni (270/95; Fig. 4d; Arch & Haima): Specimen is solid, well preserved. Three Apical spires are embedded in the body whorl forming a disk like structure. Body whorl is large and semi rounded in shape. Outer lip is dilated and thickened. The dimensions of the figured specimen (d) is height 5cm and breadth 6.6cm.

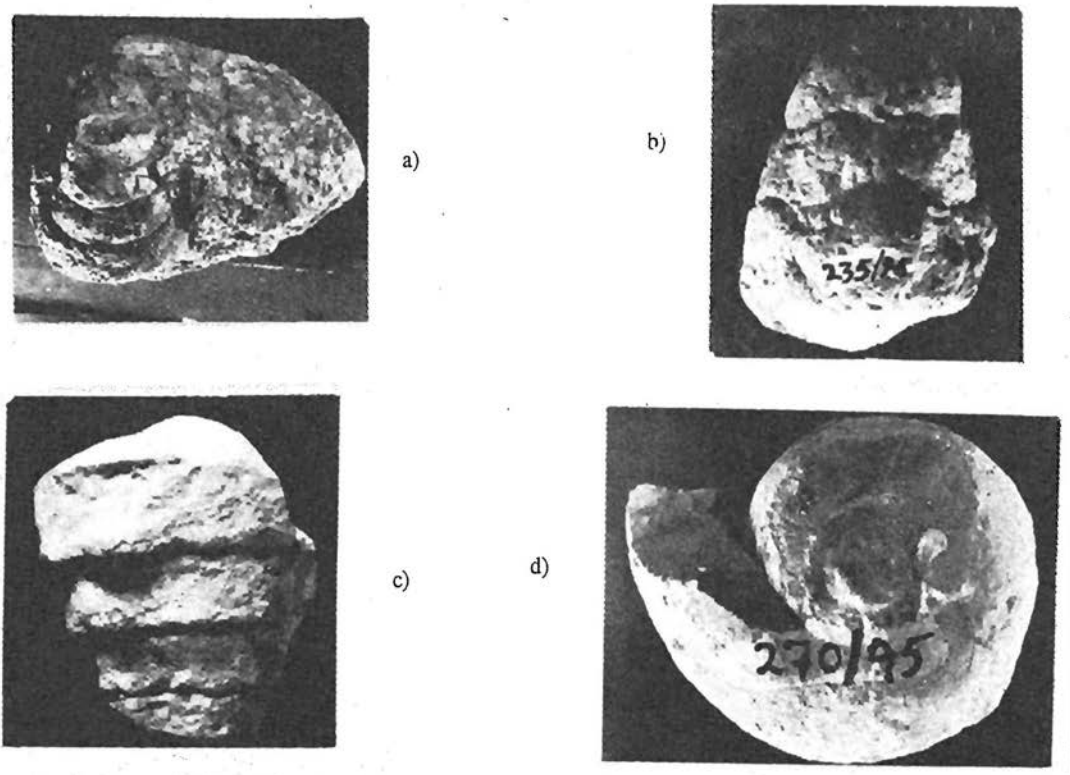

Fig. 4. Photographs of fauna (a-c) Tibia nurpureniss (121/95, 235/95, 309/95) and (d) Gissortia murchisoni (270/95).

DISCUSSION

The presence of abundant gastropods fossils in the basal marls of the Bhadrar beds exposed at Nurpur indicates the changes in the environmental conditions of these creatures. The sudden death of the fauna during the deposition of the basal beds reflects the pollution of the clean warm waters by the erosion, transportation and deposition of the clayey, silty, sandy detritus into the Tethys sea from the newly rising Himalayas.

The sizes of the gastropodes studied indicate the presence of abundant food in the shallow sea. The food material was most likely the blue green algae, mineral particles and probably some marine organism. These studies also indicate the distribution of these gastropodes on a regional scale and these fossils may be used as markers in the lower part of the Bhadrar beds, in tectonically disturbed areas.

CONCLUSIONS

1. The Bhadrar beds of Early Eocene age, exposed in the Nurpur area of Salt Range display abundant gastropod fossils in the basal marly beds. The gastropods fossils include eight species representing six genera belonging to three families. These creatures used to live in shallow, well lighted marine waters of the continental shelves.
2. The blue green algae, marine animals and the mineral particles were abundant in the marine waters to serve as the food material.
3. These animals died due to the regression of the Tethys Sea as a result of the uplifting of the Himalayas and pollution of the clean marine waters due to the detritus transported from the newly formed Himalayas mountains.

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