

A NEW EOCENE LOUVAR FROM BARMER, SOUTHWESTERN RAJASTHAN, INDIA

ASHOK SAHNI AND NAGENDRA K. CHOUDHARY

DEPARTMENT OF GEOLOGY, UNIVERSITY OF LUCKNOW, LUCKNOW-226007

ABSTRACT

A new louver, *Eolouvarus boudeigeni* gen. et sp. nov., is described from the Fuller's Earth horizon of the Ypresian sequence exposed in shallow wells at Bothia, district Barmer, Rajasthan. The specimen which represents the post-louarella stage of development, is a pelagic oceanic form, which is more closely allied to *Prolouvarus necopinatus* from the Eocene of Turkmenistan, than to *Louvarus praemperialis* from the Oligocene of Iran. However, it is comparatively more specialized than both these species. Associated with the specimen are the remains of the marine crabs *Gonio-cypoda rajasthanica* and *Penaeus kapudii*.

INTRODUCTION

Although the fish fauna has been known for over two decades, comparatively little work has been done on the material, apart from the investigations carried out by Tewari (1968), Sahni and Choudhary (1972). The latter authors described a few new marine teleosts *Scombroculupea murlii*, *Palimphytes misrai* and *Eobothus singhii* from subcrops at Bothia village. Choudhary (1972) published a note on the stratigraphy and palaeoecological conditions of Fuller's Earth horizon of this area. Subsequently Singh and Choudhary (1972) described a carangid *Matsyana laghukaya* from the same horizon and area. Mishra, Choudhary and Khare (1973) have identified a shark, *Scylliorhinus* sp. from the same locality. The present louverid specimens (LUV 12013 and its counterpart 12013A) form a part of a greatly diversified fish fauna collected during field investigations (1970-1972) near Bothia village (N 25° 55' : E 71° 22'), district Barmer in Rajasthan (fig. 1). The material was obtained from lower part of the Kolayat Formation of Lower Eocene (Ypresian) age (fig. 2).

Singh (1974) published a note incorporating the results of grain size and mineralogical investigations carried out by him on the Fuller's Earth samples, collected by the present authors, from various localities in Rajasthan. His studies revealed that the Fuller's Earth material is an extremely fine grained clay containing more than 90%, < 2 μ fraction which characterizes deposition of sediments in shallow brackish to marine environment of protected coastal lagoons lacking any significant wave and current activity. Presence of gypsum bands and stringlets suggests existence of partly hypersaline conditions.

The stratigraphic position and age of the Fuller's Earth of Rajasthan is a matter of some controversy,

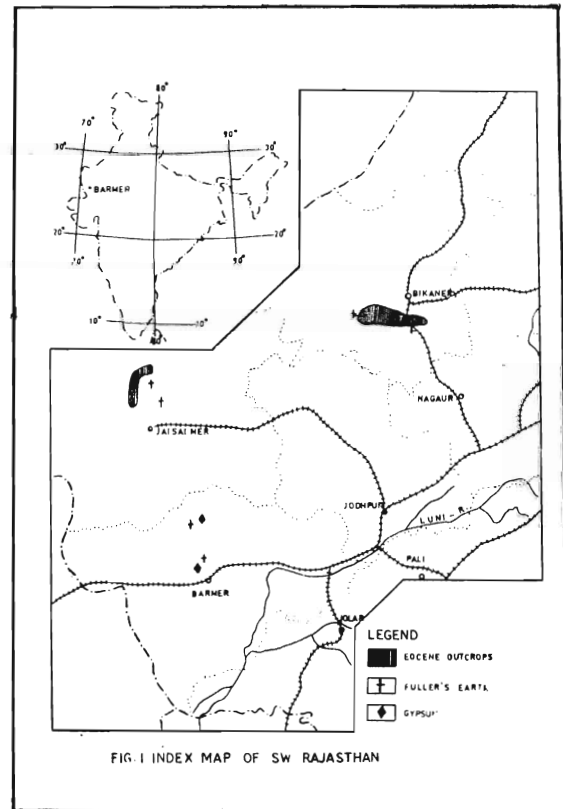


FIG. 1 INDEX MAP OF SW RAJASTHAN

though the deposits are now generally regarded as Lower Eocene (Ypresian). The age of the horizon has been determined, among others, by Singh (1969) on the basis of a comprehensive study of the micro- and mega-foraminiferal assemblages of the Eocene outcrops of Bikaner and Jaisalmer districts in Rajasthan. He assigned the Fuller's Earth to the Lower Eocene (Ypresian), a view

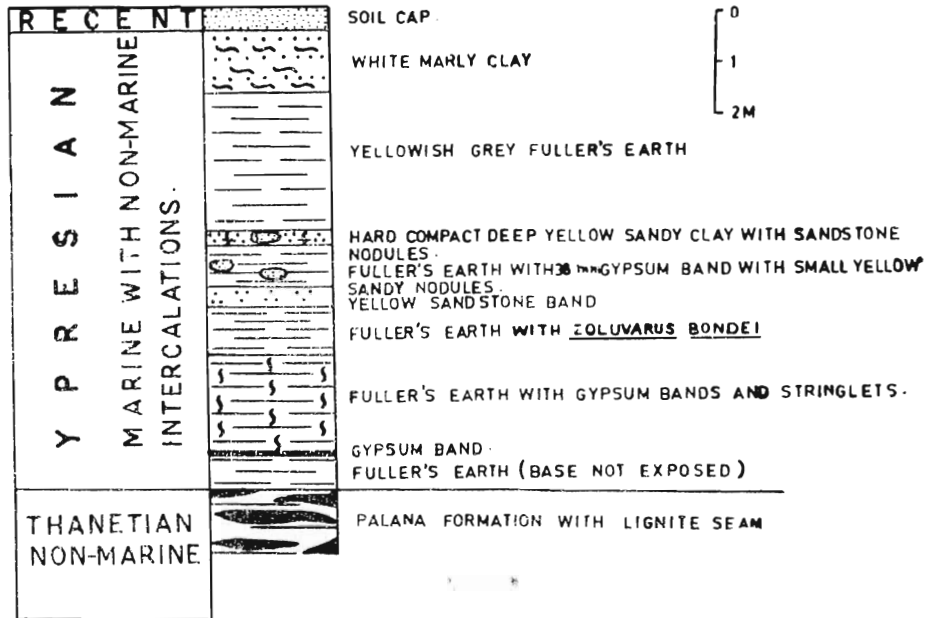


Fig. 2. Section in well No. 3 Bothia Village.

also held by the present authors on the basis of lithological, stratigraphic and palaeontological studies carried out on the Eocene succession of Barmer district in Rajasthan.

SYSTEMATIC DESCRIPTION

<i>Infra class</i>	Teleostei
<i>Super order</i>	Acanthopterygii
<i>Order</i>	Perciformes
<i>Sub order</i>	Scombroidei
<i>Family</i>	Luaridae
<i>Genus</i>	<i>Eoluarus</i> gen. nov.
Type specimen	<i>Eoluarus bondei</i> gen. et sp. nov.

GENERIC AND SPECIFIC DIAGNOSIS :

Body is nearly fusiform with gently curved dorsal margin and a deeply arched ventral border, possessing a large skull with terminal mouth. Eyes are oval and elongated. A dorsal bony keel of the supraoccipital bone

is developed which supports the dorsal muscular hump. Dorsal and ventral bony trusses which are well developed in *Luarus imperialis* and *Proluarus nicopinatus*, are less developed in *Eoluarus*, the ventral more poorly developed than the dorsal. Dorsal and anal fins are entire; pectoral fins are well developed, of the same size and situated in the same position as in Recent *Luarus imperialis*. A bony caudal fan with extended hypurals is present. The form possesses a very low vertebral number, i.e. 22 and a large lunate and homocercal caudal fin. Typical Louvar-like caudal is well developed, possessing two "rudder-stock-vertebrae" and a "Pivot vertebra" which provide a slightly movable base for the hypural fan. Neural and haemal spines are broad and stout. Pre-haemal spine emerging from the 9th vertebra is sickle-shaped. Some of the skull bones are distinguishable. Scales are small and cycloid.

The new genus is similar to *Proluarus nicopinatus*, Danilchenko, 1968, in possessing a high supraoccipital crest, narrow caudal peduncle, entire dorsal and anal

fins, large lunate caudal fin, equal number of abdominal vertebrae, small rounded scales and a dorsal bony truss which is otherwise primitively undeveloped in the specimen ; but differs markedly in the general body geometry, ratio and size, greater number of caudal vertebrae i.e. 13 instead of 12, in the absence of ventral bony truss, a more robust and stronger skeleton, more ventral emergence of pectorals, a more elevated dorsal muscular hump, a straight first haemal spine and a sickle-shaped pre-haemal spine.

The form is distinguishable from *Luvarus praeimperialis* (Arambourg, 1967), in possessing lower vertebral number i.e. 22 instead of 28-30 and in being morphologically close to the Recent *Luvarus imperialis*. Also *Luvarus praeimperialis* corresponds to the *Astrodermella* stage of development which is the first larval stage of *Luvarus imperialis*. Whereas, *Eoluarus* represents the post-luvarella stage of its developmental history.

The general body geometry and ratio, besides the size and emergence position of the pectoral fins ; long and extended dorsal and anal fins ; large lunate well developed caudal fin ; presence of "pivot-vertebra" and the "rudder-stock vertebrae", and broad hypural fan, sickle-shaped posteriorly directed pre-haemal spine ; presence of dorsal bony truss, bony keel borne by supra-occipital bone ; shape position and articulation of the skull bones etc. show that this form represents the more

mature stage i.e. the post-luvarella stage instead of the larval stages as represented by the *Proluvarus necopinatus* and *Luvarus praeimperialis*.

Eoluarus bondei sp. nov.

(Pl. I--1-4 ; Figs. 3-4)

Etymology : The species has been named after Dr. Niels Bonde, Institute of Historical Geology and Palaeontology, Copenhagen.

Material : Holotype I.U.V.P. 12013 nearly complete fish with skull and it's counterpart lacking the anterior-most portion of the skull.

Description : Body is more or less regularly fusiform, more than three times as long as high ; ventral margin is arched ; caudal peduncle is very narrow ; maximum depth of body coincides in position to place of emergence of pectorals ; skull length is less than one-third of the total body length ; skull length and height are nearly equal ; pectorals are enlarged composed of 15 unsegmented stout fin rays, emerging below the vertebral column and just behind the operculum, vertically in line of the fifth vertebra ; dorsal fin is entire on the dorsal border of the body, arising vertically in the line of second vertebra and continuing up to the seventeenth, anterior part consisting of stout spines followed posteriorly by feeble unsegmented fin rays, in the middle, the fin becomes very low ; anal fin is entire on the ventral border of the

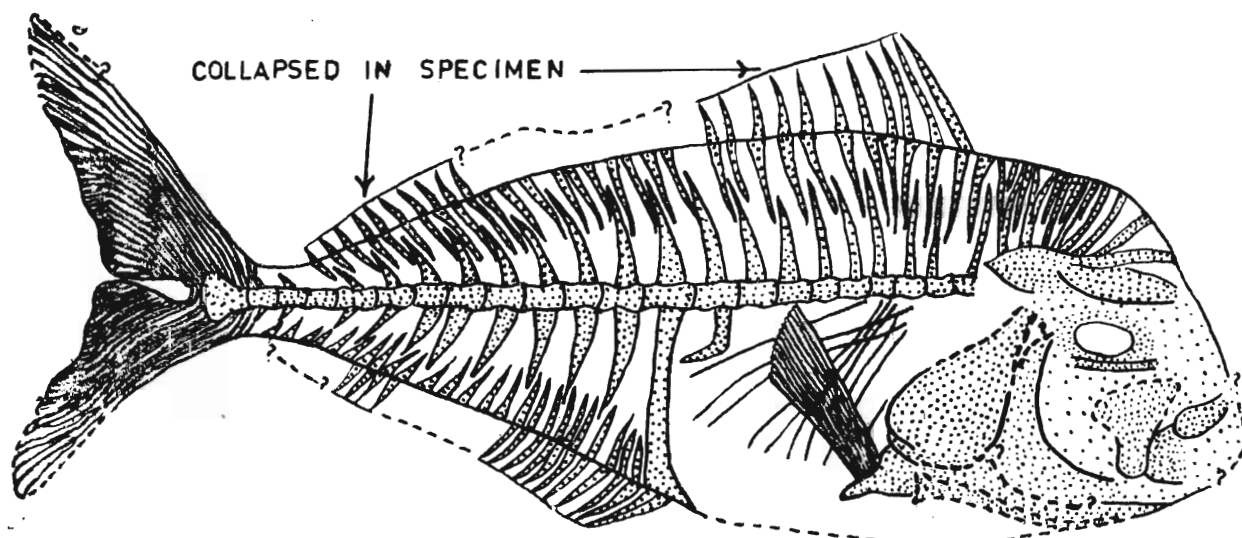


Fig. 3. *Eoluarus bondei* Sahni and Choudhary. $\times 1/2$.

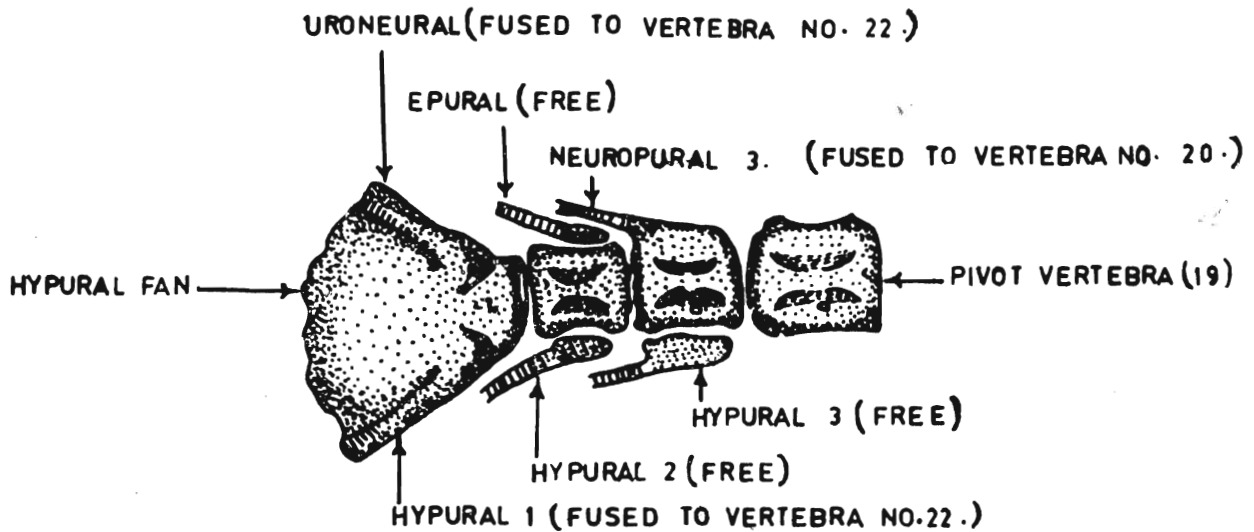
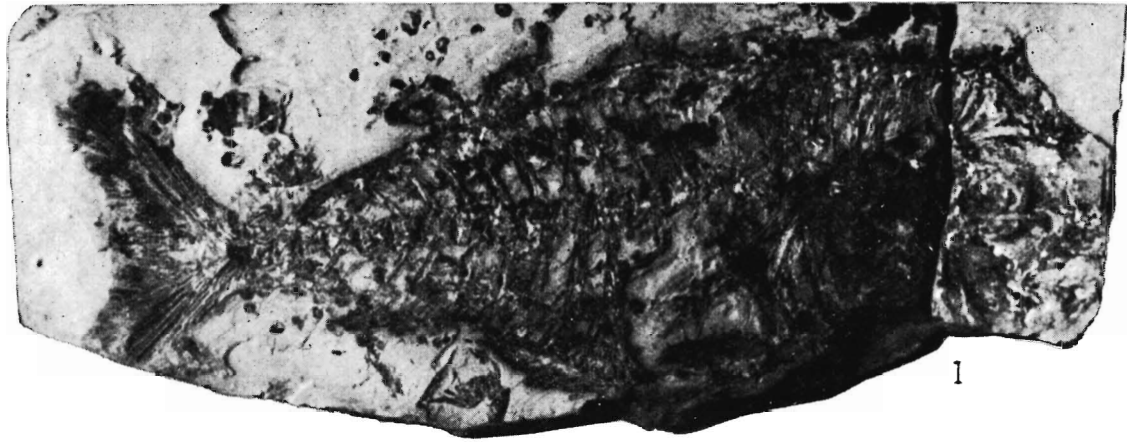


Fig. 4. Caudal of *Eolwans bondei* Sahni & Choudhary.

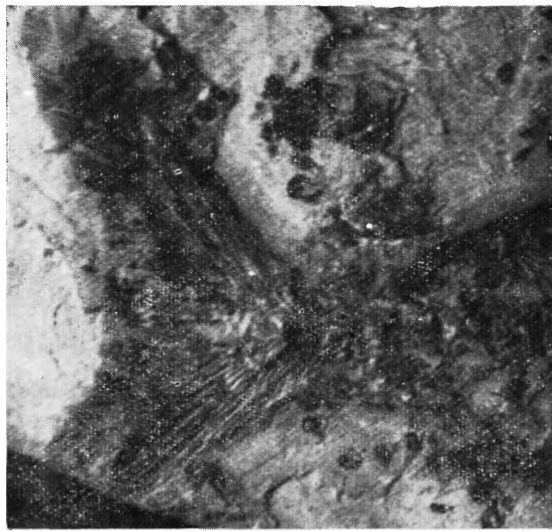
body, emerging vertically at the tenth vertebra and extending up to the seventeenth, comprising entirely of stout fin rays; caudal fin is large, lunate in shape, both fin lobes are equal and spread wide apart, caudal fin rays are strong, elongated, numerous, segmented and bifurcated distally, resting on the broad hypural-fan which attaches with the "rudder-stock vertebrae" which in turn adjoins the "Pivot-Vertebra" (19th vertebra) which is devoid of neuropural and hypural processes; the 20th vertebra possesses fused neuropural 3 and a free hypural 3; the 21st vertebra comprises one free epural and free hypural 2; the 22nd and last vertebra is conical consisting of an uroneural and hypural 1 which are fused with the body of the vertebra; to the last vertebra is attached the hypural fan, a flattened triangular plate formed by the fusion of hypurals, which is flanked dorsally by the uroneural and ventrally by hypural 1 of the last vertebra.

Most of the skull bones are distorted in the specimen, some of them are distinguishable viz. supraoccipital, frontal, circumorbital bones, parasphenoid, quadrate, articular, maxilla, pre-operculum, operculum, post-temporal and part of cleithrum; quadrate is big, its breadth in upper part is more than the axial diameter of the orbit, pre-operculum is crescented and strongly def-

lected forward in the lower part; operculum is enlarged, broad with semi-circular posterior margin, anterior margin is somewhat straightened, a bony protuberance emerges, midlength along the anterior margin, numerous ridges radiate from this protuberance but only a very few of them reach the outer margin of the operculum; parasphenoid is slender, feebly curved and visible just below the lower margin of the orbit; post-temporal is big and united closely with the supra-cleithrum; pterygials of the pectoral fin rest on the cleithrum; orbit is elongated and one-sixth of the skull length, placed just above the centre of the skull and below the vertebral column, horizontal diameter is more than vertical diameter, pre-orbital distance is less than the post-orbital distance of the skull; a peculiar bony-keel is borne by the supraoccipital bone to support the dorsal muscular hump; bony truss structure is formed by the zig-zag interlocking of the pterygiophores or bony fin supports. The truss which marks the dorsal contour of the body is yet not fastened to the vertebral column except for the anteriormost region where, it receives support from the bifurcated and dorsally extended neural spines; total vertebral number is 22, 13 of them being caudal; vertebrae are amphicoelus longer than broad, constricted in the middle part, dumb-bell-like, having a strong reinforcement of bony ridges, con-



1



2



3



4

SAHNI & CHOUDHARY

ERRATA

EXPLANATION OF PLATE I

1. *Eoluvarus bondei* gen. et sp. nov., $\times \frac{1}{2}$; 2. Caudal region $\times 0.8$; 3. Skull region $\times 0.8$; 4. Abdominal region $\times 0.8$

centric rings are seen in the centrum, neural and haemal spines arise from the middle part of the vertebrae; abdominal cavity is rather small and in anterior half of the body, it is restricted posteriorly by first haemal spine arising ventrally from the tenth vertebra, broadening ventrally to reach the ventral contour of the body; pre-haemal spine is sickle-shaped, arising ventrally from the ninth vertebra, flattened at the base, sharply bent at midlength and directed posteriorly; neural spines up to 7th vertebra are long and feeble, needle like, the anterior ones are bifurcated, neural spines posterior to 7th vertebra, i.e. from 8th to 18th are stout and flattened laterally up to midlength and then constricted, haemal spines are stout laterally, flattened and bluntly pointed; ribs in the abdominal region are paired, feeble, curved and needle-like, arising latero-ventrally from the abdominal vertebrae; scales small, thin, rounded and cycloid.

The following conventional body measurements have also been recorded:

	Measurements in cm.
Total body length	33.30
Body length up to caudal base ..	27.30
Body height	11.00
Skull length	10.00
Skull height	9.00
Length of dorsal fin	17.00
Length of anal fin	9.00
Length of pectoral fin	5.00
Axial length of caudal fin	6.00
Length of caudal fin lobe	8.00
Depth of caudal notch	4.20
Tail spread	11.00
Width of caudal peduncle	2.50

Remarks: The fossil record of the Luvaridae is quite meager and is confined to the Asian continent. Apart from the present specimen from Rajasthan, a Eocene (Ypresian) louvar, *Proluvarus nicopinatus* has been described from Turkmenistan (Danilchenko 1968). The only other record is from Middle Oligocene of Iran *Luvarus praemperialis* (Arambourg 1967). The Recent *Luvarus imperialis* is a rather rare, pelagic, oceanic fish confined to the Mediterranean but sparingly reported from the coasts of Australia, California and New York.

The Rajasthan genus, *Eoluvarus bondei* gen. et sp. nov, closely resembles *Proluvarus nicopinatus* and *Luvarus imperialis* in its low vertebral number (21-22), but differs in this respect from the Oligocene *Luvarus praemperialis* where the vertebral count varies from 28-30. The specimens also represent different growth stages: *Proluvarus nicopinatus* probably represents a "luvarella" stage of growth, while *Luvarus praemperialis* consisting of two specimens, the "Astrodermella" as well as the "Luvarella" stages. The Rajasthan specimen is, however, larger than *Proluvarus* by nearly 50 percent. and represents a "post-luvarella"—adult stage. Thus the Rajasthan specimen may represent the adult growth stages of *Proluvarus nicopinatus*, but the data is as yet insufficient to determine a generic correspondence. On the other hand, there are a number of features which suggest that *Proluvarus* and *Eoluvarus* are not congeneric but distinct though allied genera.

Type Locality: Bothia Fuller's Earth mine, about 2½ Kms SW of Bothia Tube well no. 3, Bothia village in district Barmer (Rajasthan) on Barmer-Jaisalmer Road.

Type Horizon: Fuller's Earth, Laki, Lower Eocene (Ypresian).

Repository: Holotype no. LUVP 12013 and 12013 A, in Museum of the Geology Department, Lucknow University, Lucknow.

REFERENCES

- ARAMBOURG, C. 1967. Les Poissons Oligocene de l' Iran (in French). Notes et Mem. Moyen Orient (VIII), Mus. Nat. Hist. Nat. Paris
- CHOUHARY, N. K. 1972. A note on the Stratigraphy and Palaeoecology of Fuller's Earth deposits of Barmer District, SW Rajasthan. *Proc. Ind. Sci. Congr. Assoc. 59th Session* (III). 283-284.
- DANILCHENKO, P. G. 1968. Fishes of the Upper Palaeocene of Turkmenistan. (in Russian). Pub. Acad. Sci. U.S.S.R., Moscow. 143-144.
- MISHRA, V. P., CHOUHARY, N. K. & KHARE, S. K. 1973. Eocene Sharks from India. *Proc. Ind. Sci. Congr. Assoc. 60th Session* (IV): 31.
- SAHNI, A. & CHOUHARY, N. K. 1972. Lower Eocene Fishes from Barmer, SW, Rajasthan, India. *Proc. Ind., Nat. Sci. Acad.* **38A**. (3+4): 97-102.
- SINGH, I. B. 1974. Mineralogy of the Fuller's Earth of Rajasthan, India. *Jour. Geol. Soc. Ind.* **15**(3): 278-285.
- SINGH, S. N. 1969. Stratigraphy of the Eocene of Rajasthan. *Proc. Ind. Sci. Assoc.*, 56th Session. (3): 217-217.
- SINGH, S. N. & CHOUHARY, N. K. 1972. A new Fossil Fish genus from the Eocene of Rajasthan, India. *Geophytology* **2**(2): 206-210.
- TEWARI, K. K. 1968. A new Fossil Percoid Fish from the Lower Tertiary Fuller's Earth deposits of Kapurdi, Barmer District, Rajasthan., *Jour. Zool. Soc. Ind.* **20** (1+2): 95-103.