

# A NEW FOSSIL FISH GENUS FROM THE EOCENE OF RAJASTHAN, INDIA

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## ABSTRACT

The present paper embodies a detailed description of the new carangid genus *Matsyana* obtained from the Fuller's earth succession of Bothia village District Barmer, Rajasthan. The main characters that differentiate it from other members of this family are: absence of scales and the anterior placement of the pelvic fins with reference to the pectorals. On the basis of the observations made on a number of living fish genera and from the available literature on fossil fish genera, it has been suggested that the anterior shifting of the pelvic fins is probably because of the large size of the skull and the deepest part of the body being anterior to the mid point of the body.

## INTRODUCTION

Although the existence of Eocenes in Rajasthan was reported as early as 1897 by LATOUCHE, the first record of the presence of the fossil fish was by BAROOAH (1946 and 1950) from the Fuller's earth of Kapurdi village. KAUL (1950) in his paper on *Cocos sahnii* Kaul, has given without identification the photographs of the associated fossil fishes. GHOSH (1952, p. 108) while enumerating the recent discoveries states, "...also a shark's tooth identified by Dr. E. I. White of the British Museum as *Odontaspis macrata striata* (Winkler), a European Lower Eocene species and a fish vertebra, respectively from 290' 3" and 197' 6" from a bore-hole core at Gunga, north of Sheo, on Barmer-Jaisalmer road (personal communication); these fossil crabs and fishes excepting the shark's tooth which is lower Eocene may belong to any age in the Tertiary."

An excellent collection of the Fuller's Earth fossil fish fauna from Bothia village (N 25° 55'; 71° 22'), District Barmer is being studied in detail by Sahni and his collaborators at this University. It is expected that after the completion of the study of the fish assemblage and other associated invertebrate genera, enough data would be available to elucidate the palaeoecological conditions of this part of the Lower Eocene basin of Rajasthan. The lithological succession in well No. 3 from which the present specimen was obtained is given below:—

### Section in Well No. 3, Bothia village (in descending order)

<i>Lithology</i>	<i>Thickness</i> (metres)
1. Soil cap .. .. .	.45
2. White Marly Clay .. .. .	1.20
3. Yellowish grey variegated Fuller's earth .. .. .	2.80
4. Hard compact deep yellow sandy clay with sandstone nodules, gypseous at the top .. .. .	.25

5. Fuller's earth with 1/2" gypsum band and small yellow sandy nodules	..	..	..	..	..	.82
6. Yellow Sandstone band	..	..	..	..	..	.35
7. Fuller's earth	..	..	..	..	..	.92
8. Fuller's earth with gypsum bands and stringlets	..	..	..	..	..	1.92
9. Gypsum band	..	..	..	..	..	.08
10. Fuller's earth (Base not exposed)	..	..	..	..	..	.77

#### SYSTEMATIC DESCRIPTION

Infra class—TELEOSTEI

Super order—ACANTHOPTERYGII

Order—PERCIFORMES

Suborder—PERCOIDEI

Family—CARANGIDAE Rafinesque, 1815

Genus—**Matsyana** gen. nov.

Type species—*Matsyana laghukaya* gen. et sp. nov.

*Etymology*—The generic name has been derived from the Sanskrit word 'Matsya' meaning fish.

*Diagnosis*—Body irregularly fusiform and deepened; head large; caudal peduncle much constricted; snout sharp and mouth small, proximal with oblique cleft; high supra-occipital crest; preoperculum not serrated. Total number of vertebrae about 23. Paired fins small, pelvics inserted in advance to pectorals, dorsal fin entire, anal fin emerges from a point posterior to the point of the dorsal projected on the ventral margin, two separate short post anal fin rays distinct, caudal fin large and deeply forked. Scales absent.

*Comparison*—The new genus under description compares with the genus *Aipichthys* Steindachner, 1859 in skull length and body length ratio, in possessing entire dorsal fin, small pectorals and deeply forked caudal fin, but differs markedly, in the height and length ratio of the body, in not having scales, in possessing greater number of anterior spines, i.e. 4 to 5 instead of 2 to 4, lesser number of vertebrae, in very much smaller size, position and size of pelvics, in emergence position of the anal and the presence of two post anal fin rays. It is similar to *Semiophorus* Agassiz, 1838 in skull and body length ratio, in possessing the entire dorsal fin and small pectorals. But differs distinctly, in the emergence position of the pelvics, in the height and body length ratio, in possessing no scales, in being very small in size, the length of the anal fin being shorter, in bearing two post anal fin rays and the caudal being deeply forked. It resembles *Platax* Cuvier, 1817 in the characters of possessing entire dorsal fin and small pectorals, but differs distinctly in all other characters. *Matsyana* gen. nov. is akin to *Amphistium* Agassiz, 1844 in the characters of the entire dorsal fin, small pectorals and the size and emergence position of the pelvics, but is dissimilar in all other characters particularly in the height and length ratio of the body, the ratio of the skull and body length and in the forked nature of the caudal fin. It compares with *Vomeropsis* Heckel, 1854 in having the entire dorsal fin, the size and emergence position of the pelvics but is distinctly different in all other characters. It is similar to *Caranx* Lecepede, 1802, in having small but not falciform pectorals, small pelvics and two post anal fin rays, but differs characteristically in possessing no scales and bearing the entire dorsal fin. The new genus except in the characters of possessing no scales, body height and body length ratio, and post anal fin rays, differs with *Archaeus* Agassiz, 1844 in all other characters. It is quite close to *Seriola* Cuvier, 1817 in the characters of skull and body length ratio and small

pectorals, but differs in the height and length ratio of the body, in having no scales, in being smaller in size and having the two post anal fin rays and the entire dorsal fin. With the genus *Carangopsis* Agassiz, 1844 it compares in the characters of skull and body length ratio and in possessing equal number of vertebrae, but differs in all other characters. It is similar to *Dutcor* Agassiz, 1844 only in having the small pectorals but varies characteristically in all other characters.

***Matsyana laghukaya* sp. nov.**

Pl. 1, Fig. 1; Pl. 2, Figs. 1—4; Text-fig. 1

*Etymology*—The Sanskrit word '*Laghukaya*' used for the derivation of the specific name means small body size.

*Material*—One complete fish preserved in the Fuller's earth, showing left lateral aspect.

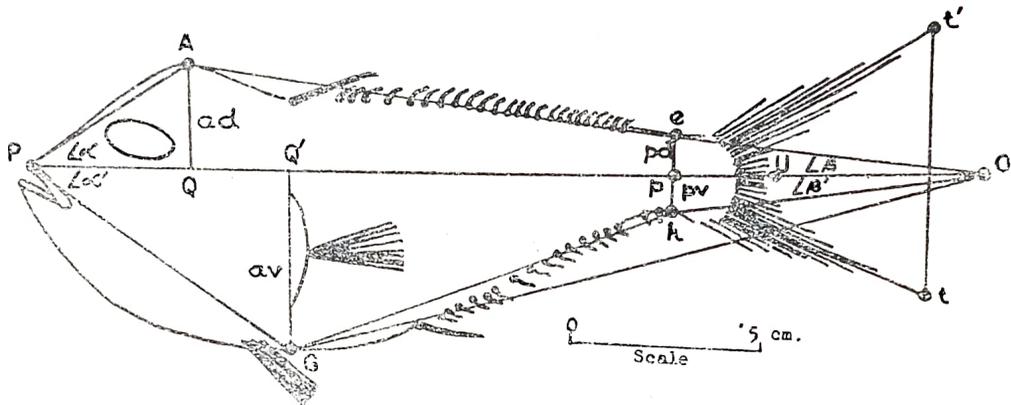
*Description*—Body irregularly fusiform, nearly four times as long as high; trunk deep-end, maximum depth of the trunk just behind the skull; ventral border deeply arched; caudal peduncle very narrow; skull large, almost equal in height and length; paired fins small, pectoral emerges below the vertebral column just behind the opercular apparatus vertically in line of the sixth vertebra, with about eight soft unsegmented fin rays articulating on pterygials just behind the cleithrum; pelvics inserted near the ventral border, and this point of emergence with reference to the emergence point of the pectorals is distinctly anterior, the pelvics comprise about ten soft unsegmented fin rays. Dorsal and anal fins entire on the dorsal and ventral borders respectively, anal fin comparatively less extended; dorsal fin low, emerges vertically in the line of the fourth vertebra and continues posteriorly up to the nineteenth, the first four or five being stout spines and the remaining nineteen being soft and unsegmented fin rays; anal fin low, arises vertically in line of the tenth vertebra and extends posteriorly up to nineteenth, the first being a stout spine followed by fourteen soft unsegmented fin rays; two short separate post anal fin rays appear behind the anal fin on the ventral border of the caudal peduncle; caudal fin large and deeply forked both fin lobes equal and spread wide apart, caudal fin rays elongated numerous resting on broad hypurals attached to the last vertebra; most of the skull bones distorted and a few even displaced, some of them intact and even distinguishable viz. premaxilla, maxilla, dentary, a few units of the circumorbital series, supraoccipital, units of the opercular apparatus and cleithrum; preoperculum not serrated posteriorly; orbit oval, high supraoccipital crest, snout sharp, mouth small proximal with oblique cleft that hardly reaches the antorbital margin, teeth absent; total number of vertebrae 23, 14 of them being caudal; abdominal cavity small, in the anterior half of the body, restricted posteriorly by the first haemal spine arising from the 8th vertebra, which develops ventrally into pterygiophore. Scales absent. Tail homocercal.

Besides the conventional measurement, in order to make a close comparison of the body geometry with other carangid genera, measurements as suggested by GREGORY (1951) have also been made and included.

*Measurements in mm.*

Total body length	23·0
Body length up to the caudal base	18·0
Body height	6·5
Skull length	6·9

Skull height	6.5
Length of the dorsal fin	8.5
Length of the anal fin	6.5
Length of the pectoral fin	2.5
Length of the pelvic fin	2.0
Axial length of the caudal fin	5.0
Length of the caudal fin lobes	6.0
Depth of the caudal notch	4.0
Tail spread	6.7
Width of the caudal peduncle	2.0



Text-fig. 1.—*Matsyana laghukaya* gen. et sp. nov. Diagrammatic sketch to show the geometry of the body. Main Reference Points—A=Apex, P=Prosthion, G=Gasterion, O=Opisthion. Auxiliary Reference Points—p=Pygidion, U=Uranion, ad=Anterior dorsal vertical, pd=Posterior dorsal vertical, av=Anterior ventral vertical, pv=Posterior ventral vertical, t=Tail spread, t'=Tail spread.

*Body Geometry measurements*—(After Gregory 1951, Vol. II, p. 319)

PQ	=	3.91 mm.
QQ'	=	2.39 mm.
Q'p	=	9.56 mm.
pU	=	2.39 mm.
UO	=	5.21 mm.
AQ	=	2.50 mm.
GQ'	=	4.34 mm.
tt'	=	6.70 mm.
$\angle \alpha$	=	35°
$\angle \alpha'$	=	35°
$\angle \beta$	=	7°
$\angle \beta'$	=	6°

*Type locality*—Well No. 3, Bothia Fuller's earth mine, about 2 1/2 Km SW of Bothia Tube well No. 3, Bothia village, on Jaisalmer-Barmer Road.

*Type horizon*—Fuller's earth, Laki, Lower Eocene.

*Repository*—Holotype No. LUVF 12006, in Authors' collection.

*Remarks*—While going through the available literature on the functions of the various fins of the fishes, generally all the workers have stated that the pelvics have the least function in comparison to the other fins. Although detailed work on the functions of the pelvics is being done in this laboratory, but so far no conclusive results have been obtained. How-

ever, the observations made by us on the placement of the pelvics in relation to the other fins, proportion and the shape of the body etc., lead us tentatively to the conclusion, that the forward shift of the pelvics seem to be closely related to the proportionate weight of the anterior and posterior halves of the body, in other words, if the anterior half of the body is proportionately heavier than the posterior, because of the large skull and the anteriorly located coelomic cavity, the pelvics exhibit a proportional forward shift in order to provide additional buoyancy for maintaining horizontal equilibrium of the anterior portion. The synonymous use of the anal and the ventral fins have been observed in the literature, in order to remove this confusion, it is suggested that the entire ventral fin be divided into two divisions, namely the part that is posterior to the anal opening be termed 'Anal fin' and the part that is anterior to the anal opening be termed as 'Preanal fin'.

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## EXPLANATION OF PLATES

### PLATE 1

*Matsya laghukaya* gen. et sp. nov.

Photograph of the Holotype, No. LUVF 12006×6.5. 1. Cleft of the mouth, 2. Eye orbit, 3. Occipital crest, 4. First dorsal spine, 5. Point of origin of the pectoral fin, 6. Point of the origin of the Pelvic fin, 7. First anal spine, 8. Post anal fin rays and 9. Width of the caudal peduncle.

### PLATE 2

*Matsyana laghukaya* gen. et sp. nov.

1. Enlarged view of the skull. ×8.
2. Enlarged view of the middle part of the body showing details of the dorsal and anal fins. ×8.
3. Enlarged view of the posterior part of the body showing details of the caudal fin. ×8.
4. Enlarged view of the pectoral region showing details of the pectoral and the pelvic fins. ×10.

