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A Shark Tooth from Zewan Series of Guryul Ravine, Kashmir*

By

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Abstract

A new species of a shark, *Ctenacanthus ishii* is described on the basis of an isolated tooth from the Zewan Series of Guryul Ravine, Kashmir. The tooth of *Ctenacanthus ishii* is characterized by eight subsidiary cusps and an elevated cusp. The central cusp is oriented at right angle to the basal plate. Of the subsidiary cusps, the extreme lateral pair is the largest (approximately 1/3 of central cusp) and is situated at the labial extremity of the tooth making an angle of 115° with the base. The root plate is reniform with the labial border almost straight and the lingual side convex.

The find of a shark tooth in the marine Permian beds of Kashmir is significant considering the rarity of fossil vertebrates in the Palaeozoics of the Himalayas.

Introduction

The solitary shark tooth was collected from the Zewan Series at Guryul Ravine, Kashmir by Ken-ichi ISHII†. Prior to this find, no vertebrates have been reported from this series, though a number of palaeoniscid fish and labyrinthodonts are known from the underlying Gondwanas.

The systematic description of the Guryul Ravine was made by MIDDLEMISS (1909) when he delineated the Permian-Triassic boundary by taking the black shales as the top of the Permian; later TEICHERT, KUMMEL & KAPOOR (1970, p. 175) revised the boundary and brought the contact below the black shale on the basis of faunal assemblage. This contact has been essentially accepted by NAKAZAWA, KAPOOR *et al.* (1970). The shark tooth was obtained, 3 metres below this contact from calcareous sandstone designated as Bed No. 46b by NAKAZAWA, KAPOOR *et al.* (1970).

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† Dr. Ken-ichi ISHII of Faculty of Science, Osaka City University visited Kashmir in 1969 as a member of a geological party led by Prof. K. NAKAZAWA of Kyoto University. H.M. KAPOOR, one of the author of this paper was also a member of the Indo-Japanese team.

Description

Class	Chondrichthyes
Subclass	Elasmobranchii
Infraclass	Osteodonti
Superorder	Ctenacanthoidei MOY-THOMAS, 1939
Family	Ctenacanthidae DEAN, 1909
Genus	Ctenacanthus AGASSIZ, 1935

Type Species: *Ctenacanthus major* AGASSIZ, 1935

Generic Description: The *Ctenacanthus* was defined on the basis of isolated fish spines. Later, teeth assigned to *Sphenacanthus* were included in the genus. The dentition consists of a "cladodont" tooth pattern with a central elevated, acutely pointed cusp with usually two to four lateral subsidiary cusps situated on a flattened semicircular base.

Ctenacanthus ishii, n. sp.

(Figures 1 a, b)

Etymology: Named in honour of Dr. Ken-ichi ISHII of Osaka City University, Japan who collected the specimen.

Type No.: G.S.I. No. 18510

Locality: Guryul Ravine, Kashmir

Horizon: Bed No. 46b, calcareous sandstone; 3 metres below Permian-Triassic contact, Zewan Series.

Diagnosis: The tooth with a central elevated cusp, oriented at right angle to the basal root plate; eight subsidiary cusps of which the extreme lateral pair is the largest (approximately 1/3 of central cusp) making an angle of 115° with the base; section of the central cusp oval in outline; root plate reniform in basal view, labial border almost straight and lingual side convex.

Description: The tooth posseses a central cusp with eight lateral subsidiary cusps, arranged four anteriorly and four posteriorly (Fig. 1a). The central cusp (whose tip is broken), is slender, tapering slightly and oriented at right angles to the flattened, expanded root plate. The length of the central cusp measured from the base to the broken apex is about 8 mm and the surface is ornamented by parallel, longitudinal ridges. The cross-section of the apex is oval in outline. Of the subsidiary cusps, those situated on both the extremities are the tallest (height 3.5 mm approximately) and are tilted away from the central cusp, making an angle of 115° with the root plate; their surface ornamentation consists of subparallel, prominent ridges. The other subsidiary cusps are small, conical and show some signs of wear.

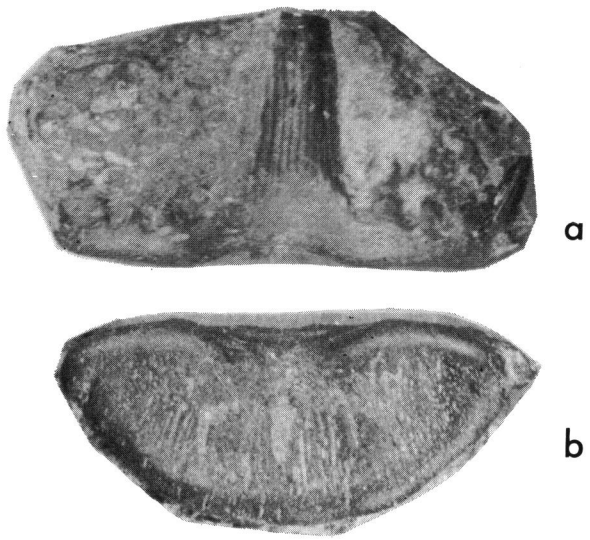

Fig. 1. *Ctenacanthus ishii*, sp. nov., ca × 3.5. a: Labial view of tooth. b: Basal view of the root plate.

The basal plate (Fig. 1b) is reniform in shape with an almost straight labial and convex lingual border, which is somewhat elevated; maximum length of the plate 16 mm and its maximum width 6 mm. The anterior and posterior labial extremities are produced in the form of "alae", and the length/width ratio of the basal plate is much greater than that of *Ctenacanthus occidentalis* (LEIDY).

Discussion: Among the many species of *Ctenacanthus* erected on dental characteristics, such as number and relative size of subsidiary cusps, angle of inclination of the central cusp, surface ornamentation and the basal root plate, *Ctenacanthus ishii* is defined on a tooth comparable with *Ctenacanthus costellatus* TRAQUAIR, *Ctenacanthus* sp. (KHABAKOV) and *Ctenacanthus occidentalis* (LEIDY). It differs from *Ctenacanthus costellatus* (Lower Carboniferous of Scotland) and *Ctenacanthus* sp. (collected by KHABAKOV from the Permian of the Volga Basin) in posessing 8 subsidiary cusps of unequal height in comparison to 4–6 cusps of almost equal dimension and can be distinguished from *Ctenacanthus occidentalis* (LEIDY) by the orientation of the subsidiary cusps to the main central cusp and length/width ratio of the basal plate.

Conclusion

The knowledge of the vertebrate fauna from the marine beds of Kashmir Himalaya is limited to very few types, most of them are of doubtful nature. Fish

remains are known from the Muth Quartzites (Devonian), the Upper Trias and the Jurassic. DIENER (1915, p. 55) recorded the occurrence of two fragments of ichthydorulites from Zewan beds of the Wean Spur, which he thought to be of Permian age, but which are in fact of Upper Triassic age (MIDDLEMISS, 1909, p. 308).

The occurrence of a shark tooth in Zewan Series is of additional interest, as it is the first record of a vertebrate from the marine Permian beds of Kashmir. The tooth was discovered *in situ* from the calcareous sandstone and there does not appear to be any possibility of this being derived or redeposited from the coastal or lagoonal sediments of the underlying Lower Gondwana beds, which have palaeoniscid fishes of different nature and habitat.

The present occurrence of *Ctenacanthus ishii* sp. nov. extends the geographic distribution of the genus southwards to the Permian of Kashmir. The genus is so far been recorded from the Upper Devonian to Permian beds of America and Eurasia.

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