

CHITINOZOA FROM LOWER PALAEOZOIC SEQUENCE OF SPITI, HIMACHAL PRADESH, INDIA

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ABSTRACT

Chitinozoa are being recorded from the upper part of the Takche Formation, Spiti Valley, Himachal Pradesh, India. The assemblage comprises *Angochitina* sp., *Ancyrochitina* sp., *Cyathochitina* sp., *Conochitina* sp., *Eremochitina* sp., *Lagenochitina* sp., *Desmochitina* sp., *Rhabdochitina* sp., indicating a late Ordovician to late Silurian age.

INTRODUCTION

The paper records the occurrence of Chitinozoa from the Lower Palaeozoic Takche Formation (SRIKANTIA, 1974) exposed at the Muth village in the Pin River section of Spiti Valley, Tethyan Himalaya, Himachal Pradesh (Fig. 1).

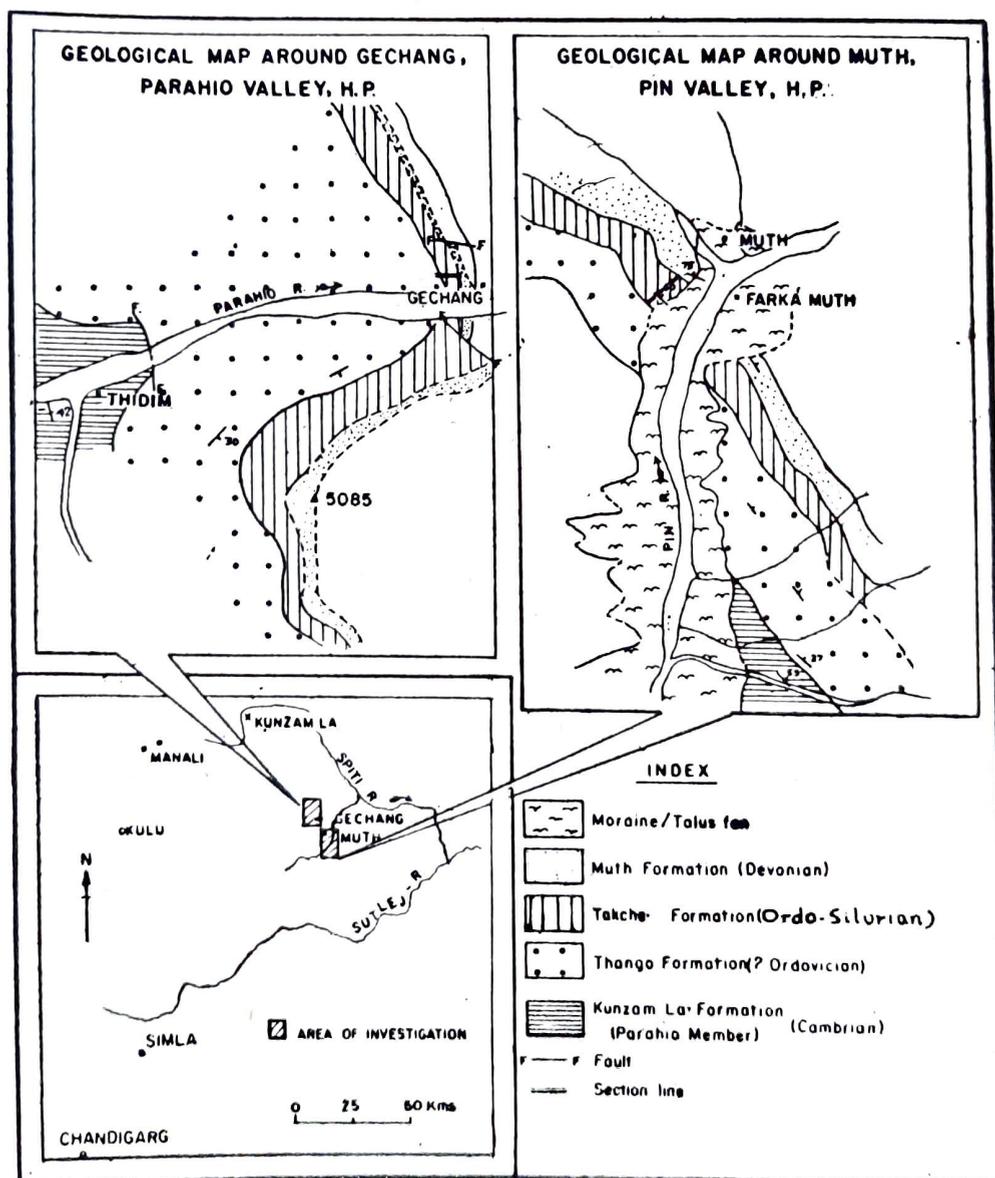


Fig. 1

The Chitinozoa is an important group of marine organisms which is now considered to range in age from late Cambrian to early Carboniferous. These are chitinous bodies whose animal affinity is uncertain though their stratigraphic significance is considerable because of the limited vertical range and wide geographical distribution. Chitinozoa have been found useful in biostratigraphic zonation and dating of Lower Palaeozoic sequences in many parts of the world.

In India, the knowledge regarding Chitinozoa is too meagre. These have been reported from the Lokapur Formation of Kaladgi Group of South India (VISWANATHIAH *et al.*, 1979) and Saknidhar Formation exposed near Satpuli in Lesser Himalaya (NAUTIYAL, 1978). These two formations are dated as Precambrian-Cambrian and late Precambrian, respectively. The only identifiable taxa from these two areas are *Lagenochitina* and *Desmochitina*. Chitinozoa-like bodies have, of late, also been recorded from Talchir Formation of Jharia Coalfield in Peninsular India by TIWARI *et al.* (1981). VISWANATHIAH *et al.* have described 44 species belonging to 10 genera of Chitinozoa, namely—*Desmochitina*, *Cyathochitina*, *Ancyrochitina*, *Lagenochitina*, *Rhabdochitina*, *Conochitina*, *Margachitina*, *Clathrochitina*, *Acanthochitina*, *Sphaerochitina*, from the Badami Group suggesting a late Ordovician age (PRASAD, 1980).

GEOLOGICAL SETTING

The general geological setting of the Lower Palaeozoic succession, as worked out by one of the authors (GOPENDRA KUMAR), is given below :

Table 1—Lithostratigraphy of the Lower Palaeozoic sequence in Pin Valley of Spiti area, Himachal Pradesh

Formation	Member	Lithology	Age
Takche	C	Intercalation of limestone, shale and arenite	Ordovician to Silurian
	B	Limestone with partings of shale	
	A	Alternation of limestone, calcareous arenite and shale	
Thango		Red, gritty to fine general quartzite with minor shale bands	Ordovician
		Conglomerate with sub-rounded clasts of quartzite, dolomite, shale and vein quartz	
----- angular unconformity -----			
Kunzam La	Parahio	Arenite micaceous and shale alternation with lenticular dolomite bands. Fossiliferous	Mid-late Cambrian
	Debsa Khad	Quartzite with shale alternations. Trace fossils of trilobite and worm burrows in upper part	Early Cambrian to late Precambrian
Batal		Dark grey to carbonaceous phyllite/slate and quartzite	Precambrian

The above lithostratigraphic classification is broadly in accordance with the work of SRIKANTIA (1974) with following modifications :

The presence of an angular unconformity at the base of Thango Formation is in accordance with the observations made earlier by HAYDEN (1904) and GOEL AND NAIR (1977). The Takche Formation has been divided into three members, viz. A, B, and C. The A and major part of B Members correspond broadly with Ordovician of HAYDEN (1904) while the uppermost part of B and the entire Member C is restricted to Silurian. Various members of the Takche Formation have been measured in the field by GOPENDRA KUMAR and each member has been further classified accordingly to lithology as shown in Fig. 2. Bed numbers 11 and 12 belonging to Members B and C have yielded Chitinozoa, which are described here.

MATERIAL AND METHODS

Fossil Chitinozoa have been recovered in association with scolecodont and acritarchs from Sample Nos. 69, 71 and 73 from Bed Nos. 11 and 12. Various maceration techniques were tested to separate the Chitinozoa and ultimately the technique proposed by URBAN AND KLINE (1970) was found satisfactory. In this technique the samples were broken to nearly 1 cm size and treated with concentrated hydrochloric acid until all the carbonate material was dissolved. Thereafter, the acid was decanted and the residue was washed with distilled water. Washing was repeated till all the calcium ions were removed. The residue was treated with 40 per cent hydrofluoric acid for about 14 hours. This was decanted and Schultz's mixture was added. This was diluted with water after 15 minutes and washing was repeated till it became acid-free. Ten per cent potassium carbonate was added and left for five minutes. This was decanted and washed till it became neutral. It is important to note that residue is never centrifuged at any time during maceration.

MICROFOSSILS

The various forms identified up to generic level on the basis of available literature (COMBAZ, 1955, 1970 ; CRAMER, 1973 ; DUNN, 1959 ; JANSONIUS, 1967 ; JENKINS, 1967 ; NEVILLE, 1974 ; TAUGOURDEAU, 1966 ; TAUGOURDEAU & JEKHOWSKY, 1964 ; URBAN & KLINE, 1970) are listed below :

1. Sample No. 69

Angochitina cf. *capillata*

2. Sample No. 71

Ancyrochitina sp., *Angochitina* sp., *Bursachitina* sp., *Conochitina* sp., *Eremochitina* sp., *Lagenochitina* sp., *Cyathochitina* sp.

3. Sample No. 73

Ancyrochitina sp., *Bursachitina* sp., *Conochitina* sp., *Desmochitina* sp., *Eremochitina* sp., *Lagenochitina* sp., *Rhabdochitina* sp., *Cyathochitina* sp.

DISCUSSION

The age of the horizons now designated as Takche Formation, was regarded as Ordovician-Silurian by HAYDEN (1904) and REED (1912). The latter author also described the fauna and broadly differentiated the Ordovician and Silurian sequences on the lines proposed by HAYDEN (1904). In their scheme of classification, the Ordovician-Silurian boundary is demarcated between Bed Nos. 10 and 11 of Member B. Of the

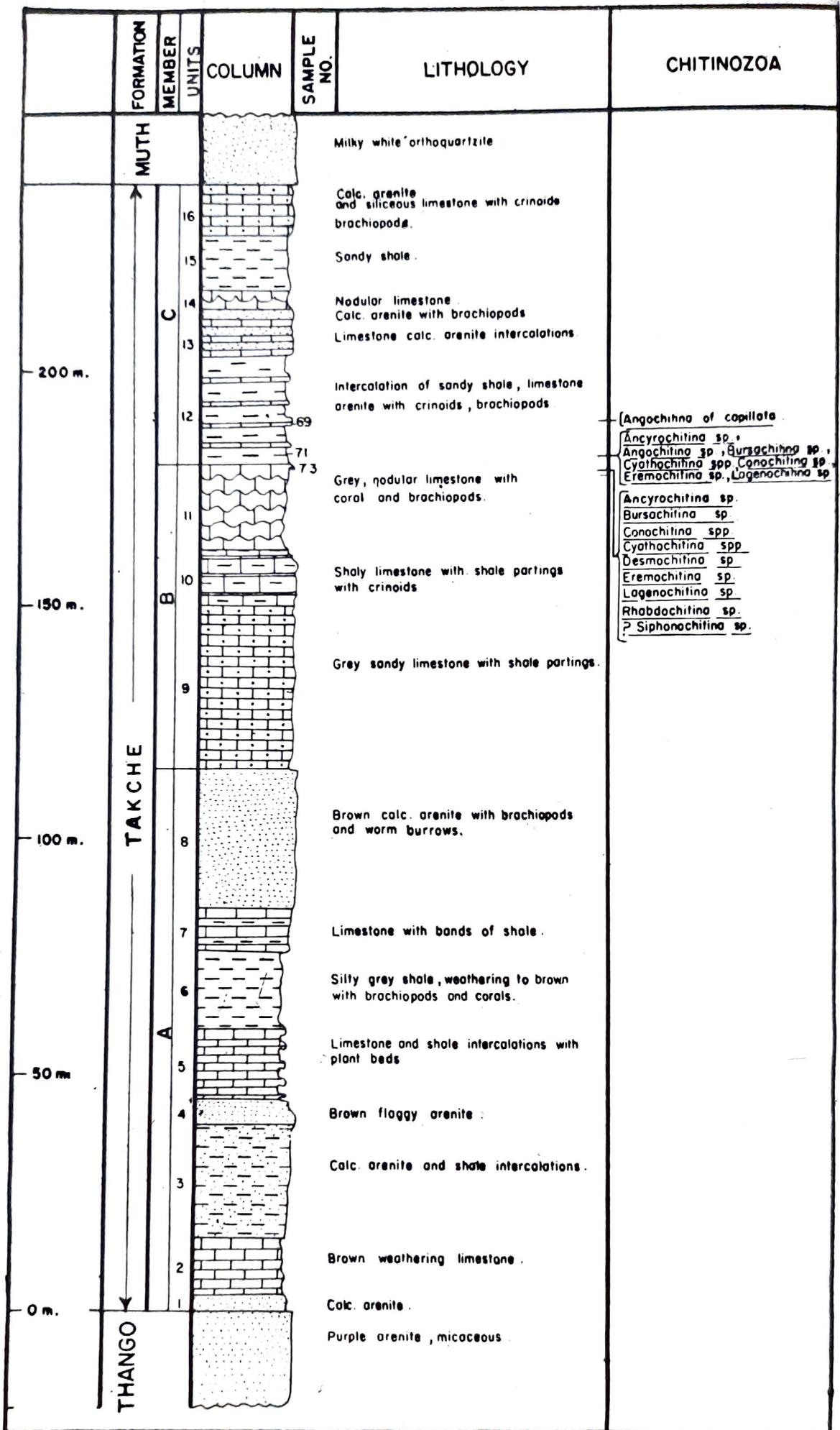


Fig. 2. Lithostratigraphic column of Takche Formation at Muth, Pin Valley, showing Chitinozoa bearing horizons.

Table 2—Showing the known distribution of taxa (Genera) recovered from the Takche Formation, Spiti Valley, Himachal Pradesh

CHITINOZOA	ORDOVICIAN						SILURIAN			DEVONIAN						
	TREMADOCIAN	ARENIGIAN	LLANVIRNEN	LLANDEILIAN	CARADOCIAN	ASHGILLIAN	LLANDOVERIAN	WENLOCKIAN	LUDLOWIAN	GEDINIAN	SIEGENIAN	EMSIAN	EIFELIAN	GIVETIAN	FRASNIAN	FAMENNIAN
ANGOCHITINA																
ANCYROCHITINA																
BURSACHITINA																
CYATHOCHITINA																
DESMOCHITINA																
EREMOCHITINA																
LAGENOCHITINA																
RHABDOCHITINA																

three samples, namely 73, 71 and 69, which have yielded Chitinozoa, Sample No. 73 comes from top of Member B, while 71 and 69 are from the base of the Member C.

From the known distribution, the taxa range from Ordovician to Silurian with a few even extending to Devonian. The range of *Cyathochitina* and *Ancyrochitina* suggests the age of sample nos. 73 & 71 from Late Ordovician to Late Silurian. The faunal difference between Members B and C is marked by the appearance of *Angochitina* in the latter member which ranges in age from uppermost Ordovician to Silurian indicating the possibility of Ordovician and Silurian boundary within Member C and not at the contact between Bed Nos. 10 and 11 of the Member B as visualised by HAYDEN (1904) and REED (1912).

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EXPLANATION OF PLATE 1

(Measurements are along the longer axis)

- Figs. 1. *Angochitina* sp. (180 μ m)
 2. *Ancyrochitina* sp. (260 μ m)
 3. *Bursachitina* sp. (140 μ m)
 4. *Bursachitina* sp. (110 μ m)
 5. *Bursachitina* sp. (140 μ m)
 6. *Bursachitina* sp. (140 μ m)
 7. *Conochitina* sp. (210 μ m)
 8. *Conochitina* sp. (230 μ m)
 9. *Conochitina* sp. (140 μ m)
 10. *Conochitina* sp. (145 μ m)
 11. *Conochitina* sp. (150 μ m)
 12. *Cyathochitina* sp. (300 μ m)
 13. *Cyathochitina* sp. (280 μ m)
 14. *Cyathochitina* sp. (140 μ m)
 15. *Cyathochitina* sp. (280 μ m)
 16. *Cyathochitina* sp. (200 μ m)
 17. *Desmochitina* sp. (210 μ m)
 18. *Eremochitina* sp. (250 μ m)
 19. *Eremochitina* sp. (115 μ m)
 20. *Eremochitina* sp. (170 μ m)
 21. *Lagenochitina* sp. (220 μ m)
 22. *Lagenochitina* sp. (240 μ m)
 23. *Rhabdochitina* sp. (350 μ m)
 24. *Rhabdochitina* sp. (160 μ m)

