

Occurrence of *Conophyton Garganicus* from the Gangolihat Dolomites, Kathpuria Chhina Area, District Almora, U.P.

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Abstract

This paper records the occurrence of *Conophyton garganicus* from the Gangolihat Dolomites of the Calc Zone of Pithoragarh. On the basis of the presence of *Conophyton garganicus*, the correlation of Gangolihat Dolomites is discussed.

Introduction

The *Conophyton*, which in vertical cross section appears as if cones are fitted in cones on regular pattern, is an important group of stromatolites. It is considered as the most reliable stromatolite in the inter-regional correlation of Precambrian rocks. Though, the occurrences of various groups of stromatolites from the Precambrian rocks of both Peninsular and Extra-peninsular regions are numerous, the records of *Conophyton* are surprisingly only from a few stratigraphic horizons. It has been reported from the Semri Group (Lower Vindhya) of the Son Valley by Valdiya (1969) and Kumar (1976), from Bijawar dolomites of Joga area, Madhya Pradesh by Krishna Murthy (1972), and from Jammu Limestones of Udampur area, Jammu and Kashmir State, by Raha and Sastry (1973). Recently, Bhattacharya (1976) has recorded the occurrence of *Conophyton* from the Calc Zone of Tejam of the Lesser Himalaya, district Almora, U.P., and Sinha (1977) has recorded it from Shali Formation, Himachal Pradesh. For the identification of different forms of *Conophyton* the micro structures of the axial zone and laminae is essential (Komar *et al* 1965, Raaben 1969). However, except Kumar (1976) and Sinha (1977) none others have studied the microstructure of the *Conophyton*.

In the present paper the *Conophyton garganicus* has been recorded for the first time from the Gangolihat Dolomites of the Calc Zone of Pithoragarh from Kathpuria Chhina area, district Almora, U.P.

Geological setting

The Calc Zone of Pithoragarh constitutes an argillo-calcareous sequence of the sedimentaries of the Zone of Badolisera lying north of the North Almora Thrust. The Calc Zone has been subdivided into 4 lithostratigraphic formations by Valdiya (1962, 1968), (Table I). The purely arenaceous rocks of Berinag Quartzites overlie the Gangolihat Dolomites.

The tectonic position of sedimentaries is somewhat intriguing. There are two conflicting views regarding the stratigraphic position of different lithostratigraphic units vis-a-vis Gangolihat Dolomites. Misra and Valdiya (1961), Valdiya (1962), Misra and Kumar (1968) held the view that the entire sedimentary pile is inverted while Heim and Gansser (1939), Gansser (1964), Banerjee (1975) and Ram Ji (1976) consider them to be normal. In the present work the sedimentaries are considered as normal.

Stromatolites

Misra and Valdiya were the first to record the stromatolites from the Gangolihat Dolomites as early as 1961. Later on Valdiya (1969) recorded a number of stromato-

lite forms from these dolomites. The most important forms, which have been recorded are *Colonella columnaris*, *Baicalia baicalica*, and *Collenia septentrionalis*.

Well developed stromatolite form *Conophyton garganicus* is recorded from the Gangolihat Dolomites near the contact with the Sor Slates. This form is seen at two localities; one is at Kathpuria Chhina on the Kathpuria Chhina-Raikholi mule track and the other is about 2 km from Kathpuria Chhina on the same mule track. The dolomite is bluish gray showing development of two forms *Conophyton garganicus* and *Colonella columnaris*. Associated with this dolomite is a well developed horizon of current bedded oolitic limestone. Other sedimentary structures recorded are parallel lamination with low angle discordances, graded bedding, small scale ripple lamination, herringbone structure and intraformational conglomerate. All these sedimentary structures suggest that the environment of deposition is an intertidal zone of a carbonate tidal flat.

TABLE I. Field succession of Calc Zone of Pithoragarh, Kumaon (After Valdiya, 1968)

ZONE OF BADLISERA	CALC ZONE OF PITHORAGARH	Berinag Quartzite	Orthoquartzites and amphibolites
		Gangolihat Dolomites	Lower member comprises of massive dolomites and dolomitic limestones with great development of stromatolites. It includes the lenticular deposits of magnesite. The upper member consists of tuffaceous purple phyllites and light coloured dolomites.
		Sor Slates	Olive green, brown, gray and black slates. Subordinate argillaceous and dolomitic limestones. A prominent member of protoquartzites.
		Thalkedar Limestones	Cherty and dolomitic limestones and siliceous dolomites and calc phyllites
		Rautgara Quartzites	Brown and grayish pink protoquartzites and purple, olive green and brown slates.
----- North Almora Thrust -----			
		Crystalline Zone of Almora	Porphyries, garnetiferous mica schists quartzites, gneisses.

Systematic description

Supergroup: CONOPHYTONIDA Raaben, 1969

Group: CONOPHYTON Maslov, 1937

Form: *Conophyton garganicus* Koroljuk, 1963
(Plate I, 1, 2, 3 & 4)

Colonies are conical to subcylindrical, characterised by conical internal laminae. The colonies make angles between 90°-60° with the bedding plane. Height varies from 35 cms to 130 cms. In cross section, it appears as circular to elliptical, often they taper at both ends giving rise to eye-shaped appearance. Diameter varies from 13 to 50 cms. Both isolated as well as connected colonies are recorded. The columns show well developed axial zone. In thin section, the dark laminae is continuous to lenticular. In the axial zone, the dark laminae thickness becomes distorted. Thickness of the light bands remain relatively constant. Thickness of the dark bands is in the range of 0.03 to 0.35 mm.

Remarks: The form is similar in distinctive characteristic to *Conophyton gar-*

ganicus described from the Riphean of U.S.S.R. by Komar *et al* (1965). It resembles *Conophyton garganicus* described from the Fawn Limestone of Semri Group, Son Valley area, U.P. by Kumar (1976) and from Amelia Dolomite, Northern Territory, Australia by Cloud and Semikhatov (1969). However, the same form has been incorrectly described by Singh *et al* (1976) as discrete cone-in-cone structures.

Occurrence: In the Gangolihat dolomites, near the contact with Sor Slates on Kathpuria Chhina-Raikholi mule track.

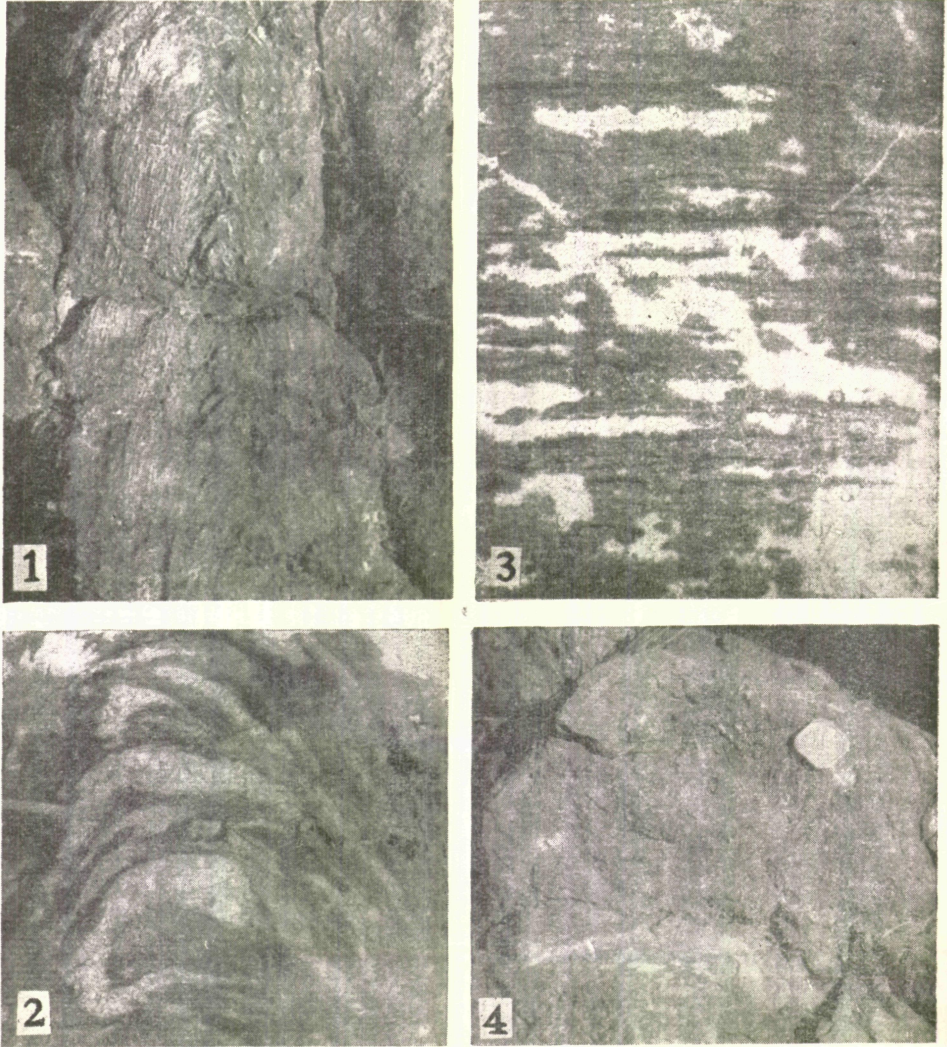


PLATE I

1. *Conophyton garganicus* Gangolihat Dolomites, Kathpuria Chhina area, District Almora, U.P. $\times 4$.
2. Photomicrograph of axial zone of *Conophyton garganicus* $\times 3$.
3. Photomicrograph of the laminae of *Conophyton garganicus* $\times 7$.
4. Transverse section of the *Conophyton garganicus*, Kathpuria Chhina, District Almora, U.P.

CONCLUSIONS

1. On the basis of the sedimentary structures of the stromatolite bearing horizon, it is concluded that the *Colonella columnaris* and *Conophyton garganicus* are formed in intertidal environment of the carbonate tidal flat.
2. The association of *Colonella* and *Conophyton* is quite characteristic. This association has also been recorded in the Fawn limestone of Semri Group. Similar association has been recorded from the Siberian platform of U.S.S.R. by Komar (1966).
3. On the basis of the presence of *Baicalia baicalica*, Valdiya (1969) has assigned Middle Riphean age to be Gangolihat Dolomites. In this respect, the discovery of *Conophyton garganicus* is quite significant.

The *Conophyton garganicus* is recorded from the Fawn Limestone of Semri Group (Lower Vindhya) of the Son Valley, U.P. The Fawn Limestone underlies the Glauconitic Sandstone. According to Vinogradov and Tugarinov, (in Misra, 1969), the radiometric age of the glauconitic sandstone is 1110 ± 60 my. The age of the Fawn Limestone is taken as Middle Riphean (Kumar, 1976). Thus, the Gangolihat Dolomite can be correlated with the Fawn Limestone.

The *Baicalia-Conophyton garganicus* association is quite significant and diagnostic. On the common occurrence of the *Baicalia-Conophyton garganicus* assemblage, Walter and Preiss (1972) correlated the Bangemall Group of Nullagina Basin with Burra Group Callanna Beds of Adelaide geosyncline of Australia. This association is characteristic of Middle Riphean of U.S.S.R. This correlation accords well with 1080 ± 60 m.y. dating for Bangemall Group.

The Gangolihat dolomites are also characterised by *Baicalia-Conophyton garganicus* assemblage. Thus on the inter continental correlation on the basis of *Baicalia-Conophyton garganicus* assemblage, the Gangolihat Dolomites can be correlated with Bangemall Group and Burra Group of Australia and Middle Riphean of U.S.S.R.

4. A more thorough search and study of stromatolites will throw light on those forms, which are not environment sensitive and which can be used for correlation.

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