

THE CHOCOLATE FORMATION (SCYTHIAN) IN PAINKHANDA SECTION, MALLA JOHAR AREA, TETHYS HIMALAYA, UTTAR PRADESH: A COMMENT

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ABSTRACT

The Chocolate Formation (Chocolate Series of Heim and Gansser, 1939) - a distinct lithostratigraphic unit of Kumaun Himalaya has been described by Heim and Gansser (1939) from Kali-Kuti region (Byans), Tethys Himalaya, Uttar Pradesh and has been given Scythian age. In Kali - Kuti Valley of Byans, it is represented by 32 - 50 m thick, chocolate coloured, reddish-brown, fossiliferous, nodular impure ferruginous limestone and shale. The occurrence of this unit in Yong and Kio Valleys in Painkhanda section is still a matter of dispute - several workers supporting its presence (Kumar, G. *et al.*, 1972; Kumar, S. *et al.*, 1977) while others denying (Shah and Sinha 1974; Sinha, 1989).

During the field work carried out in 1986 and 1988, it was noted that it is not possible to identify the Chocolate Formation in Painkhanda section on lithological criteria. It appears that the Kalapani Limestone rests directly over the Kuling Shale. However, the lowermost horizon of the Kalapani Limestone in this section has yielded Scythic conodont assemblage (Chhabra, 1988).

Thus, the lowermost part of the Kalapani Limestone is a time equivalent of the Chocolate Series (Heim and Gansser, 1939) of Byans area.

INTRODUCTION

The Chocolate Formation (Scythian) constituting the lowermost lithostratigraphic horizon of the Triassic succession has been initially described by Heim and Gansser (1939) from Kali - Kuti region (Byans), Tethys Himalaya. The name chocolate qualifies for reddish-brown colour of the carbonate rocks constituting the Chocolate Formation. After a period of three decades, Kumar, G. *et al.*, (1972) reported the presence of this formation at the confluence of Shalshal and Yong Gad (known as Painkhanda section) with a thickness of 2 - 4 m only. Kumar, S. *et al.*, (1977) also reported the presence of this horizon from the Painkhanda section with a thickness of 7 m. However, Shah and Sinha (1974) and Sinha (1989) argued that the lithounit is not identifiable. The paper looks into the controversy and comments on the occurrence of this horizon in the area. In this paper, field data obtained during two expeditions of 1986 and 1988 is evaluated in an attempt to clarify the status of Chocolate Formation in Painkhanda section, Tehtys Himalaya, Uttar Pradesh.

GEOLOGICAL SETTING

The Malla Johar area constituting the north-eastern part of district Chamoli and north-western part of district Pithoragarh, Uttar Pradesh, is characterised by high peaks ranging in height from 3,000 - 6,500 m. The area shows very hazardous topo-

graphy. Due to high altitude, the field work is possible between the months of June to September. For rest of the year the area is covered with snow.

The Painkhanda section shows more or less a complete succession of sedimentary rocks ranging in age from late Precambrian to Cretaceous which is designated as Malla Johar Supergroup (Kumar, S. *et al.*, 1977). The Malla Johar Supergroup is further subdivided into four lithostratigraphic divisions viz., the Malari Group, the Sumna Group, the Rawalibagar Group and the Sancha Malla Group of which the Rawalibagar Group is dominantly represented by Triassic sediments (Kumar *et al.*, 1977).

In the area under consideration the Triassic exposures are best developed at two places i.e., Yong Valley and Rawalibagar area in Kio Valley (Fig. 1). The aerial distance between the two areas is about 7 Kms. Accessibility of most of the exposures is very limited due to difficult terrain but at a few places in both the valleys the Kalapani Limestone exposures can be studied.

In the type area i.e., Kali - Kuti regions (Byans), Heim and Gansser (1939) designated Chocolate Series (Lower Triassic) for 32 - 50 m thick 'chocolate coloured rocks which are best developed in "Castle Hill" of Kuti. They divided the unit in three divisions i.e. (a) Castle Hill horizon (b) Middle division and (c) Upper division. The lowermost "Castle Hill" horizon

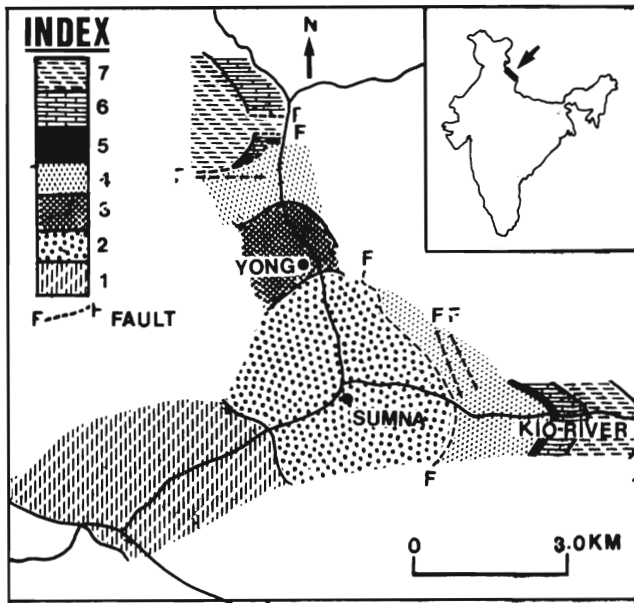


Fig. 1. Geological map of the area showing 1 - Garbyang Formation, 2 - Shiala Formation, 3 - Variegated Formation, 4 - Muth Quartzite, 5 - Kuling Shale, 6 - Kalapani Limestone, and 7 - Kuti Shale, (modified after Kumar, et al., 1977).

is 3 - 5 meters, of streaky or nodular impure ferruginous limestone with shaly layers forming a light brownish projecting band on the cliffs, rich in imperfectly preserved ammonites of the *Ophioceras* horizon. The lower contact with the Kuling Shale is sharp and conformable. The middle division 30 - 40 meters, is a repetition of impure limestone, clay - iron stone and shale with rare and badly preserved fossils.

The upper division is 3 - 6 meters thick, usually well defined, chiefly made up of shaly layers.

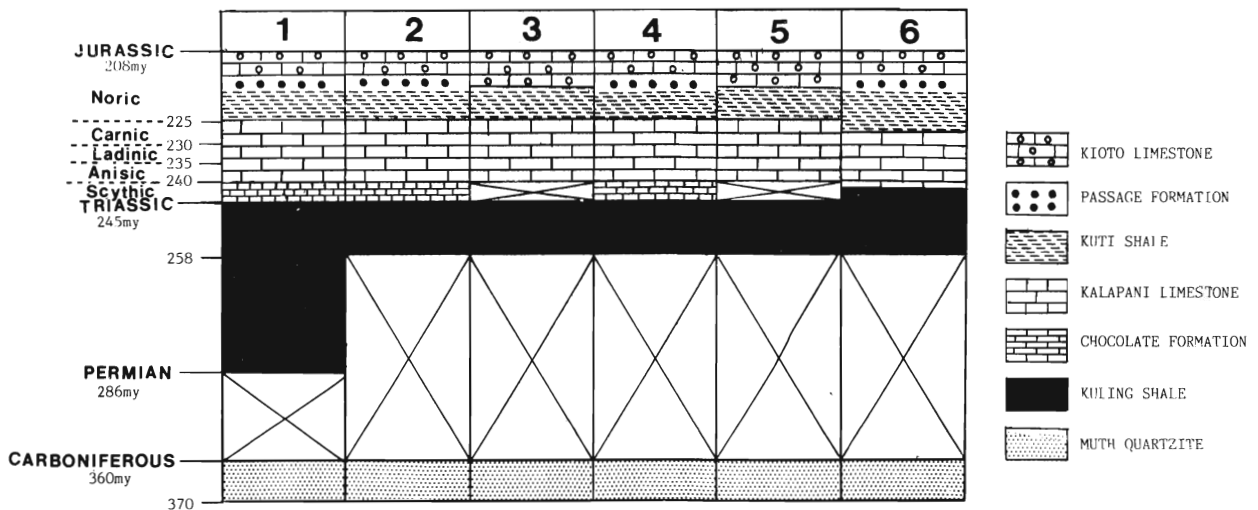
PREVIOUS WORK AND STRATIGRAPHY

The earlier reports of Triassic rocks from the Malla Johar and adjoining areas are by Griesbach (1881, 1883), Von Kraft (1902) and Diener (1912) but a comprehensive lithostratigraphy of the Malla Johar area was proposed by Heim and Gansser (1939) who divided the Triassic sequence into four lithostratigraphic divisions viz., the Chocolate Series, the Kalapani Limestone, the Kuti Shale and the Kioto Limestone. The Chocolate Formation forms the base of the Triassic sequence. Kumar, G. *et al.*, (1972) identified this from the Painkhanda section but noted its absence in south-eastern part i.e., in Unta Dhura Pass section. Kumar, S. *et al.*, (1977) ranked the Chocolate Series as formation. Shah and Sinha (1974) denied the presence of Chocolate Formation and also typical Scythian megafossils. Sinha (1989) reported it from Unta Dhura, Kali - Kuti Valley but denied the uniform development of the formation in Malla Johar area. The stratigraphy proposed by different workers is summarised in Table 1.

FIELD OBSERVATION AND DISCUSSION

In the Yong Valley section good exposures of the Muth Quartzite, the Kuling Shale and the Kalapani Limestone on the northern side of Yong camping ground are seen. The conformable boundary of the Muth Quartzite and the Kuling Shale is well exposed on Sumna - Yong mule track. The Kalapani Limestone crops out on the same mule track but the boun-

Table 1. Various lithostratigraphic classification proposed by 1 - Heim and Gansser, 1939 (Kali - Kuti region) 2 - Kumar, G. et al., 1972 (Painkhanda section); 3 - Shah and Sinha, 1974 (Painkhanda section); 4 - Kumar S. et al., 1977 (Painkhanda section); 5 - Singha, 1989 (Painkhanda section); 6 - Authors (Painkhanda section)



dary of the Kuling Shale and the Kalapani Limestone is not well exposed. The Kalapani Limestone grades into the Kuti Shale.

In the Kio Valley there is a good development of the entire Triassic sequence (Plate - I). A sharp boundary between the Muth Quartzite and the Kuling Shale and between the Kuling Shale and the Kalapani Limestone is well exposed near Rawalibagar. A 30-40 m thick carbonate sequence between the Kuling Shale and the Kuti Shale is made up of rather uniform greyish-black carbonate interbedded with shale. The entire carbonate is represented by more or less fossiliferous, nodular, skeletal wackestone. The lower 6 - 7 m thick sequence is not differentiable from rest of the sequence. It is fossiliferous, nodular, shaly, greyish-brown to greyish-black, compact limestone. Megafossils are rare. Thus, it is not possible to identify the Chocolate Series of Heim and Gansser (1939) recorded in Kali - Kuti regions in both Yong and Kio Valleys of the present area.

Regarding the presence of Scythian in the area, Shah and Sinha (1974) have denied the presence of Scythian megafossils from the present area. Chhabra (1988) have reported two species of conodonts of late Scythian (Spathian) i.e., *Neospathodus homeri* and *Neogondolella jubata* from the lowermost horizon of the carbonate sequence of Yong Valley. He also confirmed the presence of these conodonts from the Rawalibagar (Kio-Valley) section (personal communication). Thus, the conodont assemblage in the lowermost horizon confirms the presence of Scythian. It can be interpreted that in Painkhanda section, chocolate coloured carbonate horizon of Byans (Chocolate Formation) overlying the Kuling Shales is not developed as a distinct lithounit, but represented by grey nodular carbonate facies of the Kalapani Limestone. The lowermost part of the Kalapani Limestone in Painkhanda section is a time equivalent of the Chocolate Formation of the Byans area.

The modified lithostratigraphy in Yong and Kio Valleys is as follows;

- 4 - Kuti Shale (? Upper Carnic - Noric)
- 3 - Kalapani Limestone (Late Scythic, Anisic, Ladinic, Lower Carnic)
- 2 - Kuling Shale (Permian - (?) Early Scythic)
- 1 - Muth Quartzite (Devonian)

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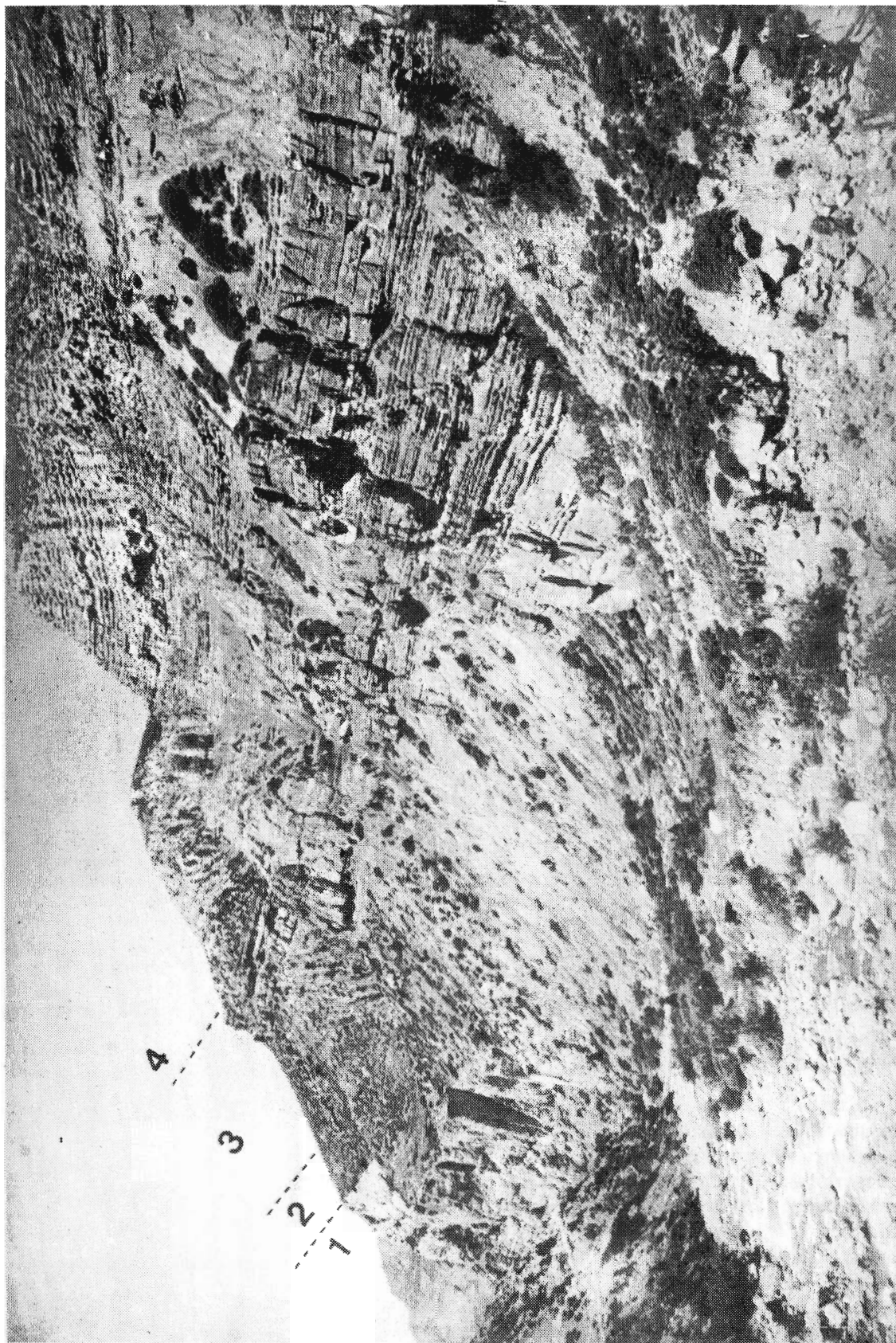
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EXPLANATION OF PLATE

PLATE I

Photograph showing 1 - Muth Quartzite, 2 - Kuling Shale, 3 - Kalapani Limestone. 4 - Kuti Shale in Kio-Valley section (view from Rawalibagar towards west).



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