Vol. 48, No. 1
Jan. 5, 1979

GLAUCO-CONGLOMERATIC PHOSPHORITE AND STROMATOLITES FROM THE LATE PRECAMBRIAN SEMRI GROUP (LOWER VINDHYAN), CHITRAKUT AREA, MADHYA PRADESH

S. KUMAR

Department of Geology, Lucknow University, Lucknow 226 007

ABSTRACT

The paper records the association of glauconite, conglomeratic phosphorite and stromatolites. The glauconite occurs as sand size pellets in penecontemporaneous conglomerates made up of pellets of collophane of various sizes. It appears that this association is the product of a very shallow water environment of deposition of a mixed carbonate flat.

INTRODUCTION

ASSOCIATION of phosphorite and stromatolite is peculiar to Indian Precambrian sequences and has been recorded from the Tirohan Limestone, the Aravalli Formation and the Gangolihat Dolomite (Valdiya[11], Banerjee[2], Kumar[6]). The present paper describes an unusual association of glauconite, phosphorite and stromatolite. This association is being recorded for the first time either from the present areas of carbonate and phosphorite sedimentation or from any ancient rock. It is observed in the Tirohan Limestone of the Semri Group (Lower Vindhyan) of Late Precambrian age, exposed in the river cutting near Janaki Kund, Chitrakut area, M.P.

GEOLOGICAL SETTING

The Chitrakut area lies at the fringe of the Bundelkhand Granite where the sedimentaries of the Semri Group unconformably overlies the pink granites. The main lithotypes are conglomerate, pellet limestone, micritic limestone, stromatolitic limestone, sandstones and shales. In the area under consideration, the Semri Group represents a condensed sequence attaining a thickness of only 10 to 100 metres in contrast to the thickness of about 1000 metres it attains in Son Valley area, U.P. (Singh and Kumar)[10]. The rocks are least disturbed and are more or less horizontal. They do not show any effect of metamorphism. The generalised lithostratigraphic succession is given in Table I.

The stromatolite assemblage of the Semri Group gives Lower to Middle Riphean age (Valdiya[12]; Kumar[4,5]). It is in agreement with the radiometric age of 1110 ± 60 m.y. determined by Potassium/Argon method (See Misra[8])

GLAUCONITE–PHOSPHORITE–STROMATOLITE ASSOCIATION

Near Janaki Kund, Chitrakut area, the Tirohan Limestone (= the Rohtas Limestone of Son Valley area) is well exposed in the river cutting showing large ripple like features with wavelength varying from 6 to 12 meters and height upto 1·30 m (Figs. 1, 2) (Kumar *et al*[7]). In the troughs of these ripple-like features the columnar stromatolites, oncolites, algal mats and phosphorite bearing horizons are generally restricted (Figs. 3, 4). The phosphorite forms conspicuous horizons of penecontemporaneous conglomerates. The P_2O_5 content is about 24%. These conglomerates are made up of pellets of collophane, detrital quartz and glauconite cemented together by sparry–micritic dolomite. Sometimes collophane is also seen in the matrix. These are termed as glauco-conglomeratic phosphorite.

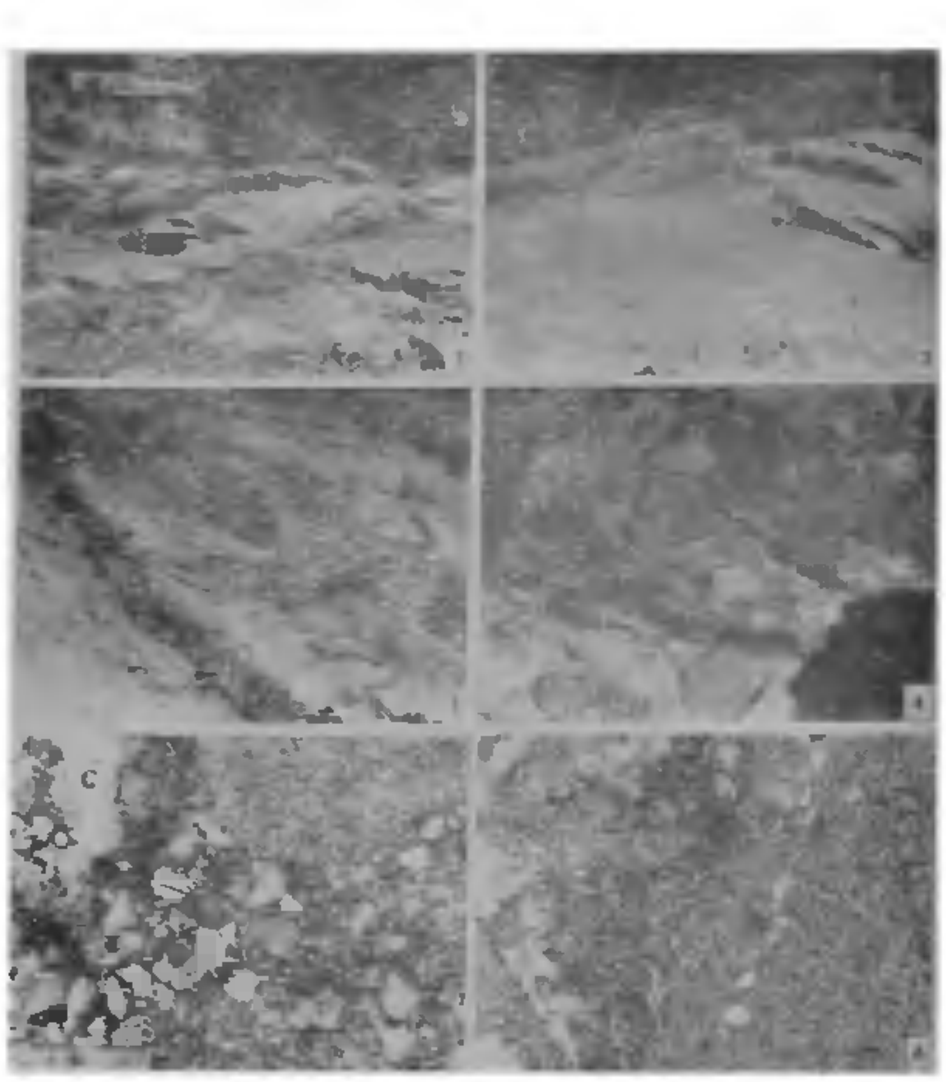
TABLE I

Lithostratigraphic succession in Chitrakut area, M.P. (after Auden[1])

Upper Vindhyan		Kaimur Sandstone
.....	Unconformity	.....
Semri Group (Lower Vindhyan)		Tirohan Limestone
		Upper Glauconitic Sandstone
		Pellet Limestone
		Lower Glauconitic Sandstone
		Basal Conglomerate
.....	Unconformity	.....
Bundelkhand Granite		Granites

In thin sections, the glauconite occurs as subangular to subrounded pellets ranging in size from 0·2 to 0·4 mm. (Figs. 5, 6). The phosphorite is represented by collophane. The collophane occurs as angular to rounded pellets. Some of them, however, are irregularly shaped. Generally these are light brown in colour and show peculiar appearance resembling intestinal markings. Some of the larger pellets also contain detrital quartz and glauconite, suggesting that the collophane is formed during lithification process

(Fig. 6). It must have resulted by collophane replacement process brought about by the reaction of the phosphate rich intertidal waters with lime mud. As the collophane could not replace the detrital quartz as well as glauconite, these occur within the collophane pellets.



FIGS. 1–6. Fig. 1. Large ripple-like features in the Tirohan Limestone, near Janaki Kund, Chitrakut area, M.P. Fig. 2. Crest of the ripple-like feature in the Tirohan Limestone. Same locality as above. Fig. 3. Trough of the ripple-like feature in the Tirohan Limestone. Same locality as above. Fig. 4. Development of phosphatic oncolites in the trough of the large ripple-like features. Same locality as above. Fig. 5. Photomicrograph of glauco-conglomeratic phosphorite Darker grains marked by arrow are glauconite. The grains marked as 'c' are collophane pellets. Scale is equal to 1 mm. Fig. 6. Photomicrograph of glauco-conglomeratic phosphorite. In the right hand side, the detrital quartz and glauconite (dark grain) are seen within collophane pellet. Scale is equal to 1 mm.

CONCLUSIONS

Parker[9] has recorded the occurrence of glauco-conglomeratic phosphorite from the South African continental margin of possibly Tertiary age. He considered a rather unusual depositional environment for these phosphorites and suggested the influence of a regressive coast line as quite significant in the development of phosphorite. In the present area, on the basis of the primary sedimentary structures, Singh and Kumar[11] have considered the entire Semri Group as a coastal complex. Thus, the association of glauco-conglomeratic phosphorite and stromatolites is a product of a very shallow water environment of deposition possibly the intertidal zone of a mixed carbonate tidal flat in which some detrital material was supplied from the nearby Bundelkhand Granite. It appears that due to very slow rate of sedimentation the glauconite formed from pre-existing silicates by reaction with the sea water or by direct colloidal precipitation (Jackson[3]). Phosphorite originated by inorganic process under some special chemical milieu.

ACKNOWLEDGEMENT

The author is grateful to Professor S. N. Singh for encouragement during the course of investigation. Financial assistance from the Sate Council of Science and Technology, Lucknow, is thankfully acknowledged.

1. Auden, J. B., *Mem. Geol. Surv. India*, 1933, 62 (2).
2. Banerjee, D. M., *Bull. Geol. Soc. Am.*, 1971, 82, 2319.
3. Jackson, K. C., *Text Book of Lithology* McGraw-Hill Book Company, New York, 1970.
4. Kumar, S., *Jour. Palaeo. Soc. India*, 1976, 18, 13
5. —, *Ibid.*, 1976, 19, 24.
6. — *Curr Sci.*, 1977, 46 (10), 341.
7. —, Singh, S. N. and Singh, A. K., *Workshop on Stromatolites, Geol. Surv. India*, Udaipur, 1978, p. 23 (Abstract).
8. Misra, R. C., *56th Session, Ind. Sci. Cong.*, Bombay, 1969 (Presidential Address).
9. Parker, R. J., *Jour. Sed. Petrol.*, 1975, 45 (1), 230.
10. Singh, I. B. and Kumar, S., *Jour. Geol. Soc. India*, 1978, 19 (8), 359.
11. Valdiya, K. S., *Curr. Sci.*, 1969, 28 (17), 415.
12. —, *Jour. Geol. Soc. India*, 1969, 10, 1.