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Ooids in the Shali Belt. Himachal Himalaya

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ABSTRACT

The ooids are reported for the first time from the Lower Shali Limestone, Himachal Pradesh. The various types of ooids are described with special reference to diagenetic changes. The environmental significance of ooids in deposition of Lower Shali Limestone is discussed.

The present note records the ooids from the Lower Shali Limestone, Simla district and Aut Dolomite, Larji window (=Lr. Shali Limestone), Kulu district, Himachal Pradesh. The oolitic limestone occurs near Khaira (31°18″00″, 77°13′00″). Shali window and Garsa (31° 50′ 30″; 77° 14′ 00″) on Garse Hurla Motor road. The Shali and Larji tactonic windows occupy a vast area along Satluj and Beas river valleys and is represented by huge thickness of carbonate rocks with orthoquartzite overlying the Sundernagar Formation and Mandi-Darle volcanics. The Lower Shali Limestone is about 1000 meters thick and consists of Massive grey, cherty dolomitic limestone and shales. The Aut Dolomite confirmably overlies the Hurla Quartzite and show facies variation from Calc. quartzite to dolomite. The bluish grey dolomite is fine grained and contains lenses of chert. Cream and purple colour limestone is interbedded with grey dolomite. Thr oolitic bands and lenses, 2-4 cms in thickness were found within the bluish grey colour limestone. The limestones in which the ooids are reported show good development of stromatolite assemblage consisting *Colonnella columnaris*, *Conophyton cylindricus* and *Kussiella kussiensis* (Sinha, 1977, Tewari, 1981-82, unpublished annual report WIHG; Tewari, 1983). These stromatolite forms are characteristic of Lower and Middle Riphean age. This is the first report of ooids from Shali belt however, Thoni (1977) casually mentioned about some grains having concentric layering of dolomite and fine grained quartz as metaoolites from Larji window.

The petrographic studies of rocks show that ooids are made up of carbonate material in the form of grains which are moderately sorted and cemented together by sparry calcite cement. Silica is also found in the matrix. Following folk's classification (1959) the rock is termed as oosparite. The other microfacies recognized are dolomicrite, dolooosparite, calcarenite and dolarenite. Intraclasts from small proportion of allochemical constituents. The ooids are spherical (Plate I, Figs. 1,2,3), elliptical (Plate I, Fig. 5; Plate II, Fig.3) and stretched or chained (Plate II, Figs.2,4) in shape. The ooids (range in size from 0.28 to 2 mm. Two types of ooids have been noticed. (1) The ooids having mainly quartz as nucleus (Plate I, Figs. 4,5,6, and Plate II, Figs. 2,3) and (2) ooids with microcrystaline calcite as nucleus (Plate I, Figs. 1,2,3, and Plate II, Fig 1). The quartz nucleii are generally shifted from the centre and the larger ones are simply coated by carbonate rings (Plate II, Fig. 3). The ooids with micrite as nucleus show concentric, concentric-radial and composite substructures.

The ooids show effect of diagenesis and low grade metamorphism which has obliterated the oolitic structures partly or completely. The calcite grains have been replaced by dolomite as the development of bigger rhombs of dolomite (Plate I, Figs. 1,2,3) show extensive recrystallization, early dolomitization and late dolomitization stages of diagenesis. The replacement of carbonate ooids by silica is not observed. Pressure-solution phenomenon (microstylolites) were also observed in the contact of carbonate ooids, (Plate I, Figs. 4,6).

The ooids are generally believed to be formed by high energy shallow marine environment with shoaling of current but recently, Simone (1981) has suggested that the oolitic substructures (radial ooids) are always associated with low energy environments. The attribution of ooids to low energy quite water conditions and poorly agitated environments is suggested by Freeman (1962) and Davis (1966) for those ooids in which the rims abuot against the nucleus. The ooids of the Shali belt suggest moderate to high energy environments. The Lower Shali Limestone is characterised by columnar and conical stromatolite forms (*Colonnella clumnaris, Conophyton cylindricus* and *Kussiella Russiensis*. The conical laminae of stromatolites suggest that waves or currents were not very turbulant and they were formed in protected intertidal mudflats and subtidal regions of a carbonate tidal flat. (Tewari, unpublished data). The intraformational conglomerates, ooids and intraclasts are found associated with these stromatolites which suggest fluctuations in turbulence and moderate to high energy (wave dominated) regime in intertidal flat. The composite ooids also suggest reworking of the earlier formed ooids and intraclasts from supratidal zone (Plate I, Fig. 6; plate II, Fig. 1). The ooids in which the large nucleus is made up of quartz must have been formed in a short lived restricted quiet water, low energy environment.

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PLATE I

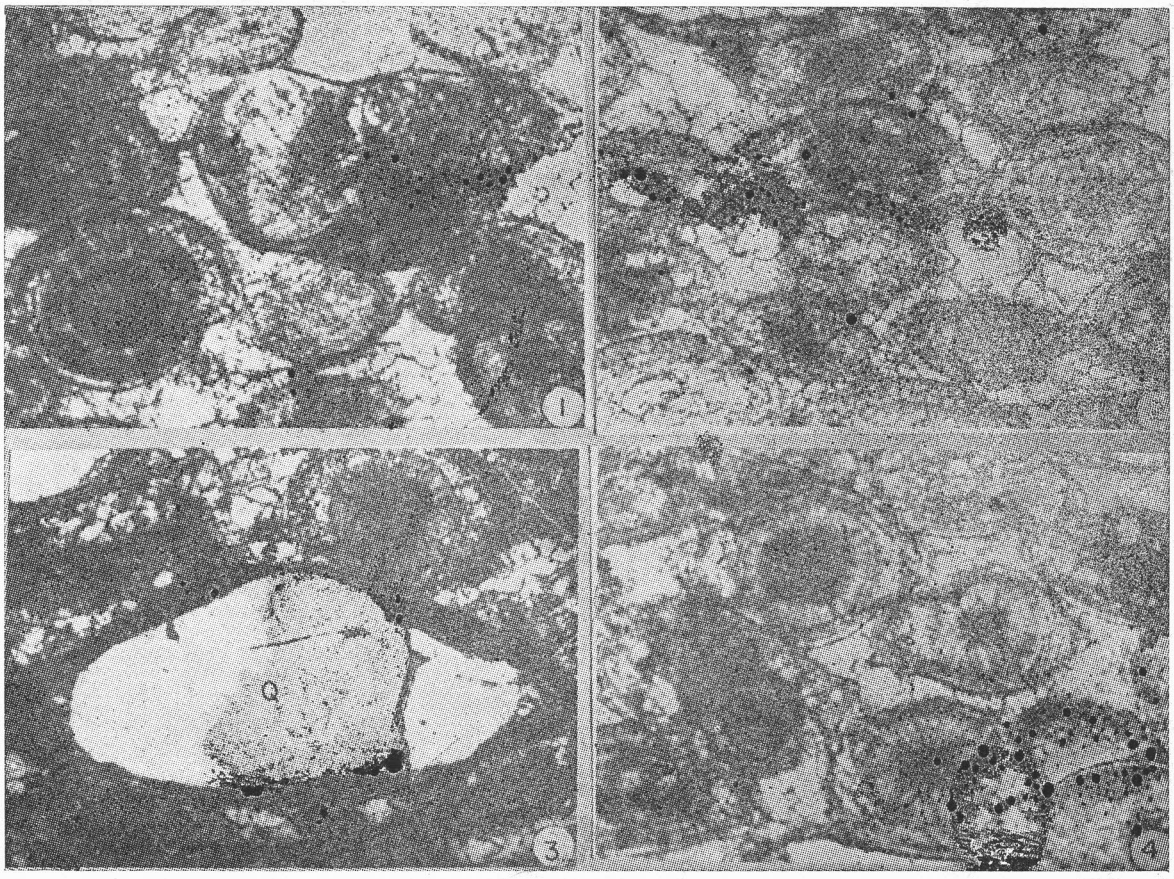

Fig. 1 Concentric ooids showing recrystallization and microcrystalline calcite as nucleus.
Fig. 2 Completely replaced ooids showing dolomitization & development of bigger dolorhoms. (crossed nicol).
Fig. 3 Partly replaced concentric ooids (Crossed nicol)
Fig. 4 Ooids with quartz (Q) as nucleus and silica in matrix (crossed nicol)
Fig. 5 Ooids with abutting quartz as nuclus. The nuclus is angular to subrounded in shape (Crossed nicol).
Fig. 6 Composite ooids coexisting with concentric and radial ooids. Micros tylolites observed in the contact of carbonate grains. (crossed nicol).

These explanations refer to Plate II. Please see overleaf.

PLATE II

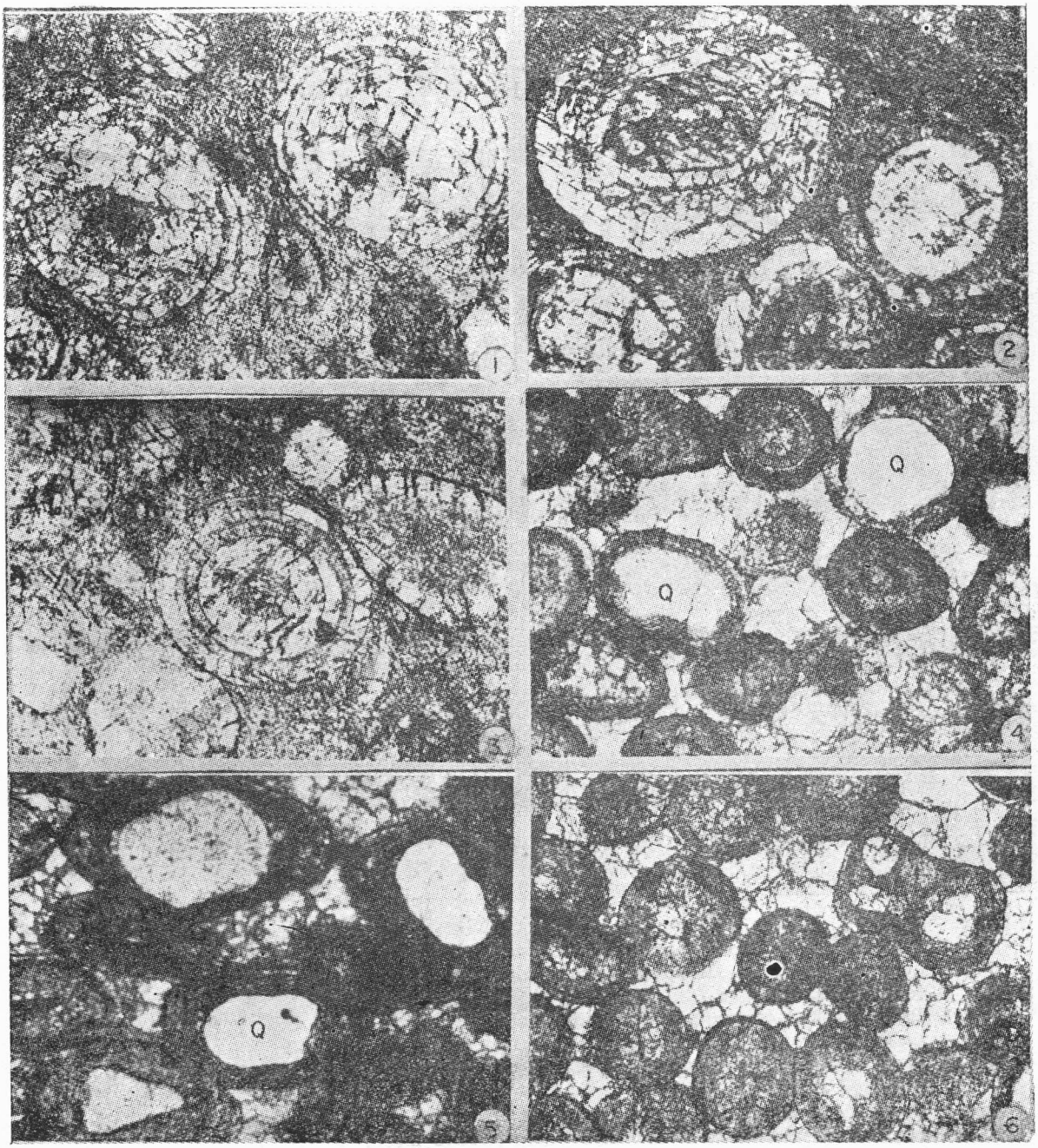

Fig. 1 Composite ooid enveloping concentric and radial ooids. Partly re- placed coid with micrite as nucleus. (crossed nicol). Fig. 2 & 4 Stretched (deformed) and chained concentric-radial ooids with quartz and micrite as nucleus (Polarised light) Fig. 3 The elliptical large quartz nucleus (Q) is coated by carbonate rings indicate quiet water conditions,

These explanations refer to Plate I. Please see overleaf.