

Wave Agitated Signatures in the Oolitic Limestones of Kuniyar Formation, Proterozoic Simla Group, Lesser Himalaya, India

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Abstract : Ooid bearing horizons of the Proterozoic Kuniyar Formation, Simla Group, Lesser Himalaya have been addressed in the present work. The study is concentrated around the outskirts of Arki town, Solan district, Himachal Pradesh, India. Based on the sedimentary facies associations, the processes that promote the formation of ooids have been documented. The facies associations that have been recorded are: (i) Oolitic-Intraclastic grainstone (FA1), (ii) Oolitic grainstone (FA2), (iii) Boundstone (FA3), (iv) Dolomudstone (FA4) and (v) Rudstone (FA5). Oolitic-Intraclastic grainstone (FA1) mainly consists of well sorted ooids with concentric laminae and intraclasts. Large ooids with grain sizes more than 4 mm are characteristic of oolites throughout the area. Normally graded beds consisting of ooids and intraclasts are frequently documented in storm sediments in shelf environments and carbonate platforms. The well-sorted grainstone fabric indicates deposition in a high-energy shoal with tidal currents and storm reworking. FA2 comprises spherical to elliptical grains up to 8.5cm in size with concentric cortex and micritic nuclei. Peloids in FA2 are elliptical, rounded objects <0.3 mm in size. FA1 and FA2 have been recorded alongside boundstones (FA3) comprising stromatolites having columnar, wavy and domal morphology. Boundstones (FA3) reflect microbial growth in carbonate platforms and reefs. Dolomudstones (FA4) interbedded with cross laminated sandstones and erosional surfaces reflect sedimentation in storm dominated zones below fair-weather wave base. Rudstone (FA5) is composed of oolitic grainstone (FA2), boundstone (FA3) and dolomudstone (FA4). These clasts are few mm to more than 10 cm in length. Rudstones indicate deposition along a slope with intermittent influence of wave currents and storm activities. Most ooids from the Kuniyar Formation are regular ooids with abundance of broken ooids. Compound and concentric ooids indicating medium to low energy environments are present but scarce. Ooids from high energy domains are more dominant than ooids developed from low energy environments. The unusually large size of the Kuniyar ooids (more than 8.5 cm) is rare in the geological record. Development of carbonate deposits such as oolitic- intraclastic Grainstones (FA1), oolitic grainstones (FA2) and rudstones (FA5), and reflect deposition in an agitated beach environment with abundant microbial activity and high energy shallow marine waters influenced by tide, wave and storm currents. Occurrences of boundstone (FA4) or stromatolitic carbonate amongst oolitic facies (FA1 and FA2) and appearance of compound and concentric ooids indicate intervals of calm in between agitated phases of storm, wave and tidal activities.

Keywords : proterozoic, Simla Group, ooids, stromatolites

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