DETRITAL DOLOMITE FROM UJHANI STRUCTURAL WELL NO. 1
GANGA VALLEY, INDIA

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Introduction: A detailed lithological analysis of the rocks of continuously cored interval 1099.03-1246.91 m in Ujhani st. well No. 1, Ganga Valley, revealed the existence of four lithological units viz. from the top (1) bluish gray dolomites, (2) dark green to dark brown shales, (3) red beds and (4) pale bluish gray to pinkish calcilutites. Some of the shales of unit 2, contain a fairly large proportion of minute, anhedral, subhedral to a few euhedral dolomite grains of 5 to 10 μm size. These are considered to be detrital in origin. Further, an attempt is made to show that these are windblown (aeolian) in origin and the dolomite grains in rocks of unit 1, are nothing but diagenetically enlarged original wind blown dolomite nuclei.

Dolomite identification: Thin slabs of about the size 1" by 1" were cut from the rocks of unit 1, and dolomite bearing shales of Unit 2, mounted on General Electric XRD-6 X-ray diffractometer with nickel filtered copper (Cu Kα) radiation and scanned at the rate of 2° per minute over a range of 24° to 32.5° 2θ angle to identify prominent peaks of quartz, calcite and dolomite (Hughes, Bradley and Glass 1962). Figure 1, shows the diffractograms of a dolomite bearing shale (a, and a'), and a dolomite rock of unit 1 (b). From these diffractograms, in dolomite bearing shale, a prominent peak for quartz at 26.6° (d₀ = 3.348 Å) calcite at 29.4° (d₀ = 3.03 Å) and dolomite at about 30.6° to 30.9° (d₀ = 2.9 Å) 2θ angles my be observed. Of the two diffractograms of dolomite bearing shale, a, shows a prominent peak for quartz, a minor peak for calcite and none for dolomite. Figure 1, a', is a diffractogram taken from a different part of the same slab. It shows a prominent peak for quartz and none for calcite and a minor one for dolomite. This would suggest that within the area of the slab, while quartz shows a uniform distribution, calcite and dolomite appear to be patchy in occurrence. The diffractogram of the dolomite rock of unit 1, (Figure 1 b) shows a prominent peak for dolomite, a very subdued one for quartz and the calcite peak altogether eliminated. The quartz peak (d₀ = 3.348Å) is slightly broad at the base. This suggests the occurrence of clay minerals (illite d₀ = 3.355 Å) along with quartz. Patterns taken from different parts of the same slab yield practically the same type of diffractogram and therefore it may be presumed that the rock is a pure dolomite with minor quartz and clay minerals,
but no calcite. The 'd' spacing for dolomite in both the rock types is 2.9 Å units. This suggests a non-ideal (more calcitic) dolomite composition.

**Petrography:** The dolomite rocks of unit 1 are hard, compact, fissile and pale bluish gray in colour. Thin sections of the rocks show a uniform hypidiotopic (Friedman 1965) aggregate of subhedral to euhedral dolomite grains generally less than 50 μ in size. The dolomite bearing shales are hard, compact, well laminated and fissile. Thin sections of the rocks show minute, rounded, subhedral to euhedral, colourless dolomite grains of 5 to 10 μ size grade, embedded in a medium of detrital quartz, calcite and clay minerals of silt grade. Dolomite and calcite are patchy in distribution. Dark opaque inclusions, and cloudy interiors may be seen in some of the grains.

![Figure 1](image)

Figure 1. X-ray Difractograms of a dolomite bearing shale of unit 2 (a, and a,) and dolomite rock of unit 1 (b), Ujhani structural Well No. 1.

**Discussion:** Dolomitisation of carbonate muds is a well known phenomenon (Chilengar et al 1967, Rao, 1969), but the reported occurrence of detrital dolomite in carbonate and non-carbonate rocks is rather rare. Ambsbury (1962) and Sabins (1962) report the occurrence of detrital dolomite in the terrigenous Upper Cretaceous rocks of Central Texas and the Western Interior, U.S.A., respectively. The grains are subrounded, polycrystalline, range in texture from micro to coarsely crystalline, and generally associated with detrital quartz and chert. Black (1965) reports penecontemporaneous detrital dolomite from the Jeffersonville Limestone (Mid. Devonian) of Indiana. The grains are found as (1) internal sediments in open calcities, (2) caught up grains in stromatolite growth mesh and (3) matrix filling in allochemical rocks. Lindholm (1969) considers dolomite grains in Onondaga (Mid. Devonian) Limestone of New York State, as of aeolian origin. Here, the grains are small 5-10 μ in size, non-ideal in composition and show positive correlation in size and abundance with the associated detrital quartz. The dolomite bearing shales under study exhibit patchy distribution of dolomite grains in a quartz, clay and calcite matrix of silt to clay grade, (b) the grains are small, generally in the 5-10 μ size range and (c) exhibit non-ideal dolomite composition. These characters suggest that the dolomite grains in the shales are aeolian (wind blown) in origin. Positive correlation in size and abundance between quartz and dolomite grains could not be established.
as the samples under study are from the subsurface, are only a few, and about all available for investigation.

The Dolomite of unit 1, is (1) non-ideal in composition (2) the rocks are associated with dolomite bearing shales of unit 2, (3) grains generally small in size (< 50 \mu m) and (4) the rocks contain minor proportions of detrital quartz and clay but no calcite. These factors suggest that the crystalline dolomite of unit 1, may be a rock built up by diagenetic enlargement of original detrital wind blown dolomite grains. In fact such an origin is doubted for a similar dolomite occurrence in the Onondaga (Mid Devonian) of New York Slate. It is believed that the rock under study corresponds to the Model ' B' dolomitisation process of Lindholm (op cit). Chemical kinetics involved in such a process appears to be far less rigorous as compared to those involved in diagenetic dolomitisation of original calcareous mud (Lindholm op cit). The small grain size of the dolomite under study suggests that the source of detrital dolomite was not far from the basin of deposition (Model ' B' of Lindholm, op cit).

Aeolian dolomite appears to characterise shelf carbonates; at least, Onondaga (Mid. Devonian) is interpreted that way (Laporte 1969). If this is true, then the occurrence of detrital dolomite in Ujhani st. well No. 1 rocks further supports the earlier contention of Rao (1961) that these rocks are of shelf origin.

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REFERENCES