Conclusions

Our study using summer monsoon type basic flow generated in a global spectral model shows that

- when an incipient vortex is superposed on the low level monsoon type flow in the region of the monsoon trough and cumulus heating is present the vortex grows to depression stage (and further strengthens). The evolving disturbance has many features similar to those of observed monsoon depressions.
- the main growth mechanism is by large-scale baroclinic energy conversions in the presence of cumulus heating.

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RESEARCH COMMUNICATIONS

Occurrence of ultramafic breccia in the Aravalli Fold Belt, Rajasthan

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A lensoidal body of serpentinite breccia is preserved within the ophiolite melánge of the Aravalli Fold Belt at Modi, Rajasthan. The field, petrographic characters and rock association possibly suggest that the breccia is formed as a consequence of tectonic emplacement of the serpentinite during the closing of the Aravalli basin.

THE Lower Proterozoic Aravalli Fold Belt (AFB) contains ultramafic rocks distributed in two lineaments, viz. the Rakhavdeb in the east and the Kaliguman in the west[1]. The former coincides with the boundary between the continental shelf and deep sea facies rocks of the Aravalli stratigraphy[2] but the latter is restricted to the deep sea sediments. In both the cases the ultramafic and associated rocks occur as a series of composite slivers and possibly represent ophiolite melánges. Though the serpentinized ultramafics form the dominant constituent, the other commonly associated lithologies are banded chert, gabbro, pillowed basalt, carbonates and minor granites. The ultramafics have undergone various degrees of serpentinization and greenschist facies metamorphism. Here we describe a rare occurrence of serpentinite breccia from the western lineament as Modi–Madha ophiolite melánge (MMOM).

The MMOM forms a band of 100 m to 1.5 km wide and extends for more than 50 km from north of Modi to south of Madha (Figure 1) and possibly joins with the ultramafic band at Jharol. The serpentinized ultramafic rocks in it either form a continuous band or occur as lenses of variable dimensions. The contact of these bodies with the Jharol turbidites is always sharp and very often marked by intense mylonitization. The effect of shearing in the serpentinite is rarely preserved but at places a foliation fabric parallel to the contact is well developed. The chert band generally bordering the ultramafic-turbidite contact is intensely sheared and there is a broad parallelism between the mylonite banding and the first foliation (S_1) of the country rock. The chert band along with the serpentinite and carbonates is involved in (map scale) second generation folding, thus suggesting the melange emplacement during the first deformation of the country rock.

The serpentinite breccia occurs as a lensoidal body (100′ × 20′) within the MMOM about 1.5 km east of Modi (24 47′ 15″, 73 ′ 33′ 50″). It is fine grained, light greenish in colour and contain uneven fragments of

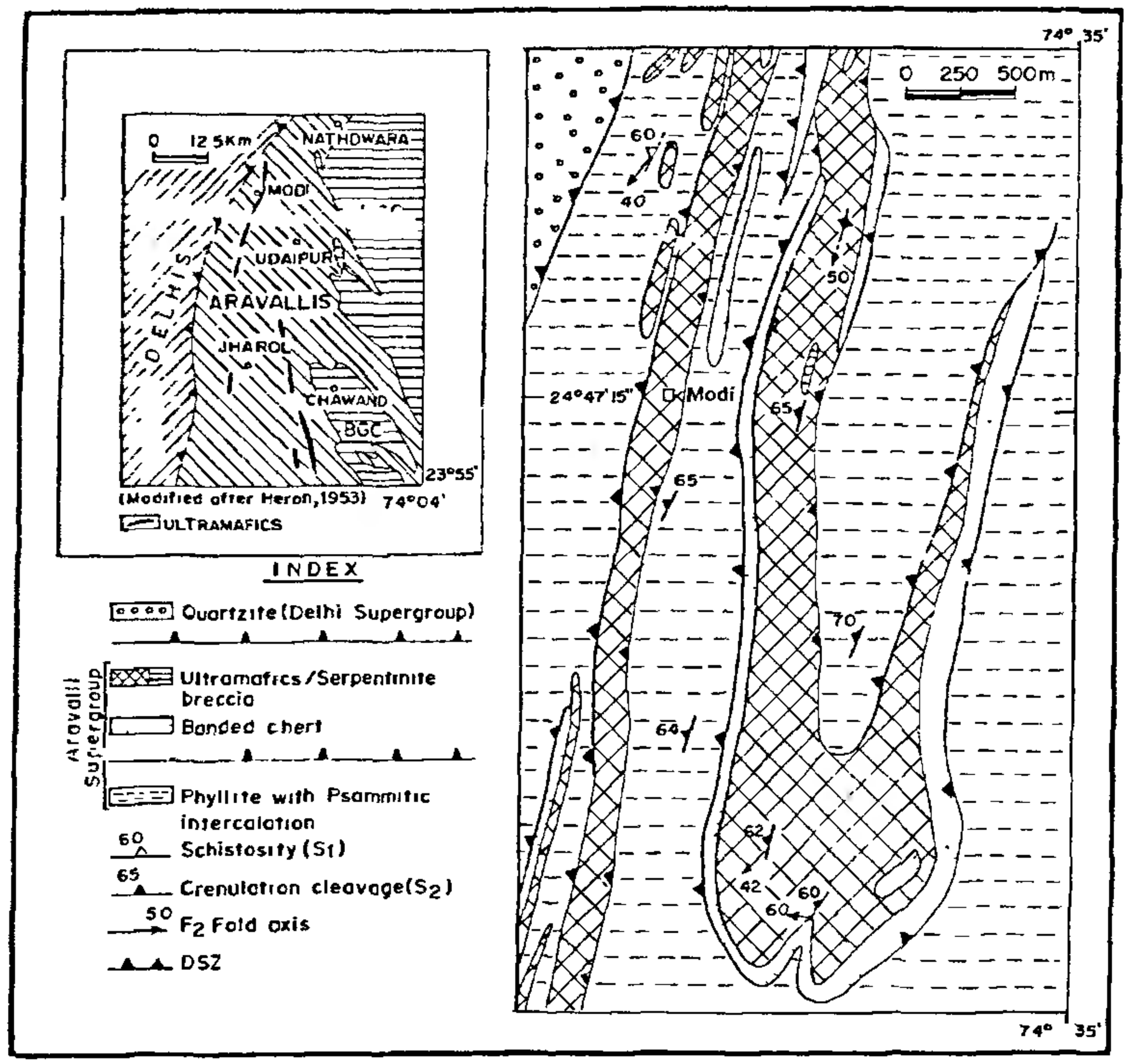

Figure 1. Geological map of the Modi Area showing the occurrence of the ultramafic breccia in the Modi–Madha ophiolite melange.

black to dark green serpentinite. The size of the fragments range from a few mm to 2.5 cm in diameter and shape from rectangular to ellipsoidal and uneven. They neither occur with any preferred orientation nor do the fragments have any crystal faces. Some of the fragments show a faint white rim. The thin section studies reveal that the fragments are composed of mainly unaltered antigorite or a coarse mosaic of tremolite and dolomite. In most cases the boundary of these fragments with the groundmass is sharp (Figure 2) but sometimes the boundary is occupied by flaky antigorite. Some of the fragments show microfractures offsetting the antigorite fibres. The groundmass is composed of a fine mosaic of talc, dolomite, minor tremolite needles, antigorite flakes and opaques. Relict patches of antigorite are also present in the groundmass mosaic. Minor veinlets of chrysotile cross-cutting

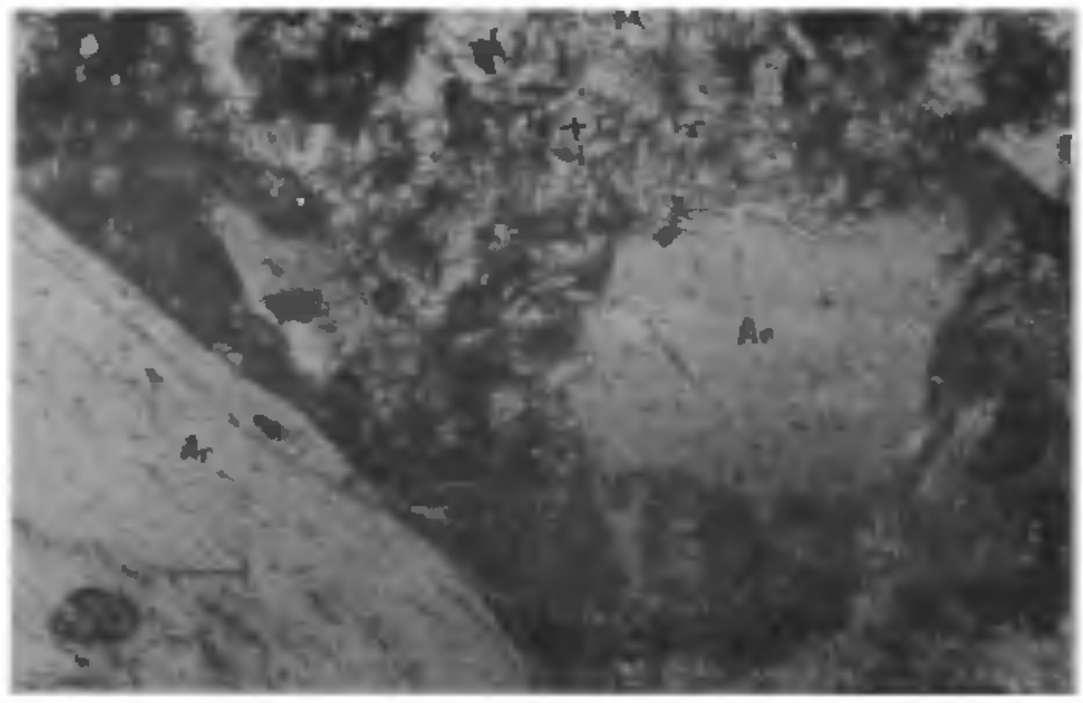

Figure 2. Photomicrograph of serpentinite breccia showing sharp boundary of serpentinite fragments and ground-mass Bar = 0.1 mm. Ar, Antigorite, Tc, Talc, Cc, Carbonates; Tr, Tremolite

antigorite and tremolite represent the late stage derivative. Opaques (magnetite) occur either as euhedral crystals or as clusters in the groundmass. Although there is no protolith mineral preserved in the breccia, nevertheless the dominant antigorite and carbonates as its major constituents suggest it to be derived from either peridotite or pyroxenite.

Opinions regarding the mode of emplacement of the ultramafic bodies in the AFB are divergent. Heron[3] observed them as sills. But later workers argued that these bodies either represent rift-related syn-sedimentary emplacement[2,4] or tectonic slices of obducted oceanic crust emplaced during the closing of the Aravalli basin[5]. The serpentinite and associated chert, carbonates and metabasalt of MMOM occur as tectonic slivers within the Jharol turbidites. Development of mylonite fabric both in the country rock and serpentinite as well as intense fracturing of the latter at the contact zone are the evidences suggesting tectonic emplacement. In the history of an ophiolite complex, serpentinization may occur in varied environments[6], namely before obduction or during obduction and emplacement and some alteration after its emplacement. In the MMOM, the ultramafic breccia is possibly formed after the serpentinization of the ultramafics as a consequence of the tectonic emplacement of the serpentinite during the closing of the Aravalli basin.

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Addition of lysine, an amino acid to fix fragile structures, cytoskeleton for electron microscopic studies

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Addition of lysine in Karnovski's modified fixative for tissues fixing for electron microscopy gave better results in comparison to without addition of this amino acid. Cytoskeletal elements from the tissues of human uterine cervical carcinoma showed distinct identity of the cytoskeleton and good contrast. Otherwise cytoskeletal structures were not clear and looking like a broom having no identity.

ELECTRON microscope, which has proved a basic tool in different disciplines of science, has revolutionized our understanding of most of the cell structures. Conventional use of glutaraldehyde followed by osmium tetroxide do not fix cytoskeletal elements of a cell. It is seen that visualization and clear identity of the cytoskeletal elements become impossible unless added with some modifying agents. The contractile system of actin filaments and associated proteins are not fully fixed with the routine fixatives. Sometimes it is also seen that the lipids not rich in double bonds are not properly fixed and stained due to not reacting with glutaraldehyde or osmium tetroxide.

In the present study lysine was added to improve fixation and visualization of the cytoskeletal elements, particularly microfibres, which are of immense value in the diagnosis of the carcinoma of the uterine cervix. All confirmed cases of carcinoma *in situ* of human uterine cervix were fixed in modified Karnovski's fixative[1] having 4% formaldehyde, 1% glutaraldehyde and 50 mM lysine in 0.1 m sodium cacodylate buffer for 24 h at 4° C. Secondary fixation was done in ascending grades of acetone whereas propylene oxide was used as clearing agent. Blocks were prepared in araldite resin. The silvery sections were cut on the LKB ultramicrotome model IV. The sections were stained with uranyl acetate and lead citrate.

The performance of lysine in the glutaraldehyde buffer (Karnovski's) to fix cytoskeleton is reported by many workers[2,3]. The addition of lysine was found very effective in fixation and improving staining; the cell appears smoother with intact membrane; the nucleus with circular ring and nuclear pore; the rough endoplasmic reticulum showing fine arrangement of the ribosomes; the mitochondria with internal membrane having high contrast; golgi body showing distinction and clear contrast. Distinct microfibres distinguished like spoke with high contrast were visible otherwise