

## Field geology, petrography, and orthopyroxene clusters of the Dhule-Parola dike, Tapi valley, central Deccan basalt province

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The > 40 km-long, E-W-trending Dhule-Parola multiple dike marks the southern limit of the Tapi rift. It is made up mainly of an aphyric and a plagioclase (pl)-phyric dike, with large loose boulders of dioritic gabbros. Unlike a previous report, we have found no clearcut basement xenoliths in it. In the pl-phyric dike, the groundmass plagioclases are more calcic ( $An_{89-92}$ ) than the phenocrysts ( $An_{82-85}$ ). This unusual phenomenon indicates contamination or magma mixing. An interesting observation is the presence of orthopyroxene clusters in the pl-phyric dike. Each of these clusters comprises hundreds of microscopic, individual orthopyroxene crystals. Except from Shirpur, in the same general area as that of the present study, the development of such puzzling clusters is not yet reported from basalts of the entire Deccan province.

We have mapped and sampled a > 40 km-long Deccan Trap dike between Dhule and Parola in northern Maharashtra, parallel to the Narmada-Satpura-Tapi regional tectonic trend (E-W). This dike is apparently the southernmost member of the major E-W-trending dike swarm in this region, and thus marks the southern limit of the Tapi rift. The presence of basement xenoliths in this dike has been briefly mentioned by Guha<sup>1</sup>, who however did not mention their lithology. Over vast areas of the Deccan the basement is completely covered by the basalts; and hence xenoliths, if found in the Deccan flows or dikes, would provide invaluable information. At present such confirmed xenolith occurrences are few (e.g. lithospheric mantle xenoliths from Kutch<sup>2,3</sup> and from Murud-Janjira<sup>4</sup>; crustal xenoliths from near Mahabaleshwar<sup>5</sup> and Mandaleswar<sup>6,7</sup>). Suspected basement xenoliths in dikes of Shahada and Shirpur<sup>8</sup> were later indicated to be of Deccan age (~65 Ma) based on <sup>40</sup>Ar-<sup>39</sup>Ar radiometric dating<sup>9</sup>. With careful field observations they are now known to be simply the weathered remnants of a major, multiple Deccan dike<sup>10</sup>. Thus, as the scarcity of basement xenoliths in the Deccan has made them highly valuable, we made a detailed field and petrographic study of the Dhule-Parola dike, the results of which are reported here.

The physiographic expression of this dike is a ridge

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which begins 3 km north of Dhule town (20°54'N, 74°25'E) and runs for > 40 km eastward up to Parola (20°53'N, 75°07'E) (Figure 1). This dike is multiple and consists mainly of an aphyric dike and a plagioclase (pl)-phyric dike, intruded into a compound flow of pl-phyric basalt (Figure 2) which is areally extensive and shows an exposed thickness of up to 70 m near Dhule and near Parola. The dike is segmented. It appears that it was originally continuous, but right-lateral strike-slip faulting and erosion have produced its present segmented configuration. Right-lateral strike-slip displacement of older, E-W-trending faults and E-W dikes; along younger, N-S-trending cross-faults, has been previously noted and discussed by Guha<sup>1</sup>. Our observations match with those of Guha in this regard.

All along the dike large loose boulders are exposed and apparently these were described by Guha<sup>1</sup> as base-



Figure 1. Geological map of the study area with the Dhule-Parola dike shown in black. The locations of Dhule, Shahada, Shirpur and Parola and some other important localities in the Deccan province, and the Tapi rift and the Satpura range, are also shown.