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TECTONIC EVOLUTION OF THE ARCHAEAN HIGH-GRADE TERRAIN OF SOUTH INDIA

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The southern Indian shield (Fig. 1) consists of three major tectonic provinces viz., (1) Dharwar Craton, (2) Eastern Ghat Mobile Belt and (3) Pandyan Mobile Belt. An understanding of their mutual relations is crucial for formulating crustal evolution models.

Dharwar Craton is divisible into Western and Eastern Blocks separated by the linear Closepet Granite (1). The supracrustal belts of the Western Block are comparable to the Early Proterozoic 'geosynclines' of Canada and Australia and those of the Easter Block are typical late greenstone belts. Both types of N-S trending supracrustals are co-eval (2600 Ma) and their differences are due to minor reactivation of 3000-4000 Ma old basement in the Western Block, in contrast to the extensive juvenile plutonism and large scale crustal remobilization of the Eastern Block, resulting from anomalous heat flow from mantle. The favoured model for their evolution is sagging and rifting of sialic crust with proto-ocean opening and its partial closure due to regional compression (2). Still older supracrustals (Sargur Group) are found in the gneissic basement as small enclaves (3) and their origin is obscure.

Orthogonal to the trend of the supracrustal belts is the E-W trending charnockite belt extending from Madras to Mangalore (4). As the supracrustal belts approach this belt they become narrower, more highly metamorphosed and migmatised. Trains of supracrustal enclaves cut throught the charnockite belt and after passing through a series of small dextral shear zones (Kabini, Gundlupet, Moyar, Bhavani) are terminated by the major Palghat-Cauvery shear zone (5). Curving into this main shear zone are the numerous northerly vertical fault zones (Chitradurga, Bababudan). The faults are developed contemporaneously with the folding of Dharwar supracrustals and are fomed as a consequence of subhorizontal shortening and basement uplift to the east (6). The Palghat-Cauvery shear zone is marked by fissile gneisses containing roots of supracrustal belts and dismembered layered basic complexes. The high grade terrain occurring to the north of this shear zone represents deeper crustal levels of the Dharwar craton (7) brought up due to northerly tilt of the Peninsular shield during Himalayan collision.

Pandayan Mobile Belt: This terrain which lies to the south of the Cauvery shear zone is discinctly different from the Dharwar Craton and is divisible into two zones, the northern and southern. The northern zone consists essentially of the orthoquartzite-carbonate-pelite suite (with minor basics) within a migmatitic and charnockitic terrain. It has curving and swirling structural patterns like the central Limpopo or Greenland. These swirling structures are probably related to movements on the Cauvery dextral shear in the north and Achankovil sinistral shear in the south. The southern zone is a linear belt of khondalite-leptynite-charnockite, which is an extension of the South-West Group of Sri Lanka and Androyan Group of Malagasy. Contrary to the picture painted by Drury et al. (5), the Achankovil shear does not truncate discordant structural trends from the north. The comparison of this belt with the Eastern Ghat belt is not valid due to the absence of manganese-marble association, abundance of quartz arenites and unfavourable structural trends. The lack of worthwhile geochronological information leaves us in doubt whether this forms part of an

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older gneissic terrain or a younger (Proterozoic?) mobile belt.

The contact of the Dharwar craton and this belt is a zone of transcurrent dislocation, but in point of detail this is a zone of highly ductile structures with both the terrains interacting in a diffuse mobile zone. There is no evidence in this zone for the collisional suture visualized by Drury et al. (5).

Eastern Ghat Mobile Belt: This is a long mobile belt fringing the Singhbhum and Central Indian cratons and extending to the north-east of Dharwar craton. It is predominantly composed of khondalites, charnockites, leptynites and minor amounts of manganiferous marbles and quartzites. This belt is cut off at the continental margin near Ongole, where it extends into Napier Complex of Antarctica and Highland Group of Sri Lanka. The thrust at the eastern margin of the Middle to Late Proterozoic Cuddapah basin and similar basins to the north is a late event in the polymetamorphic evolution of this belt and is not linked to the main movement of Palghat-Cauvery shear zone as suggested by Drury et al. (5). The eastern Ghat belt appears to be a product of continent-continent collision.

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