ABSTRACT

Lithological and structural mapping, P-T path reconstruction, monazite chemical age determinations and SIMS U-Pb zircon chronology are combined to identify several crustal domains with distinctive evolutionary histories within and neighboring the WNW-trending Rengali orogen, Eastern India. The Rengali Orogen is sandwiched between the meta-sedimentary lithologies of the Gangpur Schist Belt (GSB) of unknown age that flanks the dominantly Paleo/Mesoarchean Singhbhum Craton (SC) in the north, and the granulite facies gneisses of the Eastern Ghats Belt (EGGB) in the south. The Rengali Orogen itself comprises anatectic high-grade gneisses and younger granitoids of unknown stratigraphic affiliation in the core, and an ensemble of amphibolite facies mica schists (±staurolite, kyanite, garnet pyrophyllite), micaceous quartzites, inter-bedded meta-conglomerates, and mafic (hornblende-plagioclase-epidote)/ultramafic (tremolite, anthophyllite-antigorite) schists flanking the gneisses.

Anatexis and granulite facies metamorphism in the Rengali gneisses characterized by clockwise P-T path occurred between 2.5 and 2.4 Ga; the emplacement of the structurally younger granitoids within gneisses occurred between 2.2 and 2.0 Ga. Available age data suggest that these magmato-metamorphic events correlate with the orogenic events in the Bastar Craton (BC). The anatectic gneiss in the orogen is a septum of the Bastar craton. In the north, these gneisses are directly juxtaposed with the GSB paraschists. This dissertation is the first report that details the Grenvillian-age structural set up and the metamorphic P-T evolutionary history of the Gangpur Schist Belt.

The schists in the Rengali Supracrustal Belt flanking the Bastar Craton gneisses evolved along variable P-T paths with variable peak-P, T conditions between sub-greenschist and amphibolite facies conditions, in closely-spaced samples. The two lithodemic units (schist and gneisses) of contrasting P-T-deformation histories experienced D_1, D_2 and D_3 fabric-forming events, but the steeply-plunging D_3 folds in the anatectic gneisses are oblique to the gently-plunging D_3 folds in the supracrustal unit. By implication, the two lithodemic units were tectonically accreted post-S_2. The Rengali Supracrustal Belt is inferred to be a tectonic mélange formed in an accretionary wedge at

the BC-EGGB-SC/GSB tri-junction; the basin closure was possibly synchronous with the assembly of EGGB in the south and SC-GSB-BC composite in the north that occurred between 500 and 600 Ma. The evidence in the light of existing information along the facing coastlines of India and Australo-Antarctic Blocks in a Pan Gondwana set up suggests the Rengali Orogen was related to Pan African accretion between the EGGB and SC-GSB blocks, consistent with known paleogeographic reconstructions of Gondwanaland.

Key words: *Rengali orogen; Bastar Craton; Singhbhum Craton; Gangpur schist belt; Eastern Ghats Granulite Belt; Kantilo pseudotachylite*