PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A MATHEMATICAL, PHYSICAL & ENGINEERING SCIENCES

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Phil. Trans. R. Soc. Lond. A 1971 **268**, 621
doi: 10.1098/rsta.1971.0017

Phil. Trans. Roy. Soc. Lond. A. **268**, 621 (1971) [621]
Printed in Great Britain

Metamorphosed igneous rocks from the Mid-Indian rift zones

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A petrographic survey of several hundred rock fragments, dredged from more than 40 points in six areas of the Mid-Indian rift zone by R.V. *Vityaz* and *Academic Kurchatov* in 1964–5 and 1967 revealed the existence of three main series (associations) of magmatic and metamorphic rocks. These are: dunite–peridotite, fresh tholeiitic basalt and greenstone (spilite–diabase) associations similar to those of geosynclines. The first two have been described in our previously published papers, the third is discussed here.

Greenstones (including spilites, metamorphosed diabases, porphyrites, uralitic gabbros and some other varieties of basic rocks, as well as low-temperature metasomatites) have been obtained from four of the six areas mentioned above (at 15 points). The uralite–epidote–albite–chlorite assemblage is most common in this group of the rocks. Quartz and chlorite veins with sulphides were found in the brecciated spilites. Chemically greenstones (metabasalts) are close to the oceanic tholeiites, differing in their higher Na_2O (up to 5.3%) and H_2O^+ (up to 3.2%) contents. There is a continuous series of rock varieties from basalts to spilites, like the one observed by J. R. Cann and F. J. Vine in the Carlsberg Ridge spilites.

Low-grade metamorphic mineralization, probably connected with the greenstone alteration of the basic rocks, was observed in the rift zone serpentinites (seen as the development of secondary amphiboles, talc, chlorite, prehnite, sphene, apatite, etc.).

Besides the greenstone and greenschist facies there are some features of higher metamorphic facies, such as metasomatic plagioclase–pyroxene and plagioclase–hornblende assemblages in the metamorphosed gabbros and peridotites.

All stages of the metamorphism are connected with multiple deformation of the rocks. Infiltration of the volatile fluids (possibly of upper mantle origin) through deep fracture zones is considered to be an important factor in the metamorphism. The metamorphic greenstone association is distinctly separated from unaltered tholeiitic basalts by a period of tectonic deformation and metamorphism.