LOW PRESSURE GRANULITE-FACIES METAMORPHISM IN THE YAMATO MOUNTAINS, EAST ANTARCTICA

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The Yamato Mountains (71° 30'S, 35° 45'E) consist of seven massifs, A. B. C. D. E. F. and G which range for 50 km from south to north, and are made up mainly of high grade metamorphic rocks and intrusive syenitic rocks which are called the Yamato-Blegica Complex. The metamorphic rocks can be divided into two groups on the basis of their petrographic features and field occurrence: 1) granulite-facies gneiss of pelitic to psammitic, basic to intermediate and calcareous compositions, which occur as small masses and xenolithic inclusions in the syenitic rocks in Massifs A and G and as paleosomes of migmatitic gneiss inMassifs D and F, and 2) amphibolite-facies granitic gneiss, which occupies the central part of the Mountains. Although no direct contact between the two groups has been found, the geological and petrological relations of the syenitic rocks to the metamorphic rocks suggest that the granulite-facies gneiss-syenitic rock unit is in tectonic contact with the amphibolite-facies gneiss unit. Petrological significance of the granulite-facies rocks is presented.

The granulite-facies rocks have characteristic mineral assemblages such as garnet-biotite-K-fieldspar-plagioclase-quartz and orthopyroxene-biotite-K-feldspar-plagioclase-quartz in the pelitic to psammitic gneiss, two-pyroxene-hornblende-biotite-plagioclase-quartz (-K-feldspar) in the basic to intermediate gneiss and wollastonite-anorthite-clinopyroxene-scapolite-quartz in the calcareous gneiss. In the garnet-biotite gneiss, the stable association of ferruginous matrix biotite and magneisan interior of zoned garnet during the granulite-facies metamorphism is suggested by textural and compositional relations of garnet and biotite, and its K_{DMg-Fe} gives an equlibrium temperature of 760°C. This temperature is in good agreement with 730°-770° C estimated from two-pyroxene compositions. On the basis of the published experimenta studies of the anorthite-wollastonite equilibria and the two kinds of thermometries, it is inferred that the granulite-facies metamorphism in this region took place under conditions around 750° C and below 6 kb. Retrograde metamorphism is indicated by the development of magnesian biotite by which the garnet is partially embayed in the pelitic gneiss, and the Ca-garnet or Ca-garnet-quartz corona around anothite and wollastonite in the calcareous gneiss. The retrograde metamorphic temperatures are estimated to be 450°—460° C from the pair of the magnesian biotite and contacting ferruginus garnet rim.

The granulite-facies metamorphic event and the retrograde one might be assigned to the 700 Ma Rb-Sr whole rock isochron age and 450-500 Ma Rb-Sr mineral isochron and K-Ar biotite ages known for the metamorphism in the Yamato mountains can be chronologically correlated with the upper amphibolite-to granulite-facies metamorphism of medium pressure type in the Prince Olav Coast-Lutzow Holm Bay region. The contrasting metamorphic characters between the two regions may be useful to confirm the reconstruction model of the Gondowanaland.