

Time relation between deformation and growth of metamorphic minerals in the Pelitic Schist, West of Rajnagar marble band, Udaipur District, Rajasthan

KAMALA PRASAD GHOSH

Abstract

The pelitic schist, west of Rajnagar marble band has been grouped as Rajalo Series by Heron. The rock shows imprints of two phases of folding. The metamorphic minerals present in the rock have been dated with respect to the two phases of folding. The dating reveals that the thermal peak of metamorphism was attained after the early folding and a secondary peak existed after the late folding.

Introduction :

The pelitic schist west of Rajnagar marble band, Udaipur district, Rajasthan has been grouped as Rajalo series by Heron (1953). The rock shows imprints of two phases of folding—early and late as described by Naha & Majumdar (1971). The schistosity present in the rock is related to the development of the early folds and has been puckered and folded by the late folds (Majumdar, 1971). The rocks were subjected to Barrovian type regional metamorphism. The Index minerals developed are biotite, garnet, staurolite and kyanite. The grade of metamorphism increases towards wsw. The metamorphic minerals present in the rock have been dated with respect to the development of schistosity and late folds. The results are described and shown in a tabular form below :

Minerals	Early folding			Late folding	
	Pre	Syn	Post	Syn	Post
Biotite		_____			_____
Muscovite		_____			_____
Garnet		_____	_____		_____
Staurolite		_____	_____		
Kyanite		_____	_____	— ?	

Results of dating

Biotite and Muscovite—There are two generations of biotite and muscovite. The first generation biotite and muscovite are syntectonic with respect to the schistosity. They are aligned parallel to the schistosity plane and are kinked in places. The second generation biotite and muscovite are post tectonic with the development of schistosity and they crosscut the first generation elongated and xenoblastic biotite and muscovite grains. Their idioblastic habit, squarish to rectangular shape and undeformed nature suggest that they have formed later than the late folds.

Garnet—There are two generations of garnet which are porphyroblastic and very irregular in shape. The first generation garnets are syn- to post-tectonic with respect to the development of schistosity plane and show straight as well as

s-shaped trails formed by inequant quartz grains and opaque bodies (Fig. 1a, b). The second generation garnets are post-tectonic with respect to the late folds and show M-shaped trail formed by inequant quartz and opaque bodies (Fig. 1c). The first generation garnets are in places rimmed by inclusion free garnet (Fig. 1d)—a feature described by Spry (1969) as indicative of fast growth followed by slow growth. The slowly grown garnets without inclusions may belong to either generations.

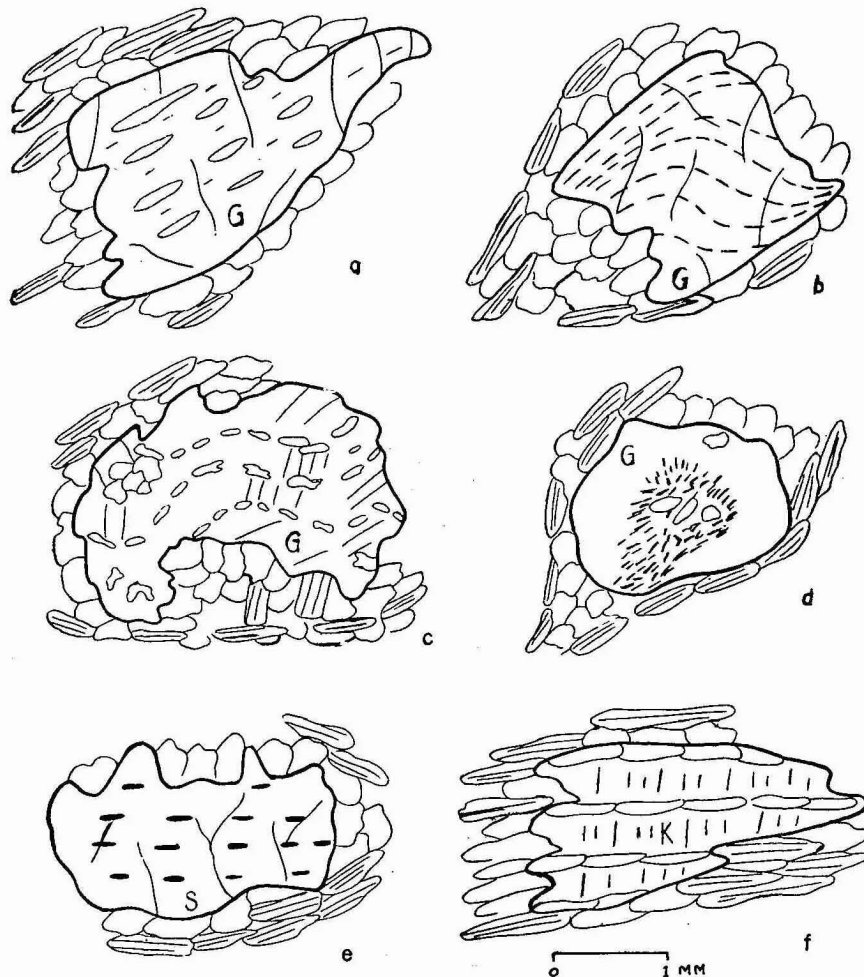


Figure 1. Sketches of a) Garnet porphyroblast (G) showing straight trail of inequant quartz and opaque bodies. b) Garnet porphyroblast (G) showing s-shaped trail formed by inequant opaque bodies. c) Garnet porphyroblast (G) showing M-shaped trail formed by inequant quartz. d) Garnet porphyroblast with inclusion rimmed by inclusion free garnet (G). e) Staurolite porphyroblast (S) showing straight trail formed by inequant opaque bodies. f) Kyanite porphyroblast (K) showing straight trail formed by inequant quartz.

Staurolite:—Staurolite is syn- to post-tectonic with respect to the schistosity and shows straight trails formed by inequant opaque bodies (Fig. 1e). They have formed before the late folding as suggested by the fractured and crushed appearance of the grains.

Kyanite:—Kyanite is syn- to post-tectonic with respect to the development of chistosity and shows straight trails formed by inequant quartz grains (Fig. 1f).

They have formed before the late folding as suggested by a) fractured and crushed appearance of the grains and b) development of deformation twin lamellae in some grains.

A few grains show slightly wavy trails formed by inequant quartz grains. The waves persist in the schistosity outside the grain suggesting that the growth of kyanite possibly continued till the initiation of the late folding.

Conclusion

From the dating it is seen that the thermal peak of metamorphism of the pelitic schist, West of Rajnagar marble band, Udaipur, was attained after the early folding with the formation of kyanite. A secondary peak however, existed after the late folding with the growth of second generation garnet, biotite and muscovite (Fig. 2).

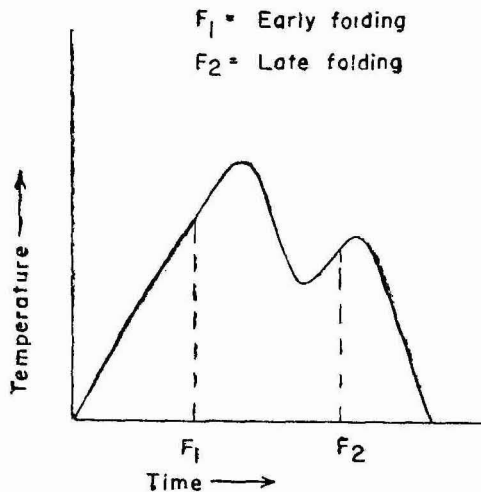


Figure 2. Time relation of deformation and metamorphism of pelitic schist, West of Rajnagar marble band, Udaipur, Rajasthan.

Acknowledgement: The author is indebted to Prof. A. K. Saha, Calcutta for going through the manuscript and to Prof. A. K. Banerjee, Calcutta for laboratory facilities.

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Address of the author

KAMALA PRASAD GHOSH, Department of Geology, Presidency College, Calcutta - 73.