

Andalusite-garnet hornfels from Daroji (Sandur schist belt), Bellary district, Karnataka

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Abstract

The note deals with the occurrence of andalusite-garnet-bearing rock from Daroji area, its geological setting, petrographic description and relationship with the other meta-sediments. Its occurrence at the borders of the Thorangallu granite indicates that its development in the contact zone is due to thermal metamorphism.

Introduction

So far two occurrences of andalusite-bearing rocks have been reported from Karnataka State (Suryanarayana Rao, 1968; Srinivasan and Tareen, 1972). The present note deals with the occurrence of this mineral from Daroji, Bellary district.

Geological setting

South of the tank of Daroji (57 A/12, 15°14'; 76°41') and south of Tungabhadra high level canal in the northern part of the Copper Mountain syncline, rocks of the Sandur schist belt are exposed. Rock types consist of meta-sub-greywacke, grit, actinolite-chlorite-plagioclase-quartz schist (meta-basalt) and banded ferruginous quartzite. These are intruded by Thorangallu granite, exposed around Thorangallu. The granite shows sharp contact with the schistose rocks and sends apophyses into them as seen in the high level canal south of Daroji tank. Meta-basalt and meta-sub-greywacke occur as caught up patches in the granite. The primary foliation marked by the linear arrangement of the phenocrysts of feldspars swerve round the xenoliths.

Andalusite-garnet-chlorite-quartz rock is exposed at the foot hills of the ridge south of Tungabhadra high level canal, 200 m south of the aqueduct. The Thorangallu granite is 200 m away from this rock outcrop. The intermediate zone between the granite and the andalusite bearing rock is marked by phyllite in which clusters of chlorite and biotite have been formed thereby producing hornfelsic texture. Along the strike, the andalusite-garnet-chlorite-quartz rock grades to meta-sub-greywacke. The foliation trends NNW-SSE and dips 42° west.

Petrographic characters

The rock is greenish black and highly weathered with limonitic material filling the foliation planes. Andalusite occurs as stout crystals, 2 to 3 mm in length and .05 to 1 mm in thickness and is randomly oriented. Garnet occurs as well-formed crystals in a quartz-chlorite groundmass. The rock shows knotted or maculose texture due to the porphyroblastic growth of garnet and andalusite. Foliation is destroyed due to the development of granular and decussate texture. Randomly oriented porphyroblasts of andalusite have a post-tectonic relation to foliation. At places the andalusite shows preferred orientation which may be due to parallel growth. Garnet also shows post-tectonic relation with foliation. Under the microscope, andalusite is seen as tabular crystals filled by muscovite. Often the andalusite

shows black cross. It is feebly pleochroic with X = pale pink, Y = colourless, Z = colourless, and the indices of refraction as $N_X = 1.631 \pm 0.002$, $N_Y = 1.633 \pm 0.002$, $N_Z = 1.642 \pm 0.002$, $N_z - N_x = 0.011$. The mineral is optically negative with a negative elongation.

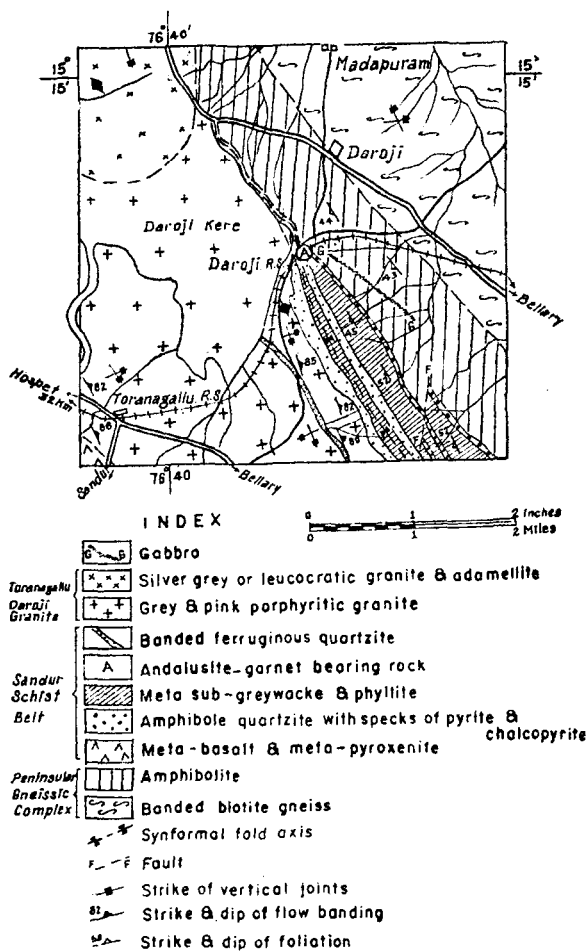


Figure 1. Geological map of the area around Daroji, Bellary District, Karnataka.

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The X-ray powder pattern of the andalusite and garnet was obtained by using Philips D.S. 114.6 mm dia. camera using Ni filter and Cu $K\alpha$ radiation. The data are given in Table I. Chemical analyses of the andalusite was not undertaken because of inclusions present in them which could not be removed.

TABLE I
X-RAY POWDER DATA ALONG WITH XPDF 11-446 CARD DATA

Andalusite d Å	RI	XPDF 11-446 d Å
5.5745	MS	5.58
4.5469	S	4.52
4.2639	MW	
3.9434	MW	3.92
3.5036	W	3.49
3.3406	VS	3.33
2.9060	MS	
2.7802	MS	2.75
2.4792	MS	2.47
2.3697	W	2.35
2.2775	MS	2.26
2.1787	MS	2.17
1.8172	MS	1.83
1.6818	MS	1.79
1.5426	MS	1.59
1.4883	MS	1.47
1.3869	M	1.28

The associated garnet is pale pink and perfectly euhedral. X-ray powder pattern is given in Table II.

TABLE II
X-RAY POWDER DATA OF GARNET FROM
ANDALUSITE-BEARING ROCK

d Å	RI
3.3299	M
2.8783	S
2.5693	VS
2.3592	W
2.2502	W
1.1013	W
1.8763	M
1.6740	S
1.6023	S
1.5438	S
1.2966	W
1.2644	W

Paragenesis

The present occurrence of andalusite-bearing rock is very near to the Thorangallu granite. The granite is intrusive into the schist belt as xenoliths of the schistose rocks are seen in the granite. The texture of the rock indicates that the garnet and andalusite are post-tectonic and have destroyed the schistosity. The random orientation of andalusite in the plane of schistosity and at right angles to it indicates that andalusite has developed due to thermal metamorphism and the texture is hornfelsic or knotted. These features suggest that the rock was produced due to thermal metamorphism, as a result of granite emplacement.

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References

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