

OCCURRENCE OF KYANITE IN THE NEARSHORE SEDIMENTS OF NORTH COASTAL ANDHRA PRADESH AND ITS IMPLICATION

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The heavy mineral assemblage in the nearshore sediments of north coastal Andhra Pradesh includes ilmenite, garnet, sillimanite, monazite, zircon, pyroxenes etc., and is derived from Eastern Ghat Group comprising dominantly khondalites and charnockites. The assemblage also consists of minor to accessory amounts of kyanite that has not been reported so far from the Eastern Ghat Group. Kyanite bearing rocks are reported from the Archaean schists of the Khammam District of Andhra Pradesh along the Godavari drainage basin. The evidences available so far suggest that the rocks from Godavari drainage basin are the sources for kyanite. However, further work is needed to confirm whether these rocks in the Godavari drainage basin or hitherto unreported kyanite bearing rocks in the other drainage basins constitute the provenance.

INTRODUCTION

Heavy minerals are useful in deciphering the provenance. In the present study, the heavy mineral occurrences covering different environments, viz., continental shelf, beaches and coastal palaeo dunes between Mahendra Tanaya and Vamsadhara rivers to the north of Visakhapatnam and between Pudimadaka and Pentakota to the south of Visakhapatnam have been studied (Fig.1). Minimum 300 grains of magnetite-free heavy minerals, separated by bromoform (sp.gr. 2.89) were counted under microscope in each slide and their percentages were calculated (Table 1). The objective of this paper is to report the presence of kyanite amongst the heavy minerals in the nearshore sediments of north coastal Andhra Pradesh and discuss its possible provenance.

HEAVY MINERAL SUITE

The main heavy mineral assemblage in the study area includes ilmenite, garnet, sillimanite, monazite, zircon, rutile, ortho - and clino-pyroxenes etc., derived from the hinterland occupied by the Eastern Ghat Group. Besides, minor to accessory amounts of kyanite occurs in the study area. Kyanite occurs as colourless bladed crystals with two sets

of perfect cleavages perpendicular to each other, shows high relief, non-pleochroism and high extinction angle (27-30°). Kyanite was also reported by a number of workers from different segments of north coastal Andhra Pradesh (Table 1).

PROVENANCE OF KYANITE

The occurrence of kyanite in the sands from different parts of East Coast in Andhra Pradesh is significant, because the source rocks for this mineral are not reported so far from the nearby hinterland of this area. Interestingly, kyanite bearing rocks are reported from Archaean schists of Khammam District of Andhra Pradesh along the Godavari drainage basin (Subba Raju, 1975). Rao (1998), while trying to explain the occurrence of kyanite in the nearshore sediments, discounts the Godavari drainage basin as the possible source, on the basis that the present day Godavari River drains only the sediment of silt- and clay-size fractions, whereas kyanite occurs in sand-size fraction and these minerals are distributed uniformly along the shore. This argument is not tenable because Godavari river might be draining mainly silt and clay sized sediments, but it also carries sand sized sediments though in very small quantities. Mohapatra et al. (1992) reported the occurrence of clayey sand and sandy silt from the innershelf sediments of Godavari. Rao (1998) suggests that the nearshore red sands might have contributed kyanite to the beach and nearshore sediments, but did not explain the source of kyanite in the red sands itself. Gaitan Vaz et al. (1998) have reported kyanite from the nearshore red sediments of Bavanapadu - Ichchapuram area and interpreted that these sediments might have been derived from the exposed continental shelf during the upper Quaternary regressive cycles. There are two possible alternatives to explain the presence of kyanite in the coastal stretch, viz., they might have either been contributed by the rocks from Godavari drainage basin or there are certain hitherto unreported kyanite bearing rocks in the hinterland. Interestingly, Murthy and Rao (1989) and Purnachandra Rao (1991), have reported high smectite content in the sand zone of continental shelf sediments of Godavari-Visakhapatnam

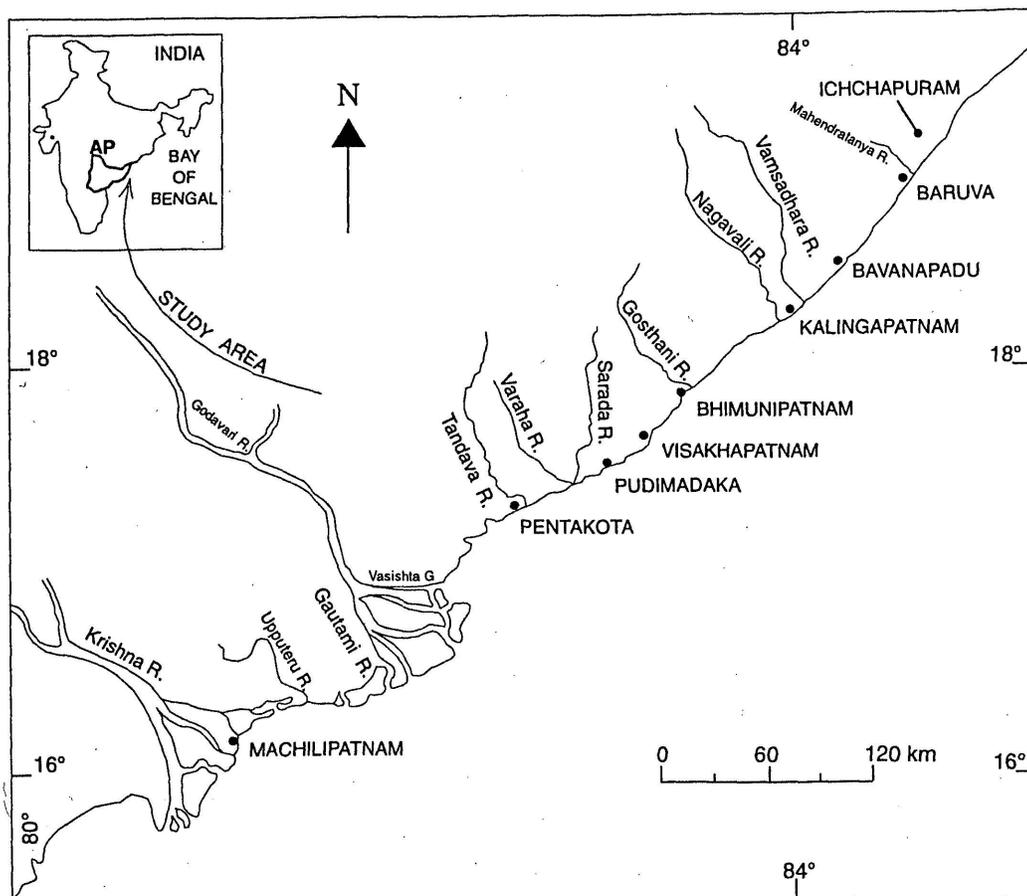


Fig.1. Map showing the locations of kyanite occurrences.

Table 1. Distribution of kyanite in heavy mineral suite of sands from different areas along East coast of Andhra Pradesh

S.No	Area	Kyanite (No%)	Reference
Beaches			
1	Pudimadaka-Pentakota	0.06-0.77	Present study
2	Baruva-Bavanapadu	0.1-2.02	Present study
3	Bavanapadu-Kalingapatnam	0.06-1.69	Present study
4	Hamsaladivi-Manginipudi	<1	Nagamalleswara Rao, 1994 a&b
5	Vasishta Godavari-Upputeru	1-2	Nagamalleswara Rao, 1994 a&b
6	Visakhapatnam-Bhimunipatnam	<1	Nagamalleswara Rao, 1994 a&b
7	Machchali Sunnapalli to Bendi Creek	2.5	Rao et al. 1998
8	Ramayapatnam-Vasishta Godavari river	Reported	Dhanunjaya Rao et al. 1989
9	Gosthani river-Champavati river	Reported	Dhanunjaya Rao et al. 1989
Red Sediments			
10	Red sediments of Srikakulam District	0.11-0.4	Present study
11	Red sediments of Bavanapadu-Ichchapuram		
	Lower Unit	1.07	Gaitan Vaz et al. 1998
	Upper Unit	0.3	Gaitan Vaz et al. 1998
12	Red sands of Visakhapatnam	Reported	Mahadevan and Sathapathi, 1949
Continental Shelf			
13	Baruva-Bavanapadu	0.13-0.47	Present study
14	Bavanapadu-Kalingapatnam	0.09-0.51	Rajasekhara Reddy et al. 1999
15	Nizampatnam Bay	0 - 3	Sreenivasa Rao et al. 1995
16	Off Visakhapatna - Baruva	Reported	Rao, 1998
17	Off Kalingapatnam and Sonapurapeta	Reported	Rao et al. 1992
18	Off Puri - Kakinada coast	Reported	Mohapatra et al. 1992
19	Off Godavari - Krishna deltas	Reported	Mohapatra et al. 1992
20	Off (south of) Nizampatnam Bay	Reported	Mohapatra et al. 1992

and concluded that the Godavari-derived sediments extended northerly and deposited up to Visakhapatnam by NE moving currents under the influence of SW monsoon winds. If these sediments were derived from Godavari drainage basin, then the sediments, even in small quantity, might have been transported further beyond Visakhapatnam by northerly moving currents. Thus, the

evidences available so far suggest that the rocks from Godavari drainage basin are the source for kyanite. In the second alternative, there may be hitherto unreported kyanite bearing rocks in drainage basins other than the Godavari drainage basin, which in itself is scientifically significant. However, further work is needed to confirm either of these alternatives.

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