

- DOUILLET, P. and NICOLS, J., (1969) Les Minéraux du Kaolin historique- réflexions concernant les diverses classifications et nomenclature - proposition d'une nomenclature nouvelle. *Bull. Soc. fr. ceram.*, v. 83, pp. 87-114.
- RAMACHANDRA RAO, M. B. and RADHAKRISHNA, B. P., (1939) Report on the prospecting for Bauxite, near Shivaganga, Holalkere Taluk. *Rec. Mysore Geol. Dept.*, v. 38, pp. 106-115.
- VENKATARAMAIAH, B. N., (1918) Notes on prospecting for Bauxite in the Kadur and Chitradurga Districts. *Rec. Mysore Geol. Dept.*, v. 17, pt. 2, pp. 124-133.

Address of the Authors

T. C. DEVARAJU, K. S. ANANTHA MURTHY and N. M. UDAYASHANKAR, Department of Geology, Karnatak University, Dharwad-580 003, India.

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A note on the natural arch in the Tirumala Hills, Chittoor District, Andhra Pradesh

B. K. NAGARAJA RAO

Abstract

A natural arch is carved by the agencies of nature in the Nagari Quartzite, exposed on the Tirumala hills. It is suggested that this may owe its origin to jointing and stream action.

Introduction

A natural arch (Fig. 1) of scenic beauty and geological significance is situated on the Tirumala hills, forming a part of the Palkonda Ranges in the Chittoor district of Andhra Pradesh. It is located about 0.8 km WNW of the well-known shrine of Lord Venkateswara on the Tirumala hills on the road leading to the micro-wave station. A detailed account of the arch has been given in the handbook of the Geology Department of Shri Venkateswara University (Suryanarayana, 1977).

Geological setting

The Tirumala hills, essentially made up of Nagari Quartzite of the Cuddapah Supergroup rise abruptly from the plains to the west and south, where gneisses and granites forming the basement (Precambrian) are extensively exposed. The lowermost bed in the Nagari Quartzite sequence is a conglomerate which is traced in a cutting close to the road leading to the micro-wave station from Tirumala. The conglomerate is polymict and is essentially composed of pebbles of quartzite, quartz and boulders of hornblende granite. It is followed by flesh coloured, medium to coarse grained quartzite. The natural arch is carved out of the quartzite. The regional strike of bedding is NNW-SSE with low dips of 5°-12° towards east. The bedding follows the contours showing variations in strike and dip directions. The rocks are highly jointed

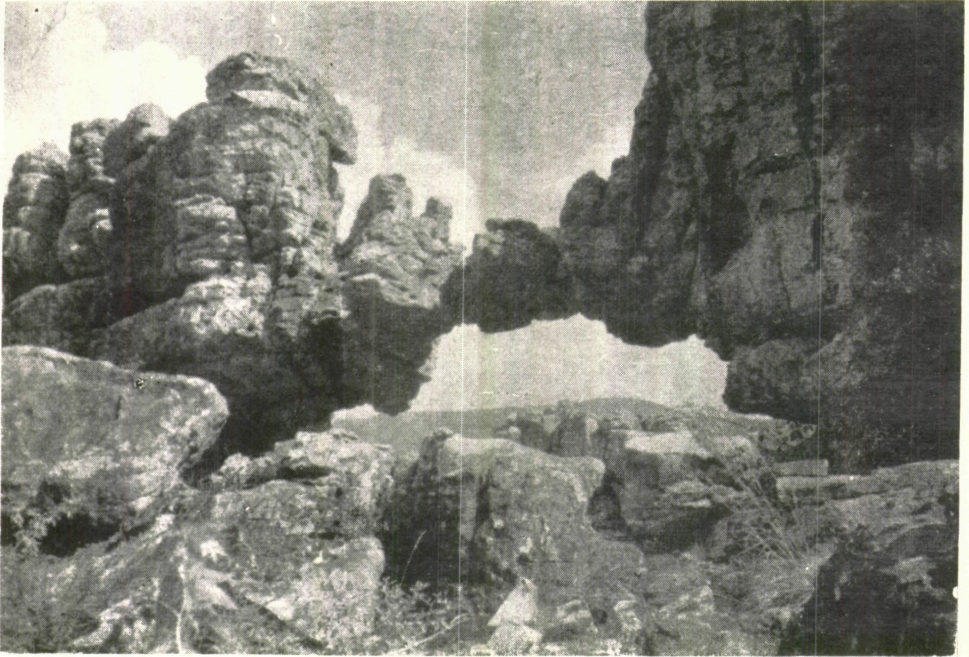


Figure 1. Natural Arch.



Figure 2. Exfoliation in quartzite.

in NNW-SSE and NNE-SSW directions and cross joints due WNW-ESE have accelerated mechanical weathering, producing exfoliation structures (Fig. 2) in the quartzite. What is significant is the vivid evidence of stream action which has resulted in the formation of pot holes by the removal of soft ferruginous concretions in the quartzite 0.2 km SW and west of the natural arch.

Geomorphologically, the area is marked by a cuesta type of topography with the hill scarp forming obsequent slopes facing the Chandragiri plains in the west and gentle consequent slopes going down to the Pullampet valley in the east.

Origin of the Arch

Many well known natural bridges and arches are known to have been sculptured from sandstones with gentle dips by the hand of nature (Fairbridge, 1968, p. 765).

It is suggested that intense weathering and erosion of quartzites aided by cross joints in the rocks and stream action were responsible for the formation of the unique natural arch near Tirumala. Field studies show that the rocks have been cut into blocks by cross joints. There are no large perennial streams in the area now. However, a study of aerial photographs of the areas (part of the Swarnamukhi river basin) adjacent to the Tirumala hills bears out misfit streams with wide flood plains. This feature suggests that this part of the peninsula experienced more heavy precipitation in the geological past than at present. Ramanujam (1968), on the basis of flora collected from sedimentary formations of Tertiary age along the coast of South India, has suggested that the East Coast of the Peninsula experienced heavy rainfall in the Mio-Pliocene times and that this part of the Peninsula dried up in comparatively recent geological past. The observation of Ramanujam is therefore in support of greater incidence of rain in the eastern part of the Peninsula. Surface run-off channelled into a stream has eroded and removed blocks of quartzite, rendered loose by cross joints and exfoliation giving rise to the Natural Arch.

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References

- FAIRBRIDGE, R. W., (1968) Encyclopedia of Earth Science Series: Vol. III. (*Encyclopedia of Geomorphology*) Dowden, Hutchinson and Ross Inc., 1968, p. 765.
- RAMANUJAM, C. G. K., (1968) Flora of Cuddalore Sandstone series; Cretaceous-Tertiary Formations of South India. *Mem. Geol. Soc. India*, v. 2, p. 281.
- SURYANARAYANA, K. V., (1977) Geological monuments; the need for their preservation; Handbook of Department of Geology, Sri Venkateswara University, Tirupati, p. 28.

Address of the Author

B. K. NAGARAJA RAO, 1-10-222, Ashoknagar, Hyderabad-500 020.