

On the occurrence of pillow lavas in Dalma metavolcanic suite, Singhbhum & Ranchi district, Bihar

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Introduction

Detailed geological investigations in the Precambrian Belt of northern Singhbhum and south Ranchi (Toposheet No. 73 F/9) revealed extensive occurrence of pillow structures within the Dalma metavolcanics over a strike length of about 40 km.

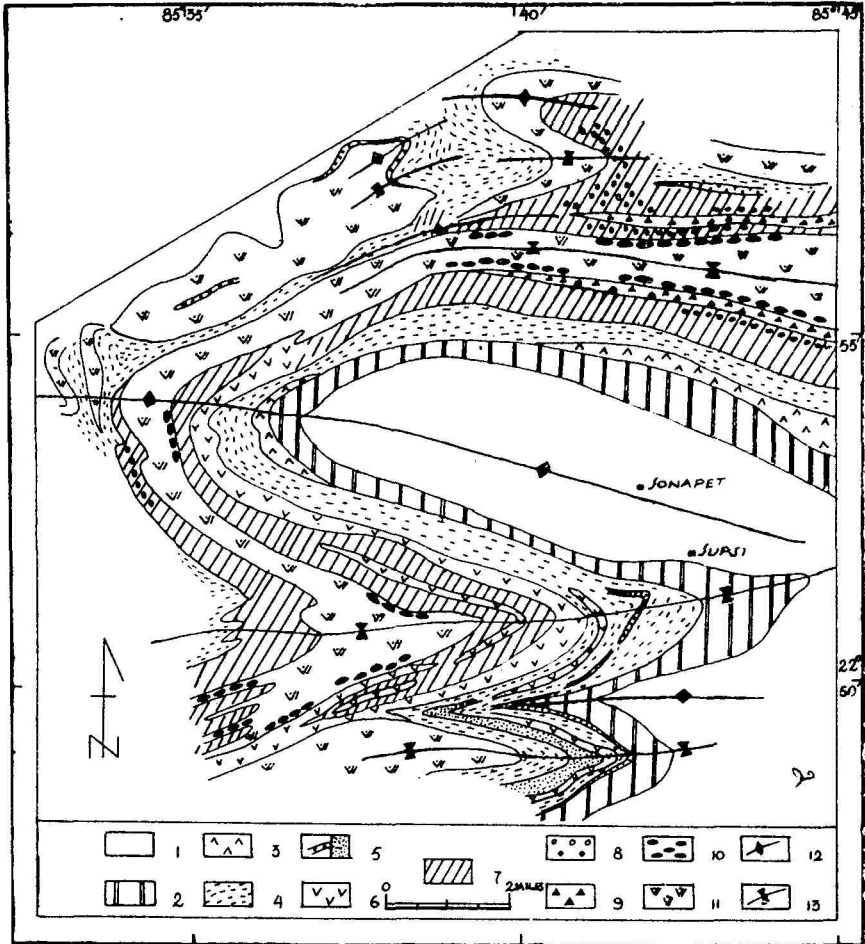


Figure 1. Geological map of the area around Sonapet, Western Singhbhum, Bihar.

1. Mica Schist (Chaibasa Formation). 2. Chlorite-sericite phyllite (Dhalbhum-Formation).
3. Ultramafics. 4. Shale/phyllite, Carbonophyllite. 5. Quartzite and nodular chert.
6. Mafic intrusives. 7. Tuffs and tuffaceous schist. 8. Pyroclastic conglomerate.
9. Agglomerate. 10. Pillow lava. 11. Basalt. 12. Major antiformal axes. 13. Major synformal axes.

The most illustrative occurrences are located 800 m NE of Sobhadih (22°55' : 85°44'30"), 900 m north of Gutuhatu (22°55' : 85°43'30"), north of Baredih (22°55' :

85°43'), Silaghati (22°56' : 85°42'), 1.4 km NE of Gunti (22°55'30" : 85°37'30"), Dhubruberana north of Karerango (22°56'15" : 85°44'), and south of Harbagarh (22°57'30" : 85°41'15"), 800 m south of Bhurudih (22°58'45" : 85°40"), 1.6 km NE of Kamirda (22°50' : 85°36'30"), Hatnabera (22°49'15" : 85°36'), and 1 km SE of Karanjaidih (22°44' : 85°32'30").



Figure 2. Profile section of deformed pillows in upper basaltic suite of Dalmas near Baredih.



Figure 3. Plan view of pillow structures in upper basaltic suite near Gutuhatu.

Geological set-up:

In this part of the belt, the Dalma suite of rocks and the underlying Singhbhum Group metasediments are thrown into major east-west trending superposed fold system comprising the Dalma syncline, Sonapet anticline, Sursi syncline, Dango anticline and Nalita syncline from north to south (Fig. 1). All these major structures with varying style and geometry represent the second deformative episode of the tectonite.

The Dalma suite comprises a thick volcanic-plutonic-sedimentary sequence representing a distinctive evolutionary history along a restricted tract of the Precambrians of northern Singhbhum. The bottom most horizon of this suite is characterised by a thick pile of alternate carbon phyllite and tuffaceous rocks with occasional grey and purple shaly phyllite, cherty quartzite and ironstone. This passes upwards into a dominantly tuffaceous sequence with numerous volcanic-plutonic members of mafic, ultramafic and intermediate compositions. Though the tuffaceous sediments show wide variation in texture and composition, the most dominant type may be classified as an ultramafic welded vitric tuff. Volcanic-plutonic members belong to gabbro-diorite-basalt, pyroxenite-peridotite, serpentinite and alkali-basalt-clans. The above mentioned sequence is overlain by the main basaltic flow of Dalmas, with an intervening reworked coarse pyroclastic horizon (conglomeratic at places) and basaltic agglomerates.

Pillow Structures:

The pillow structures are observed mainly along the basal parts of the upper basaltic suite. They are also noted in some of the early flows within the lower volcanic-plutonic-sedimentary pile. The pillows vary in size from 20 cm to 150 cm along the longer axes. The shape of the pillows varies from undeformed spheroid (with or without tails), 'bunn' or 'Balloon' with flat bottom and convex top to considerably flattened ellipsoids. In every case, however, the identity of the structure is preserved by the presence of a black glassy skin over each individual pillow. At places the pillows are highly vesicular with infillings of quartz, calcite, zeolite etc. The pillows are either closely packed together with coalescing chilled margins of adjacent ones or at times separated from each other by thin tuffaceous or black cherty material. The thin pillow lava members within the lower sequence are mostly characterised by intricate interfingering with tuffaceous and cherty sediments. At the base of the upper basalt, the size of the pillows gradually diminish upwards and finally disappear.

The present finding is significant in that it indicates sub-aquatic (sub-marine) condition of volcanism over a wide span of time along the restricted tract of Dalmas.

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(Received: Oct. 13, 1977; Revised form accepted: Nov. 21, 1978)