

fact that majority of the deposits are leased out, the wealth of information on the minerals will be immensely beneficial to the students of earth science and the entrepreneur who would embark on some mineral based project. The present technological advancement in metallurgy will be an impetus for reassessment of vanadium bearing magnetite deposits to extract vanadium and low grade lateritic nickel ore to extract nickel. The vast array of rare-metal pegmatite needs re-look for their strategic element potential other than gemstones and tin. The chapter on 'Groundwater' by S Das and 'Exploitation of Minerals and Growth of Mineral based industries' by R C Mohanty and S K Sarangi are indeed welcome additions.

However certain minor attentions need to be given, hopefully in its fourth reincarnation. The size and cover colour of the book, which attracts at the first sight, seem mismatch to its content. The present book, an edited compilation, is the result of combined efforts of number of authors. A bit of information of the contributors along

with their subjects at the beginning in the form of an 'Introduction' by the editorial committee as well as their names suffixing the title of their subject in the content chapter would have created easy links. An index of the subjects, localities and authors would have been the icing on the cake. The quality of the material information contained in the book would have attained its zenith with the help of still better map drawing and printing. It is time that SGAT takes the initiative of putting up an integrated and uniform geological, structural and metallogeny map of Orissa.

The book has been a treasure trove of information on all the basic aspects of geology and mineral deposits/ occurrences of the highly endowed state of Orissa. Kudos to SGAT.

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## DISCUSSION

**A NEW FIND OF YOUNGER DOLERITE DYKES WITH CONTINENTAL FLOOD BASALT AFFINITY FROM THE MESO-NEOPROTEROZOIC CHHATISGARH BASIN, BASTAR CRATON, CENTRAL INDIA** by D.V. Subba Rao, M.W.Y. Khan, D.N. Sridhar and K. Naga Raju. *Jour. Geol. Soc. India*, 2007, v.69(1), pp.80-84.

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- 1 The scientific communication is interesting to read, based on two subsurface samples of two locations namely, (i) Lat N 21°15'14", Long E 81°36'6.4" and (ii) Lat N 21°15'7.9", Long E 81°35'52.7". It is a common phenomenon in Proterozoic sedimentary formations, wherein dykes related to Deccan Basalt have been intruded in the sedimentary rocks. The paper generates an interest to read, but does not give full satisfaction of reading. The reason may be because the authors are planning to publish a detailed paper elsewhere and have not as such included full data (such as plot not shown – p 80, figures not shown – p 81, 83).
- 2 The title of the paper gives an understanding that

authors are describing younger dolerite dykes for the first time in Meso-Neoproterozoic Chhattisgarh Basin. The earlier reference of dolerite dykes traversing Gunderdehi (shale) Formation of the upper most Raipur Group, reported by Tripathi and Murti (1981), near Dhangar and Mohadeopali of Raigarh district of erstwhile Madhya Pradesh, has already recorded the presence of such activity in Raipur Group. Authors have not correlated their new find with the reporting of Tripathi and Murti (*op cit*). The stratigraphic position where such dykes have been encountered is an essential information which is missing in this write-up. This may be added up for reference for future studies. Sinha et al (1998) have also reported younger basic sills and dykes in the Rohatikhi Formation of Singhora Group of Chhattisgarh Supergroup, but they are comparable with older age (~1100 my, Sinha et al *in press*).

- 3 The paper could have been improved by incorporating a section through these boreholes so that one has an idea of the dimension of dykes observed by the authors. A fence diagram can help in better presentation and therefore conceiving the ideas of authors. The separation of boreholes and width (thickness) of the dykes are important factors in such cases. Authors may acknowledge the agency which has taken up the drilling programme and may comment on further absence or presence of dyke in continuity/vicinity, provided it is not confidential and allowed by the drilling agency. This shall help for geoscientists to think further adding of knowledge in this aspect.
- 4 Authors have correlated these dykes with Deccan Basalt activity mainly on the basis of geochemical affinity. It is a widely accepted fact for Proterozoic Sedimentary rocks in the vicinity of Deccan plateau. In the opinion of author, they may look for more geological and geochronological evidences to corroborate their conclusion. Contact relationship of dyke with sedimentary units is a helpful tool, if studied carefully. Such types of data are missing in the paper. Geochronology added with geological evidences may yield complete picture of genesis of dykes and their economic importance, if any. Authors, however, have taken the base of REE geochemistry to conclude its least contaminated nature and striking similarity with the Deccan tholeiitic basaltic flows.

**D. V. Subba Rao**, Scientist, National Geophysical Research Institute, Hyderabad - 500 007, *Email* dvsubarao3s@rediffmail.com, reply

We thank Dr D K Sinha for his constructive comments and useful suggestions and for providing relevant information on the within basin mafic dyke swarms of Chhattisgarh basin in the Northern Bastar Craton, Central India. Our reply to his comments point-wise is as follows:

- 1 We have not included the plots such as Mg# vs  $Al_2O_3$ , Zr/Y vs Zr and ternary Ti-Zr-Y plots in the text as it is only a short communication.
- 2 The authors have reported the occurrence of unusual basaltic dykes from the central part of the Chhattisgarh Basin from Raipur area only. These younger unmetamorphosed dykes intrude the upper Raipur Limestone Formation which belongs to Raipur Group of Chhattisgarh Supergroup (Moitra, 1995). Whereas the within basin older dolerite dykes occurring in the

NE part of the Chhattisgarh basin near Dhanagar and Dumarपाली areas around Raigarh region (Lat N210 53 7 and Long E83 19 51 6) intrude the lower Gunderdehi Shale Formation of the Raipur group in Chhattisgarh Supergroup (Tripathi and Murti, 1981, Moitra, 1995, Subba Rao et al 2005). These Raigarh dykes show both coarse-grained metagabbroic and medium grained metadolerite types and are highly metamorphosed / recrystallized in nature. The within basin fine-grained basaltic dykes of Raipur have not been correlated with the within basin Raigarh mafic dykes due to their contrasting geological setting, petrological, mineralogical and geochemical characteristics. In addition to the above, Sinha et al (1998) have also reported ~1100 my old basic sills and dykes traversing the Rehatikhl Formation of Singhora Group (Pre-Chandrapur Group) in Chhattisgarh Supergroup. Moitra et al (1995) have suggested the occurrence of basic intrusives and tuffaceous rocks occasionally in different formations of the Chhattisgarh basin.

- 3 We agree with the suggestion of Dr D K Sinha that a section through the boreholes, fence diagram and as well as the ground geophysical magnetic surveys can help in better presentation of the dimensions and subsurface configuration of the basic intrusive bodies (sills/dykes) in the study areas. We wish to acknowledge the Central Ground water Board (CGWB) agency, North Central Chhattisgarh Region, Raipur for undertaking extensive drilling programme in and around Raipur in Chhattisgarh region.
- 4 As has been suggested by Dr D K Sinha, the combined/integrated studies involving field geological (contact relationship of dykes with sediments) and geochronological (Sm-Nd emplacement ages of dykes etc) data will throw more light on the genesis and tectono-thermal events of these basic dykes and their relation to development and evolution of Chhattisgarh Basin. The authors propose to undertake the detailed geochronological studies on these dykes in order to refine the existing models on the stratigraphy, sedimentation and associated magmatic activity of the Chhattisgarh Basin.

We are grateful to Dr D K Sinha for the interest he has shown which has enabled us to examine certain aspects for future researches. The Chhattisgarh region in our opinion is underexplored and a multi-disciplinary effort is required to characterize the nature of pyroclastic and intrusive basic-ultrabasic rocks of the basin and associated metallogeny.

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***Obruchevella* AND OTHER TERMINAL PROTEROZOIC (VENDIAN) ORGANIC-WALLED MICROFOSSILS FROM THE BHANDER GROUP (VINDHYAN SUPERGROUP), MADHYA PRADESH** by Bijai Prasad, *Jour. Geol. Soc. India*, v.69, pp.295-310.

**P.K.Maithy**, formerly Birbal Sahani Institute of Paleobotany, Lucknow and **Gopendra Kumar**, formerly Geological Survey of India, Lucknow comments:

The author has postulated following age to the Bhander Group, Vindhyan Supergroup on the basis of cyanobacteria genus *Obruchevella* and other organic-walled microfossils – Acritarch. (i) Ganugarh Shale- Late Cryogenian-Early Vendian (ca 650 – 590 Ma); (ii) Nagod Limestone – Early Vendian or Late Vendian (ca 570 – 560 Ma); (iii) Sirbu Shale – Late Vendian to Early Cambrian.

1. The author has considered cyanobacteria genus *Obruchevella* as an “Index Fossil” for Vendian though its presence is well known from Late Precambrian to Devonian (Mankiewiz, 1992). Moreover, recently this genus has been reported by Rai and Singh (2004) from Late Paleoproterozoic sequence of Semri Group of the Vindhyan. It may not be out of point to mention that *Obruchevella* compares exactly with modern helical Cyanobacteria *Spirulina* and *Arthospira*. Thus, this form exists in fossil form in Precambrian and extends up to the present time. As such it has no biostratigraphic significance. This fact has been pointed out by Riding (1991; p.326). Therefore, the age conclusion drawn by the author on the basis of long ranging genus *Obruchevella* is incorrect.

2. The Neoproterozoic biostratigraphy is best based in the presence of Acritarch and organic-walled microfossils produced by phytoplanktonic protists (Timofeev, 1973). Both spheromorphic and acanthomorphic forms have played useful role in correlating the rocks of Neoproterozoic-Cambrian succession. Results of studies have demonstrated that the size of spheromorphs increases towards the close of Proterozoic whereas the acanthomorphic forms are larger in Neoproterozoic and show gradual reduction towards Precambrian/Cambrian onwards (Maithy and Babu, 1997).

The biostratigraphy is based on the overall composition of assemblages, in particular Acritarch. According to Bijai Prasad (2007) the Ganugarh Shale is dominated by filamentous cyanobacteria along with spheromorphs *Symplastosphaeridium*, *Kildinosphaera*, *Trachysphaeridium* and *Stictosphaeridium*. The overlying Nagod Limestone also shows dominance of filamentous cyanobacteria along with spheromorphs *Trachysphaeridium*, *Favosphaeridium*, *Letosphaeridia*, *Kildinosphaera*, *stictosphaeridium* and *Vandalosphaeridium*. The Sirbu Shale shows dominance of the spheromorph *Letosphaeridia* associated with tubular filamentous cyanobacteria viz *Siphonophycus* and *Oscillatoriopsis*. The acritarch details given by the author does not support the conclusion drawn.