

**NEW FINDS OF CONGLOMERATE HORIZON IN SOUTHERN PART OF CUDDAPAH BASIN** by I.V. Reddy, M.S. Reddy, G. Satyanarayana and V.K.K. Kalluraya. *Jour. Geol. Soc. India*, v.59, pp.213-217.

**N. Rajendran**, Geological Survey of India, Bangalore, comments:

The authors have proposed a new stratigraphy for the Cuddapah rocks of Gadikota area based on some new finds of conglomerate horizons. In the proposed classification, Nagari quartzite and Pullampet Formation are shown against the Bairenkonda (Nagari) quartzite of Nallamalai Group (Nagaraja Rao et al. 1987). If the Bairenkonda quartzite overlies the Pullampet Formation with an angular unconformity, how they could be shown against each other. Similarly, the Bairenkonda quartzite and Cumbum Formation are shown against Cumbum (Pullampet) Formation of Nagaraja Rao et al. (1987). The Nagari quartzite and Pullampet Formation could have been correlated with the Pulivendla quartzite and Tadpatri shales of Chitravati Group (Nagaraja Rao et al. 1987) as done by King (1872).

However, before revising stratigraphy, some of the points that require to be clarified are:

1. The authors consider the quartzites around Mantapampalle as Bairenkonda quartzite, "as they occur in the core of a dome". However, the outcrop pattern of these quartzites (Fig.2b) does not reflect a domal structure. If the quartzites are in the core of a dome, how could the Cumbum Formation (younger) occur on the northern side and the Pullampet Formation (older) occur on the southern side?
2. The quartzite south of the Madavir River is considered as Nagari quartzite, while the one on the northern side as Bairenkonda quartzite. Both these units overlie the Gulcheru quartzite and Vempalle Formation and are in the same strike direction. Further, both these quartzites do not come into contact with each other at any point. Then, how to consider that one is older than the other – just because of few conglomerate horizons!
3. The Vempalle Formation overlying the Gulcheru quartzite is shown extending for about 2 km towards east in the dip direction near Gadikota along the Mandavi river. Surprisingly, it does not extend southward even for a little distance between the Gulcheru and Nagari quartzites.
4. It is mentioned that the Gulcheru quartzite near

Gadikota has a ENE-WSW trend with northerly dip. This could be due to local warps, as the contacts of the Gulcheru quartzite with Nagari and the basement continues in NNW-SSE direction parallel to the trend of the Nagari quartzite itself.

Thus, the evidences provided for the revision of the stratigraphy are not convincing enough.

**I.V. Reddy**, Geological Survey of India, Hyderabad, replies:

In the proposed classification, the Nagari Quartzite and Pullampet Formation, which were considered as equivalent to Bairenkonda Quartzite and Cumbum Formation respectively by earlier workers (Nagaraja Rao et al. 1987), have now been assigned to a lower stratigraphic position than Bairenkonda Quartzite and Cumbum Formation, as they are unconformably overlain by Bairenkonda Quartzite and Cumbum Formation. Neither the Nagari Quartzite and Pullampet Formation nor the Bairenkonda Quartzite and Cumbum Formation are shown against the designated Bairenkonda (Nagari) Quartzite and Cumbum (Pullampet) Formation respectively. Point-wise replies to Rajendran's contention are as follows:

1. Because of reduction, the outcrop of the quartzite does not reflect a domal structure. Nagaraja Rao et al. (1987) opined that the quartzite which was regarded as Bairenkonda Quartzite by King (1872), was shown as intercalations within the shale/phyllite sequence of Cumbum (Pullampet) Formation in the southern Nallamalai Fold Belt. Recent studies have indicated that the quartzite, north of Cheyyair river either underlies or overlies the Cumbum (Pullampet) Formation. The former one is designated as Bairenkonda Quartzite and the latter as upper horizon of the Cumbum Formation. The quartzite, south of Cheyyair river occurs only over the Cumbum (Pullampet) Formation and considered as upper horizon of Pullampet Formation. In the proposed classification, Pullampet Formation and Cumbum Formation are not equivalents.
2. The quartzite south of the Mandavi river is considered as Nagari Quartzite as it is conformably overlain by Pullampet Formation. The Quartzite north of the Mandavi river is considered as Bairenkonda Quartzite

because in the west, it is unconformably underlain by Vempalli Formation; towards east, it is unconformably underlain by Pullampet Formation.

3. In the up-dip direction, i.e., southwards, older Gulcheru quartzite can only be expected to be exposed, but not the younger Vempalli Formation.
4. The change in trend is not due to a warp but is due to an angular unconformity between Gulcheru quartzite and Nagari quartzite.

**ASSOCIATION OF MICROBES WITH ARSENIC-BEARING SIDERITE CONCRETIONS FROM SHALLOW AQUIFER SEDIMENTS OF BENGAL DELTA AND ITS IMPLICATIONS** by Ravi Shanker, T. Pal, P.K. Mukherjee, S. Shome and S. Sengupta. *Jour. Geol. Soc. India*, v.58, 2001, pp.269-271.

**R.K. Bandyopadhyay**, Project Arsenic, Eastern Region, G.S.I., Salt Lake, Sector-2, Kolkata - 700 091 comments:

Ravi Shanker et al. proposed bacteria mediated  $Fe^{3+}$  and  $Fe^{2+}$  reduction and consequent development of (siderite?) concretions where arsenic was fixed by microbes and its subsequent dissolution owing to marginal lowering of pH in "locally developed acidic condition" which caused the arsenic pollution in groundwater of the study area.  $Fe^{3+}$  to  $Fe^{2+}$  reduction necessitates anaerobic bacteria that abound in anoxic conditions. These anoxic bacteria are obligate anerobe (survive in the absence of oxygen) and they thrive on electron donated by higher charge ions, viz.,  $Fe^{3+}$ ,  $SO_4^{2-}$ , etc. These bacteria types are vast and varied. There are anaerobic bacteria/microbes (MIT-13) which thrives on electron donated by arsenate ( $ASO_4^{4-}$ ) oxyanion (Ahmann et al. 1994). This follows that these microbes reduce arsenate to arsenite ( $ASO_3^{4-}$ ). Because these trivalent oxyanions are more soluble and more toxic, hence upon microbe aided reduction of pentavalent arsenate, trivalent arsenate will be generated and dissolved in groundwater. This being the case, it is quite possible that in the reduction reaction of  $Fe^{3+}$  to  $Fe^{2+}$ , arsenate that occurs as sorbed lode on ferric-hydroxide surface would also be released, reduced, and dissolved in groundwater. Presence of considerable concentration of trivalent arsenic ion in groundwater indicates that above theoretical postulation merits attention. But the authors did not probe any alternative possibility. In scientific investigation one should balance the possibilities and choose the most likely on the basis of best fit data. Moreover, authors have

### References

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- NAGARAJA RAO, B.K., RAJURKAR, T., RAMLINGA SWAMY, G. and RAVINDRA BABU, B. (1987) Stratigraphy, structure and evolution of the Cuddapah basin. *In: Purana Basins of Peninsular India. Mem. Geol. Soc. India*, no.6, pp.33-86.

proposed lowering of pH and emergence of acid conditions to explain siderite dissolution. But in acid conditions acidophile aerobic bacteria dominate. These are obligate aerobe. That means they need oxygen for their respiration. In brief, a contradiction is apparent in the theory that has been proposed by the authors.

Whatever explanations they have given for siderite precipitation/dissolution is oversimplified. Occurrence of siderite is indicative of strongly reducing conditions and presence of carbon-di-oxide in more than atmospheric amount ( $pCO_2 > 10^{-3.5atms.}$ ). "... Fluctuation of pH without a change in oxidation condition can cause alternation of siderite and magnetite in a sediment in a closed system to carbon-di-oxide, but in an open system, where,  $pCO_2$  is constant, the change from siderite to magnetite cannot take place without a change in  $pO_2$ " (Garrels and Christ, 1965). Authors have not described whether the system is open or closed. They have not given any pH or Eh data either. The temptation to formulate premature theory upon insufficient data is indicated.

**Ravi Shanker**, B-5, Section-K, Aliganj, Lucknow - 226 024 replies:

1. We are happy that our short communication has aroused the interest of Shri Bandyopadhyay in the subject.
2. He has completely missed the objective and the main purpose of our communication, which was to focus the attention of all those involved on the problem of arsenic pollution in the groundwater of Bengal,