

August 1996), it is necessary to drill an experimental bore hole, and subject the cores to detailed chemical analysis, in order to trace the sources of arsenic in the subsurface. If the arsenic content associated with different aquifers is known, an attempt can be made to seal off the "culprit" aquifers, if that is feasible.

(iii) *Hydrochemical*: An inexpensive, readily available and easy to use, compound has to be developed, either to absorb As(III) or precipitate it or convert it into a form (organoarsenic ?) which is readily excretable (on the analogy of defluoridating highly fluoruous water through the use of dead-burnt magnesite or charcoal made with coconut husk). Microbial remediation holds great potential. For instance, it has been found that bacterial cultures of *Thiobacillus acidophilus* precipitated in a month 75% of the initial solute As in acid mine waters (Leblanc *et al.* 1996). It should be possible to identify or develop through biotechnology, microbes capable of removing As from drinking water in West Bengal. When developed, such a microbial remediation would come as a boon to communities (say, in Bihar) which are faced with drinking water shortages in areas with lots of acid mine water.

(iv) *Treatment*: On the analogy of what has been done to remove lead from the human system (when injected, the reagent chelates lead in the extracellular fluid, and gets lead excreted through urine), it is necessary to identify a similar reagent to cure the victims of arsenic toxicity.

(v) *International cooperation*: Kenneth G. Brown Inc., P.O. Box 16608, Chapel Hill, NC 27516-6608, USA (Tf: +1- 919-408 8067; Fax: +1-919-408 8138; e-mail: <kbinc@mindspring.com>) is engaged in the study of the health effects arising from arsenic in drinking water in several countries, notably, Taiwan, Inner Mongolia, Chile (Antofagasta), Ghana (Obuasi), and Argentina (Corodoba). They welcome cooperation with individuals or institutions who are engaged in the study of the etiology and epidemiology of hyperkeratosis in West Bengal. Such a cooperation would be mutually beneficial. Mitigation measures which succeeded elsewhere could be evaluated for their cost-effectiveness and social acceptability, and adapted in the context of West Bengal.

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References

- FERGUSSON, J.E. (1990). "The Heavy Elements: Chemistry, Environmental Impact and Health Effects", Pergamon Press, 614 p.
- LEBLANC, M., ACHARD, B., BEN OTHMAN, D., LUCK, J.M., BERTRAND-SARFATI, J., and PERSONNE, J.CH. (1996). Accumulation of arsenic from acidic mine waters by ferruginous bacterial accretions (stromatolites): App. Geochem., v.11, pp.541-554.
- NRIAGU, J.O. (1988). A silent epidemic of environmental metal poisoning? Environ. Pollut., v.50, pp.139-161.
- THORNTON, I., WATLING, H. and DARRACOTT, A. (1975). Geochemical studies in several rivers and estuaries used for oyster rearing: Sci. Total Environ., v.4, pp.325-345.

DELVING INTO ANCIENT HISTORY

The tribute to Prof. Sediypu Krishna Bhat by Dr. B.P. Radhakrishna (Editorial, JGSI, v.48, No.4, 1996, pp.373-376) is quite illuminating and aspects of his character like giving

importance to facts over blind postulates is worth emulation. In this context, I would like to present some current views.

The Vedic geography, particularly Rig Vedic geography has been a matter of intensive study by Indologists during the last one hundred years. The similarities in certain points like *Airyānam vaejo* (*Avesta, Vendidad 1.1*) *Apām nayāt* prompted indologists to think of a common origin of the Rig Vedic people, Zoroastrians and the ancestors of those who belong to the Indo-European language family. There are three possibilities: (1) The *Airyānam vaejo* or the place of origin of the common stock was in Kashmir-Punjab area and some of them migrated to Central Asia; (2) The common place of origin was in Central Asia and one group came to Kashmir-Punjab area and (3) The place of common origin was in some other place from where one branch migrated to Central Asia, and the other branch migrated to the Kashmir-Punjab area. The third possibility was advocated by Lokmanya Bal Gangadhar Tilak whose "Arctic Home in the Vedas" reflects ample geological knowledge about cycles of glaciation and climatological variations. He opined that the Rig Vedic people originated in the Arctic Siberia and migrated during the beginning of the present cold period around 6000 years B.P. (or around 4000 B.C.), one branch to South Asia and the other to Kashmir-Punjab area.

While Ramayana and Mahabharata have recensions in relation to the geographical provinces, Rig Veda recited in Kashmir, Kanya Kumari, Gujarat and Bengal is the same without any recensions. But Rig Veda could not have originated at all the places at the same time. It is more probable that it originated in one place and people reciting it have migrated to different places. There was no change in the contents in spite of oral transmissions over thousands of years. Also nowhere in the respective Rig Vedic texts, it is mentioned that the Rig Vedic Aryans of Kanya Kumari or Gujarat came from the Kashmir-Punjab area. Hence it is equally probable that the Rig Vedic Aryans of Kanya Kumari came from outside India.

Rig Veda describes four seas, about half a dozen mountain ranges and 99 rivers and only one place Ilaspada. Manohar Lal Bhargava has given a good analysis of geographical elements and showed that of the 99 rivers, 7 are important and they are Sarasvati, Yajnia or Sindhu, Apaya, Drshadvati, Sarayu Rasa and Krumu. Ganga and Yamuna were very small rivers. Also there are elements like pairs of rivers and mountains -- Arjika river and Ajrika mountain and Sushoma river and Sushoma mountain. There are references like (*Teere Sindhunām*) suggesting one coast for more than two seas. Indologists advocating the theory that Kashmir-Punjab area as the original home of the Rig Vedic people opine that small river Gaggar, a tributary of the river Yamuna represented the original mighty Sarasvati flowing through Rajasthan. Within the last few thousand years a geological situation developed where the rivers of Kashmir-Punjab area were affected by major changes.

The status of the river Indus, which is next only to river Sarasvati in importance, remained without change. Sarasvati, Drshadvati, Apaya and Sarayu have become insignificant rivers and rivers like Ganga and Yamuna have changed from an insignificant stage to mighty rivers. The geological evidence shows that the area between rivers Ganga and Yamuna is rising and if so a river that was flowing through Rajasthan had to migrate not towards Jamuna but towards the Indus. The palaeo-channels of the palaeo river through Rajasthan with Harappan sites show a striking similarity to the Indus system. Hence it is probable that the Indus was originally flowing through Rajasthan and gradually it migrated towards northwest. If so, where was Sarasvati? Also the Rig Veda contains references to enormous quantities of gold and iron. The reference include gold being taken by chariots

on land. There are no known gold mines and iron mines in the Kashmir-Punjab area to support such huge quantities of gold and iron.

When one looks at the detailed map of the Arctic Siberia, there are many striking similarities in the name of the seas, rivers and mountains with those of the Rig Vedic geographical elements. *Sharyanāvat* - Severanaya; *Saraswatan* - Sosva; *Arjika* - Alajjiya; *Sushoma* - Kolima. Also there are sufficient deposits of gold and iron in the Arctic Siberia. The single coast for more than two seas where the Aswins got down from their chariots could be the coast for the Kara Sea, Sevarnaya Sea and the East Siberian Sea which represent the *Saraswat*, *Sharyanāvat* and *Arvāvat* seas, respectively. The expressions -- "Dogs being the beasts of burden" and the "chariots with lower front wheels" are more apt in the higher latitudes of Arctic Siberia. Also one should bear in mind that *Aryāvarta* is not the place of origin of Aryans (whereas *Airyānam vaejo* is) but the place of movement.

Following Kalidasa *Santhat Pareekshya anyataradbhajante* "Wise examine various views and adopt which is more logical," one has to examine the above angles and has to choose between the different views of the land of the Rig Vedic people. The above argument holds that the Arctic theory of Lokmanya Balagangadhar Tilak, who also like Professor Bhat opined that future researchers would lend more support to his theory.

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I, B.P. Radhakrishna, hereby declare that the particulars given above are true to the best of my knowledge and belief.

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(Sd.) B.P. RADHAKRISHNA

Editor, Journal of the Geological Society of India
