Geochemical basis of tropical endomyocardial fibrosis

It was interesting to go through the article by Valathan et al (Curr. Sci., 1994, 67, 99-104) and understand that geochemical pathogenesis is being researched in India too. However, while going through the paper, the need for a good geological background was felt in order to relate epidemiology to geochemistry and it is in this connection that the relationship between a geologist and a medical practitioner is beyond that of a patient to a doctor. As a geologist, I feel that there are some incompatibilities in the article in describing the geological milieu:

Th is not a rare earth element (REE) as mentioned in Table 1 although it is present in monazite. Monazite also contains U which is not indicated in the paper.

The map showing the distribution of monazite in Kerala does not bring out anything. In fact, monazite is omnipresent in the crystalline rocks of not only Kerala but the whole of Peninsular India as a trace constituent. Being very resistant to physical and chemical weathering the mineral gets dislodged from the parent rocks and gets carried by streams to the sea-shore where it is concentrated by an interaction of waves and currents to minable deposits. The reason why monazite along with ilmenite, rutile, sillimanite, zircon, etc. gets concentrated along south Kerala coast is not well understood. The rocks of north Kerala and those even beyond up to Goa also have monazite as a trace constituent, but there is no minable concentration as in south Kerala coast.

The abundance of monazite in the coastal sands of Kerala is restricted to a narrow stretch between Neendakara and Kayamkulam. Its abundance in the rest of the Kerala coast is extremely low.

The process by which REE and Th reach the biological system is not clearly described. Does the mineral get dissolved by the digestive juices, releasing the constituent elements. The mineral is chemically very stable (does not get dissolved in the natural environment) and so its chances of uptake by plants to transfer to humans are remote. Even if some particles of monazite, certainly with ilmenite, zircon, sillimanite, etc., inadvertently enter the digestive system, the chances are that they get rejected by the system through excreta. Incidentally zircon also contains some Th.

Tubers concentrating REE may be by an entirely different pathway, namely uptake of REE through the relatively more soluble mineral phaseapatite, much more ubiquitous than monazite in the rocks of Peninsular India.

Table 2 shows only the radioactivity of food crops but not their REE. K, Sr, and U may also contribute radioactivity in food crops. Further, phosphorite, which is the source rock for phosphatic fertilizers also contains many of these elements in an easily soluble form. K and U (the latter present in minerals like pitchblende, uraninite and allanite in granitic rocks) are more easily released on chemical weathering of rocks in the tropics than do REE and Th from monazite.

Elevated concentration of REE and Th in faeces is more likely to be due to the presence of monazite as undigested excrement.

The lateritic soils of Kerala are rich in Al. The monazite sands of south Kerala are also rich in sillimanite, an Al-rich silicate mineral. If monazite can release REE and Th, the same environment should be capable of releasing Al from bauxite and sillimanite which should lead to increased incidence of Alzheimer’s disease.

The mineral deposits of south Kerala coast have ilmenite as the chief constituent. It is a Ti-rich mineral containing also traces of V, Ni, Cr and Co in its crystal structure. Some of these elements are known to be carcinogenic if ingested. Since these elements in ilmenite are in non-labile form, like REE and Th in monazite, they are harmless in the present environment.

In the light of the above, future research on EMF should concentrate more on the geochemical aspects mentioned above.

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Some reflections on earth science education in India

I read with interest the article ‘Earth science scenario in India: A Perspective’ that appeared in Current Science recently. Most of the points raised are relevant and pertinent. In particular, I am concerned about the following ones:

Quality of teaching. Somehow, we seem to place undue emphasis on a teacher’s research output in our education system. His promotion and other opportunities are based on the research output whereas there is no mechanism presently that would monitor the teacher’s teaching capacity, methods, etc. However, course evaluation system exists in IITs from one of which (Bombay) I had my MSc and Ph.D. I urge senior scientists of the country to take this matter up at the national level and introduce some system of monitoring the teaching work of teachers.

Lack of enough earth-related component in our school syllabus. We need to do something about this because I clearly see a distinct trend of decline in the number of students coming for geology-related courses. Again, there is no recognition for any work that a teacher does to take geology to schools or, for that matter, to common man. A person would be encouraged if this kind of work is accorded some recognition.

Geochimcal reference standards When I started my career here, I asked one of the CSIR labs to provide large volume samples of marine sediments to pursue the objective of bringing out our own reference standards. The request was turned down saying a University cannot handle such a project! Even to
this day, we run USGS and NRC Canada standards. What a shame!

Exposure of teachers to other environments. There is much inbreeding in our Universities. A research fellow completes his PhD and is usually absorbed as a teacher in the same University; so there is no exposure to other researchers, other lines of thought or other approaches to problems and data interpretation. A policy has to be drafted and implemented at the national level that bans recruitment of research fellows from the same department, unless he has spent a minimum of three years outside the parent University after PhD.

Keeping in mind the needs. Perhaps it is a good idea to estimate at the national level how many MScs and PhDs we need to turn out depending on the plans, programmes and needs of the country, rather than mass-producing geology post-graduates and PhDs.

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NEWS

ISI and IBM join hands to develop an electronic library system

The Institute for Scientific Information (ISI) and International Business Machines (IBM) Corporation have launched a joint study to develop a prototype electronic document storage management and distribution system for ISI’s Electronic Library project. The agreement between ISI and IBM’s Almaden Research Centre (ARC) was signed in July.

The Electronic Library is a critical component of ISI’s Information Gateway — a link that will connect users everywhere with the world’s most important scholarly research literature, says Ms Bonnie Lawlor, ISI’s Executive Vice President and Head of the Database Publishing Division.

According to Ms Lawlor, ISI’s ultimate objective is ‘to be able to provide our customers with ease of access to and retrieval of relevant bibliographic and full-text/full image information in the format, medium, and time-frame desired and delivered to the location of their choice — library, laboratory, home or office’.

The objective of the ISI—IBM joint project is to allow publishers and users of scholarly information to test the many variables relating to the electronic distribution of information. Initially, the prototype will provide users with desktop access from their own local-area-network (LAN) environment to the bibliographic data, abstracts, table of contents, full text, and full images of the 1,350 scientific journals contained in the Life Sciences edition of ISI’s Current Contents. This collaborative project will also serve to evaluate new technologies for use in future digital library systems.

Using IBM’s modular, client/server solution, ISI’s subscribers would have direct local access to customized selections of information. Network connections between local ‘library servers’ and ISI’s ‘enterprise server’ would permit subscribers to easily order copies of information not contained in their local collections and enable ISI to deliver updates to local collections and provide for account control and customer usage information.

‘This electronic project has been developed in response to the demands from the marketplace,’ says William Schlegel, Chief Executive Officer, ISI. ‘We have been working on this project for almost two years, and have been in ongoing discussions with key players in the publishing industry, including primary publishers and representatives from both corporate and academic libraries’. ISI chose IBM as a technology partner, and Schlegel hopes that IBM’s expertise in systems development will enable ISI to launch the electronic library prototype within a year. ‘This venture is very much a cooperative effort among all of the participants. Meetings will continue to be held this year with the primary publishers, members of the library community, and IBM in order to finalize the project specifications,’ says Schlegel.

Other key areas that will be explored in the project include: Practical applications of the electronic journals (data access, retrieval, and usage) from the perspectives of publishers and users, including issues related to copy-right and intellectual property rights; Systems required to facilitate use of the electronic libraries, including billing, accounting, and business management reporting; Pricing scenarios to determine how to meet the diverse needs of both the publishing and user communities; Usage patterns to determine if, and how, the electronic journal will change traditional information purchasing and usage.

IBM’s client/server design will provide ISI with the means to manage a very large database and allow its customers to view the information on personal computers that run the most popular operating systems (such as OS/2, DOS/Windows, Macintosh and Unix) and are connected by commercially available LAN software (such as Lan Server, Novell, Appletalk, and TCP/IP). IBM’s solution is based on many technologies pioneered at its Almaden Research Center (ARC), the birthplace of the relational database, in San Jose, California. The design incorporates products of IBM’s PC Server organization (servers), Storage Systems Division (magnetic and optical disk drives and libraries and data storage management software) and Software Solutions Division (DB2 relational database family). New technologies from ARC include those that provide advanced database functions, integrated text and image applications, and address copyright security issues.

‘This study offers us the opportunity to test our integrated client/server