

a non-toxigen with all toxin genes deleted. A cryptic haemolysin gene locus was introduced in the chromosome of this strain and through a series of genetic manipulations, *ctxB* gene was integrated. This strain provided full protection against the challenging dose of *V. cholerae* in animal model, and the vaccine is now undergoing human trial<sup>5</sup>.

A few years ago, scientists from the University of Maryland have found out that *Vibrio cholerae* has unusual high intake of salt, i.e. it absorbs most of the human body salt, thus its ancestral home must be in the ocean. Bhadra and his group from IICB have studied gene products of *Vibrio cholerae* needed for survival under cold shock and nutritional stress. Rukshana Chaudhuri has studied the effects of bile on the cell surface permeability barrier and efflux system of *Vibrio cholerae* strains.

Intestinal infection with vibrio species results in the loss of large volumes of water, leading to severe and rapidly progressing dehydration and shock. 'Without adequate and appropriate rehydration therapy, severe cholera kills about half of affected individuals', says G. B. Nair of ICDDR, Bangladesh. The introduction of oral rehydration therapy (ORT) has been very cost effective and has also simplified the treatment. In most cases patients can be treated initially with ORS.

'Preliminary studies show that Bangladeshi households who first filter their pond water through sari cloth, before drinking water, reduce the risk of cholera infections by approximately 50%', says Rita Colwell. However control of the deadly cholera still rests on education and improved sanitary conditions besides consumption of hygienic food and water.

In a nutshell, the various strategies that can be followed are: Isolation and treatment of patients; Management of contact of cholera patients; Anti-cholera immunization; Environmental sanitation.

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3. Mekalanos, J. J. *et al.*, *Infect. Immun.*, 1999, **67**, 5723–5729.
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## Aswathanarayana receives AGU award

Uppugunuri Aswathanarayana of the Mahadevan International Center for Water Resources Management, Hyderabad has received the 'Excellence in Geophysical Education Award' (2005) from the American Geophysical Union at a special award ceremony on 25 May 2005 at New Orleans, USA. 'The Award recognizes As-

wathanarayana's meritorious services in the cause of geoscience education in different parts of the world. He is the first Indian and the first from the developing countries to get this award.' Aswathanarayana was a Director of Center of Advanced Study at University of Saugar, Saugar, Madhya Pradesh (1967–80). He subse-

quently served as Professor and Director of State Mining Corporation, Dar es Salaam, Tanzania (1980–90) where he initiated modern laboratories. He is author of several books linking geoscience instruction with natural resource management and job generation.

## MEETING REPORT

### Towards a tsunami warning system in the Indian Ocean\*

The great earthquake of 26 December 2004 of magnitude 9.0 that originated 200 km off the west coast of Sumatra, was perhaps nature's wake-up call. A wake-up call to tell us that nature will continue its own acts, and we need to prepare ourselves to face the inevitable. This time it occurred in the form of a tsunami, quite an unusual

occurrence in the Indian coast. Not that it has never occurred in the past. History tells us of three older episodes – 1881, 1941 and 1945 – none so devastating as the 2004 tsunami. The first two originated from earthquakes in the Andaman and Nicobar region, and the third from an earthquake in the Makran coast. The 2004 tsunami was a reiteration of the enormity of damage that could be caused by a tsunami generated more than 2000 km away from the Indian coast. Even countries far away, such as Maldives and Somalia were not spared. The lesson that came through

was that we cannot afford to ignore some of these seismic sources located far beyond our political boundaries. How should we gear up to handle such events in future? What are the shortcomings in our existing set-up? How could we improve them? And what should be our approach towards setting up a tsunami warning system in the Indian Ocean?

A brainstorming session provided an excellent forum to deliberate on some of these issues. This event, attended by nearly 200 delegates brought together an array of specialists – seismologists, geo-

\*A report on the brainstorming session on tsunamis organized jointly by the Departments of Science and Technology, Ocean Development and Space, together with CSIR and INSA on 21st and 22nd January at INSA, New Delhi.