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Calamity-resistant biosafety laboratory

The University of Texas Medical Branch (UTMB) facility in Galveston – home to two national biocontainment laboratories – has been in the news for surviving the deadly Ike hurricane. The 13 September calamity caused damages equalling US$ 700 million to the University of Texas facilities[1]. The US$ 180 million worth medical laboratory of Galveston is facilitated to withstand winds as strong as those of tornadoes. It contains a Biosafety Level 4 (BSL-4) laboratory to house deadly pathogens such as *Anthrax bacilli* and *Ebola* viruses, for which there are no effective drugs or vaccines[2].

The biosafety experts at the UTMB claim that their laboratory is sturdy enough to withstand almost any natural disaster, stressing that though Ike washed away whole sections of Galveston, it left the university's biodefence research facilities completely intact[3].

The officials at the US Department of Health and Human Services have designed the new laboratory to resist 140 miles/h hurricane winds and also withstand earthquakes according to the requirement of the National Earthquake Hazards Reduction Program. In addition to standby generators to provide power in case of a power failure, the Galveston National Laboratory boasts of uninterruptible power supply module or a fuel-cell power supply to power the BSL-4 biosafety cabinets, BSL-3 enhanced biosafety cabinets, and critical building control panels. The building is also said to be equipped with an environmental monitoring system to assess room pressure differentials, smoke detection, automatic watering system pressure and flow, as well as high efficiency particulate air filters. The proposed laboratory will have fire protection systems that meet or exceed requirements specified by the National Fire Protection Association and all applicable local, State, Federal, and UTMB requirements[4].

However, opponents of the new laboratory, set to research some of the world's most dangerous diseases, opine that housing it in a major hurricane zone is akin to inviting accidents. Biological agents stored in the laboratory, which is less than a mile from the sea wall, could leak out after damaging winds or flooding, or could be looted by rioters in post-disaster mayhem. Infectious exotic agents such as Congo–Crimean hemorrhagic fever viruses[5] with potential for aerosol transmission pose a high risk of exposure and infection to laboratory personnel, the community and the environment. Facilities such as this are generally housed in a separate building or isolated zone with complex, specialized ventilation requirements and waste management systems to prevent release of viable agents to the environment.

The threats to constructing the Galveston National Laboratory noted in the Record of Decision include vulnerability to severe storms, including hurricanes; location within a 100-year floodplain, and location within the Gulf Coast Normal Faults Region (earthquakes). Other than vulnerability to hurricanes, floods and earthquakes, the idea of locating a BSL-4 laboratory on a barrier island in the Gulf of Mexico made perfect sense. Americans fear that laboratories of such stature situated near the coast may pose a risk to their health, should there be any environmental slip-ups[1].

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TWAS, illycaffè announce Trieste Science Prize winners 2008

A press release from Trieste, Italy, dated 29 September 2008 announced the Trieste Science Prize Winners 2008. The prize, is administered by TWAS, the academy of sciences for the developing world, and illycaffè in collaboration with the city of Trieste and Fondazione Internazionale per il Progresso e la Libertà delle Scienze. The prize provides international recognition to outstanding scientists living and working in the developing world. Winners share a US$ 100,000 cash award.

The winners in 2008 are Beatriz Barbuy, an eminent Brazilian astrophysicist,

who has made a major contribution to the study of the evolution of the chemical composition of stars, and Roddam Narasimha, an internationally renowned Indian engineer and physicist, whose work in fluid dynamics has increased our understanding of turbulence.

Beatriz Barbuy, professor at the Institute of Astronomy, Geophysics and Atmospheric Sciences at the University of São Paulo, Brazil, and Vice-President of the International Astronomical Union is being honoured for her contributions to astrophysics and, in particular, for enhancing our understanding of the evolution of the chemical composition of stars.

K. R. Srinivasan (Director and Abdus Salam Honorary Professor, Abdus Salam International Centre for Theoretical Physics, Trieste) writes, 'Roddam Narasimha's scientific accomplishments in engineering sciences and his intellectual influence have both been enormous. The focus of his research has been fluid mechanics. In particular, the three areas to which he has made lasting and salutary contributions are: transition between laminar and turbulent states, turbulent shear flows, and the shock structure. His work on the effects of surface curvature and nonlinear vibration of strings established him as an independent research worker of high calibre. The paper on vibration is a class act in which one can see the stirrings of modern ideas of nonlinear dynamics and chaos – for instance, Arnold tongues. Narasimha did venture into chaos much later. He has made salient contributions to a number of problems on flow control, transonic and supersonic flows, wind energy and rural technology, standard atmosphere for tropics, monsoon dynamics, inversion layer very near the ground, reliability and maintenance of air fleet, and civil aviation; all these subjects are richer today because of his outstanding work. His work on atmospheric phenomena is trend-setting and has brought new rigour into that area of research. All his papers are written with exemplary lucidity. Narasimha fostered an excellent school of engineering sciences in India, from which have emerged many young people who have established themselves all over the world.'

MEETING REPORT

Extremophiles 2008*

About 200 delegates from 33 countries participated and presented their work in an international conference on extremophiles, the microbes from extreme habitats. The conference encompassed latest research developments in a range of areas concerning extremophiles: molecular ecology, metagenomics, physiology, genetics, protein structure and function, and biotechnology. The deliberations in the conference aimed at: (1) The current and future prospectives on various aspects of extremophiles. (2) To understand molecular mechanisms for adaptation strategies of the extremophiles. (3) Understanding recent trends in extremophile research. (4) Exploration of newer habitats and developing new tools for isolation, metagenomics and phylogeny. (5) Setting priorities for future research.

Garo Antranikian (President, International Society for Extremophiles (ISE)) introduced the aims and the activities of ISE. Brian O'Connell (Rector, University of Western Cape) delivered the opening plenary lecture on 'Science education and research in South Africa: needs and challenges in a new nation'. He emphasized that most of the adaptive capabilities are contributed by Africans intellectual power. O'Connell sketched various parameters of social and economic developments and compared the trends between developing and developed nations. He further emphasized that for a long time Africa has been identified with ignorance and anti-intellectualism, leaving the issue of higher education unattended and unrecognized.

Seven oral sessions were conducted every day, with three sessions running in parallel. The sessions focussed on proteins and enzymes, microbiology and microbial ecology, adaptations to extremophily, genes and nucleic acids, and applications of extremophiles. Patrick Forterre (Pasteur Institute, Paris, France) proposed a third archaeal phylum, Thaumarchaea. He also challenged a hyperthermophile to be a last common ancestor of archaea. Aharon Oren (The Hebrew University of Jerusalem, Israel) spoke on the environmental genomics of the Dead Sea using metagenomic analysis. He highlighted the amplification of 16S rRNA genes from the environmental samples showing only 89–93% identity with cultivated Halobacteriaceae. His group is trying to obtain metagenomic information on preserved Dead Sea biomass collected during the 1992 microbial bloom. Yoshizumi Ishino (Department of Generic Resources Technology, Kyushu University, Japan) explained the contribution of proteins from hyperthermophilic archaea to structural and functional analysis of DNA replication/repair apparatus. He has analysed the complexes that appear at the elongation process of DNA replication, using electron microscopic single-particle analysis. Haung Li (State Key Laboratory of Microbial Resources, China) reported about the Sac10b family of archaea. Proteins of the Sac10b family are highly conserved among archaea, but their physiological functions are unclear. He speculated that the proteins of this family may have diverged in function during the course of evolution and hyperthermophilic members of the protein family may be involved in the adaptation of the organisms to growth at high temperature. S. C. Carry (University of Waikato, New Zealand) examined the microbial diversity of thermophilic communities in hot mineral soils of Antarctica, using automated rRNA intergenic spacers analysis

*A report on 'Extremophiles 2008', an international conference organized by the University of the Western Cape and University of Cape Town, Cape Town, South Africa in collaboration with the International Society for Extremophiles during 7–11 September 2008 at Lord Charles, Somerset West.