

and unknown, which cause damage by an earthquake in a particular locality. The earth scientists have yet to learn a lot before any reasonable predictions of earthquakes and seismic hazards in Tehri Dam area could possibly be made. Uttarkashi earthquake provides an opportunity to seismologists and earthquake engineers to make systematic measurements and credible analysis to

assess the probability of failure of a rock-filled large dam during its projected life-span in the Tehri-Garhwal area.

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NEWS

Meeting discusses use of animals in research

Laboratory animals are the basic requirement of biomedical research and testing. To ensure reliability and reproducibility of results and to minimize the number of animals used, the quality of animals and selection of right model have to be ensured. Though animal experimentation has been in vogue in India since many decades, low priority has been accorded in most institutions to the quality of material and manpower needed for animal breeding, care and management.

To improve this situation, awareness has to be created not only amongst primary users of laboratory animals and caretakers, but also amongst senior biomedical-science planners and science administrators. Therefore the Laboratory Animals Information Service Centre (LAISC) at the National Institute of Nutrition (NIN), Hyderabad, organized a two-day meeting (21 and 22 February 1992) on 'Trends in laboratory animal science and technology—Indian perspective'. Senior scientists, including heads of institutions and departments from biomedical institutions, universities and pharmaceutical companies, participated. At the inaugural function a keynote address on 'Laboratory animals in service of mankind' was given by P. M. Bhargava.

Various aspects of laboratory animal science were discussed. Each subject was introduced by an expert and their presentations were followed by supplementary comments and general discussion (see box).

At the end of the meeting, a concluding session was held and specific recommendations made. This discussion

was moderated by B. N. Dhawan, Director, CDRI.

The following specific recommendations were made:

- (1) An ethical code for animal experimentation relevant to India should be prepared and the initiative and responsibility for this should come from scientists.
- (2) Journals that publish experiments using laboratory animals must insist on basic information such as species, strain, age, weight, sex, experimental conditions including details of diet, genetic background, environment, etc. This point should be included in the instructions to authors.
- (3) Grant-giving agencies that fund research projects pertaining to laboratory

animals must insist on the above details in project proposals. In fact, in the project proposal, information on funds needed for purchase of good-quality animals, diet, etc. should be provided in a separate column. By clubbing this information under the head 'Contingencies', research workers do not give adequate thought to the actual amount that would be required for animal experimentation and end up using substandard animals and diet owing to paucity of funds.

(4) Mechanisms should be developed to provide orientation and training to research workers in the handling and care of laboratory animals.

(5) While planning experiments on

1. Need for animal experimentation and influence of animal quality on animal experimentation; introduced by	M. S. Bamji, NIN and LAISC, Hyderabad
2. Factors affecting quality of animals	K. R. Bhardwaj, Central Drug Research Institute Lucknow
3. Human resource development	P. R. Mastlamony, Tamil Nadu Veterinary and Animal Science University Madras
4. Ethical issues	T. Desiraju, National Institute of Mental Health and Neuro Sciences Bangalore
5. Alternatives to animal experimentation	U. V. Wagh, National Facility for Animal Tissue and Cell Culture Pune
6. Role of national and international agencies in improving the standards of laboratory animal infrastructure and experimentation	

animals, a trained and experienced animal scientist should be included in the team

(6) Awareness can be generated amongst users through appropriate posters and video tapes in major scientific meetings.

(7) In addition to two or three national centres for laboratory animals (breeding, supply, training, etc.) like LAISC and the Laboratory Animals Centre at the CDRI, creation of smaller regional facilities can be considered. The bigger national centres should have state-of-the-art technologies like development of transgenic animals.

(8) Institutions should constitute ethics committees for animal experimentation. This committee should include at least one veterinarian, qualified animal scientist.

(9) The quality of commercial diet in the country is inconsistent and unsatisfactory. Certification from the Indian Bureau of Standards (formerly Indian Standards

Institute) should be made mandatory for commercially produced laboratory animal feeds.

(10) To improve the human resource in the country, specialized training programmes for veterinary science as well as biological science graduates should be evolved. Veterinary institutions can play a major role in providing this training with advice and assistance from the existing national centres like LAISC and CDRI.

(11) Pharmaceutical companies and allied agencies should be brought under strict guidelines with regard to the use of good-quality laboratory animals for drug development and testing. The guidelines can be formulated by a committee of experts.

Mahtab S. Bamji, National Institute of Nutrition, Hyderabad.

because of hydrogen tunnelling.

Granular materials exhibit unusual properties, intermediate between those of liquids and solids. Using the thermodynamic approach of Edwards, Anita Mehta (Birmingham) built up a theory of dynamics of powders in which a quantity called the compactivity, which plays a role analogous to temperature was attributed a microscopic meaning in terms of fluctuation properties of clusters of grains. This picture was substantiated by Mehta in terms of computer-simulation studies. While Mehta's approach was a dynamic one, an alternative viewpoint on the statistical mechanics of grains has emerged recently in terms of an analogy with ordinary critical phenomena, giving rise to the new field of self-organized criticality. Deepak Dhar (TIFR) pointed out how self-organized systems exhibit power-law correlations in an exactly solvable model.

Jyotsana Lal (Saclay) presented recent light-scattering data on the effects of polymer networking on the phase-separation behaviour in a system where one of the components is gelatin, which undergoes sol-gel transition. Exact results for various critical exponents characterizing 'directed' polymers and some related vertex models were presented by Somen Bhattacharya (IOP, Bhubaneswar).

Neural networks and immune networks have several characteristics reminiscent of spin glasses. Chandan Dasgupta (IISc) and Bikas Chakrabarti (SINP, Calcutta) summarized the progress made over the last few years, following the pioneering work of Hopfield, on content-addressable memory and the behaviour of neural networks in living systems. Although the possibility of a similar network-like behaviour of the immune system was pointed out long ago, a quantitative picture of immune response has emerged only recently. This work was reviewed in three lectures by Debashish Chowdhury (JNU) and Dietrich Stauffer (Köln).

Amphiphilic membranes. Until very recently no microscopic model was developed to study the bursting of the thinnest possible soap films, the so-called Newton block films, where hydrodynamic effects are expected to be negligibly small. Using a microscopic model defined on a lattice, Debashish

Workshop on statistical physics

A workshop on statistical physics in Calcutta from 27 December 1991 to 7 January 1992, organized by the S. N. Bose National Centre for Basic Sciences, was devoted to the frontier areas of statistical physics. The highlights were (i) transport in porous media, (ii) physics of glassy systems, such as supercooled liquids and proton glasses, granular materials, polymers, neural/immune networks, and (iii) dynamics of amphiphilic membranes. In addition, the M. N. Saha and the S. N. Bose memorial lectures were delivered by H. E. Stanley on the interesting topic of fractals.

Porous media. Engineers have been using many simple empirical rules to deal with porous media, particularly because of their technological importance, e.g. in oil recovery. Only recently physicists have begun serious attempts either to find justification of these rules or to propose better alternatives from the study of the physical processes involved. Pabitra Sen (Schlumberger) and Partha Mitra (Harvard/Schlumberger) together delivered four talks on the methods of characterizing the geometry of porous materials from the studies of their transport properties.

They also talked about the theory of pulsed NMR measurements in porous media. Dietrich Stauffer (Köln) reviewed the results of large-scale computer simulation of fluid flow through porous media using the techniques of cellular-automata hydrodynamics.

Glassy systems. In spite of thousands of papers written on the nature of the glass transition this phenomenon remains poorly understood. In their talks Chandan Dasgupta and Sriram Ramaswamy (both IISc, Bangalore) presented evidence for (a) the existence of a large number of metastable states in glasses using Ramakrishnan-Youssouf density functional theory and (b) the absence of divergence of any correlation length at the glass transition. The orientational glasses have attracted a lot of attention in recent years because a clear understanding of the latter may provide crucial insights for a better understanding of the glass transition in general. Sushanta Dattagupta (JNU) talked about recent predictions about NMR in $(\text{Rb})_{1-x}(\text{NH}_4)_x\text{H}_2\text{PO}_4$, not only is the exchange interaction random but there are also random fields in these systems. In addition, there are quantum effects