A report on the brainstorming session in the area of photosynthesis

Photosynthesis is the process on which all agricultural productivity depends and it is unlikely that any significant achievements for improving photosynthetic efficiency can be expected until the component steps of photosynthesis and their regulation in plants are thoroughly understood. A study of these processes could also be expected to help improve the efficiency of physical and chemical systems for solar energy conservation.

Recognizing its importance, the area of photosynthesis was identified as one of the challenging areas by the Department of Science & Technology. The Programme Advisory Committee on Plant Sciences has organized a series of brainstorming sessions (see *Curr. Sci.*, 1992, **63**, 112; 1993, **64**, 161; 1993, **65**, 115) in order to formulate specific measures for encouraging scientists to take up research and evolve meaningful projects in the identified challenging areas.

A brainstorming session in the area of photosynthesis was organized at the National Botanical Research Institute, Lucknow between 30 November and 2 December 1992 with P. V. Sane as the Chairman.

In the inaugural address, Sane reviewed the development in photosynthesis research in India emphasizing the much forgotton earlier work in this area by Indian scientists. He also reviewed the development of photosynthetic work in the past three decades and major contributions of different groups in this area. He mentioned that with the development in the area of molecular biology, the phenomenon of photosynthesis can now be taken up at the molecular level.

A. K. Tyagi reviewed the structure and expression of chloroplast and nucleus-encoded genes responsible for the synthesis of chloroplast proteins and various regulation mechanisms evolved during chloroplast biogenesis.

A. S. Bhagwat reviewed the phosphorylation of proteins in plants and described the various mechanisms involved in phosphorylation and dephosphorylation.

Pre-proposals invited from mid career and young scientists were also presented and discussed in detail with the experts helping in focusing the ideas. The recommendations have been communicated separately to the Project Investigators.

The following general recommendations were made:

- To strengthen the molecular biology groups on photosynthesis where expertise already exists.
- To extend photosynthetic research to forests and orchard species and to study the biomass production and utilization of algal systems.

The following aspects were recommended as focal points for intensive studies:

1. Regulation of gene expression and molecular biology of chloroplasts, including characterization of relevant chloroplastic and nuclear genes for proteins involved in photosynthesis and chloroplast transformation.
2. Current perspectives of photosystem II including its composition and function in relation to environmental changes like light intensity and variations of temperature.
3. Regulation of carbon metabolism, photosynthate translocation, partitioning, storage, and carbon and nitrogen interactions in photosynthetic tissues.
4. Chloroplast protein phosphorylation, including studies on control of primary processes of photosynthesis.
5. Diagnostic criteria to assess photosynthesis tolerance to stress including mechanism of stress tolerance in relation to photosynthesis, mathematical and computer models to take appropriate remedial measures under given stress and changed environment.

A comprehensive report on the brainstorming session giving detailed recommendations has been brought out by the Department of Science & Technology and can be obtained on request.

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A report on the First National Workshop on Monitoring and Modelling of the Coastal Ocean: Towards an operational system for regulating waste disposal

Coastal marine pollution is a major area of growing concern on account of high population density and escalating human and industrial activities in the coastal tracts of the country. Accordingly a major research programme was generated a few years ago under the sponsorship of the Department of Ocean Development and other central

and state agencies. The CSIR Centre for Mathematical Modelling and Computer Simulation provided a catalytic role in this endeavour by organizing the first national scientific workshop on 'Monitoring and Modelling of the Coastal Ocean: Towards an operational system for regulating waste disposal', at NAL, Bangalore during August 17–19, 1993. About 40 scientists from over 20 leading national institutions and R&D establishments participated in this workshop which underlined the growing concern for applying new scientific and computational approaches towards designing effective methods of waste disposal. A notable feature of the workshop was the enthusiastic participation of officers from the state regulatory agencies, notably, including B. Shivalingaiah, Secretary, Karnataka State Pollution Control Board and Yellappa Reddy, Secretary, Department of Environment and Ecology.

K. N. Raju, Acting Director, NAL inaugurated the workshop and V. K. Gaur delivered the presidential address followed by an introduction to the scientific programme by K. S. Yajnik, Head C-MMACS and C. R. Murthy, NWRI, Canada. The technical sessions covered important topics related to coastal processes (3 sessions), coastal models (2 sessions), thermal discharge (1 session), case studies (1 session) and software demonstration (1 session).

C. R. Murthy explained during the inaugural session the crucial role of coastal ocean research in efficient management of marine resources and environment He also outlined the modern techniques now used in coastal ocean studies in developed countries like Canada, and explained the physical processes that affect waste-disposal systems in the coastal ocean. He also presented several interesting results related to the parametrization of ocean diffusion processes.

P. C. Sinha described the extensive studies made at IIT, Delhi on modelling of circulation in the Hooghly estuary and V. Joshi from NEERI, Bombay on the evaluation of water quality management options for Malad creek using detailed computer simulation. This study examined the efficacy of various available field options for improving the creek water quality. T. C. Gopalkrishnan from Kodaikanal spoke on important features in numerical modelling of coastal dispersion, and also presented the results of a finite element model applied to a coastal region near Kuwait.

D Srinivasan of IIT, Madras discussed the modern techniques of monitoring the coastal ocean and S. K. Dube and A. D. Rao, IIT, Delhi described the modelling studies make in Gulf of Kutch and Godavari estuary respectively. M. S. Phanikumar presented in some detail the methodology used in the studies at C-MMACS on modelling the hydrodynamics and levels of pollutant concentration in the vicinity of Bombay harbour. He also gave a few results on validation of the model.

G. N. Swamy, NIO, Goa spoke on dispersion processes and studies with reference to Indian coastal waters while his colleagues, N. M. Anand and S. Mandal, described the software packages SAGARDIL (for marine outfall design) and DOLPHIN (for wave hindcasting studies).

T. M. Krishnamurthy, BARC, Bombay described modelling studies made to determine the concentrations of radionuclides in coastal waters as a result of an accidental release from a nuclear power plant. The model has been applied to predict the concentration profiles of Br-82 tracer used to follow the pathway of domestic sewage discharged into Colaba and Malda coastal waters of Bombay, while S. M. Rao explained the use of isotope tracers in sediment transport studies. T. P. H. Gowda, SJCE, Mysore spoke about modeling the fertilizer plant discharges into the Arabian Sea.

V. K. Gaur chaired the session on the concluding day of the workshop. There was a general discussion about the status and future of modelling activities related to the coastal ocean. Several recommendations have been made on the development of a national coastal ocean database, literature database, software development and application and coordinated field experiments and training workshops. It was also agreed that this type of workshop should be held once in every two years.

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CORRESPONDENCE

What should India be doing on the human genome?

We are responding to the write-up by J. Gowrishankar on the above subject (*Curr. Sci.*, 1993, **63**, 705) To establish our bonafides, one of us was, perhaps, the first to suggest that India should invest on sequencing the entire human genome, at a time when the project was new and few in our country had heard of it. The other of us is a co-author of, perhaps, the only detailed project submitted in this area in India, with emphasis on sequencing of the sex chromosomes.

Gowrishankar seems to be against a consolidated project on the sequencing of the human genome for the following reasons:

(a) He is against it being carried out in the mission mode with earmarked funds as this work, in his opinion, does not represent a pressing national or social concern, nor is it a research project in the area of defence, atomic energy or Bhopal gas disaster and their likes (we do not understand the inclusion of