
ANNOUNCEMENTS

NATIONAL SEMINAR ON NEED AND PRIORITIES OF GENETIC ENGINEERING RESEARCH IN INDIA

The Indian Society of Genetics and Plant Breeding organized a seminar on Need and Priorities of Genetic Engineering Research in India. The seminar held on October 12 and 13, 1984 at the campus of the Haryana Agricultural University, Hissar, was convened by Professor V. L. Chopra and chaired by Dr S. Ramachandran, Advisor (Biotechnology), National Biotechnology Board. Presentations were made on the following nine topics: Priorities of Genetic Engineering Research for Improved Agriculture (N. K. Notani, Biology & Agriculture Division, Bhabha Atomic Research Centre), Priorities of Genetic Engineering Research for Industrial Products (T. V. Subbaiah, Research Division, Alembic Chemical Works, Baroda), New Trends in Development of Vaccines for Communicable Diseases (A. H. Band, National Institute of Immunology, New Delhi), Population Control by Structured Vaccines aligning Immuno-prophylaxis with Fertility Control (Chandana Das, National Institute of Immunology, New Delhi), Hybridomas and their Application in Diagnostics and Therapy (Kamal Dev Moudgil, National Institute of Immunology, New Delhi), Infrastructural and Management Requirements for Efficient Working of Genetic Engineering Research (H. K. Das, School of Environmental Sciences, Jawaharlal Nehru University, New Delhi), Curriculum Development for Generating Trained Manpower for Genetic Engineering Research (V. L. Chopra, Indian Agricultural Research Institute, New Delhi), Genetic Engineering and Improved Energy Harvest (N. K. Pandey, Hindustan Levers Research Centre, Bombay) and Genetic Engineering for Environmental Conservation (T. N. Khoshoo, Department of Environment, Government of India, New Delhi). In addition to the discussions following individual presentations, a panel discussion was organised in which leading molecular biologists participated. The objective was to identify areas relevant to Indian needs in which national investment will be profitable. The following set of recommendations emerged from this exercise.

Scientist panel recommendations on priorities in Biotechnology

Subsequent to the presentation of status papers in

several areas namely – agriculture, health, industry, biomass, energy, environment, and manpower development, the specific suggestions expressed at the panel discussion, are presented as Summary recommendations. It is suggested this may be forwarded to the National Biotechnology Board for their consideration:

1. Basic Studies:

- (a) Many of the standard genetic engineering techniques do not work in our labs because of the lack of reagents and chemicals and proper facilities. Steps must be taken to ensure their availability. Adequate infrastructural and instrument maintenance facilities must be established. Major instrument manufacturers may be asked to maintain adequate inventories of spares in India for facilitating quick repairs.
- (b) Mechanisms and procedures should be urgently framed to eliminate delay in getting the expensive and unstable chemicals required for genetic engineering research released from the customs.
- (c) Informatics is underdeveloped. The journals published in the field reach our labs late. A National informatics net work with international hook up must be established at the earliest. There is an immediate need for bringing out a publication like 'Current Contents' priced around Rs. 250/- per year.
- (d) There is a need for strengthening the supply of biological experimental material, particularly Indian strains. Exchange of plasmids, clones and short DNA sequences must also be facilitated.
- (e) Exchange of information between laboratories through periodic publication of bulletins is essential.
- (f) Microbe-based research is better and easier even for studies involving photosynthesis (Cyanobacteria).
- (g) There is an urgent need for nationally coordinated programmes for research on new DNA vector systems for plants including cereals.
- (h) Research must be intensified on the genetics of photorespiration. Using rDNA technology, RuDP

carboxylase gene must be studied especially with regard to its oxygenase function.

- (i) Eucaryotic genome system must be better understood through mapping and making genomic libraries.

2. Agriculture:

- (a) Property rights and patents will have to be seriously studied. This constraint may seriously affect the flow of information and materials from outside the country in future.
- (b) Regeneration from protoplasts especially in cereals is difficult. This should be taken up on a priority basis.
- (c) Microinjection of DNA directly into the nucleus of plant cells derived from tissue cultures and selective transfer of organelles via protoplast-cytoplasm fusion (for cytoplasmic male-sterility, herbicide resistance etc.) must be given priority.
- (d) Research should be concentrated on the testing of tissue culture-propagated plants in the field conditions.
- (e) Cloning for disease resistance, pest resistance as well as dwarf genes in wheat and rice should be taken up. The crop plants that are to be studied must be specifically identified and that R & D should be initiated on a cooperative inter-institutional basis.
- (f) Somaclonal variation is likely to contribute to crop improvement efforts significantly in the immediate future. Experimental assessment of this possibility is an urgent necessity.
- (g) Grain legumes such as pea are genetically well worked out but they are difficult to regenerate. Efforts should be made to intensify research in this area even with reference to grain pulses.
- (h) Bamboos are economically very important for the country. They also represent rapidly growing biomass. Tissue culture of somaclonal variants (e.g. drought resistance, salt tolerance) is urgently needed.
- (i) There is an urgent need to bridge the gap between lab and field scientist. Frequent and close interaction with each other should be organized.

3. Medicine and Health Care:

- (a) There is an urgent need for understanding of the biology and chemistry of the disease process itself (including genetics of the pathogens/parasites/vectors).

- (b) Basic knowledge on the infectious diseases (e.g. TB, Leprosy) is not available as of now. Hence studies be initiated.

- (c) Study of T-cell clones in culture for identifying useful antigens and immunomodulators has to be taken up.

- (d) Production of vaccines is another priority area.

- (e) Disease diagnosis through enzyme/protein engineering has to be taken up.

- (f) Establishment of Hybridoma Laboratories for diagnostic, drug delivery and basic research purposes must be given high priority.

4. Veterinary Sciences:

- (a) Production and increase per unit of animal productivity must receive immediate attention through newer techniques such as super ovulation, embryo culture etc.

- (b) An urgent need is felt for very basic and fundamental research on buffaloes, particularly with reference to endocrinology and reproduction.

- (c) Production of cost-effective vaccines through rDNA technology and development of immunodiagnostics should be of high priority.

- (d) Investigation of the total genome of pathogenic bacteria should be undertaken.

- (e) Manpower training in the field is of utmost importance.

5. Industry and Bioenergy:

- (a) Derivation of *Saccharomyces cerevisiae* with high ethanol tolerance, high osmotolerance, and high temperature tolerance for bioethanol production is urgently needed.

- (b) Protoplast fusion has to be intensively investigated.

- (c) Blue green algae have to be studied in depth (for nitrogen fixation.)

- (d) Multicentric network like the Centre for Biochemicals (CSIR) should be set up for more effective research. In addition to reagents and biochemicals, facilities to train personnel in peptide and nucleic acid synthesis must be set up.

- (e) More research is required on biologically active peptides as these can readily be produced through genetic engineering or other chemical methods.

6. Manpower Training:

- (a) Biochemicals and other reagents be procured manufactured. DST can play a role in this.

- (b) Adequate manpower training is essential through postgraduate education in Universities in the area of molecular biology. The M.Sc. Course be of 3-year duration with enough motivation provided in terms of job opportunities and salaries.
- (c) Sufficient grants should be provided for the purchase, maintenance and repair of instruments so that students could derive the maximum benefit.
- (d) Specialization in various areas of biotechnology should start at M.Sc. level especially after the initial period when non-biology entrants would be given biology courses and biology entrants are given courses such as mathematics, biophysics etc.
- (e) Training in modern informatics must also form part of the curriculum.
- (f) Emphasis on having adequate laboratory training is essential.
- (g) Wherever relevant, courses in biochemical engineering must be included. Suitable facilities for these may also be provided.

7. General:

A high level National Committee should be constituted to periodically review the priorities since priorities shift and this is a dynamic process.

PLATINUM JUBILEE CELEBRATIONS, INDIAN INSTITUTE OF SCIENCE, DEPARTMENT OF ORGANIC CHEMISTRY, BANGALORE SYMPOSIUM ON 'RECENT TRENDS IN ORGANIC CHEMISTRY'

The Department of Organic Chemistry at the Indian Institute of Science is one of the oldest departments of its kind in the country. Eversince its inception, the Department played continuously, an important role in the development of teaching and research in organic chemistry and also helped the growth of chemical industry.

The fundamental investigations carried out in the Department very much benefitted the growth of essential oil industry in general and sandalwood and turpentine oils in particular. The first stereospecific total syntheses of a number of steroid hormones were achieved in this Department. The 19-nor-steroids, which are synthetic steroid hormones, are used as male and female oral contraceptives. In tune with the Family Planning Programme of the Government of India, the Department has done considerable amount of basic research in the development of processes for the synthetic sex hormones and 19-nor-steroids. Several industries in our country have adapted these processes for the manufacture of these important drugs.

Besides this, significant contributions have been made in the areas of natural products chemistry, NMR spectra, physical organic chemistry, reaction mechanisms, x-ray crystallography photochemistry and bio-organic chemistry. New areas of research in theoretical organic chemistry, and organometallic chemistry are projected in the near future.

The Department of Organic Chemistry has good facilities for postgraduate research and compares well with any other laboratory abroad. Talented students

from all over India join the Department for pre-doctoral and postdoctoral research work. The Department has been receiving generous financial support from DST, DAE, CSIR, ICMR and UGC. Several sponsored programmes are supported by industries. About 1000 research papers were published and 200 students obtained their Ph.D. degree from the Department since its inception. Because of its reputation for high quality research, the UGC has recognised the Department for special assistance and consist of programmes under which substantial funds have been received for equipment and infrastructural support.

At this juncture of the completion of seventy five years by the Institute, the organisation of the symposium on "Recent Trends in Organic Chemistry" in July 1984 was most appropriate and was in line with the avowed objective of the Department to foster research culture by bringing together some of the eminent organic chemists of the country and abroad in our relentless effort in updating our skills and techniques.

The symposium was supported by the UGC, DST, CSIR and DAE besides chemical industries. About 100 scientists from universities, research institutions and industrial laboratories participated in the symposium and the deliberations of the seminar covered (i) organic synthesis (ii) nature products (iii) heterocyclic chemistry (iv) physical organic chemistry (v) theoretical chemistry (vi) organometallic chemistry (vii) x-ray crystallography and (viii) NMR

spectroscopy.

The symposium was inaugurated by Professor T. R. Govindachari, Director, Amrutanjan Ltd., Madras, who highlighted the importance of natural product chemistry. Professor Arthur J. Birch, FAA, FRS, President, Australian Academy of Sciences, Canberra, Australia, in his key note address on "Fifty years of Science" gave a personal account of his experiences and thrills in research that led to the discovery of 'Birch Reduction', polyketide hypothesis and finally to the new approach to organic synthesis using "Inorganic Enzymes". He stressed the importance of basic research which is essential for tackling applied problems and advised the young scientists to look for challenging problems as luck favours only the mind that is prepared to receive it. Professor D. K. Banerjee, formerly Director, Indian Institute of Science, released the souvenir. This was followed by invited lectures which were spread over eleven scientific sessions.

Several papers dealing with the regio- and stereospecific synthesis of biologically active molecules which include guggultetrols, antitumour antibiotics, insect pheromones, terpenoids, pseudomonic acids and novel compounds from Indian plants were presented. A new carbon-carbon bond formation using oxo-ketene dithioacetals and the importance of dimethyl boron group in organic synthesis have been reported.

In view of Professor M. V. Bhatt's retirement from

the service of the Institute on 31st July 1984, one forenoon session was devoted to Physical Organic Chemistry as a token of the Department's appreciation of his contributions. Several interesting topics like organoboranes, neighbouring group effects, mechanism of oxidations, application of the concept of overleaf matching, stereochemistry of reduction of cyclic ketones, dynamic nuclear polarisation and free-radical solute solvent interactions were covered.

In the area of bioorganic chemistry, topics of current interest, such as remote functionalisation *via* carbenes, peptides as bioorganic models, biosynthesis of medically important compounds and biomimetic photochemical transformations of natural compounds, were discussed.

In addition to the above mentioned topics, interesting papers on solid state reactions and crystallography were presented.

The symposium brought all the leading organic chemists of the country under one roof to identify and discuss research projects in frontier areas in organic chemistry.

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G. S. R. SUBBA RAO

NEWS

BORLAUG AWARD

Dr V. L. Chopra, Professor and Head of the Division of Genetics, Indian Agricultural Research Institute, New Delhi, has been awarded the Borlaug award for his outstanding contributions in agriculture.

The Award consists of a gold medal and a cash prize of Rs. 10,000. The Award was instituted in 1971 in honour of the Nobel Laureate Prof. Norman Borlaug, to honour Indian Agricultural scientists.

Prof. Chopra is well known for his original contri-

butions on the genetics of micro-organisms and the mechanism of rust-resistance in wheat. He has developed concepts and generated supporting data to show that it is possible to incorporate horizontal type of rust resistance using the conventional recombination breeding method. This has opened up avenue of breeding for horizontal resistance, which eliminates the disease and imparts stability to production.