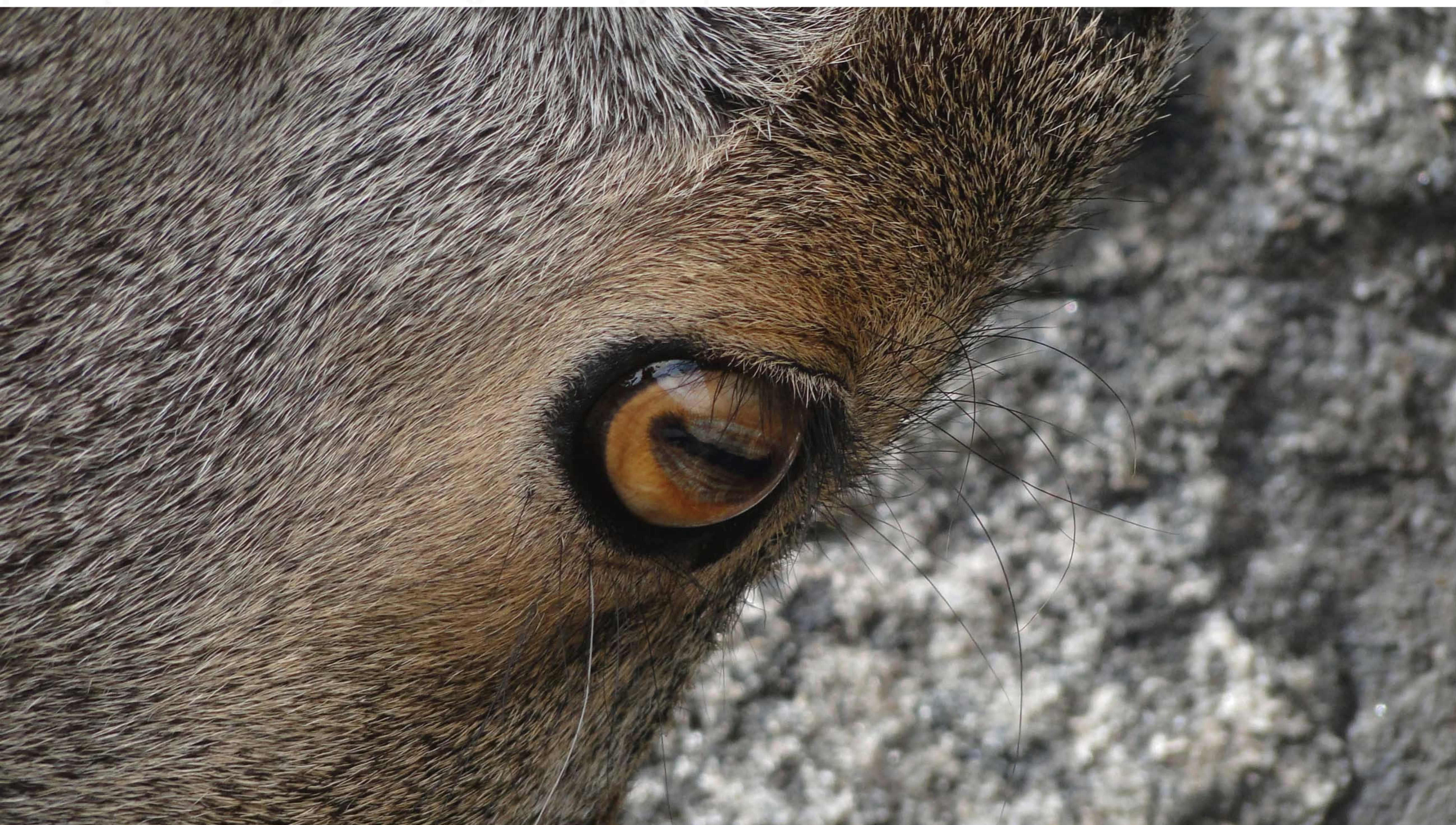
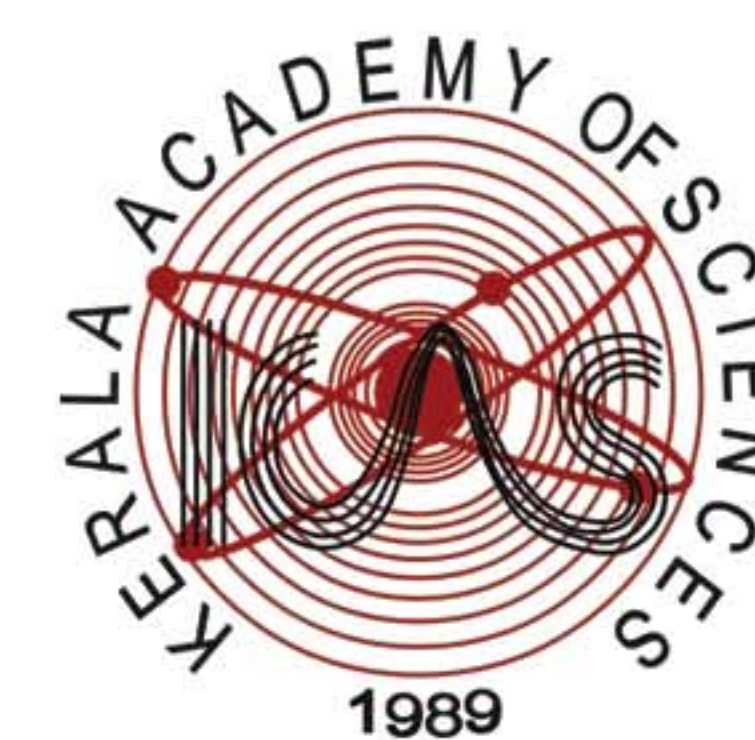


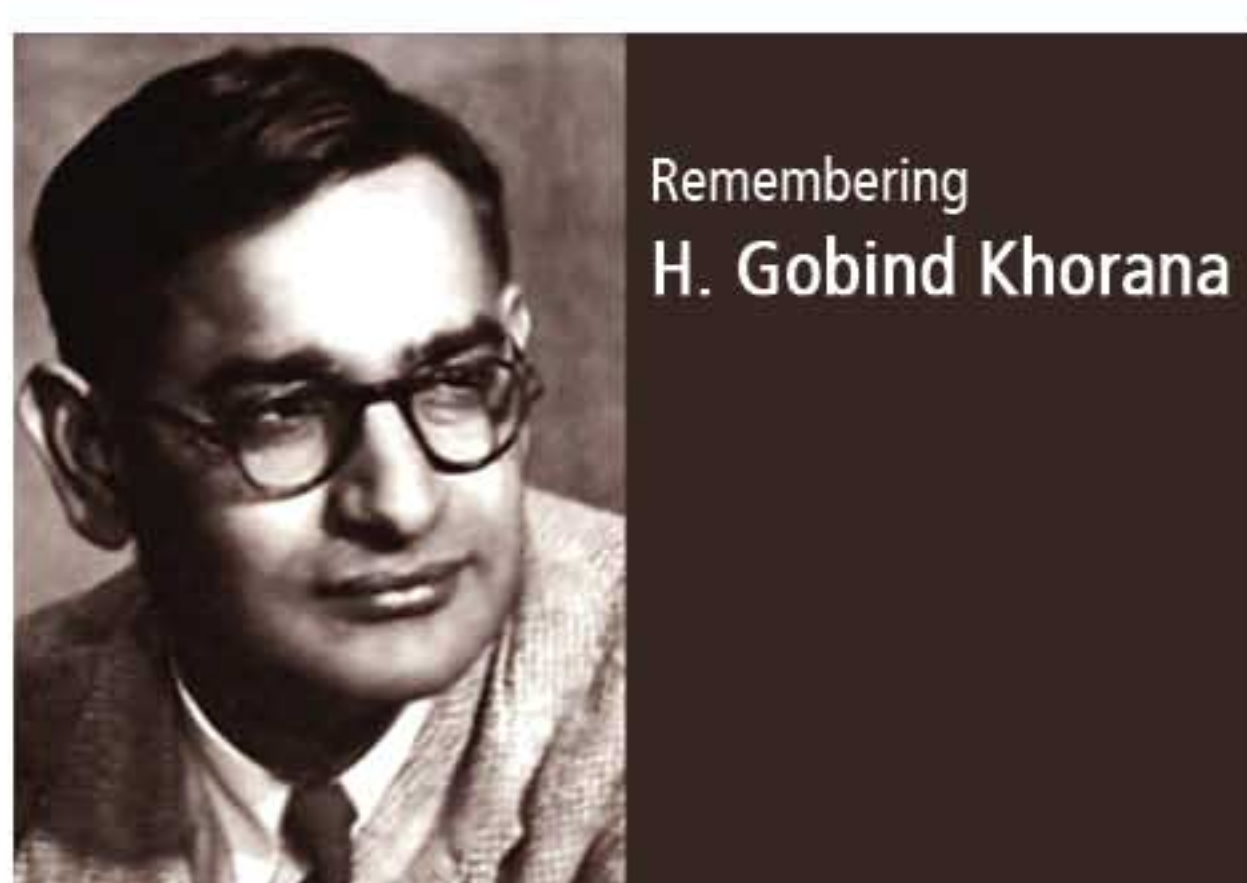
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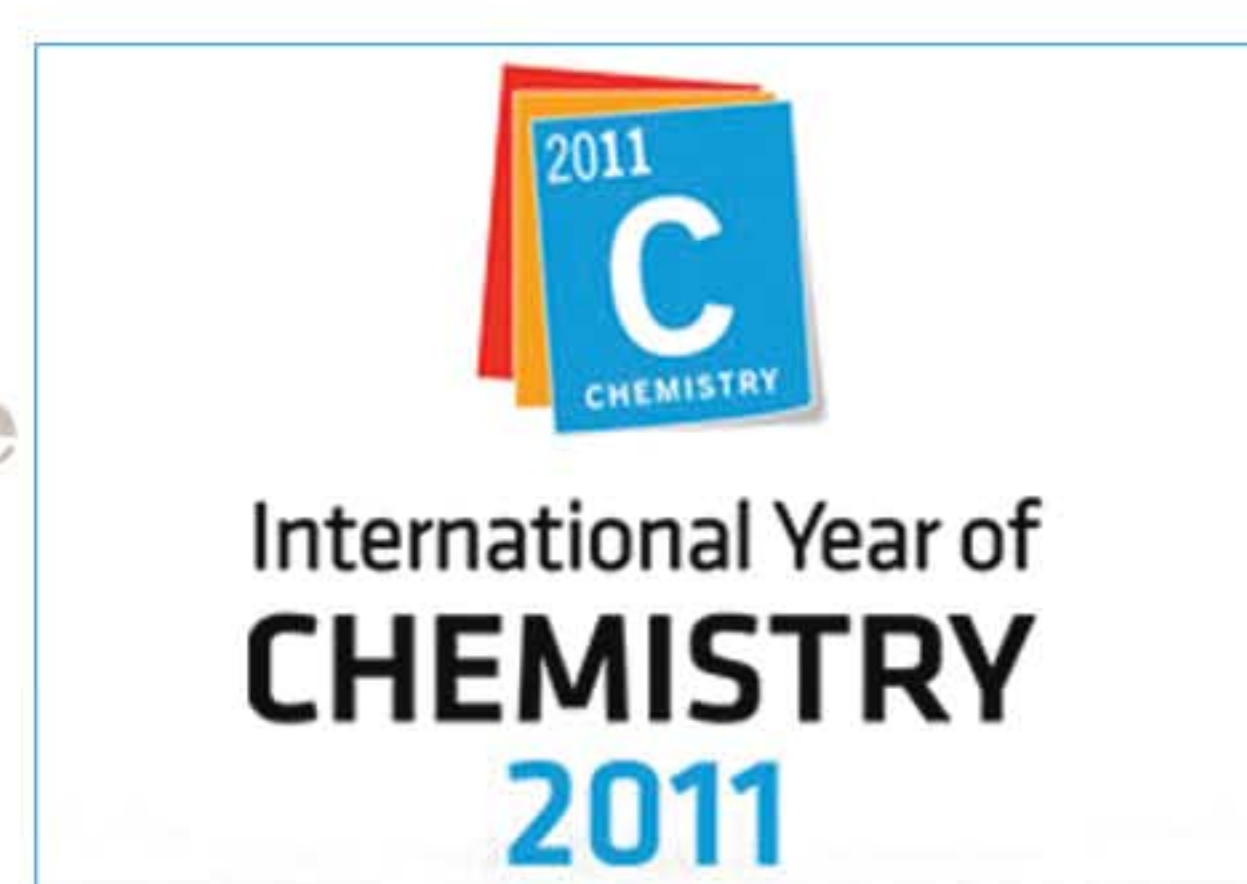


Nilgiri tahr (Nilgiritragus hylocrius)

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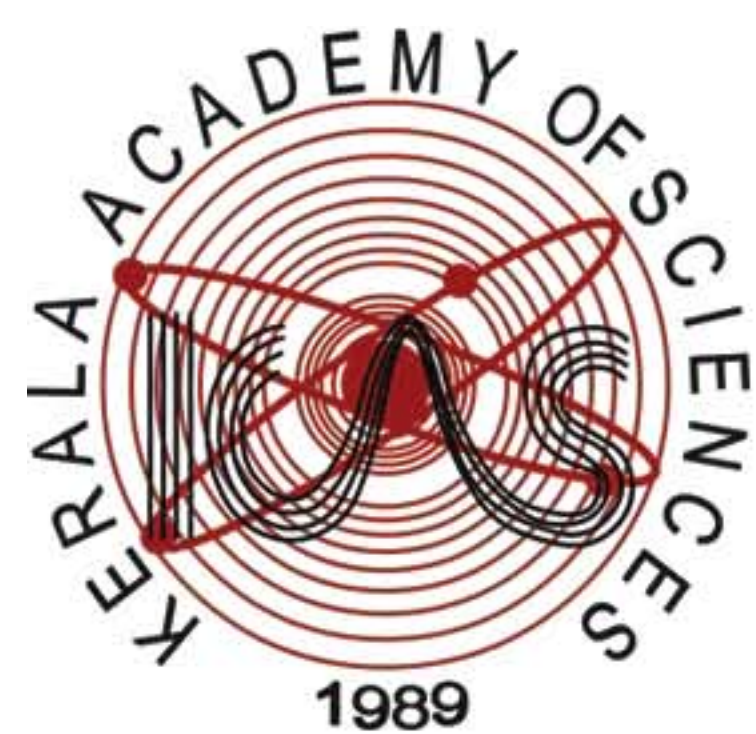


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news and views of

Kerala Academy of Sciences
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Kerala Academy of Sciences (KAS) is a premier professional body of scientists and academicians, instituted in 1989, for the promotion of teaching and research in various branches of science, for conducting seminars and workshops and creating multidisciplinary integrated approach towards popularization of science in the state of Kerala. The Academy derives its memberships from the cream of science professionals, technologists, physicians and academicians in the State. Dr P K Iyengar, Dr K Kasturirangan, Dr M S Swaminathan, Dr M S Valiathan, Dr Varghese Kurien and Dr G Madhavan Nair have been honored with honorary fellowships KAS has thirty one Fellows and two hundred and thirty life members.

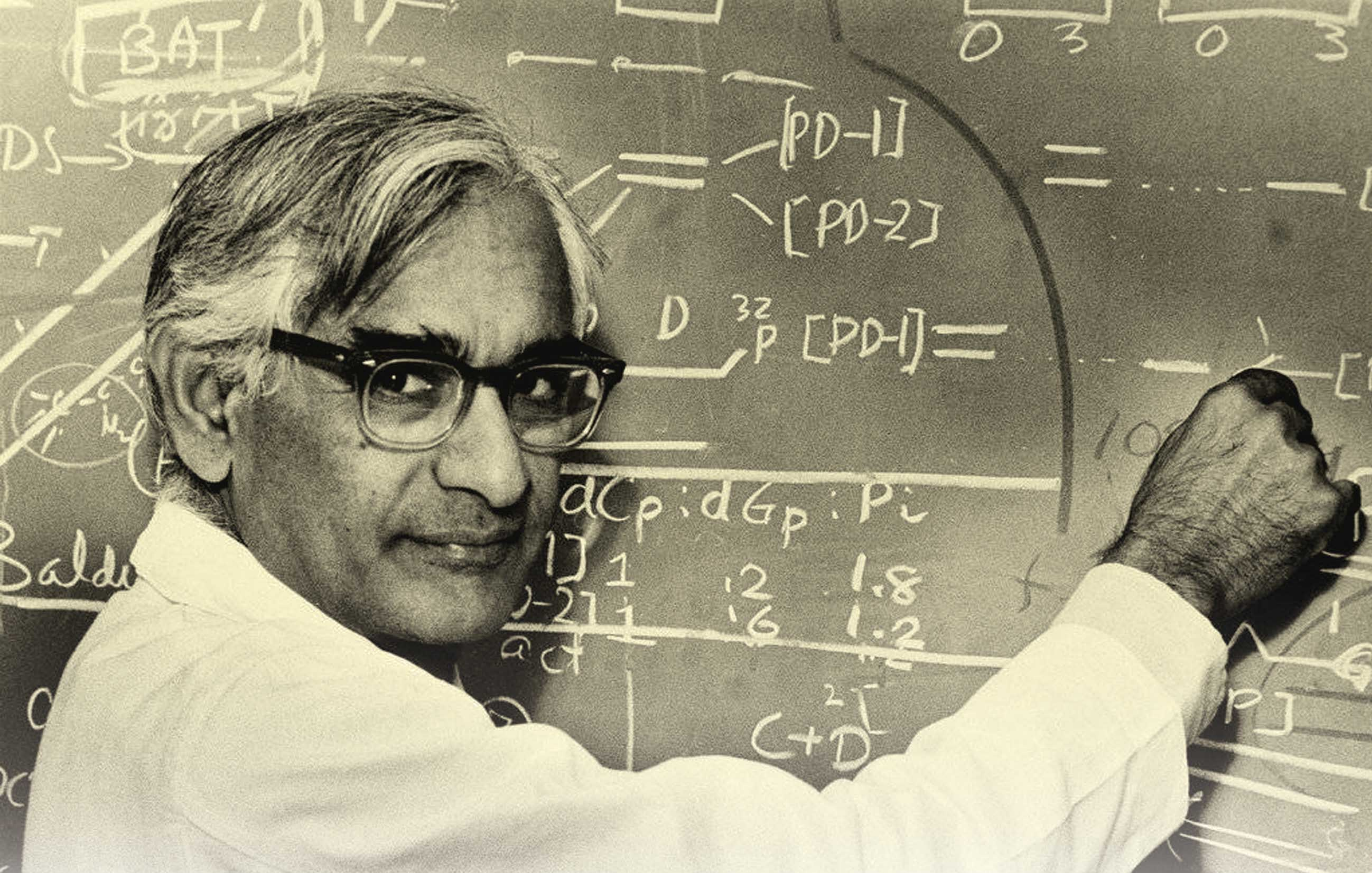
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Khorana Young Scientist Programme (KYSP)

Kerala Academy of Sciences, with its stated objective of “creating an integrated approach towards popularization of science in the state of Kerala”, is launching Khorana Young Scientist Programme (KYSP), to continue the popularization of the thematic focus of IYC-2011 among students by broadening the theme to include science as a whole as “Science; our life, our future” and with emphasis on chemical sciences. The proposal, in general, aims at enhancing the awareness and appreciation of science as a career among students and motivate them to opt for a career in science.

The KYSP was launched on 30th December 2011 with the 1st set of Khorana Lectures of the series, in which eminent scientists of Kerala addressed a selected audience of students.

The components of KYSP are:

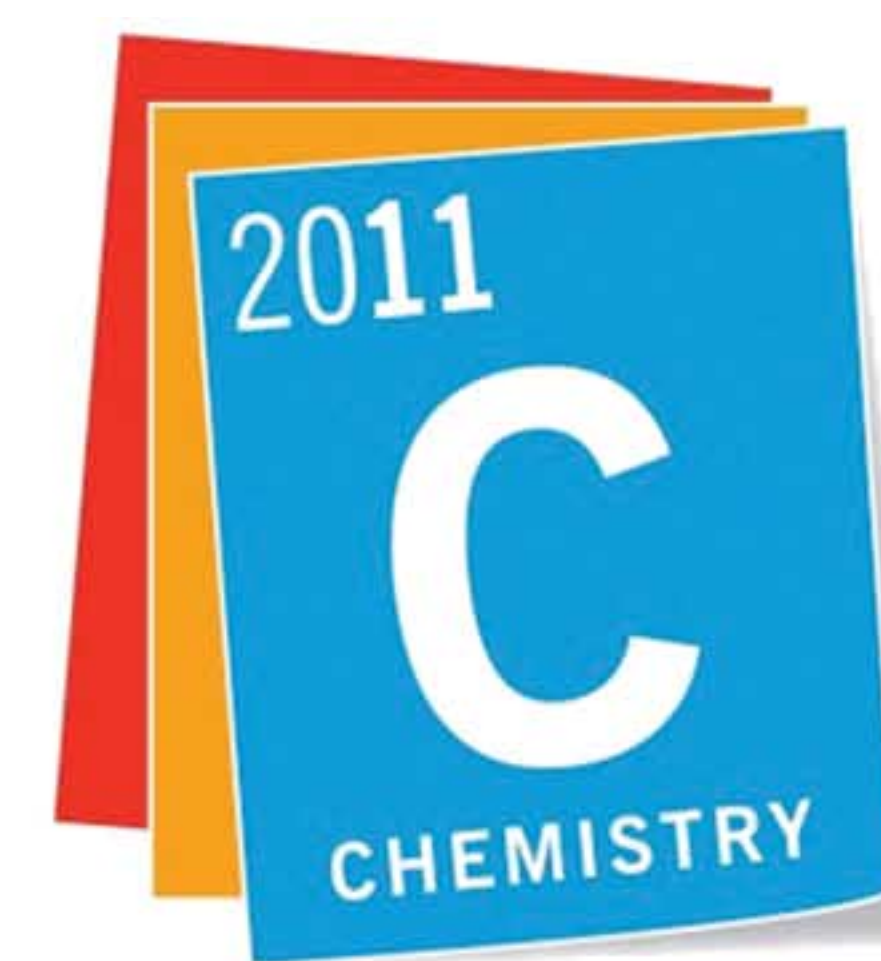
- i. Khorana Lecture Series (KLS)
- ii. Khorana Quiz Competition (KQC)
- iii. Khorana Young Scientist Attachment Programme (KYSAP)

The Khorana Lecture Series is designed to provide students an insight into the cutting edge areas in Science and Technology. A series of lectures will be conducted during Jan 2012 – Nov 2012 at different locations in Kerala. The venue will be a research institution of repute or a centre of higher education in the different districts of Kerala.

This important event is partnered with *Kerala State Council for Science, Technology and Environment* (KSCSTE) with financial support under its science popularization programme.

International year of Chemistry (IYC – 2011)

International Year of Chemistry 2011 (IYC 2011) with its thematic focus of “Chemistry; our life, our future”, has been a worldwide celebration of the achievements of chemistry and its contributions to the well-being of humankind. The year has coincided with the 100th anniversary of the Nobel Prize awarded to Madame Marie Curie - an opportunity to celebrate the contributions of women to science. The year has also been the 100th anniversary of the founding of the International Association of Chemical Societies.



International Year of
CHEMISTRY



Honoring
Senior Chemist



Senior Veterans in Chemistry Honoured

Prof. Dr. C G R Nair, Prof. Dr. K T Augusti, Dr. A D Damodaran, Dr. C S P Iyer, Prof. Dr. K N Ninan, Dr. Radha Das, Dr. Vijay Nair, Prof. Dr. Joseph Francis, Dr. C K S Pillai, Prof. Dr. M S Gopinathan, Prof. Dr. C P Aravindakshan, Dr. V George.

Scientists felicitated for their recent achievements

Prof. Dr. VN Rajasekharan Pillai, Ex.Vice President, KSCSTE, Dr. R Prakashkumar, Fellow of The Linnaean Society London (FLS), Dr. Suresh Das, Fellow of The National Academy of Sciences (FNASc.), Dr. A Ajayaghosh, Fellow of The National Academy of Sciences (FNASc.), Dr. C. Gauri, Scientist, VSSC. Prof. Dr. A Jayakrishnan, Vice Chancellor, UoK, Dr. Gopidas, Fellow of the Indian Academy of Sciences (FASc.), Dr. D Ramaiah, Fellow of the Indian Academy of Sciences (FASc.),

Celebrating International Year of Chemistry

*Inauguration of Function in Shasthra Bhavan, December 30, 2011.
A D Damodaran PhD (Leeds), alathurdamodaran@gmail.com*

I passed out the then three-year BSc (Hons) in chemistry from Maharaja's College, Ernakulam, in 1957 and joined the then Atomic Energy Establishment, Trombay (AEED) in its First Batch Training School. After successful completion of the training period, I was posted to work on a section dealing with Preparation of Pure Materials (the first time I heard of such description of an R&D activity in our country!), where me and a junior colleague together developed a method for preparing Kg quantities of pure individual rare earths by adopting the then not much known ion exchange displacement chromatography using alkaline EDTA as the eluant and -

developed most elegantly in Iowa State University by the veteran 'chemist' FH Spedding. Based on this meaningful work I was deputed to University of Leeds to work under Prof Harry Irving (a veteran in liquid-liquid extraction and also co-ordination chemistry of transition metal complexes). Importantly enough he asked me to work on Liquid Anion Exchangers; initially we developed some unique methods in analyzing anions in very small concentrations, but otherwise my work was primarily on understanding the extraction mechanisms of this 'doubly working' compound.

Returning back to Trombay, I was mandated to develop a suitable technology for separating and purifying niobium and tantalum from the indigenous columbite-tantalite mineral and it was done through a neat multi-stage LLE technology using what are called Mixer-Settlers. And then onwards and in due course I concurrently got metamorphosed to a specialist in producing materials (metals, chemicals, P/M products and so on with only less or not more than parts per million levels of 'active' impurities therein through a Division in the Nuclear Fuels Complex and which I had the privilege to co-ordinate from its inception as its head. As one in charge of a technologically complex multidisciplinary project, I was slowly and steadily compelled to change my professional scope and this eventually transformed me to a materials processing specialist. In a way, as I often wondered, am I was turning more into the role of the proverbial Alice in Wonderland, or alternately a Jack of all trades and Master of none or something else towards an interdisciplinary research mode?

On coming to Trivandrum in the eighties and when I had a brief stay in VSSC in preparing a report on the then rather little-known Micro Gravity Materials Research as desired by its director Dr Vasant Govariker and then coming over to the CSIR institute here, my challenges were further heightened, not to minimize my earlier trepidation while working for KSEDC enabling me to revise my whole concept and rigour in industrial R&D and T/T efforts in materials technology. With the help and guidance of a number of my friends there in VSSC I learned for the first time what sounding rockets are with a coasting period up to even 8-10 minutes in microgravity and then the in-situ studies on a variety of materials study and processing, I was stretching myself really too much! In the CSIR institute, a truly multidisciplinary R&D centre in also subjects to which I had no previous exposure at all, I almost met my nadir! There also in line with my ambition in a 'more than participatory' role even as a Director, I chose to at least understand them and meaningfully involve myself in their R&D problems through the help and even also guidance of my younger colleagues and my overall rating among them over the years turned out to be not too discouraging! My experience in the State S&T set-up also was a great seat of learning in S & T management from a ministerial-cum-secretariat point of view, as far as I was concerned. In an overall sense I venture to say that all through my four decades long active career, I have been going

through a continuous process of change and this has continued since then to the present as well, nowadays working on 'patents & patenting practices' integral with national S&T policies for national development through modern S&T particularly through our own experiences where we made great advances along with others where we are yet to make any meaningful mark. Many a time I have wondered how even to a limited extent I could go through such changes, though of course with tremendous additional inputs in physics, chemical process engineering, ceramic oxides systems, metals and alloys and so on. At some stage I was much drawn to the great stanza in Poonthaanam's Jnaanappaana,

*“Vidyakodariyendathariyaathe,
Vidwaanennu natikkunnithu chilar,
Kunkumaththinte gandhamariyaathe,
Kunlumam chumakkumpole garddabham!”*

Roughly and quite crudely translated into prose, “There are many who know little of what vidya truly meant and yet posed themselves as vidwaans, As much as the donkey carried saffron flowers, without feeling its fragrance”. I asked myself, “Am I missing something in my professional career?” That was around that time that I saw an article “Opportunities in Chemistry” in CHEMTECH and then also the celebrated George C. Peimantal report on chemistry in which he had described how and how Chemistry is a “Central Science”. It struck me immensely, its true message on the essence of chemical science as itself being a veritable vehicle for interdisciplinary research in search of 'an idea, a product or a service', to quote a celebrated science policy analyst.

It was sometime then in 1996 that I was invited by the Department of Chemistry in St. Berchmann's College, Changanacheery, to deliver the Memorial Lecture in honour of late Professors T.P. Chacko, Chacko Ramacha and James Valiaparambil. There I spoke on “Chemistry, a Central Science” making use of examples from my own professional career and championed the need for making our teachers in the subject aware of this crucial aspect and steadily also to upgrade the syllabus accordingly to enable our students to equip themselves wholeheartedly to face the new challenges emerging in chemistry in line with those in advanced countries. I got another opportunity to deliver an invited lecture Always in its famous educational institution, U.C. College. There again I described the

process of Liquid Liquid Extraction (with which, I repeat, I had developed the best method to separate and purify niobium and tantalum from indigenous columbite-tantalite ore and which are very crucial refractory metals of critical use including in nuclear fuel fabrication) which, as an inimitable separation technology, eventually became a very important unit operation in chemical engineering, without which many of the very well known S&T Revolutions would not have taken place including the apparently very simple colour TV and how 'chemists' played their crucial role in them – the unique role chemistry as a Central Science. Ever since then I have been trying to spread this crucial message in many platforms; and yet, I am afraid, I have remained by and large a minority member if not even a loner!

This year we celebrate the International Year of Chemistry in honour of late Madame Curie, marking the 100th anniversary of Madame Marie Curie's Nobel Prize. She was certainly a chemist by training; and through her work on pitchblende and discovery of radium, she rose to great heights as a mineral separation expert, a full radiochemist and ultimately a Nobel grade interdisciplinary nuclear scientist. That is the message which I get when I stand here in front of you to inaugurate this august function.

I like always to quote my most favoured scientist of all times Louis Pasteur in this context. To quote, "No, a thousand times no; there does not exist a category of science to which one can give the name applied science. There are science and applications of science, bound together as the fruit to the tree which bears it". Chemistry is the Mother Science through which we have been able to develop new materials, new processes, new chemicals per se including drugs, new breeds of plants and animal species and as expressed by the this year's Nobel Foundation itself new alloys through awarding its prize for Chemistry this year to one who invented certain aluminium alloys with quasi-crystalline structures, in turn considerably augmenting their properties many times! There are already many patents on this new material. Are we not aware that the very nuclear fission process itself was discovered by the team consisting of the German radiochemist Hann and analytical chemist Strassman, of course, under the inspiration and leadership of Leise Meitner, through radiochemical separation through an ion-exchanger? But for the observation of a chemist Warf that uranyl nitrate is soluble in ether, the Manhattan

Team would not have been able at that stage to produce nuclear pure uranyl nitrate so urgently. But for the chemist D F Peppard and his team in Argonne National Laboratory in developing new phosphorous based reagents for liquid-liquid extraction separation of rare earths, we would not have seen colour TV or for that matter also optical fibre for communication. But for new trace analytical techniques, industrial pollution monitoring would not have been possible as tested to be below the permitted levels. In our own country, it was PC Ray who championed the cause of generic drugs with indigenous S&T through his Bengal Chemicals and Pharmaceuticals – truly a Heritage Industry to be preserved! How do we forget the remarks of none other than the Nobel Laureate Prof Watson in his lecture sometime ago in SCTIMST "If one of us was a chemist, we would have discovered the Double Helix structure at least two years ago!"

The most challenging issue before all of us academics is then this: How do we review and reorganize the teaching of chemistry in our teaching and research institutions? How do we enable our students to get themselves equipped on those lines? Many years ago in 1973 Prof CNR Rao wrote the book "University General Education, An Introduction to Chemical Science" prepared under the sponsorship of the National Council for Science Education, New Delhi. Prof M. V. George was a contributor to this historic task. In the Preface, he writes, "Chemistry has seen its greatest information explosion in the last decade and college curricula are becoming increasingly inadequate to cope with the flood of new ideas and information. There appears to be general agreement that courses in chemistry should be restructured in such a way as to present unifying principles of chemistry to beginners. The traditional sub-structure of physical, organic, inorganic and analytical chemistry has origins in the main activities of chemists in the past, but still continues to determine how chemistry is taught. However, it does not accurately reflect or encompass what is actually done in chemistry. Chemistry today is dynamic in scope and chemists find themselves working in areas currently described as interfaces like molecular biology or solid state sciences. These interfaces progressively get absorbed and become integral parts of chemistry. Chemistry has truly developed into chemical science and people trained as chemists are making significant contributions in areas which overlap strongly with physics, biology as well as earth and material sciences. As such any organizational scheme to provide unified instruction in chemistry

should recognize the strong interaction between the various branches of chemistry and the increasing exchange of ideas between chemistry and other sciences. A syncretic course in general chemistry given during a student's first year in college would go a long way in providing the right perspective of chemistry". These requirements in chemistry teaching were projected by Prof Rao four decades ago; and undoubtedly "we have miles to go" and better late than never, we have to assess whether we in Kerala has ever used such requirements seriously in our program. Let me conclude by projecting before you on this august occasion the excellent monograph entitled "Chemistry Today, A Book to Celebrate the International Year of Chemistry" again by none other than our true leader in the field Pro C. N. R. Rao. It is indeed a very inspiring document, more for those who have followed the history of chemistry through the decades. I only pray for his continued health and vitality, ably assisted also by his well-endowed wife Mrs Indumati Rao. He keeps the wick glowing, but then we need at least another thousand more of his ilk. This cannot obviously be achieved 'madly or badly', to use the words of late Jawaharlal Nehru, but only through incessant striving of committed chemists through our schools, colleges, universities and research institutions. Advanced countries do this very systematically to the extent of senior professors giving initiation lectures in the beginning of the semester for fresh entrants at even undergraduate level; we too must practice our own strategies in this direction. I am sure that we can do it too and perhaps the KAS could play a meaningful role in such noble tasks as well.

Let me summarize my points in the briefest and most explicit manner by repeating the following instance of what Prof Watson had said in his celebrated lecture in the SCTIMST Conference hall a few years ago. He said, "At least if one of us was a chemist, we would have discovered the double helix structure at least two years ago!" Late Prof Asundi, a doyen spectroscopist from BHU used to say, "Spectroscopy is the mother of physics; but then when they grow up they invariably forget the mother!" That shall not and will never happen to chemistry as long as chemists continue to work on the celebrated Pasteur Dictum, discovering new science in chemistry and also new applications of chemistry in the cause of human life, nay, the very preservation of this planet itself as a habitable member of the vast cosmos. Let that be our trust with destiny when we celebrate the International Year of Chemistry.

With these words I inaugurate this function with great pride and privilege concurrently also expressing my grate appreciation and thanks to the organizers of this historic function and to give an opportunity to speak to this person who had retired from active professional life over one-and-half decades ago! I will always cherish this gesture.

Science Education, Research And Career In Kerala – *Assessment And Action Plan In Connection with the Formulation of 12th Five Year Plan of the KAS*

Executive Summary

The State of Kerala was the first state in India to realize the significance of promoting science and technology at the government level and the State has expended much funds in the development, promotion and support of scientific and technological activities in the state. Despite these efforts, a career in science figures holds no attraction for the youth of Kerala. This situation is tragic, especially in the light of the present view that the knowledge base of a nation is a better indicator of its economical robustness and potential for growth. Unless our brilliant youth opt for a career in science, further development of science in Kerala will be in jeopardy. At this juncture of formulating 12th Five-Year Plan (FYP) of the State of Kerala, the Kerala Academy of Sciences submits a set of recommendations and an action plan, as detailed in the following pages, to the Government of Kerala for attracting our youth to science.

Action Plan and Recommendations

The time is ripe for initiating action in order to bring Kerala to the forefront of science research as we have now earned much reputation with our capabilities in IT related areas.

A. Making science attractive as a career

Recommendation:

Institute handsome fellowships, research associateships and visiting fellowships, under the aegis of the new Higher Education Council or KSCSTE, starting at the integrated Master's and Doctoral level with a promise of employment.

B Improving science education:

Recommendations:

i. At secondary school level: Spruce up and strengthen the school science laboratories; set up of a vibrant culture of science clubs, provide opportunities for

exposure to the world of science using multimedia, establish linkages and twinning programs with research institutions and start orientation programs directed at science teachers; ii. At highersecondary school level: Strengthen science laboratory teaching at HSC level, extend the science-club culture to cover HSC level; iii. At college level: Nourish the college clusters, implement an Integrated M Sc program, improve capacity building of science teachers and encourage science communication and science journalism activities and iv. At research level: Facilitate visits of research scholars and supervisors centers of excellence permit porting of results of course work, credits earned, experiments done and even course attending.

C Promoting the link between science and the society Recommendation:

Highlight the potential of science for beneficial changes in the society through ground level units with science clubs as the basic organizational unit.

D. Improving science research

Recommendations

i. Establish a science research centre that would serve as a beacon of high quality international standard research in the state and ii. improve the research training by: identifying and nurturing university departments and institutions as centers of excellence, implementing sabbaticals, instituting an integrated Doctoral programme, strengthening interdisciplinary research, ensuring mobility of researchers, introducing flexibility in the research system, treating superannuated reputed senior faculty/research scientists as a resource and providing support for non-tenured, post-doctoral attachments.

E. Identifying thrust areas in science research in Kerala Recommendations:

Identify and develop a research base in thrust areas suited for Kerala and pinpoint emerging areas that are especially suited to the overall Kerala temperament, strength and our natural environment. [A list of such areas have been included below under the respective section]

F. Developing expertise in Kerala in emerging areas in science

Recommendation:

To develop the expertise in emerging areas, launch a research scientist program in cutting-edge and emerging areas of science in universities/research institutions in Kerala and tenured for five years with 100 such awards



with remuneration and grants and with special attention to lady scientists.

G. Resource mobilization to achieve the above goals Recommendation:

An endeavor of the scale, and time span, as envisioned here, requires a corpus fund at the government level in order to meet the expenses involved in improving science education, providing facilities for research, for popularization of science. The funds can be sourced from public, private, public-private-partnership (PPP) and philanthropic sectors. In the case of public sector, it is recommended that appropriate heads to be created in user and stake-holder departments of the state government and related public sectors ear-marking funds that would be utilized to achieve the above general goals. Such an arrangement would spread out the sourcing of funds across a larger number of public sector end users and would avoid the designation of a lump sum as a new item in the public Budget.