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Team CSIR

International Polar Year (IPY)

"Maintain Balance between Development and Ecology"

— Shri Somnath Chatterjee
Hon'ble Speaker, Lok Sabha

THE Lok Sabha Speaker Shri Somnath Chatterjee called for adopting a path that promotes development without hindering the delicate ecological balance. He was speaking at a function organized by the National Institute of Science Communication and Information Resources (NISCAIR), New Delhi, on 4 February 2009 to mark the International Polar Year. With the participation of thousands of scientists from more than 60 nations, the International Polar Year is the largest-ever international programme of scientific research focused on the Earth's Polar Regions.

Shri Somnath Chatterjee delivering his keynote address

The Speaker also released special issues of NISCAIR's publications *Indian Journal of Marine Sciences* and *Science Reporter* dealing with this very important subject that could cause widespread changes in the world climate in times to come.

Delivering his keynote address, Shri Somnath Chatterjee underlined the need to make the people aware that the changes beginning to be observed in the Polar Regions today will not remain confined to those regions alone. They will have their adverse effects on the whole ecosystem and necessarily on human life and society. There is indeed an urgent need to understand the vulnerability of the Polar Regions, which have a profound influence on the global environment, particularly on the weather and climate systems.

Shri Somnath Chatterjee said he was happy that CSIR and the Ministry of Earth Sciences have been collaborating with international scientific institutions to forge closer scientific links on this issue of grave concern to the world community. Referring to Shri Kapil Sibal, the Speaker said, "This Ministry and the CSIR are fortunate to have a Minister who has had first hand experience of the real situation in both Antarctica and the Arctic by his visits there and direct interaction with the scientists working in this crucial area."

Shri Somnath Chatterjee said that the Polar Regions are especially vulnerable to the phenomenon of global warming. As more greenhouse gases cause our planet to warm, some of the ice and snow in the Polar Regions melts, less of the solar radiation is reflected out to space, and more of it is absorbed by the Earth's surface and oceans. The added energy further warms the Polar Regions, causes more ice to melt and more warming. This vicious cycle will ultimately lead to rising sea levels and flooding of vast tracts of the Earth making large areas uninhabitable.

Earlier, in his welcome address, Shri Nikhilesh Jha, the then Joint Secretary, CSIR gave an account of the CSIR's strong contributions to polar studies. The National Institute of Oceanography (NIO), Goa, a constituent establishment of CSIR, was in the forefront in executing the first Indian scientific expedition to Antarctica. Dr S. Z. Quasim, the then Director, NIO, was the leader of this first Indian scientific expedition. The expedition had been launched on 6th Dec 1981 and the team reached Goa from Antarctica on 21st February 1982. The team consisted of 13 scientists and 8 were from the constituent establishments of CSIR.

The leader of the third expedition to Antarctica was Dr H.K. Gupta, former Director, National Geophysical Research Institute (NGRI), Hyderabad. Scientists from the constituent establishments of CSIR, viz., NIO, NPL and NGRI have been leaders of the team for nine scientific expeditions to Antarctica.

Shri Jha pointed out that scientists working in CSIR laboratories have published more than 120 research papers in SCI journals on the biodiversity of flora and fauna, geology and geophysical aspects, atmospheric sciences and chemical characteristics of marine algae of Antarctica.

The Centre for Cellular and Molecular Biology (CCMB), another institute of CSIR, owns 12.5% of the new species identified by the global scientific community in Antarctica. The National Botanical Research Institute (NBRI), yet another institute of CSIR, owns 12 new species of lichen from the McLeod Island, Antarctica. The National Physical Laboratory (NPL) has been planning to set up a fully operational multi-instrument ionospheric real-time monitoring facility both at Arctic and Antarctica and to run the facility for a minimum of 11 years. The National Geophysical Research Institute (NGRI) has achieved a major global role in maintenance and improvement of a Global Reference Frame.

In fact, scientists working in CSIR laboratories have been associated with all the twenty-eight Indian scientific expeditions to Antarctica. In this context, *Contributions of CSIR to Antarctica Research*, a comprehensive document containing collection of reprints of the work done by CSIR scientists on Antarctica, was brought out by CSIR during the year 2006. The compendium has 116 papers published in SCI journals.

Release of special issues of *Indian Journal of Marine Sciences (left)* and *Science Reporter*

Indian contributions to the cause of polar research were further highlighted in an inspiring presentation by Dr Rasik Ravindra, Director, National Centre for Antarctic and Ocean Research, Goa. He said that the Indian Antarctic Programme began way back in December 1981 when the first Indian expedition was flagged off from Goa. Subsequently, annual Antarctic expeditions are being sent under the aegis of the Department of Ocean Development/National Centre for Antarctic and Ocean Research.

To date, 27 such expeditions have been undertaken, including one to the Weddell Sea and another one to the Southern Ocean for krill exploration. India has two permanent stations in the Antarctica and now one in the Arctic, said Dr Ravindra. Another one is soon coming up in the Antarctic. He said that by virtue of India's sustained interest and demonstrative capabilities in polar science, our country has achieved several milestones.

India was admitted to the Antarctic Treaty on 19 August 1983 and soon thereafter obtained Consultative Status on 12 September 1983. India was admitted as a member of the Scientific Committee on Antarctic Research (SCAR) on 1 October 1984 and became a member of Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) in 1986. India also ratified the Environment Protocol to the Antarctic Treaty in 1997, thus upholding its commitment to preserve the pristine continent.

During the function, the Hon'ble Speaker of the Lok Sabha Shri Somnath Chatterjee also launched a project entitled, "Development of Database for Climate Impact Studies". The project has been initiated by NISCAIR and will be executed in collaboration with the School of Environmental Sciences and School of Social Sciences of the Jawaharlal Nehru University.

Prof. V.K. Jain, Dean of Students, JNU, giving a glimpse into the objectives of the project said that Asia will be particularly vulnerable to climate change followed by sea level rise, especially major population centres at low elevations, such as Mumbai in India; Shanghai in China; Jakarta in Indonesia; Tokyo in Japan and Dhaka in Bangladesh to name a few.

The basic objectives of the project, therefore, are to observe and analyze the temporal and spatial changes in rainfall, temperature, evaporation and groundwater-quantity and quality in the Lakshadweep islands; develop a web-enabled database based on data of observed and published documents about changes in natural resources and socio-economic variables due to climate change; develop a framework and decision support tool to assess the climate change impacts on natural resources and socio-economic variables and to formulate a methodology for developing capacity for the proper adaptation and mitigation due to climate change.

Seen with Shri Somnath Chatterjee, Shri Nikhilesh Jha and Shri Pradip Banerji, are: Dr Rasik Ravindra, Director, National Centre for Antarctic and Ocean Research, Goa; Dr M.R. Ramesh Kumar, Scientist, National Institute of Oceanography, Goa; Dr S.V. Ramachandra Rao, Scientist, National Geophysical Research Institute, Hyderabad; and Dr A. Sengupta, Dr A.K. Hanjura, Dr S.D. Sharma, Dr S.L. Jain, Dr H.N. Dutta and Dr B.C. Arya, all Scientists, National Physical Laboratory, New Delhi. These nine scientists are among those who have been member/leader of the Indian expeditions to Polar Regions and were felicitated with mementoes during the present function

India partners with EU to prevent India's Traditional Medicinal Knowledge from Biopiracy

India through an Access Agreement signed on 7 February 2009 at Nirman Bhawan, New Delhi, with the European Patent Office, has established a mechanism to protect India's traditional medicinal knowledge from biopiracy. The maiden Indian effort in creating the Traditional Knowledge Digital Library (TKDL) database would now be available to the Patent Examiners at European Patent Office (EPO — It has 34 member states) for establishing *prior art*, in case of patent applications based on Indian systems of medicine.

This first such agreement would provide cover against infringement of country's rich traditional medicinal heritage having huge economic potential, of the kind that was witnessed during the last decade, e.g. grant of wrong patents on wound healing properties of turmeric (1995) at the United States Patent & Trade Mark Office (USPTO) and on antifungal properties of Neem granted at European Patent Office (EPO).

The grant of these patents in United States and Europe were the cause of great national distress, since every Indian felt that the knowledge that belonged to India was wrongfully taken away from India. Further, the patents would have conferred exclusive rights on the use of technology to the applicant of the patent in the country in which it has been granted.

The genesis of this maiden Indian effort dates back to the year 2000, when an interdisciplinary Task Force of experts was set up by AYUSH and CSIR, to devise a mechanism on protection of India's traditional knowledge. The TKDL expert group estimated that about 2000 number of wrong patents concerning Indian systems of medicine were being granted every year at international level, mainly due to the fact that India's traditional medicine knowledge exists in languages such as Sanskrit, Hindi, Arabic, Urdu, Tamil, etc. and was neither accessible nor understood by patent examiners at the international patent offices due to language and format barriers.

The TKDL breaks these barriers and has been able to scientifically convert and structure the information available in languages like Hindi, Sanskrit, Arabic, Persian, Urdu and Tamil, in open domain text books into five international languages, namely, English, Japanese, French, German and Spanish, with information contents in 30 million A4 size pages, with the help Information Technology tools and a novel classification system - Traditional Knowledge Resource Classification (TKRC).

Today, India through TKDL is capable of protecting about two lakh (0.2 million) medical formulations similar to neem and turmeric. On an average it takes five to seven years for opposing a granted patent at international level which may cost Rs one to three crores (0.2-0.6 million US$). Therefore, the cost of protecting two lakh (0.2 million) medicinal formulations, in the absence of TKDL, would be staggering and completely unaffordable.

This international agreement is unique and would have long-term implications on the protection of

traditional knowledge and global intellectual property systems as would be evident from the fact that in the past, patents have been granted at EPO on the use of over 285 medicinal plants due to the lack of access to the documented knowledge in public domain for the examiners of EPO. Also, at any point of time, 40-50 patent applications based on Indian traditional knowledge are awaiting grant of patent and TKDL Access Agreement would prevent all future grant of patents wherever evidence of prior knowledge exists in TKDL.

The TKDL Access Agreement with EPO would enhance the negotiating strengths of India and developing countries at the international forums. In fact, the international IP community has recognized TKDL as an effective tool for defensive protection of Traditional Knowledge. In a recent communication, the Director General, World Intellectual Property Organization, has recognized TKDL as a strong practical tool which has made unparallel contributions to the international policy context of the patent systems by offering a template for other countries who seek to protect their traditional knowledge.

The TKDL Access Agreement with EPO would pave the way for similar agreement with other major international patent offices to prevent the misuse of this vast information of huge economic potential in easy to access form.

A common *MYBPC3* variant associated with cardiomyopathies in South Asia

Heart disease is the number one killer in the world. It is estimated that the highest death rates in India are associated with problems of the heart and blood circulatory system in people aged 35-64 years. According to a conservative estimate, at least 30 million people suffer from heart diseases in India. By the year 2010, India will carry 60% of the burden of world's heart diseases.

An international team of 25 researchers led by scientists of the Centre for Cellular and Molecular Biology (CCMB), Hyderabad, has provided a clue to why this should be so in their recent research, published in *Nature Genetics* [Dhandapany P.S. *et al.* (2009) A common MYPBC3 (Cardiac Myosin Binding Protein C3) variant associated with cardiomyopathies in South Asia. *Nature Genetics*, Published online before print as doi: http://dx.doi.org/10.1038/ng.309, print version: **41**, 187 - 191 (2009)].

There are many causes of heart attack, some genetic and others linked to our lifestyle, but all seemingly complex, hard to pin down, and not yet completely understood. About 20 genes that are implicated in cardiac disease have been identified so far. One of these, Myosin binding protein-C3 (MYPBC3) is one of the major genes involved in maintaining the structure of cardiac muscle, and regulating cardiac contraction. Mutations in this gene accounts for about 44% of the sudden cardiac arrest.

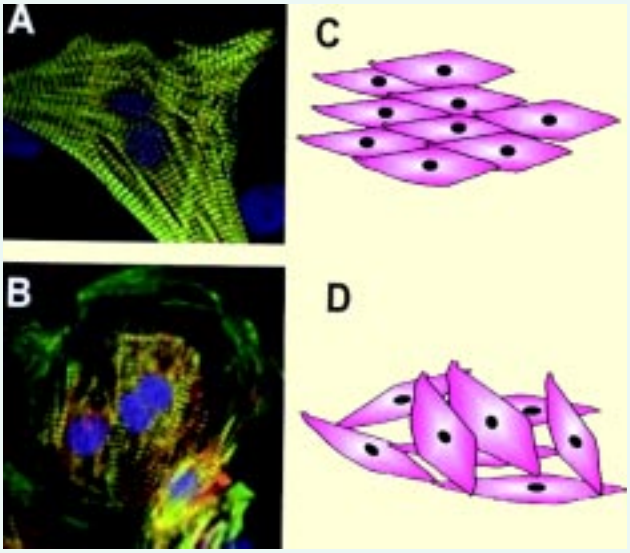
Scientists have analyzed the DNA (genetic material) of 800 cardiac patients – who were reporting to cardiac centres at Hyderabad, Madurai, Tirunelveli, Thiruvananthapuram, Kozhikode, Mumbai, Bhubaneswar, Delhi and Chandigarh – along with age and ethnically matched 699 normal individuals. They found that a 25 base pair deletion within the gene making the heart protein MYBPC3 was significantly more frequent in cardiac patients compared to the normal individuals. In addition, they found that if an individual had both copies of this gene defective (homozygous, containing the 25 base pair deletion), he or she might die at a very early age before reaching 5 years. They confirmed this by analyzing post-mortem samples with a history of sudden cardiac arrest. But, if the individuals carry the mutation in only one copy of the gene (heterozygous), they can live without any symptoms of heart problems up to the age of 45; however, beyond 45 years they suffer from a range of effects, including sudden attack leading to death. Since the deletion leads to the formation of an abnormal protein, such individuals, therefore, have both abnormal as well as normal proteins. In young people this abnormal protein is degraded efficiently by cellular machinery called the proteasome and carriers thus remain healthy, but as they get older the protein degrading machinery becomes inefficient and

leads to a build-up of abnormal protein eventually resulting in symptoms of cardiac problem and leading to sudden heart attack. In order to find out how widespread this mutation is in Indian populations, scientists screened 6273 randomly selected individuals from 107 ethnic populations, including primitive tribes, tribes, castes and sub-castes belonging to all religious groups (Hindu, Sikh, Muslim, Christian, etc.) living across India, and found that about 4% of the individuals studied had this genetic defect (25 base pair deletion in the gene MYBPC3).

Scientists investigated whether this genetic abnormality is restricted to India or is widely distributed all over the world. They analyzed the DNA of an additional 2085 individuals belonging to 70 populations from 26 countries. They found that this genetic defect is present only in the people of the Indian subcontinent and nearby (India, Pakistan, Sri Lanka, Indonesia and Malaysia) but not in other countries.

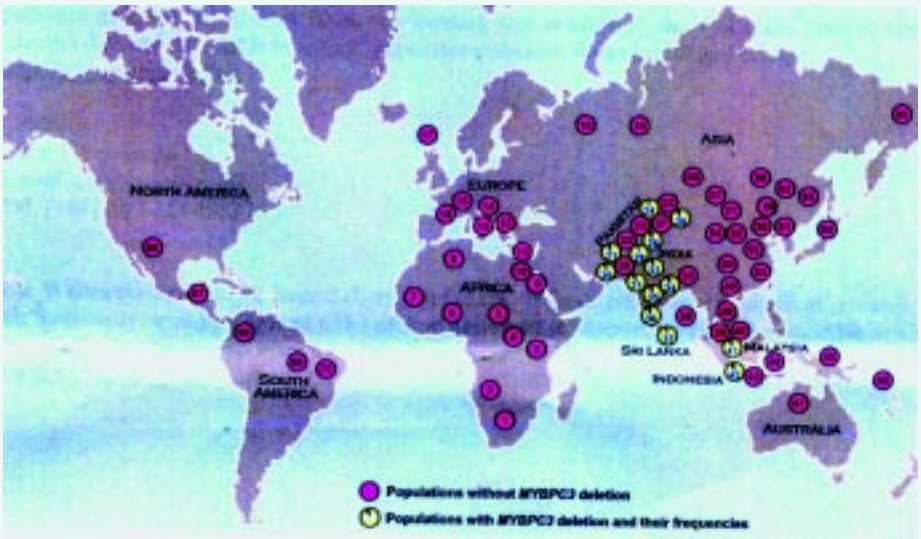
The lifetime risk of developing heart failure is roughly one in five for a person aged 40 years. Now that the defect has been identified, there is a new glimmer of hope. It could be detected very early during pregnancy. If parents choose, a foetus having two copies of the defective gene (homozygous) could be aborted after genetic counseling. Carriers of the defect could be identified at a young age by genetic screening and advised to adopt a healthier lifestyle. Perhaps eventually new drugs could be developed to enhance the degradation of the abnormal protein and postpone the onset of symptoms. Cardiac stem cell transplant might be used very effectively to expand the lifespan of the individuals who carry the deletion. There is a market of 60 million people waiting for such therapy.

Eventually, with suitable therapy, such individuals may fully recover from the disease and live a long and normal life. "For us this is most exciting and is a matter of great happiness that we have discovered something which is going to help the mankind, particularly people in India, Pakistan, Sri Lanka, Malaysia and Indonesia. The estimated number of people at risk from heart disease due to this mutation is about 60 million, i.e. 1% of the world population," say the researchers.



A – Muscle fibres in heart cells under normal condition showing striated pattern due to systematic arrangement of cells (Schematic structure shown in C)

B – Muscle cells in the heart having mutation showing disrupted pattern (Schematic structure shown in D)



Global distribution of deletion of 25 base pairs of the heart protein gene MYBPC3 in indigenous populations

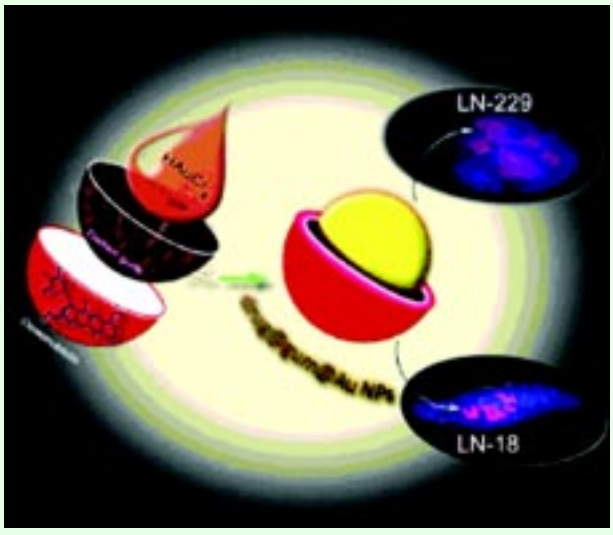
Natural Gum Stabilized Gold Nanoparticles for Drug Delivery Formulations

Metal nanoparticles, especially those of gold, covered with appropriate stabilizing agents are being actively considered for drug delivery applications. The stabilizing agents are expected to provide stability to the nanoparticle against aggregation and they survive in both alkaline and acid media. Further, if the stabilizing agent provides the functionality necessary for the drug to be efficiently loaded on the nanoparticle surface, it would be an added benefit. The advantage of gold for such particular application includes its non-toxic nature, convenient synthesis in a variety of sizes with great control, effectual attachment of payloads through various means (electrostatic, covalent or non-covalent interactions), stabilizing agent tailorability to ensure cellular uptake, controlled release of the drug and specific cell targeting.

Several ligands are being explored as stabilizing agents that would be acceptable to the stringent rules set-up by various agencies for drug delivery applications. Dr B.L.V. Prasad and team were looking for a ligand that would be acceptable by different agencies for drug delivery applications and that could act as nanoparticle reducing and stabilizing agent at the same time imparting the necessary functionality to the surface so that further loading of the drug would be possible.

Dr B.L.V. Prasad, Scientist, Physical and Materials Chemistry Division of National Chemical Laboratory, (NCL), Pune (www.ncl-india.org) said that "Gellan Gum" widely used in food and confectionary industry as thickening and gelling agent fitted the bill perfectly. Gellan Gum (GG) has unique structural features consisting of four linked monosaccharide (i.e., simple sugars), including one molecule of rhamnose (a sugar found in various plants), one molecule of glucuronic acid (an oxidized glucose molecule), and two molecules of glucose (a component of sucrose, which is common sugar). GG is a high molecular weight polysaccharide gum produced by a pure culture fermentation of a carbohydrate by the microbe *Pseudomonas elodea*. The production organism is an aerobic, non-pathogenic, gram-negative bacterium. GG is water soluble, commercially available as a free-flowing offwhite powder. It is approved for food, non-food, cosmetic and pharmaceutical use in the United States, Canada, Australia and many other countries in Latin America, South America, Asia, and the European Union. According to FDA, GG may be safely used as a direct food additive for human consumption as per the European Commission Directive. Its water solubility, thickening, gelling, stabilizing properties are some of the reasons for its wide application in food and pharmaceutical industry and is currently used in bakery fillings, confections, dairy products etc. GG also has been an ingredient in personal and oral care applications like hair care products, creams, sunscreens etc.

"In this study we took advantage of the reducing and stabilizing properties of the GG for the synthesis of gold nanoparticles," said Dr Varsha Pokharkar co-author of the work from Poona College of Pharmacy, Bharati Vidyapeeth University, Pune. These GG reduced/stabilized nanoparticles displayed superior stability to electrolyte additions and pH changes as compared to the traditional citrate and borohydride reduced ones. Subsequently these have been used to load one of the anthracycline rings antibiotic Doxorubicin hydrochloride and tested for their cytotoxic effects



against human glioma (brain tumour) cell lines LN-18 and LN-229.

Dr Anjali Shiras from National Centre for Cell Science (NCCS), where the activity of nanoparticles on these cells was assessed, added, "Interestingly, the drug loaded on nanoparticles showed enhanced cytotoxic effect as compared to pure drug taken at same concentrations as present on the nanoparticle surface," and "they also showed effectiveness for longer periods of time," she concluded. Anticancer drugs generally face a big problem against brain tumours as the Blood Brain Barrier (BBB) does not allow the drugs to cross it and hence delivery to the tumour site is blocked. Nanoparticle based drug delivery systems are considered a good alternative as nanoparticles have been shown to cross BBB rather effectively. In such a background, gum loaded nanoparticles could possess additional advantageous as the BBB is reported to contain glucose receptors and thus the nanoparticles stabilized by GG with many sugar moieties may be favoured to cross the BBB.

This work has appeared on the cover page of the December 2008 issue of "*Chemistry: A European Journal*"

While the work reported above showed the effective anti cancerous activity of drug loaded- GG stabilized-Gold nanoparticles *in vitro,* the group is currently actively pursuing the *in vivo* studies.

For further reading: Natural Gum Reduced/Stabilized Gold Nanoparticles for Drug Delivery Formulations, Sheetal Dhar, E. Maheswara Reddy, Anjali Shiras, Varsha Pokharkar, and B. L. V. Prasad, *Chem. Eur. J.*, 2008, **14,** 10244. For further information please contact Dr B.L.V. Prasad

Process for production of Dopa and Dopamine from hairy root cultures of *Beta vulgaris*

(European Patent No. 1578978 and Russian Federation Patent No. 2326946)

L-dopa (Dihydroxy L-phenylalanine) and dopamine are neurotransmitter precursors being used for symptomic relief of Parkinson's disease. Their high cost, demand and dose requirement have led to search for various alternatives and inexpensive methods for their production. The Central Food Technological Research Institute, (CFTRI),Mysore, has developed a process for production of Dopa and Dopamine from hairy roots of *Beta vulgaris*, where the hairy roots are obtained upon infection of the explant using an isolate of *Agrobacterium rhizogenes* wild strain. *In vitro* culture of hairy roots are used for production of Dopa and Dopamine. As roots exhibit hormonal autotrophy, the process requires a relatively low-cost medium for the phytochemical production. The faster growth and genetic as well as biochemical stability of hairy roots is an added advantage. The identification of the right stage of culture time for maximum accumulation of Dopa and Dopamine would make this process a commercially feasible one. Use of precursors like tyrosine, which are easily available for better production of Dopa and Dopamine would be useful. As Dopamine is water soluble, its direct use after extraction in water could be an additional advantage. The process can be scaled up for commercial production.

Process for preparation of instant soup mix from Indian Dill

(European Patent No. 1696746)

Soup mixes are convenient to prepare and are popular appetizers. CFTRI has developed a process for the preparation of instant soup mix from Indian dill with reduced viscosities and ability of holding more quantities of solids thus enhancing its energy and nutrient density. The formulation of the products involves the optimized drying of all the ingredients concerned and mixing in suitable proportions apart from modifying the starch by subjecting to physical treatments in order to yield thin paste viscosities. The Indian dill or sowa is known for its medicinal properties like carminative, antipyretic and antihelminitic, in addition to being an antiflatulent. The soup mix has good antioxidant properties and it plays an important role as an appetizer in diet. Being a dry soup mix, it has a better shelf life, it can be easily reconstituted by mixing in 1:10-12 ratio of soup powder with cold water. The mixture is stirred and brought to boil before serving. The product prepared by the present invention has excellent sensory qualities in terms of color, consistency, flavour and overall quality.

National Symposium on Open Access and Building Institutional Repositories (NSOABIR)

The unprecedented escalation in the journal subscription price, together with increased number of scholarly communications resulting in more number of new journals have led even well-endowed institutions in developed countries to reduce number of renewals of journals every year. The journal crisis and the developments in Internet technologies paved the way for Open Access Movement (OAM) world over. With this critical situation facing the scholarly community, the Information Center for Aerospace S & T (ICAST) organized a three-day National Symposium on 'Open Access and Building Institutional Repositories (NSOABIR)' during 21-23 January 2009 at the National Aerospace Laboratories (NAL), Bangalore, as a part of the NAL's Golden Jubilee celebrations. Nearly 60 delegates from academic, R&D and corporate sectors participated in this meet.

The inaugural session started with an invocation followed by the welcome address by Dr I. R. N. Goudar, Head, ICAST and Chairman of the symposium. He introduced the chief guest and mentioned about the CSIR's initiative towards promoting Open Access by way of constituting a 'Group on Open Access for Science Publications (GOASP)'. It has a mandate to come out with CSIR policy on OA, steps to be taken to build Institutional Repositories at all CSIR laboratories to negotiate with publishers in the matter concerning

copyright and IPR issues. The chief guest Prof. Subbaiah Arunachalam inaugurated the symposium and Ms Poornima Narayana, convener of the symposium, presented a detailed account about the theme and the programme details.

Prof. Arunachalam delivered a keynote address on 'Why do we need open access to science? A developing country perspective' and presented a comparative scenario about the Open Access movement in the world, Asia and especially in India. He called upon the scientists, researchers and academicians to make their publications open for increasing visibility, usage and impact factor while overcoming the fear factors such as the copyright problems, etc. He told that National Knowledge Commission under the chairmanship of Mr Sam Pitroda has already recommended implementation of OA in the country, setting up of Institutional Repositories by every institution, which is the most effective open access channel.

In his presidential remarks, Dr A. R. Upadhya , Director, NAL, mentioned the importance of open access in the current situation. He stressed that information has to reach the grass root level for the less privileged in the country by making the scholarly communication open as OA provides easy and low-cost access. Mr Shyam Chetty, Chairman, Library Advisory Committee and Head, Flight Mechanics Division, released the Symposium CD containing the presentations of the resource persons, the software DSpace for setting up of IRs and other useful publications. Dr M. N. Satyanarayana, Convener, NAL Golden Jubilee Committee, proposed the vote of thanks.

The technical sessions addressed the relevant issues of the Open Access Initiative/Movement like Scholarly Communication, OA Journals, Digitization and Digital Workflow, Institutional Repositories, IPR and Copyright Issues of OA and IR, CSIR Metadata Harvesting service and two case studies — those of NIO, Goa and NAL.

The resource persons were Dr H. S. Siddamallaih, NIMHANS, Mr Raghuraman and Mr Francis from NCSI/IISc, Mr T. B. Ananad, GEIT, Mr Sahu, NIO and Dr I. R. N. Goudar and Ms Poornima Narayana from NAL.

The second day was completely dedicated to lecture/demonstration on setting up of IRs using DSpace, the most popular Open Source software jointly developed by HP Laboratories and MIT, USA. Dr A. R. D. Prasad and Dr Devika Madalli from ISI, Bangalore, explained the various factors involved in setting up of IRs including an account on DSpace, Metadata standards (Dublin Core) etc. apart from giving a detailed demo on installing DSpace administering IR, depositing and document review/moderate before the documents are made available on IR. All the sessions had very active participation of the participants.

The highlight of the symposium was a two-hour panel discussion on the topic 'Impact of Open Access on Science Communication' which was addressed mainly to scholars and researchers in an attempt to inform them about the impact of open access on new forms of scholarly/ scientific communication. While open access is gaining strength and popularity as a new model for dissemination of information, there are still many issues yet to be addressed such as pricing models, peer reviewing, indexing and impact factors, archiving and the stability of this new publishing model for scientific literature.

The discussion turned out to be a 'real brain storming session'. The panelists were chosen from scientific/academic community, the information seekers and information managers, the information providers like Mr N. V. Satyanarayana, MD, M/s Informatics India (Pvt.) Ltd as the moderator and other members were Dr H. S. Siddamallaiah, PSO, NIMHANS; Dr M. D. Deshpande, Head, Research, M. S. Ramaiah School of Advanced Studies; Dr A. R. D. Prasad from ISI and Dr L. Venkatkrishnan and Dr I. R. N. Goudar from NAL.

Two recommendations were made in matters like archiving and funding for publication activity as a part of R&D budget. The valedictory session was chaired by Mr. N. V. Satyanarayana, and presided by Dr M. R. Nayak, Advisor (M&A), NAL.

International Conference on Magnetic Materials

The National Physical Laboratory (NPL), New Delhi, is playing an important role in the development of magnetic materials and advancement of magnetic metrology. The laboratory establishes, maintains and improves National Standards of Measurements, and assists industry and other agencies in solving their industry-related problems. In addition, it is engaged in developing technologies and advanced materials for R&D activities.

Prof. A.K. Raychaudhuri, Director, S.N.Bose National Centre for Basic Sciences, Kolkata, releasing the souvenir during inaugural function of MMA 21. Others seen in the photograph (*from left*) are: Dr Hari Kishan, Scientist G, NPL; Dr V. Chandrasakeran, Scientist G, DMRL; Dr Vikram Kumar, Director, NPL and Dr R. K. Kotnala , Scientist F, NPL

NPL in association with the Magnetic Society of India (MSI), organized an International Conference on Magnetic Materials (MMA 21) at its premises during 21-23 October 2008. The objective was to provide a platform to the scientists and engineers working in the area of magnetism, magnetic materials, spintronics, and magnetic memory besides industrial metrology for exchange of ideas and experiences in the field. The areas covered included magnetism theory, soft and hard magnetic materials (ferrites, rare earth based permanent magnets), colossal magneto-resistance, half metallics, spin valves, thin films, magneto-optical memory materials, nanostructures, biomagnetism, magneto-superconductors, sensor materials for gas and humidity and their applications. The event was organized under the chairmanship of Dr Vikram Kumar, Director, NPL, and Dr R. K. Kotnala, Scientist F, NPL, was the convener. The keynote address was delivered by Prof. A. K. Raychaudhari, Director, S.N. Bose National Centre for Basic Sciences, Kolkata.

Over 250 researchers from Brazil, France, Germany, India, Israel, Japan, South Korea and UK participated in the conference and exchanged their views and experiences. The participation from India was from NPL, DRDO, IISc, JNCASR, BARC, TIFR, Saha Institute of Nuclear Physics, SN Bose National Science Centre, IITs and various universities. The conference had nine technical sessions, including the one on Nanoethics. Chaired by Prof. K. L. Chopra, this session discussed ethical values while working in thearea of nano science and technology.

Institutional Ethics Committee (IEC) Meeting at NEIST

A meeting of the Institutional Ethics Committee (IEC), formed by North East Institute of Science and Technology (NEIST) Jorhat, was held on 19 November 2008. The committee comprised Chairman, Dr Mridul Hazarika, Director, TRA-Jorhat and ten members namely Dr P.G. Rao, Director, NEIST, Jorhat, Member (General); Prof. S.R. Choudhary, Former Head, Department of Pharmacology, AMC-Dibrugarh; Member (Medical Scientist/ Pharmacology); Dr P.K. Baruah, Medical Officer, NEIST; Member (Clinician); Dr Adinath Sarmah, Tarajan, Jorhat, Member (Clinician); Mr M.C. Khound, Advocate, Jorhat Court, Member (Legal Expert); Prof. Ananta Kr. Baruah, Retd Vice Principal, Bahona College, Jorhat, Member (Social Scientist); Dr P.C. Borah, Principal, CKB Commerce College, Jorhat, Member; Dr (Mrs) Anuja Baruah, Medical & Health Officer, 3rd Assam Police Battalion, Jorhat, Member (Epidemiology); Dr B.G. Unni, Scientist F, NEIST, Member (Secretary) and Dr H.K.

Hazarika, Principal, DCB College, Jorhat, Member (Philosopher).

Dr P.G. Rao, Director, NEIST, in his welcome address said that the committee was formed especially to review the research project '*Environmental contaminants: New screening technologies and effect on Human health*' which would include the assessment of impact of polluted environment on human health with special reference to population living in the vicinity of oil refineries, paper and pulp factories, coal mines, oil fields and oil drilling sites.

The Chairman Dr Hazarika said that there is a need to address various dimensions of ethics and its affect on societal activities. He also informed that other research institutes will also be invited to review some of the ongoing projects.

Dr Unni presented the objectives accomplished under the project. Different aspects of the project like work plan, infrastructure involved, survey and sampling and animal experiments were thoroughly discussed and critically reviewed by the committee members. The members appreciated the study and unanimously opined that the study will benefit the society.

17th Dr Y. Nayudamma Memorial Award Lecture

TOWARDS PEOPLE CENTRIC INNOVATIONS: A FORESIGHT OF NAYUDAMMA*

by

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Dr T. Ramasami, Secretary, DST, receiving the prestigious Dr Y. Nayudamma Memorial Award for 2008 from the Union Minister Mrs. D. Purandeswari, at Tenali. Also seen in the photograph are My Y. Ratheish Nayudumma, Chairman of Nayudumma Memorial Trust; Mr N. Manohar M.L.A. and Mr P. Vishnu Murthy, Founder and Managing Trustee

Dr Yelavarthy Nayudamma is a living legend for all his admirers and students. This talk is a dedication of a pupil to his master who fathered a student with care and righteousness. To me this (lecture) is a prayer to the soul of a man without an ending.

Born on 10 September 1922 in a small village close to Tenali, Yelavarthy Nayudamma would have been 86 years old had those men of terror not taken him away from us on 23 June 1985. He called himself the son of a farmer and a cobbler by profession. He went to Banaras Hindu University and obtained his doctoral degree from Lehigh University, USA, under the supervision of Edwin R. Theis. He joined the Central Leather Research Institute (CLRI) in Madras and became the youngest ever Director of the institute. He laid the foundation of an institution that would be celebrated in the times to come through an extraordinary leadership. At the age of 47, he became the youngest ever Director General of the

*Abridged version

Council of Scientific and Industrial Research (CSIR), New Delhi. He went on to lead the nation in several other functions in later years until he flew away from all of us on the unfortunate day of 23 May 1985. He was a great human being who believed in the cause of social and public good and he combined that with his total commitment to universal goodness.

Nayudamma: What made His Life Special?

Nayudamma distinguished himself by linking the products of his work with the livelihood of people he strived to serve. He built a social contract to his research and development activities. While many scientists of his generation focused on success, his focus was on service. Leather sector gave him an immense opportunity to connect science and technology to the weaker segments of the society. The social divide based on work undertaken was a reality. He foresaw in technology a means to bridge such untenable divide. He innovated in management and leadership styles. He thought aggressively and spoke softly. There are numerous original management innovations he explored while leading CLRI. He believed that the best and assured means to bring about technology revolutions in a tradition bound industry was to engage CLRI in human capacity building. The relationship he built with the University of Madras in conducting courses in leather technology was phenomenal. Today, the vibrant relationship within the trinity of academy-research-industry for the leather sector is exemplary. People like me emerged from such a partnership and nearly 60% of the industry in India is manned by the alumni of the university-research partnership. India International Leather Fair, Tanner's Get-together, scientist-tanner interactions, field extension of research outputs and many more new concepts were introduced. We celebrate his ideas and innovations widely. There may be others who might have accomplished similar feat in their professional lives. What is the main lesson from the life of Nayudamma that makes him special? It is truly about his concern for people and the purpose of his work. The lessons from his life are more relevant today than ever before in the history of Indian science. He was a people centric innovator.

Various Models for Innovation and Their Features

The current model for generation of innovations is derived from technocratic push and desire to emerge as the first in the market place. Formal systems of innovation based on business model back the process of innovation with large amounts of capital. As a consequence, the benefits of most innovations are beyond the purchasing power of a large section of people. Differences in access to technology have caused already inequities in the world. National states are grouped as developed and industrialized on the one hand and developing or emerging on the other, based on the level of technology preparedness. Rural urban divide is once again the direct result of technology-induced divide among people. Technocratic push for innovations would result in even larger divides than what technology induced divides have caused. The current emphasis from the process to the social outcome of the innovations within the ecology for innovation is a more noble option. I would like to propose a thesis that Nayudamma's people centric focus for innovation was a foresight and a valuable one at that.

People Centric Innovation

We have made a case for change in emphasis from the process of innovations to the social outcome resulting from them. In the current market economy, terms like "bottom of the pyramid" are used to point out the possible untapped market space available. In a knowledge society, where knowledge is equitably shared, creation of innovations within the purchasing power of large segments of the social fabric would derive higher importance. Then the purpose of innovation would drive the whole innovation ecology. The very process of innovation would have to be modified to suit the needs of the people.

Let us take some concrete examples. The current health care system remains inaccessible on account of affordability for as many as two-thirds of the global population. Therefore, increasing the accessibility of health care technologies and innovations becomes a major requirement. Development of drugs for diseases of the poor, i.e. on account of malnutrition, poor sanitation and

hygiene would not be in the commercial interests of the private sector. The terms like "neglected diseases" refer to "neglected people" really. Innovations for reaching health care systems to the poorest of the poor and making it affordable requires a people centric model for innovation, which is not only socially responsible but also appropriate.

Developing a People Centric Model in the Current Innovation Ecology

Keeping the costs of creating innovation low enough for matching the purchasing power within the per capita income of the country is the major challenge of people centric innovations. The current western model of innovation ecology based on technocratic push does not offer suitable tools for people centric model for innovation. We would need a different paradigm for innovations to make them people centric.

India: Unique Opportunity in People Centric Innovation Space

The Indian social context offers a unique opportunity to develop an ideal model for people centric ecology for innovations. Primary requirements for excelling in people centric innovation are: (a) social behaviour to share and care, (b) analytical ability, (c) a mind set for preferring social good over private good and (d) developed educational system. Indian civilization promoted many of the features required for people centric innovation. The practice of Ayurveda, Siddha or Unani medicine focused on affordable health care priority for the society.

Indian strength in creating innovations at lower costs is well known. The recent *Chandryaan I* provides a shining demonstration of India's ability to create knowledge at much lower costs. India derives the benefit of developed educational systems, expertise arbitrage, analytical ability in a wide cross section of the society and large market need for low-cost innovations. India enjoys a tremendous advantage in designing and developing people centric innovation models. Our analytical engineering capability is of high value in emerging knowledge economies.

Enhanced Value of Analytical Engineering in Knowledge Economies

Engineering always had two parts, namely application and analytical component. Application engineering trains minds in given and standardized technologies. Analytical engineering enables engineers to innovate new modes/ methods and novel products. One facilitates incremental innovation and market strength. The other prepares for a new technology paradigm and offers competitive edge. The Indian Institutes of Technology and some other Indian institutions became a global brand because they trained engineers in analytical engineering.

Innovation demands an ability to combine individual creativity with professional training imparted through structured systems. Innovative engineers are in high demand. Analytical engineering is gaining higher values in an innovation-dominated world.

Indians are descendants of a rich intellectual heritage. We enjoy a favourable genetic disposition to create innovations. One could gain access to personal wealth and even psychic delight through knowledge and innovations. Competence for innovation would gain access to power in knowledge economies. Is that enough? Perhaps not.

The current trends of the modern world indicate technocratic push for economic benefits to the innovator. The purpose of innovation emanating from the traditional wisdom of Indian psyche had been social inclusion. It strived to increase access to the benefits of research to as many people as possible. Modern IPR regimes have tilted the balance in favour of those with resources. Healthcare systems, based on modern technology products, bypass many on account of cost factors. Increasing access to the products of innovation would call for new innovation ecology. It should be derived from the strength of an ability to create innovations at low financial investments. Indians are exceptionally good at creation of innovations with low capital investments.

Synergies among Informal and Formal Innovation Systems: Some Examples of Leather Sector

India enjoys the benefit of a large population of grass root innovators. The informal innovation system is rich and diverse. It is

judicious to nourish the informal innovation system and design suitable models for linking the informal and formal innovating systems.

Case Studies from Leather Sector: Nayudamma was a forerunner in coupling informal and formal innovation systems through his work at CLRI. He believed in the strength of the informal innovators. He cultivated an organizational habit in CLRI to respect the outputs of informal innovation system. He built ecology for mutual respect between the informal and formal innovation systems. In recent times, there have been many successful examples of synergy between informal and formal innovation systems in the leather sector. I would like to present some case studies in the leather sector during its more recent history.

Fallen Animal Carcass Recovery: India is almost the only country that processes hides and skins from dead animals into leather and value added products. Recovery of fallen carcasses is hence an important aspect of the Indian leather industry. As many as 1.6 million people are engaged in the primary raw material collection and processing in the non-formal sector. A viable technology with bankability at 3-4 animals per day processing capacity was developed by CLRI and referenced to the widely differing social contexts of India. Techno-social innovations have been accomplished in several locations in the country. It is a case of low-cost people centric innovation which can generate sustainable social incomes of Rs 45000 per annum for a group of 3000 below poverty line families for investments less than Rs 50 lakh.

Kolhapuri Sandals: Kolhapuri sandal is a product of informal innovation which resulted in family tradition. Relatively coupling between the ultimate user of the product and manufacturing micro enterprises led to a slow decline of the market and socio-economic marginalization of the artisans. CLRI undertook a socio-economic study of the artisans in the micro enterprise clusters in the Karnataka and Maharashtra regions in early 1990s. CLRI mounted a technology campaign and built a synergy between the informal and formal innovators in *Kolhapuri* footwear sector. A new producer company under the brand name of Toehold has emerged and is engaged in successful business based on products developed from people centric innovation. About 177 families connected to the business on Kolhapuri sandals derive sustainable income from the techno social innovation.

Do-Ecology Solutions in Leather Sector: In 1996, the Supreme Court of India delivered a landmark judgment ordering the closure of about 400 tanneries in Tamil Nadu on account of their inability to comply with the environmental regulatory norms. CLRI in association with National Environmental Engineering Research Institute and All India Skin and Hide Tanners & Merchants Association developed and implemented a basket of Do-Ecology Solutions for the leather sector. This technology plan saved about 250,000 jobs and an industrial turn over of about Rs 6000 crores per annum. The project involved a vibrant synergy of formal and informal innovators.

Synergy among Informal and Formal Innovation Systems on national Scale

National Innovation Foundation supported by Department of Science and Technology, Drug discovery from botanicals launched by CSIR, several programmes of Department of AYUSH are some examples where coupling of informal and formal systems of innovation have been successfully attempted.

National Innovation Foundation has been working closely with several grass root innovators and registering practices of high techno-social value. Last year alone, NIF registered more than 30,000 innovative practices of grass root innovators. The challenge ahead is developing a market value and penetration for some of those exciting innovations. A New National Innovation Project for inclusive growth is being designed. This would demand greater synergy between informal and formal innovators. Informal innovators could help in cost optimization of innovations while the formal innovators could help in value optimization through inputs of both analytical and application engineering. This flows from the foresight of Nayudamma. Hence I chose to call him a father of people centric innovation.

Dr V.P. Dimri elected Fellow of TWAS

Dr V.P. Dimri, Director, National Geophysical Research Institute (NGRI), Hyderabad, has been elected Fellow of the Third World Academy of Sciences (TWAS). Dr Dimri's contributions have been already recognized through the fellowship of prestigious National Academies such as Indian National Science Academy; National Academy of Sciences; and AP Akademi of Sciences. He became first Asian recipient of Lorenz Award of American Geophysical Union in 2007. He is also a recipient of the prestigious National Mineral Award and Department of Ocean Development (DOD) Award, Government of India; Outstanding Scientist Award of FAPCCI; and Prof G.P. Chatterjee Award, presented by Prime Minister Dr Manmohan Singh, during Indian Science Congress 2007.

Dr Dimri has about 100 International and National papers published, authored/edited three books entitled: Deconvolution and Inverse Theory (Elsevier, Amsterdam, 1992); Application of Fractals in Earth Science (Balkema, U.S.A. 2000) and Fractal Behaviour of the Earth System (Springer, Germany, 2005). His first book was declared as a 'Didactical Masterpiece' by Prof M. Koch of USA and is a reference book in the field of inversion.

Dr Dimri is a member of various national and international scientific committees. He was the Sectional President of Earth Systems Science Section at the Indian Science Congress Association, ISCA-2008. His presidential address 'Geological Sequestration of CO_2 for Reducing Global Warming' was well received. He was also a Sectional President of Earth System, Space and Engineering Sciences of recently concluded A.P. Science Congress.

Dr S. N. Maity, Acting Director, CMERI

Dr S. N. Maity, Scientist-G, has been appointed Acting Director of Central Mechanical Engineering Research Institute (CMERI), Durgapur, w.e.f. 31 December 2008.

During his over 23 years' of R&D career he has been credited with 58 national/international patents and received four national awards of repute.

CLRI Scientists awarded

Dr J. Raghava Rao and Dr (Ms) A Gnanamani have recently been selected for Indira Gandhi Paryavaran Puraskar from Ministry of Environment and Forests and Tata Innovation Fellowship Award of the Department of Biotechnology, respectively.

Dr Sushree Swarupa Tripathy awarded DEF Prize

The Academy of Environmental Biology (AEB) has awarded "Dalela Educational Foundation (DEF) Prize", the Young Scientist Award-2008, to Dr Sushree Swarupa Tripathy, Scientist-B, Material Character-ization Division, National Physical Laboratory, New Delhi, on 20 November 2008, in recognition of her outstanding contributions and research in the field of Environmental Chemistry.

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