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CSIR NEWS

Progress, Promise and Prospects

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C O N T E N T S

69th CSIR Foundation Day Celebrations,
26 September 2011



India @ 75: An Innovation Superpower?



CSIR Young Scientist Awards 2011



CSIR Technology Awards 2011



CSIR Diamond Jubilee Invention Award
for School Children 2010



Prof. G. N. Ramachandran
Gold Medal for Excellence in
Biological Sciences & Technology



website: <http://www.csir.res.in>



69th CSIR Foundation Day Celebrations, 26 September 2011

CSIR Foundation Day was celebrated at a glittering Function held at Vigyan Bhawan on 26 September 2011. Shri Vilasrao Deshmukh, the Hon'ble Minister for Science & Technology & Earth Sciences and Vice President, CSIR was the Chief Guest. Dr. Ashwani Kumar, the Hon'ble Minister of State (IC) for Science & Technology, Earth Sciences and Planning presided over the Function, which was attended by a galaxy of scientists, technocrats and media personnel. Prof. Samir K. Brahmachari, Director General, CSIR, extended a warm welcome to eminent personalities, the Prizewinners and their families, the distinguished invitees and the CSIR family.



Seen on the dais during the CSIR Foundation Day Function at Vigyan Bhawan, New Delhi (*from left*) are: Prof. Samir. K. Brahmachari, Director General, CSIR; Dr. Ashwani Kumar, the Hon'ble Minister of State (IC) for Science & Technology, Earth Sciences and Planning, Shri Vilasrao Deshmukh, the Hon'ble Minister for Science & Technology & Earth Sciences and Vice President, CSIR; Dr. R. A. Mashelkar, and Dr Rajesh Gokhale, Director, Institute for Genomics & Integrative Biology

Founded in 1942, the Council of Scientific & Industrial Research (CSIR) completed 69 years of its dedicated service to the Nation on 26 September 2011. The occasion was celebrated by the entire CSIR family of 37 Institutes/Laboratories, spread all over the country, with great enthusiasm. It was an occasion to celebrate the accomplishments of the year that has gone by and

plan for the future to serve the Nation with still greater dedication. It was also an occasion to accord recognition to excellence in science through the presentation of various Awards.

The main Function of the CSIR Foundation Day this year was held at Vigyan Bhawan, New Delhi. Attended by the distinguished gathering of scientists and technologists, the Chief

Guest of the Function, Shri Vilasrao Deshmukh, the Hon'ble Minister for Science & Technology & Earth Sciences and Vice President, CSIR along with Dr. Ashwani Kumar, the Hon'ble Minister of State (IC) for Science & Technology, Earth Sciences and Planning, who presided over Function, gave away the various Awards.



Welcome Address by Prof. Samir. K. Brahmachari, Director General, CSIR



DG-CSIR, Prof. Samir. K. Brahmachari
delivering the Welcome Address

The Hon'ble Minister of Science and Technology and Vice President, CSIR, Shri Vilasrao Deshmukhji, Chief Guest for 69th Foundation Day Celebration; the Hon'ble Minister of State, S&T and Parliamentary Affairs, Dr. Ashwani Kumarji; our own Dr. Mashelkar; guests from academia, industry, other science departments; Awardees and their families; CSIR staff; members of electronic and print media; Ladies and Gentlemen. A very warm welcome to you all. I thank you for joining us on this happy occasion of CSIR's Foundation Day celebration. I convey my personal as well as entire CSIR family's greetings to our Hon'ble Vice President, CSIR and to MoS, Science & Technology and Earth Sciences.

CSIR Foundation Day is an occasion that gives us a wonderful opportunity to reminisce our past year's achievements and think deeply for future. How are we placed? What positioning we need in future? How we are planning for that? What resources

we have created for the purpose? I am convinced we are on the right path. We are on the way to carve out more and more scientific and technological niches for our country. I am confident such efforts would give India global recognitions.

CSIR had been, over the decades, a champion of industry from self reliance to strategic sector to low cost generic drugs, empowering the leather

industry and so on. CSIR continues its Scientific and Technological endeavours. It's work force is working dedicatedly. I will like to recall some of our very recent achievements today.

The Academy of Scientific and Innovation Research (AcSIR) Bill has been passed by the Lok Sabha. The Academy being set up by CSIR will be a world-class institution of National importance and nurture trans-disciplinary human resource. It will empower CSIR system to the core. We are grateful to the Vice President, CSIR for achieving it in the Lok Sabha.

The Kelkar Committee suggested the formation of an enterprise, the CSIR Tech., a Company to valorize CSIR IP and to unleash the entrepreneurial spirit of many of our scientists. Dr Vijay Kelkar has accepted to be the Chairman of the Board along with Mohandas Pai and others as members. CSIR is extremely proud to have them associated with us. These achievements are

historical milestones in the purposeful journey of CSIR.

C-NM5, a five-seater civil aircraft had its first successful flight early this month and then several successful flights thereafter. C-NM5 is a product of successful PPP in civil aviation – the partnership between CSIR-NAL and Mahindra Aerospace. Again, it is a matter of pride that CSIR-IMT signed a unique agreement for the licensing of next generation clot buster molecules. We will receive US\$ 150 million as milestone payment + royalty.

Based on CSIR technology, first time in India, a carbon fibre plant has been set up, creating thus the strategic capacity of the country. In order to achieve excellence in S&T we have operationalized EMPOWER (Encouraging and Motivating Pursuit of World Class Exploratory Research) and RISK (Research Initiative to Scale New Knowledgebase).

Our Hon'ble Prime Minister has expressed that we should rebuild a new CSIR that will fulfill the aspirations of modern India. CSIR has repositioned itself and built a new route of restructuring the organization. I must congratulate our Planning Division, Dr Sudip Kumar and his team who have put extra extraordinary efforts to reorganize the entire CSIR—its 37 Laboratories and three Units into clusters and those clusters eventually are picking up Programmes and Projects of a dimension we have never done before. We have also operationalized a mega programme entitled, *Technologies and*



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Products for Solar Energy Utilization Through Networks (TAP-SUN) in partnership with MNRE so as to create niche knowledgebase in the domain.

CSIR organized Technofest 2010 during India International Trade Fair at Pragati Maidan last November. The event was a great success. Over a million people participated in this and we had 134 industries which exhibited during the CSIR Technofest. CSIR bagged the Gold medal for display in CSIR Technofest.

CSIR has repositioned itself for the 800 million Indians who are at the bottom of the economic pyramid but are intellectually strong and emotionally engaged for that part of the community. *CSIR-800* Programme is taking science to the masses and several programmes have been initiated in different CSIR laboratories, whether it is improving mushroom cultivation of North-East or to provide electrical rickshaw to the rickshaw pullers or providing North-East with special technologies to improve their post-harvest productivity.

We are often asked, have we done the science that is best in the world? Whether it is *CSIR-800* or high science, CSIR has been able to make a difference. CSIR continues to do well in terms of 'publication of peer reviewed papers', 'filing of patents' and 'commercial earnings through licensing'. CSIR's paper publications and EBR is highest this year. I congratulate all in CSIR for achieving this. I thank our Industry partners for helping us achieve this.

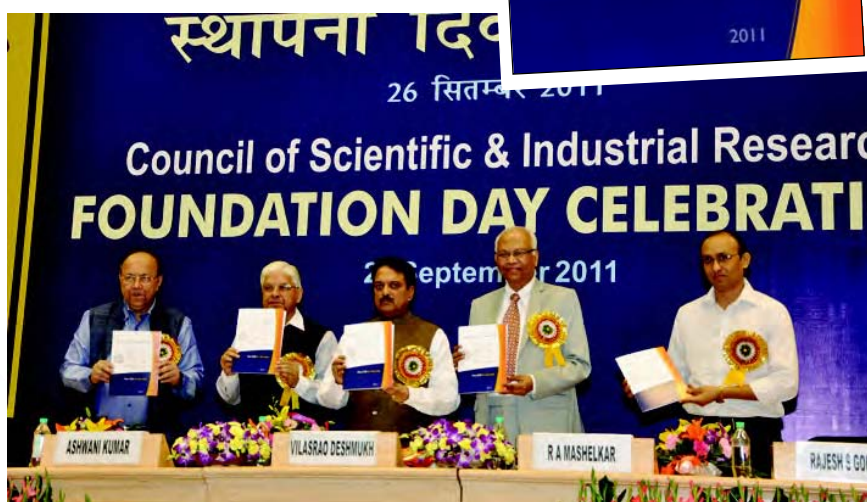
We asked ourselves as to who should decide that what CSIR should do when India is at 75. Should we continue to have tuberculosis? Can we reduce the burden of tuberculosis from 1000 people

dying per day to 100 persons? Can we reduce this order of magnitude? What do we need to do? Our Open Source Drug Discovery (OSDD) initiative has created a world wide web towards this effort. First time it is CSIR that is leading and the world is following. I feel very proud about the young generation who have made it happen. So we decided that let the young people of CSIR take the decision as to what CSIR should look at 80. We made a team from young people and gave them leadership who will have job beyond 2022 to write the document and not people like us.

CSIR is positioning itself for 2022, when India will be 75 and CSIR will be 80. My young colleagues have developed an innovative document entitled, *CSIR@80: Vision and Strategy 2022*, a New CSIR for New India in partnership with stakeholders. Our beloved Prime Minister and President, CSIR had given inspiration to CSIR to develop the same. We will be releasing the document at the hands of our Hon'ble Vice President, CSIR, Shri Deshmukhji today.

These are some of our recent achievements, which give all of us in CSIR a sense of happiness and pride. Sir, globally innovation is driving economy of nations. Successful are those nations who are embracing knowledge and innovation. Our country too is moving in that direction. We are convinced of success. It provides unique opportunity to those who are creative, innovative and entrepreneurial. CSIR is moving higher in scholarship and delivery of innovation. We honour achievers of science and Technology today.

I thank you all for joining the CSIR Foundation Day Function.



The Hon'ble Vice President, CSIR Shri Vilasrao Deshmukh released the document, *CSIR@80: Vision and Strategy 2022* on the CSIR Foundation Day 2011. Close-up of the document (Inset)



Address by Shri Vilasrao Deshmukh, the Hon'ble Minister for Science & Technology and Earth Sciences and Vice President, CSIR

Dignitaries present on the dias: Dr. Ashwani Kumar, Minister of State for Science & Technology; Dr. R.A. Mashelkar, Prof. Samir Brahmachari, DG, CSIR; Dr. Rajesh Gokhle, Director, IGIB; Distinguished Guests; Award Winners and their family members; Friends from Media, Ladies and Gentlemen. It is indeed a rare pleasure to be here on this day, the Foundation Day of CSIR. It is the day to celebrate the formation of CSIR, which has emerged as a unique organization today for pursuing innovation. This is also a day to recognize, acknowledge and laud contributions of all members of the CSIR family who tirelessly pursue their dreams with passion and great sense of commitment. I congratulate each and every one of my CSIR family.

At the outset, I convey birthday greetings, to our beloved President, CSIR, the Hon'ble Prime Minister of India, on my personal behalf and on behalf of all the CSIR staff. We all are

beneficiaries of his generosity and understanding for the cause of Indian science and technology.

The announcement of winners of Shanti Swarup Bhatnagar Prizes has been made. I congratulate all the Award winners and their families. Indeed, they have brought us pride through their extraordinary contributions. I wish that they continue to contribute more and more science for the benefit of our brethren.

I specially congratulate winners of CSIR Young Scientist Award — the future leaders of Indian science. They would have added responsibility now on, as they would have to perform well and help our country achieve S&T leadership. I wish that many of you, the Young Scientist Awardees, get Shanti Swarup Bhatnagar Prize in years to come.

CSIR is entering into 70th year of its memorable journey. It is an important milestone in the purposeful journey of any organization. CSIR would celebrate this year with fervor and gusto. To mark the year, I suggest that CSIR institutes two new Shanti Swarup Bhatnagar Prizes. These should be



Shri Vilasrao Deshmukh, the Hon'ble Minister for Science & Technology & Earth Sciences and Vice President, CSIR addressing the audience

in the domains of trans-disciplinary research and innovation. We need to recognize contributions of our scientists and technologists in these two important domains. India has to create a leadership position for itself in the space of knowledge-driven economy and we need to nurture these two domains in a significant manner.

I congratulate CSIR for their one of the recent feat that is design and development of C-NM5 – a five-seater civil aircraft. The aircraft has been developed in partnership with Mahindra Aerospace Pvt. Ltd. I congratulate the whole team for this success. The plane took its first flight in the first week of this month. This success is a unique example of a public-private partnership in civil aviation, which has brought pride to the country. I wish we create more and more technological niches for the country, leveraging our strengths through desired synergistic partnerships.



Presentation of a shawl and memento to the Hon'ble Minister Shri Vilasrao Deshmukh, by DG-CSIR, Prof Samir K. Brahmachari



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I had the honour to pilot the Academy of Scientific and Innovative Research (AcSIR) bill in the Lok Sabha. We are grateful to our Parliamentarians that they supported passing of the bill in the Lok Sabha. The Academy, I am sure would emerge as a world-class organization. This would attract the best students to remain in the country and will train them in the frontier areas of science and technology. This will enable them to out-compete and out-innovate the rest of the world. The Academy is instituted to secure India's leadership in tomorrow's science. I urge our youngsters to take up this challenge of securing our leadership.

CSIR has risen to the occasion many a times in the past and would continue to do so, I am confident. I had seen CSIR from a distance. Now I see CSIR from inside. I salute our leaders who set up CSIR with a great vision. It gives me immense satisfaction when I meet the people of various strata of our society and listen that they have benefitted from the CSIR contributions, one way or the other. We have Dr. Mashelkar amongst us today, an Indian Icon of Science and Technology – a CSIR man who gained from CSIR and then build CSIR further. I am sure he would continue to guide CSIR in times to come.

CSIR has received significant guidance from the top leadership in the country. Pandit Jawaharlal Nehru Ji very fondly interacted with CSIR leadership and gave his vision of industrial development in the country and technological leadership for the purpose. I feel proud to be the Vice President of CSIR. Pandit Nehru Ji once said and I

quote, "It is science alone that can solve the problems of hunger and poverty, of insanitation and illiteracy, of superstition and deadening custom and tradition, of vast resources running to waste, of a rich country inhabited by starving people... Who indeed could afford to ignore science today? At every turn we have to seek its aid... the future belongs to science and those who make friends with science." True are these statements even today and inspire us to the core.

In Indian Science & Technology, CSIR is considered to be a flag bearer of multi-farious developments. Outcomes of its scientific endeavours cover a significant spectrum of science disciplines. CSIR has been contributing over the years not only directly to Indian science and technological developments but has been contributing in a very significant way in the programmes being run by other science departments as well, both in strategic and non-strategic sectors. CSIR can rightly be called the fountain-head of ushering in an innovation culture in India. It is now partnering with National Innovation Council to set up Cluster Innovation Centres. This partnership deserves all appreciation in the current decade of innovation. I see a special role for CSIR in the current context where there is increased focus on knowledge-led economic development. We are in the process of building our 12th Five Year Plan. I want CSIR to take a much bigger role in the plan. My colleague Shri Ashwani Kumarji is here, I am sure he will give CSIR a larger allocation for the 12th Five Year Plan!

As per Hon'ble Prime Minister's instructions, CSIR has developed

CSIR@80: Vision and Strategy 2022. It not only embodies the philosophy of inclusive growth through desired S&T but also strategies to achieve and create desired niches. In a way it is a road map for "New CSIR for New India". I must congratulate Prof. Brahmachari, and his younger colleagues who in partnership with CSIR's stakeholders created this.

CSIR receives the largest number of Indian patents and is leader in American patents awarded to India and utilization of them. It is already an accomplished National leader in high-end knowledge generation. These achievements are a significant addition to CSIR's recent globally recognized achievements of its programmes namely, 'Open Source Drug Discovery.' It is based on CSIR's novel open innovation movement using crowd sourcing as a model. 'CSIR-800' a programme focused at bringing in S&T interventions for our people at the bottom of economic pyramid, and 'Traditional Knowledge Digital Library' to enable protection of our Traditional Knowledge.

For all those organizations who do well and meet their objectives, the bar of performance rises and peer pressure increases. CSIR is no exception to this phenomenon and is facing it. I am confident that CSIR under the able and dynamic leadership of Prof. Brahmachari would continue to perform well, progressing further and higher. It will create a new research and development trajectory for itself. I want CSIR to bring more and more pride and laurels for our country.

Once again I congratulate all the Awardees and their families and wish all of you the very best.

Thank you all. Jai Hind!



Address by Dr. Ashwani Kumar, the Hon'ble Minister of State for Science & Technology, Earth Sciences and Planning



Dr. Ashwani Kumar, the Hon'ble Minister of State for Science & Technology, Earth Sciences and Planning addressing the audience

The Hon'ble Minister of Science & Technology & Earth Sciences, Shri Vilasrao Deshmukh, Dr. R.A. Mashelkar, Prof. Samir K. Brahmachari, Scientists, Dignitaries, Ladies & Gentlemen. Let me begin by congratulating the winners of the Young Scientist Awards, Technology Awards, CSIR Diamond Jubilee Invention Awards and Prof. G. N. Ramachandran Gold Medal Awardees. Each one of you has made us proud and I see a scientifically and technologically secure India in your hands.

I extend warm felicitations on this CSIR Foundation Day. CSIR is growing from strength to strength with each passing year. Its contributions are globally known today, be it the domain of basic research, applied research, technology development or bringing in S&T intervention for the people at the bottom of economic pyramid. The canvas of Indian Innovation System is fast changing. It is changing for the

good. The research institutions and industry are collaborating more and more, so as to develop the desired products in knowledge intensive domains. But it is happening in globalized economy, we need to remember. This throws a real challenge, challenge of being globally competitive, performing at the top of the end and of creating 'Global Niches' to have the cutting-edge advantage.

I am extremely happy that CSIR has established a new line of research named Ayurgenomics. Ayurgenomics is an integrative approach of Ayurveda and Genomics for the discovery of predictive markers for preventive and personalized medicine. I am given to understand that Ayurgenomics study so far has not only provided a novel molecular framework for integration of these two disciplines, but also that this integrative approach of Ayurgenomics can accelerate/assist discovery of markers for predictive and personalized medicine. I wish that this ultimately creates global niche for our country.

We need to create new platforms for innovation, nurture them and make them global. It is particularly relevant in the changing context. In this reference, I would like

to highlight an alternate model of innovation created by CSIR to make healthcare affordable to the common man. It is CSIR-launched *Open Source Drug Discovery (OSDD)* Programme. The same is based on the realization that the current Intellectual Property based models of pharmaceutical innovation do not address the diseases of the poor such as Tuberculosis.

OSDD has emerged as a new platform for innovation in the domain of healthcare. I am happy that this CSIR-led 'Team India' consortium with global partnership has more than 4500 researchers from over 100 countries as registered participants. Enthused with the success of OSDD, CSIR has now launched *Distributed Organic Chemical Synthesis (DOCS)* Programme in open source mode.

The traditional route to professionalism involving years of study under the supervision of a mentor has now changed to the need for (i) having



Prof. Samir K. Brahmachari, DG-CSIR, presenting a memento and shawl to the Hon'ble Minister Dr. Ashwani Kumar



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a strong grounding in theory in conventional & trans-disciplinary areas and the ability to apply the theory practically (ii) ability to leverage a large set of tools and use them in a variety of situations and (iii) a strong capability to analyze failure and make improvements. CSIR is truly following it under the learned leadership of Prof. Brahmachari.

We need to make our populace aware of our S&T achievements. I am happy to see CSIR efforts towards this. CSIR had organized *Technofest* during the last 'India International Trade Fair'. Its pavilion was adjudged the best under the Public Sector category. CSIR had displayed over 500 technologies there and stakeholder meetings were held during that period. This provided connectivity to the people and companies. We need more of such efforts.

CSIR has signed a unique agreement with Nostrum Pharmaceuticals Inc for licensing of new generation thrombolytic molecules. CSIR will be receiving over 150 million USD through various milestone payments and royalties. I find this as high-end healthcare effort in association with CSIR's affordable healthcare endeavour. Rightly, CSIR has been recognized by the Department of Industrial Policy and Promotion for begetting maximum number of patents in the country last year. Further, it won the Thomson and Reuters Innovation Award 2010 for being the most 'Innovative High-Tech Academic Institution' in India. These are indeed true recognitions for its concerted efforts.

Our Government has passed 'Legal Metrology Act-2009.' As per the Law, which comes into force from 1 April 2011, all the activities related to National Standards are the sole responsibility of National Physical Laboratory (NPL), New Delhi. This responsibility comes to CSIR due to the unique knowledgebase it has evolved over the years.

CSIR touches the life of common man through its *CSIR-800 Programme*. CMERI has set up Post-Harvest Technology Centres at Aizwal (Mizoram) and at Pashighat (Arunachal Pradesh). These Centres house technology for high efficiency drying and processing of ginger, cardamom, turmeric, chillies etc. More than 10,000 farmers of the North-East region are able to sell their produce at 20-25% higher price to these Processing Centres. They are generating direct employment for the people of the North-East region. Our Government is committed to bring in derived S&T interventions for the masses of the North-East States.

I congratulate the entire CSIR family under the learned leadership of Prof. Brahmachari, the DG-CSIR, for all these accomplishments. The Nation demands much more from CSIR. A big responsibility lies on CSIR's shoulders. CSIR has to come up with solutions for the present-day problems which the country is facing. I am confident that CSIR can do it. CSIR's R&D programmes could help achieve it.

The current decade is declared as the *Decade of Innovation* by our Government. Fourteen new National Innovation Universities are planned to

be set up. National Innovation Council has already come into existence. Innovation must be viewed as a means of creating sustainable and cost-effective solutions for people at the bottom of the economic pyramid. I urge CSIR to redefine innovations to go beyond formal R&D parameters and facilitate innovative solutions that must lead to inclusive growth for the people by the people.

During my Keynote Address at the Summer Davas Conference, organized by the World Economic Forum and CII in China, ten days back, I announced that we are willing to contribute an initial sum of USD 2 million as our share of the contribution to the proposed '10 million USD BRICS STI Fund'. That shows our commitment to Science, Technology and Innovation. I would like to urge to our Scientists and Technologists to come up with methodology to harness the scientific and technological knowledge in mitigating some of the most burning issues that humankind is facing today such as food security, healthcare for all, universal access to education, energy independence and internal security etc.

We are currently preparing our 12th Five Year Plan. We have challenged ourselves to make a five year plan which out-competes all our earlier Five Year Plan efforts. Science and Technology as always would find a unique place in the 12th Five Year Plan. I see for CSIR a special role in the 12th Plan. I am confident that CSIR would carve out a unique placement for itself in the Plan in times to come.

Thank you all and wishing you all the very best. Jai Hind!



CSIR Foundation Day Lecture

India @ 75: An Innovation Superpower?

Dr. R. A. Mashelkar, FRS



Dr. R. A. Mashelkar, delivering his lecture

The Hon'ble Minister of Science & Technology and Vice President of CSIR, Shri. Vilasrao Deshmukh; the Hon'ble Minister of State for Science and Technology and Earth Sciences and Parliamentary Affairs, Dr. Ashwani Kumar ji; the one and only Dr. Samir K. Brahmachari, the DG of CSIR; Dr. Rajesh Gokhale and the members of my CSIR family. I used the word 'My' because I always said once a CSIR, always a CSIR. Ladies & Gentleman, it is a very special privilege and a special honour to be standing before you this morning. Thank you so much Samir for doing me this honour of asking me to deliver the CSIR Foundation Day Lecture.

I'm watching as an old man with great pride, Samir, the dynamic and bold steps that you have been taking that I was unable to accomplish while I was DG-CSIR. Setting up the board on fire with great ideas like the Open Source Drug Discovery, AcSIR, CSIR Tech etc., and executing them, one feels so

proud. As one gets older, one adds not just years to one's life but life to one's years when one sees this great change. Today I'm going to speak on, *India@75: An Innovation Superpower?* and it coincides with *CSIR@80*. I have got a question mark and my entire lecture is about this question mark and how to eliminate that question mark and how will we become '*The Innovation Superpower*.'

Now why the question mark, let me give an idea. Samir just now referred to this book of mine '*Reinventing India*' where you will find some discussions on Indian innovations; as I talk about the pleasures and pain of being a part of this innovation journey over the years. What does one see as pleasure and pain? You can see, for example, with great pleasure that Tata *Nano* is created in India; which is the

rare first to the world innovation not just first to India. Then one finds the pain when it loses a couple of years in moving its plants from Singnur to Sanan before the Indian customer can have the benefit of using a world class product like *Nano*.

Look at the pleasure when Ashok Jhunjhunwala from IIT Madras develops wireless local loop technology; very contemporary at that time, and then one watches with pain when this technology had to get implemented in Brazil and Madagascar before moving to India. Then one sees a great leader in Indian Science, publishes some breakthrough research and then with pain one watches a Japanese company taking regular patents based on his research. In other words, the pleasure was that Indian science will make money and that is fantastic but the pain was that the money would be made in Japan and not in India.



Prof. Samir K. Brahmachari, DG-CSIR, presenting a memento to Dr Mashelkar in the presence of Hon'ble Ministers Shri Vilasrao Deshmukh and Dr Ashwani Kumar



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Ladies & Gentlemen, that's why the title of my talk *India @ 75: An Innovation Superpower?* What do we need to do to remove that question mark and become 'The' *Innovation Superpower*. The simple idea that I want to pose to you is that we can do all this provided we understand the true meaning of innovation, which is simply the 'successful exploitation of a new idea'. Let's get into the depth of this definition; the keyword as I said is exploitation. Exploitation means an actual use in practice, not just demonstration. We have CSIR laboratories, and several other laboratories and Universities, which are a source of great ideas. It is not the power of great ideas but it is the power of execution that matters, and finally, how do we move a product or a service for the benefit of the Nation. That is the key point, and that is really where the innovation journey begins.

If you look at the keywords they are extremely important to me. First keyword is 'successful.' What constitutes success? First is the speed at which you do things because if not fast enough your competitors will take over. Then it is the scale at which you do it. And finally, 'sustainability' because we can't depend on government

Dr. R A Mashelkar, FRS National Research Professor, CSIR Bhatnagar Fellow & President, Global Research Alliance

Dr. R. A. Mashelkar is a National Research Professor, a CSIR Bhatnagar Fellow and the President of Global Research Alliance. Dr Mashelkar was the Director General of Council of Scientific and Industrial Research (CSIR) during 1995-2006. He was also the President of Indian National Science Academy (2004-06).

Dr. Mashelkar's research in Polymer Science and Engineering has won him many International laurels. Dr Mashelkar is the third Indian engineering scientist to have been elected (1998) as Fellow of Royal Society (FRS), London. He was elected (2005) Foreign Associate of National Academy of Science (USA), being the only Indian engineering scientist elected so far. He was elected Foreign Member, American Academy of Arts & Sciences (2011); Foreign Fellow of US National Academy of Engineering (2003); Fellow of Royal Academy of Engineering, U.K. (1996); Foreign Fellow of Australian Technological Science and Engineering Academy (2008) and The World Academy of Science (1994).

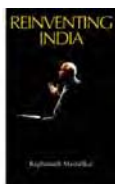
Dr Mashelkar has been a member of Science Advisory Council to the Prime Minister (SAC-PM) set up by successive governments. Deeply connected with the innovation movement in India, Dr Mashelkar is currently a member of National Innovation Council (NInC) and also the Chairman Foundation, Reliance Innovation Council, Thermax Innovation Council and Marico Innovation Foundation.

Recipient of *Padmashri* (1991) and *Padma Bhushan* (2000), 29 Universities have honoured Dr. Mashelkar with honorary doctorates, which include Universities of London, Salford, Pretoria, Wisconsin and Delhi.

Post-retirement, Dr Mashelkar continues to be extremely active. Today, he is an independent Director of many leading Indian companies, from Reliance to Tatas, besides being the Chairman of over 20 key Committees, Boards and Councils. Just within the past year or so, he has published papers in prestigious journals ranging from *Harvard Business Review* to *Proceedings of US National Academy of Science*, besides producing two books '*Reinventing India*' and '*Timeless Inspirator: Reliving Gandhi*', both of which are in their second print.

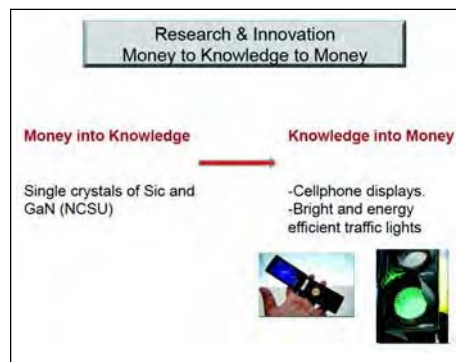
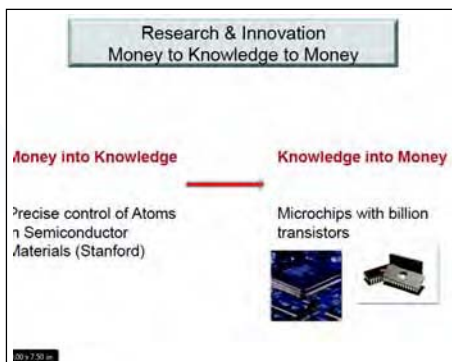
Pleasure:

When Tata Nano is a rare first to the world innovation- not just first to India.



Pain:

When it loses a couple of years in moving plants from Singur to Sanand.





subsidies. The innovation in order to be successful has to be sustainable on its own. Speed, Scale, and Sustainability – that is where we had problems.

Let's get into another fundamental. When we do research, we convert money into knowledge. The government keeps on giving us money and we keep on converting it into knowledge in the form of papers, patents, useful knowledge, not so useful knowledge, breakthroughs and so on. But actually it is innovation that converts knowledge into money. Therefore, the social good that follows afterwards. How do we understand this chain? If you see the rest of the world they have seen this for example: United States of America was probably the world's best innovative ecosystem. Look at the science for example: which is creative without any constraints for pure science and then you end up with a reality check. Look how the breakthrough of transistor took place. For this you require a great bridge through engineering and then you require innovation ecosystem with support of science like National Science Foundation.

Let me give you some examples of the journey of *Money to Knowledge to Money* that constitutes the complete story of research and innovation. Look at money into knowledge: The control

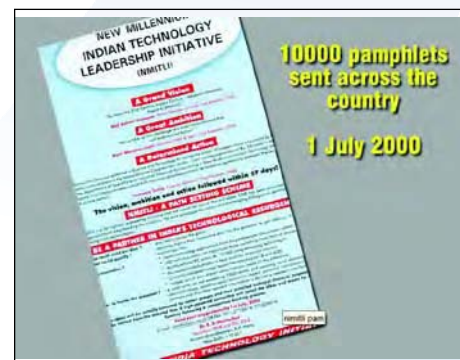
of atoms in semi conductivity was the basic research which was supported by the government. But knowledge was converted into money when we had microchips, with billions of transistors working in the field. Similarly, single crystals of silicon carbide and galvanic nitrate was the science that was done that converted money into knowledge and it led to cell phone displays, bright energy efficient traffic lights; which was converting knowledge into money. This is the journey from *Money to Knowledge to Money*.

The other keyword is 'New Idea.' Innovation is successful exploitation of a new idea. New idea means what? Is it new to India? Is it new to the world? All these ideas that I depicted were new to the world, out of which technologies were created. Innovation chain was completed. We have over a period of time seen that there are some ideas that have been new to the world that we have created. I mean the Ramans, the Ramanujans and S. K. Boses of this world etc. were the people who did that.

But post independence it is seen that bulk of the time we have worked on the ideas that were new to India. But why not, we were in the stage of development. No issues at all. Samir mentioned about drugs, the generic

drugs. If you look at, for example, the contribution that CSIR had as a key player in the generics, it has been phenomenal. Whether it is anti-viral for HIV/AIDS or the whole range of anti-bacterials. It is terrific. It was nothing new to the world but was new to India, and the world benefited from it. For example, some of the anti-retrovirals that we produced made history. I remember when 10,000\$ was the cost of one year's treatment with anti-retroviral drugs. Thanks to the work done in our own laboratories, and Cipla was able to use process engineering and created anti-retrovirals with which 10,000\$ crashed to 300\$ and then to 200\$ and this made a big difference.

Yes, we should be proud of what we have done in the past. But what I want to emphasize is that innovation is a marathon and not sprinting race and, therefore, we must move to new products like Risorine, which made a very clear use of our ancient wisdom and knowledge of Ayurveda. We have used *Trikuta* out of which piperine was extracted as one of the components. The journey started in 1979 when the concept of natural products as bioenhancers was proposed. Piperine was found to be a bioenhancer based on the clue from Ayurveda. Then we had data on the





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preclinical studies, and further we got permission from the Drugs Control General of India for Phase I studies. The Indian patent, the other permissions, then clinical trials and finally the permission for Cadila to manufacture it created a new low dose formulation which is unique, and first to the world. But this journey took 30 years or so. So innovation involves hard work. I want to emphasize that at the end if you want to make a difference you have to work hard. I'm again delighted with the development of Mahindra and CSIR coming together to create this civilian aircraft, it's extraordinary.

My mind goes back to Hansa, 11 May 1998 to be precise, when three important technological events took place including the Pokharan II and the Government decided to declare that as 'Technology day'. I still remember the CSIR Directors' Conference when we all met and the byline that Samir had given at the end was the vision: '*India matters to us, and we want to matter to India*'. On that day it came as voice unison of all CSIR Directors. So, Ladies and Gentlemen, it's a marathon of 24 years! The first point I want to emphasize for India to become – The Innovation Superpower, it must recognize that for concept to commercialization, mind to market place

it is a long strenuous journey.

Nothing comes easy. We have had, of course, public policies like recognizing the importance of public-private partnership. The Hon'ble Minister Shri. P. Chidambaram, the then Finance Minister, made a statement in his budget speech (1997-98): "Closer linkages have to be developed between Indian industries and public funded research laboratories. Hence I propose to allow Government promoted societies recognized by the Department of Scientific and Industrial Research to invest in the equity of private sector companies." These institutions will invest not money but their knowledge and know-how as their equity.

I want to emphasize once again that in innovation, the key points are: speed, scale, and sustainability. And the speed at which we have done things, I think we need to work hard in case we want to become innovation superpower. I said innovation converts knowledge into money. But not all knowledge can be converted into money. It has to be monetizable one. Now patents represent monetizable knowledge. I would say potentially monetizable knowledge. The fact that you have a patent does not mean much actually. Can you actually monetize or not it all depends on several factors.

I'm very happy to see Dr. Sivaram in the audience here. In the history of CSIR, the recent patent successes had origins in the patent filed on 5 May 1992 by Dr. Sivaram of National Chemical Laboratory, Pune. This was followed by what was to be a milestone to the Indian patent history when it showed immense interest. Ladies and Gentlemen, once again I want to go back for a simple reason. When I took over as Director of National Chemical Laboratory in 1989, do you know the number of patents NCL had? Zero. When I say zero, it means zero in 39 years of history. I had a very interesting challenge because when ever we did something new and we went to Indian industries, the Indian industry asked us, have you done it? That confidence was not there, the creative confidence what people say was not there.

Then I said what am I selling? I'm selling knowledge. What is my market? My market is the world. That is where Sivaram, I and others decided that we'll test ourselves out, trying to see whether we can be ahead of the rest of the world, we can sell our knowledge to rest of the world. But certain fundamentals had to be changed. We changed the name of the game. We said not '*Publish & Perish*'. But '*Patent, Publish and Prosper*'. If there is an idea in India,





the wealth created should be in India. No question about that. We said in order to do that we must go for the protection. This was way back in 1989. Creating confidence that yes, we can think ahead of the world is very important.

Today Indian industry in US patent has become stagnant and CSIR has taken a leap forward. But lately, there has been some MNC's surging ahead. US patents are filed from India. So it is the Indian mind, Indian IQ which is creating IP for these people or MNCs. Right! That means Indian mind is capable of creating intellectual property and, therefore, Indian industry might as well do it. I'm happy to see that change is coming up in certain sectors, pharma, auto and so on. I wouldn't worry very much the way that little dip was taken by CSIR because they did the right thing. We are not very discriminate in patent filing. Samir introduced more rigorous processes for validating patents because patents cost money, You have to get returns also. The PCT applications now are prominent before we get into the National phase and, most importantly, the trend is reversing, in the sense that we had 70 plus more patents which are 50 plus more than the last year. I'm quite confident we'll recapture this space and become No.1 once again. I have absolutely no doubt about this.

The other point about wanting to become an innovation superpower, is about recognizing Goddess Saraswati and Goddess Lakshmi. Though their poojas are different there is a route from Saraswati to Lakshmi, which the rest of the world has understood. You see here the picture of Prof. George Whitesides. In Samir's wisdom, he has made him the Founding Professor of AcSIR. He is the most highly cited scientist in the world, but do you know he is also a co-founder in 12 companies with a combined market capitalization of over 30 million dollars. He had no confusion about Saraswati and Lakshmi. How can we do this in India? Our ideas to create wealth for India, for our people, for our society. Can our scientists find route from Saraswati to Lakshmi?

In this very hall, Vigyan Bhawan, I remember Vivek Ranade from NCL getting Bhatnagar Prize from our Prime Minister Dr. Manmohan Singh because he did top science. Look at the company he had set up, the 'Tridiagonal Solutions'. He is a scientist entrepreneur as he has demonstrated that we can create wealth. And Rajesh Gokhale is sitting right here. You received the Bhatnagar Prize for great science that you have done. I'm also proud to see that you have set up 'Vyome'. The issue is how can we multiply the Ranades and

Gokhales over a period of time. Not one or two exceptional examples but in thousands and what kind of ecosystem we create. Once again I'm delighted that this venture centre has come up. This is a CSIR's initiative.

Now what I'm going to say is that alright Rajesh Gokhale will do well, Vivek Ranade will do well. But will India do well? How do we ensure that India does well. Let me tell you an anecdote. Last year in Cambridge on 11 June, the Harvard Business School had invited me to give the Inaugural Lecture and in the morning Ratan Tata got an honorary doctorate. So it was a kind of India day in Cambridge and in the evening in the honour of Ratan Tata there was a dinner that was held and I was invited. A Cambridge Professor was sitting next to me and he pointed towards Ratan and told me Dr. Mashelkar do you realize that you are looking at an Indian who is the biggest employer of British in Britain. Can you imagine an Indian being the biggest employer of British in Britain? But he then actually turned to me after half an hour and said; why is it Dr. Mashelkar that some Indians are doing well, but when will India do well?

India will do well when CSIR 800 succeeds. That is why CSIR has taken this initiative. Through innovation, of course, we achieve more from less for





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more. More performance at a lesser cost, more profit value to the shareholder. But there is an interesting dimension to it, i.e. getting more from less. It is not just profit but for more and more people, the 800 million people we talk about. Who are these people? We are talking about four million people with income less than 2\$ per day and what would they need if their incomes are less than 2\$ a day. They don't need low cost but ultra-low cost solutions. They need not affordability but extreme affordability, you can quite clearly see that. You can't say, oh! you have HIV AIDS! You are poor, oh! Here is 10,000\$ cocktail of anti-virals and because you are poor, we offer you 10% concession. No. It doesn't work. It has to be low by a factor of not 10 but 100. So you are moving from low cost to ultra-low cost. You are moving from incremental innovation to disruptive innovation. That is what India has to specialize in.

Dr. C. K. Prahalad is no more, and this was his last paper with me. I happen to be his co-author. We published a paper in *Harvard Business Review*. This is called 'Innovation Holy Grail'. In that paper we demonstrated the 'MLM Principle', getting More from Less for More people principle. We showed how the fact that India had scarcity and at

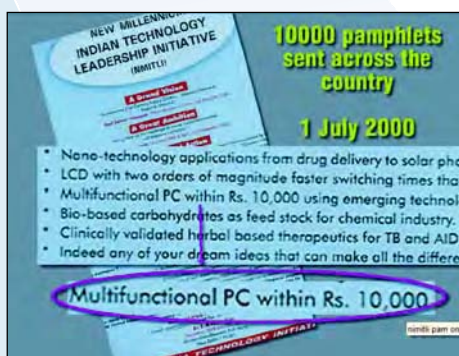
the same time it had an aspiration. Scarcity and aspiration is a deadly combination through which you can do inclusive innovation. I'll just give you an idea about what I mean by not low cost but ultra-low cost, for example, look at this artificial foot which cost 20,000\$. And there are four billion people whose income levels are less than 2\$ per day. How can they afford it? Basically they can't! That is where this 28\$ foot came up. It became headlines, *Time* magazine carried cover page story, that global scourge of land mines left thousands limbless. And two Indians developed 28\$ foot.

Mind you the challenge of making this foot was that you had to be better than an American, because an Indian walked bare foot while an American didn't. An Indian stood in the paddy field for the whole day, an American didn't. An Indian did what you will see in this film for example: just look at this foot. I'm showing this particular example because there is a symbolism in this. How many of you here in Vigyan Bhawan today can run a kilometer in four minutes and thirty seconds? Please raise your hands. The point is that there is a symbolism in this.

CSIR-800 is such a great idea. Why? By providing such solutions you

are making the poor competent. This is the challenge that we have in inclusive innovation. How we can empower these four billion people whose income levels are less than 2\$ a day and to me inclusive innovation is a win-win for a country like India. This foot is better than American foot available at 1000 times low cost. That is where we started supporting programs like Mobilis, 200\$ laptop that was created on 10 May 2005, which is now in the market as DSK Mobilis. D.S. Kulkarni from Pune is manufacturing it. You can see the way they advertise it – inclusive application device. If it was 2000\$ it couldn't reach out to the have-nots. But if it is 200\$ there is a better chance and, of course, now there is a 35\$ laptop which was demonstrated.

The issue is how did this journey from 2000\$ to 200\$ to 35\$ begin? It began again as a CSIR initiative—New Millennium Indian Technology Leadership Initiative in the year 2000. What did we do at that time? We said these are the grand challenges our country is facing. Here is the money, public - private partnership, interest-free loans to the Private Sector but grants to the institutions. When I left as the DG-CSIR more than 100 Private Sectors were in partnership with 250 institutions and I must say that NMITLI has





galvanized the Nation.

But once again just to prove the point, Samir will be ten times better DG, he has created Open Source Drug Discovery (OSDD), which is galvanizing the world. I would say in the last 50 years or so it has actually galvanized more than 4500 users around 30 countries. It is working on something which is very relevant in inclusive innovation agenda of the have-nots, which is understanding TB bacterium through crowd sourcing. You know, it is the 'how' that matters. It is not 'what' that matters.

I remember I was the Vice Chair at the Commission on Intellectual Property Rights, Innovation and Public Health in WHO, and Madam Ruth Dreifuss the former President of Switzerland was the Chairperson. We had proposed it at that time that we should also look at Open Source Drug Discovery. This was five years ago, but nobody knew how to do it. It was Samir you, who came out with this fantastic model on Open Source Drug Discovery and I think that it is going to make a big difference. I believe India will specialize what I call Indian innovation – Indovation, making impossible possible. Look at the prices when you talk about the car *Nano* from 20,000\$ to 12,00\$. A cell phone today at

lowest cost is not 8 cents like in USA but one cent per minute. Laptops, I have given an average price of 100\$ because that covers 200\$ to 35\$. Psoriasis treatment is not 20,000\$ but 100\$ treatment. The cost of Hepatitis B vaccine has come down from 18\$ to 0.4\$, again an incredible feat. Cataract surgery is not 30,000\$ but 30\$.

All these case studies are categorized under technologies innovation, business process innovation, work flow innovations, organization innovations and policy level innovations and it is fascinating how India is able to do that. And you know when India does it, it doesn't do it for its own, it does it for the whole world and that is the way to become superpower. I like to conclude by talking about what do we need to do, because two Hon'ble Ministers are here. What do we need to do from the government side that this happens because we can't rely on a Ratan Tata thinking about *Nano* and creating a car. We have to think as a Nation and try to see what can we do for these 1.2 billion people. We do require conducive government policies. We require new performance major firms, we require the MLM mindsets, more-from less-to more mindsets. By the way MLM has become a buzz word. I mean I wrote about

MLM four years ago, World Economic Forum had a full day session on that, the CII had a full day session on that, the whole world is capturing the essence of MLM because they recognize that this is the way for competitiveness in the new space that is coming up.

Public procurement, guaranteed off-takes, private subsidies for inclusive innovation because initially you have to give it a big start so that it propels itself. Target funding for inclusive innovation, like we said when personal computer was 80,000/- we took out 10,000/- and said make it in 10,000/- and then came the best brains to do it. Fiscal incentives, national and global recognition for game changing into inclusive innovation. I think we need to set this up and target funding at grand challenges. Setting ambitious targets in diverse areas and then early stage financing, and promoting diffusion, prototyping, scaling up, wide scale deployment for all those innovations which belong to this category. I like to end by talking about the leadership that we require. The business of future cannot be traditional, they have to think differently.

Traditional firms say we cannot change our cost structure, Inclusive Innovation firms will say what if we change the way we operate. Traditional



Linking Saraswati to Lakshmi
Prof. George Whitesides (Harvard)

- The Most Cited Scientist in the world.
- Co-founder of 12 companies with a combined market capitalization of over 5.30 billion.
- His science - creating both wealth and social good.

1. Genzyme, USA
2. GelTex, USA
3. Theravance
4. Surface Logix
5. WMR Biomedical
6. Nano-Terra

Highest ever licensing deal by CSIR
New Generation Thrombolytic Molecules
 CSIR-IMTECH license to Nostrum Pharma (Nov 2010)

US\$ 150 million in milestone payments + royalty



firms say 'No' price elasticity, while. Inclusive Innovation firms have to say 'Yes' there is price elasticity. Traditional firms say if you reduce the price the market is unlikely to grow dramatically. Inclusive innovation firms have to say, we have to make it affordable to the poor and, therefore, we'll see an explosive growth after that focus on volumes, low cost, low capital intensity. We cannot say there is no market for hi-tech products. You have to believe that there is a market for high-tech products among the poor. They will pay for it and adopt it rapidly. In 2000 how many mobile phones did we have? Five million, today we have 800 million plus; what an explosive growth! That high-tech product is there in the hands of poor and this is making a big difference simply because of the business process kind of innovations that were done but also the innovations in public policy by the government which took telecom to different sector. It is a combination which can make a difference.

Inclusive innovation leaders have to be different. They have to set up ambitious goals, clear directions. They have to invent the next practices not just best practices. Because if you follow the best practices, you will do what others are doing. No, I'm sorry. You have to take the next jump. Language in inclusive innovation organizations has to change. They have to look at suppliers as partners, employees as innovators and customers as people. For becoming an innovation superpower we science leaders will not be only leading in science but will also be thinking as business leaders.

I tell you honestly, CSIR gave me such an opportunity to grow, to do things,

complete freedom to do and I'm continuing to do that. Samir talked about *PNS*, prestigious journal in which CSIR is publishing. Yes in July 2010, I had a paper in *PNS* but in July 2010, I'm proud to say I had a paper in *Harvard Business Review*. So, not only doing science, thinking science but thinking business. I think that is very important and again CSIR gave me the chance, National Chemical Laboratory gave me the chance in 1976, I remember coming there I did my science. I was lucky enough to become a 'Fellow of Royal Society' in 1998 for the science that I did. Thanks for the CSIR support but in the same year. I got the 'JRD Tata Corporate Leadership' Award which is reserved for the corporate leaders. I remember Narayan Murthy got it, then I got it and then Premji got it. People used to joke Saraswati sandwiched between two Lakshmis. It is entirely possible; it is the mindset issue. I mean examples like Rajesh Gokhale, examples like Samir Brahmachari, Vivek Ranade I think that is what has to happen.

I would like to end quoting what I said in my JRD Tata Corporate leadership lecture. I had said, 'Finally, 1999 should be the year, where we should launch a powerful National Innovation Movement to propel us into the next millennium. The 'I' in India should not stand for imitation and inhibition. It must stand for innovation. The 'I' in IIT must stand for innovation. The 'I' in industry, the 'I' in every individual Indian must stand for innovation. And then I have said it is only this innovative India that will signal to the rest of the world that we are not a hesitant Nation. I'm sure of our place in the global order, but a confident one that



is raring to go. I'm delighted that our Hon'ble President said in her Parliamentary Address that 'the next 10 years would be dedicated in India as a Decade of Innovation'. The Hon'ble Prime Minister has declared that 'the decade of 2010-2020 will be the Indian Decade of Innovation.'

I'm delighted Samir, once again, about the great initiatives you are taking including the innovative clusters to make that decade of innovation, a decade that would transform India, that will change India. You know people call me dangerously optimist, *Durdhamaya Ashawadi*, I have been known like that. I have been a dreamer. I think about these things and you know these question marks against India, I don't like for example: The cover-page in *The Economist*, had: 'Can India fly?' Look at the question mark. What I would like to see at 2022 when CSIR @ 80 happens? What India @ 75 happens is this cover page in *The Economist* – 'India leads the global Innovation Race' with this racing tiger that's what we have to do. Ladies and Gentlemen, therefore, I end from where I began, not with a question mark. I have removed that question mark. I'm not saying 'An Innovation Superpower', but 'India @ 75 - 'The' Superpower.

Thank you very much.



Shanti Swarup Bhatnagar Prize for Science & Technology

Shanti Swarup Bhatnagar (SSB) Prize for Science and Technology was instituted in the year 1957, in the memory of late Dr (Sir) Shanti Swarup Bhatnagar, FRS, the Founder Director of the Council of Scientific & Industrial Research (CSIR). The SSB Prize is awarded each year on the basis of conspicuously important and outstanding contributions to human knowledge and progress, made through work done primarily in India during the five years, preceding the year of the Prize.

Any citizen of India engaged in research in any field of science and technology up to the age of 45 years is eligible to be nominated. Overseas

Citizen of India (OCI) and Persons of Indian Origin (PIO) working in India are also eligible. The SSB Prize, comprising a citation, a cash award of Rs.5,00,000/- (Rupees five lakh only) and a plaque, is given to each person selected for the Award in the following disciplines:

- Biological Sciences
- Chemical Sciences
- Earth, Atmosphere, Ocean and Planetary Sciences
- Engineering Sciences
- Mathematical Sciences
- Medical Sciences
- Physical Sciences

SSB Awardees are also entitled to a special honorarium of Rs.15000/-

(Rupees fifteen thousand only) per month, till superannuation or till the age of 65 years (whichever is earlier). Till 2010, 463 scientists have received the prestigious Shanti Swarup Bhatnagar Prize for Science and Technology. Majority of SSB Awardees have remained in the country and contributed immensely to Indian Science & Technology.

Eleven scientists were selected for Shanti Swarup Bhatnagar Prize for Science and Technology for the year 2011. The DG-CSIR announced the names of the Prizewinners during the CSIR Foundation Day Celebration at Vigyan Bhawan on 26 September 2011.

Winners of Shanti Swarup Bhatnagar Prizes 2011

Biological Sciences

Dr Amit Prakash Sharma

Structural and Computational Biology Group, International Centre for Genetic Engineering and Biotechnology (ICGEB), Aruna Asaf Ali Marg New Delhi – 110067

Dr Rajan Sankaranarayanan
Structural Biology Laboratory, CSIR Centre for Cellular & Molecular Biology (CCMB), Uppal Road, Hyderabad – 500007

Chemical Sciences

Dr Balasubramanian Sundaram

Chemistry and Physics of Materials Unit, Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Jakkur P.O., Bangalore – 560 064

Dr Garikapati Narahari Sastry

Molecular Modeling Group, CSIR Indian Institute of Chemical Technology (IICT),

Tarnaka, Hyderabad – 500 607

Earth, Atmosphere, Ocean & Planetary Sciences

Dr Shankar Doraiswamy

CSIR National Institute of Oceanography (CSIR NIO) Dona Paula Goa – 403 004

Engineering Sciences

Dr Sirshendu De

Department of Chemical Engineering, Indian Institute of Technology, Kharagpur (IITKgp) – 721 302

Dr Upadrasta Ramamurty

Department of Materials Engineering, Indian Institute of Science (IISc), Bangalore – 560 012

Mathematical Sciences

Dr Mahan Mj

School of Mathematical Sciences,

Ramakrishna Mission Vivekananda University (RMVU) Belur, Howrah – 711 202 (WB)

Dr Palash Sarkar

Applied Statistics Unit, Indian Statistical Institute (ISI) 203, B. T. Road, Kolkata – 700 108

Medical Sciences

Dr Kithiganahalli Narayanaswamy Balaji

Department of Microbiology and Cell Biology, Indian Institute of Science (IISc), Bangalore – 560 012

Physical Sciences

Dr Shiraz Minwalla

Department of Theoretical Physics, Tata Institute of Fundamental Research (TIFR), Homi Bhabha Road, Colaba, Mumbai – 400 005



CSIR Young Scientist Awards 2011

Introduced in 1987, these Awards are open to scientists working in CSIR system who have not attained the age of 35 years by 26 September of the preceding year. The Awards are given annually for outstanding contributions made by the young scientists, based on work done primarily in India, in the following fields: Biological Sciences; Chemical Sciences; Engineering Sciences; Earth, Atmosphere, Ocean and Planetary Sciences and Physical Sciences (including Instrumentation).

The scientist should be a regular

employee of CSIR, holding a post of Group IV (Scientist 'B' or above) and should have joined the CSIR laboratory on or prior to 26 September of the previous year. The Awards carry a citation, a plaque and a cash prize of Rs 50,000.

CSIR Young Scientist Awardees are also entitled to a research grant of Rs 5.0 lakhs (Rupees five lakhs only) per annum for a period of five years and an honorarium of Rs 7500/- (Rupees seven thousand five hundred only) per month till the age of 45 years.

Till 2010, 140 scientists (including 17 women scientists) have received the CSIR Young Scientist Award and out of these 15 scientists have been conferred with the prestigious Shanti Swarup Bhatnagar Prize.

For the year 2011, Advisory Committee consisting of eminent scientists recommended the following seven scientists for the CSIR Young Scientist Awards. This year, none was found suitable in Biological Sciences and Physical Sciences (including instrumentation).

CSIR Young Scientist Awardees 2011

Chemical Sciences

Dr Bikash Kumar Jena

The CSIR Young Scientist Award for the year 2011 in Chemical Sciences has been awarded to Dr Bikash Kumar Jena of Institute of Minerals and Materials Technology, Bhubaneswar, for his outstanding contributions in the area of Materials Chemistry particularly in developing methods for synthesizing shape control structures useful for sensing, electrocatalysis and surface enhanced Raman scattering studies.

Dr Dattatraya Hanumant Dethe

The CSIR Young Scientist Award for the year 2011 in Chemical Sciences has been awarded to Dr Dattatraya Hanumant Dethe of National Chemical Laboratory, Pune, for his outstanding contributions in total synthesis of biologically active alkaloids, using novel methodology, which is expected to open

new avenues to synthesis of various types of important molecular architectures.

Dr Rahul Banerjee

The CSIR Young Scientist Award for the year 2011 in Chemical Sciences has been awarded to Dr Rahul Banerjee of National Chemical Laboratory, Pune, for his outstanding contributions in the design of new materials for hydrogen storage and carbon sequestration based on metal-organic frameworks.

Earth, Atmosphere, Ocean & Planetary Sciences

Dr Arun Singh

The CSIR Young Scientist Award for the year 2011 in Earth, Atmosphere, Ocean and Planetary Sciences has been awarded to Dr Arun Singh of National Geophysical Research Institute, Hyderabad, for his significant

contributions to understand the mantle deformation patterns of the Indian plate using seismic anisotropy studies. He has successfully demonstrated the anisotropic nature of the Indian plate and its linkage to the geodynamics of the Himalayan-Tibetan Mountain System.

Dr Rajeev Saraswat

The CSIR Young Scientist Award for the year 2011 in Earth, Atmosphere, Ocean and Planetary Sciences has been awarded to Dr Rajeev Saraswat of National Institute of Oceanography, Goa, for his excellent work on developing unique techniques to infer relative strength of Northeast and Southwest monsoon during the past 140000 years using temporal changes in the morphology and abundance of benthic foraminifers and the first ever quantitative estimation of past sea water temperature changes in the Indian Ocean as well as study of foraminiferal



response to various physio-chemical parameters under laboratory conditions.

Engineering Sciences

Dr Amol Arvindrao Kulkarni

The CSIR Young Scientist Award for the year 2011 in Engineering Sciences has been awarded to Dr Amol Arvindrao

Kulkarni of National Chemical Laboratory, Pune, for his outstanding work on microreactors and designing ability to transform basic understanding into viable processes.

Dr Kaushik Biswas

The CSIR Young Scientist Award for the year 2011 in Engineering Sciences has

been awarded to Dr Kaushik Biswas of Central Glass & Ceramic Research Institute, Kolkata, for his outstanding contributions towards development of rare earth doped fluoride nanocrystal containing transparent glass ceramics which represent promising future materials.



CSIR Young Scientist Awardees with Prof. Samir. K. Brahmachari, Director General, CSIR; Dr. Ashwani Kumar, the Hon'ble Minister of State (IC) for Science & Technology, Earth Sciences and Planning, Shri Vilasrao Deshmukh, the Hon'ble Minister for Science & Technology & Earth Sciences and Vice President, CSIR; Dr. R. A. Mashelkar, and Dr Rajesh Gokhale, Director, Institute for Genomics & Integrative Biology

CSIR Technology Awards 2011

CSIR Technology Awards seek to foster and encourage multi-disciplinary in-house team efforts and external interaction for technology development, transfer and commercialization. These Awards include one each for: (i) Life Sciences; (ii) Physical Sciences including Engineering; (iii) Innovation;

(iv) Business Development and Technology Marketing; and (v) Most Significant CSIR Technology of the Five Year Plan Period (awarded once in five years coinciding with the plan period, to such technology which has proven in the market place, at least for 5 years).

Each Technology Award comprises of a cash prize of Rs. 2 lakh except the award for the “Most Significant CSIR Technology of the Five Year Plan Period” which has a cash prize of Rs. 5 lakh. Besides, a plaque and a citation are also given to the awardees.

For the year 2011, five awards were



given in all the categories following a very stringent criterion:

1 **The Technology Award for Life Sciences was given to CSIR North East Institute of Science and Technology (CSIR-NEIST), Jorhat** for developing *Terminalia chebula* based bioformulation (Muga Heal) as an anti-flacherie agent and a silk fibre enhancer.

The developed method results in healthy growth of larvae and improved cocooning of muga silkworm, *Antheraea assamensis* which comprises of spraying *Terminalia chebula* fruit based bioformulation on the leaves and branches of some plants, *Persea bombycina*. Application of *Terminalia chebula* fruit based bioformulation resulted in enhanced cocoon production with uniform shape, size, improved quality of silk having more reeling filament of unbreakable length. This is a new method applicable to muga silkworm, *Antheraea assamensis*, Helfer for enhancing production of high yield and quality silk. The developed process can be used for the enhanced production of high quality silk fiber and improvement of silkworm cocoons of muga silkworm, (*Antheraea assamensis*) through application of herbal *Terminalia chebula* fruit based bioformulation.

2. **The Technology Award for Physical Sciences including Engineering was given to CSIR Central Institute of Mining and Fuel Research (CSIR-CIMFR), Dhanbad** for developing technology for extraction design of locked-up coal by Highwall Mining in India.

Highwall Mining is a new technology

which can extend the life of opencast mines without disturbing the surface dwellings, and maintaining economy and productivity. It is a remotely operated coal mining technology closely related to underground mining machinery. The method comprises extraction of coal from a series of parallel entries driven in the coal seam from the face of the highwall. These entries are unmanned, unsupported and unventilated.

CSIR-CIMFR is instrumental in adapting this new Highwall Mining technology for Indian geomining conditions by providing scientific extraction design for the three Highwall Mining sites at Ramagundem Opencast Project-II and Medapalli Opencast Project of M/s. Singareni Collieries Company Ltd (SCCL), and Quarry SEB and AB, West Bokaro of M/s. Tata Steel Ltd (TSL). The first Highwall Mining has started operation from 10 December 2010 at Ramagundem Opencast Project-II of SCCL. This made over 5 Million tonne of locked-up coal immediately viable for extraction by Highwall Mining, thus adding to the energy supply of the Nation.

CSIR recognizes the contribution of M/s. Advanced Mining Technology Pvt. Ltd., Hyderabad and M/s. Delta Construction Systems Ltd., Hyderabad in implementing the extraction design of CSIR-CIMFR for recovering huge amount of locked-up coal using ADDCAR-make Highwall Mining machine.

3. **The Technology Award for Innovation was given to CSIR Central Leather Research Institute (CSIR-CLRI), Chennai** for developing salt free tanning technology.

The developed technology eliminates brackish water associated during the process of tanning of hides and skins. It ensures uniform distribution of chromium throughout the hide or skin and high quality leather, which has gained user acceptance. Customarily, prior to the actual process of chrome tanning, which is the primary method used in tanning industry, the pH of hides and skins is lowered to about 2.5-3.0 by use of acid through a process known as 'pickling'. Lowering of pH helps in the facile penetration of the mineral tanning agent into the substance. Salt is added to negate the effect of swelling of animal tissues caused by acid addition, which would otherwise make the leather physically unstable. While addition of the salt in the above process helps in retaining the strength and quality of leather, it leads to high amount of TDS (total dissolved solids) with respect to pollution standards in the effluents during treatment at a later stage.

Even after a huge financial investment to treat effluent systems, the present tanning industry has been struggling on for years to meet the proper regulatory standards of TDS in effluent systems. The developed salt free technology has not only eliminated the usage of salt, but also shortened the process by avoiding the steps of pickling and then again basification to make the medium neutral.

4. **The Technology Award for Business Development and Technology Marketing was given to CSIR Indian Institute of Petroleum, Dehradun (CSIR-IIP)** for significantly enhancing the business through



commercialization of its technologies against stiff global competition and marketing of its knowledgebase.

CSIR-IIP played a vital role in Nation's quest towards the scientific and technological leadership; providing globally competitive, sustainable and energy efficient ecofriendly technologies/products/scientific solutions to energy and allied sectors particularly petroleum (upstream, refineries, petrochemicals) and other industries including Strategic/Defence.

CSIR-IIP has adopted several new initiatives for establishing national and international linkages with prospective industrial, academic and research clients to continually enhance collaboration, cooperation and external cash flow; reach out to new customers; share knowledgebase; and offer consultancy and S&T services to meet the growing needs of the industrial sector; and enhance

the valuation of intangible assets. Over the last 3 years CSIR-IIP's earnings from industry have increased significantly.

5. The Technology Award for Most Significant CSIR Technology of the Five Year Plan Period was given to CSIR National Chemical Laboratory, Pune for developing complete process technology for manufacture of 2-acrylamido-2-methyl-1-propane sulfonic acid (ATBS).

2-acrylamido-2-methyl-1-propane sulfonic acid (ATBS) is one of the speciality monomers used in field of Enhanced Oil Recovery Application, Paint industry, Water Treatment, Acrylic/Acrylonitrile Fibre dye-pick up application, Personal care applications, Medical polymers etc. There are very limited players in the field of speciality monomers in India.

CSIR-NCL has developed complete

one pot process technology for manufacture of 2-acrylamido-2-methyl-1-propane sulfonic acid (ATBS) wherein complete conversion of isobutylene is achieved. After recovery of excess acrylonitrile, the effluent stream is subjected to side product recovery such as Tertiary Butyl Acrylamide (TBA) recovery, the balance effluent stream is polymerized and the polymer is dried to get powder useful as Construction Additive/Chemical. This has made process economically viable and free of pollution.

The process was licensed to M/s Vinati Organics Limited (VOL), Mumbai. CSIR-NCL has received Rs. 40 lakh as license fee and Rs. 186 lakh as royalty after commercialization of the process. The present capacity of VOL's commercial plant is 18000 Tonne per annum of ATBS and this plant is 2nd largest plant in the world for producing ATBS.



CSIR Technology Awardees with Prof. Samir. K. Brahmachari, Director General, CSIR; Dr. Ashwani Kumar, the Hon'ble Minister of State (IC) for Science & Technology, Earth Sciences and Planning, Shri Vilasrao Deshmukh, the Hon'ble Minister for Science & Technology & Earth Sciences and Vice President, CSIR; Dr. R. A. Mashelkar, and Dr Rajesh Gokhale, Director, Institute for Genomics & Integrative Biology



CSIR Diamond Jubilee Invention Award for School Children 2010

In order to enhance creativity amongst school children, CSIR announced for the first time Diamond Jubilee Invention Award for School Children on 26 April 2002, which is celebrated as *World Intellectual Property Day* throughout the world. The objectives of this competition are: to capture creativity and innovativeness amongst school children and create awareness about IPR.

There are 60 Awards to be given each year. The first prize winner becomes eligible for WIPO's Young Inventor's Award, carrying a medal and a certificate besides cash prize of Rs.50,000/-. For the year 2010, only two inventions were selected out of 353 proposals received for the various categories of prizes to be given. No First Prize is however being given. The winner gets a cash prize, trophy and a certificate.

Category: 4th Prize; Rs.10,000/-

Awardee Name & School:

Master Shantanu Gangwar,
Delhi Public School, R. K. Puram, New Delhi

Invention: AN INFRA-RED BASED PATH GUIDANCE SYSTEM (SMART STICK) FOR BLIND PERSONS.

The invention relates to a walking stick which can be innovatively

converted into a smart stick as an infra red (IR) based path guidance system for early detection of objects by blind persons. The smart stick not only helps the blind person in walking but also helps him in early warning of an obstacle. The smart stick is light, cheap, safe and easy to use

Category: 5th Prize; Rs.5,000/-

Awardee Name & School:

Master Ankit Kumar Mittal,
Dr Raghubir Parkash, S. D. Sen Secondary School, Barnala, Punjab.

The invention relates to modified lock for Zips which are used in travel bags, kit bags, jackets etc. Normally it is very difficult to change the defective lock of the zip. The traditional lock of the zip which is one piece can be designed in two pieces and can be assembled with screws.



Winners of the CSIR Diamond Jubilee Invention Award for School Children with Prof. Samir. K. Brahmachari, Director General, CSIR; Dr. Ashwani Kumar, the Hon'ble Minister of State (IC) for Science & Technology, Earth Sciences and Planning; Shri Vilasrao Deshmukh, the Hon'ble Minister for Science & Technology & Earth Sciences and Vice President, CSIR; Dr. R. A. Mashelkar, and Dr Rajesh Gokhale, Director, Institute for Genomics & Integrative Biology



Prof. G. N. Ramachandran Gold Medal for Excellence in Biological Sciences & Technology

CSIR instituted a Gold Medal in 2004 in the fond memory of Prof. G. N. Ramachandran, a pioneer of protein chemistry & the Founding Father of Structural Biology in India, for recognizing excellence in the interdisciplinary subject/field of Biological Sciences & Technology.

Till the year 2008, five scientists have been bestowed with this prestigious Award: Prof. M. Vijayan (2004), Prof. P Balaram (2005), Prof. T. P. Singh (2006), Prof. C Ramakrishnan (2007), Prof. M. R. N. Murthy (2008).

For the year 2009, 2010 and 2011, the Advisory Committee recommended the following scientists for Prof. G. N. Ramachandran Gold Medal.

Prof. R. V. Hosur (2009)

Tata Institute of Fundamental Research, Mumbai

Prof. R.V. Hosur of Tata Institute of Fundamental Research, Mumbai, has made outstanding contribution in deciphering protein structure and dynamics using Nuclear Magnetic Resonance (NMR) spectroscopy. His research over the last decade pertains to multi-dimensional NMR, protein folding and self association, DNA structure and dynamics. He has developed new NMR pulse sequences to solve complex macromolecular structures providing new insights.

Dr Dinakar M. Salunke (2010)

Regional Centre for Biotechnology, Gurgaon

Dr Dinakar M. Salunke of Regional Centre for Biotechnology, Gurgaon, has addressed fundamental issues pertaining to the specificity of antigen recognition and provided structural insights into the maturation of antibody response using elegantly designed crystallographic studies. He has also elucidated diverse facets of molecular mimicry in the context of humoral immune response.

Prof. Jayant B. Udgaonkar (2011)

National Centre for Biological Sciences, Tata Institute of

Fundamental Research, Bangalore

Prof. Jayant B. Udgaonkar of National Centre for Biological Sciences, Tata Institute of Fundamental Research, Bangalore, has made pioneering contributions to the understanding of protein folding, stability, dynamics and aggregation. His path-breaking contribution showing that polypeptide chain contraction and collapse precede structure formation during folding, has received international acclaim. His recent finding about the pathways for the aggregation of the prion protein provides a lucid molecular explanation for a number of neuro-degenerative disorders.



Winners of the Prof. G.N. Ramachandran Gold Medal for Excellence in Biological Sciences & Technology with Prof. Samir K. Brahmachari, Director General, CSIR; Dr. Ashwani Kumar, the Hon'ble Minister of State (IC) for Science & Technology, Earth Sciences and Planning; Shri Vilasrao Deshmukh, the Hon'ble Minister for Science & Technology & Earth Sciences and Vice President, CSIR; Dr. R. A. Mashelkar, and Dr Rajesh Gokhale, Director, Institute for Genomics & Integrative Biology



IICB Scientist Honoured with Prestigious *J. C. Bose Fellowship 2011*

Dr. Chitra Mandal, Scientist H, IICB, Kolkata has recently been awarded prestigious J. C. Bose Fellowship as a recognition of her active outstanding performance and contribution to Science in 2011. She has made sustained contribution in the field of Glycobiology and Immunology in deciphering the role of carbohydrates in host's immune system both in leukemia and visceral leishmaniasis for their application both in applied and basic medical research. She has transferred three technologies for this work.

Dr Mandal and her group have demonstrated *O*-acetylated-sialoglycolipids and sialoglycoproteins on cancer cells as universal biomarkers in leukemia. A new era of signalling by disrupting the fine tuned balance of sialylating enzymes has been established in leukaemia. She has identified two potent herbal molecules and putative

target molecules against glioblastoma, leukemia, cervical, pancreatic and lung cancer cells.

Dr. Mandal has successfully utilized her knowledge in identification of a unique modified sialoglycoproteins exclusively induced on erythrocytes of patients and developing an antigen-based diagnosis of visceral leishmaniasis. Her expertise in the field of glycobiology has made another outstanding observation by demonstration of glycosylation in C-reactive protein in pathological conditions and their modulation in host's innate immunity. Her research contribution includes 116 research papers including reviews, book chapters in reputed International and National journals.

Dr. Mandal is an elected Fellow of all three prestigious Academies i.e. Indian National Science Academy

(F.N.A.) in 2010, The Indian Academy of Sciences (F.A.Sc) in

2005 and The National Academy of Sciences (F.N.A.Sc) in 2004. She has also been elected as the fellow of West Bengal Academy of Science and Technology (2010). She has received several Awards like *Senior Scientist Oration Award* (2008) by the Indian Immunology Society, BioTech Product and *Process Development and Commercialization Award* (2005) by DBT, '*Kshanika Oration Award*' (2002) by the ICMR, '*Smt Chandaben Mohanbhai Patel Industrial Research Award*' (2000) by Vividhlaxi Audyogik Samshodhan Vikas Kendra (VASVIK) and '*The P B Rama Rao Memorial Award*' (2001) by SBC.



CLRI Scientist Honoured

Dr Vadivel Kasi Rao, Documentation Officer EII/Associate Professor & Head, Documentation Division, Central leather Research Institute (CLRI), Chennai has been recently presented the National Award for Best Research Paper at the recently held National Education Conference on "Professional Development & ICT in Education", organized by Gandhi P.R. College, Bhopal and Indian Society for Education and Environment (ISEE), Bhopal Chapter. Dr Rao's Award-winning research paper was entitled, *Information and Communication Technologies (ICTs): Its Impact on Inclusive Education for Rural Community Sustainable Development*.



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