

**16th National Children's Science Congress (NCSC),  
Dimapur, Nagaland**

**27 December 2008**

**Knowledge makes you great : “It does not matter who you are”**

My greetings to all of you participating in the 16th National Children's Science Congress with the focal theme “Planet earth- Our Home, Explore, Share and Care in this beautiful environment. What a great opportunity for all of you from different parts of the country to be in the beautiful scenic Nagaland with the most appropriate theme of nurture nature. This vibrant environment of natural beauty, folklore music, brave ancestry and fashion design gives the right backdrop for discussing a bright future in science for development preserving the rich heritage and the human-value system. Innovation is enabled by beautiful environment. As you hear about scientific challenges for the future, as you discuss with colleague scientists of your dreams, please keep one message clear, how do we maintain the pristine purity of nature as you see in Nagaland, even as we make advances in development.

I would like to assert that “No youth today need to fear about the future”. How? The ignited mind of the youth is the most powerful resource on the earth, under the earth and above the earth. If you have an aim in life, continuously acquire the knowledge, work hard with confidence to win and have the confidence to defeat problems and succeed with righteous heart, you will definitely succeed in all your missions. It does not matter who you are.

Today, I would like to talk about the life of three great scientific minds that have made a difference to the society. You will see what type of challenges they had to face during their childhood, what type of life they were blessed with, their struggle and how they achieved their goal and the inspiring story behind

their lives. Hence, I will be discussing on the topic “**It does not matter who you are**”.

### **Birth of Creativity in a difficult situation**

Mario Capecchi had a difficult and challenging childhood when his mother was imprisoned during World War II. He began four years of wandering when he was four and a half years old. He sometimes lived in the streets, sometimes joining gangs of other homeless children, sometimes living in orphanages and most of the time hungry. He spent the last year in the city of Reggio Emilia, hospitalized for malnutrition that would never be cured, since he, like the other children, was given only one cup of coffee and a small crust of bread every day. He wanted desperately to escape. Scores of beds lined the rooms and corridors of the hospital, one bed touching the next. No sheets, no blankets. That was where his mother found him on his ninth birthday after a year of searching.

Within weeks, the Capecchi and his mother sailed to America to join his uncle and aunt. The day after he arrived, his uncle and aunt sent him to the third grade, although he'd never before been to school. Nor did he speak English. Capecchi became very active in sports, playing on four varsity teams: football, baseball, soccer and wrestling, where he was team captain. Capecchi says that sports are important from a psychological point of view which enables you to learn about human psychology, things that you later transfer to relationships: perseverance, pushing yourself beyond certain limits. The sense of social responsibility permeating the atmosphere at school also influenced him. First Capecchi started with political science, but after one political science class, he found there wasn't anything to bite on. He switched to science and math, graduating in 1961 with a double major in Physics and Chemistry. Physics lacked the excitement in his time that Capecchi sensed in a new science being developed: molecular biology. He knew he would switch to molecular biology in graduate school, on the advice of James D Watson. Watson taught him that he

should not be bothered about small things, since such pursuits are likely to produce only small answers

After earning his doctorate in biophysics in 1967, he spent on the Biochemistry faculty at the Harvard School of Medicine, and then his objective was to do gene targeting. The experiments started in 1980, despite NIH's refusal to fund the work. By 1984, Capecchi had clear success. Three years later, he applied the technology to mice. In 1989, he developed the first mice with targeted mutations. The technology created by Doctor Capecchi allows researchers to create specific gene mutations anywhere they choose in the genetic code of a mouse which was considered not worthy of pursuit by National Institute of Health. It may seem like science fiction, but by manipulating gene sequences in this way, researchers are able to mimic human disease conditions on animal subjects. What the research of Mario Capecchi means for human health is nothing short of amazing, his work with mice could lead to cures for Alzheimer's disease or even Cancer. The innovations in genetics that Mario Capecchi achieved won him the Nobel Prize. What the message? The message here is:

“When you wish upon a star,  
Makes no difference who you are  
Anything your heart desires  
Will come to you”

Now let me talk about Srinivasa Ramanujan, a genius well ahead of time.

## **A genius well ahead of time: Failure did not deter him**

Ramanujan, born and raised in Erode, Tamil Nadu, first encountered formal mathematics at the age of ten. He demonstrated a natural ability at mathematics, and was given books on advanced trigonometry by S. L. Loney. He mastered this book by age thirteen, and even discovered theorems of his own. He demonstrated unusual mathematical skills at school, winning many awards. By the age of seventeen, Ramanujan was conducting his own mathematical research on Bernoulli numbers and the Euler–Mascheroni constant. He received a scholarship to study at Government College in Kumbakonam. He failed his non-mathematical coursework, and lost his scholarship. Srinivasa Ramanujan lived only for 33 years and did not have formal higher education or means of living. Yet, his inexhaustible spirit and love for his subject made him contribute to the treasure houses of mathematical research – some of which are still under serious study and engaging all-available world mathematicians' efforts to establish formal proofs.

Ramanujan was a unique Indian genius who could melt the heart of the most hardened and outstanding Cambridge mathematician Prof G H Hardy. In fact, it is not an exaggeration to say that it was Prof. Hardy who discovered Ramanujan for the world. Professor Hardy rated various geniuses on a scale of 100. While most of the mathematicians got a rating of around 30 with rare exceptions reaching to 60, Ramanujan got a rating of 100. There cannot be any better tribute to either Ramanujan or to Indian heritage. His works cover vast areas including Prime Numbers, Hyper geometric Series, Modular Functions, Elliptic Functions, Mock Theta Functions, even magic squares, apart from serious side works on geometry of ellipses, squaring the circle etc. One of the tributes to Ramanujan says that, 'every Integer is a personal friend of Ramanujan'. He was elected a Fellow of The Royal Society (F R S) in 1918.

Ramanujan used to say “An equation means nothing to me unless it expresses a thought of God”. For him the understanding of numbers was a process of spiritual revelation and connection. In his investigations into pure mathematics, he drew extraordinary conclusions that mystified his colleagues, but were usually proven, eventually, to be right. He opened a universe of theory that still today is reaping applications. The landscape of the infinite was to Ramanujan a reality of both mathematics and spirit. His love for numbers led Ramanujan to number theory. Despite being affected by chronic health problems, he was breathing Mathematics throughout his short life and his genius was recognized internationally. So friends you saw, how great creative minds, gave problem to the problems to succeed through the instrument of knowledge.

### **Million tree Mission:Planting of trees is the planting of ideas**

I would like to talk about Prof Wangari Maathai’s who has a passion for environment and bio-diversity and is contributing to the sustainable development and growth of planet Earth. Wangari Maathai Wangari Muta Maathai was born in Nyeri, Kenya (Africa) in 1940. She was the first woman in East and Central Africa to earn a doctorate degree and to become chair of the Department of Veterinary Anatomy and an associate professor. Wangari Maathai was active in the National Council of Women of Kenya and was its chairman in 1981-87, where she introduced the idea of planting trees with the people and continued to develop it into a broad-based, grassroots organization whose main focus is the planting of trees with women groups in order to conserve the environment and improve their quality of life. Through the Green Belt Movement Noble Laureate Prof Maathai has evolved innovatively a movement with 600 community networks across Kenya and branches in 20 countries resulting in the plantation of 31 million trees. She and the Green Belt

Movement have received numerous awards, most notably The 2004 Nobel Peace Prize.

Prof Maathai gives a new meaning to the important act of planting a tree by extending it to the whole life, when she says, “the planting of trees is the planting of idea.” She highlights the qualities of patience, persistence and commitment in planning and realizing a future, which is what we learn when we plant trees and wait for them to yield fruits for the next generation. She believes that no matter how dark the cloud, there is always a thin, silver lining, and that is what we must look for. The silver lining will come, if not to us then to the next generation or the generation after that. And may be with that generation, the lining will no longer be thin. India values Prof Maathai’s involvement and contribution in furthering the relationship between India and Kenya and had the privilege of honouring her with the Jawaharlal Nehru Award for International Understanding for the year 2005. She concludes Nobel Lecture on December 10, 2004 like this: quote, “As I conclude I reflect on my childhood experience when I would visit a stream next to our home to fetch water for my mother. I would drink water straight from the stream... I saw thousands of tadpoles: black, energetic and wriggling through the clear water against the background of the brown earth. This is the world I inherited from my parents.

Today, over 50 years later, the stream has dried up, women walk long distances for water, which is not always clean, and children will never know what they have lost. The challenge is to restore the home of the tadpoles and give back to our children a world of beauty and wonder.” Unquote. What a message for “nature nurture nature”!

What we have seen in the above three lives establishes how one can become great, irrespective of the circumstances he or she is put into, the ability

to overcome problems and achieve your mission and carving out a unique mission which others have not done so far. Dear friends, all of you should imbibe some of these unique qualities which will enable you to excel in the field of your choice.

Dear Children, what will be the type of India you will see when you children grow into your prime age. I visualize India in the year 2020 to have the following distinctive competitive profile. Now, let me give my visualization of India during the year 2020.

### **Distinctive profile of the nation**

1. A Nation where the rural and urban divide has reduced to a thin line.
2. A Nation where there is an equitable distribution and adequate access to energy and quality water.
3. A Nation where agriculture, industry and service sector work together in symphony.
4. A Nation where education with value system is not denied to any meritorious candidates because of societal or economic discrimination.
5. A Nation which is the best destination for the most talented scholars, scientists, and investors.
6. A Nation where the best of health care is available to all.
7. A Nation where the governance is responsive, transparent and corruption free.
8. A Nation where poverty has been totally eradicated, illiteracy removed and crimes against women and children are absent and none in the society feels alienated.
9. A Nation that is prosperous, healthy, secure, devoid of terrorism, peaceful and happy and continues with a sustainable growth path.
10. A Nation that is one of the best places to live in and is proud of its leadership

**Integrated Action for developed India:** To achieve the distinctive profile of India, we have the mission of transforming India into a developed nation. We have identified five areas where India has a core competence for integrated action: (1) Agriculture and food processing (2) Education and Healthcare (3) Information and Communication Technology (4) Infrastructure: Reliable and Quality Electric power, Surface transport and Infrastructure for all parts of the country and (5) Self reliance in critical technologies.

Dear friends, each one of you should carve out one unique area among the 10 distinctive profiles, where you can make an important contribution for realizing the Distinctive profile of the nation

**Bio Diversity in India:** Dear Children, a nation's strength predominantly reside in its natural and human resources. In natural resources, India is endowed with a vast coast-line with marine resources and also oil wealth. In minerals, apart from conventional material resources, it is well-known that India has the largest deposits of Titanium, Beryllium and Tungsten. India ranks among the top few nations having a rich bio-diversity. Particularly, in the herbal area there are potential applications for developing multiple products for nutrition, prevention and cure of diseases.

**Bio Diversity – Technology Prosperity Matrix:** One of the core competences of India is Bio Diversity. Bio Diversity and technology combined will yield value added products. In biodiversity, few countries like INDIA, CHINA, BRAZIL, INDONESIA, and MEXICO are very rich. Technology is needed for developing a genetically engineered seed or transforming a molecule extracted from the herb into a drug. Today technologically advanced nations in this field are USA, JAPAN, FRANCE, GERMANY and UK. What is needed is high productivity in farming, biodiversity material and technology integrated. There are some regions in desert nations where biodiversity and tech are poor. Today there is no nation having rich bio-diversity and high technology together. Therefore the challenge for youth like you is the is the Integration of technological best and abundant biodiversity of India.

**Earth-moon-mars complex:** Friends, through this children's science congress you have an opportunity to give a new vision in science innovations and certainly contribute for transformation of the world. All of you are aware how the scientists and engineers of ISRO have made the country proud by their path breaking accomplishments in Chandrayaan Mission recently. The precise launch, crucial orbit raising operations, the perfect lunar orbit insertion, pay load operations and precise guiding of the Moon Impact Probe (MIP) to the specific location of their choice have all been demonstrations of disciplinary and interdisciplinary skills in this high tech area and acknowledged by the world.

I personally witnessed the MIP operations along with the confident, cautious and jubilant faces of the young and experienced. How many different types of hardware and software systems these scientists have perfected in a short duration of five years for onboard computers of Chandrayaan, mission planning and simulations, spacecraft tracking,

payload data processing, space craft check out and launcher operations. How did they succeed? ISRO engineers thought it is possible to take up the challenges of such a complex mission. They not only have completed a successful mission, but have triggered many minds to take up innovative missions of their lives to explore the earth-Moon-Mars complex.. I am sure the children's science congress can create a new vision challenges for the young minds of India.

**Clean habitat is my goal :** The status of environmental cleanliness is one of the indicators of development of a nation. As a nation, we have to keep our environment clean and tidy and it has to start from the home. This is essential for better health conditions of all the citizens and also for presenting a wholesome and aesthetic atmosphere for us. It is essential that we keep all our places of worship and rivers clean and tidy to preserve their innate divinity. Students can promote a clean habitat movement in their home and surroundings and participate in imparting the awareness amongst the rural and urban population leading to a clean nation. Clean homes lead to clean villages, clean villages will lead to clean districts, clean districts will lead to clean states, and clean states make a clean nation.

**Navigation of time :** As you all know, the earth rotates on its own axis once in a day having 24 hours or 1440 minutes or 86400 seconds. Earth itself orbits around the sun. It takes nearly one year for an orbit. With the completion of one rotation of earth around the sun, your age is added by one year as you are living on planet earth. Seconds fly, minutes fly, hours fly, days fly and years fly. We have no control over it. The only thing that we can do is, while the time flies, we can navigate the time. "Let not thy winged days, be spent in vain". Let us all make the small beginning which will create a big change as has been demonstrated by Nobel laureates. For example, as a first step, let us

work on the mission of planting billion trees as a token of contribution for improving the environment.

Planting of billion trees: India has over 200 million children in the age group of 5-17 years. If each child plants five trees and nurtures, we will have one billion additional trees within five years time, which can make a big difference to the atmosphere. Hence, I would suggest that each one of you should join the mission of planting billion trees in India.

**Conclusion:** Thus the 'Nature – Nurture' philosophy holds good even in this Genomic Era: 'Genes' what we inherit from our parents is the basis; a beautiful 'building' is built over it, be it sports, arts, culture, science or any unique creation, the environment plays a crucial role in shaping the destiny of the individual and leading to excellence. It is just the opportunity that makes Man. All children when they are born are equally poised to become a great scholar or an artist or scientist or a great sportsman.

I am sure, the 16th National Children's Science Congress is a forum, that will ignite the minds of youth with a thought that **"When you wish upon a star, makes no difference who you are, anything your heart desires, will come to you"**. Definitely children's science congress should be the mechanism to inspire the youth for achieving excellence in all their missions.

My greetings and best wishes to all of you participating in the National Children's Science Congress for success in all your scientific innovations.

May God bless you.

## **Eight point Oath**

1. Science is a life time mission. I will work, work and work and succeed.
2. Wherever I am, a thought will always come to my mind. That is what I can innovate, invent or discover.
3. I will always remember that “Let not my winged days, be spent in vain”.
4. I realize I have to set a great scientific goal that will lead me to think high, work and persevere to realize the goal.
5. My greatest friends will be great scientific minds, great teachers and great books.
6. I firmly believe that no problem can defeat me; I will become the captain of the problem, defeat the problem and succeed.
7. I will work and work for removing the problems faced by planet earth in the areas of water, energy, habitat, waste management and environment through the application of science and technology.
8. My National Flag flies in my heart and I will bring glory to my nation.