


**Address
by the
Chief Guest**



Address by Prof. Samir K. Brahmachari, Director General, CSIR as Chief Guest on the occasion of 42nd Convocation of NBU on 08 April 2010

Preparing for Leadership of Tomorrow

His Excellency, Shri M. K. Narayanan, Honorable Chancellor, North Bengal University; Prof. Arunabha Basumajumdar, Vice Chancellor; Prof. Ananda Mukhopadhyay, Dean of the Faculty of Science; Heads of the various Departments; distinguished invitees; all the students graduating today, ladies and gentlemen.

You are indeed lucky to have such a sprawling campus set in such beautiful and green surroundings. I am lucky too...to be addressing you- the bright young people who are assembled here to receive the formal degree of graduation. The Convocation is a watershed event in a person's life. I am indeed privileged to be sharing it with you and with your distinguished teachers who have worked so hard to equip you to be the leaders of tomorrow.

This is an exciting moment for all of you who are here to receive your degrees. I can sense the excitement even from the dais. The faces I see from here are sparkling. The air is filled with hope. The atmosphere is charged. This is not surprising because Graduation is a major academic milestone in an individual's life. The degree is something that will abide for all time. Nothing and nobody can take it away. It is the key that unlocks the door to higher studies and future careers. Your perusal of Goddess Saraswati will eventually lead to Goddess Lakshmi. You will soon be treading on un-trodden ground and exploring the boundaries of your capabilities. Every student who is here today knows this. This is the reason of the buoyant atmosphere and the source of the "buzz" in the air.

However, this vibrant aura, real as it is this moment; is also ephemeral. It will soon vanish! It will last only as long as the last student receives the degree and leaves the hall. What I say is not a paradox. I mean to emphasize the point that Education is a life-long process and the Graduation ceremony is a brief and formal recognition that the student is ready to step forward.

The University of North Bengal confers degrees in Science, Arts, Commerce and Law and so, I am pretty sure that in the audience there are budding scientists, young scholars in different fields of the Arts and also, nascent lawyers. Even as they sit in adjacent seats awaiting their respective degrees it is amazing to realize what a wonderfully diverse group this is and how, every individual student views the world in his or her own way. It is this individual vision that has guided the student's choice of subjects and which will continue to guide their paths in the future.

Although there are differences in the subjects that the students seek to pursue, their path is the same. It is the pursuit and use of knowledge. Education is a never-ending journey. While inborn love for the subject, or talent, is the point where the journey begins, it is the formal process of learning that sets the feet firmly on the path. The guidance of the gurus facilitates progress. The student's dedication and hard work accelerates the pace. In time, the student

acquires mastery over the subject. This in turn, opens up new vistas of thought and understanding. Life then becomes a never-ending process of discovery, development and growth.

Lucky to be Here

I began by saying that you were lucky to enjoy such a wonderful campus. However, you are far luckier than that! You are lucky to have been born as an Indian at this particular juncture of time and space. You are what I call, the post-Maruti generation...as opposed to the India of the Ambassador and Fiat car era when I was your age. Cars are just a metaphor. What I actually mean to emphasize is that you belong to an era that gives you many options; an incredible variety of choices and opportunities. You are a part of post-modernism in the modern era. You do not need to conform. You are free to strike out in whichever direction you want. For you, even the sky is not the limit—you can go beyond. The vast expanse of space is your domain; if you so want!

This freedom; this liberty; this opportunity is truly good fortune that those born even just a couple of generations ago did not enjoy to any great degree. The circumstances greatly enhance your potential just as tail-winds aid flight. The impetus of the improved situation will, together with your own realized potential, guide you to fly even higher and faster. You are entering a new life and there will be many exciting opportunities ahead. You are lucky that you have been born in the right country, at the right time and in the right age.

Today a click of the computer key puts us in touch with almost anyone we would like to name. Video-conferencing has put an end to the dictates of geography and the hassles of travel...it is indeed now a very small world. A scientific journal that would take weeks, even months, to reach the University library is now available online as soon as it is published overseas. This brings availability of resources onto a level playing ground as far as access to information is concerned.

Of course, to today's generation I should not be talking about level playing fields—you know it already. In the IPL matches, members of Test Teams that play against one another play as fellow Team mates!

The Human Potential

The Biology students sitting here already know that taxonomically, human beings are called *Homo sapiens sapiens*. It means Intelligent Man... and to be gender sensitive, let me add that this definitely includes the Ladies too! Latent in the name is the recognition that we are Intelligent and that perhaps this is the trait that distinguishes our species from others.

- However, what really distinguishes us from all the other species on Earth is that our minds can feel wonder. Be it a sunrise or the secrets of nuclear fission...we are able to taste wonder.
- We have the power to dream; our minds can go anywhere. And where our minds go...our achievements invariably follow.
- We have the ability to question. We do not merely accept...we seek to know the reason why.

- We actively go in search of the truth. We spend entire life-times searching for answers to the questions that we ask.
- In this search no sacrifice is too big. The search for truth is a quest all of us embark on...howsoever long or short the journey.
- We are blessed with an enormous ability to join hands, to network, to plan ahead, to organize and to pass on knowledge.

The Human Heritage

Each generation inherits the combined knowledge pool of all previous generations. Each new generation builds on this knowledge pool—correcting it and enhancing it as time goes on. We are, as far as I know, the only species that records all it learns. We are the only species that can leave behind records of acquired knowledge even as individuals die. Thus we do not need to reinvent the wheel every generation. Our educational institutes give us an encapsulated version of the entire knowledgebase in the field. It is a way to transcend time.

We have inherited a grand heritage. The entire repository of human achievement is ours as a birthright. However, whether it is spelt out or not the responsibility of using this knowledge wisely now rests on your shoulders. You will have to have the wisdom to make the right choices and the courage to forge ahead. It is not a difficult task for, as a species, we have an instinctive understanding and the capability to distinguish between right and wrong. If we let our innate human spirit guide us, we cannot go wrong and it helps to be aware of our history.

Trend- Spotting in Science

A study of Indian Science shows us that till the 1950s science was mostly driven by gifted individuals who were passionate about their work. With World War II (more specifically, after the Manhattan Project) many things changed; most importantly, the scientific landscape of the world.

In India, Independence was a crucial turning point and the milestones of Indian science are easy to spot. As a nascent nation, the emphasis was on Self-Reliance.

From the 1950s to around the 1970s Indian science strove to meet not just the needs but also the expectations of the people. Indelible ink, pesticides and Swaraj tractors were developed by CSIR. From the 1970s to the 1990s the fledgling nation sought to test its new-found wings to fly free in the sky of science. However, the winds of technology denial were strong. Many nations denied India the technology she wanted. The denial was meant to become an insurmountable problem for a young and not very-developed nation.

However, Indian science looked inwards and discovered enormous pockets of strength along with untapped talent and steely determination that helped it bypass the sanctions and denials. This was the time that CSIR built the first parallel computer of India, Flosolver Mk1. It was built in 1986. The PARAM series of supercomputers was later assembled by the Centre for Development of Advanced Computing (C-DAC) in Pune. CSIR-CSIO developed Head of Display and CSIR-NAL developed the carbon fibre composite essential for the wings of LCA.

The Indian Space Programme that has very recently seen the triumphant launch of *Chandrayaan-1* owes its genesis to this era. That the world was a willing collaborator on Project *Chandrayaan-1*, and an eager partner for the next venture being planned, is a happy footnote to the struggle that our scientist waged in the period spanning the two decades: 1970s to 1990s. It was their work that sent the unequivocal message to the world that denial of technology to India was only going to make us more determined to have it. Their work was also demonstration of our innovativeness, ability and will. It was a valuable lesson in self-reliance and it paid rich dividends. It was their work that set us firmly on the way to assuming leadership position in the years ahead.

Of course, in time the winds changed as winds have a way of doing. The years that followed were characterized by a wave of Liberalization that swept through the world. By the time the twentieth century drew to a close, Intellectual Property generation had become the new “buzzword”. Global competitiveness held the key to development and progress. India today has proudly joined the elite club of genomics, even though we started late. This was only natural since globalization and liberalization are directly linked with each other. It is no wonder that while celebrating 60th Anniversary of our Republic, the *Times of India* (23 January 2010) marked five areas where Indian scientists have made significant strides: Agriculture, Atomic Energy, Space, IT and Genomics.

Vision of Globalization

Today, in the first decade of the Twenty-first century we are at home in a globalized world. But visionaries knew many years ago that the seeds for this “globalization” lay dormant in the womb of time. They knew that globalization was a reality that would germinate in the fullness of time. They knew that the baton of learning is passed not only from individual to individual as when a parent teaches a child or a guru instructs a student. It is also passed on from generation to generation. It cuts across national boundaries.

As Sir Jagadis Chandra Bose said in his Presidential Address at the 1927 Indian Science Congress at Lahore, “...in the realm of the mind there can be no boundaries and no separations...” He went on to say, “The whole world is interdependent, and a constant stream of thought has throughout enriched the common heritage of mankind.”

Over eighty years ago, a Scientist from a nation that was a colony of another proudly spoke these words of truth. Today as citizens of the same country—now independent, we experience firsthand, everyday, the truth that lay beneath his words. We marvel at his foresight because “globalization”...or a world without boundaries is currently, a reality!

Leadership Always

There is another word that we must remember whenever we speak of Globalization. That word is “Leadership.” In a globalized world no credit is given to the Also-Rans. One must be a leader in the field. And in this too, we have a heritage to be proud of. I will cite just one example.

Acharya Prafulla Chandra Roy founded the Bengal Chemicals & Pharmaceuticals Works, India's first pharmaceutical company ...when India was many years away from achieving

Independence. It was the first Indian company of its kind to manufacture quality Chemicals, Drugs, Pharmaceuticals and Home Products, employing indigenous technology, skill and raw materials. It marked the beginning of India's chemical Industry. The flag of this company is still flying high today.

Anticipating Changes

Times change bringing new challenges in its wake. We must anticipate the change and be prepared for it. This is why I want you to ask yourselves, "What is my target for the next two decades?" The question is not really as difficult as you think. If you study the trends of the past few decades since Independence, the answer suggests itself.

It is pretty certain that the coming years will see a struggle to establish global S&T leadership. The emphasis will definitely be on individual excellence but it will not rest solely on it. The focus will be on collaborative efforts for social good. This is the goal towards which it is worthwhile to steer your life and there can be no better place than India to do so...because ours is a nation like no other.

A Nation like No Other

Even to a casual observer, India seems to exist in many different centuries at the same time. We still have bullock carts and tongas alongside the Mission to the Moon. We have the highest number of educational institutes yet we have a huge illiterate population. Two of the five richest individuals of the world belong to India but we still have over 500 million people who subsist on less than two dollars a day. From a poor nation dependent on handouts from the West for food and technology we have progressed to being a Leader in R&D. Today, the world looks at us with respect.

Much of this is because Indian scientists have proved their mettle in laboratories across the world. India's intellectual prowess is recognized globally. Additionally there is another factor that works strongly in our favour.

Despite all that we still aspire for and despite our resource crunch, India's education system is considered at par, if not better than, that of many nations in the world. 15 million Indians are seeking higher education this year. There will be 36 million of them by the year 2050.

India is truly, a nation characterized by contradictions. However, if the challenges are many; the opportunities here are almost limitless too. Can there be a better place to make a difference? No. But the question is how do we make this difference? How does the new generation prepare to shoulder the new responsibilities? What path should the new citizens tread?

The Power to Make a Difference

As a Scientist myself, I am convinced that the power to make a difference lies in the hands of Science. Science allows us to observe, study, to learn and to plan ahead even when the technology support is awaited. The Science that makes a difference is always original and innovative, usually ahead of its time and never simply incremental. Original and Innovative

Science confers Leadership status. And the easiest way to do original science is to be passionate about your dream.

Learn to Dream

In a letter written to Galileo Galilei, Johannes Kepler wrote:

"There will certainly be no lack of human pioneers when we have mastered the art of flight. ...Let us create vessels and sails adjusted to the heavenly ether, and there will be plenty of people unafraid of the empty wastes. In the meantime, we shall prepare, for the brave sky travelers, maps of the celestial bodies - I shall do it for the moon, you, Galileo, for Jupiter."

The letter was delivered in April 1610. It took almost four centuries for the probe from NASA's robot spacecraft *Galileo* to fly through the atmosphere of the planet Jupiter! So in 1995 Kepler's dream finally came true... in a way he could not have foreseen in the Seventeenth century. His dream, though founded on incomplete knowledge, was breathtaking in scope. It was truly original.

It was not a quantum jump, you know. His dream was powered by a succession of scientists who kept working on the challenge of Space travel through the many constraints of inadequate technology. It was a dream that Kalpana Chawla shared even as a school student at Tagore Public School, Karnal. Her name means Imagination...and she had a dream that took her to her final destination amongst the stars. The inspirational fact is that even the fiery end of the Space Shuttle Columbia has not daunted the other dreamers...the effort to conquer space is still going on.

Who is to say that the "*human pioneers*" Kepler wrote about are not sitting here in this auditorium today?

Never give up the power to dream. Find your own dream...do not borrow dreams. Then, power your dream with ceaseless effort.

Question Everything

You may ask...how do I find my dream? I will only say, Keep wonder alive in your heart and you will find your dream. The famous poet Kahlil Gibran once said, "*Perplexity is the beginning of knowledge.*" This is in essence where the journey of discovery begins. I think all of you have heard about Sir C. V. Raman...he was the first Asian and first non-White to get any Nobel Prize in the sciences. The example, I want to give is from his life.

On his maiden voyage to attend the British Empire Universities' Congress in Oxford, he was fascinated by the deep blue colour of the sea. However, it also triggered a question in his mind. He began to question the idea that the water's blue colour was because of the reflection of the sky. He carried out experiments and proved that the deep blue colour of the sea is due to the scattering of light. Ultimately it led to the discovery of the Raman Effect in 1928.

So confident was Raman of winning the Nobel Prize in Physics that he booked tickets in July 1930, even though the awards were to be announced in November! His confidence was rewarded when he won the 1930 Nobel Prize in Physics.

How many of us can honestly say that as children we have not coloured the sky in rainbow hues when we first laid hands on a crayon? We were so full of wonder then and so full of the questions we were not shy to ask. Over the years as we grew up, the sense of wonder diminished and we stopped asking questions.

The aim of education is not just to provide answers; it is also to empower us to ask probing questions. Questions of significance; questions on which future progress depends. So ask questions...and no teacher worth his/her salt will be annoyed with you. Ask also for support—for example ask for high speed Internet connections, ask for access to more research journals, cutting edge instrumentation. Ask for whatever you need.

Ask Significant Questions

Remember, however, that the questions you ask must not be trivial ones although they may appear to be simple. Think what it would have been like if Edward Jenner had not asked why milkmaids who contracted cowpox did not get small pox. He chased the question till he found the answer. He did not lose heart even when his critics published cartoons about him.

Today, the World Health Organization (WHO) admits that Edward Jenner's demonstration, in 1798, that inoculation with cowpox could protect against smallpox brought the first hope that the disease could be controlled. In 1967, when WHO launched an intensified plan to eradicate smallpox, the "ancient scourge" threatened 60% of the world's population, killed every fourth victim, scarred or blinded most survivors, and eluded any form of treatment. The global eradication campaign eradicated smallpox. Small pox is the only disease to have been eradicated because of human intervention. The initiative against small pox is an excellent example of globally coordinated effort geared to a common cause.

Another simple question that was asked on the morning of 28 September 1928, and which had equally far-reaching consequences was, "Why did the bacterial colony die out where the mold grew?" I am sure you know that Alexander Fleming asked this question and his research led to the discovery of Penicillin.

Although many new antibiotics are now in use, the first person saved by penicillin was alive till fairly recently. Mrs Anne Sheafe Miller, who had made medical history when she was administered the then experimental injection, died on 27 May 1999 aged 90...and a great grandmother. Without penicillin, her story would have been cut short in its prime and the great grandchildren who no doubt gathered around her death bed would never have seen the light of day. Penicillin saved Mrs Miller and millions of others, in particular soldiers wounded in World War II.

Pursue the Dream

Sir Upendranath Brahmachari found a safe and effective medicine for Kala-azar in 1922 when he synthesized Urea Stibamine. In the pre-antibiotic era, this new compound saved

thousands of lives. He was nominated for the Nobel Prize in 1929 in the category of Physiology and Medicine. Later in life, this is how he described his laboratory. *"I shall never forget that room where Urea Stibamine was discovered. The room where I had to labour for months without a gas point or a water tap and where I had to remain contented with an old kerosene lamp for my work at night."*

He was not the only Scientist who made a grand discovery despite working in a pitiable laboratory. The laboratory where Marie and Pierre Curie worked was an abandoned dissection shed that had a leaking roof through which rainwater entered. It has been compared to a *"cross between a stable and a potato cellar."* But Marie Curie has written that, *"...it was in this miserable old shed that the best and happiest years of our lives were spent, entirely consecrated to work."* She hit the nail on the head...nothing matters when we love the work we do.

Let nothing come between you and your dream. Go actively in search for it. Take risks if necessary. Go without. But do not give up. You owe it to yourself and you also owe it to the generations to come.

Providing Intellectual Leadership: Mobilizing Global Resources

Jenner gave intellectual leadership by asking WHY. Why Cowpox victims never suffered the more virulent smallpox attack. Our practice of documentation and carrying forward the efforts of others ensured that the global eradication programme against small pox could be orchestrated with such spectacular success. Because we learnt that joining hands works; we have joined hands again, to battle Polio. We have also rallied to find a better cure for T.B.

This is an area I am passionate about –an area where India has given intellectual leadership and the Council of Scientific and Industrial Research has mobilized global allies to contribute resources geared to a common cause. I am referring to the Open Source Drug Discovery Programme or OSDD, which is a CSIR-led global initiative with the vision to provide affordable healthcare to the developing world. Its aim is to discover drugs for tropical infectious diseases which draw limited attention of established pharmaceutical enterprises.

As some of you would know, June 2008 marked the 10th anniversary of the complete sequencing of *M. tuberculosis* genome, which was made available as open source to the scientific community. OSDD has taken up Tuberculosis as its first challenge and already almost 70 countries have joined hands. About 3000 brilliant young people are working around the clock and across the globe.

The open source model gives students in colleges and universities an opportunity to experience and share scientific excitement. It provides a hands-on platform coupled with the opportunity to contribute to the scientific cause. It allows the initiates to get in touch with motivated mentors and to assimilate all they have to teach. I strongly believe that the Helping Hand is more powerful than a clenched fist and at OSDD we encourage all to reach out to their peers wherever they are. It is lucky we live in an age where physical boundaries matter very little.

One Final Word

So what is the take home message that I want to give you to empower you as you step out into the real world that is awaiting you outside the cocoon of your university?

I want to remind you that brilliance flourishes where knowledge is free and the mind unfettered to soar to the highest reaches of excellence. Each one of us sitting here can make a difference. But you can make a difference ONLY if you refuse to settle for anything but the Best. You need an inter-disciplinary, holistic approach to handle the challenges that the future will definitely pose. You must remember to respond as a global citizen committed to Tomorrow.

My blessings for you, as you begin your innings, is that may you forever be driven by wonder. May you never give up your right to ask questions that matter. May you always have the courage to seek difficult answers; unlearning, relearning and reinventing in the process. May you never, ever relinquish your dreams; may you never give up.

On your life's journey as you take India towards the pinnacle of progress let these words of Mahatma Gandhi be your guide. *"Just as some of the experiments in your laboratories go on for all the twenty-four hours, let the big corner in your heart remain perpetually warm for the benefit of the poor millions."*

With this as your guiding principle you cannot go wrong.

Also remember, whatever your personal struggles are, celebrate the success you see around you. The *Chandrayaan* mission, OSDD, India's success in Genomics and many other fields-- all came at a high price happily paid by those who worked for their dreams. It is your turn now to write the next chapter of Indian leadership. Be confident. Be compassionate. Be a leader.

Thank You