Indian Science News Association
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Scientifica Communica

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A Journey Begins

Seventy-five years ago, when India's 'tryst with destiny' began average Indians were clueless because they had no idea which way the nascent nation would move. Will it again be a travel of travails or will it be one of aspiration and hope? For the new rulers problems were galore like multitude of millions, hunger, malnutrition, illiteracy, ignorance, utopias, misconceptions, dogmas, superstitions and so on. While economic roadmaps were being planned, there was need for a specific science policy to eradicate this myriad of issues.

Unfortunately, it was not before 1958 when the first Prime Minister Jawaharlal Nehru and the father of India's nuclear programme Homi Jehangir Bhaba sat together to present the first national draft science policy before Parliament. Both of them had stressed on "scientific temper." Since then, much water has flown down the Ganges and how India now stands before the world with its scientific manpower and achievements is an interesting chronicle. However, on introspection it is found that the darkness still remains even seven and a half decades after Independence when ignorance can no longer be called bliss.

But the 75th anniversary of the Independence is an important milestone in the life of a nation, leave alone individuals or institutions. Everyone will like to celebrate it in their own way on this landmark. The history of the Indian Science News Association (ISNA) set up at the initiative of doyens of modern Indian science, such as Acharyya Prafulla Chandra Ray, Acharyya Jagadish Chandra Bose, Prof Satyen Bose, Dr. Meghnad Saha and others, is no less interesting. Apart from publishing the historic journal Science and Culture for the last 86 years, ISNA took up the onus of training science communicators to spread over urban societies as well as rural areas to help eliminate this darkness as far as possible. Over more than three decades, hundreds have graduated from the ISNA course to discharge their sworn. responcibilities.

It was probably not enough to fulfil the goals. A communication revolution was taking place in the meantime. Even a poor van driver now possesses a smart phone. The brilliant youngsters, wanted to catch up with these people to bring science closer to their doors. A confluence of grey-haired and the greenhorns led to the germination of the idea to bring out e-Papers to keep pace with the changing times and trends but by not discarding the hoary footsteps of the founding fathers. The decision was unanimous that the first issue of Scientifica Communica would be launched only on August 15 itself. The vernacular edition Bigyan Kahon would follow suit. The aim is science popularization and communication in the simplest possible term and in the simplest possible way only through the social media.

Probably only time will tell whether SC or BK will be a trailblazer or whether the progeny of the present batch of science communicators will stand in unison with the same spirit when India will be a centurion. George Bernard Shaw once said: Success does not consist in never making mistakes but in never making the same one a second time. The SC and BK trust the historic advice and will count on the blessings from those for whom these are planned.

*boseprasanta@hotmail.com
arnab_jour@yahoo.co.in

Seven Minutes of Terror

Prasanta K. Bose: It was not literally a one-on-one, but digitally yes, courtesy the American Center, Chennai. Otherwise, who could have imagined that Dr. Swati Mohan would be chosen among the powerfully influential group of 4.8 m Indian Americans to inaugurate their Digital Diplomacy Dialogue. Does the name sound familiar? Dr. Mohan hit the media headlines all over world as the supervisor of NASA's Jet Propul-

sion Laboratory that landed the Perseverance Rover on Mars eight months ago.We all felt proud as an Indian and I did not want to miss the opportunity to

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Digital India: The First 75 Years

Devaprasanna Sinha: In 1946, ENIAC, the world's first electronic general purpose digital computer was installed in USA and also the first mobile service. India got its independence on August 15, 1947. The first computer installed in India was HEC-2M in 1955 at Indian Statistical Institute (ISI), Calcutta. Since then, different makes of computers were installed at educational institutions, commercial organizations and government departments. Prior to these, different makes of calculators were bought and manufactured and an analog computer was also built at ISI. The first first-generation indigenous computer TIFRAC was installed at Tata Institute of Fundamental Research (TIFR) in Bombay in 1956, and the first second-generation indigenous computer ISIJU was installed in Calcutta in 1966. It is not possible to list down the names and features of all computers, or even to present a concise trajectory on the evolution of computers in India since 1947.


Image source: ISI

This brief note is an attempt to provide a glimpse of a few events that may trigger the readers to search for more information available online and offline. Companies were formed in the 70's to initially provide data processing

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The North Star Shines

Indian Science News Association (ISNA)

Sudhendu Mandal: Calcutta, being the capital of India from 1772 to 1911, was somewhat privileged in terms of education, development of infrastructure, and many other aspects. The British took many steps on education and entertainment in order to rule the country effectively. These pioneering steps included the first newspaper (The Bengal Gazette) printed in Calcutta in 1780, the first official newspaper (The Calcutta Gazette) established in 1784, "The Asiatic Society"

1st issue of Science and Culture, June 1935 (Journal of ISNA)

(1784) for "Oriental research," the first Bengali magazine 'Digdarsan' published from Serampore (1818), the Hindu college (Presidency college) in 1817, the Calcutta University in 1857, the Indian Museum in 1875, and the leading English Newspaper 'The Statesman' (later incorporated with The Englishman) in 1875. Finally, the first science research laboratory of the country (Indian Association for the Cultivation of Science) was established in India

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Bose Institute: The Temple of Modern Indian Science

Manas Chakrabarty: Bose Institute, also known as Basu Vigyan Mandir, is one of the premier research institutes in India. Acharya Jagadish Chandra Bose, the doyen of science in modern India, set up Bose Institute on November 30, 1937 (incidentally, his 60th birthday) at 93/1, Upper Circular Road (now known as A.P.C. Road), solely for the advancement and diffusion of knowledge. In his inaugural address - 'The Voice of Life'- he said, "I dedicate today this Institute – not merely a Laboratory but a Temple. "

In his endeavour, J.C. Bose received moral and/or material support from Rabindranath Tagore, Swami Vivekananda, Sister Nivedita, Sara Chapman Bull, Gopal Krishna Gokhale and Mahtma Gandhi. Since 1971, Bose Institute has become an autonomous grant-in-aid institution of Government of India. It has a unified campus at Salt Lake, four experimental stations at Falta, Shyamnagar, Madhyamgram and Darjeeling, and a museum on J.C. Bose in the original premises of the Bose Institute. Over the years, a large number of heads of states, scientists including Nobel laureates and eminent personalities have visited this seat of learning and research. Postgraduate courses in physical and sciences have recently been started here, After J.C. Bose passed away in 1937, his nephew, Debendra Mohan Bose became the Director. Some of the notable achievements of the Bose Institute are the discoveries of: (i) sub- atomic particle, pi-meson, by Bibha Choudhuri, a student of D.M. Bose, (ii) the mechanism of how queens produce other queens, workers or soldiers in the insect society, by the legendary naturalist Gopal Chandra Bhattacharyya (winner of Rabindra Puraskar, 1968 and Ananda Puraskar, 1975), and (iii) cholera toxin and its role in the pathogenesis of cholera by Prof. Shambu Nath De (later nominated for the Nobelprize).

Notably, a crater on the far side of moon has been named as 'Bose' in honour of Sir J.C. Bose's work on wireless communication, and the star HD 86081 has been named as 'Bibha' in honour of Bibha Chowdhuri's contribution towards discovering pi-meson.

*Retired Professor of Chemistry, Bose Institute, chakmanas09@gmail.com

Quotations of Scientists and Science Jokes

* "Never give up. I invented algebra and the laws of electricity, and I never learned how to count 100."

Carl Friedrich Gauss

* "I can calculate the motion of heavenly bodies, but not the madness of people."

Isaac Newton

* "The science of today is the technology of tomorrow."

Edward Teller

* Science is a way of thinking much more than it is a body of knowledge.

Carl Sagan

. The science of today is the technology of tomorrow.

Edward Teller

*Do you know what is the cutest ion ever?-

Cation (cat-i-on).

* No matter how important they are, vaccines will never go viral.

* The second great reason to not eat uranium is "a gram of uranium is 20 billion calories."

*Rezwana Parviin
*Tuhin Sajjad Sk

Science Through AIR: The Kolkata Saga

Manas Pratim Das: The year, 1931. The place, Riga city of Latvia. A thick layer of snow has covered the landscape. General Vornoff meets Ghanshyam Das and takes him to his home. There he reveals his true identity. His real surname is Rothstein and though he is a high-ranking officer in the German army, he is actually a Jew by birth. What happened next? That was 'Poka,' the first story of the Ghana-da series by Premendra Mitra, well-known novelist and science fiction writer. The Science Cell of All India Radio (AIR), Kolkata decided to make a radio play out of it. Twelve more stories were added to complete a radio serial. It was produced in 2008. But AIR's romance with science broadcast had started much earlier. The mandate for setting up a separate Science Cell in eight AIR stations including Kolkata came from the Union Ministry of Information and Broadcasting in 1977. Apart from the regular programmes, serials on science were planned. The first mega-serial was on Human Evolution, and was broadcast from 1992 to 1994 with help from National Council for Science and Technology Communication (NCSTC).

Then, of course, there was a long lull as far as broadcast of such serials was concerned. AIR Kolkata partnered with Vigyan Prasar (VP) in 2008 with radio plays on science fiction that has already been mentioned. In the same year a 52-episode long serial on saving the planet earth was broadcast. This was not exclusive to Kolkata but like the NCSTC collaboration earlier it was a countrywide affair. The VP support continues till this day and the joint effort has been able to produce a good number of popular serials of varying lengths. The latest one is on Artificial Intelligence (AI). The national broadcaster remains dedicated to the spread of science awareness through these broadcasts.

*Producer, Science Cell, AIR, Kolkata
i2manas@gmail.com

The IIT, Khragpur: A Beacon of History

Minakshi De: After Independence, the first Prime Minister of India Jawaharlal Nehru wanted to promote higher education as well as science and technology in India. With the help of Dr. B. C. Roy (the then Chief Minister of West Bengal), famous educationists Humayun Kabir and Jogendra Singh formed a committee in 1946 to consider the creation of Higher Technical Institutions for post- war industrial development of India. A 22-member committee of scholars and entrepreneurs was formed under the able leadership of Nalini Ranjan Sarkar to promote technical education in the country. In its interim report, the Sarkar Committee recommended the establishment of Higher Technical Institutions in various parts of the country along the lines of Massachusetts Institute of Technology, with affiliated secondary institutions.On the ground that the state had the highest concentration of industries at the time, Dr. Roy persuaded Nehru to establish the first such institute in West Bengal. The first Indian Institute of Technology (IIT) was established in May, 1950 as the "Eastern Higher Technical Institute," initially located at Esplanade East, Calcutta. In September, 1950 it was shifted to its permanent campus at Hijli, Kharagpur, and

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Why Eco Restoration

Ashesh Lahiri: Ecosystem is a complex network of interconnected system of nature where a biological community interacts with physical environment and regulates various cycles of nature (water, carbon, nitrogen etc.)

The sustainability of ecosystem depends on health of the ecosystem and the physical environment. So ecosystem functions ideally in undisturbed old growth forests, wetlands, and savannas etc., developed through the process of plant succession.

But various ecosystems were subjected to unsustainable use after deforestation, and for expansion of intensive agriculture and other development activities which has resulted in degradation of land. Since 1990 our planet has lost 80m hectares of forest. Sixty four per cent of world's wetland has disappeared since 1900, and one million species are threatened with extinction.

India, like many other countries, is suffering from flood, draught, landslides, storm, man-animal conflict etc. causing economic loss due to unsustainable use of land that need to be attended through the restorative process.

Urban areas which occupy 1% of planets land covering more than 30% of the population, which by 2050 is expected to rise by 50%, are the harshest habitats because of its increasing sealed surface, problem of water logging, and increase in heat retention, making the condition inhospitable. So there is need for its eco restoraton.

Restoration, therefore, is a process of assisting recovery of the ecosystem by taking up appropriate means of afforestation with indigenous species/aided natural regeneration, preventing biotic interferences, developing suitable architectural designs to accommodate trees and other indigenous vegetation to develop urban ecology for cities and adopting eco-friendly practices in agriculture and other land uses with a pro-nature mindset and aim to revive functional ecosystem.

We are currently at the very beginning of U.N. Decade of Ecosystem Restoration (2021-2030), which was officially launched on June 5, 2021.

*Former
Chief Conservator
of Forests,
West Bengal &
Consultant, FAO

Kadamba: The Wonder Plant

Tulika Mukhopadhaya: Underutilized plants are the richest bio-resources for traditional medicines, used as food supplements, nutraceuticals and pharmaceuticals. One such underutilized plant is Kadamba (Neolamarckia cadamba), found in India, Bangladesh, Nepal, etc which contains fat (mg/100g) (2.4%), proteins (2.1%), Zn (11.05), Fe (28.297), Cu (4.19 , Ca (123.7), Mg (71.04), K (36.7), Na (10.7), Mn (13.7) and provides 103.7 kcal/100g. Ripe fruits have a good amount of vitamins and minerals compared to the matured and immature fruit.

The nectar of kadam is also a good source of antioxidants. The traditional healers worldwide have used cadamba in treatment of eye inflammation, stomatitis, fever, urinary infections, skin infections etc. The usefulness of several parts of kadam tree and its bark has also been mentioned in

Charaka Samhita, Sushruta. Sushruta. Ancient people used to consume these to treat fever, uterine complaints, blood diseases, skin diseases, eye inflammation, diarrhoea, anaemia, stomatitis, etc. Kadam fruit juice with jeera, sugar was given in gastric irritability. The tribes of Orissa drink the root paste of kadam duly suspended in water to reduce blood sugar in the patients with diabetes mellitus. It's also used in constipation and thus can be helpful for the gut health. It has been reported to be used in different food preparations by tribal people as chatni, vorta, etc. However, being unfamiliar as a fruit or ignorance about its edibility, such a rich resource of minerals has remained neglected and hence needs to be added to our meal.

*M.Sc. student, Food and Nutrition Department, University of Calcutta
tulikamukhopadhyay99@gmail.com

Turmeric Shows The Way

Amit Krishna De: It all started in 1995 when two American researchers of Indian origin, Suman K. Das and Hari Har P. Cohly of the University of Mississippi Medical Center, put a claim before the US Patent and Trademark Office (USPTO). The claim covered "a method of promoting healing of a wound by administering turmeric to a patient afflicted with wound". This patent was granted which also gave them the exclusive right to sell and distribute turmeric. This caused a revolution in India as Indians have been using turmeric since ages for treatment of inflammation and wound healing.

Immediately in 1996, The Council of Scientific & Industrial Research (CSIR), India, New Delhi requested the USPTO to revoke the patent. Unfortunately it was difficult for CSIR to provide evidence of past research in India about the wound healing properties of turmeric even though it was known to every Indian household for ages. However, it could provide documentary evidence of traditional knowledge including ancient Sanskrit text finally, and also a paper published in 1953 in the Journal of the Indian Medical Association. On the basis of this evidence the patent was revoked in 1997, after ascertaining that there was no novelty.

The then CSIR's Director General R.A. Mashelkar was so elated that he said the victory would send a strong warning to all those bio-pirates of our herbal wealth and that India was ready to take them on.

The victory over turmeric showed the way. However, it was not easy in the case of Neem and Basmati patents. The patent for Neem was granted by the European Patent Office to the United States Department of Agriculture and the multinational W.R. Grace in 1995. Since then it was opposed several times by India-based Research Foundation for Science, Technology and Ecology (RFSTE) that Neem tree is part of the traditional Indian knowledge, and that Indian farmers have been using Neem oil to prevent growth of fungus since ages. In 2000, the European Patent Office revoked the patent but the victory was short-lived and the court upheld the earlier revocation of the patent. However, on March 9, 2005 India won this battle too.

The story was the same for Basmati rice when in late 1997, an American company Rice Tec Inc, was granted a patent by the USPTO to call the aromatic rice grown outside India 'Basmati.' It is well established that such a type of rice is grown in the foothills of the Himalayas for thousands of years. An appeal was made in court that Rice Tec's usage of the name Basmati for rice which was derived from the Indian rice but not grown in India, and hence not of the same quality as Basmati, would mislead the consumers. The company contented that its patent covered a novel form of basmati which was an improved form over its previous varieties. Incidentally, India and Pakistan are the only two countries that produce Basmati in the world. On August 14, 2001, the final decision was handed down changing the title of the invention from Basmati Rice and Grains to Rice Lines Bas 867, RT 117 and RT 121. This was again a victory for India.

All these three victories are not only an achievement for India but also a protection of the traditional uses of medicinal plants to foreign companies who had been poaching these plants since long.

*Former
Executive Secretary,
Indian Science
Congress Association
(Under DST
Govt. of India)
ade59247@gmail.com

Artificial Emotion from 1 & 0

Aurunima Samaddar: Prof. G was bent over his greasy worktable again.

"Namaskar Prof. G!" "You seem to have had an argument with someone?" he asked.

"About a silly science fiction novel. He said we would be soon so good that we would be making robots that would be better than us, would desire power and might oppress us."

"Is it not impossible for a machine to feel? And their basic structure doesn't support desire!"

Prof. G turned to the board and marked a cluster of dots as sensors, then feelings. He then drew a big empty rectangle; then a cluster of small asterisk marks, labelled actuators, and acions.

"This is not a template of a machine but of an infant's brain. Do you notice the similarities? Given consummate sensing abilities, a machine can feel like any other human. Now, the algorithm for interpretation…." he tapped on the empty rectangle.

"This is where we could be lacking; an example." he drew smaller boxes inside the rectangle.

"A, identify fruits."

"B, associate fruits to societal appeal."

"C, learn health benefits of fruits."

"D, evaluate one's health; D1, physical health & D2, mental health."

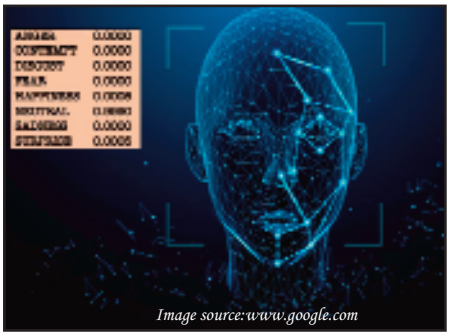

Image source:www.google.com

"Of course, these in turn are themselves resultant of other seemingly independent units."

"E, request for fruit based on calculations from the afore-mentioned units."

"Seen singularly, these units seem simple enough; they also exist as apps nowadays."

"Now, J records human behaviour under various circumstances. And P executes actions based on results of J."

"Suppose E's result is a request for a banana but bananas are not available. J's weighted result would probably be anger, frustration. P could suggest stomping of feet and throwing things."

"Do you see how easy it is to generate anger and desire, even greed?"

"But they would not feel the compulsion to?"

"Of course they would, if J functions properly and a unit for self-awareness is inserted between it and P, like in children. Human brains are computers after all, designed by better hands than ours. Even the most complicated of our decisions boil down to numerous 1s and 0s as the leaves of a cascading tree of comparisons. Artificial intelligence is a very real (attempt of) mimic of real intelligence. Artificial emotion will be so as well."

*Software Engineer, Robert Bosch
aurunima94@gmail.com

Digital India...

1>>facilities, and then software development and maintenance, including hardware and networking services, both in India and abroad. We may mention the names of ECIL, TCS and CMC, and later NIC.

One should mention the names of two persons, Rajiv Gandhi and Sam Pitroda, who in the 80's, provided thrust on computer literacy amongst the general public, despite resistance from some corners. India, over these years, has had tremendous impacts in various sectors like banking, railways, hospitals, healthcare, tourism, to name a few. The initial problem of importing supercomputers led us to the development of indigenous supercomputers in the early 80's, when two companies CDOT and CDAC were established. CDOT has developed many supercomputers, primarily for weather forecasting; the recent three, PARAM SIDDHI-AI ranking 63, and the other two PRATYUSH and MIHIR developed by IITM and NCMRWF have been included in the World's TOP 500 list of November, 2020.

Internet users in India are now the second largest in the world. India has gone a long way in regard to the mobile penetration in different areas country since its first demonstration in 1973 worldwide. The first call in India with internet services by VSNL was also made on August 15, 1995. There have been significant earnings in software exports with nearly three million software professionals. Digital transformation has radically revolutionized our lifestyles to form an information-centric society with IT-enabled devices and modern techniques coupled with newer and newer methods of learning and teaching. Now digital ecosystem is visible, and is in fact reshaping many systems particularly in agriculture, healthcare and in e-governance as well. Though we have started the process of digital transformation to have the desired goal of making Digital India, the digital divide unfortunately still exists in many parts of India, in respect of affordability and accessibility and its proper usen in many applications.


Image source: www.google.com

*Devaprasanna Sinha
*Fellow, Computer Society of India
devaprasannasinha@rediffmail.com

Seven Minute....

1>> to listen to her.

Like the other Americans, Swati Mohan, who calls herself a rocket scientist and engineer, loves presenting herself through the PowerPoint. Her "life lessons on the road to success" is based on three principles:

•Know and accept who you are
•Actively do your best
•Create your own support system

While in school what had she wanted to be? It was easy for her to be a doctor because her family including her parents, who had long migrated to the US before, is full of physicians. "But physics was easy and biology was harder to me. I then switched focus to engineering. My favourite movie was Star Trek and to me space meant NASA."

So, from Heyfield School her natural destination was Cornell University to study space engineering, then to California Institute of Technology, and finally to Massachusetts Institute of Technology. Her systematic transition from one abode of learning to another, necessitating attending camps, enjoying internships, and completing doctoral dissertation, engaged her from Mission Cassini to ultimately the Mars Rover Mission for the last eight years. "I went to a new world," she quips.

Dr. Mohan, a mother of two girls, says it would not have been possible for her to be a leader without her "super-supportive parents and husband, who is also a doctor, another leader in the Covid time." I had to strike a balance between spouse, family, friends and others "so that you can form a team respecting each other."

She gleefully dubs her Mars Landing Mission, "the Seven Minutes of Terror." They have been piling telemetry data, studying satellite dynamics and ballistic cruise velocity, flying supersonic parachutes, and reviewing different sites for Rover landing "because simulation is not always that predictive." There were other panic moments as well including an earthquake. "All it required was empathy and support," Dr. Mohan asserts.

Is she a foodie? She smiles and answers that she likes the Indian street food whenever she visits her home state of Karnataka. The vendor roasting corns in an open oven is a site that she relishes. She doesn't know whether there is a link between science and spirituality. Dr. Mohan also reveals that in her career journey she felt "more pressure in the male dominated world of space science and technology."

Before I was planning to shoot the final question whether she would like to come back to India as a space scientist, the connection got snapped and despite my heroic efforts as a digital dud, I couldn't restore the link. All I could hear were her words buzzing,"everyone's journey will be different."

*Prasanta K. Bose
* Journalist and Science Writer,
boseprasanta@hotmail.com

Let Lightning Be Called A National Disaster

Prasanta K. Bose: What a coincidence! What a timing! What a backdrop! Buds were plugged into my ears to participate in a national webinar on lightning. The sunlight was filtering through the windows making the room warm. Suddenly the brightness changed following an overcast sky. The roaring started and the flashes sliced through the dark clouds. Before I could get up the dazzling blue rays burst like deafening crackers.

The panelists – scientists, policy planners and media veterans – could not see the flashes from their cloistered chambers. But at that moment


Image Source : www.google.com

they all were making the clarion call that lightning be declared as a national disaster. For, every year it claims at least 2000 lives in India alone and 96% of the fatalities are from rural areas. Between 2012 and 2019, a total of 21,572 people were killed by lightning.

That's not the end. By the turn of the century, lightning may increase by another 50% if steps are not taken immediately. That's why the Lightning Resilient India Campaign has been launched.

And it is yielding results, at least in Jharkhand as a case, claimed a participant, though


Image Source : www.google.com

mining and deforestation, two contributing factors, are rampant there. They were all unequivocal on one point. Global warming is the root cause for increased lightning everywhere, be it Bengal or Brazil.

The Down to Earth webinar churned out some more alarming statistics: • For every one degree rise in temperature lightning possibilities rise by 12%.• The more the number of storms, the more the chances of lightning.• About 45 flashes occur globally every second. • Lightning strikes in Arctic countries have gone up from 18,000 in 2010 to 150,000 in 2021 •Lightning sparks wiped out 1.5m hectares of forests in Australia's Victoria within three months from November 2019.

And there are many more. Concluding, a meteorologist advised one and all to download the Damini app to ensure safety from lightning. There are also funds for lightning disaster victims.

Is that a guarantee to prevent theft of lightning arresters in Bokaro? Who will answer?

* boseprasanta@hotmail.com

BITM Celebrates The Moon Landing Day

Barnini Bhattacharya: The Birla Industrial & Technological Museum (BITM) organized an online demonstration and quiz programme on July 20 to commemorate the first landing of man on the Moon on this very day in 1969. Director of BITM Venkatraman Subramanian Ramachandran in his welcome address pointed out that this day should be celebrated by one and all for the successful landing by Neil Armstrong and Buzz Aldrin on the Moon. The historic event took place 52 years ago when technology was way behind than today. He also thanked the BITM education and technical team for arranging such an interesting event.

The inaugural address was followed by the demonstration of the 'Miraculous Moon,' a visual treat to watch the array of fascinating models simulating the moon, earth and the solar system. The digital presentation by BITM Technical Officer Tarun Das was indeed the talk of the day. Special characteristics of moon, from 'No Air' environment, meteor crash, lunar eclipse to tides, and the Moon phases were presented in a lucid and lively manner that charmed the viewers including school students from different corners of the city. The online live-streamed event on you tube was flooded with phone calls and comments from the students. The last and the most awaited part was the online quiz programme when he placed a variety of questions on special features of the moon. There were non-stop responses. Perhaps, everybody wanted the online engrossing journey to the surface of the moon to continue, despite thanksgiving by Mr. Das.

*Research Student
Cognitive and Cybernetics Lab,
ISI, Kolkata,
Dept. of Physiology,
University of Calcutta.
barnibhattacharya@gmail.com


Image Source : www.google.com

Finding Roots of Algebra

Tuhin Sajjad Sk: For someone it's very interesting to solve and finding the root of a problem and for someone it's just a mathematical headache; yes, it is about Algebra, a branch of mathematics where letters and symbols are used to represent quantities.

Interestingly, the ancients had to adopt a surgical term for its nomenclature. They took two Arabic words together "al" and "jebr" meaning "the" and "reuniting what is broken" or "restoring" consecutively. Sometimes these words were used to refer to "bone-setting" in surgery.

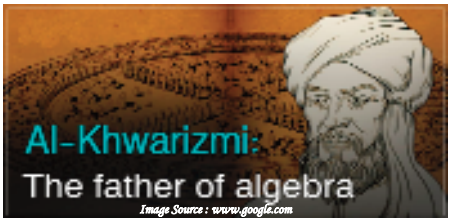

Image Source : www.google.com

In around 9th century, a Muslim Persian mathematician Muhammad ibn Musa al-Khwarizmi, the "father" of algebra, composed a new science book named "ilm al jebr wal muqabalah" which meant "reduction and comparison by equations." In his book, the phrase "al jebr" implied to the operation of moving a term from one side of an equation to the other. After that, the word eventually found its way into Spanish, medieval Latin as well as in whole Europe. It was the Italians who mercifully took the second and third words from the name of the book and combined them to form the word "Algebra," a type of mathematics.

The word ultimately entered into the English language during fifteenth century, but the mathematical means was first recorded in the sixteenth century. In India mathematician Bhaskara made major contributions to algebra. Despite this as late as the seventeenth century, the word algebra kept its original Arabic meaning and still referred to as surgical treatment. For instance, we read in the historian Halle: " This Araby worde Algebra sygnifyeth as well fractures of bones as sometyme the restauration of the same". But to the students, it's just a mathematical hazard.

Now what do you call friends that love maths? --- Algebros.

*Science Communicator
*tsk2317563@yahoo.com

Social Distancing May Be New For Us But Not For Them

Neepa Banerjee: Perhaps 'Social distancing' is one of the most frequently used phrases in recent years. Although for us this social behavior is quite 'new,' it is pretty common in the animal kingdom. As recognizing infected individuals can be tricky, animals tend to use general cues (e.g. unusual appearance, expressing sickness behavior and the like) to avoid others. We can take Caribbean spiny lobsters as an example. They normally live in group. They can detect a chemical signal in the urine of the sick lobster and avoid the areas that these sick lobsters occupy. Surprisingly, some of them do it in a subtle way, like just interacting less with a particular individual in a group. Their usual behavior is to remain packed together in dens to protect themselves. Hence, for these animals, social distancing means abandoning that den, which may be quite dangerous for them.

In some cases, it has been found that infected insects die.It is interesting to note that these species are highly social, even more than that of the human; they know that reducing the degree of sociality can be costly and unsustainable for them. Still the infected individual purposefully leaves the group and sacrifices itself to protect its larger family. As we are presently experi encing that even though social distancing is a 'costly' behavior, the benefits clearly outweigh the costs, these small creatures also know it well, if not better. Therefore, it may be mentioned that not only the human beings, animals also follow 'infectious- disease appropriate behavior,' as and when required.


Caribbean spiny lobsters can detect chemical signal in the urine of the sick lobster (Science Journal)

* Bhairab Ganguly College
bneepa.15@gmail.com

India And Its Contribution

Nature-Inspired Technology

Barnini Bhattacharya: Nature-Inspired or Bio-inspired Technology, scientifically termed as Biomimicry is a technical practice to artificially create something by utilizing structures, principles or strategies existing in natural organisms or systems. Though such a technology may appear to be a modern-day and sophisticated approach gaining popularity worldwide presently, surprisingly this very technology existed in the world even in the 20th centure era.

The noteworthy fact especially on the eve of India's 75th Independence is that the world-famous Lotus Temple (1986), of Delhi is one such bio-inspired architecture that mimics the structural arrangement of our national flower lotus, and hence the name. The functional advantages of such a design are manifold – base and top openings not only allow plenty of natural light to enter the building but also draws air through the building that forms a natural ventilation system. Such a combination of natural cooling and lighting arrangement helps to reduce electricity consumption.

Several renowned research and development establishments of India have already begun to contribute in this field through their extensive research. The IIT, Hyderabad has a special team of faculties and young researchers that has come up with innovative nature-inspired solutions to problems like waste management, oil spill removal and so on. The CLRI, Chennai focuses on producing bio-inspired nanomaterials (material sized between 1-100nm of single unit) that are used for pollution control management and production of biosensors – a sensor made up of biological element to sense or detect change in chemical responses/composition, for example – pregnancy test kits, glucometers etc. Other research organizations of national importance that are engaged in nature-inspired invention include JNCASR, IISER, VIT and many many more eminent. institutions.

India is, therefore, contributing on a large scale to propagate nature-inspired inventions and its derived technology. It is indeed a promising area of research and development that needs awareness and greater popularization because bio-inspired technology is presently considered the choicest future approach for inculcating sustainable development.

A – Top opening of Lotus Temple; B- Base opening of Lotus Temple; C- The Lotus Temple, Delhi (Image Source: www.google.com)

*Research Student,
barnibhattacharya@gmail.com

Operation Flood: A Revolution That Strengthened India

Sandipan Chatterjee: India, the world's largest democracy, has emerged as a major economic power despite its infrastructural adversities. Post-Independent India accelerated its growth by the highest degree of innovation in science and technology. India's "Operation flood" was the world's major dairy development program that led to "White Revolution." It created a national milk grid to link the producers to the consumers in merely 700 towns and cities throughout India that also gave a major thrust to national milk production. Varghese Kurien, the chairman and founder of Amul, was named the Chairman of the National Dairy Development Board by the then Prime Minister Lal Bahadur Shastri. Kurien propelled the initiative towards success and has been acknowledged as the originator.

Before the white revolution, India imported milk solids, which was ended by the technological breakthrough that revolutionized the Indian dairy industry. It was the production of skimmed milk powder out of buffalo milk. In the first phase of the Operation Flood, programmes were organised on animal breeding, veterinary health care, feeding and management of dairy animal to improve the productivity. Phase two was the continuation of phase one, and by the end of 1989 the domestic milk powder production was increased from 22000 tonnes in the pre project year to 1, 40,000 tonnes. India also started exporting milk powder. In 1989, the number of women members and women dairy co-operative societies increased significantly. As the dairy industry was being modernised and expanded, around 10 million farmers started earning their income from dairy farming.

The final and third phase of the programme emphasized on the need to improve productivity and efficiency of the dairy sectors for long-term sustainability. A programme was organised on veterinary first-aid health care and artificial insemination services to educate the co- operative society members. Genetic progress of milking animals also increased due to cross breeding. The last phase also increased importance on research and development in animal health and nutrition. Innovation of vaccine for theileriosis, bypassing protein feed and urea- molasses mineral blocks, contributed to the enhanced productivity of milk-producing animal.

Operation flood celebrates the advancement of India's own technology and the entire success was achieved not only by mass production, but by production by the masses.

*Science Communicator
*sandipan.april@gmail.com.

The IIT...

2 >>120 km south west of Kolkata. On August 18, 1951 the then Union Education Minister Maulana Abdul Kalam Azad inaugurated the first Indian Institute of Technology (IIT) of the country in West Bengal. The name "Indian Institute of Technology" was adopted before its formanl inauguraton by Maulana Azad.

The IIT Kharagpur was established to train scientists and engineers. The classes initially started in the abandoned Hijli detention camp used by the British to imprison the freedom fighters. In 1952, the foundation stone for the new building was laid in a dedication ceremony attended by Prime Minister Nehru. On September 15, 1956, Parliament passed the Indian Institute of Technology (Kharagpur) Act declaring it as an Institute of National Importance.

When the first session started in August 1951, the college had 224 students and 42 teachers in 10 departments of the institute. The class rooms, laboratories and the administrative office was housed in the historic building, now known as the Shaheed Bhawan, where political revolutionaries were executed under the British rule. Incidentally, the office building was used as the headquarters of the Bomber Command of the U.S. 20th Air Force during World War II. The IIT Kharagpur, therefore, is still a beacon of history.

Image source: www.google.com

* Minakshi De
*Department of Microbiology,
Surendra Nath College,
University of Calcutta

Perspective!

Barun Kumar Chatterjee: There are few of us who have gone to every street, by lane and house in our city, let alone of our state or our country. We simply did not have time to comprehend how big our neighborhood, our country or our world is. A child would stretch out his (or her) tiny hands and exclaim that it's huge. Sure we feel it is huge and robust, and believe that man has been to almost all places on this planet. To understand how insignificant the man is on earth, one can take the egg analogy. The average diameter of the earth is 12724 km (all data from web) and if it is scaled down to 5 cm, which is roughly the average diameter of a chicken egg (longer diameter 6.2 cm, shorter diameter 4.3 cm), it gives an interesting perspective of things though their shapes are different (earth is geoid, an oblate spheroid, and egg is oval, which is prolate spheroid). In this Lilliput world, the thickness of the crust (roughly 70 km) of the earth scales down to 0.03 cm. The atmosphere (roughly 60 km thick) scales down to a thickness of 0.02 cm. The height of Mount Everest (8.849 km) scales to 35 micron! The depth of the Mariana Trench (6.825km) scales to 27 microns (10.929 km depth of Challenger Deep scales to 43 micron). Our entire biosphere (including the crust) is a lot thinner than the thickness of the egg-shell, whose surface features would resemble the mountainous terrain of earth. In the same scale the height of an adult human being comes out to be almost the same as that of a Corona virus.

In this scaled view, the sun would still be as big as a two storey building (5.5 m tall) and would be at a distance of 586 m from the earth. The moon would be 1.4 cm in diameter, like a marble, and orbiting at 1.5 m from the earth, while Neptune would be like a soccer ball at 1.8 km from the earth. Jupiter would be 0.5 m in diameter, our galaxy would still be 4 billion km big and the entire universe would be 2 million billion km in diameter.

*Emeritus Scientist, Department of Physics, Bose Institute, Kolkata
barun_k_chatterjee@yahoo.com

Herbal Tea or Tisane : The True Healer

Anindita Ray (Chakravarty) & Kousani Chakraborty: "Tea is the elixir of life"- this is a common quote that is often used and has profound scientific basis. Traditional tea is obtained from the species 'Camellia sinensis' usually. A modification to this is herbal tea or 'tisane'. Herbal teas are not made from a single kind of tea plant but is actually a combination of several ingredients, and are most commonly known as 'tisanes.' Different types of medicinal herbs and spices are used to prepare herbal teas and these have beneficial effect on health due to a wide variety of bioactive compounds present in them and the roles that they play. These are effective against a number of lifestyle diseases like obesity, cancer, diabetes and also helps in modulation of Gastro Intestinal tract functions, protecting the cells of the body from free radical dam age,etc.

Tisanes are made up from mixtures of dried leaves, seeds, grasses, nuts, barks, fruits, flowers, or other elements of different types of beneficial herbs that give the taste and provide the benefits of herbal teas. Tisanes are caffeine free and that is why they are sometimes considered better medicinal beverages than the traditional tea or coffee.

There are different types of herbs and spices from which herbal teas are produced. Some common tisanes examples are - Chamomile tea (Matricaria chamomile) ,Peppermint herb tea (Mentha piperita L.) , Ginger tea (Zingiher officinate Roscoe) , Hibiscus tea (Hibiscus rosasinesis), Rooibos tea (Aspalathus linearis, etc. The various bioactive compounds that are of significance for human health mainly are polyphenols like carotenoids, phenolic acids, flavonoids, coumarins, alkaloids, saponins, terpenoids etc.. These bioactive compounds are anti-inflammatory, anti-diabetic, hepato-protective, anti-carcinogenic and has several other such effects. Tisanes thus can play essential roles in maintaining human health and may be considered as 'true healer'.

*Assistant Professor & HOD, Dept. of Food & Nutrition, Maharani Kasiswari College, CU
*Viharilal College of Home Science, University of Calcutta

Yoga -The Mystical Lifestyle

Pratiti Ghosh: Yoga is an ancient Indian technique to keep oneself agile till old age with an optional spiritual aspect. It induces changes at the cellular and molecular level in every tissue of the body. It delays/stops onset of a disease unless it is genetic or accident driven or caused by a serious infection. The ability of such a yogic macromolecular system to combat any adversity, far supersedes that of a non-practitioner. Yogic practice stimulates the neuroendocrine system, enhances cognitive functions, significantly increases beta-brainwave activity which enhances focus and clarity through cerebrum, slows down the reticular brain and parietal lobe enabling calmness and lowering anxiety, relaxes the mind through limbic system thus imparting energy; helps maintain cardiovascular health through reduction in sympatho-adrenal activity, changing baroreflex and renin-angiotensin sensitivity; helps in stretching, flexing and toning the muscles, improves range of movement of joints, improves orthostatic tolerance, gait posture and body alignment; induces higher tolerance for pain and temperature; improves digestion, circulation and immunity. It accelerates the reboot function of the body physiology, creating ideal homeostasis by organismic holistic approach akin to ayurveda and homeopathy.

There is often a mental hindrance to mundane exercises for fitness but is overcome with elevation of 'prana' through meditation, pranayama and 'satwik' food style which are integral components of the wholesome yoga package. These not only generate spiritual integrity but also keep lifestyle diseases such as psychological issues, obesity, cardiovascular diseases, diabetes mellitus, thyroidism, some cancers, smoking, and alcohol/drug abuse at bay. Degenerative diseases like Alzheimer's, dementia, hepatic cirrhosis, osteoporosis, polycystic ovarian

syndrome, colitis, arthritis, and dental caries and similar other organ dysfunction may be more effectively dealt with in a practitioner if at all it has struck him/her.

Nevertheless, these manifold benefits do not encourage its practice in concoction with gymnastics or exercise in the same module or its overdoing in especially the childhood.

*Professor & Head, Department of Physiology, West Bengal State University
pratitig@wbsu.ac.in

ISNA....

1 >> in Calcutta. All these helped in the enlightenment of the people of the country.

Some educated Indians, however, challenged the English claims of superiority of science and felt the need for an association where scientists and other educated Indians could interact and exchange ideas in order to promote science and instill a scientific temper among the masses to reap the benefits of science. In order to give these into a shape the Indian Science News Association (ISNA) was established in 1935 by Acharya P. C. Ray, with him as the founder president, Prof. Meghnad Saha and Dr. B.B. Ray, as the founder secretaries, and Prof. N.R. Sen as the treasurer along with some other distinguished thinkers and personalities like Sir U.N. Bramachari, Dr. Shyama Prasad Mookerjee, etc. with the prime objective of "Dissemination of scientific knowledge amongst the public." ISNA introduced the journal; Science and Culture in 1935. Interestingly, the first issue of Science and Culture was published in June 1935 with M.N. Saha and B.B. Ray as the editors, while the ISNA was founded on July 9, 1935. Science and Culture is not just a journal of natural science, but also a journal of cultural science. Its holistic founders believed that one discipline could not be completely divorced from the other, preferring to focus on research and development of science, society and culture, making it a unique and truly multidisciplinary science journal. Pandit Jawaharlal Nehru, the first Prime Minister and the architect of modern India in his message stated: "Science and Culture are the essence of life today, in war and peace, and any periodical which serves the cause of science and culture performs a service to India and humanity." Presently, the Journal is listed in Thomson Reuters Master List, UGC-Care List Group-A and also indexed in UK-based CAB Abstracts.

The ISNA is also organizing a 12-week Training Programme on Science Communication and Media Practice course since 1980. A few years ago, Vigyan Prasar of the Department of Science and Technology, Government of India started, collaborating with ISNA. The course is very popular and a number of participants has subsequently found jobs in various media.

*Editor-in-Chief, Science and Culture, Indian Science News Association
chiefeditorscienceandculture@gmail.com /smandalbot@gmail.com

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How Vaccine Protects

TV Venkateswaran: We are living in an unprecedented time. The novel Corona virus pandemic has engulfed the whole planet. Normal activities are hindered, and death and destruction is all around. As a proverbial silver lining, vaccines appear among the dark clouds. Yet, instead of embracing the protection, some are spreading rumours and promoting vaccine hesitancy. This short essay provides a simple explanation of what happens when we are infected, and how the vaccines help us brace the viral attack.

Vaccines help the immune system by training it to recognise the pathogen it had not encountered earlier. The component of the virus acts like a decoy and instigate the development of neutralising antibodies that can bind to specific regions of the germ. Once the real virus is in sight the immune system can fire arrows of antibodies and not let the virus take a foothold.

Essentially, there are three types of vaccines; one contains the whole virus, the second includes the pathogen's genetic material. The third consists of a part (usually a protein unit) of the virus.

In a whole virion vaccine such as Covaxin, the virus is inactivated by denaturing its genome. Only the proteins are intact. The immune system mistakes the vaccine decoy for the 'real' pathogen and forges theantibodies.

Alternatively, we can now isolate the virus's genomic material and administer it directly or attach it to a 'vector', the genome of a benign pathogen. The subset of viral genomic material produces alien viral proteins to which the immune system reacts by developing antibodies.Covishield and Sputnik are of these kinds.

Another way is to manufacture the viral proteins and administer them. Encountering the viral proteins the immune system is kicked into develop neutralising antibodies. Covovax, recently approved in India is one such vaccine against Covid 19.

Whatever be the method of training the immune system, the ultimate aim of the vaccine is to trick our body into evolving neutralising antibodies against specific antigens of the pathogen. When the actual pathogen strikes, our immune system is not stunned or unprepared. Swiftly and powerfully, the immune system produces the neutralising antibodies and nips the danger in its bud.

*Senior Scientist,
Vigyan Prasar, New Delhi

Sonar Bangla: The Health Journal Of The Past

Krishanu Bhattacharyya: Communicating with the masses in their language is the need of any social movement. It becomes necessary in case of any awareness drive. To meet that demand under the leadership of Dr Gopal Chandra Chatterjee, the noted virologist of his time, the Central Anti Malaria Co-operative Society started its own bi-lingual monthly named Sonar Bangla in November, 1925. The journal was published continuously till 1937 as per the records. It was published from Premchand Boral St, Calcutta which was the office of the Central Anti Malaria Cooperative Society. The registration number was C1381.

Editors of the journal were noted freedom fighter and journalist Bipin Chandra Pal and Dr Gopal Chandra Chatterjee. Abanindranath Thakur designed the cover of the first issue. After 1930, Chittasukh Sanyal, father of noted writer Narayan Sanyal replaced Bipin Chandra. It was published to create awareness among the people regarding sanitary conscience to get rid of mosquito borne diseses like Malaria, Kalazar and others. In the first issue the editorial policy of the journal was declared. There it was declared that the main motto of the journal is to bring back prosperity among the people who were continuously suffering from fever and poverty. So this magazine they guided the masses to take the path of preventing the diseases by cooperation. The noted contributors of the magazine included Dr P C Roy, Gurusaday Dutta, Dr Rabindranath Chowdhury, Mir Mosharaf Hossain and others. The activities of the different village societies and the reporting on the activities of the societies working in around 3500 villages were published in the magazine on regular basis. Dr Gopal Chatterjee contributed various scientific papers in English in Sonar Bangla. Surely this journal is the part of our glorious heritage of science communication.

*Science communicator

Greetings

On behalf of the Council Members of Indian Science News Association we sincerely acknowledge the untiring efforts of the Editors and all the members of the Editorial Board for publication of the inaugural issue of this E-paper on this special day of 75th anniversary of Indian independence. We wish them every success for this great endeavour.

Prof. Manas Chakrabarty & Dr. Amit Krishna De
Hony. Secretaries, ISNA

Covid 19 Pandemic: Features on Grief Counselling

Tinny Dutta: The second wave of the pandemic has been wreaking havoc in the world. No doubt in India too. We have lost near and dear ones. Our sorrows are irreplaceable and unbelievable. We are helpless and take recourse to Tagore's songs to console ourselves. Scientifically we have to develop psycho-spiritual processes to deal with such a devastating situation. The grieving processes is complicated and unique to each and every one. But for extending our help scientifically we divide them into different stages.

The first stage is blocking and denial. We experience numbness and great pain. Denial unconsciously protects us to confront with reality. The crucial processes are that we cannot grieve and heal ourselves until we move out of this stage.

The second stage is frustration and anger. After experiencing death, we become highly frustrated and become angry with the Almighty and nature because the person has been unfairly taken away. The third stage is powerlessness. But we realize from the core of the heart that we are powerless to the divine power or nature.

The fourth stage is deep depression. It is the longest stage. Previously we had our entire focus and energy to our objects of love but as someone dies, we become highly depressed. Under such circumstances providing support and administering Cognitive Behavior Therapy will be highly beneficial.

The final stage is restoring the balance. The life begins to return to the New Normal. The distress gradually less- ens, and we recover the desire to live.Thus, re- integration occurs, and we feel we are not alone. The soul is eternal!

*Assistant Professor,
Department of Psychology,
Muralidhar Girls' College

ARTICLE MAY BE SUBMITTED AT
scientificacommunica@gmail.com

Published By

Dr Amit Krishna De and Dr T V Venkateswaran,
Conveners, 34th Trainning Programme on Science Communication and Media Practice on behalf of Indian Science News Association,
92, APC Road, Kolkata 700009. E-mail: scie2224@dataone.in
website: www.scienceandculture-isna.org