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What An Irony!

We live in a strange country. Here national leaders are remembered according to political convenience, politicians are adored by their fanatic supporters and religious gurus are worshipped for their astrological prophecies. But scientists are just an anathema. Who cares?

For a proof of this startling statement, ask anyone what is the significance of August 2 every year. We can guarantee that nobody knows, even in our home state! Except for organizations like the ISNA or the Indian Chemical Society is anyone aware that the father of modern Indian chemistry Acharya Prafulla Chandra Ray was born on this auspicious day?

The savant looking giant was not only a scientist but an entrepreneur as well. Those who are interested in him must know that he was also the founder of Bengal Chemical, a company that has been hitting the headlines for right or wrong reasons after many a rough and tumble. It is now put in the dock for being a loser, maybe up for a sale in the open market. Barring the shuddering employees and shareholders no one makes any effort to learn that it has garnered profits in the last couple of years.

This has been possible only because of the Acharya's distant dreams. Words like MSME or Unicorn were unheard of in his time. But had these recognitions been there he would have been the first winner as a true nationalist entrepreneur who called upon people not to cloister themselves in a clerkship mentality but to go ahead and engage in trade and commerce. Probably our economic scenario would have changed by now had we listened to him. Despite having higher education our boys, as victims of brain drain, would not have flown to distant shores to reach their goals.

On his anniversary today we should try to guage his meteoric rise from a non-descript village in undivided Bengal to becoming a scientist of international repute, an educationist, a national leader, and above all being a visionary who also believed that science should reach the common people.

The Indian Science News Association (ISNA) has been a fructification of his ideas. He did not end there, as he had nurtured a group of brilliant soldiers who would become the doyens of Indian science in future under his tutelage. It was his painstaking effort to involve them steadfastly that saw the emergence of Science and Culture, a class publication for the last 88 years that draws revered reference even from unimaginable quarters.

However, his times have changed and so have the modes of communication. From the old derelict model of a dialing phone we are now proud possessors of smart phones. Had he been alive today he would have been happy himself to see that his brainchild ISNA has been churning out graduates of science communication for the last 35 years. He would have even been happier that ISNA has kept pace with time to bring out e-Papers, *Scientifica Communica* and *Bigyan Kahon* with a view to bringing science closer to the doorsteps of the masses by these young media debutantes.

On this significant day we pay our obeisance to the great man of Bengal whose image like that of an ascetic with unkempt hair and unshaven beard remains indelible in our mind. Our politicians may forget him but we at ISNA have not. We rather become too sentient whenever there is any reference to him.

Will it be too inappropriate then if we classify this issue of SC as "The Ray Legacy?"

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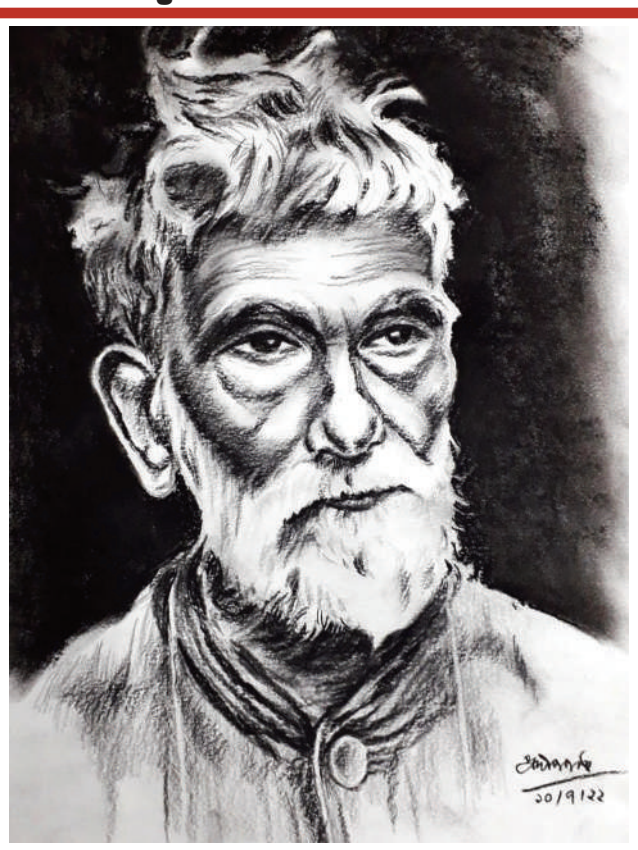

The Ray Legacy

Spatula And Scalpel

Prasanta K. Bose: Will he? Will he not? I hesitantly requested him and he agreed, without even batting an eyelid. "Because, as a Bengali, we all have a special place of respect and compassion for Acharya Prafulla Chandra Ray in our heart." The result was two unbelievable portraits of the Acharya, just within a span of 24 hours.

My task to introduce the eminent ENT surgeon, Dr. Pradip Patra became easier. He didn't have any formal schooling to learn painting though he had nurtured a "cultural bent of mind" since his childhood. "Probably it was in my gene," he smiles under a double layered mask in between a break while examining patients. And that too on a Sunday, when people are supposed to be relaxed.

How was he influenced by P.C. Ray? That's very interesting, he recalls. A product of the Oriental Seminary, where Rabindranath Tagore had studied, he had enrolled himself as a member of Kishore Kalyan Parishad, a literary, socio-cultural organization in North Calcutta for juvenile students. There he came in touch with Rabin Bandopadhaya, a chemist by profession and a bibliophile. He had a rich collection of books, especially on Acharya P.C. Ray. "He introduced me to the treasure trove and that's how my indoctrination on P.C. Ray began." Dr. Patra remembers that he had had the privilege of coming into contact with several luminaries of the Bengali literary world when he had served as the organization's secretary.

I continued reading P. C. Ray even after I was admitted to R.G. Kar Medical College for my MBBS degree. As a representative of the college, I took part in several competitions and debates when I referred to his teachings and sermons. That helped me earn accolades and several laurels, he reminisces.

In fact, Dr. Patra feels, the Acharya is a "beacon of light in a distant galaxy of stars which continues to shine brightly to enlighten us." He lived the life of an ascetic though he had hailed from a rich Zamindar family, and he loathed the

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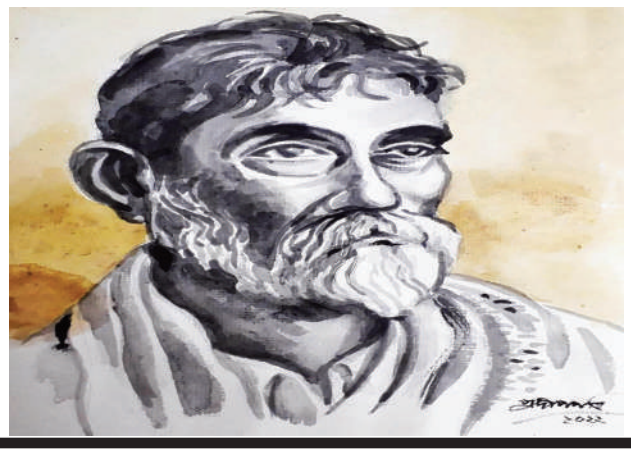
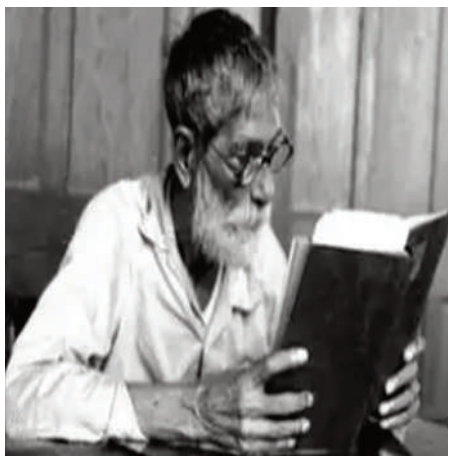


The Ray Legacy

The Short Story Of A Big Life

Sudhendu Mandal: Indian Renaissance was a constructive interaction and a creative synthesis of the best of both worlds i.e. East and West within the canopy of Indian tradition and culture. Ram Mohan Roy was the torch bearer, followed by Iswar Chandra Vidyasagar, Michael Madhusudan Datta, Bankim Chandra Chattopadhyay, Rabindranath Tagore, Prafulla Chandra Ray, Asutosh Mukherjee and many others from all stages of Indian life, culture, religion, literature, and finally science. Acharya Prafulla Chandra belonged to the class of "Jewel Scientists" of the British India period. He made significant contribution to the betterment of human life to have an identity of our own nation. His life is a role model for all persons who aspire to make a mark in the national/international context and may achieve excellence in their own field of specialization.



How can Acharya Prafulla Chandra Ray be described? A Bengali academician? A celebrated chemist, concerned with all spheres of human interest? The founder of the Indian school of modern chemistry and a pioneer of the chemical industries in India, who was also the founder of Bengal Chemicals & Pharmaceuticals, India's first pharmaceutical company? Or, as the founder President of the Indian Science News Association (ISNA)? Or as the author of "A History of Hindu Chemistry" between the earliest times and the 16th century? Or, as a professor, who devoted his spare time in research on Ayurveda?

More to add. Alexander Pedler was his inspiring teacher of chemistry at the Presidency College. He also learnt languages like Latin, French, English, in addition to Sanskrit and Bengali. He was the winner of the most prestigious Gilchrist Scholarship as the second Indian, and also the Hope Prize to study at the University of Edinburgh. He worked under Alexander Crum Brown for his doctorate and his thesis title was "Conjugated Sulphates of

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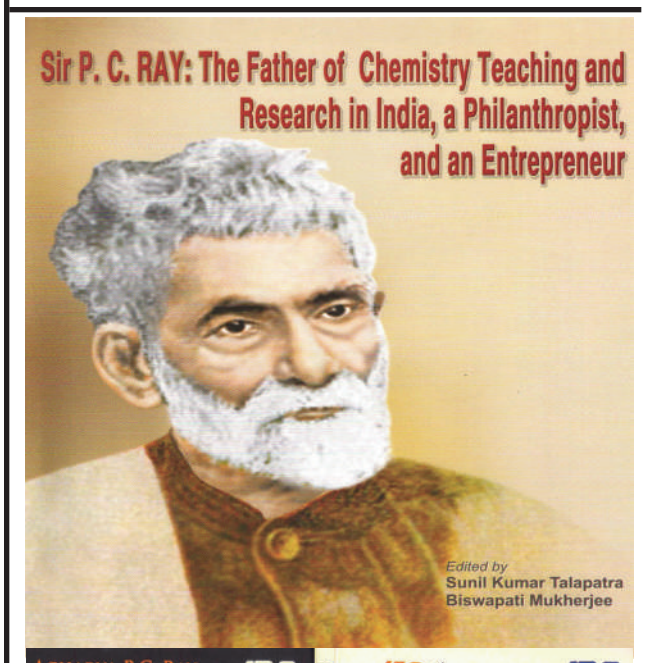

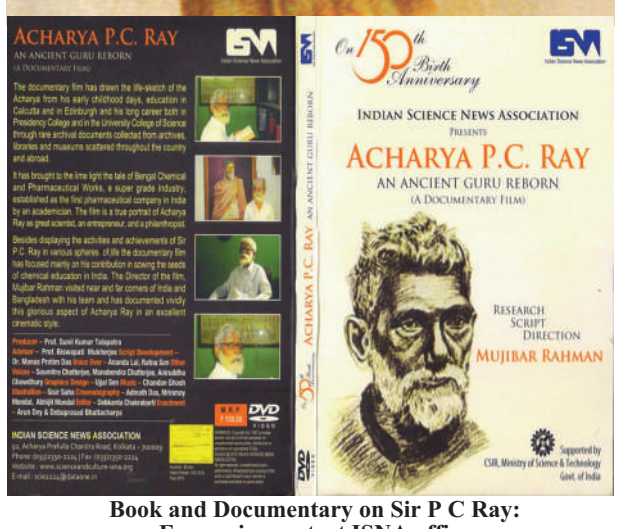

Book and Documentary on Sir P C Ray:
For copies contact ISNA office

The Ray Legacy

The Savant Patriot

Manas Chakrabarty:

The great Indian savant, Acharya Prafulla Chandra Ray was a man of unique virtues and multifaceted activities. In all respect he was a true patriot. Because of his tacit support for the revolutionaries, the British police tagged him as 'a revolutionary in the garb of a scientist'. The philanthropist, P.C. Ray was always at the forefront in all kinds of relief work following natural disasters like earthquake, famine and flood. He strongly advocated that

primary education should be taught in mother tongue but English should not be abolished. He was also an advocate of Charka and Khaddar as a means of economic salvation of especially the peasants, the widows and the unmarried women. It is no wonder that P.C. Ray was famous for his charity. He had always helped orphans, widows and the needy. He even donated his salary from Calcutta University for 15 years for the scholars and the chemistry department.

However, the greatest legacy of P.C. Ray is his creation of a school of modern Indian chemistry by his pupils. In fact, his laboratory was the 'nursery of modern Indian chemists' who reigned over the chemistry teaching and re search all over India.

In 1892, P.C. Ray set up the Bengal Chemical Works with its headquarters at his residence at 91, Upper Circular Road. In April, 1901, it became a Limited Company and renamed Bengal Chemical and Pharmaceutical Works (BCPW). A new factory was built at Manicktala and three other factories were subsequently set up at Panihati in West Bengal, Bombay and in Kanpur (1949). It was nationalised in 1981. The Govt. of India, however, recently decided to disinvest this Company. The first 'Swadeshi' venture of P.C. Ray is thus facing death.

He also set up the Indian Chemical Society along with its mouthpiece, Journal of Indian Chemical Society. In 1935, P.C. Ray, Meghnad Saha and others founded the Indian Science News Association (ISNA) and its journal Science and Culture. He published many other books and articles in both Bengali and English. His two-volume magnum opus *A History of Hindu Chemistry*, 2-vol. autobiography *Life and Experiences of a Bengali Chemist* and his *Atmacharit* top the list of hiscontribution.

Born to Harish Chandra Ray and Bhubanmohini Devi on August 2, 1861 in the village of Raruli in Jessore district, now in Bangladesh, P.C. Ray had pursued teaching and research in chemistry throughout his life. He breathed his last on June 16, 1944, in the room where he lived in the Calcutta University Science College.

In the words of his student Satyendra Nath Bose, "His saintly life is a beacon light to all who wish to dedicate their lives in the service of humanity."

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The Ray Legacy

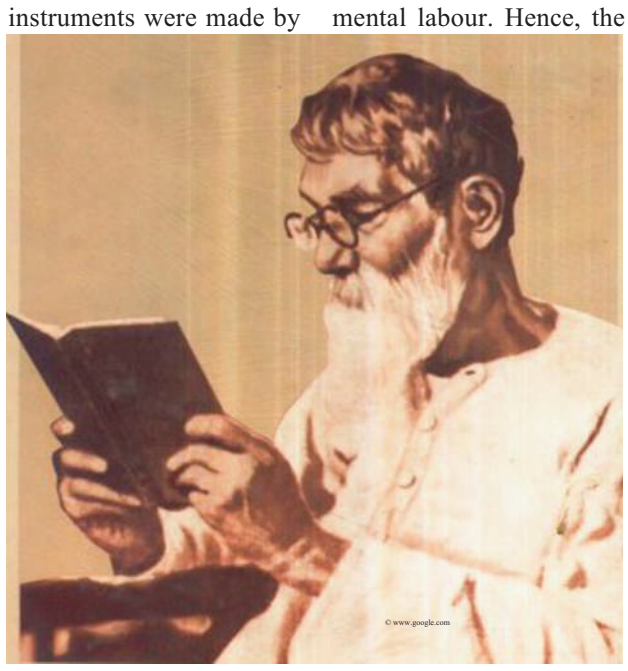
The Historian Prafulla Chandra

Sabyasachi Chattopadhyay:

Acharya Prafulla Chandra Roy was a person, who tried to make science social and to make society scientific in outlook and practice. That's why he tried to throw light on the social history of science. He showed his meticulous research aptitude and rational outlook in his book History of Hindu Chemistry (Two volumes, published in 1902 & 1909). He divided the entire period of the growth of Hindu Chemistry in four phases, the first is up to 800 A.D, second phase is the period between 800 A.D and 1100 A.D, the third is 1100 A.D-1300 A.D and the time period of the last phase is 1300 A.D-1550 A.D.

He tried to trace the reasons behind the decline of the study of chemistry in particular, and science in general. To trace the reason behind decline, he focused on caste system in Indian society and the attitude of difference between mental work and physical work. He pointed out that this indifference to physical work acts as a hindrance to the path of the development of our country. He, therefore, gave much emphasis on the utility of physical labour.

Prafulla Chandra thought of applying science to applied technology. For that reason, he mentioned that the caste system of ancient society had acted as an obstacle to the study of experimental science in that period. Generally surgical instruments were made by



the blacksmiths and those were used by the medical practitioners. But in ancient India the co-ordination between the medical physicians and blacksmiths was gradually lost.

He also showed that superstitions related to dead bodies prevented the growth of medical science. A medical student has to dissect a human body for getting the true knowledge regarding the body. A budding surgeon has to dissect the body first. Only thereafter, the surgeon can dissect a living human being. But the then Hindu society did not allow an upper caste like Brahmin or Vaidya to dissect the body; to them that was the work of Doms, the lower caste people. Physical labour was hated by those who did mental labour. Hence, the study of surgery & medical science in particular and technical subjects in general suffered badly. He strongly felt that the ego of having a golden past could not lead the country to anywhere. On the contrary, he thought it was the duty of us to do something for nation-building.

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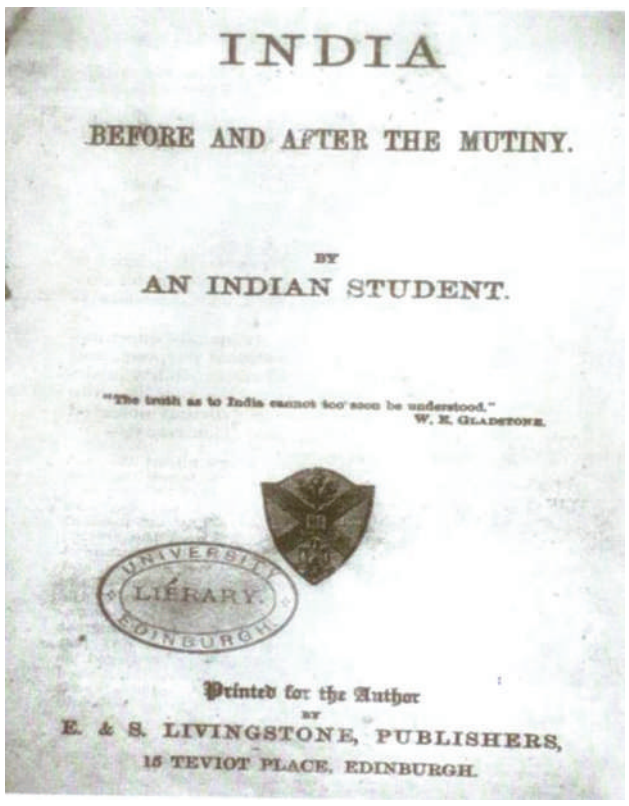
1>> A Big Life..

the Copper-Magnesium Group: A study of Isomorphous mixtures and Molecular combinations." To him goes the credit of synthesizing first the compound, Mercurous Nitrite.

Acharya Prafulla Chandra became the President of the Indian Science Congress in 1920. He was the recipient of Faraday Gold Medal of the University of Edinburgh (1887), Companion of the Order of the Indian Empire (CIE, 1912), a Knight Bachelor (1919), and a fellow of the Royal Asiatic Society of Bengal, the Foundation Fellow of the National Institute of Sciences of India (1935), and the Indian Association for the Cultivation of Science (1943).

He had earned several other laurels. He was honoured with Hon. Doctor of Philosophy degree from the University of Calcutta (1908), and D.Sc. degrees from the Durham University (1912), the Banaras Hindu University (1920), the University of Dhaka (1920), and also from the University of Allahabad



(1937). The Royal Society of Chemistry (RSC) placed the Chemical Landmark Plaque in the University of Calcutta in 2011, the first to be situated outside Europe. Rabindranath Tagore spoke of him "as a teacher of youth, as a guru inspiring them with high ideals and the spirit of quest for knowledge."

It is therefore pertinent to mention that Acharya Ray should be remembered and focused in a befitting way following the ethos and culture of India in the context of its progressive development for the present society. We are paying our respectful homage and tribute to Acharya P.C. Ray, now on his 162nd birth anniversary and we are still being amazed by his wealth of legacy.

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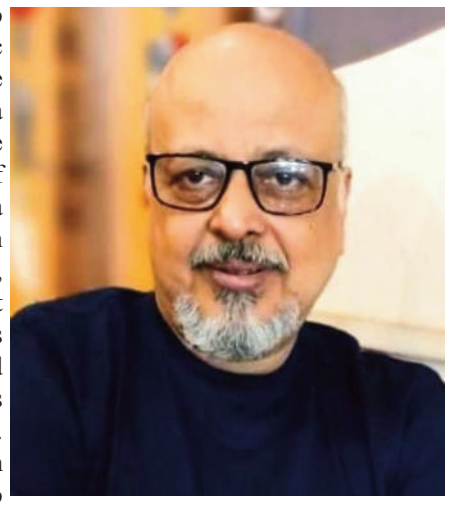
1>> And Scalpel...

life of modern consumerism that is influencing our generation, and also our progeny. His achievements are many. Look at the number of brilliant students that grew under his tutelage. They are all geniuses.

But all said and done, P.C. Ray was a modern man. After showing his acumen everywhere, especially abroad, where he had shown his excellence in chemistry, he came back and started working also on herbal medicine, a historical tradition of India. With his unending zeal and enthusiasm he was instrumental in setting up the first pharmaceutical company of the country, which was still under the shackles of British rulers. "That's an example of his nationalist spirit."

Dr. Patra is emphatic that had P.C. Ray been alive today he would have reoriented himself to the trends of modern medicine. Maybe, he would have invented some. He refers to another Ray, a legend of Bengal, the late physician Chief Minister Bidhan Chandra Ray. When they were very much active in their time, antibiotics or modern methods of surgery or pathological tests were not there. Prafulla Chandra knew what people would need as their panacea while Bidhan Chandra solely depended on his knowledge and power of observation to treat even the most incurable diseases. "Unfortunately, P.C. Ray's national emblem, the BCPW, is now being put up for sale," he laments.



Going back to his artistic continuum, the surgeon, a typical example of the heritage of North Calcutta where he is born and brought up, says he did not stop his trysts with brush and easel despite his busy schedule. He has an anecdote to share. While I was financially stable after joining the medical profession, I had engaged one painting tutor for my younger son. One day, he came across my collection and he was simply flummoxed. "Be my teacher," the tutor appealed to him and "that's what had happened," he bursts into laughter.

"Knock, knock!" Who is it? The apologetic assistant sneaks through the heavy curtains. "Sir, another patient with throbbing ear pains." Sorry! I got the signal and the free-flowing interview had to be cut off. Already an hour has passed and my dilemma began. Of Dr. Patra's, which painting to choose?

I was mired in thoughts while strolling on way back home and lo! We decided to choose both.

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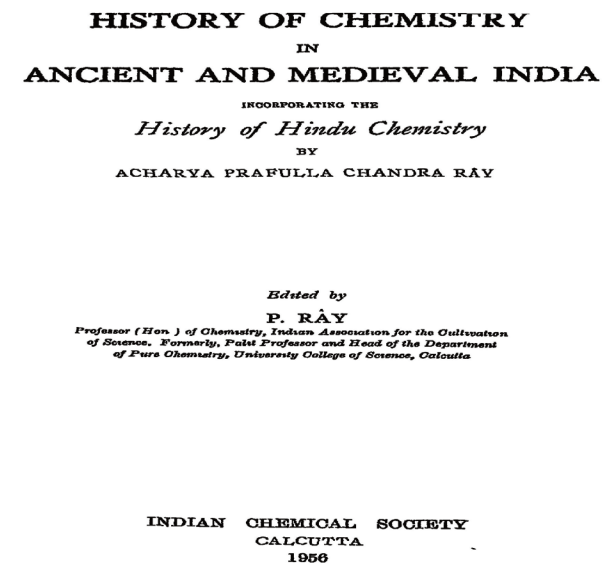
The Ray Legacy

A Thought On Modern Medicine

Soumitra Kumar Choudhuri: Modern medicine, developed over the last two centuries, is the product of western science where Indian herbal drugs (Ayurveda) finds no place. But Indian herbal medicine, developed thousand years back, proved to be effective in many diseases. Such drugs have wide use in the community and a huge number of ancient references exist.

The profoundness of herbal medicine, its history, mode of development, and applications were described by Acharya Prafulla Chandra Ray in his book 'History of Chemistry in ancient and medieval India.' The herbal medicine (Ayurveda) is still practiced and people are confused many a time about its role. Will this practice of herbal drug application go independently or be mixed with modern medicine?


HISTORY OF CHEMISTRY
IN
ANCIENT AND MEDIEVAL INDIA
INCORPORATING THE
History of Hindu Chemistry
BY
ACHARYA PRAFULLA CHANDRA RAY

Edited by
P. RAY
Professor (Hon.) of Chemistry, Indian Association for the Cultivation of Science. Formerly, Palit Professor and Head of the Department of Pure Chemistry, University College of Science, Calcutta

INDIAN CHEMICAL SOCIETY
CALCUTTA
1956

We may seek the answer from Acharya Roy, the eminent professor and world-renowned scientist who paved the way of industrialization in Bengal. He developed and marketed some medicines through 'Bengal Chemical' which he founded. Dr. Ray maintained a very clear view about the development of modern medicine for effective treatment. During his time, modern medicine was poorly developed in the sense that antibiotics, anticancer drugs and disease detection kits (except X-ray) were not discovered. Penicillin, though discovered earlier, was approved for application in 1944.

P.C. Ray wanted to develop indigenous drugs so that the British rulers cannot make sole profit and have the monopoly in the drug market. Based on his vast knowledge of Indian Medicines (Ayurveda), particularly on Charaka and Sushruta, and chemistry, he developed some drugs as well. He proposed some ideas of developing modern medicines combining both Indian and western approaches for treatment of various diseases.

What should be the policy of new drug development? According to him, mere incorporation of some anatomy and physiology topics in Ayurveda courses will not be correct. He said, "The policy should rather be to accept the western scientific system of medicine as the nucleus round which the tested knowledge derived from indigenous system of medicine is gathered. All our knowledge should be accumulated on scientific lines." (Founder's Day address at the Medical College, Calcutta, February 20, 1940)

Unfortunately, we did not accept his idea and failed to be self-reliant in medicinal industry even after 75 years of Independence.

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Along with the Students (1914-15)
Sitting (Left), PB Sarkar, Amaresh Chakraborty, PC Ray, PS Muthu, S N Bose,
Standing (Left): Meghnad Saha, UN Karmakar, J C Ghosh, J N Mukherjee

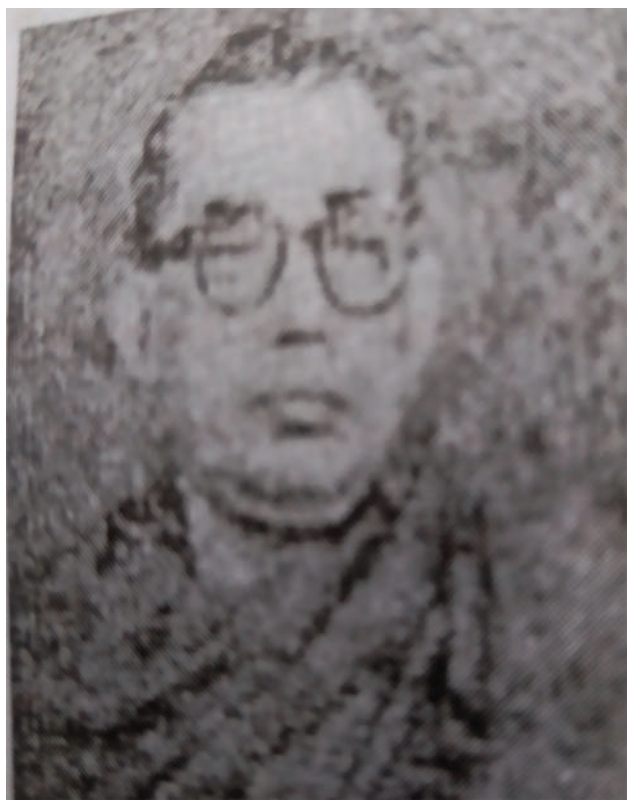
The Ray Legacy

The Story Of An Unknown Soldier

Paritosh Bhattacharya:
It is often said that chemistry is a science of mystery. When we look into the life of Acharya Prafulla Chandra Roy, we find that the statement is no exaggeration. While people are aware of the triumvirate of three "Jnans," his three best students, mysteriously little is known of his another disciple, the late Professor Dukkhohoron Chakraborty of the University College of Science, Calcutta.

When Prof. Chakrabarty started his research work in 1926 in the Rajabazar Science College, the Acharya was teaching as the Palit Professor of chemistry. Due to his brilliance in academic career all through, Dukkhohoron Chakraborty came into his close contact and endeared himself to P C Ray. In fact, being inspired and nurtured by the Acharya, Prof. Chakrabarty undertook research works on synthetic organic chemistry, especially on different dyes including Anthrocyanine, Flavone, and Aquamarines etc. At that time India used to import dyes from abroad at a price that proved too heavy for the exchequer. Encouraged by P.C. Ray to help minimize the cost of import, Dukkhohoron started to synthesize dyes from natural resources like Butea fondosa, Carthamus Tinctorius etc.

Chakrabarty's association with Ray did not end there. Again, it is a well known fact that the Acharya, who was himself a great science historian and author, had encouraged others to write on different subjects, whenever possible in Bengali. In 1949, Bhavesh Chandra Ray and Narendra Nath Singh jointly wrote a book named, Yuddha Vigyan (War science). The authors acknowledged that they were inspired by Acharya P.C. Ray, Dukkhohoron Chakrabarty, and Sasanka Sekhar Bagchi. Dukkhoharan himself was notable as the author of a Bengali book - " Ranjan Drabyo" - published by Viswa Bharati as a part of Viswo Bidya Sangroho Granthamala in 1943.



Dukkhoharan Chakrabarty's career itself may be a subject of study. Having hailed from the village of Kotalipara in the district of Faridpur (now in Bangladesh), he stood first in 1920 in the matriculation examination. He graduated later from the Presidency College and earned his M.Sc from the Calcutta University with specialization in organic chemistry. He obtained his D.Sc in 1934. That year itself he joined the science college as an assistant lecturer.

Professor Chakraborty showed his mettle as a good administrator as well. He became the secretary, University College of science, and later became the Registrar, Calcutta University. He soon returned to teaching/research as the Ghosh Professor of chemistry. In 1969, he became the head of the chemistry department and took over as the Dean of the faculty of science.

Professor Chakraborty was also an active social worker and was attached with various organizations like Indian Chemical Society, Indian Association for the Cultivation of Science. He breathed his last in Calcutta on September 25, 1972.

Former Director,
National Biofertilizer Research & Development Center,
Government of India

The Ray Legacy

The Bengal Chemical Saga

Saikat Basu: The Bengal Chemical that began operations in 1892, an organization developed by Acharya P. C. Ray, has been an industrial unit of national repute that has stood the test of time. It is reported by historians as the first chemical industry established in India. It was formally established as Bengal Chemical & Pharmaceuticals Ltd (BCPL) in 1901 and has been a testimonial of India's freedom struggle. It has seen the independence of a divided nation and rose to its eminence in post independent India. Again history has brought us back to where certainly this giant is now losing out in competition in modern India.

What have been the major Bengal Chemical products? These include various medicines including floor cleaners and disinfectants that have been in the grocery items of most Indian families for decades. The organization has been once associated with production of anti snake venom too. Lack of infrastructure, proper management and leadership, lack of modernization and upgrading in time and innumerable labour related complex issues has negatively impacted its business. It is in need of much awaited funding and infrastructural support to survive in the context of modern India.

Bengal Chemical has been a fruit of passion for Prof P. C. Ray and he made innumerable sacrifices. He has been a monumental example of possibly one of the first enlightened visionaries from the continent of Asia to promote the marriage or integration of academics and industrial development. He was first to demonstrate to the entire nation during the British Raj that wisdom generated in our university classrooms and laboratories need to step out of the campus.

Bengal Chemical has not only generated numerous products over decades but has also been instrumental in building confidence among the citizens of an occupied nation. It has inspired generations to develop self respect, confidence and national feelings to work for the betterment of the nation. Bengal Chemical is not an industry or organization or a company a national monument of pride. Perhaps no other scientist, researcher or academic in India has ever been able to demonstrate such outstanding dedication, devotion, spirit, hard labour and sincerity in developing an industry by itself. It is a brand with which Indians still associate their nostalgia and their pride. Nobody knows whether a torrid time awaits the BCPW.PFS,

Executive Research Director
Lethbridge, Alberta, Canada

Like Father Like Son

Amit Krishna De: Just a hundred years ago the Nobel Prize in Physics 1922 was awarded to Niels Henrik David Bohr, a Danish scientist, for his investigation into the structure of atoms, and on radiation emanating from them. Bohr developed the Bohr model of the atom, in which he proposed that energy levels of electrons are discrete and that the electrons revolve in stable orbits around the atomic nucleus but can jump from one energy level (or orbit) to another.

However, the Bohr model or Rutherford–Bohr model, presented by Niels Bohr and Ernest Rutherford in 1913, is a system consisting of a small, dense nucleus surrounded by orbiting electrons - similar to the structure of the Solar System, but with attraction provided by electrostatic forces in place of gravity. The Bohr model is still commonly taught to introduce students to quantum mechanics before their studying the more complex structures of atom.

In 1922 when Niels Bohr got the Nobel prize his son Aage Bohr was born. Aage grew up in an environment surrounded by physicists and he naturally developed an interest in physics and became a physicist himself. During World War II, Aage accompanied his father to the United States to work on the Manhattan Project. Then he returned to Denmark to earn his Ph.D. at the University of Copenhagen. Thereafter Aage turned his attention to a problem on the atomic nucleus. During the 40's he worked as an assistant to his father on the development of the atomic bomb at Los Alamos, New Mexico. He was associated since 1946 with the Niels Bohr Institute of Theoretical Physics, founded in Copenhagen by his father, whom he succeeded as director (1963 to 1970).

Aage Niels Bohr discovered that the motion of subatomic particles can distort the shape of the nucleus, thus challenging the widely accepted theory that all nuclei are perfectly spherical. This discovery was important for the understanding and development of nuclear fusion. He shared the 1975 physics Nobel "for the discovery of the connection between collective motion and particle motion in atomic nuclei and the development of the theory of the structure of the atomic nucleus based on this connection."

He died on Sept. 8, 2009, in Copenhagen.

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Some Thoughts On Names And Nomenclatures

Devaprasanna Sinha: Recently, in two offline events relating to science communication in Kolkata, with experienced and would-be communicators, I along with different groups, came across names of certain disciplines and sub-disciplines that have evolved from time to time. Further investigations and/or searches, mostly through internet,reveal there do exist a lot of deep studies in this arena, and a plethora of papers, articles, reports, news etc. by various authors are there, leave alone books and soft copies. References have also been made on various scores like traditional histories and nomenclatures, as available in erstwhile books, hitherto known or unknown, but uploaded. It is not possible for anyone to prepare a fairly good comprehensive article with limited size of this small note here. The intent, therefore, is to provide a glimpse of some of the works done and new thought-processes in this regard.

Thirteenth Science Communicators' Meet, 25th June 2022

To start with, we ought to mention the two words "Natural Philosophy". Way back in the 17th century, we find the book entitled "Philosophia Naturalis Principia Mathematica" (Mathematical Principles of Natural Philosophy: in English) by Isaac Newton, published in 1687. In 1867 also, we find Lord Kelvin and Pete Guthrie Tait (sic) writing the "Treatise on Natural Philosophy," where these words exist.

It is a well-known fact that the natural philosophy did include, in earlier years, zoology, botany, anthropology and chemistry as well as what we now call Physics. Interdisciplinary and Interdisciplinarity are the two oft-quoted buzzwords in this process. The amalgamation of two or more disciplines has resulted in many new disciplines on their own, in terms of their new and varying scientific content and engineering applications.

We knew of broadly three types of Chemistry, a little over 50 years ago. Today's chemists know many more broad level classifications. Biology, a discipline, not considered an exact science in earlier days, has generated, with amalgamation, disciplines like biomathematics, bio-physics, biochemistry, biocomputing, microbiology etc. Each of these need not be explained in terms of their scope of study and research along with others like, for example, a new discipline "Astrobiology".

Data Science has been in vogue for more than few decades, with bigger and deeper analytical and numerical tools, and also with rigorous flavour of mathematics and statistics. Data Science was used first in 1974. Peter Naur proposed data science as an alternative name for computer science. Information Science, as a d iscipline, is still in demand for a different clientele with its varying usage and applications.

From data to information we have also come to know about knowledge science and, in fact, its domain knowledge. We find many definitions, types, classes, and other subdisciplines, coupled with other terms. An interesting paper by Professor Chaim Zins of Israel (Journal of Documentation, 62(4), 447-461), questioned the naming of data science, information science and even knowledge science. He suggested that the name information science be changed to knowledge science. He has many other posers and arguments, not all equally acceptable but has not touched upon the parts of wisdom.

A critical review and arguments have become imperative not only to provide the posers only but also arguments and rationale for suggestions of new names. In fact, some of us share the common view that the nomenclatures and names in other disciplines need to be looked afresh and reviewed.

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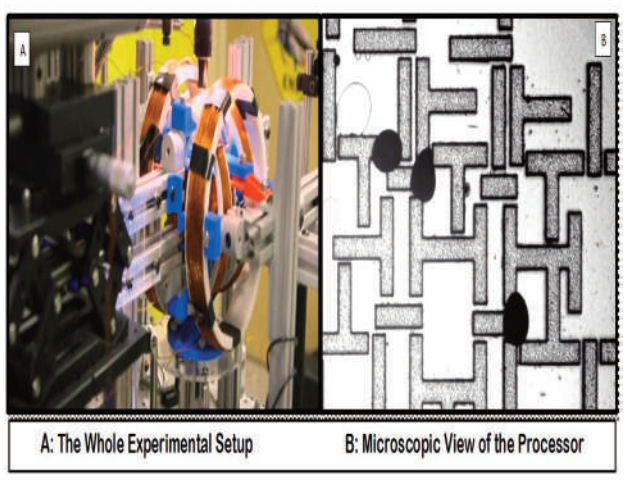
Water Droplets For Computers?

Shibsankar Roy: It took around more than a decade for Dr. Manu Prakash, an Indian scientist, presently an associate professor at Stanford University, and his research team to create for the first time in the world a working computer based on the physical movement of water droplets. Though it might sound astonishing, Dr. Prakash and his team indeed introduced a revolutionising technique in 2015 to the world of computer science. To simply put this water-based computer functioned on the basis of mixture of droplets consisting of two molecular compounds, naturally found in food colouring agents – water and propylene glycol.

The more surprising fact associated with such water computers is that these non-living droplets mimicked motion-like behaviour of living cells. The basic physics behind these dancing droplets is the delicate balance between surface tension and evaporation. Water evaporates more quickly than propylene glycol. Water also has a higher surface tension. These differences create a tornado-like flow inside the droplets, which not only allows them to move but also allows a single droplet to sense its neighbours. Evaporation determines the direction of that motion. Each droplet releases gaseous molecules of water into the air that detects the signal and provides the exact location of any given droplet. The droplets converge where the signal is strongest.

So, evaporation provides the sensing mechanism and surface tension provides the pull that moves the droplets together. This phenomenon appears like a careful dancing of the droplets to the observer. Dr. Prakash and his team really hope that in the near future they can revolutionize the world of science by introducing more such not-so-conventional computational techniques.



A: The Whole Experimental Setup B: Microscopic View of the Processor

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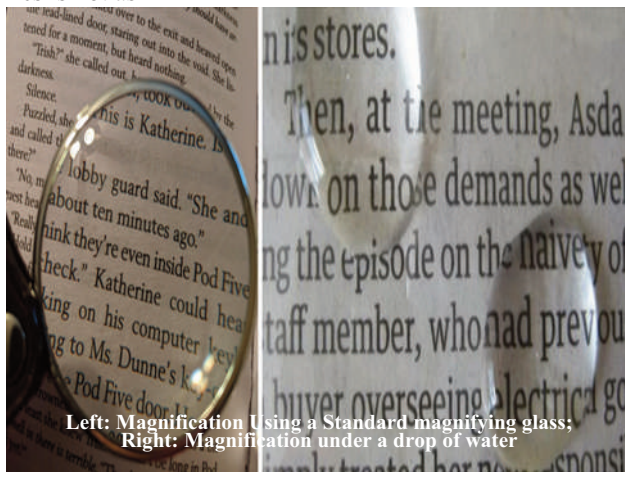
Water Droplets As Magnifiers!

Barnini Bhattacharya: Physics, the mother of all scientific disciplines is not as demanding as it appears to be. There are numerous table-top experiments which allows one to visualise and comprehend the fascinating principles and laws of Physics. One such bench-top experiment is using water drop as a magnifying lens. The basic principle of physics associated with this phenomenon is the concept of refractive index.



Left: Magnification Using a Standard magnifying glass;
Right: Magnification under a drop of water

What happens is that when light travels through transparent materials like glass, plastic or water there occurs a change in the speed of travel and angle of the light ray due to the variation in refractive indices of the materials (which is dependent on the material density). A drop of water in the air has a higher refractive index as compared to air. Moreover, owing to the convex shape of the droplet it tends to converge a parallel beam of light falling onto it. Therefore, it acts as a converging lens.

A convex lens is a converging lens. When parallel rays of light pass through a convex lens the refracted rays converge at one point by bending the oncoming light rays. This makes an object look larger than they actually are. A convex lens curves outward in the middle and can focus light rays to magnify an object. Water in a curved container or water droplets (both highly curved and convex) can thus be great magnifiers.

To visualize simply, when a small drop of water is poured on top of an object or the object looks bigger. The curved surface, unlike a flat surface, bends the light as it comes out from the water, and causes this magnification effect. This effect is very similar to how a microscope or magnifying glass works, except instead of a curved drop of water, the lens is made of a curved piece of glass. The more curved the water droplet (or glass lens) is, the higher the magnification.

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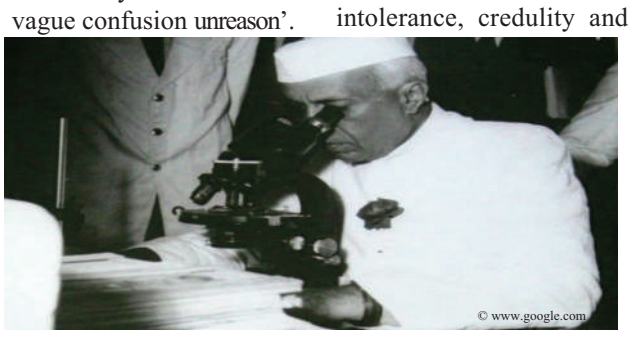
Nehru's Scientific Temperament In Making Of The New India

Sujit Rajbanshi:

Pandit Jawaharlal Nehru as India's first Prime Minister took several steps toward India's development. It was true that Nehru faced many obstacles in building a strong nation. He understood that science and technology must be prioritized to establish a strong nation. Rapid development of science and technology will permit the newborn India to be free of problems such as poverty, illiteracy, illness, superstition etc. Nehru's definition of Scientific Temper was even broader than the traditional definition of popular science. It is clear to him that, 'Science does answer more and more questions, and help us to understand life, and thus enables us, if we will but take advance of it, to live a better life, directed to a purpose worth having. It brightens the dark corner of life and makes us face reality instead of the vague confusion unreason'.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Nehru followed two methods in the transformation of Indian society. The first was to spread the scientific thinking among the Indian people and the second was to strengthen the Indian economy through the proper application of science and technology.

He thinks, 'Very different is the method of religion. Concerned as it is principally with the regions beyond the reach of objective inquiry, it relies on emotion and intuition. And then it applies this method to everything in life, even to those things which are capable of intellectual inquiry and observation: Organized religion, allying itself to theology and often more concerned with its vested interests than with things of the spirit, encourages a temper which is the very opposite to that of science. It produces narrowness and intolerance, credulity and superstition, emotionalism and irrationalism. It tends to close and limit the mind of man and to produce a temper of a dependent, unfree person.'

He has frequently spoken of the 'scientific temper' or the creation of the scientific mood. He enacted the Drug and Magic Remedies (Objectionable Advertisement) Act of 1954. It makes advertisements for drugs and remedies that claim to have magical properties illegal and makes them appear to be a punishable offence. The Prevention of Food Adulteration Act, 1954 was passed the same year.

Simultaneously the Scientific Policy Resolution passed by Parliament on March 4, 1958, reflected Nehru's vision of the role of science in national reconstruction. The goal was to make India a prosperous nation in the modern world through effective use of human resources, to foster human creativity, to increase science education, and to address the scarcity of natural resources by developing and applying new scientific techniques.

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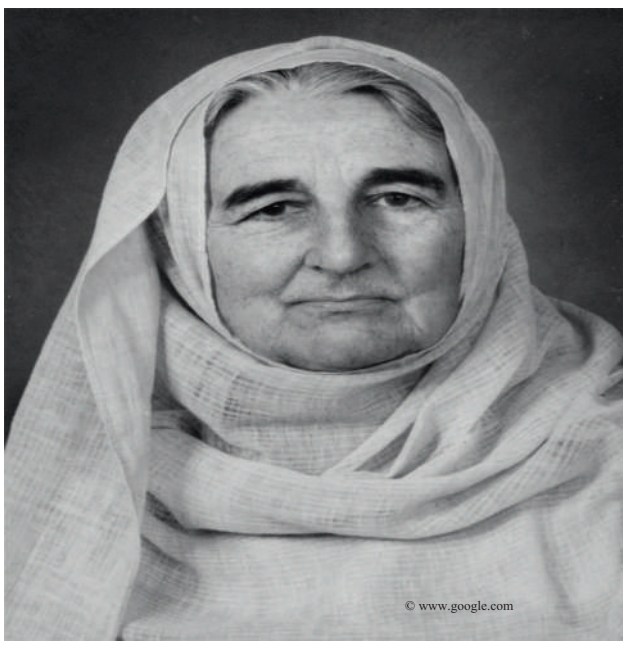
Miraben
Gandhi's English Daughter and Environmentalist

Sudip Mandal: Actress Geraldine James played the role of Mira Ben in Richard Attenborough's Oscar-winning film 'Gandhi' (1982). The movie has probably made Miraben famous all over the world. The woman, who lived in India for more than three decades, loved this country and cared about India's agriculture and environment. Unfortunately, the people of independent India do not know much about her.

Mira Ben's real name was Madeleine Slade, who was born in 1892 in an aristocratic family in England. Madeleine spent her childhood at her grandparents' home, where they owned a large estate. That is why she got close to nature in her childhood. Miraben first came to know about Gandhiji by reading a book written by Romain Rolland. After that, she decided to become Gandhiji's disciple and come to the holy land of India. At the call of Gandhiji, she left the life of happiness and comfort in England and lived like a saint in India. She learned Hindi and spent some time in the Bhagavadbhakti Ashram established by Swami Paramananda Maharaj. Madeleine gradually became Mira Ben.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When Mira Ben came to India, she also became involved in politics, went to the UK with Gandhiji in 1931 to attend the second round table conference. She was also imprisoned during the civil disobedience movement. She went to the United States in 1933 to meet the U.S. First Lady to tell her about the injustice and oppression in India.

Miraben also established the Kisan Ashram at Muldaspur village near Roorkee. In 1948 she established the Pashulok Ashram in Rishikesh, and tried to build a self-reliant village, named 'Bapu Gram'. While in Rishikesh, the heart breaking news of Gandhi's assassination came on January 30, 1948. She was there until her return to England, and her experiments on agriculture continued. Miraben also tried to popularize organic farming. In 1981, the Govt. of India awarded her with the Padma Bhushan. The question remains. How much do we remember her now?

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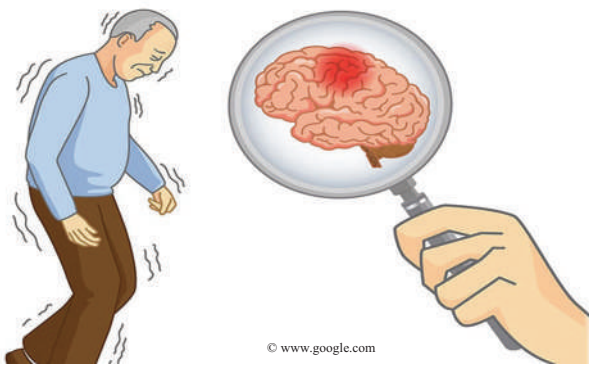
Parkinson's Disease: A Nervous System Disorder

Minakshi De:

Parkinson's disease is a disorder of the nervous system that affects the movement of an individual. In this problem, the Dopamine producing neurons of the brain are affected. When Dopamine levels decrease in the brain, abnormal brain activity, leading to impaired movement is seen in an individual and this is one of the major symptoms of Parkinson's disease.

Symptoms of Parkinson's disease

A person's heel touches the ground first and then the toes, while walking regularly which thus maintains the gait, balance, posture and mobility. But in Parkinson's disease an individual's movement gets slow. The stride length is reduced which subsequently affects the ankle. As a result, the victim adopts a flat foot type of walk. This irregular walking style affects the foot when it strikes the ground to take a step. The consequence: the victim experiences pain in foot, leg and knee. Muscle twitching, spasms and cramps are an indicator of the onset of Parkinson's disease.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Curled and clenched toes are another symptom of the disorder. Due to limited movement, the affected individual can also notice swelling in the ankle and feet which is called oedema. Doctors throw light on the foot problems even after Parkinson's medication is administered. Due to the medication, ankle swelling can happen as a side effect. The legs may seem heavy and these people would have difficulty in wearing shoes. Courtesy: The Times of India

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Crop Stubble: A Burning Issue

Debabrata Sur:

Issue: Burning of crop stubble (agro-waste) is considered one of the major causes of air pollution in India. It is commonly called as stubble burning. After rice is harvested, it leaves behind crop stubble, which is a useless plant material that fuels countless disposal fires. Burning of stubble results in emission of Greenhouse gases (CO_2, N_2O, CH_4), air pollutants (CO, NH_3, SO_2, NO_x, volatile organic compounds), particulate matters, and smoke that cause suffocating air pollution.

Generally, farmers rotate between crops, planting rice in May and wheat in November. In order to quickly prepare their fields for wheat crop, many of them burn leftover plant debris after harvesting rice. It is more common in the Northern States of India. About 20 million tons of rice straw is being burned every year in Haryana and Punjab alone, filling the air with smoke and harmful particles. This also adversely affects the nutrient percentage in the soil. The heat generated during the burning kills the bacterial and fungal populations which are crucial for fertile soil. As a sequel, New Delhi continues to be the world's most polluted capital city for the fourth consecutive year in a row, according to the World Air Quality Report, prepared by the Swiss organisation IQAir.

Solutions:

* The good news is that a New Delhi–based start-up company is dedicated to convert rice straw into cellulosic pulp which can be used to make products like paper and disposable tableware. They are now selling this technology to manufacturers of eco-friendly plates. Eating utensils made from this pulp are 100 % biodegradable. It can reduce the waste created by single-use plastic tableware. They are planning to create its first manufacturing plant in India and also help local entrepreneurs to set up their own plants. Farmers can be given incentives for not burning the straw.

*Other alternative uses of straw are: biomass power projects, co-firing in thermal power plants, feedstock for 2G ethanol plants and for compressed biogas plants, fuel in industrial boilers etc.

*The Indian Agriculture Research Institute has devised a radical solution for stubble burning in the form of a bio-enzyme called PUSA. When sprayed, this enzyme decomposes the stubble in 20-25 days, turning it into manure, which further improves the soil quality.

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Should Coal Remain Shelved?

Amar Nath Bhadra:

The energy scene in India is very much complex, being a mixture of variety of energy resources that are being utilized for economic growth and progress, when India is still an agriculture-based economy.


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While the use of the non fossil fuel-based energy resource continues to increase steadily, there are major bottlenecks like logistics of transportation and environmental pollution.

Prime Minister Narendra Modi spoke of net zero emission target of India by 2070 through de-carbonization in the COP 26 summit. India is committed to fulfilling its obligations and the operation by the 2,245 MW/D solar village in Rajasthan, the largest in the country, has put a new dimension in the history of solar power even in the global context. But solar power is available only during the day, which also depends on insulation. So, depending on power from the solar panel is rather an unfeasible option.

Coal undoubtedly is the primary fossil fuel resource for the nation's growth but now the pattern seems to be shifting. Sustainability through optimal use of natural resources like coal, oil and natural gases should meet our own needs for the generations to come. The question is whether the climate pact of the Glasgow Summit is enough to avoid the catastrophic impact of the changing climate? For, 70% of the world's population aspires to fall in the category of a developed nation, and that is a matter of deep concern in the energy perspective.

And what about our country with a population base of 1300 millions? The energy matrix must, therefore, be designed carefully by the planners and policy makers and the much hyped phasing out of coal be shelved as India is yet to be a developed country, and if she, with a total of 3.3 trillion GDP, wants to reach the five trillion mark by 2026.

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Paper Bag Puppets Say Something To You

Sima Mukhopadhyay:
Dramatic expression is an effective medium for education and communication. Puppetry can be used successfully in this aspect.

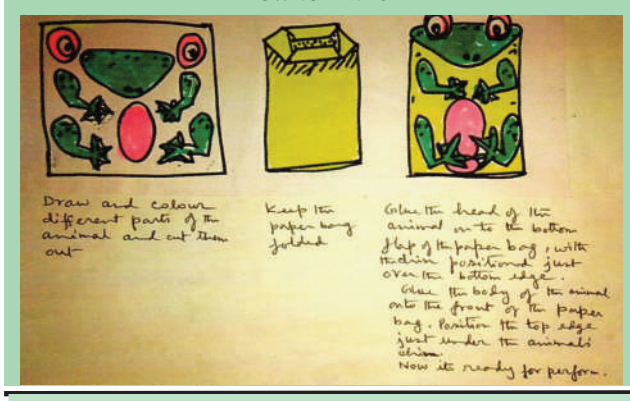
Puppetry is the magical art of bringing inanimate things to life. Children are highly attracted by puppet and therefore it can be effectively used to capture their attention. Now puppets are used as powerful educational medium in teaching specially in classroom situation. Teachers are also encouraged using Puppet as teaching aids.

Paper bag puppets are simple hand puppets. Children can use this paper bag puppet to tell stories easily and can enjoy. Grocery paper bags are cheap and just the right size for little hands. If it is not available easily any body can make this paper bag without difficulty.

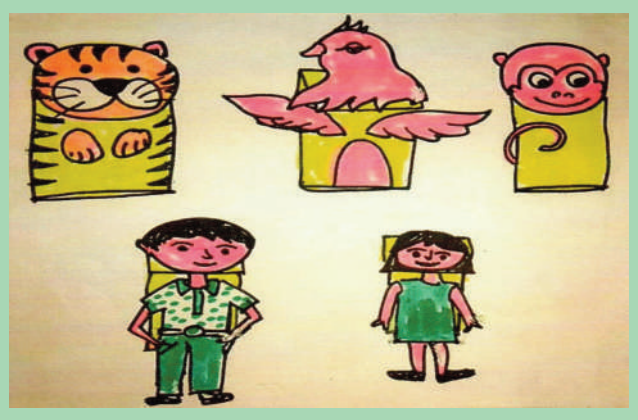
*** Requirement for making Paper Bag Puppet:**

a)White paper b) Paper bag c) Coloured pencil or marker pen d) Scissor e) Glue

How to make



Sample of some Paper Bag Puppet



Sample Story

Story of some Paper Bags

Characters: Paper Bags puppet, a little boy (paper bag puppet)

[Two paper bag puppets are singing]

Paper Bags --- (singing) We shall overcome……we shall over come……..

Boy --- What happens to you paper bags? Why are you singing and dancing?

Paper Bag --- Now this area is declared as 'No plastic zone'. Nobody can use poly-bag for their marketing, plastic glass for their drinking water, plastic cup for tea etc etc.

Boy --- Yes. That's a very important decision. Actually, when wind blows, thin poly bags fly here and there, it blocks the drainage system. Water logging condition appears even in light rain.

Paper Bag --- You people throw discarded food items in thin poly-bags and that create problem in the digestive systems of that animals.

Boy --- Yes you are right. Even in ocean Sea Tortoise instead of jelly fish eat poly-bag by mistake. Now aquatic animals are felling threatened due to plastic pollution.

Paper Bag --- Aquatic animals are not using poly-bag in their daily life. You people are main culprit for these situations. You are throwing poly-bags here and there continuously.

Boy --- I agree with you hundred percent. We have to change our habits. See with my friends we have developed this poster.

•Think Before Throw Plastics.
•Segregate Plastic Items at Source in Your Home.
•Carry Cloth or Jute Bags for Marketing.

Paper Bag --- Include our names also.

Boy --- Yes. Yes

USE PAPER BAG AS MUCH AS POSSIBLE

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Laugh A Little

Tuhin Sajjad Sk

1. I was arrested a few days ago for stealing people's electrons.
And I was heavily charged, despite my victims' saying it was an overall positive experience!

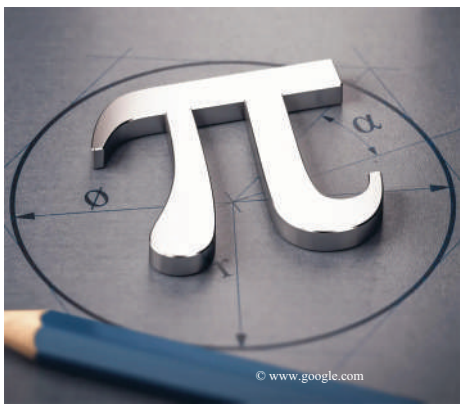
2. What do you call an Acid with Attitude?
A-mean-oh acid!

3. Na: - I explode when I kiss the water.
Cl: - They took me as a chemical bomb in WWI.
NaCl: - Sorry! I make your baby's dish too salty.

What Is The Pi (π)?

Shefalika Ghosh Samaddar:
Have an irrational day! As we celebrate the world's most talked about irrational number π (Pi) on July 22 (there are others who celebrate it on March 14 considering the truncated value of π) every year, the number is able to evoke a non-ending curiosity in the mind of scientists, mathematicians and general public.

The value of Pi or π is believed to be equivalent to 22/7, an unending series of numbers 3.14... . This happens to be the



decimal equivalent of the ratio of the circumference of a circle to its diameter, which is denoted by π (pi) in modern calculations. However, π is irrational and therefore not equal to 22/7! (Though many people believe this). There are some really cool infinite series formulae involving π credited to the Indian mathematician. Ramanujan. The π is ubiquitous in mathematics, physics, engineering, and statistics - everywhere.

The first recorded algorithm for rigorously calculating the value of π was a geometrical approach using polygons, invented around 250 BC by the Greek mathematician, Archimedes. This polygonal algorithm of Archimedes computed upper and lower bounds of π by drawing a regular hexagon inside and outside a circle, and successively doubling the number of sides until he reached a 96-sided regular polygon. By calculating the perimeters of these polygons, he was able to prove that $223/71 < \pi < 22/7$ (that is $3.1408 < \pi < 3.1429$). Archimedes' upper bound of 22/7 may have led to a widespread popular belief that π is equal to 22/7.

However, Shanu A. from Kerela created a record for his feat of memorizing the value of Pi up to 50,000 places and made his entry in the Guinness Book of Records. His source of inspiration was the Vedic numerical code which he used to memorize the value of π (Pi) up to the number of places required for breaking the record. He used the Code innovatively as a mechanism of tagging the numbers into a system of linear mnemonics of meaningful lyrics having a different meaning altogether. The process is based on Katapayadi Shankya. The truncated verse can ultimately obtain the number-

3141592653589793238462643383279 2

The number gives the accurate value of π/10 correct to 31 decimal places. This was also a proof that the value of π (pi) was known in ancient India. There is enough scope to pursue our age-old traditional knowledge base for application and use in the present era.

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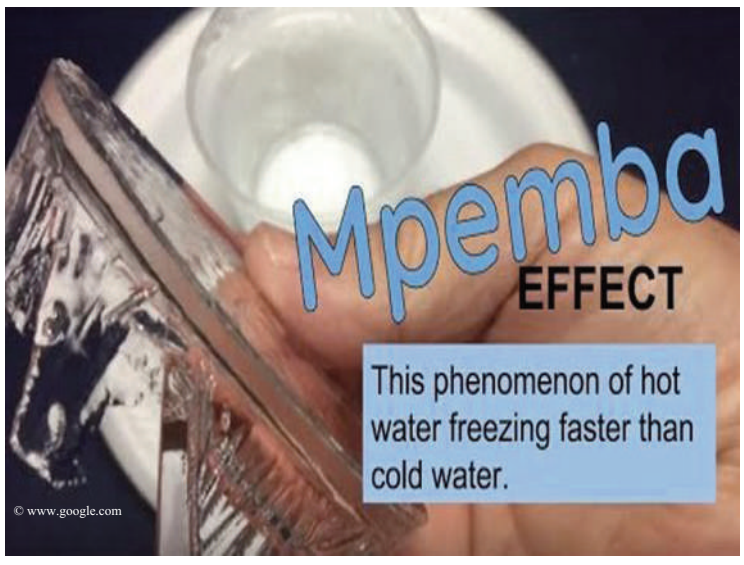
The MPEMBA Effect

Tuhin Sajjad Sk:
It was the year 1960. A Tanzanian teenager Erasto Mpemba asked his class teacher whether ice cream would freeze faster if it was heated first before being put in the freezer. Everyone laughed at him since it was known to all those warm objects cool down faster than the warmer. But everyone in the class was stunned when the teacher got that vindicated by doing that experiment successfully.

Hot water normally does not cool quicker than cold but in that case, it happened. Hot water can be made to cool more rapidly than cold by supplying more energy to the cooling of hot water. In the history of chemistry, this incident is known as the MPEMBA Effect.



This assertion is counter-intuitive. There are no straightforward laws to prove it, but this effect breaches the fundamental thermodynamics law. This incident connects the molecular interactions and hydrogen bonding with liquid water. Such events result in meaningful hysteresis in the thermal or fluid properties of water. No doubt, it was a mystery to the scientific community but Aristotle and Rene Descartes had demonstrated such a vague action long back. Unfortunately, they failed to provide supporting evidence.

In 2012, The Royal Society of Chemistry organized a competition focusing on this odd occurrence. Interestingly it received substantial publicity!

The scientific society is trying to prove it, thinking in terms of the Theory of Convention. It believes that the temperature of the water becomes non-uniform as the water cools down. At that time the temperature gradient and convection currents develop. In most temperatures, the density of water decreases as the temperature increases. This theory couldn't satisfy many but it is still happening as the MPEMBA Effect.

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First Offline Since Pandemic

ISNA Launches 35th SCMP Training Programme

Barnini Bhattacharya: In a first offline programme since the pandemic, the inauguration of the 35th Training Programme on Science Communication and Media Practice (SCMP), 2022-2023, jointly

organized by the Indian Science News Association (ISNA) and Vigyan Prasar, Government of India, took place on June 17, 2022. The ceremony, at the N.R. Sen Auditorium of the Calcutta University, began with the felicitation of the dignitaries.

Mr. Prasanta K. Bose, Chairman of the Training Programme, and Editor of ISNA's e-papers, in his welcome address spoke about the journey of Scientifica Communica and Bigyan Kahan, the new online ventures of ISNA, amidst the pandemic. Prof. Manas Chakraborty, Honorary Secretary, ISNA, recalled the history of the association and its role in science communication since ages.

Chief Guest of the evening, Prof. Nemai Chandra Saha, Vice-Chancellor, University of Burdwan, dwelt on the basics of science communication. Recalling Tagore's contribution to science, he emphasized on the role of media in proper communication of scientific facts and figures to benefit the commoners.

Earlier, Prof. Sudhendu Mondol, Editor-in-Chief, Science and Culture, introduced Prof. Saha, who also released the May-June 2022, issue of the journal, simultaneously with other dignitaries. Prof. Sunil Kumar Talapatra, Vice-President of ISNA, presented a ceremonial plaque to Prof. Saha, on behalf of the organizing committee.

Dr. Nakul Parashar, Director, Vigyan Prasar, the guest of honour, in his address, highlighted the role of different Indian Institutions towards science communication and popularization. There is an importance of organizing more of such training programmes for science communication, particularly in the present scenario, he stressed.

The next session started with Dr. Amit Krishna De, Honorary Secretary, ISNA, and Convener of the training programme, introducing Dr. Subhabrata Roy Chaudhuri, Former Vice-Chancellor, Techno India University.. The topic of the second Prof. Biswapati Mukherjee Memorial Lecture, delivered by Dr. Roychaudhuri was "Advanced Media Reporting and Development in Science Communication."

He primarily discussed about the history of development of science communication, various modes of science communication, focusing on a comparison between science communication of the past and the present. He thought social media was acting as a powerful tool in science popularization. Dr. Roychaudhuri was also presented with the prestigious Biswapati Memorial award by Prof. Talapatra. The vote of thanks was delivered by Prof. Prabir Kumar Saha, Honorary Treasurer of ISNA.

Former Student
Indian Science News Association

Doctors' Day Celebrated On July 1

Arnesha Guha: On the auspicious occasion of the 140th birth anniversary of Dr Bidhan Chandra Roy, National Doctors' Day 2022 was celebrated at the N. R. Sen auditorium, Rajabazar Science College, on July 1. The programme was jointly organized by National Environment Science Academy (NESA), W.B. Chapter, International Academy of Science and Research, Kolkata (IASR) and Indian Science News Association (ISNA).

In his welcome address, Prof Manas Chakraborty, Secretary, ISNA, elucidated on the life of Dr Bidhan Chandra Roy who, apart from being a top-notch medical practitioner, was a great administrator. Dr. Amit Krishna De, Chairman of NESA, W.B. Chapter, discussed on the significance of Doctors' Day celebration. Dr Tanmoy Rudra, Executive Secretary of Confederation of Indian Universities, New Delhi, spoke on the aims and objectives of IASR. Dr Anindita Ukil from the Department of Biochemistry, University of Calcutta, spoke on "Unique Approach: Identifying drug targets to develop magic bullet for parasites". She elaborated on different types of metabolic and non- infectious diseases vis-a-vis parasites.

Dr Subhrajyoti Bhowmik, Clinical Director of Peerless Hospitex Hospital and Research Centre Ltd delivered an enthralling lecture on "Career Opportunities in Clinical Research" He explained in detail on clinical trials, essential elements of clinical trials and related aspects, especially in the context of the ongoing pandemic.

Dr Nilanjan Das, Head of Applied Nutrition and Dietetics, Sister Nivedita University, spoke on "Importance of hygiene maintenance in public washrooms," emphasizing on the significance of toilet hygiene.

At the conclusion of the scientific lectures, mementos were presented to all the speakers. Dr Subhendu Bikash Patra, Convenor, NESA, delivered the vote of thanks. The entire programme was moderated by Dr Tina Mukherjee, Assistant Professor, Department of Microbiology, Scottish Church College, Kolkata Many students, research scholars and academicians from different reputed educational institutes attended the programme.

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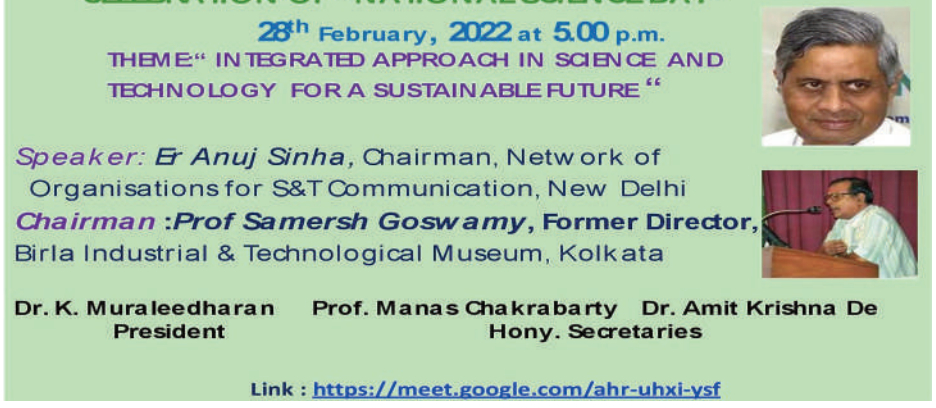
National Science Day Celebration by ISNA



Saikat Basu: The Indian Science News Association (ISNA) celebrated the National Science Day on February 28, 2022 online by presenting an erudite talk by Er. Anuj Sinha from their august platform. Er. Sinha is the Chairman of the Network of Organization of Science and Technology Communications, New Delhi. His talk was delivered on the theme 'Integrated Approach in Science and Technology for a Sustainable Future'. Er. Sinha provided an excellent future pathway for our sustainable future in a simple layman's language appreciated by all the participants. The program was chaired by Science Communicator, Prof Samaresh Goswami, Ex Director of the Birla Industrial and Technological Museum, Kolkata. He was introduced by Prof. Manas Chakrabarty, Honourary Secretary of ISNA. The Vote of Thanks was delivered by ISNA Honourable Secretary Dr. Amit Krishna De. On this occasion ISNA also released the Vol 1, Issue 2 of e paper Scientifica Communica at the start of the program. The details was explained by Sri Prasanta Bose, Editor. This webinar was well attended by students, scholars, researchers, academics, journalists, science educators and the ISNA council members.

Former Student
Indian Science News Association (ISNA)
Kolkata

Cryptocurrencies

The Technology Behind It

Tithi Roy: Recently, El Salvador- a tiny Central American country has declared Bitcoin, as a national currency along with the Salvadoran Colon. Cryptocurrencies such as Bitcoin, Litecoin, Ethereum etc. are names of various digital currencies produced and transacted in virtual space. Digital currency can also be called cryptocurrency as it uses algorithmic encryption to verify the transactions.

The process of mining and transaction of these currencies are associated with Block Chain Technology. Block Chain functions are based on Distributed Ledger Technology where every participated network shared a common database. In this Distributed Ledger, data are stored in Blocks. To create a new Block, one needs to go through a process technically known as Proof-of-Work i.e., a method of solving complex algorithms.

Once a new Block is filled with data it is linked to the previous one through the Cryptographic Hash Function, a mathematical algorithm that maps data. By this method, all the Blocks mined in the shared database of peer-to-peer network are connected to maintain a continuous chain. Due to the Cryptographic Hash Function, any data (for cryptocurrency it is the money value) stored in a particular Block cannot be altered without altering the data of the subsequent blocks. The transaction of digital currencies also involves one-way Hash Function to secure the valuation of a coin. This immutable character has made Bitcoin and other cryptocurrencies more secure than prevalent currencies.

Interestingly, the overall process of Bitcoin mining and transferring isn't possible by our smart phones or household PCs. Rather, it requires high performance computers containing GPU (Graphics Processing Units) or video cards, a specialized hardware called ASICs (Application-Specific Integrated Circuits) along with a super-fast internet connection.

To run the machines as well as to prevent the system from overheating, an exorbitant amount of energy is being used. With the growing popularization of digital currencies, the prospect of exponential increase of power consumption has emerged as a major concern at the time of intensifying global warming.

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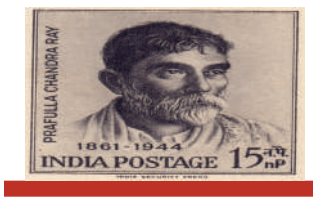


Scientifica Communica

Kolkata. August 3. 2022. Vol.2, Issue.1

The Ray Legacy

P. C. Rây and Shakespeare!

Anirban De: Acharya Prafulla Chandra Rây was not only an internationally acclaimed chemist but had a multifaceted background. Do you know anything about his Shakespearian connection? Here are some interesting anecdotes:

☐ Acharya Rây was an admirer of the great poets like Tagore, Michael Madhusudan Dutt and Shakespeare. He even carried out extensive research on the works of the great English poet–playwright and subsequently authored—sometimes co-authored with Bhabes Chandra Ray—a series of articles called '(The) Shakespearean Puzzle—Endeavours after Its Solution' in *The Calcutta Review* monthly issues from November 1939 till April 1941, when he was on the verge of entering his eighties! These are a rare instance of an Indian scientist's takes on the literary works of the all-time greatest British writer.

☐ He never used to spell his surname as 'Roy' and did prefer to write and sign his surname as 'Rây' (with a circumflex over the vowel a), so as to ensure that his non-Bengali readers do not mispronounce his surname as /reh/ instead of the Bengali /raay/.

☐ Rây fondly called three of his most favourite pupils as the 'Jnan trio' They were: physical chemist and the first IIT Kharagpur director Sir Jnan Chandra Ghosh (1894–1959), colloid chemist and soil scientist Jnanendra Nath Mukherjee (1893–1983), and organic chemist Jnanendra Nath Ray (1897–1968).

☐ Acharya Rây was a polyglot. He learned more than half a dozen languages (Latin, Greek, French, German, English and Sanskrit apart from his mother tongue, Bengali). He published several papers in the German language, of which more than 10 appeared in the peer-reviewed journal *Zeitschrift für anorganische Chemie*.

SHAKESPEAREAN PUZZLE—ENDEAVOURS AFTER ITS SOLUTION

SIR P. C. RÂY, KT. AND BHABES CHANDRA RAY, M.Sc.

XVII

SHAKESPEARE AS A REVISER OF PLAYS WRITTEN BY OTHERS—
TRILOGY OF *Henry VI* AND *Titus Andronicus*

☐ Sir Prafulla published more than 150 research papers. About 65 of his papers were published in the *Journal of Chemical Society Transactions (JCST)*, considered to be the best journal in those days. In *Nature*, he wrote as many as eight articles.

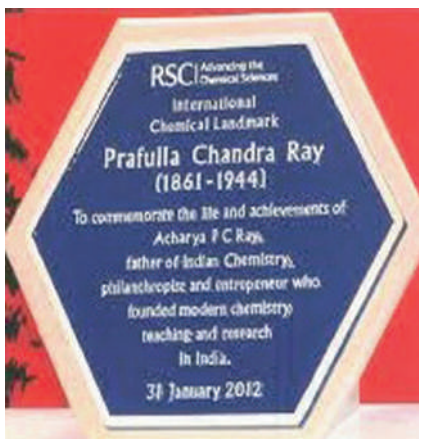
☐ Rây was a true patriot and had kin understanding of the socio-political history of India and the world. At the young age of 25, his *India: Before and after the Mutiny* got published —first as an essay in a university competition in 1885 and then as a book in 1886. He sent a copy of this book to John Bright, a member of the British parliament, who surprised at the maturity of this young Indian student.

☐ In 1896, he became the first chemist to have synthesised a stable yellow crystalline solid called mercurous nitrite. Moreover, he made major contributions on the thermal decomposition of ammonium nitrites, alkylammonium nitrites, nitrous acid, and many other inorganic & organic nitrites. He is justly regarded as the 'Master of Nitrites', although he had received his D.Sc. degree in 1887 from The University of Edinburgh for his works on the so-called 'double–double' sulphates.

☐ Founded by Acharya Rây, Bengal Chemical is the first-ever Indian pharmaceutical company. Since its inception, Jatindra Kumar Sen was appointed as a commercial artist. In 1903, Rajshekhar Bose (eminent Bengali writer famous under the pen name 'Parashuram') joined the company as a chemist. Sen was responsible for designing the labels, logos and advertisements for almost all the medicines, perfumes and other chemicals. under the supervision of the Bose.

☐ Acharya Rây was a science historian who introduced to the world the contributions of the early Indian chemists by his two-volume monumental book titled *A History of Hindu Chemistry from the Earliest Times to the Middle of the Century A.D.* (renamed later, in 1956, as *History of Chemistry in Ancient and Medieval India*, revised and edited by his student Dr Priyadaranjan Rây).

☐ In the 'Obituaries' section of the 15 July 1944 (No. 3898, Vol. 154) issue of the British weekly *Nature*, J. L. Simonsen wrote, "By the death on June 16 of Sir Prafulla Chandra Rây at the ripe age of eighty-three, Indian chemistry has suffered a severe loss. By his own contributions to science, but especially by his personal influence, Sir Prafulla was, more than anyone else, responsible for the great development of scientific research in India during the past fifty years." Unfortunately, his date of birth has been wrongly mentioned as 20 April 1861 in this obituary!



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D.Sc. Degree Conferred Upon Ray, 1934
Left- Jadunath Sarkar, Sarat Chandra Chattopadhyay,
Chancellor John Anderson, P C Ray
& A F Rahman (Vice Chancellor, Dhaka University)

Editor's Note

We are happy to introduce a page for school children. They are invited to contribute. Their articles would be published along with their photos

Article May be Submitted at
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