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Swami Vivekananda and Sister Nivedita: Pioneers of Indian Scientific Research

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Swami Vivekananda and Sister Nivedita: Pioneers of Indian Scientific Research

Introduction

The contribution of Swami Vivekananda in nation-building is well known. Vivekananda's idea was that a true exchange should take place between India and the Western world, where the latter would learn from Indian spirituality while India would benefit from the West's material advancement. He emphasised the need to educate the women and the poor of India.

What is generally not known is Swami Vivekananda's ideas about education and scientific research. A visionary, he realised the importance of scientific and material advancement for the welfare of India.¹ According to Swami Vivekananda, the main purpose of education is the full development of the human personality. He had said, "*Education is the manifestation of the perfection already in man*". Everyone is endowed with certain capacities, which remain dormant, although in a potential form. He wrote, "We need to study, independent of foreign control, different branches of knowledge that is our own, and with it the English language and western science, we need technical education and all else that will develop industries, so that men

instead of seeking for service may earn enough to provide for themselves and save against a rainy day.”² Swami Vivekananda said, "Science and religion will meet and shake hands. Poetry and philosophy will become friends. This will be the religion of the future, and if we can work it out, we may be sure that it will be for all times and peoples. This is the one way that will prove acceptable to modern science, for it has almost come to it.”³

Our former President, Dr APJ Abdul Kalam, was fond of narrating the story of the meeting of the two prodigal sons of India and how the Indian Institute of Science, Bangalore came into being.

Establishment of the Indian Institute of Science Bangalore

More than a century ago, Swami Vivekananda inspired Jamshedji Tata to establish higher education and research centres, especially in the fundamental sciences. A frequent visitor to Japan, Jamshedji Tata in 1893, was staying at the same hotel into which Swami Vivekananda would check in a few days later.



Source: <https://www.getbengal.com/details/how-swami-vivekanandas-meeting-with-jamsetji-tata-changed-indias-scientific-vision>

On May 31, 1893, two Indians, very different in their vocations, travelled together on a ship SS Empress of India, from Yokohama in Japan to Vancouver in Canada. Swami Vivekananda was a young 30-year-old unknown monk who would take India's spiritual tradition to the West more effectively than ever before. Jamsetji Tata was a very successful trader-industrialist who would become one of India's greatest visionaries. Swamiji was going to address the World Parliament of Religions between September 11 to 27, 1893, as part of the World's Columbian Exposition in Chicago. Jamsetji Tata was on his way to an industrial exposition in Chicago. For the first time, two great Indians met. They had plenty of time to engage in lengthy conversations during their sea voyage.

Vivekananda described to Jamsetji the experiences of his travels throughout the length and breadth of India as a wandering monk in the quest for truth. He spoke about the relentless oppression and repression of his fellow Indians he had seen at the hands of colonial authorities. He talked about how he had come across many Sanskrit and Bengali manuscripts in Buddhist monasteries during his stay in Canton (Guangzhou) in China. They also deliberated on Japan's phenomenal technological progress and Jamsetji's plan to lay the steel industry's foundations in India. Jamsetji, the founder of one of India's largest conglomerates, described that he was searching for equipment and technology that would help make India a strong industrial nation. Swamiji enthusiastically endorsed the vision, adding that the real hope of India lay in the prosperity and progress of its ordinary millions.⁴

Swamiji passionately impressed upon Jamsetji the need of transitioning more and more to manufacturing rather than trading raw materials or semi-finished goods. Manufacturing would help create jobs, add much greater value to the products then sold and make the country developed and self-sufficient. He also spoke of training Indians not just in science but also in technology so that its domestic manufacturing could significantly fulfil the country's requirements. They both knew it was not an easy dream in the days of a hostile regime. These conversations indeed had a strong resonance with the industrialist as these were probably the ideas he had been nursing.

Impressed by Swami Vivekananda's views on science and patriotism, Jamsetji sought his guidance to establish a research Institute in India. Swamiji gave his blessings and said, "How wonderful it would be if we could combine the scientific and technological achievements of the West with the asceticism and humanism of India!"⁵ Swamiji emphasised the importance of establishing a Research Institute of Science for India, and the seed of establishing the Indian Institute of Science, Bangalore was planted.

They bade each other goodbye after landing at their destination, probably thinking that this would be their last meeting. Five years passed. Swami Vivekananda returned from the West after four years. He was given a tremendous welcome across numerous towns and cities throughout the subcontinent. It was then that Jamshedji Tata wrote a letter to his old co-passenger:⁶

Esplanade House,

Bombay.

23rd Nov. 1898

Dear Swami Vivekananda,

I trust, you remember me as a fellow- traveller on your voyage from Japan to Chicago. I very much recall at this moment your views on the growth of the ascetic spirit in India, and the duty, not of destroying, but of diverting it into useful channels.

I recall these ideas in connection with my scheme of Research Institute of Science for India, of which you have doubtless heard or read. It seems to me that no better use can be made of the ascetic spirit than the establishment of monasteries or residential halls for men dominated by this spirit, where they should live with ordinary decency and devote their lives to the cultivation of sciences –natural and humanistic. I am of opinion that, if such a crusade in favour of an asceticism of this kind were undertaken by a competent leader, it would greatly help asceticism, science, and the good name of our common country; and I know not who would make a more fitting general of such a campaign than Vivekananda. Do you think you would care to apply yourself to the mission of galvanising into life our ancient traditions in this respect? Perhaps, you had better begin with a fiery pamphlet rousing our people in this matter. I would cheerfully defray all the expenses of publication."

With kind regards, I am, dear Swami

Yours faithfully,

Jamshedji Tata

What is fascinating is that Jamshedji Tata offered the first directorship of such an institute to Swami Vivekananda. He was referring in the letter to his promise of a gift of 200,000 in pound sterling for setting up a research institute to "induce the students of this country to undertake researches on the problems of tropical diseases or tropical chemistry, to investigate the vast and neglected materials of our national history and Indian philology" and "to found laboratories and libraries, where students may work under the direction of great teachers."⁷



This historic letter was written by J.N. Tata to Swami Vivekananda on November 23, 1898, describing him as his inspiration in setting up the magnificent IISc, Bangalore, following their conversation on a voyage from Japan to the US.

TATA STEEL

Dear Swami Vivekananda,

I trust that you remember me as a fellow traveler on your voyage from Japan to Chicago. I very much recall at this moment your views on the growth of the astatic spirit in India and the duty, not of destroying, but of directing it into useful channels.

I recall these items in connection with my scheme of a Research Institute for India, of which you have doubtless heard or read. It seems to me that no better use can be made of the astatic spirit than the establishment of universities or residential halls for men dominated by this spirit, where they should live with ordinary decency and devote their lives to the cultivation of sciences - natural and humanistic. I am not of opinion that if such a scheme in favour of an institution of this kind were undertaken by a competent teacher, it would greatly help materialism, science and the good name of our common country, and I know not who would make a more fitting general of such a campaign than Vivekananda. Do you think you would care to apply yourself to the mission of galvanizing into life our ancient traditions in this respect? Perhaps, you had better a fiery pamphlet rousing our people in this matter?

I should cheerfully repay all the expenses of publications.

With Kind Regards

*I am dear Swami
Yours Faithfully,
Jamshedji Tata*

Source: Sanchari Pal, What Connects Vivekananda and Jamsetji Tata? A Sea Voyage That Changed India! January 12, 2018 available at: <https://www.thebetterindia.com/127599/swami-vivekananda-jamsetji-tata-chicago-conference-iisc/>

Obviously, Swamiji could not take up the leadership of this project due to his own preoccupation with setting up a new, dynamic monastic order aimed at channeling the traditional ascetic spirit of spiritual practitioners toward the service of humanity. However, he wished it well and, more importantly, also transmitted his enthusiasm regarding the project to some of his disciples. While Swami Vivekananda's response is not documented, the Prabuddha Bharata, a monthly journal started by Swami Vivekananda as the official organ of the Ramakrishna Mission, expressed its warm appreciation of the scheme in its editorial column of April 1899, during Swami Vivekananda's lifetime.

Sister Nivedita wrote:

"We are not aware if any project at once so opportune and so far-reaching in its beneficent effects was ever mooted in India, as that of the post-graduate research university of Mr Tata. The scheme grasps the vital point of weakness in our national well-being with a clearness of vision and tightness of grip, the masterliness of which is only equalled by the munificence of the gift with which it is ushered to the public.

It is needless to go into the details of Mr Tata's scheme here. Every one of our readers must have read Mr Padsha's lucid exposition of them. We shall try to simply state here the underlying principle of it. If India is to live and prosper and if there is to be an Indian nation which will have its place in the ranks of the great nations of the world, the food question must be solved first of all. And in these days of keen competition it can only be solved by letting the light of modern science penetrate every pore of the two giant feeders of mankind: agriculture and commerce.

The ancient methods of doing things can no longer hold their own against the daily multiplying cunning devices of the modern man. He that will not exercise his brain, to get out the most from nature, by the least possible expenditure of energy must go to the wall, degenerate and reach extinction. There is no escape. Mr Tata's scheme paves the path placing into the hands of Indians this knowledge of nature — the preserver and the destroyer, the ideal good servant as well as the ideal bad Master — that by having the knowledge, they might have power over her and be successful in the struggle for existence.

By some the scheme is regarded as chimerical, because of the immense amount of money required for it, to wit about 74 lacs. The best reply to this fear is: If one man —

and he not the richest in the land — could find 30 lacs, could not the whole country find the rest? It is ridiculous to think otherwise, when the interest sought to be served is of the paramount importance.

*We repeat: No idea more potent for good to the whole nation has seen the light of day in modern India. Let the whole nation therefore, forgetful of class or sect interests, join in making it a success.*⁷⁸

Two of India's premier institutions dedicated to fundamental scientific research, namely, the Tata Institute of Fundamental Research and the Indian Institute of Science, bear testimony to the inspiration of Swami Vivekananda's vision. At Swami Vivekananda's behest, Sister Nivedita and, later, Josephine MacLeod met Jamsetji. Swami Vivekananda not only supported the foundation of such an institute in India but, welcomed the spread of modern scientific education and research in our country.

Obstacles and the Role of Sister Nivedita

Mr Tata met the Viceroy, Lord Curzon. The Viceroy rejected the idea as impractical. He believed Indians did not have the temper to carry out scientific research, that the institute would not get enough capable candidates, and expressed doubt regarding students' employability prospects after such training.

Sister Nivedita, Swami Vivekananda's pre-eminent disciple, started to campaign actively to realise this project and wrote several articles in the English Press to champion it. As early as 1899, she wrote: "*We are not aware if any project is at once so opportune and so far-reaching in its beneficent effects was ever mooted in India, as that of the Post-Graduate Research University of Mr Tata. The scheme grasps the vital point of weakness in our national well-being with a clearness of vision and tightness of grip, the masterliness which is only equalled by the munificence of the gift with which it is ushered to the public.*"⁷⁹

In 1900, the Government appointed an inquiry into this proposal by Sir William Ramsay. Ramsay was an eminent scientist who won the Nobel Prize in Chemistry four years later. Ramsay was brilliant as a scientist but could not rise above the coloniser's prejudice and shot down the proposal in his

submission. One of his observations was the unfeasibility of an institute that would combine scientific research with humanities streams as intended by Tata. The issue remained in a deadlock.

Sister Nivedita wrote to several leading world-thinkers, requesting them to voice their thoughts on the desirability of such an institution. She was personally in touch with many of them. She contacted William James of Harvard, the leading American philosopher of the day. He had the privilege of meeting and spending time with Swami Vivekananda and used to address him as Master. William James wrote, "*With regard to Mr Tata's scheme for promoting higher education in India, I am of the opinion that for the attainment of his objectthe management ought to be conducted entirely on national lines.*" He recommended equal representation of all communities of India on the governing body of this institution and freedom from government control. Sister Nivedita also got the backing of Patrick Geddes, arguably the greatest Scottish intellectual of the last few centuries, an intellectual genius with seminal inter-disciplinary work as a biologist, sociologist, environmentalist and town planner. When the former was troubled with a sore eye in Paris in 1900, it was to Geddes that Swami Vivekananda had said, "*Professor, be mind-minded, not eye (I)-minded, having a pun on the word eye.*"¹⁰

While in London in 1901, Sister Nivedita took up the issue with Sir George Birdwood, an eminent official of the Education Department. She faced the same unwillingness of the His Majesty's administration towards any initiative leading to opening up avenues for India's self-reliance in science and research.¹¹ However, Jamsetji persisted and continued to work on these plans, convinced that the country's future progress depended critically on research in science and visualised an institution that would inspire the same. While looking for a suitable place for such an institution, he met and discussed his idea with Sheshadri Iyer, the Diwan of Mysore, in 1898. The two of them convinced the progressive ruler of Mysore State, Krishnaraja Wodeyar IV, to donate approximately 372 acres of free land in the heart of Bangalore and provide other necessary facilities. It is noteworthy that the Maharaja's father, H.H. Chamaraja Wadiyar, was a devoted disciple of Swami Vivekananda and was instrumental in sending him to the West.

Jamshedji Tata passed away in 1904, two years after Vivekananda did. He could not see his dream see the light of the day. In 1909, the proposal was finally approved by Lord Minto who succeeded Lord Curzon as the Viceroy. The Indian Institute of Science, Bangalore has been at the forefront of scientific research in the country and acted as the knowledge incubator of the host of other specialised institutions that came in its wake. While the fact of the inspiring force of Vivekananda behind this is well known, the contribution of that great selfless lover and servant of the country, Sister Nivedita, is almost completely forgotten and unacknowledged

Swami Vivekananda and Acharya JC Bose

In 1900, Acharya JC Bose presented a path-breaking paper at the International Congress of Physics held in Paris on 'On the similarity responses of inorganic and living matter'. He compared the responses to the excitation of living tissues with that of inorganic matter. Bose used his invented crescograph to demonstrate the similarity between plant life and animal life. He gave a fresh scientific impetus to the age-old wisdom of the East, i.e. the fundamental unity of all life. Swami Vivekananda has been observing the benefits of science to humanity. He was in Paris and went to hear Bose at the Congress. Swami Vivekananda was incredibly delighted and impressed to listen to this, e.g. the response of living and non-living objects to electrical current. While describing his impression of the Congress, Swami Vivekananda wrote, *"Here in Paris have assembled the great of every land, each to proclaim the glory of his country. Savants will be acclaimed here; and its reverberation will glorify their countries. Among these peerless men gathered from all parts of the world, where is thy representative, O thou the country of my birth? Out of this vast assembly a young man stood for thee, one of thy heroic sons; whose words here electrified the audience, and will thrill all his countrymen."*¹²

Often Swami Vivekananda would point out to his acquaintances the greatness of this Indian scientist, "the pride and glory of Bengal". Once at a gathering, a student of a celebrated English scientist maintained that her professor was experimenting on the growth of a stunted lily. Swamiji humorously replied, "Oh, that's nothing! Bose will make the very pot in

which the lily grows respond! "¹³

Swami Vivekananda understood the usefulness of patenting scientific inventions. He requested JC Bose to patent his pioneering development of the solid-state detector. Though JC Bose was committed to not taking any patent, Swami Vivekananda prevailed upon JC Bose to file for its patent in USA as a one-time gesture for his unique invention of 'Detector for Electrical Disturbances'. He did not leave it at that. Swami Vivekananda made arrangements with his disciples, Mrs Sara Ole Bull and Sister Nivedita to endorse/file the patent application of J. C Bose in 1901. The first semiconductor device and the photovoltaic cell has U.S. Patent No. 755840, awarded in 1904. This is one of the best examples of Vivekananda's enthusiasm for science and respect for scientists.¹⁴ Here, it would be in order to mention Acharya Bose's scientific contributions and Swamiji's admiration of him.

Scientific Accomplishments of Acharya JC Bose

Sir Jagadish Chandra Bose was a physicist, biophysicist, biologist, botanist and archaeologist. He was a pioneer in plant science and laid the foundations of experimental science in the Indian subcontinent. Besides being a dedicated researcher in cutting-edge areas in multiple disciplines, Sir JC Bose was an inspiring teacher, a skilful experimenter who designed his own research equipment, a committed institution builder and a great humanist who believed the benefits of science should reach out to the society at large.



Sister Nivedita and Sir JC Bose (Source: Wikimedia Commons)

Acharya JC Bose was a great researcher and teacher. Some of his eminent students who influenced science in the pre and post-independence era were: Prof Meghnath Saha, Prof SN Bose, Prof Prasad Chandra, Prof S K Mitra, Prof PC Mahalanobis and Prof DM Bose. In 1917, Knighthood was conferred on the Acharya by the British Government. In 1920 Acharya JC Bose was elected Fellow of the Royal Society, London



MN Saha, JC Bose, JC Ghosh, Snehamoy Dutt, SN Bose, DM Bose, NR Sen, JN Mukherjee, NC Nag (Source: Wikimedia Commons)

According to Dr D.M. Bose, his nephew and a pioneer of nuclear physics and cosmic ray research in India, the research activities of JC Bose can be divided into three periods:

- From 1894 to 1899, he produced possible electromagnetic waves (the microwaves) and extensively studied their quasi-optical properties. His research with coherers (considered 'Diode' years later) led to the anticipation of semiconductors, and the effect of microwaves on the coherers became the next critical phase of research.
- From 1899 to 1904, the study of the fatigue effect in metallic coherers was used to detect electric waves. He studied various other inorganic systems that exhibit stress under different kinds of physical stimulation. The resemblances in responses of inorganic and organic systems led to his famous and controversial generalisation about the

reactions in the living and the non-living. In 1904, U.S. Patent on 'Detector for Electrical Disturbances' was granted to JC Bose.

- The third period logically followed the second phase, which led to his studies of plant electrophysiology and epic investigations, which were ahead of his time as most of his research. These researches continued till the end of his life.

In 1895, in the presence of Sir William Mackenzie, the Governor of Bengal, Professor Bose transmitted an ether wave through a solid wall and a whole bunch of men, had it ring a bell, and discharge a gun!¹⁵ Based on solid recommendations of Sir Alfred Croft and Sir William Mackenzie, Professor Jagadish Chandra Bose was invited to make a presentation of his research at the Royal Society, and sanction for Bose's visit to England was announced on July 1, 1896.

JC Bose went to England and delivered his lecture on September 21, 1896, on the quasi-optical behaviour of millimetre waves to an august gathering of scientists at the British Association at Liverpool. Some of the eminent scientists present were Lord Kelvin, Professors J.J. Thomson, Sir Gabriel Stokes, Everett, Fitzgerald, Oliver Lodge and a few continental scientists. Bose was 38 years old at that time. He was "*a little nervous at the beginning. It has not often fallen on me to address such a critical audience. But I soon got interested in my subject and was encouraged by the kind manner with which the paper was received.*" The famous Physicist, Lord Kelvin, broke into warm applause. He climbed up the gallery to meet Lady Abala Bose and congratulated her on the brilliant performance of her husband. He wrote to then the Secretary of State for India, Lord George Hamilton, "*It would be conducive to India and the scientific education of Calcutta if a well-equipped physical Laboratory is added to the resources of the University of Calcutta in connection with the Professorship of Dr Bose.*"¹⁶ It is believed that the Baker Laboratory is the outcome of the mail from Lord Kelvin.

Perhaps Acharya JC Bose was never interested in developing a communication receiver. He was not at all interested in patenting and publicity. Else he would have been the inventor of wireless communication. Marconi, in 1896, met him and gave a proposal for business, which Acharya JC Bose

declined. Bose, in 1899, announced the development of the 'Iron-Mercury Iron coherer with telephone detector'. It is believed that this work influenced the work done by Marconi, Popov and other researchers working on radio communication. Sir JC Bose was the first to use a semiconductor junction to detect radio waves, which can be called the father of semiconductor junction diodes. In 1897, at Royal Institution in London, JC Bose presented his work on the millimetric wave. He used horn antennas, waveguides, dielectric lenses, polarisers, and even semiconductors at ~60 GHz. We can rightly call him the father of waveguides and horn antennas.

However, Dr Marconi received the Nobel Prize in Physics for his work in 'wireless telegraphy'. Prof JC Bose did not get any share of it. Much later, in 1943, the American Supreme Court dismissed the claim of Marconi's company in the U.S. and annulled the patent with Marconi as the inventor of Wireless Telegraphy. Ultimately, wireless telegraphy would lead to the radio, television, Wi-Fi and even cell phones! When Dr DM Bose asked Bose who Acharya Jagadish Chandra believed was the true inventor of Radio, The Acharya replied, "*It is not the inventor but the invention that matters.*" JC Bose's aversion to patenting may have been the leading cause of Prof JC Bose not getting due recognition in the West. The patent issue is being discussed separately.



Acharya J C Bose with his R.F. equipment at the Royal Institution, London in 1897

The use of millimetre waves, first invented by Acharya Jagadish Chandra, almost ended with his establishment of the validity of Maxwell's equations at the millimetre-wave range. Wireless telegraphy using long waves was used extensively during the first world war, transistors were yet to come, and microwaves were far off. Nobel Laureate in 1977 for his research in solid-state electronics, Sir Neville Mott remarked, "*J.C. Bose was at least 60 years ahead of his time, and he had anticipated the p-type and n-type semiconductors.*"¹⁷

There is a 'resurrection' of Acharya Jagadish Chandra Bose in the area of Physics where he was virtually forgotten. Millimetre waves that had no use about one hundred years ago have returned in a big way. One must consider Bose's lecture at the Royal Institution on January 29, 1897, trying to get a narrow pencil of radiation. Millimetre waves are suitable for short-distance transmission (handheld mobile phones, televisions) or inter-satellite communication.¹⁸ Around the year 1900, JC Bose changed his research subject. He could not continue researching millimetre waves or his point contact detectors that predicted semiconductors. Quantum mechanics was not known and possibly beyond the mathematical training of Dr JC Bose.

For inventing the Transistor, Brattain received the Nobel prize along with Shockley and Bardeen. In their seminal paper, G.L. Pearson and W. Brattain acknowledged, "*The demonstration of the existence of radio waves by Hertz in 1888 created potential demand for a suitable detector, but it was not realised until 1904 (Bose's American patent) that semiconductor rectifiers were well-suited for this purpose. J.C. Bose found that point contacts (cat whiskers) on galena, silicon carbide, tellurium, silicon etc. were good detectors of radio waves.*"¹⁹ This patent by Acharya JC Bose has a fascinating background involving Swami Vivekananda, Sister Nivedita and Mrs Sara Ole Bull.

JC Bose was proud of India's ancient glory and heritage in the sciences, and he wanted her to emerge as a leader in modern science. While lecturing from America to Japan, he once said, "Nothing could be more vulgar or more untrue than the ignorant assertion that the world owes its progress of knowledge to any one particular race. The whole world is interdependent and a constant stream of thought has throughout the ages enriched the common heritage of mankind...Science is neither of the East nor of the West, but international..."²⁰

Romain Rolland wrote about Jagadish Chandra Bose, "In your wake will be seen in the richness of her [India's] profound soul, of that inner world which was bequeathed to her by centuries of thought, will add hitherto the Intellectual weapons of Europe, which will be given to her to make her perfect for the mastery of Nature and for the glory of atman."²¹

Aversion to Patenting by Dr JC Bose

Jagadish Chandra's pioneering role in Wireless Technology has not been duly recognised because JC Bose's aversion to patenting. Bose could put patents on his discoveries and make millions from them. Various radio companies tried to cut deals with him, but he refused stubbornly. His objections to patenting were well-known. He shared freely the working behind his instruments in his lectures, available to everybody.

A week after his lecture, in May 1901, in the Royal Institution, Bose wrote to Rabindranath Tagore, with whom he had a very close relationship. He stated that just before the lecture, the proprietor of a famous telegraphy company (most likely Dr. Alexander Muirhead, a D. Sc in Electricity) had sent him a cable indicating that he wanted to see Bose urgently. When they met, he pleaded with Bose not to reveal the details of his work in the lecture but rather allow him to take out a patent on Bose's behalf so that they may share the profit.²² Bose's revulsion at the overture made by the billionaire, "who to make further profit came to me like a beggar," was undisguised. He wrote to Tagore in disgust, "If only Tagore would witness the country's (England's) greed for money. What a dreadful all-consuming disease it was."²³ Possibly Bose believed that Indians are superior to Westerners in our apathy to worldly possessions. Patric Geddes described Jagadish Chandra as a Rishi (hermit).²⁴

Acharya JC Bose believed that knowledge should be available to all and not be constrained by patenting.²⁵ Patenting was forbidden in the Bose Institute that JC Bose had founded. JC Bose ensured that a specific clause was included in the Bose Research Institute's founding registration document that no member of the Institute may be allowed to apply for a patent for any idea and/or device developed at the Institute! However, it is fascinating to note that Bose's recognition as a pioneer in semiconductor technology was because of his American Patent (1904). He was the first Indian to have an American Patent. Two Western ladies almost forced Bose, one was Sister Nivedita and the other Mrs Ole Bull, at the behest of Swami Vivekananda, to apply for the Patent for his "electric eye". Mrs Ole Bull paid the \$80 necessary

for submitting the patent application.²⁶ This was in the year 1901.

Differences with Swami Vivekananda

Acharya Jagadish Chandra Bose and Swami Vivekananda were radically different in their religious beliefs. Acharya JC Bose was a staunch Brahmo and Swami Vivekananda a devout Hindu. Vivekananda's worship of Goddess Kali and Guru worship was repulsive to Bose. JC Bose was openly disgruntled. Bose had once commented rather casually that Sri Ramakrishna was a misogynist. Of course, he was incorrect. Sri Ramakrishna used to hold women in the highest esteem as a real reflection of the 'Mother of the Universe'. Sister Nivedita was very close to JC Bose, almost a member of his family. However, JC Bose was disappointed when she delivered public lectures on Kali. Another reason for the disappointment was that she was an initiated disciple of Vivekananda and deeply devoted to the Swami's guru, Sri Ramakrishna.²⁷

Nivedita had once said, *"It grieves me much to find the attitude of men like Dr. Bose ... to the Swami, since I lectured on Kali. Now all that about the Comparative Study of Religion is beginning to have its real value for me. I understand by the baffled feeling he (Bose) gives me when we talk on the question how impossible any other line of approach will be to him, to see these things as we see them. And his position, great thinker and scholar as he is in other lines, seems, compared to Swami's on this branch, a position of ignorance and superstition compared to science and reason."*²⁸

Sister Nivedita tactfully discussed and tried to resolve the misconception with fortitude. Nivedita wanted these two great sons of India to come closer to making the country strong. While doing so, Nivedita faced Bose's "bitterness". She was cut to the quick. Still, she had no room for impatience and misunderstanding. She wrote to Josephin Macleod on April 5, 1899, "At present my dreadful narrowness hurt him (Bose) unbearably. I coaxed him to tell me our differences. Then it came out. The deification of Swami's Guru. A man cast in a narrow mould ~ a man who held woman to be something half fiend ~ so that when He saw one, He had a fit. Between a gasp and smile I

said I could not accept the narrative."²⁹ Sister Nivedita "confessed" that she "too worshiped" Ramakrishna, but that "was personal". She "pointed out" that "none" and "least of all Swamis (of the Ramakrishna Order) wanted him to worship".

Sister Nivedita told Swami Vivekananda everything. She said to Macleod: "I told him (Vivekananda) of Dr Bose... every detail, and he said 'Yet that boy worshipped me for three days ~ in a week's time he would be mine'. I said, 'he does worship (if you only knew with what depth and self-restraint that exquisite worship is given)". Vivekananda remarked: "Yes and those are always the people who make the fuss about worship of the personal. They don't understand themselves ~ and they hate in others what they know they are struggling against!"³⁰ Sister Nivedita was sure if Bose met Swami Vivekananda, all his doubts would disappear. She was successful. After consulting Swamiji, she went straight to the Boses' and requested them to come to Belur Math with her and have tea. She wrote, "I love the Boses and I loved to have them there ~ and the King (Vivekananda) was his dear self, ..."³¹ Of course, the conversation for the first time was fruitful.

It was the turning point. Vivekananda later visited the Boses many times. Bose's centenary publication mentioned, "The editor of this brochure had more than once heard from lady Bose how Swamiji, in between his sojourns abroad, would call on his friend in Calcutta and amuse him with stories of his many odd experiences abroad and regale himself with East Bengal dishes, hot curries, cooked specially for him by her, the hotter, the better."³² JC Bose's reservations against Vivekananda disappeared because of Sister Nivedita's catalytic role.

After Paris, they never met again. Vivekananda lived only for another two years. He passed away on July 4, 1902. The message of his death gave Bose a severe jolt. He wrote to Miss MacLeod three days later, "*I cannot tell you how grieved I am to send you the enclosed copy of a telegram. India has lost her great son. But his has been a heroic life, and he carried the banner of glory.*" He wrote to Nivedita, "What a void this makes! What great things were accomplished in these few years. How one man could have done it all. And how all is stilled now."³³

Sister Nivedita and Acharya Bose

Sister Nivedita came to know about Dr JC Bose in 1898 for the first time. At that time, Dr Bose had good standing in science in Western Countries. She once said, *"Men of the inventor and discoverer type —men like Marconi, Tesla, Machine, and so on—rank in the world of science far below the investigator, the man of Sannyasin mind like Dr Bose, who pursued knowledge for its own sake."*³⁴

Acharya JC Bose and his wife Lady Abala Bose, were closer to Sister Nivedita, Swami Vivekananda's disciple. On several occasions, Bose and his wife stayed in the Ashrama at Mayavati, started by Vivekananda in the Himalayas. In the meantime, Bose's idea about Ramakrishna had also undergone a substantial transformation. JC Bose started admiring Ramakrishna's great renunciation and spiritual attainment. During one of his visits there, while Nivedita was once giving a talk to the monks and novices, she "spoke of the necessity for the highest learning, among the followers of a religion". Some youngsters then aired their own ideas about Sri Ramakrishna not being learned. Bose's reaction was sharp. Nivedita wrote, "Afterwards the Bose said he was so angry, he could hardly contain himself. Did they realise what it meant to sit day after day beside the Ganges, changing earth and gold from hand to hand till he could throw both away? Did fools not see what an effort of the mind there was? Did they suppose it made any difference, whether that found expression in Mathematics or Greek or Physics or Religion? Could they see it was the essence of learning?"³⁵

Sister Nivedita appreciated the significant role JC Bose was destined to play in science in general and for promoting scientific activities in India in particular. She took his cause to be her own and tried to help him in every respect. In a public reception accorded after her return to India on February 3, 1902, at Madras, she spoke primarily in praise of Dr Jagadis Chandra Bose, whose scientific genius she felt India might see as proof of its intellectual superiority over the West.³⁶ His difficulties, she made her own, constantly inspiring him to "go out and fight" the battle. In 1901, when everyone stopped publishing Bose's Research papers, she motivated him to write his own book and assisted him in writing his scientific papers and books. Being

ten years younger than her, she used to treat him like his child.³⁷

A section of British scientists made a conspiracy to suppress Bose and went so far as to prevent publication of his work and try to have it shelved or stolen. This significantly depressed JC Bose. Nivedita expressed shame at the conduct of some of her countrymen for discrimination against Bose in publishing his research in Western academic journals. Nivedita encouraged Bose to take his work to the world by writing books directly. Nivedita helped Bose to write four of his books: 'Living and Non-Living', 'Plant Response', 'Comparative Electro-Physiology' and 'Irritability of Plants'. She edited the books. She also revised his papers published in the journal Philosophical Transactions of the Royal Society. She wrote about him continuously in newspapers and journals to attract wider attention to his extraordinary talent, tenacity and achievement.³⁸

Dr J.C. Bose's books Plant Response and Comparative Electro-Psychology had caused a stir, and he was invited to go to Europe. He requested Nivedita to accompany him. With Dr J.C. Bose, Nivedita paid a month's visit to Ireland. Then they went to America and stayed in Boston with Mrs Ole Bull. She obtained money from Mrs Bull for the publication of his works. In a letter to Mrs Sara Ole Bull Sister Nivedita writes:³⁹

To Mrs. OLE Bull

Fairy Hall, Dum-Dum

April 24, 1907

My dear S. Sara,

A servant in the Bairn's household has plague. So they are all scattered. And we shall probably wait only to finish our respective manuscripts and be off to the Hills. We hope to march and camp a good deal – to and from Mayavati. The drawback is that the neighbourhood is haunted by a man-eating tiger.

I would have liked so much to have dedicated it to "One whose whole life speaks his love of the Mahabharata." But he [Dr. Bose] says he would rather have a blank page!

We are now in the last week of the appointed twelve years. And we are at work on a most significant group of 4 chapters. Two sub up, in the deepest and most masterly way,

the physical results of all this work on living response. He speaks of his contribution freely as "the Molecular Theory" – and the whole thing awes me with its aspect of Divinity appearing in triumphant incarnation as a great Physicist. And then, immediately after this, he inserts 2 chapters of psychological inferences. Magnificent ! Say then, that the 12 years are worthily concluded. One wonders so what will be the next. Perhaps new discoveries? Perhaps practical embodiment and personal conquest. Who knows?

The new book will probably, like the last, have 700 pages. The chapters, I think are 45.

In another letter Nivedita writes:

You will be glad to know that we did 12 chapters of a new book by the M [Man] of Science, [Dr. Bose] at Mayavati – the stiffest he has yet written. So I am not idle – though I do not know that my writing is heroic. I wish it may be! Oh do get well!

Your ever loving

Childe,

Margot

In a letter to Mrs Wilson Dr JC Bose wrote:

2nd Nov. 1911

My dear friend,

I have faced and gone through the papers [which Sister Nivedita] left. There is a mass of material for two books, but very incomplete. Then there are some of which two books could be made up.

And then the book which she was helping me to write is staring me in the face. I have not at present the strength to do anything with it.

Yours affly,

J. C. Bose

In 1910, on the birthday of Jagadish Chandra Bose, in one of her letters, Nivedita compares him with Columbus finding a new world and prophesied that he would one day be regarded as the pioneer of Modern Indian Science. Her long dreamt of Bose's research centre came to be realised when Sister Nivedita was no longer in this world. She passed away at Darjeeling in 1911 under the tender care of Jagadish and Abala Bose. But she still lives as a Lady

with the Lamp at the entrance of the Bose Institute that Acharya Jagadish erected to her memory on a striking base relief in bronze.

Nivedita wished to have a Vigyaan Mandir, which Dr Bose completed and inaugurated 'Basu Vigyaan Mandir' on November 30, 1917. At the entrance to the building there is a marble relief of a woman with prayer beads and a lamp in her hand, made by the renowned sculptor Padmasri Vinayak Pandurang Karmakar. This was modelled on the famous painting called 'The lady with the Lamp' by Nandalal Bose, a protégé of Nivedita in many ways. The emblem of the Institute is Vajra (Thunderbolt) which is the symbol of Rishi Dadachi's sacrifice. This was also the wish of Sister Nivedita.⁴⁰ A portion of Nivedita's ashes is kept there.

An emotional JC Bose, during the inauguration of the Bose Institute (Basu Vigyan Mandir) said, "In all my struggling efforts, I have not been altogether solitary. While the world doubted, there have been a few, now in the city of silence, who never wavered in their trust." In one of his letters, he wrote, "*Sister Nivedita was also greatly interested in the revival of all intellectual advances made by India, and it was her strong belief in the advance of Modern Science accomplished by Indian Men of Science that led me to found my Research Institute.*"⁴¹

After the Death of Acharya JC Bose, Rabindranath Tagore, a common friend of Sister Nivedita and Dr JC Bose, said, "*On the day of his success, Jagdish gained an invaluable energiser in Sister Nivedita and in any of his life work, she must be given a place of honour.*"⁴²

Role of Mrs Sara Ole Bull

Mrs Sara Ole Bull was a dedicated disciple of Swami Vivekananda. Vivekananda considered Sara Bull his American Mother, addressing her as *Dhira Mata* (calm mother). In 1893, Mrs Sara Ole Bull attended the Parliament of Religions in Chicago, where she met Swami Vivekananda. This encounter initiated her lifelong sponsorship and financial support of Swami's work, both in the United States and India. She travelled several times to India.

Mrs Sara Ole Bull was close to the Boses. She helped JC Bose in his mission in many ways. She had heard of the scientific research of Prof Bose. In 1899, during her visit to Calcutta, she visited Bose's laboratory. She gave financial assistance of US\$4,000 to Bose to set up his botanical research laboratory.



Swami Vivekananda with Mrs Ole Bull

Source: <https://artsandculture.google.com/asset/swami-vivekananda-with-mrs-ole-bull/CgG34IDmT-U3SQ?hl=en>

During his second mission to Europe, when JC Bose fell seriously ill in London, Patrick Geddes wrote, "After Bose's attendance at the International Science Congress at Paris in 1900, and subsequent *cares*, his health broke down, and he was in imminent danger, when Mrs. Bull, hearing of this, came over from the Continent, found him an expert surgeon and helped to nurse him back to health. From this time a deep friendship grew up, and Bose found in her anew the great qualities of his own

mother!"⁴³ By the middle of December 1900, Jagadish Chandra Bose had his operation done. But it was a real challenge before the surgeon, for his life was in question. The chances for his survival were thin. Mrs Bull and Nivedita were under great tension in that situation and did apply all their strength and efforts to bring him back at any cost. The Boses naturally felt deeply indebted to them for their unstinted services with such affection and dedication.

When the Boses went to America, they found a home in Mrs Ole Bull's house which Jagadish Chandra made his headquarters for his lectures at different American universities. During later visits to America in 1914, when Mrs Ole Bull was dead, Prof Bose and his wife found an equally warm home

in the house of Mr I. G. Throp, a brother of Mrs Ole Bull, who had married a daughter of the poet Longfellow.

The contribution of Mrs Ole Bull for the patent of JC Bose's pioneering development of the solid-state detector has been described earlier.

Conclusion

All the personalities described in this paper were intellectual giants in their respective fields. What is most interesting is that they were willing to accommodate each others' views for the larger goal of India's scientific development. More than 100 years back, what all these great people did remains awe-inspiring. Their foresight and vision to create an atmosphere of scientific learning and research are astounding. Today's generation must know the achievements of these great men and women of India.

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