

## REVEREND FATHER EUGENE LAFONT AND THE SCIENTIFIC ACTIVITY OF ST XAVIER'S COLLEGE

ARUN KUMAR BISWAS

Indian Institute of Technology, Kanpur

Saint Xavier's College (SXC) in Calcutta was founded in 1860. Led by Reverend Father Eugene Lafont, who served this great institution for 43 years till his death (1865-1908), SXC contributed immensely to the growth of scientific culture in the city and the country. This article deals with the early years of the SXC and the meteorological and spectro-telescopic investigations conducted by Father Lafont and his scientific colleagues in the institution. Also described are Lafont's singular assistance to Dr Mahendralal Sircar in founding the Indian Association for Cultivation of Science (IACS) and his efforts towards the promotion of science education and popularisation of scientific studies and research. In conclusion, this article discusses Lafont's synthetic views on science and religion, and makes a total appraisal of his contributions towards the resurgence of scientific temper in India.

Saint Xavier's College (hereafter abbreviated as SXC) in Calcutta was founded in 1860, and has served the 300 years old metropolis for more than two-fifth period of its existence. Led by Reverend Father Eugene Lafont (1837-1908) of the Society of Jesus (S.J.) SXC contributed immensely to the growth of a scientific culture not only in Calcutta, but also, through this metropolis, in the entire sub-continent<sup>1,2</sup>. This article outlines (A) the scientific activities of Lafont and his colleagues at SXC, (B) his unique contribution towards the Indian Association for the Cultivation of Science (hereafter abbreviated as IACS) founded by Dr Mahendralal Sircar in 1876, and (C) promotion of science education and popularisation of science by Lafont and his colleagues at SXC.

### INTRODUCTION

Despite several positive developments in India, such as foundation of the Asiatic Society (1784), advent of educationists like William Carey, Rammohun Roy, Derozio, David Hare, etc., and foundation of medical and engineering colleges and three principal universities (Calcutta, Bombay and Madras) in 1857, the science content in the educational curricula was extremely poor. Sen<sup>3</sup> and Deepak Kumar<sup>4</sup> have reviewed the tardy progress in Indian science. The colonial power 'wanted only a class of apothecaries, hospital assistants, surveyors and mechanics'. Physical sciences were removed from the list of necessary subjects for B.A. examination during the 1860's. W.S. Atkinson, the DPI of Bengal, was against the idea of his department working for the furtherance of original research in India. Scientific research was initiated by Jagadis Chandra Bose and Prafulla Chandra Ray in Presidency College only during the late nineties of the last century. Thus, the pioneering activities in SXC for the last four decades of the nineteenth century were indeed of singular importance.

Father H. Depelchin and seven other Jesuit Fathers founded Saint Xavier's College on 16 January 1860, at the site of *Sans Souci* Theatre at 10 (now 30) Park Street, Calcutta. The 1860 Prospectus made the dramatic announcement: 'Course of studies is similar to that pursued in the great colleges of Europe.... Lessons would be given in algebra, geometry, trigonometry, if required also higher mathematics, elements of astronomy, botany, chemistry, mechanics and natural philosophy'<sup>5</sup>. These were not empty words. Some of the Jesuit teachers had indeed been competent scientists in Europe. Father Ignatius Carbonelle was teaching the physical sciences during 1861-67 at an advanced level. On his return to Belgium, he contributed to the molecular theory related to Brownian Movement. Within 14 years after its foundation, SXC inducted several Jesuit Fathers who were outstanding scientists: Eugene Lafont (1865), Edward Francotte (1869), Alphonse de Penaranda (1874), etc. Lafont was decidedly the most outstanding among them.

Lafont had received his training in Natural Science and Physics at Namur. Arriving at Calcutta on 7 December 1865, Lafont immediately started popularising science through magic lantern, a practice which continued for 42 years (Table 1). Simultaneously, he went on steadily acquiring apparatus for his physical laboratory or 'museum' as he called it.

Lafont's popularity in the city started soon after the famous cyclonic storm in November 1867. On the first of November morning, he noted a fall in barometer reading, went across the street to the Government Observatory (later converted as Imperial Hotel) and sent a hurried note of warning to the town, fort, etc. The cyclone came that night as per his prediction. He took a series of meteorological readings, braving the fury of elements, and published the same. The newspapers had rather disparaging comments on the fact saying that 'the Government observatory had failed to do what the scientific enthusiast had braved the elements to perform'.

On 18 September 1868, Lafont gave a public lecture at SXC on a scientific topic, projecting the magic lantern slides on a screen 12 feet in diameter. The proceeds of the seance went towards the purchase of equipments for the meteorological observatory. It was decided that Lafont would continue to give a series of public lectures (Table 1). Lafont's scientific reputation in the city was so high that when there was a sharp earthquake shock on 10 June 1869, 'the Calcutta residents next day would not go to sleep till Lafont announced that the shocks were over, and that there was nothing more to fear'.

Under the editorship of Father Carbonelle, the Catholics of Calcutta had started in 1865 a weekly periodical entitled '*The Indo-European Correspondence*' (hereafter abbreviated as IEC). IEC warmly greeted Dr Mahendralal Sircar's '*Calcutta Journal of Medicine*' launched in 1868 and particularly Dr Sircar's article (in the August 1869 issue of his journal): 'On the Desirability of Cultivation of the Sciences by the Natives of India'<sup>6,7</sup>. The intention of founding IACS was spelled out in 3 January 1870 issue of *Hindu Patriot*<sup>7</sup>. These two publications were immediately noticed by Father Lafont

Table 1. A Selected List of Father Lafont's Lectures

Date	Venue	Topic
<b>1866</b>	SXC	A Magic Lantern Show & First Lecture
<b>1868</b>		
18 Sept.	SXC	First Public Lecture on Science. Illustrated. Gate Money for Meteorological Observatory. Decision for More Public Lectures
<b>1870</b>		
19 May	SXC	Dalton's Atomic Theory
2 June	SXC	Popular Science. Gate Money for IACS. First Meeting for IACS at SXC
7 Sept.	Muhammadan Literary Society	Main Properties of Fluids
<b>1872</b>		
11 April	Medical College	Physical Basis of Spectrum Analysis - comments in the Indian Mirror
<b>1876</b>		
10 April	Burrabazar Literary Club	Electricity-Remarks of Rajendralal Mitra
24 August	IACS	Very First Introductory Lecture for the IACS
<b>1880</b>	SXC	Resumes Lectures after return from Europe. Crookes on Radiant Energy. Colour - What is it?
<b>1881</b>		
23 June	IACS	The Truth about Galileo's condemnation
<b>1882</b>		
19 January	Catholic Club	The Properties of Air We Breathe
30 March	IACS	Lenses
20 December	Dalhousie Institute	The Transformation of the Physical Forces
<b>1885</b>		
12 November	IACS	The Properties of Gases
19 November	IACS	The Barometer
26 November	IACS	Barometers and Barometrographs
<b>1886</b>		
14 January	IACS	Balloons
21 January	IACS	Introductory Acoustics
11 February	IACS	Three Qualities of Musical Sound
25 February	IACS	The Laws of Vibration of Strings
15 July	IACS	The History and Capabilities of Edison's Speaking Phonograph with Illustration and Experiments
26 August	IACS	Velocity of Light and Means of Measuring It.
8 September	IACS	Reflection of Light
17 November	IACS	Refraction of Light

Date	Venue	Topic
<b>1887</b>		
6 September	IACS	Equilibrium of Fluids
<b>1888</b>		
25 September	IACS	Human Eye
<b>1889</b>		
20 Jan	Bethune Society	Motion on Gyroscope
<b>1891</b>		
22 January	IACS	General Methods in Chemical Analysis
19 November	IACS	Edison's Phonograph. Had to Repeat Next Week on Popular Demand.
<b>1893</b>		
6 September	IACS	Effect of Rapidly Alternating Currents in the Induction Coil
<b>1896</b>		
9 December	SXC	X-ray or Rontgen Rays
<b>1897</b>		
16 September	SXC	'Telegraph without Wires' - Assisted by Ex-Student Jagdis Chandra Bose. Ticket Rs 2 per seat
<b>1902</b>		
6 May	Dalhousie Institute	The Evolution of Induced Electric Current-Demonstration with Latest Equipment from Paris
<b>1907</b>		
November	SXC	The Phenomenon of Radio-activity
<b>1908</b>		
6 May	St Joseph's School, Darjeeling.	Demonstration on Gramophone. He Fell and Died Four Days Later

who delivered the entire gate collection received during his 2 June 1870 lecture at SXC towards the cause of IACS. The first meeting to discuss the constitution of IACS was also held at SXC during this time.

#### A. METEOROLOGICAL INVESTIGATIONS AT SXC

Father Lafont had started making meteorological observations at SXC during 1868 and was eventually supported by his able colleagues, such as E. Francotte, A. de Penaranda, V. de Campigneulles, P. Bruhl, H. Seitz, etc<sup>8</sup>. The site of the Meteorological Observatory had been erected by Lafont in August 1867. It was built on the College Terrace, east corner, 42 feet from the ground and 60 feet above Mean Sea Level. Later, de Penaranda calculated, through observations, the geographical co-ordinates of the site as Longitude East of Greenwich 5 hrs. 53 min. 26 sec. and Latitude as North

22°32'51". The Observatory housed standard barometers, wet and dry bulb thermometers, Phillips Maximum thermometer, Shade Minimum, Solar, Nocturnal, Radiation and Earth thermometers, Wind Vane, Anemometer and Upper Rain-Gauge.

Lafont also acquired one self-registering Secchi's Meteorograph. Father Angelo Secchi had won the Grand Prix Award at the 1867 Paris International Exhibition for his ingenious instrument for the comparative study of the weather elements. Lafont ordered one instrument in 1870. The equipment manufactured by E. Brassart under the supervision of Father Secchi himself, served SXC Observatory very well between July 1871 and January 1884. Thereafter, it served up to March 1906 only as a barograph.

The instrument consisted of a wooden press, the upper structure, the pendulum, second dial, small chariot, the board and its frame, the pencils, rain-gauge, electric battery, the barometer and the thermometers.

The practical value of the Meteorograph was much emphasized in the case of first magnitude phenomena, such as the Krakatoa (an island south of Sumatra and west of Java) volcanic eruption of 1883 and the great earthquake of 1897. From the noon of the 26 August 1883 up to 3.15 p.m. the same day, the barometer accurately recorded the tremendous pressure followed by rarefaction in the Calcutta atmosphere arising out of Krakatoa eruption. On 12 June 1897, there was a terrible earthquake, with the epicentre in the Garo Hills of Assam, rocking the city of Calcutta. The tremendous force of the earthquake made the Meteorograph to work to a certain extent like a seismograph through its barometer pencil. The violent displacement of the pencil clearly indicated two periods in the earthquake, one from West to East (starting some 4 minutes after 5 p.m.), and the second from North to South. It may be noted that at that time neither SXC nor Alipore Observatory had any seismograph.

From 1868 onwards, the readings of following parameters used to be taken at least four times a day: minimum and maximum temperature, relative humidity, wind resultant direction and velocity. Gradually, more attention was paid to specific occurrences, such as duststorms, thunderstorms, cyclonic storms, cyclones, hailstorms, heat waves, solar and lunar rainbows, halos, dew, fog, earthquakes, etc. The cogent recordings of weather in tabular forms and their publication made Lafont and his laboratory world famous. Abbe Magino, the French savant, commented: 'These are magnificent tables. We offer Father Lafont our best congratulations. He does better than Imperial Observatory of Paris'.

Francotte attempted several correlations based on the compiled data<sup>8</sup> describing day-to-day variations for half a century of Calcutta's weather. Some of his observations are as follows:

1. Over 46 years, there had been a consistent and continuous anti-clockwise motion of wind-direction-NNW in January, NWW in February and then NW, SW, S, NE in October – over Calcutta. This phenomenon called for a basic study in atmospheric

physics.

2. The daily tides of the barometer were not perfectly understood. The fluctuations had two components – one, semidiurnal with two maxima and two minima, and the other diurnal with one maximum and one minimum.
3. The velocity of the wind and atmospheric pressure moved contrary-wise. The barometer was at its lowest ebb (May-June) one month after the wind velocity had reached its maximum (April-May). Similar correlations were attempted involving relative humidity, rainfall, pressure and temperature variations etc. over half a century.
4. The final comment made by Francotte<sup>8</sup> is very interesting: ‘Who will unravel the mystery? Some one lately suggested in the columns of *Nature* to call Mathematics to the rescue’. Seventy years after Francotte’s suggestion, we are now engaged in mathematical analysis of the weather data using high-speed computers.

#### SPECTRO-TELESCOPIC INVESTIGATIONS AT SXC<sup>9</sup>

On account of financial and resource limitations, Father Lafont restricted his investigations to the meteorological field for seven years, till an opportunity came before him in 1874, when he initiated investigations in a new area. On 9 December 1874, the transit of Venus across the Sun’s disc aroused the enthusiasm of the astronomers throughout the world. Prof. P. Tacchini, the famous Italian astronomer, had arrived in India and invited Father Lafont in the Madhupur (in Bihar) expedition. Four miniature observatories with revolving cupolas were constructed. In one of them, Lafont recorded the total time of transit, using equatorial refractors and carefully rated chronometers, to be 4 hours 41 minutes, 1.5 seconds. Using spectrotelescopes, Prof. Tacchini discovered ‘unmistakable signs of the vapour of water in the atmosphere of Venus’.

Prof. Tacchini was so impressed by the value of solar observatory in the cloudless sky of India that he persuaded Father Lafont to erect a spectro-telescope at SXC. Lafont immediately started work on this project and appealed for funds. Lieutenant Governor of Bengal, Sir Richard Temple, visited SXC on 5 February 1875 and granted Rs. 5000 for the observatory project. A matching grant had to be raised and on 9 February Lafont approached the Asiatic Society, of which he himself was a member, for monetary help. His project was discussed in the monthly general meeting of the Society in March 1875, and the Society granted to Lafont a token help of Rs 500. The IACS Subscriber’s Meeting on 4 April 1875 noted Lafont’s splendid efforts and the 16 December 1875 IACS Ad-Hoc Committee meeting noted that ‘recent spectral analysis has brought astronomy in the ambit of chemistry’<sup>9</sup>. Eventually, a total of Rs 21000 was raised as donations and suitable orders were placed with various European firms.

An elaborate structure, 60 ft above the ground and a circular room 22 ft in

diameter were constructed. There were two parts in the observatory, one fixed and the other capable of revolving so as to follow the apparent motion of the sun.

S. Merz of Munich supplied a large equatorial, a parallactic instrument. The object glass had an aperture of 7 inches, and 7 feet focal distance. It was furnished with an hour-circle 9 inches in diameter, and a declination circle. There were six astronomical eye-pieces magnifying from 50 to 480 diameters, five micrometer eye-pieces and one ring micrometer. The finder's aperture was 1.75 inches. The whole equatorial was driven by clock work with a conical pendulum. A direct vision spectroscope, a polarising helioscope with photometer, completed the instrument; it took 18 months to construct this outfit costing Rs 5250.

Besides the above was received from J. Browning of London, a seven-prism spectroscope similar to the one constructed for Sir Norman Lockyer. A standard astronomical clock with a mercurial pendulum was purchased. The initial work of daily mapping of the solar protuberances was started in the winter of 1877. At this time, the physical and chemical laboratories were also set up by Father Lafont.

Forty-year old mathematician-cum-astronomer, Father Alphonse de Penaranda, had arrived at India and joined SXC on 14 November 1874. He taught Poet Rabindranath Tagore<sup>10,11</sup> during 1875-76 and immediately plunged himself into Lafont's astronomical project. Till his death in 1896, de Penaranda assisted Lafont in many astronomical observations: eclipses, movement of planet Mars (1879), movement of a comet, radiation from the solar chromosphere during a solar eclipse (24 May 1882), Mars-Saturn conjunction (20 September 1889), solar eclipse observation by SXC team at Bhagalpur (16 June 1890), transit of planet mercury (10 May 1891), occultation of Jupiter at full moon (4 October 1892), etc. Next to Lafont, de Penaranda's popularity is worth mentioning. He used to write regularly in the 'Astronomical Occurrences' column of IEC. There were so many visitors to the observatory that IEC had to announce the imperative necessity of appointments prior to such visits. IEC also published details of the astronomical observations as listed above. After de Penaranda's sudden death on 16 September 1896, the obituary suggested that 'many nocturnal observations probably laid the germs of his liver complaint'.

Father V. de Campigneulles had been interested in chemical researches at SXC during 1882-83, but gradually his interest shifted towards spectro-telescopy. After de Penaranda's demise he took more interest in astronomical observations. He published two books<sup>12,13</sup> pertaining to the observations of the total solar eclipse on 22 January 1898. Several scientific teams took different positions in India to study this famous total eclipse. At Vizianagur, a British ship was arranged and Sir Norman Lockyer and Sir Alexander Pedler led a team of scientists. At Dumraon, Bihar, the party of the Jesuit scientists was led by Fathers V. de Campigneulles, H. Jossion and C. de Clippeleur of SXC. Campigneulles reported the totality of the eclipse to be of 99 seconds – from 1 hr 58 min. 24 sec after mid-day to 2 hr 0 min. 3 sec. 'All nature was wrapped in silence, and the spectacle and feeling at that moment defy description'.

The Jesuit team observed 'Prominences on the sun which are gaseous looking incandescent masses, ascending flame-like, as if from the lowest strata of chromosphere, reaching heights of over 200,000 miles'. They also observed inner and outer corona, their radiating structures and relative actinism in the rays and streamers shooting from the depths. The coronal spectra reflected elements of hydrogen ( $H\alpha$  and  $H\gamma$  arcs), helium, calcium (K, H and blue arcs), iron (in the lowest strata) and an unknown substance. Francotte recorded drops in full sunshine temperature ( $12.7^{\circ}\text{F}$ ), shaded area temperature ( $7.8^{\circ}\text{F}$ ) and barometric pressure (0.05 inch).

## B. FATHER LAFONT AND IACS

Based on the ideals of the Royal Institution of Great Britain and the British Association for the Advancement of Science, the goal of the IACS, as formulated by Dr Mahendralal Sircar, was two-fold: (a) creation of mass interest in science, and (b) training of scientists capable of undertaking original researches<sup>14</sup>. We have noted how the IEC and Father Lafont provided the *earliest* support to Mahendralal's project in the years 1869-70. Lafont continued to spend the best part of his energy to assist IACS till his demise in 1908. He himself used to say that this was 'the best thing that he had done in India'. While in his death-bed in 1903, Mahendralal rightly referred to Father Lafont without whose ungrudging and long continued aid the Association (IACS) could never have been an accomplished fact. Referring to Father Lafont's scintillating lecture on the 'Physical Basis of Spectrum Analysis' delivered on 11 April 1872 at the Medical College, the famous periodical '*The Indian Mirror*' prophetically identified the nascent movement for Indian science and its leaders:

"Time has come when someone ought to take the missionary's role and go through the country interesting the people by means of popular science lectures and exposition of the kind given by Father Lafont. There can be no doubt that Father Lafont and Dr Sircar are the persons to whom the popular vote would turn in the matter of the choice for leaders".

While Mahendralal aimed at cultivation of basic sciences, another powerful group of people, who had founded 'Indian League' in 1875, recommended a technical school for technicians and laughingly wondered whether Mahendralal's Association would produce Newtons, Galileos, etc. Father Lafont shot back:

"The Scientific Association was not intended to produce Newtons, Galileos and Herschels, though *even that was not impossible* (italics mine; IACS did produce a Raman later); but its primary object was very different and much more practical.... The other Association wanted .... to transform the Hindus into a number of mechanics requiring for ever European supervision, whereas Dr Sircar's object was to emancipate in the long run his countrymen from this humiliating bondage<sup>15</sup>..... It would be difficult to teach a nation how to apply things they did not know anything about. It is necessary, therefore, first to teach the sciences before their application to the arts could be taught with advantage"<sup>16</sup>.



Many of the meetings of the Subscribers' Committee, the Provisional Committee (before 1876) and the Management Committee (on and after 1876 till 1907) of the IACS were presided over by Father Lafont. As soon as the IACS was inaugurated, Lafont was the first to start a series of lectures on 24 August 1876. No other lecturer could start before 1878. Upto 1893, Lafont went on lecturing on Light, General Physics, Sound, etc. (Table 1) averaging 20-30 lectures per year<sup>17</sup>. In December 1878 Lafont went to attend Paris Exhibition in Europe with Rs 4000 and a shopping list for the IACS. He brought back 'an assortment of instruments and apparatus for illustrating lectures on thermotics, acoustics (recently discovered phonograph etc), electricity and optics'<sup>17</sup>. A complete set of chemical apparatus also arrived according to his order.

In 1880, Lafont purchased for the IACS a valuable Refracting Equatorial telescope of 7 inches aperture made by M. Merz of Germany with a stand made by Mr Browning of England. This was similar to the 1875 acquisition for the SXC. For a long time, the equipment could not be properly utilised till C.V. Raman set it up in 1913 and made some observations on the planet Jupiter<sup>18</sup>. Years later, Raman used the lens in connection with his epoch-making discovery. As early as 1923, 'feeble fluorescence' was observed, but the discovery could not be made on account of 'lack of a sufficiently strong source of illumination'. In February 1928, the refracting equatorial telescope lens of 7 inches aperture, ordered and acquired by Lafont, was 'coupled to a short focus lens to condense sunlight and to obtain a more powerful source of illumination'<sup>19</sup>. A spectroscope was used and Raman's student, K.S. Krishnan, was able to record for the first time on 28 February 1928, the famous shift in wavelength and the 'Raman Effect', which brought to India the Nobel Prize in Physics. Lafont and Sircar had sown the seed, and India reaped the harvest through C.V. Raman.

### C. PROMOTION OF SCIENCE EDUCATION AND POPULARISATION OF SCIENTIFIC STUDIES AND RESEARCH

While Father Lafont was one of the natural leaders in India in the above-mentioned field, he was in turn counselled and assisted by the founders and colleagues in SXC. We have mentioned earlier about the apathy of Mr W.S. Atkinson, Director of Public Instruction and other policy-makers against introduction of scientific education and research in India. A welcome change in their attitude came about when Father Depelchin, the founder of SXC, wrote to Atkinson on 21 April 1870:

"Three times a week, lectures on the attractive and useful science are delivered to *all* students of the College Department by the Reverend Father Lafont. The lectures are illustrated with experiments. The students find these lectures very interesting".

"On the DPI's positive recommendation, Calcutta University decided two years later on 3 April 1872 'to introduce the study of Natural and Physical Sciences at schools and colleges'<sup>20</sup>. The first examination in the new Science (B) Course was conducted<sup>20</sup> in January 1874. A Gilchrist Scholar of that year, Pramatha Nath Bose, had been Father Lafont's student. Eventually he became a successful geologist and was

appointed in 1880 as the first Indian scientist in the Geological Survey of India”.

While a few pieces of scientific equipment in the Presidency College, Calcutta (during 1871) existed ‘not for use but misuse and disuse’ (Mahendralal) and the students there were ‘not seen to evince a living interest in the cause of science’ (*Indian Mirror*, 1872), the SXC laboratory was vibrant and ‘cynosure of all eyes’. In January 1872, Lord Mayo, the Viceroy, presented a beautiful model of the horizontal steam engine to Father Lafont ‘hoping that it would be of use to him in illustrating his lectures’. During his visits to Paris Exhibition (1879, 1900) Lafont procured the latest models of equipment for SXC.

During the famous 1875-76 debate, the Jesuit Fathers at SXC had endorsed the stand taken by Mahendralal and Lafont that technical education must rest upon a basic scientific training. In 1886, Mr Tawney of the Calcutta University proposed that technical education should be introduced at the school level, and the institutions which would not arrange technical education would cease to receive Government aid. Father H. Neut, the then Rector of SXC, opposed this imposition and recalled the earlier stand taken by Lafont and his colleagues. He wrote: ‘To begin the technical studies in the school itself is to prepare a generation without elevation or grandeur’<sup>21</sup>. Father Lafont’s advocacy for greater stress on science, experimental science in particular, and more laboratory facilities in the colleges convinced the members of the 1903 Indian Universities Commission. Consequently, the Indian Universities Act of 1904 endorsed direct post-graduate teaching by the universities and the development of ‘more laboratories and museums’<sup>22</sup>. Asutosh Mookerji, who had been Lafont’s colleague in IACS (1887-1890) and a member of the 1903 Commission, became the Vice-Chancellor of the Calcutta University in 1906. Assisted by P.C. Ray, C.V. Raman and others, he fulfilled Lafont’s dream of scientific investigations in the infra-structure of the Indian Universities.

#### A TOTAL APPRAISAL OF FATHER LAFONT

We have already discussed Father Lafont’s contributions pertaining to (A) scientific investigations at SXC (B) building infrastructure for scientific research at IACS and SXC, and (C) efforts for science popularisation and curricular development in the country. He was assisted by his colleagues at SXC in all these endeavours.

Many students of Father Lafont carried forward his mission of science on their shoulders. We have mentioned Pramatha Nath Bose, the famous geologist who discovered, for the Tatas, the Gorumahisani iron ore body. Richard Bradley, irrigation engineer at Roorkee, Hariprasanna Chatterji (Swami Vijnanananda of the Ramakrishna Mission), an able civil engineer, Dr Arthur Younan, a famous surgeon and a research worker on the vitreous humor of the eye, Mr E.R. Deefholts, an expert in electrification of tramways, Mr Devendra Nath Mullick, a mathematician and physicist, were all Father Lafont’s students. The most outstanding among Lafont’s students was Acharyya Jagadis Chandra Bose, who studied at SXC during 1876-79 and proceeded to England

with Father Lafont's testimonial dated 12 April 1880. Seventeen years later, the teacher celebrated his student's remarkable discovery on 'Telegraphy without Wires' by giving a popular talk on the subject which was supplemented by the student – discoverer's demonstration. Tickets were sold (Rs 2.00 per seat) for the programme held at SXC on 15 September 1897.

Father Lafont might have delivered more than 500 lectures in his career, most of which were well publicised and well attended. We have furnished a selected list of his lectures in Table 1. Referring to the current belief that Lafont had been a mere popular lecturer, Asutosh Mookerji said: 'No greater injustice could have been done to him. His knowledge of principles of sciences was as deep and as sound as that of any other scientist'. After Lafont had delivered his illustrated talk on 'Electricity' on 10 April 1876, Rajendralal Mitra prophetically commented: 'The little magnetic instrument exhibited by the lecturer may appear as a toy, but it will, under proper management, prove as efficient a motive power as steam'. Father Lafont was always on the forefront of science. He lectured six months before his death (November 1907) on the recently discovered phenomenon of radio-activity. In the annual meeting of IACS held on 13 May 1881, Lafont declared: 'The Association tried to keep up with the discoveries of the age, not to let you lag behind the students in Europe in that respect'.

Father Lafont favoured accurate observations and opposed dogmatic belief in any hypothesis:

"Every accurate observation of natural facts is precious on account of the *possible* conclusions to which it may subsequently lead.... Let us beware of accepting mere working hypotheses as absolute truths.... The discoveries about radium and other radiant substances must make us very cautious in assuming that we are already in possession of a final certainty about the constitution of matter and the forces of Nature in general".

A man of God, Father Lafont viewed the matter and forces in Nature as 'God's positive works'. He served both religion and science, which to him were *not* antagonistic. 'Truth, he often asserted with that depth of conviction so characteristic of him, cannot be opposed to truth', (Reverend Father E. O'Neill's reminiscences).

When Father Lafont left this mortal world in 1908, he left behind his able colleague Asutosh Mookerji as the Vice-Chancellor of the Calcutta University, and C.V. Raman as the budding scientist at IACS. The annual general meeting of IACS held on 21 November 1907 was the occasion of Raman's first formal participation in the Association and Lafont's last. Father Lafont also left behind a fresh movement in scientific curricula and education, which was partly his own contribution, the science laboratories in SXC 'better equipped than any other in India'<sup>23</sup> and several junior colleagues who were already well-received in the scientific society of Bengal<sup>24</sup>. As Justice Gurudas Banerji said, 'with the salutary reaction in India in favour of the study of science, the name of the Rev. Father Lafont must ever be most gratefully associated'.

## NOTES

1. Biswas, A.K., Rev. Father Lafont S.J. of St. Xavier's College, *Modern Review*, CVII (1) 42-52, (January 1960). This was the first paper on the subject in half a century since the publication of several obituaries in 1908.
  2. Biswas, A.K. Rev. Father Lafont of St. Xavier's College in A.K. Biswas, *Science in India*, Firm a KLM Pvt. Ltd, Calcutta, 67-84, 1969. Quoted in *Physics Today*, 39 (5), 36-44, May 1986.
  3. Sen, S.N. The Character of the Introduction of Western Science in India During the Eighteenth and the Nineteenth Centuries, *Indian Journal of History of Science*, 1(2) 112-122, 1966.
  4. Deepak Kumar, Science in Higher Education: A Study in Victorian India, *Indian Journal of History of Science*, 19, (3), 253-260, 1984.
  5. Father A. Verstraeten, S.J., *Annals of St. Xavier's College, Calcutta (1835-1935)*, Typed Compilation available in Goethals Library, SXC, Calcutta.
  6. Sircar, Mahendralal, *Calcutta Journal of Medicine*, 2, 286-306, August 1869.
  7. Sen, Samarendra Nath. *Vijnanacarya Mahendralal Sircar* (Bengali) IACS Calcutta, 1985.
  8. Francotte, E. '*Meteorological Observations at St. Xavier's College, Calcutta Part I 1868-1913 with Appendix 1914-1917*', St. Xavier's College, Calcutta, 1918.
  9. The history of telescopic investigation in the Indian sky is just as old as the city of Calcutta. In 1689, Father Richaud, a French-born Jesuit priest, used a 12 ft telescope at Pondicherry, 80 years after it was discovered by Galileo. That year, Richaud discovered the double star *Alpha Centauri* in connection with his observation of the Halley's Comet. In 1734, Claude Boudier, the French Jesuit priest of Chandernagore made telescopic observations at Jaipur (for Raja Jai Singh II). When the Jesuits in SXC, Calcutta, started spectro-telescopic investigations, the existence of specific elements in stars and planets was being discovered. J. Norman Lockyer, the author of '*Studies in Spectral Analysis*' (1878) had discovered a new element helium in the Sun.
  10. *Rabindra Racanavali* (Complete Works of Rabindranath Tagore in Bengali), 17, Visva Bharati, Calcutta 328-329, 1350 (B.S.)
  11. Divakar, P.R. 'The Presence of a Great Soul, *The Examiner*, Bombay, 140 (10) 11 March 1989.
  12. de Campigneulles V & Josson, H. *The Total Solar Eclipse January 22, 1898*, Thacker, Spink and Co. Calcutta, 1898.
  13. de Campigneulles V. *Observations Taken at Dumraon, Bihar, India During the Eclipse of the 22nd January 1898*, Longmans, Green and Co., London 1899.
  14. *A Century Indian Association for the Cultivation of Science*, Calcutta. 1976, 4-5
  15. Palit, C, Mahendralal Sircar: The Quest for National Science, *The Indian Historical Review*, 12 (1-2), 127, 1989.
  16. Reference 7, p. XXII.
  17. Reference 14, p. 15.
  18. Sen, S.N. *Prof C.V. Raman – Scientific Work at Calcutta*, IACS, Calcutta: 1988, 22-23.
  19. Venkataraman, G. *Journey into Light – Life and Science of C.V. Raman* Indian Academy of Science, Bangalore, 1988, 196-198.
  20. *Hundred Years of the University of Calcutta*, University of Calcutta, 1957, 93 and 95-96.
  21. *Indo-European Correspondence*, 780, 1886.
  22. Reference 20, 179-180.
  23. *Nature London* 14 May 1908 Obituary on Father E. Lafont.
  24. The present author has been fortunate in having the opportunity of studying at the feet of two great Jesuit teachers who had seen and worked with Father Eugene Lafont. In 1908, Father P. Van Neste of St. Xavier's College was elected, along with Acharyya P.C. Ray, R.S. Trivedi, etc., a member of the Executive Committee of the 'Chemical Club' in Calcutta. On 14 February, 1908, Father A. Briot, along with Father Lafont, received Lord Minto, the then Viceroy, in the Astronomical Laboratory of SXC. Father Briot told the present author in 1959 that Father Lafont was 'always ready to help others; Father Lafont's lectures had always a novel beginning and an ending with an exclamatory note on 'God's beautiful positive works'.
- The author recalls his excitement during the student days of 1948-52, when Father Briot, emulating Father Lafont, delivered lectures on physics, which were fully illustrated with *all* possible experiments being performed in the lecture hall. Spell – bound we sat, listened, observed and received inspiration.