

HISTORICAL NOTES

P. N. BOSE (1855-1934) - An Eminent Geologist

Not many of us this day even those who are attached to the Steel Factory of Jamshedpur, Jharkhand, may be acquainted with the name of P.N. Bose, an eminent geologist, whose name is forever linked with the Jamshedji Tata. For it was Mr. P. N. Bose who first discovered the rich and extensive iron ore deposits at the nearby areas of the present Jamshedpur.

P.N. Bose was a product of nineteenth century Bengal renaissance. The nineteenth century Bengal produced a galaxy of luminaries and some of them were the pioneers in the fields of science, philosophy, political thought etc. P.N. Bose, a geologist, was the first to discover petroleum in Assam, also he was the first man to introduce the study of microsections as an aid to the petrological research. He was certainly the pioneer in geological field in India to prospect its mineral wealth with the ideas of its industrial utilisation.

P. N. Bose was one of the intellectuals who emphasized on the importance of scientific context of the *swadesī* movement. Besides being a committed nationalist, he maintained universal view of the world science through out his life.

INTRODUCTION

In the early days before the Europeans came to India, the education system was very simple. There were *toles* and *catuspātis* run by Brāhmin Paṇḍits, and the Muslims also had their *Madrāsā* and *Muktab* run by Moulavis. While the adventurous Europeans started pouring into India as traders, merchants, religious preachers, they never failed to bring with the western science, the Bible along with traders' equipments. In course of time, in the mid of eighteenth century the British East India Company captured the political power of Bengal in the year 1757, primarily for the interest of their trade ('*baṇiker māndaṇḍa dekhā dila Rājdaṇḍa rūpe*': Merchant's scale appeared as King's mighty stick).

Within a short time they exposed their power grabbing tentacles and captured almost the whole country. For the colonization the British rulers engaged few scientists, who surveyed very precisely the rivers, roads of Bengal. The famous 'Bengal Atlas' was the product of great surveyor Sir James Rennell' and he is considered as the father of the geography of India.

At the beginning, the British rulers were not interested to spread proper education for the natives. The Europeans for their own interest established the Asiatic society to know the oriental countries. On January 15, 1784 for enquiring into arts, history, science and literature of Asia, a society was formed under the name of Asiatic Society. The Governor General, Warren Hastings, was the chief patron and Sir William Jones was chosen as its president. The institution thus founded proved to be the fountainhead of all literary and scientific activities in India and the mother of all learned organisations of the country. Every branch of scientific activities in India owed its genesis to the Asiatic Society, which had made valuable and significant contributions in every field of knowledge. At the beginning, the door of the society was opened only for the Europeans.¹

Needless to mention, the Asiatic Society influenced much upon the elite class of India - they became aware of scientific methodology and admirer of western scientific approach. Thus, local people gradually became more and more followers of western education system. The great social reformer, Rājā Rāmmohan Roy had also such an opinion. He wrote a long letter to Lord Amherst, advocating the introduction of western system of education including science subjects in India, instead of opening new traditional educational institutions.²

Meanwhile with the effort of educationists like David Hare, Rādhākānta Dev and others, the Hindu School was opened in Calcutta in 1817. In the same year Calcutta Book Society was formed to publish the text books for newly formed and would – be formed schools. After sometime the Medical Colleges (1835), Universities (1857) were established. As a result, a band of young progressive minded students came out, and a part of which was popularly called as 'Young Bengal' or Derozians, as they were the devotees of Henry Derozio, a great teacher of Hindu College.³

The mid part of the nineteenth century was restless, creative years so far as Bengal was concerned. The old economy had been shattered, gradually a middle class group having close contact with western system of education sprang up. This newly formed middle class section of the society used to depend on service either under some merchant firms or under East India Company. This is the period, when we find that P.N. Bose's father was in service under the British Government.

In the nineteenth century, science courses were handicapped by want of necessary facilities like laboratories etc. The rulers were not much interested in the scientific researches. Even the European scientists did not have proper facilities to perform their works here. Practically there was no infrastructure for scientific investigations. In such a situation, persons like Acharya P.C. Ray, J.C. Bose, or Ashutosh Mukherjee - did mervellous achievements in the research field of science. However, at that time the nationalist spirit was high specially in Bengal. In this environment P. N. Bose was in Geological Survey of India acting as deputy superintendent.

In this contex, geological explorations in India had a far more direct economic bearing. The East India company was aware of its importance but was not willing to run a seperate department, lastly Thomas Oldham in March 1851 established the seperate full fledged Geological Survey of India (GSI).

LIFE AND WORKS OF P.N. BOSE

Remote village to London

Pramatha Nath Bose, widely known as P.N. Bose was born on May 12, 1855 in the remote village Gaipur of Gobardanga in Nadia district (at present 24 Parganas North). He was the eldest son in a family of nine children. His ancestry was not clearly known. His father, Tarapasanna was in a police department of Bengal Government and had to tour a great deal. At the age of nine, Pramatha was put under the care of his grandfather, Nabakrishna. He was a successful Moktiar at Krishnagar Court. Pramatha was a student of Krishnagar school. It is one of the best education centre of Bengal at that time. When he was fifteen and ready to appear for the entrance examination, but he was a year short of the minimum age of that time. Young Bose spent the year in writing poems. In his boyhood he saw the famous Brahma leader Keshab Chandra Sen

and heard his impressive and eloquent lectures. Soon he became an ardent follower of Keshab Chandra, but (so far it is known) he was not Brahma as such.

Pramatha Nath passed entrance examination in 1871. He was F.A. student in Krishnagar College and stood fifth in the final examination according to merit. Then he joined St. Xavier's College, Calcutta. The next year he appeared for the Gilchrist Scholarship and stood first and sailed for England. He spent almost six years in England, took his B. Sc. degree in 1878 from the London University. He then joined the Royal School of Mines, specially to attend the lectures of Julian Huxley. Here he obtained the highest marks in biology and palaeontology, had he been a regular student he would have won the highest award.

Return to India

Pramatha Nath returned to India in July 1880. He joined the Geological Survey of India. After getting the job he married the eldest daughter, Kamalā of illustrious Ramesh Chandra Dutta. Kamalā at that time was 15 years old, and a beautiful and accomplished girl. The wedding is a memorable one. Ramesh Chandra stood at the gate of the marriage pandal and received the guests among whom were luminaries like Bankim Chandra (Chattopadhyay), Surendranath (Banerji), twenty one years old Rabindranath and others. Ramesh Chandra garlanded Bankim Chandra who seeing Rabindranath enters, placed the garland round his neck saying to his host, 'He is more deserving than I'. Rabindranath has immortalised the marriage ceremony of Pramatha Nath and Kamalā in his reminiscences, *Jiban Smṛti*.

Distinction

In his service life Pramatha Nath had to wonder various remote places of India and Burma. While searching for coal in the Kalimpong area of Darjeeling district, he was sent to evaluate the mineral wealth of Sikkim. In this way he had to tour in almost inaccessible parts of the country. His reports on mineral resources were always treated seriously. He discovered the manganese and rich iron ore in central province. For the first time he mapped India geologically in a scientific manner from Kashmir to Tuticorin and from Arabian Sea to Burma. Pramatha Nath was the pioneer to different points. He was first to

discover petroleum in Assam, first to introduce the study of microsections as an aid to petrological work. He was certainly the first geologist in India to prospect its minerals wealth with the idea of its industrial utilization.

Pramatha Nath was a man of upright nature and had a *swadesī* outlook. While he was in England he was the Secretary of the India Society and had the opportunity to meet and work with Dadaji Naoraji, W.C. Bonnerjee, Ananda Mohan Bose and many other freedom fighters.

For his involvement in freedom movement, he was not considered for the post of superintendent and was superseded by a junior Englishman. As a protest against this, Pramatha Nath resigned from his service in 1903. Immediately after he was invited to join as a geologist in Mayurbhanj state.

The most outstanding achievement of P.N. Bose's life was the discovery of iron ore deposits in Gurumahisani in Mayurbhanj state. Following the discovery P. N. Bose wrote a letter to J. N. Tata that led to the establishment of *Tata Iron and Steel Company* at Jamshedpur (Fig.1).

A few lines from that historic letter is :

“As you are interested in the development of the iron industry of this country I have to bring to your notice an exceedingly rich and extensive deposit of iron ore which I have just explored in this state.”

Industrialist J. N. Tata at that time was investigating the iron ores of India with a view to work them on a large scale on modern methods. Messrs. Tata and sons; however, took up the matter. They sent two foreign experts, Mr. C. P. Ferin and Mr. Weld, who examined the deposits reported by Mr. Bose. It was decided to establish the works in a small village called Sakchi, two and half miles from the north-west side of Kalimati Railway station on the Bengal - Nagpur Railways. The actual construction of the steel plant was undertaken in the year 1908. The company was named after its illustrious founder “The Tata Iron and Steel Company Ltd.” The plant was the second largest in Asia and the largest in the British Empire. Within a short time the small village Sakchi became Jamshedpur town and nearest Rail station Kalimati was renamed as Tatanagar.⁵

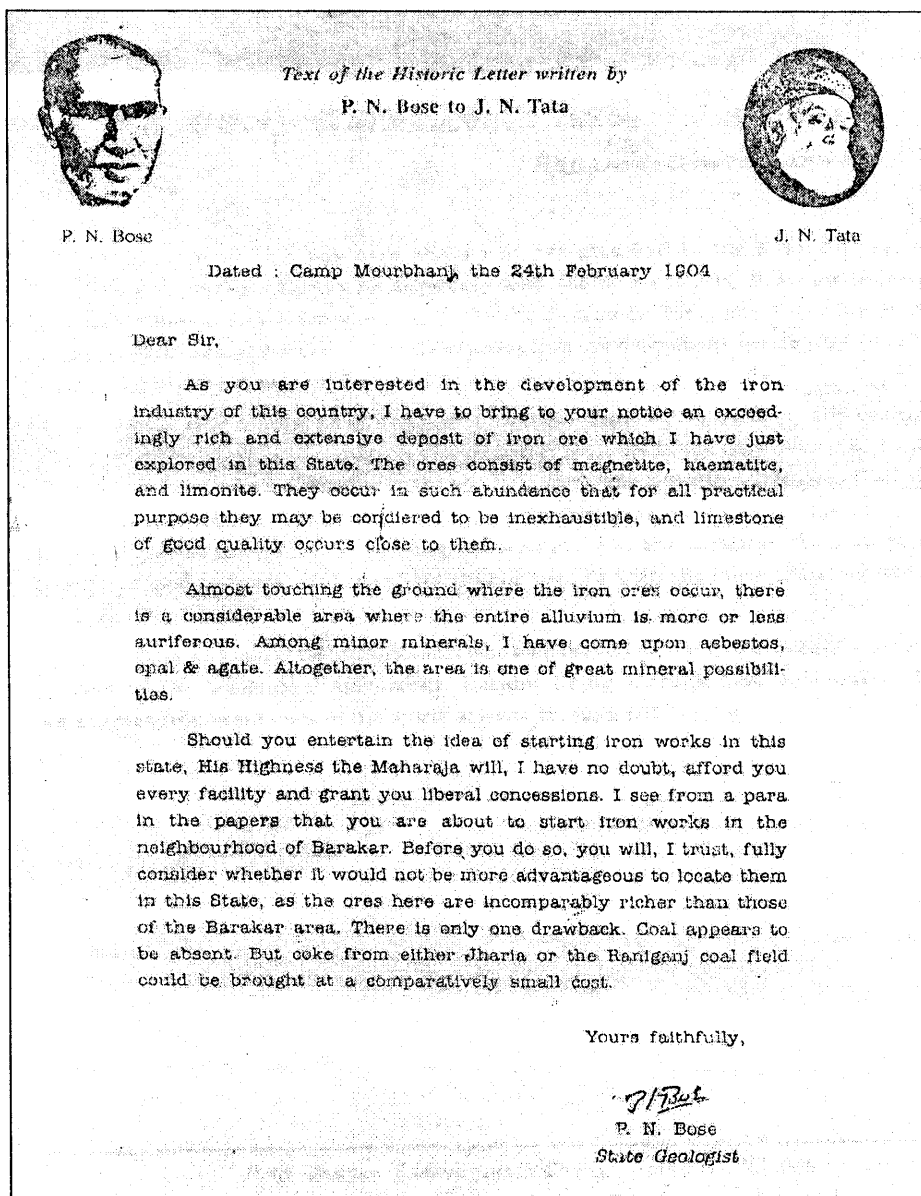


Fig.1: Facsimile of the letter written by P. N. Bose to J. N. Tata (24th Feb. 1904)

***Swadesī* movement and Bose**

P.N. Bose was a nationalist by heart and soul. At the early years of twentieth century he was attached to many other nationalist leaders of Bengal. He was one of the founders of the National Council of Education. Bose was one of the interested behind the Bengal technical Institution that started in 1906. P.N. Bose was the first honorary principal of the institution. Later on, this Institution moved to Jadavpur and in 1929, the name was changed to College of Engineering and Technology. P.N. Bose worked for the *Swadesī* movement in the line of self help and self reliance through industrial progress. His idea was not only to boycott of foreign goods, but simultaneously the setting up of industries on modern scientific lines. He was one of the brains behind the industrial exhibitions. He was a great science propagater. Also, he was an active member of Asiatic Society of Bengal. He made valuable contributions to its centenary volume in 1884. The science part of the volume was compiled by him.

P. N. Bose enjoyed his retired life at Ranchi, circular Road. At present the house is used as a hospital. A good number of books were written by P.N. Bose - *A History of Hindu Civilization under British Rule*, in three volumes, may be mentioned here. This master work is a critical estimate of the impact of the west on eastern culture. It was a pioneering effort in its authoritativeness and historical perspective even today. He died on April 27, 1934.

The steel town Jamshedpur never forget P. N. Bose. A half bust statue was erected in his birth centenary occasion and that can be seen at the Jamshedpur town near the central water tank. A monument also was built at ore deposit area of Gurumahisani.

This year 2005, is the 150th birth anniversary of P. N. Bose. Once our Prime Minister Pandit Nehru said:

He (P. N. Bose) was, I suppose one of the earliest of our noted scientists and a great geologist. All of us or many of us talk of science and geology to day but in the middle of the 19th century it was rare Indians to think of science. Pramath Nath Bose was thus one of the pioneers of science and more particularly of geology.”

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JYOTISH CHANDRA GHOSH (1870-1957) - The Forgotten and Unsung Pioneer of Pharmacy

Jyotish Chandra Ghosh (1870-1957) made significant contributions towards Pharmaceutical and allied fields during his time. In his professional career Ghosh was a late starter; he was forty-two when he graduated in pharmacy from the Manchester University (1912). He worked as pharmaceutical chemist at the Medical Stores Department, Government of India, Madras (1912-18). He took premature retirement and established School of Chemical Technology at Calcutta. His personal drive and perseverance kept the School going for over two decades. Ghosh had varied interests. Here the focus is on his contributions in the areas of pharmaceutical and technological education, pharmaceutical and chemical industry, and drugs and pharmacy legislations. The present study concludes that the period 1918-28 in particular was largely the Ghosh's decade of spearheading the cause of pharmacy and pharmaceutical developments.

Key words: Drugs Enquiry Committee, Drugs and pharmacy legislations, Medical Stores Department, Pharmaceutical and technological education, School of Chemical Technology at Calcutta.

INTRODUCTION

While working at the library of the Royal Pharmaceutical Society of Great Britain I stumbled over some forward-looking publications by Jyotish Chandra Ghosh in pharmaceutical research. A systematic search on life and contributions of Ghosh started which continued for decade. Most of the material steadily became available in the London based libraries and some institutions in India, like the Calcutta School of Tropical Medicine Library and the National Archives of India. It was also possible to locate some of Ghosh's descendents in Calcutta ¹.

J. C. Ghosh was a man of varied interests. The professional topics which remained of particular concern to him were the pharmaceutical and technological education, traditional drugs, drug cultivation, pharmaceutical and chemical industry, drugs and pharmacy legislations, tanning and tanning materials, and surgical dressings.

We consider here the life and contributions of J. C. Ghosh, his Early Life, Education and Work at the Medical Stores Department, Madras; School of Chemical Technology, Calcutta and Pharmaceutical Education Perspective; Drugs and Pharmacy Legislations; and Professional Status and Impact of his Contributions having bearings on the pharmacy profession.

HIS EARLY LIFE, EDUCATION AND WORK AT THE MEDICAL STORE DEPARTMENT, MADRAS

J. C. Ghosh was born on 19 August 1870.² Jyotish passed F.A. in science stream. Some particulars about him have been gleaned from the official processing of the application which he submitted in March 1909 for studies abroad.³ Jyotish Chandra started as a village schoolmaster.⁴ He had worked for thirteen years in the Department of Military Supply after clerkships examination in 1893,⁶ and received permanent appointment to clerkship in the Military Department in 1895/1896.^{7,8}

Ghosh had six months' practical training in the manufacture of drugs and of leather at Government factories in Calcutta and Kanpur.¹⁰ This was prior to his making an application for going abroad and he desired to obtain instructions in the related areas in England.³ He could not succeed in getting a scholarship, in 1909. A year later he was deputed by the Government of India to qualify as a pharmaceutical chemist from the Manchester University.⁵ He was then of mature age (forty years), when he joined the University in April 1910 and obtained B.Sc. degree in pharmacy in 1912.

On return home in 1912 he was appointed as a pharmaceutical chemist at the Medical Stores Department, Government of India, Madras.¹⁰ In 1918, Ghosh took a premature retirement on medical grounds.

Through his studies at Manchester, visits to pharmaceutical and other factories in the United Kingdom, and his experience at Madras, Ghosh had acquired a sufficient understanding of the drug production and the professional issues. Out of the pamphlets he published while still with the Medical Stores Department, a particular mention may be made here of *Indigenous Drugs of India* (1918).^{12,13} We shall be referring to contents of this publication later at appropriate places. It may be mentioned that in it there was laid emphasis on the scope for scientific investigation of indigenous drugs, drug cultivation, ex-

traction of alkaloids, galenical preparations, the need for statutory control on the drugs, and necessity for training personnel for analytical and manufacturing work; there appeared complimentary reviews in the professional journals and daily press.¹⁴⁻¹⁸ This established Ghosh's credentials as a pharmaceutical technologist and professional of merit. The 1918 slim booklet was revised some two decades later and much enlarged edition (1940) was brought out, giving a new orientation to the subject matter.⁴

J.C. Ghosh was elected a Fellow of the Chemical Society, London, in July 1912, and his name remained on the Society's register till 1929.¹⁹ There is no information on J. C. Ghosh joining the Bengal Pharmaceutical Association or the Indian Pharmaceutical Association.

SCHOOL OF CHEMICAL TECHNOLOGY (CALCUTTA) AND PHARMACEUTICAL EDUCATION PERSPECTIVE

In early 1919, J. C. Ghosh organised a small pharmaceutical and analytical laboratory, which he soon changed into a School of Chemical Technology at Calcutta.¹⁰ The courses of training included pharmaceutical chemistry, botany and bacteriology; chemistry of soap, oil and leather; and analysis of foodstuffs, drugs, ores, soils, manures, etc.^{10,20} Investigation of the indigenous Indian drugs was also envisaged. Ghosh was the proprietor and one-man faculty of the School.

The times when Ghosh started with his activities, the projections which he aimed to focus on were new and novel. He was for academic courses with industrial orientation. He made efforts to attract attention of the public and elite of the society. There were arranged public meetings, and advisory body for the School was constituted with distinguished membership. The first public meeting in connection with the School was held in March 1921, at which Sir Ashutosh Chowdhury, a judge of the Calcutta High Court, presided.^{10,20} The utility of institutions like the School was brought out for enrichment of the resources of the country.

The dignitaries who associated with Advisory Board of the School at different stages included Sir Ashutosh Chowdhury,²⁰ Raja Manindra Chandra Sinha (M.B.E.) of Paikpara Raj,²¹ Justice M. N. Mukherjee²², Dr H. W. B. Moreno (M.L.C.),²³ and Dr P. Neogi (Sibpur Engineering College).²⁴ The Board

held its meetings almost every month for the first few years and then occasionally at long intervals, as required by circumstances.¹⁰ The laboratory facilities of the St. Paul's college became available for practical work.²⁵ There was a workshop attached to the school.²⁶

The School of Chemical Technology was a modest affair. A limited number of students joined for short courses in different vocations.¹⁰ When the founder of the institution started the enterprise, he met the expenses from his own resources.²⁶ There was appeal made to the public for co-operation. Raja Manindra Chandra Sinha gave a financial help^{21,27}. The School progressed more because of personal energy and whole hearted devotion of Ghosh.²⁸ A recognition and encouragement from the government was sought.^{29,30} The School incurred a heavy loss.³¹ Owing to financial reasons, the institution was obliged to suspend its teaching work for several months in 1924.³²

At a time there was a mention of three plots of land comprising an area of about forty bighas, near Tollygunge Race Club, having been presented as a free gift by an alumnus of the School, and the Advisory Board resolving to utilise the plots of land for practical agricultural classes which were to be started.³³

Against all odds the School continued to function. Ghosh explored every possible mean to project the institution. Pharmaceutical products were prepared for sale.³⁴ At the Calcutta Exhibition opened in December 1923, the School exhibited several raw drugs, pot cultures of herbs of medicinal value, and also pharmacopoeial preparations.³⁵ There is a mention about the School having been awarded a bronze medal for the exhibits displayed.³⁶ The medal is available with Abhijit Ghosh,¹ a great grandson of J. C. Ghosh.

The School and the founder received appreciation for the progress made. It was stated that the enterprise by J. C. Ghosh accomplished, in a small degree, what should really have been the duty of the Government authorities to perform.³⁷ His able and single-minded efforts called forth high commendation from various quarters.³⁸ Bhupendranath Basu, Vice-Chancellor of Calcutta University, on whom a deputation of the School waited, 'saw no reason why it should not ultimately grow into a great technical institution affiliated to the University.'³⁹

Gradually, the interest of Ghosh gravitated more towards pharmaceutical education. He drew attention to dispensing, analysis and manufacturing aspects of pharmacy.^{40,41} The School of Chemical Technology, though also covering training for other technical vocations, offered facilities for instruction in pharmaceutical chemistry and pharmacy proper. The editorial encomiums which the School received for the promotion of pharmaceutical didactics,^{37,38,42} encouraged Ghosh to wish, though not a practical proposition, for affiliation of his School with the Pharmaceuticai Society of Great Britain.⁴³

Ghosh kept his hope alive for establishment of proper system of pharmaceutical education and training.^{25,44} He dreamt of the School of Chemical Technology, Calcutta, becoming a nucleus for development of an organisation corresponding to that of the Pharmaceutical Society of Great Britain.⁴⁵ His vision for facilities to produce qualified pharmaceutical manpower was appreciated.⁴⁶



Fig.1: Jyotish Chandra Ghosh (1870-1957)
Photo : Courtesy: Ashok Kumar Ghosh (grandson).

All the valiant efforts made by the founder and the grandiose future be envisioned for the School did not translate into a reality. The number of students coming in was few and there was no governmental support. The School existed in a low profile. No doubt it provided Ghosh an institutional identification and a base for carrying out his crusade and spreading of awareness for the need for pharmaceutical and related developments.

It may be put on record that Ghosh submitted a special memorandum before the College of Pharmacy Committee which the Government of Bengal had constituted in 1938.⁴⁸ He opined 'that the time is more than ripe for a College exclusively for the training of pharmacists.'⁴⁹

As late as 1943, Ghosh used the School of Chemical Technology address.⁹ He was 73 at the time. At some stage in 1940s, the School stopped functioning.

DRUGS AND PHARMACY LEGISLATIONS

It was first in 1918 that Ghosh raised his voice at lack of statutory control on drugs and there being no surety for the consumers to get the genuine drugs.^{12,50} At the time he thought of a Food and Drugs Act for India as was the case in Britain. The lead given by him got enthusiastic support.^{18,51-53} He continued to emphasize the need. Steps were taken for formulation of a Food and Drugs Bill.⁵⁴ The Bill submitted to Bengal Council through Dr H.W.B. Moreno, M.L.C., came back with several objections from the Government after a lapse of two years.⁵⁵

The lack of control over the drugs and pharmacy practice remained a matter of concern for Ghosh. He protested against the lowest pharmaceutical condition that obtained in the country.⁵⁶ He deplored the negligent dispensing because of unqualified or rather almost illiterate people being allowed to engage in the practice. Looking to the status of pharmacy as a recognised scientific profession in the western countries, he said, 'India, however, is far far behind and to identify pharmacy ordinarily with any class of people here is apparently to degrade the profession'.⁴⁴

The proposed Food and Drugs Bill envisaged amending the existing Bengal Food Adulteration Act, 1919, so that there could be better supervision

and control over the sale of food and drugs as well as over the handling of poisons and to provide for a qualification for training and appointment of analysts and Pharmacists.⁴⁴ It was later suggested that if a Food and Drugs Act for India was not considered, a suitable vehicle to cover the whole ground, 'a Pharmacy and Poisons Act, as in England, vesting a non-official body with the power of directing pharmaceutical education and of controlling the manufacture, sale and dispensing of drugs (including poisons), might be adopted throughout British India.^{45,57}

During July to September 1928, *the Civil & Military Gazette*, a leading newspaper from Lahore, devoted a good deal of space for discussions on the quack doctors, the absence in India of pharmacy and food and drugs law and related matters; later the *Statesman* from Calcutta also opened debate on the issues in its columns. Ghosh brought forth his proposals. He mentioned that he prepared a draft for the 'Indian Pharmacy and Poisons Bill, 1928' which he gave to K. C. Neogy, a Bengal member of the Legislative Assembly, for further necessary action; Neogy did not follow it up because he was much occupied with certain other legislative matters.⁵⁸ Ghosh appealed to members of the Legislative Assembly to take up the issue of introduction of the Bill.⁵⁹ He felt that in view of the very large public health interests involved, it was a public scandal indeed to leave Indian pharmacy where it was.⁶⁰ He highlighted the salient features of his draft of the Pharmacy and Poisons Bill.⁶¹

Ghosh continued with his vigorous campaign for a Pharmacy and Poisons Act.⁶²⁻⁶⁴ He stated that without a systematic pharmaceutical education it was impossible either to produce the drugs of the quality required in order to be of therapeutic value, or to provide the desired machinery for enforcing legislative control of the sale, manufacture, analysis, and dispensing of drugs. He considered the idea of a British Imperial qualification in pharmacy, broached at the 1929 British Pharmaceutical Conference, as premature when in a country like India there was absence even of a legislation for the control of pharmacy.⁶⁵

The situation was deteriorating for want of control on drugs and pharmacy. With the adverse opinion expressed in the professional and commercial media and also in the daily newspapers, the Government of India stood compelled to initiate steps to appoint an expert committee to enquire into pharma-

ceutical affairs. Ghosh addressed communications to the Government of India on 4 and 19 August 1929, bringing to their notice several of the editorials and coverage on the subject in professional journals and newspapers.⁶⁶

Ultimately, the Government constituted a four-member Drugs Enquiry Committee in August 1930, with Lieut.-Col. Ram Nath Chopra, I.M.S., of the School of Tropical Medicine and Hygiene, Calcutta, as the chairman.⁶⁶ When there were certain critical press comments on the composition and terms of reference of the Committee, Ghosh rebutted such views and defended the Government's action.⁶⁷ The Committee submitted the Report in March 1931.^{68,69} Ghosh had responded to the questionnaire sent out by the Committee and given oral evidence at its sitting at Calcutta.⁷⁰

The Report on the whole was well received.⁶⁹ Ghosh also acclaimed it but had the apprehension that the recommendations would perhaps remain as pious wishes because of financial exigencies.^{71,72} He summarised the Report and examined the recommended administrative and financial measures.^{73,74}

Many years passed but the Report of the Drugs Enquiry Committee received no action on it by the Government of India.⁷⁵ On pressure from the medical profession and educated public, the Government came up with a half-hearted measure and introduced Import of Drugs Bill in the Indian Legislative Assembly in October 1937. This piecemeal approach was not welcome and the Bill was ultimately withdrawn. Ghosh was one who also reacted to the move for a legislation to regulate the import of drugs and medicines only. He impressed on the need for comprehensive central legislation for control of drugs and pharmacy, as a combined act or two separate acts.⁷⁶⁻⁸¹ For the control of pharmacy profession, Ghosh continued to be in favour of setting up an organisation in India on the lines of the Pharmaceutical Society of Great Britain, with similar powers and functions.^{45,57,61,76-78}

In February 1940, the Government of India introduced a comprehensive Drugs Bill in Legislative Assembly to regulate the import, manufacture, distribution and sale of drugs.⁷⁵ The legislative process was completed fast and by the year end the Drugs Act became a reality. Ghosh who had been advocating the requirement of the statutes for over two decades had a feeling of satisfaction but viewed that the control over drugs and pharmacy would be incom-

plete without a Pharmacy Act.⁸² He suggested that steps should be taken to draft a central Pharmacy Bill,⁸³ taking advantage of a draft which had been prepared by the College of Pharmacy Committee of the Government of Bengal.⁸⁴ Ghosh had submitted a special memorandum for consideration of the committee.⁸⁵

PROFESSIONAL STATUS AND IMPACT OF HIS CONTRIBUTIONS

To appreciate the contributions Ghosh made, we are to adjust our thinking to the times he lived and carried out almost a solo struggle. In his professional career he was a late starter; he was forty-two when he graduated from the Manchester University (1912). His ideas began taking shape during his studentship in England and the period he worked at the Medical Stores Department, Madras. He started writing, on different topics. The pamphlet, *Indigenous Drugs of India* (1918)¹² he published from Madras created a deep impact and attracted much attention of the media. He got to be looked upon as a professional with vision and maturity of thought.

Though patronized by the elite of Calcutta, his venturesome founding of the School of Chemical Technology did not meet with sufficient success for the lack of financial support. Ghosh's satisfaction was that by using the School for his professional identification he could carry out his crusade and spreading of awareness for the needed pharmaceutical and related developments. His views were looked upon with deserving deference in the editorials of professional journals.

The period 1918-28 in particular may be largely considered to be the Ghosh's decade of spearheading the cause of pharmacy and pharmaceutical developments. In a London periodical it was stated:

'Mr Ghosh is well known to the readers of this journal and to pharmacists in India, as the Principal of the Calcutta School of Chemical Technology, and as a man who has devoted considerable time, thought and energy to the ideal of furthering the status and interests of pharmacy in his own country.⁸⁶

Again, it was recorded,

'Mr Ghosh has a vision of hundreds of young men and women providing urban and rural areas with trained pharmacists and with qualified and practical chemists able to co-operate in medical and other scientific work. He sees India brought into line with the other great countries of the world as regards pharmaceutical education.⁴⁶

In the governmental circles Ghosh must have been considered to be professional of sufficient standing and merit that his name figured, when in 1929 the Government of India was determining the composition of the Drugs Enquiry Committee.^{66,87} In the initial four-member list placed in the file Lieut.-Col. R. N. Chopra (chairman) and Father J. P. Caius (Pharmacologist at the Haffkine Institute, Bombay) were named, and the third member was to be a representative from a firm of repute, who later got to be H. Cooper of the Smith Stanistreet & Co. The fourth member on the list was 'J. C. Ghosh, School of Chemical Technology, Calcutta.' In the final list Ghosh was replaced by Maulvi Abdul Matin Chaudhury, M.L.A.

The doggedness and perseverance with which Ghosh promoted the cause of pharmacy was noted in an editorial of the *Pharmaceutical Journal* (1930) wherein it was expressed, 'For some years past Mr. J. C. Ghosh, of the Calcutta School of Chemical Technology, has been carrying on an almost single-handed propaganda for the regulation in India of the by laws of pharmaceutical education, training, qualification and practice. This work is now being followed up by the Pharmaceutical Society of India.....'⁸⁸

It may be recalled that Ghosh had been in favour of regulation of the pharmacy profession through an organisation in India established on the lines of the Pharmaceutical Society of Great Britain. For the suggested body with statutory powers, in early 1938 he used the name Indian Pharmaceutical Association.⁷⁶ This was before the Bengal Pharmaceutical Association resolved in July 1938 to explore the possibility of forming an All-India professional forum under the same name.⁸⁹ The Indian Pharmaceutical Association as we know today has been the result of the renaming of the United Provinces' Pharmaceutical Association in December 1939.⁹⁰ The credit for first use of the name Indian Pharmaceutical Association goes to Ghosh.

Ghosh summed up his work and views in his updated books, *Indigenous Drugs of India* (1940)⁴ and *Technical Education* (1943).⁹ Subsequently, there seems to have been no publication under his name.

How sad it is that Ghosh quickly faded away from the memory of the profession. I enquired about him from several seniors but everyone expressed ignorance and had not even heard of his name. Jyotish Chandra Ghosh passed

away in 1957 at a ripe old age of 87 years,⁹¹ as the forgotten and unsung pioneer of pharmacy.

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I am grateful to the Indian National Science Academy for supporting my research on history of pharmaceutical developments. My thanks are due to Mr S. N. Mukherjee for establishing contacts with descendants of Jyotish Chandra Ghosh.

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D. R. KAPREKAR - A BIRTH CENTENARY TRIBUTE (1905-1986)

D. R. Kaprekar was an internationally famous Indian mathematician whose discoveries regarding patterns, properties, and theory of numbers are wellknown. His contributions are very popular especially among the lovers of recreational mathematics. The number 6174 is now universally called 'Kaprekar Constant' for its unique property (see below) discovered by him. He was so absorbed and devoted in constantly investigating numbers in various ways that he is rightly called *ankamitra* ("friend of numbers"). He will continue to be remembered for his inspriing role in the history and education of mathematics during the last century.

Dattatraya Ramchandra Kaprekar was born on January 17, 1905 at a place called Dahanu which is in Maharashtra (about 70 miles away from Mumbai). He was the youngest child of his parents (Ramchandra and Janakibai). As a student at the Fergusson College, Pune, D. R. Kaprekar won the Paranjape Prize in 1927 for his essay on theory of envelopes. He got the B.Sc. degree (Bombay Univ.) in 1929, and also obtained the School Training Certificate soon. He taught science and mathematics (and even Sanskrit) and served various schools in Devlali from 1930 onwards. On his retirement in 1962, he was given a monthly grant of Rs. 500, for 5 years by the U.G.C. for utilization of his talented service. In 1966, his wife (whom he married in 1932) died issueless. He found consolation in devoting his time in researches in recreational theory of numbers.



D. R. Kaprekar
(1905-1986)

D. R. Kaprekar started noting peculiar patterns in numbers even at the age of 14 e.g. he observed that 18^3 is 5832 where $5+8+3+2 = 18$ (a sacred Hindu number). He also began investigations of his famous *Demlo numbers* in

Kaprekar's discovery (made in 1946) of the peculiar special number **6174** made him world famous. He found that this number is always the final result when the 'Reverse Subtraction Process' is applied to any number of four digits (not all alike). For example, take the number $N = 6354$.

Arrange the digits of N in descending order; we get 6543. Reverse the digits, thereby getting 3456 and subtract it from the above. We get

$$6543 - 3456 = 3087 (=N_1, \text{ say})$$

We repeat the same process on N_1 thereby getting

$$8730 - 0378 = 8352$$

Similar process on 8352 etc. yields

$$8532 - 2358 = \mathbf{6174}$$

Then $7641 - 1467 = \mathbf{6174}$ (same as above).

Kaprekar discovered that the above process always finally ends in the constant 6174 which is rightly called, Kaprekar's constant. It is recognized internationally.

Kaprekar defined and investigated many type of special numbers such as *Dattatreya numbers*, *Demlo numbers*, *Harshad numbers*, *Junction numbers*, *Monkey numbers*, *Self numbers*, *Vijaya numbers*, etc. He also gave marvellous and advanced solutions of some classical mathematical problems. For instance consider the Tary-Escot problem which seeks to find two sets of positive integers $(a_1, a_2, a_3, \dots, a_r)$ and $(b_1, b_2, b_3, \dots, b_r)$

Such that

$$a_1^k + a_2^k + a_3^k + \dots + a_r^k = b_1^k + b_2^k + b_3^k + \dots + b_r^k$$

for $k = 0, 1, 2, \dots, n$, where n is usually greater than 2. An example from Kaprekar is

$$4^k + 20^k + 42^k + 3^k + 41^k + 25^k = 5^k + 21^k + 43^k + 2^k + 40^k + 24^k \text{ for } k = 0, 1, 2, 3.$$

The significant point here is that the digits on the right-hand side are arranged in the reverse order of digits on the left-hand side. He gave many examples of longer sets and of higher degree (e.g., $r = 24$ and k upto 5).

The significant point here is that the digits on the right-hand side are arranged in the reverse order of digits on the left-hand side. He gave many examples of longer sets and of higher degree (e.g., $r = 24$ and k upto 5).

To give even a brief description of the various mathematical (recreational as well as of other type) researches of Kaprekar will require longer study and write-up. The purpose in the short note here is to remember him and briefly mention a glimpse of some of his work and achievements. For interested reader a small bibliography of his works and a selection of studies on him is appended below.

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