

RAJNATH

(1904–1972)

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BIRTH AND PARENTAGE

RAJNATH was born on August 8, 1904 in a middle class family. He was the third of six children of his parents—Dr Ayodhya Prasad and Smt Premvati Devi—who were religious and god-fearing. The father was a physician, devoted to his profession with a missionary zeal and to the service of suffering humanity without any consideration of material gain. His spirit of dedication left an indelible imprint on the mind of the impressionable young son. In his fourteenth year, Rajnath lost his father; but his mother, with the help of an elder brother, brought him up with great care. An orthodox housewife, she also took interest in the welfare of those associated with the family. She had the good fortune to see her talented son become a well-known geologist.

EDUCATION

Young Rajnath had his early schooling, up to the Upper Middle stage (Class VIII), at Mandawa under the local guardianship of Thakur Inder Singh. He passed the Matriculation examination of the U.P. Board in 1920 as a student of Nanak Chand Anglo-Sanskrit High School at Meerut. Soon after, the family shifted to Nagina. This posed the problem of Rajnath's higher education in a college. The choice fell upon the then new Banaras Hindu University whose founder was Pandit Madan Mohan Malaviya. In July 1920, Rajnath entered this national institution and passed the I.Sc. examination in 1923. Two years later, he took the Bachelor's degree with Botany, Geology and Chemistry.

Dr L. Dudley Stamp, a geographer of world-fame and then Professor and Head of the Department of Geography and Geology in the University of Rangoon, Burma, happened to visit the B.H.U. He was much impressed by the simple and unassuming young Rajnath and offered him a position in Geology at the University of Rangoon with the facility of doing his M.Sc. there. It was indeed a timely offer which could substantially ease the burden on Rajnath's family resources. But in deference to the wish of Rajnath's mother and elder brother, the offer was declined and Rajnath continued in B.H.U. and obtained his M.Sc. degree in Geology there in 1927.





Ramath

As a post-graduate student at Varanasi, Rajnath availed himself of the benevolent care and guidance of Professor Krishna Kumar Mathur, a Foundation Fellow of the Indian National Science Academy, and a pioneer in Geology in India. Professor Mathur was a *guru* and *acharya* in the true sense of these terms and Rajnath, throughout his life, dedicated himself to the sacred duty of becoming his true disciple. The ties between the *guru* and the pupil grew stronger with the passage of time.

Impressed by his diligence, devotion to studies, keen observation in the field and aptitude for research, and with a view to strengthening the Department in various sub-disciplines of Geology, Professor Mathur, himself a petrologist, advised Rajnath to specialize in Palaeontology. Accordingly, in the summer months, following his M.Sc. examination, Rajnath began detailed field investigations on the Jurassics of "Western Kutch." Early in 1928, Rajnath sailed from Bombay and in February that year he joined the Imperial College of Science and Technology, London, for training under the well-known British Palaeontologist, Dr A. Morley Davies, and Professor W. W. Watts, a renowned Professor of Geology. Both these teachers were highly impressed by the diligence and dedication of their Indian pupil, his methodical and meticulous work, and his excellent fossil collection.

Two years later, he obtained the Ph.D. degree of the University of London as well as the Diploma of the Imperial College (D. I. C.) on his thesis, "Palaeontology and Stratigraphy of part of Cutch State," which was based only on a portion of his research material. Dr Rajnath had made a significant contribution to the geology of this region of India.

PROFESSIONAL CAREER

While in London, Dr Rajnath had planned to continue his research work further, but events in India took a sudden turn. Professor Mathur contracted a rare blood disease. The fast deteriorating health of his revered teacher compelled Dr Rajnath to return to India to join the staff of the Department of Geology of his *Alma Mater*. He was appointed Assistant Professor of Geology in the leave vacancy of Professor Mathur in September, 1930.

Simultaneously, India was in political turmoil. Malaviyaji was imprisoned. The University was in crisis and there was the threat of stoppage of government aid. Professor Mathur cancelled his leave. Consequently, Dr Rajnath agreed to serve the University without salary for several months until he was appointed Assistant Professor of Palaeontology in July, 1931.

Five years later, in July 1936, Professor Mathur died prematurely and the responsibility of administering the Department fell on the young shoulders of Rajnath who nursed the Department of Geology as its Head for over three decades. During this long period, Dr Rajnath gradually rose to the rank of University Professor of Geology and Geography. He also occupied the Chair of the Principal of the College of Science from May 1, 1960 till his retirement in June, 1967. After retirement, he worked under the University Grants Commission scheme of retired teachers from March, 1968 to December, 1970. He continued



to visit the Department now and then and hold discussions with the research team working on the Jurassics of Kutch.

During his tenure in B.H.U., he taught Geology for a few years (in the summers of 1930s) to the engineering students of the erstwhile Thomson Engineering College, which later grew into the present University of Roorkee. Again, in the summer of 1951, he accepted a similar assignment at the request of that University with the assistance of the present author. Industrialists, engineers and geologists (including his own students) had frequent and free consultations with him on their problems and took advantage of his experience and expertise.

Dr Rajnath was an illustrious alumnus of the Banaras Hindu University which he served for nearly thirty-six years with selfless devotion, sustained hard work, exemplary zeal and ability in various capacities. Inspired by Malaviyaji, by Professor Syama Charan De (who with self-abnegation served successively as Head of the Department of Mathematics, Principal of Central Hindu College, Registrar and Pro-Vice-Chancellor), and by his own talented *guru*, Professor Mathur, Dr Rajnath remained attached to this great institution throughout his career. Lucrative offers carrying attractive emoluments from industry came his way, but could not move him away from University teaching and research.

A GEOLOGIST

Professor Rajnath always impressed on his students that Geology was essentially a field science and that field investigations were as essential as, at times even more important than, laboratory studies : *“One cannot know well the geology of a country (region), howsoever small it be, if one has not lived there for long time; one must sleep, dream and even suffer the vicissitudes of the weather on the rocks which one wishes to study.”* (J. Marcou, translated by the present author).

Collection and organization of field data are of fundamental importance for the study of earth-history. Geological theories can only be verified, sifted and tested by evidence supplied by the rocks themselves exposed in the field. Professor Rajnath, therefore, stressed that one should work in the field with an unbiased mind, and should record the observations truthfully; for the natural facts are unchangeable even though the readers may interpret them differently.

He followed and emphasized the excellent geological counsel, *“Go and See !”* Even in Kutch, where he had worked extensively, he never allowed the present writer and Brahma Swarup Tewari (later Professor and Director, Centre of Advanced Study in Geology, Panjab University, Chandigarh), to take for granted what he told them. Any explanation or conjecture put forth by him in advance (from a distance) was invariably followed by the directive : *“Let’s go and see !”* One day both these students were very much tired on account of long hours of work under scorching heat and heavy load of specimens, when the Professor referred to the occurrence of a particular bed at the top of a hili. Structurally there was hardly any scope for doubt but still he wished them to climb up the steep slope (which they reluctantly did despite hunger and fatigue) to ascertain the bed number in the sequence. On such occasions of weariness and despondency, Professor Rajnath recalled the *guru-mantra* he had learnt from Professor Mathur:



“*Walking another mile would not kill us.*” These words, indeed, toned up the sagging spirit and infused a new vigour and strength in us.

Further, citing anomalies in the stratigraphic conclusions and biozones of two famous British palaeontologists, he advised his students to personally examine and measure the geological sections and collect fossils for constructing bio-stratigraphy of a region. One should not merely work out the collections made by others and make deductions on their basis with preconceived notions. For, in such cases, both systematic identification and stratigraphic interpretation could often turn out to be erroneous. Also, there was the likelihood that one might establish a zone with thickness less than the size of the fossils contained therein.

Professor Rajnath emphasized that in Geology the inferences should be based on regional study rather than on studies in limited area(s). After having personally surveyed the important and major sections (exposures) of “Chari Series,” the present author came to certain conclusions by the late fifties and wished to put them in writing. Although Professor Rajnath agreed with them on the basis of his own experience of the entire “Western” Kutch, he suggested to defer publication till the completion of a detailed study of the remaining exposures. It would perhaps be appropriate to mention here that basalt, in the first instance, was considered by Abraham Gottlob Werner and his followers to be a chemical precipitate from a universal ocean on the basis of its occurrence in the Scheibenberg in Erzgebirge. But subsequently Wernerism, when subjected to the “critical test” of extensive field-observations in other parts of Germany, Italy and France, etc., failed and this rock was accepted to be a volcanic product.

Even as a boy, Rajnath had “a flair” for collecting uncommon stones and rocks. While in the field, Dr Rajnath was a keen observer and had a quick eye for finding fossils. He was familiar with a variety of geological terrains of the Indian subcontinent. He had geologically mapped, all alone, the vast exposures of the Jurassics of Kutch Mainland, under very trying conditions, during the period from May to November. On the basis of personal experience in two field trips with him at an interval of several years, it may be said unhesitatingly that he was accommodating, an inspiring guide, untiring and adaptable under all circumstances and an exemplary field geologist. Dr L. F. Spath, F. R. S., of the British Museum (Natural History) acknowledged him as a “*very able geologist and palaeontologist..... (with) great experience in mapping.*”

Dr Rajnath had a keen interest in research and made a mark in his field at a very young age. However, misfortune hit him hard at the very outset of his research career in 1927. The fossil collection he had made during his extensive field work in Kutch was displayed at the Royal Palace in Bhuj in deference to the wish of Maharao Shree Kengarji. This was done with simple-hearted and unsuspecting enthusiasm by the young seeker after truth who had spared no pains to amass that “wealth” from the “treasure” of Jurassic sediments within the “territory of a ruling prince.”

Unfortunately, at the instigation of Mr John Hubert Smith, who was Director of Education in the erstwhile Kutch state besides being a tutor to the then Yuvaraj



Shree Vijayrajji, the Maharao Shree banned the movement of the fossil collection out of Kutch. But, to the good luck of Rajnath, the Yuvaraj Shree pleaded with his father that at least the benefit of studying those stones be given to their collector (RN) who had assiduously worked for many months to collect them. Additionally, a telegraphic request from Pandit Madan Mohan Malaviya, the then Vice-Chancellor of Banaras Hindu University, who was highly respected by the Indian princes, had its effect on Maharao Shree. And at last permission was accorded to take out of the territory of Kutch the stones which were to serve as the foundation for a future palaeontologist.

Another disappointment was there in London. For his doctoral thesis, Rajnath had meant to work on the ammonoids, with the object of "establishing a detailed succession of the Jurassic rocks of Kutch, to develop a local detailed faunal time-scale, and also to find out how far the field evidences in India would support the hemerae of Buckman." But his magnificent ammonite collection did not escape the covetous eye of the ammonitologist of the British Museum (Natural History), Dr Spath, who was more or less at the same time entrusted by the Geological Survey of India with the much needed revision of the cephalopod fauna of Kutch. Through Dr Morley Davies he requested for a loan of fossils and got more than 1500 specimens in addition to freely consulting the notes, maps and field observations which Rajnath had made so painstakingly and with such meticulous care. Rajnath had no option but to surrender them and with much disappointment had to remain content with working only on the brachiopods for his Ph.D. thesis. The incident was unforgettable and when a quarter of a century later a similar story was repeated with one of his students in London, Dr Rajnath wrote to him : "*I thought Palaeontology had taken enough sacrifice from me but probably it needs more.*"

The episode did not end with the loan of specimens. On his return from Britain, Dr Rajnath wished to publish his conclusions at an early date. A paper was presented before the Geological, Mining and Metallurgical Society of India. But certain officers of the Geological Survey of India, which was manned largely by the British, desired its publication to be withheld, in view of the pending appearance of the concluding part of Dr Spath's Memoir. However, through the kind intervention of Mr D. N. Wadia (later National Professor of Geology) who was then connected with the publication of official memoirs, Dr Rajnath's paper could see the light of the day earlier than the appearance of the British palaeontologist's memoir.

These episodes, particularly the one that took place in London, considerably shocked Dr Rajnath. Sad memories always loomed large over his mind whenever there was talk of research or Kutch Geology. But he never completely lost interest; and though in the later part of his career, he was forced to spend much of his time in administration, he contributed a good deal on research side. Nor was this in Palaeontology and Stratigraphy alone: from the bibliography at the end, and doctorate theses supervised by him it will be found that his studies were spread over other sub-disciplines such as Structural Geology, Petrology, Economic Geology (including industrial aspects), Engineering Geology and Hydrogeology.



CONTRIBUTIONS

To begin with, Rajnath's work on the Jurassic rocks of Kutch is a very notable contribution to the geology of India. It has been highly valued by accredited authorities on the subject. "His research work," in the words of Dr A. Morley Davies, "has shown great industry, accuracy and originality." It also won him international repute besides honours in his own country.

In addition to mapping the Jurassics of the "Western Kutch" on 1 inch to a mile scale with "conspicuous energy and skill" (Professor Watts), Dr Rajnath worked out in detail the stratigraphy of the "Chari Series" of the classic Jumara dome whence an ammonoid collection had been earlier made by Professor J. F. Blake and worked out by Dr Spath. On the basis of his find of a specimen referable to the Palaeozoic genus *Streptorhynchus* King in Jumara Bed No. 22, Rajnath thought of the "possible extension of the Product beds of the Salt Range to some parts of Kutch." Lately, some geologists of the Oil & Natural Gas Commission have felt that the existence of pre-Bathonian sediments in the western part of Kutch basin and in the off-shore region cannot be ruled out.

In his classification of the Kutch Jura, Dr Rajnath introduced important modifications in the upper part of the succession : (i) he used the term Umia Series in a restricted sense for Lower Umia of Waagen; (ii) he applied the name "Bhuj Series" to the plant-bearing beds, i.e., Upper Umia Group of Waagen including the *Zamia* beds (= Upper series of Wynne); and (iii) he regarded the Aptian beds of Ukra hill containing "*Australiceras*" to be older than the Bhuj Series on the basis of structural evidence. These changes have been confirmed by subsequent geological work by Burmah Oil Company and have been adopted by Dr W. J. Arkell in his standard reference book on the Jurassic Geology of the World.

Umia Series (*s. str.*) has been divided by Dr Rajnath into five divisions (in ascending order) : (a) Barren sandstones and shales, (b) the three Green Oolitic beds (= the Basal Umia Ammonite bed of Dr Spath) which have yielded Tithonian ammonites, (c) Barren sandstones, (d) *Trigonia* beds, and (e) Barren rocks. The Green Oolitic beds to the east of Mundhan (in the extreme northwest of Kutch Mainland) yielded to him a solitary individual of *Stylina*, which extended the range of corals in Kutch upwards into the Tithonian. The Bhuj Series consisting of at least three horizons, *viz.*, *Zamia* beds at the bottom, *Ptilophyllum* beds in the middle and *Palmoxydon* beds at the top, has been assigned to post-Aptian age—not older than Middle Cretaceous, and possibly, slightly younger. In other words, according to Dr Rajnath, the upper age limit of the "Gondwana System" is probably Middle Cretaceous.

He postulated the existence of "Pleistocene beds in the form of at least two big anticlines beneath the Indo-Gangetic alluvium," which run parallel to, and south of, the Himalaya. The finds of *Stegodon* teeth, one specimen each at Prahladpur (about 95km downstream of the river Ganga from Varanasi) and near Agricultural Institute at Naini (Allahabad) have lent support to his view.

Disagreeing with several geologists, Dr Rajnath ascribed an inorganic origin to the conical ring structures found in Fawn Limestone in the district of Mirzapur



(U.P.) and related them to the sink-holes formed earlier than the dolomitization and silicification of the rock.

His detailed investigations on Panjal volcanics, particularly in the vicinity of Srinagar, confirmed Professor Mathur's discovery of acid-differentiation products in them which, additionally, "are not quantitatively so unimportant" as believed by certain geologists.

Apart from his devotion to academic problems, particularly in the field of his specialization, Dr Rajnath was conscious of a geologist's role and obligation in the development of the national resources and the good of mankind. He used to say : "*Nature is bountiful but not limitless.*" He, therefore, stressed proper utilization and conservation of India's natural resources. He was always deeply moved by human sufferings on account of imbalance in hydrological cycle. He was a shocked witness to the havoc caused by the severe floods of 1938, 1948 and 1967 in northern India. He could not be a silent spectator and, in fact, deeply meditated on these problems from a geologist's point of view.

As a measure against floods in the major north Indian rivers Dr Rajnath suggested a Trans-Deccan Canal, a waterway joining the Bay of Bengal with Gulf of Kutch. This, he felt, would not only serve as an exit for the waters of rivers in spate at suitable places but also be advantageous in several other respects, such as cheaper transport and navigation, etc. Such seaways with big inland encroachment do exist in other countries. Moreover, its cost would be negligible compared with the periodic losses of crop, property and life, both human and animal. Among other remedial measures for floods, suggested by him, are : (i) construction of a network of small reservoirs to serve for greater percolation of water underground and for arresting additional discharge; and (ii) proper planning and management of our forest resources, the process of deforestation and afforestation.

To face drought, he stressed upon following the age-old maxim of hydrology : "*water lost should be water gained.*" Dr Rajnath, therefore, suggested extensive "water spreading" over the areas where underground water was heavily tapped.

In preference to canals dependent on water of the rivers, he recommended construction of tubewells on a large scale through which the subsurface water at shallow depths as well as in deep aquifer zones could be tapped to meet increasing demand for irrigation. This, he felt, should be done after proper geological investigations in regard to capacity and extent of productive aquifers, and the nature of overlying strata. The spacing of tubewells should be well planned *vis-à-vis* the sites of productive agricultural fields, power, etc. Alternatively, for the areas not having rich resources of underground water or those not far from the source of supply, he suggested a combination of the two methods, i.e., "a canal dependent on water either pumped from such areas where the underground resources of water are in plenty or pumped from... a river with a water level much below that ground level."

During a survey of the erstwhile Bilaspur state (presently, in Himachal Pradesh), Dr Rajnath discovered white sandstone of Krol Formation to be "a useful material for the manufacture of glass." Moreover, the galena associated with that parent rock was found to contain "about one ounce" of silver in one "long ton of the ore." Further, he worked out for the first time the geology of the occurrence of



“*Shilajit*,” a well-known ayurvedic tonic drug which has been in use in India from times immemorial, in Krol Limestone, Nahar Sandstone and Recent Conglomerate.

The paper on the “Iron pyrites deposits near Simla” created a stir among the officers of the Geological Survey of India at the 28th Indian Science Congress held at Varanasi since he had estimated (in that paper) the possibility of “large reserves” of ore. This enabled the entrepreneurs to manufacture sulphuric acid in India at a time when import of sulphur from foreign countries was cut off.

Professor Rajnath felt that Indian *Jari* industry could capture the international market by cheaper manufacture. This was possible only if ruby-dies were available at low cost. To achieve this objective, he suggested manufacture of synthetic rubies as the country had the raw materials for the purpose. Also, over a decade ago he envisaged the necessity of starting a factory for the manufacture of artificial gems which play a significant role in a large number of civil and defence industries.

A TEACHER

Dr Rajnath’s potentialities for being a teacher had been appreciated by his seniors right at the beginning of his career. His being summoned back to Varanasi from London by Professor Mathur, when the latter was to go abroad on long leave for his treatment, was itself a testimony to the fact. Professor W. W. Watts, F.R.S., said : “. . . . (he) *has not only great and unusual ability for original research work but has also the knowledge, talent and resources of an excellent teacher.*”

Dr Rajnath was a man of high principles and he adhered to them steadfastly. The author had the opportunity of appreciating them during the first two years of his entrance into the teaching profession and even more so when he assisted him in the teaching assignment at the University of Roorkee in the summer vacation of 1951. Professor Rajnath impressed on his young colleagues the foremost imperative : thorough preparation of the topic of a lecture in advance. While arranging the subject matter, his advice was, one should bear in mind the mental level of the students concerned. In addition, the expression should be so lucid that the audience may grasp and retain it felicitously. Besides, the emphasis should first be on the elements, followed in the natural course by greater details. The simplicity of these injunctions as well as their effectiveness was of great significance. Surely, the success of a teacher depends on them.

Geological pursuits are both academic and practical. One studies, on the one hand, the origin of the earth as well as the structure of its interior, work of natural agents such as lakes, rivers, sea, etc. in the open terrain, the causes of earthquakes, the volcanism, and so on. One cannot afford to ignore, on the other hand, the useful (economic) deposits associated with sediments or caused by volcanic activity, and also the protective/precautionary measures against devastation by quakes. Mere discovery of new groups of microfossils is not exclusively the open sesame to locating stratigraphical traps for oil. Their time-range, distribution and ecological features are also to be studied. For service of mankind, the mutual suspicion between the advocates of “academic” and “commercial” frontiers should



give way to understanding and co-operation. The former must increase their utilitarian (applied) activities whereas the latter must become more willing to acknowledge value and validities of ideas originating in cloistered halls. Accordingly, Professor Rajnath disregarded any distinction between the pure and the applied in the study of Geology. He maintained that Geology as a whole, besides being a natural science, was an applied science.

He believed in an overall grounding (of students) in the subject. Likewise, he desired his young colleagues to be associated with major sub-disciplines of Geology. He, too, whenever needed, taught branches other than Palaeontology and Stratigraphy. The present author had the opportunity of seeing Dr Rajnath's detailed notes on subjects such as Economic Geology including mineral prospecting, and Engineering Geology. He was thus a broad-based Geology teacher. His aforesaid principle of training, particularly at the post-graduate level, is even today of great advantage to young aspirants for wider job opportunities. While suggesting the area for the present author's thesis as part fulfilment of his M.Sc. examination, the Professor took care that it contained a variety of rock types and even a few economic minerals.

Professor Rajnath always felt that if in the teaching institutions we could produce really educated, resourceful and imaginative geologists, they would take care of the applications themselves. If we can only teach our students to use their brains, it is certain that they will apply them in whichever profession they may enter. With this goal in view, and in keeping with the ideals and traditions established by his *guru*, Professor Rajnath consolidated and intensified teaching and research in major branches of Geology. In addition, he laid emphasis on the applied aspects. This led to the introduction of courses in Engineering Geology, Hydrogeology, Ore-dressing, Geochemistry, Micro-palaeontology and Sedimentology at the post-graduate level in Banaras Hindu University; provision of teaching Elements of Mining and Surveying was already there. As usual, there was emphasis on field training in the curriculum of studies at all levels. Besides, instead of special paper(s) he preferred a dissertation (thesis) as part fulfilment of M.Sc examination so that the students were initiated into undertaking independent field and laboratory investigations, and thus could learn the art of "intelligent compilation" and presentation of data.

As a teacher, Professor Rajnath was a careful organiser of the minds which he helped to mould. He was very conscientious, dutiful and hard-working, qualities which he always tried to inculcate in his pupils and colleagues. Heavy and pressing demands on his time because of other official duties never led him to any short-cuts in teaching. Rather, he overworked himself to complete the prescribed course. He practically never enjoyed a vacation. He wanted strict observance of rules and discipline, but was also sympathetic, generous and considerate, almost to a fault, to his students. No wonder he was held in high esteem by his students and colleagues. Many a time he quietly helped students financially (by giving loans or gifts) in the hour of their need, without letting anybody know about it.

Professor Rajnath was singularly free from petty provincialism and parochialism. He felt upset and worried at parochial, regional and caste tendencies which occasionally surfaced in academic institutions like the Banaras Hindu University.



On the other hand, he encouraged and supported regional associations for developing a cosmopolitan culture through cultural exchanges and at the same time, advised students to develop an all-India character and spirit.

Professor Rajnath's role in the spread of geological education and industrial development of the country has been significant. Many of his pupils have successfully held and still occupy key positions in various teaching institutions, government organizations and other establishments, viz., Geological Survey of India, Atomic Energy Commission, Oil and Natural Gas Commission, Indian Bureau of Mines, Central Ground Water Board, Mineral Exploration Corporation, Wadia Institute of Himalayan Geology, etc. He himself served on a number of academic bodies of various institutions and helped them in planning, growth and development of their Geology Departments and in framing curriculum of studies.

AN ADMINISTRATOR

Professor Rajnath was an Argus-eyed administrator with a cool head and balanced judgement. He was modest and gentle, and so polite that his students and junior colleagues always received a warm welcome from him. Because of his sympathetic nature he could never be harsh. Often, one got the impression that he was reluctant to punish but it was his nature to be kind and compassionate. His intentions were never unfair even though it may not have been possible for him to please all. Two of his pupils, whom he loved much and are presently occupying high positions in two different Universities, could not be recommended for appointment in the Banaras Hindu University in the first instance. Naturally, they felt disappointed and even shocked. But it can be stated here on personal knowledge that both of them could not get in because of the principles on which the selection was made.

Official duties at Varanasi had top priority with Dr Rajnath : “ *I have always thought it my first duty to be at the disposal of University work by devoting maximum possible part of my time to it.*” He maintained secrecy in official business and never leaked out any confidential matter, not even by dropping hints. He emphasised an “all-round development of Geology” in the Department, encouraging his colleagues to specialize in different subdisciplines and new areas. He was never partial to his own branch. In his planning he always had in his mind the future interest of the budding members of the Department.

LOVE OF SERVICE AND SPREAD OF EDUCATION

The Departments of Glass (presently, in Ceramic Engineering), Geography, and Geophysics in the Banaras Hindu University owe their setting up and development to his ardent efforts. This again was done for the love of science and spread of education. These departments, initially part of the Department of Geology, became independent in 1939, 1946 and 1964 respectively. They have since attained their proud place among about a hundred departments of the Banaras Hindu University.



Dr Rajnath had the privilege of working under a galaxy of illustrious Vice-Chancellors of Banaras Hindu University such as the founder of the University himself, Mahamana Malaviyaji, Dr Sir S. Radhakrishnan (later President of India and Visitor of the University), Acharya Narendra Dev, Dr Sir C. P. Ramaswamy Iyer, etc. All of them appreciated unequivocally his simplicity, sincerity of purpose, devotion to duty and loyalty to the Institution. Professor Rajnath always had the larger interest of the University in his mind.

He served on the various bodies of the University, including the Executive Council, as an elected or *ex-officio* member. Whenever called for he expressed his views independently. He, however, avoided entering into controversies. Admittedly, he did not participate much in discussions at the meetings but followed the deliberations carefully. He was in the habit of studying the agenda and relevant papers well before the meetings. His timely interventions have occasionally turned the tables and set right unwise steps.

A HUMANIST

Dr Rajnath maintained that an individual is influenced by many people and bears the imprint of various personalities; but he builds his own character in the footsteps of his illustrious forbears. The first and foremost to influence and help him build his own character was his father. Though Rajnath lost him when he was quite young, his father's sincerity, honesty and modesty left a deep impression on the son, who ever remained conscious of his ideal that the blessings of poverty were far greater than the heady pleasures of ill-gotten wealth. Inspired by him and by his preceptors in the University, Professor Rajnath observed austerity, imbibed the spirit of public service, developed a high moral character, love for students and wide human sympathies for the poor and needy. His personal needs were few. He always preferred indigenous products. He avoided luxuries. Once one of his near relatives (in-laws) was eager to present him a car but he politely declined the offer. In this context, he very often used to say : *it is easy to own an elephant but difficult to feed it.*

During the summer vacations, while a University student, he organized volunteer corps to serve drinking water to thirsty travellers at Nagina (Paternal home town) railway station. This act was widely appreciated by the public, particularly because of inadequate arrangements for the supply of drinking water at the station in those days, though it was criticised as seditious and a slur on the prestige of the family by one of his cousins (a Rai Bahadur). Dr Rajnath used to donate liberally for a cause that appealed to him.

To sum up, Professor Rajnath was a pious and noble soul; a man of principles with progressive views, and he scrupulously followed the motto of plain living and high thinking. He was free from all forms of egotism. His modesty, politeness and gentlemanliness were exemplary. He was a thorough nationalist, and yearned for an organized effort towards rural reconstruction, particularly to meet the basic needs of the villagers.



HONOURS

In recognition of his scientific contributions, Dr Rajnath was elected, at a relatively young age, President of Geology Section of the Indian Science Congress. He delivered his scholarly address on "The Jurassic Rocks of Cutch—Their bearing on some problems of Indian Geology," at the 29th Session held at Baroda in January, 1942. He was elected Fellow of the National Institute of Sciences of India (presently, Indian National Science Academy) in 1943.

In 1949, he went to Nepal as a Member of the Goodwill and Scientific Mission led by Professor Satyen Bose, an eminent Indian physicist. Professor Rajnath was Founder Vice-President of Palaeontological Society of India, and Fellow/Member of several other learned bodies such as Mining, Geological and Metallurgical Institute of India and National Academy of Sciences of India, etc. Furthermore, he was associated with the Editorial Board of the *Journal of Ayurveda*, New Delhi.

FAMILY

Dr Rajnath was married to Daya Rani, who was not unfortunately destined to live and give him her company for more than two years. She left behind her an infant daughter, Indu by name. Later, in 1937, Dr Rajnath married Chandrakala Devi, who bore him a daughter, Manju, and two sons—Pratap Mohan and Chandra Mohan. The elder son is with Messrs General Electric, Louisville (Kentucky, U.S.). The elder daughter is married to Shri Yogendra Pal Singh Bishnoi, Deputy Chief Engineer (Design), Bokaro Steel Plant, and the second one to Shri Krishna Singh, currently Commissioner Income-Tax (Admn.), New Delhi.

LAST DAYS

Dr Rajnath was slenderly built in his youth. He gained obesity with age, which was, however, misleading. He excelled many a young man in stamina and endurance. He had all along been putting in very long hours of strenuous work. As he was habituated to a busy routine, his health was rendered weak after retirement. During the last two and a half months of his life Professor Rajnath did not keep good health. He suffered from pneumonia, pleurisy, etc., and passed away around 09.30 hours on Sunday, August 6, 1972.

He is survived by his wife, two daughters and two sons.

S. K. AGRAWAL

BIBLIOGRAPHY

1932. Terminology of some types of folding in Brachiopods. *Q. Jl. geol. Min. metal. Soc. India*, III, 189-192, Pt. XIII.
 — A contribution to the stratigraphy of Cutch. *Q. Jl. geol. Min. metal. Soc. India*, IV, 161-174, Pt. XII.



1934. Detailed stratigraphy of the Jumara area, Cutch. (*Abstr.*) *Proc. 21st Indian Sci. Congr.*, Pt. III, 346.
- Revision of the Jurassic Brachiopod fauna of Cutch. (*Abstr.*) *Proc. 21st Indian Sci. Congr.*, Pt. III, 351.
 - (With MISRA, M. L.) Palaeontological study of Nummulites from the Laki Dome and the hills near Bagatora, Sind. (*Abstr.*) *Proc. 21st Indian Sci. Congr.*, Pt. III, 350.
 - (With CHIPLONKAR, G. W.) Rhynchonellids from the Bagh beds near Cheerakhan, Gwalior State. (*Abstr.*) *Proc. 21st Indian Sci. Congr.*, Pt. III, 350.
 - (With CHIPLONKAR, G. W.) Palaeontological study of gastropods from the Laki Dome and the hills near Bagatora, Sind. (*Abstr.*) *Proc. 21st Indian Sci. Congr.*, Pt. III, 351.
1937. (With CHIPLONKAR, G. W.) Palaeontological study of Gastropods from Laki and Bagatora, Sind. *Proc. Indian Aca. Sci.*, VI(4), 232–250. Pl. XVI.
1938. Palaeontological study of Belemnites from the Jurassic rocks of Kutch. (*Abstr.*) *Proc. 25th Indian Sci. Congr.*, Pt. III, 115.
- Corals from the Jurassic rocks of Cutch. (*Abstr.*) *Proc. 25th Indian Sci. Congr.*, Pt. III, 115.
 - (With NAIETHANI, M. P.) Palaeontological study of gastropods from the Cretaceous beds of Trichinopoly. (*Abstr.*) *Proc. 25th Indian Sci. Congr.*, Pt. III, 116.
1939. (With GANJOO, P. N.) Study of the Panjal Traps in the neighbourhood of Srinagar, Kashmir. (*Abstr.*) *Proc. 26th Indian. Sci. Congr.*, Pt. III, 105.
1941. (With PRASAD, BRIJESHWAR) A note on the occurrence of *Shilajeet*. (*Abstr.*) *Proc. 28th Indian Sci. Congr.*, Pt. III, 141.
- (With MITHAL, R. S.) A study of touchstones. (*Abstr.*) *Proc. 28th Indian Sci. Congr.*, Pt. III, 141.
 - (With MITHAL, R. S.) Iron pyrites deposits near Simla. (*Abstr.*) *Proc. 28th Indian Sci. Congr.*, Pt. III, 141.
 - (With YADAVA, M. B.) A source of glass sand in Bilaspur state (Punjab). (*Abstr.*) *Proc. 28th Indian Sci. Congr.*, Pt. III, 141.
 - Coal from Bilaspur State. (*Abstr.*) *Proc. 28th Indian Sci. Congr.*, Pt. III, 141.
1942. The Jurassic Rocks of Cutch—Their bearing on some problems of Indian Geology. (*Pres. Addr., Geol. Sec.*) *Proc. 29th Indian Sci. Congr.*, Pt. II, 93–106, 1 table.
- (With PRASAD, BRIJESHWAR) Clay from Bilaspur State, (Punjab). (*Abstr.*) *Proc. 29th Indian Sci. Congr.*, Pt. III, 125.
 - (With PRASAD, BRIJESHWAR) Galena from Bilaspur State, (Punjab). (*Abstr.*) *Proc. 29th Indian Sci. Congr.*, Pt. III, 125.
 - (With PRASAD, BRIJESHWAR) Economic study of Krol white sandstone. (*Abstr.*) *Proc. 29th Indian Sci. Congr.*, Pt. III, 125.
1950. (With MERH, S.) Drilling fine holes in rubies. *Shiksha* (Jan. issue), 182–191.
- (With MERH, S.) Drilling fine holes in hard stones. *Shiksha* (October issue), 177–189.
1952. On the upper limit of the Gondwana System. *The Palaeobotanist*, 1 (*Birbal Sahni Memorial Volume*), 382–385.
1960. *Ateenutan Yuga*. *Hindi Vishwa Kosh* (Hindi Encyclopaedia), 1, 92.
- *Avar Pravaladi Yuga*. *Ibid*, 269.
1962. *Carbonprad Tantra aur Yuga*. *Hindi Vishwa Kosh* (Hindi Encyclopaedia), 2, 475–476.
1963. (With SINGH, R. M.) A note on the structures of the Fawn limestone of Salkhan Hills, Mirzapur Dist., U.P., India. *J. Sci. Res. B.H.U.*, XIV(1), 84–85.
1965. (With SINGH, R. M.) The Fawn Limestone of Salkhan Hills, Mirzapur. *Dr D. N. Wadia Comm. Volume Min. geol. metal. Inst. India*, 500–508.
1966. (With YADAWA, B. R.) A note on the origin of white spots in red sandstone. *J. Sci. Res. B.H.U.*, XVII(1), 44–45.
1967. (With YADAWA, B. R.) Gems and Gem Stones—Their varied uses in life and in industries. *Prajna*, XII(2), 226–239 (also in *Miner. Wealth*), II, No. 4, 8pp).
- (With YADAWA, B. R.) Geology of the area near and east of Kapleshwar (Dists. Nainital and Almora, U.P.) *J. Sci. Res. B. H. U.*, XVII(2), 245–260. 2 pls.
 - Fossil ya Jeewashm Vigyan. *Hindi Vishwa Kosh* (Hindi Encyclopaedia), 8, 87–94.



1968. (With YADAWA, B. R.) Nature and origin of Indo-Gangetic trough. (*Abstr.*) *Proc. 55th Indian Sci. Congr., Pt. III*, 192-193.
- (With CHOWDHARY, G. C.) Floods—Their possible remedies. *Indian Engr. Calcutta*, XII(1), pp. 3.
- (With CHOWDHARY, G. C.) Floods—their causes and remedies. *Indian Engr. Calcutta*, XII(8), pp. 4
- (With CHOWDHARY, G. C.) Suggestions for better irrigation—I. *Indian Engr. Calcutta*, XII(10), pp. 5
- (With CHOWDHARY, G. C.) Suggestions for better irrigation (Part II). *Indian Engr. Calcutta*, XII(12), pp. 3.
1969. (With CHOWDHARY, G. C.) Before and after Dam failure. *Indian Engr. Calcutta*, XIII(7), pp. 6.

MISCELLANEOUS

1937. Krishna Kumar Mathur—Obituary. *Curr. Sci.*, V(7), 365-366.
1966. Mahamana Pt. M. M. Malaviya Ji—Reminiscences. *Prajna*, XI(2), ccxxxix-ccxlii.
— College of Science. *Ibid*, ccliv-cclx.
1972. Shri Krishna Kumar Mathur—Reminiscences. *Bhuvigyan*, 3 (1971), XVII-XIX.
— Bhuvigyan ki Drishti se Varanasi ka Mahatva. *Ibid*, 85-86.

