The Department of Geology, Institute of Science, Banaras Hindu University, Varanasi: A Success Story of 100 Years

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DIALOGUE

Science, Scientists, and Society

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Completion of one hundred years of existence is a monumental occasion on every front. If an academic institution of eminence crosses this milestone it becomes imperative not only to celebrate this historic event, but also necessitate us to pause and ruminate with pride its long and illustrious journey through the past century. The Department of Geology of the Institute of Science, Banaras Hindu University (BHU), Varanasi, established in 1919, has completed its centennial year in October of 2019 and joins the proud list of such century old prestigious academic institutions of our country like Presidency University, Kolkata, and Presidency College, Chennai, where such departments were started as early as in 1892 and 1910, respectively. It is a coincidence that two renowned earth science unions *viz*., the International Union of Geodesy and Geophysics (IUGG) and the American Geophysical Union (AGU) have completed 100 years of their glorious services in 2019. This write-up briefly outlines the evolutionary history of the Department of Geology, BHU, it's phenomenal role as a progenitor and mentor to several other distinguished earth science departments across the country, present status, and also its roadmap for the future.

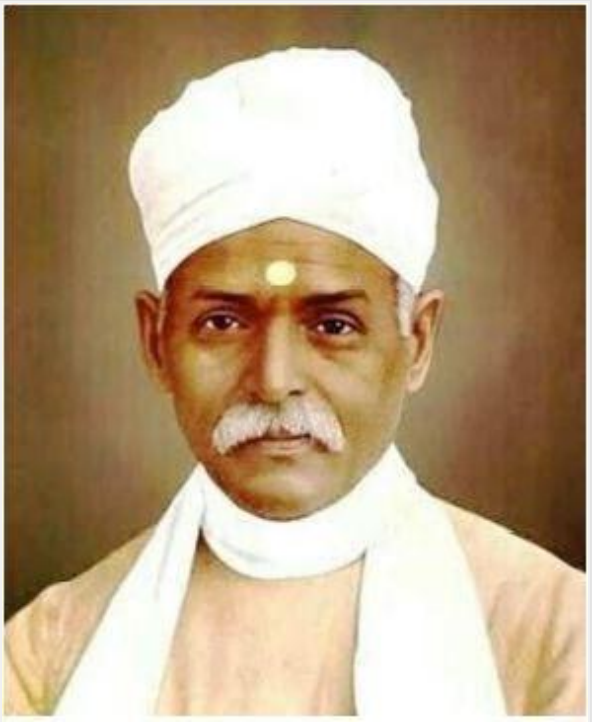

Fig 1 Bharat Ratna Mahamana Pandit Madan Mohan Malviya (1861-1946) founder of the Banaras Hindu University.

It is no exaggeration to state that almost every educated Indian is aware that the great nationalist, visionary and educationalist Bharat Ratna Mahamana Pandit Madan Mohan Malviya (Fig 1) founded the Banaras Hindu University on the banks of river Ganga in the holy city of Varanasi on 4th February 1916, which happened to be the auspicious *Vasant Panchami* day. Several departments in branches of science, arts, medicine and engineering were set up immediately thereafter and the Department of Geology was established on 6th October, 1919 initially as a composite Department of Geology, Metallurgy and Mining. It was the foresight of Pandit Malviya to promote and develop the indigenous industries and to tap the enormous mineral resources of the country an indispensible need for the three disciplines of earth science was felt.

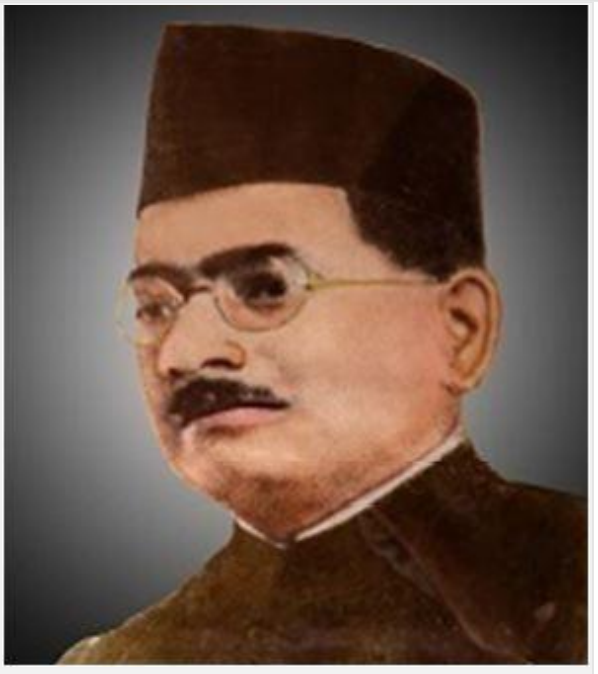

Fig 2 Prof. Krishna Kumar Mathur. The first Head (1921-1936) of the composite Department of Geology, Mining and Metallurgy at Banaras Hindu University.

Prof. N. P. Gandhi was appointed as the first Professor of Geology and Metallurgy to establish these courses in the university. Subsequently, Prof. Krishna Kumar Mathur (Fig 2), who did his B.Sc. degree in Mining Engineering with First class Honours and the Associateship of the Royal School of Mines (ARSM), UK, standing first in Mining Geology, was appointed as the founder Head of the Department in 1921 and teaching and research began ever since. An independent status was attained by the department in 1923 and mining and metallurgy emerged as separate entities at the same time.

Early Years

Despite being an igneous petrologist of repute, Prof. Mathur encouraged all other branches of geology such as paleontology, stratigraphy, structural geology, and economic geology and placed emphasis on training the students in the field work, and in basic as well as applied aspects of geology. He had also introduced, for the first time in any Indian University, research work to be submitted as a thesis for obtaining an M.Sc degree – a tradition which continues even today. Prof. Mathur served as a Head of the department till 1936 when untimely death snatched him away at a young age of 43 years. By then he not only made seminal contributions on the Deccan Traps, Panjal Traps, and igneous activity in the west coast of India, which he published in journals such as Nature (1926) and The Journal of Geology (1926), but also created a pool of well trained band of young and competent researchers such as V. S. Dubey, N. L. Sharma, and A.G. Jhingran who subsequently

became torch bearers of his school. Prof Mathur was also a founding fellow of the Indian Academy of Sciences, elected fellow of the National Institute of Sciences (now Indian National Science Academy) and National Academy of Sciences. He also served as President of the Geology and Geography Sections of the Indian Science Congress.

Consolidation and Expansion

Prof. Rajnath (Fig. 3), who obtained Ph.D from University of London, U.K. with specialisation in paleontology and stratigraphy, succeeded Prof. Mathur and served as head of the department for 31 long years (1936 to 1967). His contributions on the Jurassic rocks of Kutch are as remarkable as his postulation of Pleistocene beds in the form of two big anticlines beneath the Indo-Gangetic alluvium. He also suggested many measures to counter floods in major north Indian rivers and voiced a need for the construction of trans-Deccan canal joining the Bay of Bengal and the Gulf of Kutch as an exit for water of flooded rivers. Prof. Rajnath was a Fellow of the INSA, founder President of the Paleontological Society of India and served as President of the Geology section of the Indian Science Congress.

Fig 3 Prof. Rajnath served as the Head (1936-1967) of theDepartment of Geology, BHU for 31 years

The department faculty specialisations significantly diversified during Prof. Rajnath's tenure. He invited bright young geologists, serving in various other geological organizations, to join as the faculty members and also had the vision to get them trained abroad in the up and emerging fields of geosciences of that time. For example, young recruits such as M. S. Srinivasan went to Wellington University, New Zealand (Micropaleontology), R. K. Lal visited University of Toronto (Metamorphic Petrology) and Ram S. Sharma studied at the University of Basel, Switzerland (Mineralogy and Petrology) and after obtaining their Ph.D

degrees returned back to serve BHU with distinction. Likewise, another young faculty member, A. K. Bhattacharya, was encouraged to visit Technical University of Clausthal, Germany, to gain advanced expertise in Economic Geology. As a result, the department in due course of time went from strength to strength and emerged as a nodal centre in the country for imparting excellence in education and research and became a sought after place for students from across the country. The first wet geochemical laboratory in an Indian university was established here in 1960's by Prof. R. C. Sinha. Likewise, the micropaleontology laboratory set up by Prof. M.S. Srinivasan and Coal laboratory setup by Prof. M. P. Singh at BHU are some of the first of their kind in the university system.

Progenitor and Mentor to other Earth Science Departments of the country

The Department of Geology, BHU, also served as a progenitor and mentor for a number of post-graduate departments of earth science in the country. The Department of Geophysics, BHU, was created in 1949 with Prof. Rajnath as the founder Head. It functioned in co-operation with the Department of Geology till 1964 when it got separated. Several of the BHU alumni (for e.g., N. L. Sharma, A. G. Jhingran, R. S. Mittal, I. C. Pande, S. S. Merh, R. C. Sinha, T. C. Bagchi, Y. J. Rao, and G. W. Chiplonkar) became the founding faculty members of some of the country's most distinguished Departments of Geology/Applied Geology such as Indian School of Mines (now IIT-ISM), University of Lucknow, University of Roorkee (now IIT-Roorkee), University of Rajasthan, M. S. University of Baroda, University of Pune, Gauhati University, Patna University, Panjab University, IIT- Kharagpur, Osmania University and University of Delhi and served them with distinction. It may not be out of place to mention here that the doyen of the Indian Geology, late Dr. B. P. Radhakrishna, attributed his likeness for mineralogy and petrology (at Central College, Bangalore) to his inspiring teacher Prof. P. R. J. Naidu who graduated from the Geology Department of BHU under the tutelage of Prof. K. K. Mathur. Likewise, the much acclaimed geochemical laboratory at CSIR-NGRI, Hyderabad, was set up in late 1960s after its founder late Dr. S. M. Naqvi underwent training on wet geo-chemical techniques at BHU under the supervision of Prof. R. C. Sinha.

Present Status

The strong foundation and excellent direction provided by their esteemed predecessors (Profs. K. K. Mathur and Rajnath) helped the next generation of faculty members such as Profs. D. K. Chakrabarti, S. K. Agrawal, M. N. Mehrotra, N. K. Mukherjee, A. K. Bhattacharya, M. S. Srinivasan, R. K. Lal, Ram S. Sharma, V. K. Gairola, S. G. Karkare, R. M. Singh, B. K. Chatterjee, R. N. Tiwari, Kanji Lal, Jai Krishna, M. Joshi, H.B. Srivastava, Anand Mohan, M. P. Singh, A. K. Jaitley and others to carry forward legacy of the department.

Fig 4 Prof. K. K. Mathur memorial library at the Department of Geology, Banaras Hindu University.

Today the BHU Geology department stands not only as one of the oldest but also one of the largest of its kind in the country with a total 37 sanctioned teaching posts. It has competent and distinguished faculties specialised in almost all branches of basic and applied branches of geosciences, including the geophysics. The department has a rich library (Prof. K. K. Mathur memorial library; Fig. 4), well-maintained geological museum (Prof. Rajnath memorial museum; Fig. 5), microscopy lab (Prof. R. K. Lal memorial microscopy lab), coal laboratory (Prof. M. P. Singh memorial coal lab) and micropaleontology and paleo-ceanography laboratory. Several state-of-the art fully functional laboratory facilities such as Electron microprobe, Scanning electron microscope, Particle size analyzer, X-ray diffractometer, and CHS analyzer are being utilised by scores of researchers across the country.

Fig 5 Prof. Rajnath memorial museum at the Department of Geology, Banaras Hindu University.

The department offers a three year (six semesters) undergraduate course in B.Sc (Hons) Geology with an intake of 70 students and a two year (six semester) post-graduate course in M.Sc (Geology) with an intake strength of 60 students. Thus, it is one of the few such departments in the country where undergraduate and post- graduate courses are taught at the same place and serves as an important human resource centre to cater the needs of several geoscience organizations of the country. Admission to both these courses is based on performance in All India open competitive entrance tests (termed as UET and PET, respectively) and attract students from far and wide. A few supernumerary seats are also meant for the foreign students. The department offers Ph.D degree for researchers and also awards D.Sc (*honoris causa*) for outstanding researchers.

Fig 6 Release of the abstract volume during the inauguration (12th October 2019) of the conference on "Recent trends in earth science research and centennial celebrations of the Department of Geology, BHU". Persons from right to left (Prof. Rajesh K Srivastava, HOD and Convener; Prof. M. Joshi, Dean, Faculty of Science, BHU; Prof. Ram S. Sharma, K. K. Mathur lecture invitee and distinguished alumnus; Sri R. K. Srivastava, Chief Guest and Director (Exploration) ONGC; Prof. Anil K. Tripathi, Director, Institute of Science, BHU; Prof. N. V. Chalapathi Rao, Organizing Secretary).

The Department of Geology, BHU, has been elevated in 2010 as a Centre of Advanced Study by the UGC and is also well supported by the DST under its FIST (Fund for improvement of S & T infrastructure) program. The undergraduate and post graduate students of the department have been consistently bagging top ranks in several national entrance tests such as IIT-JAM, GATE, CSIR-UGC NET and UPSC Geologists and Hydrogeologists exam. The faculty members, past as well as present, have bagged several prestigious awards, distinctions, fellowships, election to national and international science academies, and research grants.

The Department commemorated its centennial year by organizing, under the convenership of the incumbent head Prof. Rajesh K. Srivastava, a grand national conference "Recent trends in earth science research" from 12th to 14th October, 2019 at BHU, Varanasi (Fig. 6), which was attended by several past alumni, delegates and students. The annual K. K. Mathur memorial lecture was delivered on the inaugural day by the

department's distinguished alumnus Prof. Ram S. Sharma on the topic "Tell-tale of Indian cratons". A book penned, primarily to enthuse the students in the excitements of earth system science, by Prof. Ram S. Sharma entitled "Know your Planet Earth" and the conference abstract volume were also released during the inauguration (Fig 6).

Future Road Map

BHU alumni includes such illustrious names as Profs Shanti Swaroop Bhatnagar, Birbal Sahni, C. N. R. Rao, Jayant Narlikar, U. R. Rao, Devendra Lal, Y. Nayudamma, G. S. Agrawal, Palle Rama Rao, T. V. Ramakrishnan, Lalji Singh, Vinod Gaur and many others whose contributions played a stellar role in shaping the destiny of Indian science, including that of earth system science. Incidentally, legendary earth scientist late Dr. Hari Narain (former Director of CSIR-NGRI) also served as Vice-Chancellor of BHU (1978-1981). BHU presently ranks amongst the top three Indian Universities as per the National Institute Ranking Framework (NIRF) of MHRD. It has also been included in the selected list of few universities, which have been conferred with Institution of Eminence (IOE) tag by the Government of India in 2019. Very recently, the DST has chosen BHU as one of the three centres in the country where SATHI (Sophisticated Analytical and Technical Help Institute) will be set-up. The academic and research contributions of the faculty from the Department of Geology played a significant role in many of the success stories of BHU. The Department of Geology at BHU will continue to strive to improvise in pursuit of higher standards of teaching and research and is geared up to play a significant and greater role in contributing to the growth of geosciences in the next one hundred years in our country.

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