

Birbal Sahni—architect of modern palaeobotanical researches in India

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FOSSILS are the natural archives that hold records of bygone eras. Plant fossils are the only reliable evidence of past vegetational history besides being the signatures of past environmental and climatic changes. The study of plant fossils and their subsequent evolution is called Palaeobotany. It is always exciting to know the past of the plant world through several billion years before present. The study involves a multidisciplinary approach using data from both natural and physical sciences. The first Indian who took to palaeobotanical investigation was Birbal Sahni. He was born to Srimati Iswari Devi and Professor Ruchi Ram Sahni on November 14, 1891.

Ruchi Ram Sahni was a Professor of Chemistry at Lahore. Young Birbal, third child of his parents, imbibed the love for science and nature from his father. His birth place Bhera situated near the Salt Range, famous for its fossil-bearing rocks was his initial training ground. Birbal Sahni had his early education at the Government College, Lahore, where he learnt botany from the famous bryologist Shiv Ram Kashyap and was so deeply impressed by this eminent botanist that after graduation in 1911, he decided to make botany his career though his father wanted him to join the Civil Services.

Birbal Sahni was sent to England to join the Emmanuel College, Cambridge. His elder brother Bikramjit was at that time studying medicine in London. Birbal Sahni graduated from Cambridge in 1914. He was particularly impressed by Albert Charles Seward and decided to join the Botany School under the latter's tutelage for researches in botany.

He began his research career with conventional investigations on morphology and anatomy of living plants. Before long he was attracted to the studies on plant fossils -- for which the laboratory of Professor Seward was



Birbal Sahni at microscope in the Cambridge University

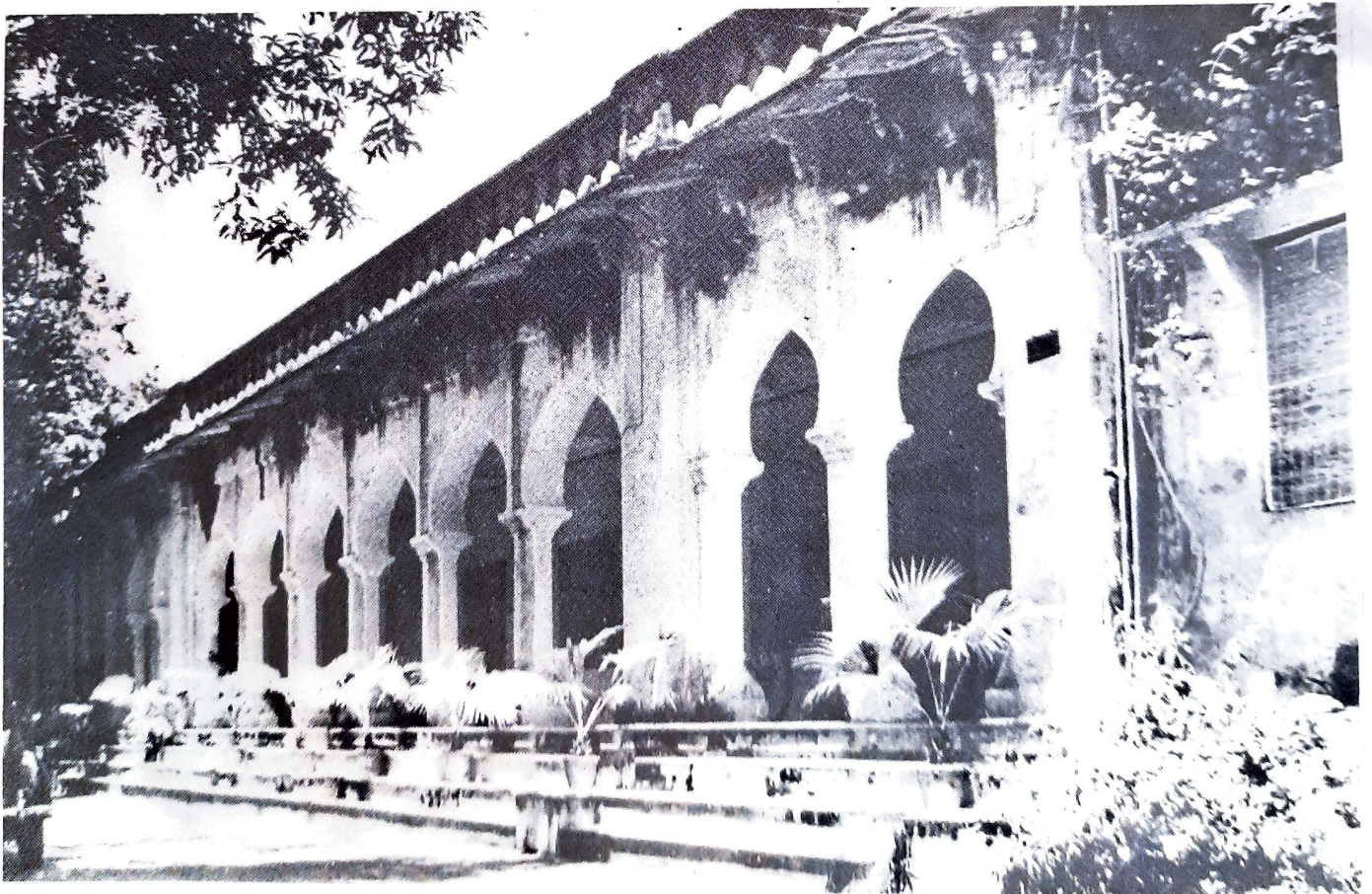
renowned. Both the teacher and student were enthusiastic researchers in palaeobotany. They were greatly helped by their understanding of extant plants. For his studies on ovuliferous structure of the conifers (Stachysperm and Phylloperm concept) Birbal Sahni was awarded the D.Sc. Degree of the University of London in 1919. While yet a student at Cambridge, Birbal Sahni undertook the revision of Lawson's text-book of botany which for many decades was the help-mate of most college students studying botany in India.

Birbal Sahni returned to India the same year. After short stints at Lahore and Banaras Hindu Universities, he joined the University of Lucknow, in 1921, as Professor of Botany. The department had just been opened and he put his heart and soul into organizing the affairs of the department. In the meantime he was married to Savitri Suri, an exceptionally charming and intelligent lady. With his persuasive charm, unstinted devotion to research, and the famous Sahni hospitality, he was able to collect around him a group of colleagues, devoted students and researchers.

After the departure of Ottokar Feistmantel from the Geological Survey of India in the early 1880s, plant fossil collections were regularly sent to Professor Seward at Cambridge for study and advice. However, with the return

of Birbal Sahni to India, Professor Seward politely declined to undertake study of further fossil collections from India hinting that the country now had its own palaeobotanist. The collections ultimately were forwarded to Birbal Sahni. This further strengthened and accelerated his interest in fossil plants and he undertook palaeobotanical researches with a greater zeal. In 1928 he completed the revision of the second part of Indian fossil plants; the first part was published in 1920 jointly with Seward. His deep involvement in the study of plant material (both fossil and living) led him to know the difficulties concerning the collection and their storage for further study. He strongly felt that national museums and herbariums should be established in the country to hold the valuable plant material and methods should be formulated for their easy retrieval. In this pursuit he also succeeded in getting back some valuable plant material held by the Royal Botanic Garden, Kew to the National Herbarium at Calcutta.

His erudition and researches won him many awards. He was admitted to Sc.D. Degree of the Cambridge University in 1920, and was elected a Fellow of the Royal Society of London in 1936. Twice he was the Vice-President of Palaeobotany Section of the International Botanical Congresses. He was elected a Honorary Foreign Member of the American Academy of Arts and Sciences



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in 1948, the year he published his prized paper on the Pentoxylales. The highest scientific honour that came to him was his election as the President of the Stockholm International Botanical Congress in 1950. He could not preside over this Congress as he passed away on April 10, 1949.

On the national scene, too Birbal Sahni was equally recognized. He was associated with all the three science academies. In 1940, he presided over the Indian Science Congress. He was one of the founding members of the Indian Botanical Society and was its President in 1924.

Birbal Sahni was a visionary. His main dream was to found an institute for palaeobotanical researches. He felt that while palaeozoology, i.e., palaeontology was being studied at several university departments, and in the Geological Survey of India, study of plant fossils was neglected. He therefore decided to institutionalize palaeobotanical researches in the country. His idea was to have a centre of excellence within the country where scientists from all over the world would be able to carry out researches on fossil plants.

In September 1939, Birbal Sahni convened a Committee comprising his students and colleagues to coordinate palaeobotanical research in India. It was also decided to bring out periodic progress reports on Indian Palaeobotany. Some of these reports were printed in the *Journal of Indian Botanical Society* under the title "Palaeobotany in India". He was editor of this journal for some time. This Committee was later given a formal status and registered as "The Palaeobotanical Society" on June 3, 1946. The main object of the Society was to foster palaeobotanical research on an all-India basis. To meet this charter, the Palaeobotanical Society, at Professor Sahni's behest, decided to start an Institute of Palaeobotany. The institute started functioning at the Botany Department of University of Lucknow. Birbal Sahni was appointed as its first honorary Director.

The initial assets of this institute included rich collections of plant fossils and literature belonging to Birbal Sahni, and a small fund contributed mainly by the Sahni couple and the Burmah Oil Company. In 1948, the Government of the then United Provinces gifted the Institute a bangalow situated at 53, University Road, Lucknow, and the Institute of Palaeobotany moved there. As Professor Sahni envisaged the development of Palaeobotany in all its aspects, a comprehensive plan was prepared for the construction of a well-equipped laboratory.

The foundation-stone for the new building was laid on April 3, 1949 by Pandit Jawaharlal Nehru, a contemporary of Birbal Sahni at Cambridge, and the then Prime Minister of India. Requesting the Prime Minister to lay the Foundation-Stone, Professor Sahni said – "... It is our hope that in this stone a link will have been forged in the

chain of international goodwill and cultural cooperation. By laying this Foundation Stone you will, therefore, be helping us to achieve for this young Institute a hopeful future of a broad and truly international outlook which is one of our main objectives..." He further said "For what is it, after all, that pious men worship in a stone which they place in a temple, but an idea or an ideal, a great truth, a hope or wish for a higher existence, whether in this world or in the next? And what is it that this stone symbolizes? – the great fact of the antiquity of plant life on the globe, the intellect of man ever striving to bring that fact more and more clearly to light, revealing different stages not only in the evolution of the plant kingdom in a more and more orderly and understandable sequence, but also the evolution of his own poor understanding of these truths. The very construction of it, the flaws and imperfections in its entire make up, the labour that has gone into its preparation, are all but symbols of our imperfect and helpless efforts at constructing something new, something worthwhile". This adequately brings out his philosophy of life. Introducing the subject he explained "The science of palaeobotany began somewhat like a purely academic pursuit, a study of curios. Gradually the point of view has changed as it always does with time, and has revealed new vistas. The whole outlook has now expanded beyond recognition. Today the study of fossil plants, pursued with modern techniques and with due regard to its repercussions upon all the bordering sciences, already occupies a respectable place among the sciences and fully deserves the support that it is now receiving all over the world. It not only allows us glimpses into the evolutionary history of plants, but helps us more and more accurately to tell the ages of strata and thereby to explore the mineral wealth of the earth, particularly coal and oil."

Applauding Professor Sahni, Panditji said "In our country he symbolizes in himself, the kind of scientist that every scientist should be. A scientist should not only aim for material gains, as his commitment to his work is supreme.... The effort of Dr. Birbal Sahni to create a scientific awareness amongst the people is worth appreciating."

Birbal Sahni did not live long to see the sapling he had planted to flower and bear fruit. In his honour the institute was named Birbal Sahni Institute of Palaeobotany. It was left to his companion Savitri Sahni to nurse the sapling into an adult plant. She who understood Birbal Sahni and had constantly laboured with him to plan and organize the institute, saw to it that the young institute could withstand the typhoon of Sahni's death. It is the result of their "Tapasya" that the Birbal Sahni Institute of Palaeobotany ranks amongst the best botanical laboratories today.

Some of the objectives in the charter of the Birbal

Sahni Institute of Palaeobotany are :

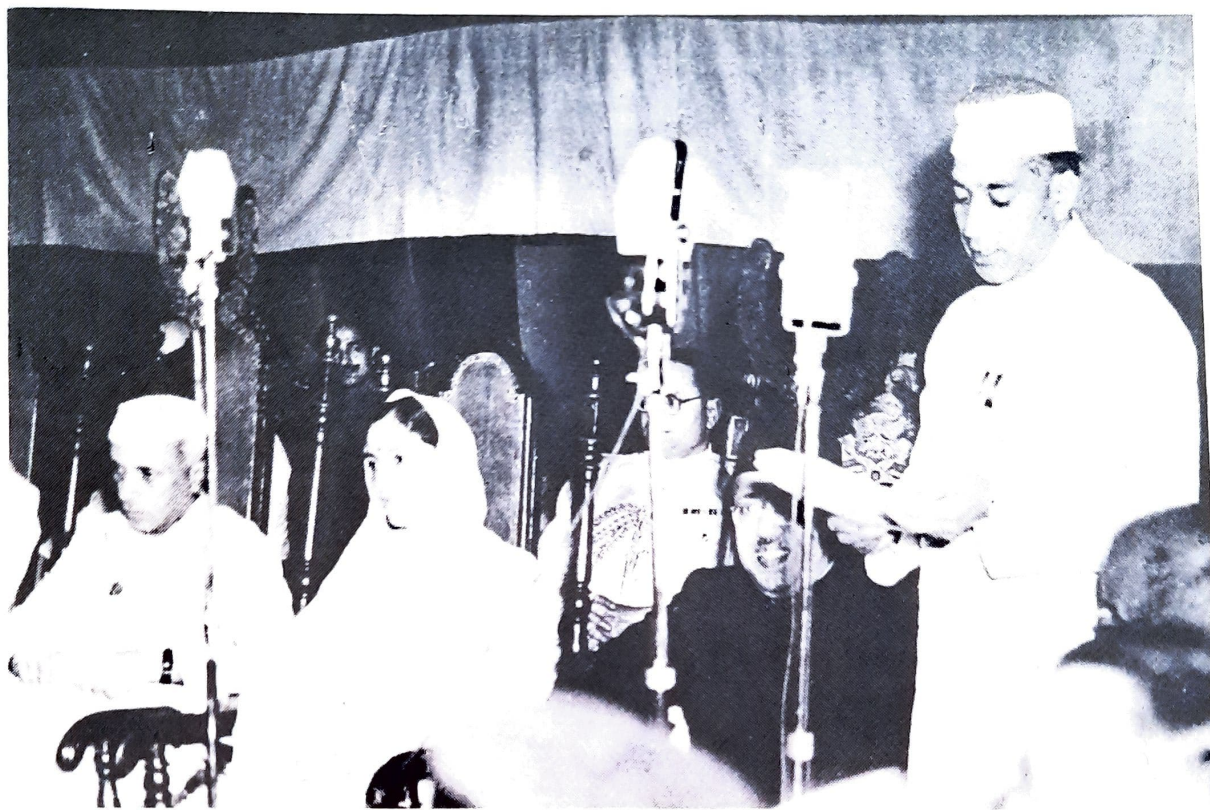
- (i) The promotion of higher study and research in fossil botany in its widest sense for the advancement of learning and dissemination of knowledge in palaeobotany.
- (ii) To co-operate with universities and other institutions in India and abroad for accelerating palaeobotanical research.
- (iii) To organise symposia, seminars, demonstrations, etc. in palaeobotany.
- (iv) To publish journals, memoirs, proceedings etc. of interest to palaeobotany.
- (v) To award tokens of merit, medals and prizes to palaeobotanists.
- (vi) To have a broad International outlook and to remain as an International Palaeobotanical Centre.

During his tenure of 28 years with the University of Lucknow, Birbal Sahni worked with a single minded devotion to build an excellent school of botany. He was a rare combination of the teacher and researcher - a *guru* and *sadhaka*. He not only lectured the undergraduate classes, but also supervised their practicals. His lectures

were simple in style and direct in approach, so much so, these attracted even those who were not his students. His research contributions were diverse involving plant morphology, anatomy, taxonomy, evolutionary biology, phytogeography and related investigations. Besides the Indian material, he also investigated fossil floras of Queensland, New South Wales, New Caledonia, New Zealand, and Burma. Palaeobotanical evidences adduced by him helped in the understanding of continental drift and Himalayan orogeny. This was an acclaimed contribution of that time. His reconstruction of *Williamsonia seawardiana* Sahni, a plant that populated the Ramahal hills, Bihar during Early Cretaceous (Ca 110 million years before present) is amongst the few reconstructions of whole plants based on fragments of fossil specimens. From younger formations in the Deccan, Sahni recorded *Azolla*, *Chara*, *Rodeites*, *Enigmocarpon* and a number of palms. The same rock formations yielded at a later date fossils of *Embllica officinalis* (Aonla), *Musa* spp. (Banana), *Cocos nucifera* (Coconut) and *Artocarpus integrifolius* (Jack Fruit). He initiated studies on fossil cuticles, and palynology in India.



Old building of the Birbal Sahni Institute of Palaeobotany



Birbal Sahni delivering the welcome speech at the Foundation Laying Ceremony of the Institute

Study of plant fossils was a passion with Birbal Sahni. He wrote "..... my own interest in Palaeobotany raises the hope that I may help to bring this fascinating subject more prominently to the notice of my countrymen, and perhaps even succeed inducing a larger number of them to turn their attention to the rich field that it offers for original investigation." Birbal Sahni as a palaeobotanist had wider horizon and perspective. He believed in multi-disciplinary approaches to solve botanical and geological problems. He, however, did emphasise in specialization too. In the charter of the Institute he therefore included

investigation exclusively of plant fossils-in its widest sense, and use. With Birbal Sahni's efforts Palaeobotany attained an important status. Interdisciplinary collaborations were forged. Today it has been possible to pursue varied types of investigations at the Birbal Sahni Institute of Palaeobotany which is a testimony to the vision of Birbal Sahni. With the advancement of knowledge, barriers between different disciplines of sciences have largely disappeared. However, specific researches in specialized institutions will continue to play a significant role in the development of science in the country.