

# Birbal Sahni : His North American paleobotanical connection with William Culp Darrah

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Birbal Sahni, the most influential and accomplished paleobotanist in the history of India, made a multitude of friends throughout the world. One of these friends was William Culp Darrah (1909–1989), the internationally known North American paleobotanist, whom he first met in 1935 at the 6th International Botanical Congress in Amsterdam. Both became well known for their work on petrification, and both enriched the lives of many aspiring paleobotanists who followed their paths. Other parallels in the lives of these gifted paleobotanists and their interactions until Sahni's death in April 1949 are summarized.

**Key-words** – Birbal Sahni, William Culp Darrah, Paleobotanical interactions.

## INTRODUCTION

BIRBAL SAHNI (1891-1949), who was trained in Cambridge, England, under the great paleobotanist A.C. Seward (Fig. 1), became the most accomplished and influential paleobotanist in the history of India. His personal and scholarly life has been superbly summarized in papers by Sitholey (1950), Thomas (1950), and Edwards (1950) and by M.R. Sahni, A.R. Rao, P. Maheswari, T.G. Halle, A.B. Walkom, P. Evans and J. Coates, and S.R. Narayana Rao in separate papers in the Birbal Sahni Memorial Volume (1952). The papers in this monumental memorial volume by a multitude of distinguished paleobotanists attest to Sahni's profound impact and influence in the field of paleobotany. In addition, his vision of an Institute of Paleobotany in India at Lucknow, to which he and his wife, Savitri, committed their entire resources, is a rich legacy unparalleled in the history of paleobotany. Birbal Sahni was truly a great man, and the Institution that he founded is great testimony to his continued influence on paleobotanical and geological research.

It is difficult to determine when Sahni's first North American connections were made. When Sahni returned to India from Cambridge in 1919, after receiving his D.Sc., there were a number of internationally prominent North American paleobotanists: David White, E.W. Berry, G.R. Wieland, and F.H. Knowlton. It

is likely that Sahni communicated with them because of his broad and specialized paleobotanical interests in Paleozoic, Mesozoic and Tertiary floras. Details on the life and paleobotanical contributions of these four North American paleobotanists have been summarized by Andrews (1980).

At the 5th International Botanical Congress in Cambridge, England (August 16-23, 1930), which was held under the leadership of Seward, the President of the Congress, Birbal probably met for the first time three North American paleobotanists: A.J. Eames (Cornell University), C.A. Arnold (University of Michigan), and Wieland (Yale University). Sahni, one of the eight Vice-Presidents of the Paleobotany Section of the Congress, participated in the extended discussions on "The relation of the Late Paleozoic floras to the Early Mesozoic floras" and on "The antiquity and early evolution of the angiosperms." He also showed specimens of angiospermous wood from the Early Jurassic (now Early Cretaceous) Rajmahal flora, which he thought was allied to the homoxyloous Magnoliaceae.

Sahni was also Vice-President of the Paleobotany Section of the 6th International Botanical Congress in 1935, held in Amsterdam, The Netherlands, September 2 thru 7. It was then that he met a young North American Paleobotanist, William Culp Darrah, who was to be-



PROFESSOR A. C. SEWARD

*President*

Fifth International Botanical Congress, Cambridge, 1930

Figure 1. Professor A.C. Seward. Reprinted by permission of Cambridge University Press from the Fifth International Botanical Congress (Cambridge, 16-23 August, 1930), Report of Proceedings, edited by F.T. Brooks and T.F. Chipp.

come one of the leaders in North American paleobotany (Fig. 2).

This paper focuses on Birbal Sahni's connection with William (Bill) C. Darrah (1909-1989), who, just a year before the Amsterdam meeting, had joined Harvard University to organize the paleobotanical collections at the Botanical Museum. A tribute to Darrah was made at the 12th International Congress on Carboniferous and Permian Geology and Stratigraphy (Buenos Aires, September 1991); this tribute (Lyons & Morey, 1993), which is published in the *Compte Rendu* of the Congress, summarizes Darrah's remarkable career and describes the first meeting of Sahni and Darrah in 1935.

The paper presents a series of unpublished photographs of Birbal and Savitri Sahni and Bill and Helen Darrah from their first meeting in 1935, recounts two stories from the Sahni's visit to the Darrah home in 1947, and releases Darrah's tribute to Birbal Sahni following his untimely death on April 10, 1949. Also, Darrah's interaction with other Indian paleobotanists after Sahni's death are summarized in this paper.

#### PARALLELS BETWEEN SAHNI AND DARRAH

Birbal Sahni and Bill Darrah were influenced by their fathers during their childhood years. Birbal's father, Ruchi Ram Sahni, was a Professor of chemistry in India who participated in Rutherford's experiments on radioactivity at Manchester, England, in the 1910's (M.R. Sahni, 1952). He instilled in Birbal a love for science and the outdoors. Birbal was to marry Savitri, a daughter of a close friend of his father. Bill Darrah's father, an engineer, encouraged the young lad in stamp collection, a life-long activity of Birbal's as well (Sitholey, 1950). At the age of 11, Bill began collecting minerals; before long, his room was bursting with mineral samples that were classified according to Dana's System of Mineralogy. During his teenage years, when he rose to great heights in the Boy Scouts of America, Bill took up collecting Carboniferous plant fossils near his home in the vicinity of Pittsburgh, Pennsylvania, one of the great coal-mining districts in the Appalachian basin (Morey, 1989; Morey & Lyons, 1990; Lyons & Morey, 1991; Lyons & Morey, 1991a, b, 1993).

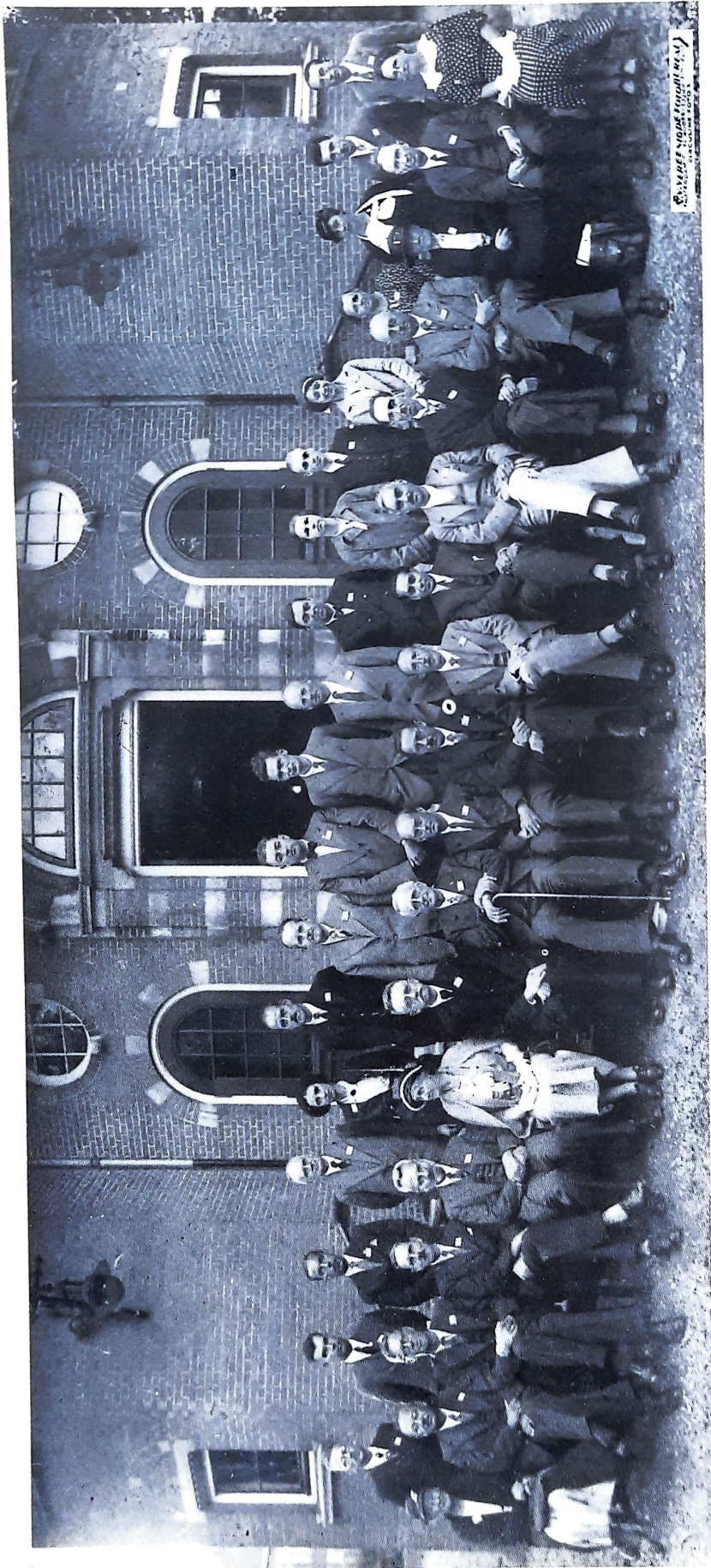
Birbal and Bill were blessed with God-given talents that propelled them in their scholarly life. Both had brilliant minds and encyclopedic memories that served them well in their paleobotanical research. They could easily read in three important scientific languages: English, German and French. This ability allowed them to read the literature extensively and, thus, greatly expand their knowledge, not just in botany, paleobotany and geology but also remotely related fields. Birbal and

Bill's independent minds first drew the attention of their respective mentors in paleobotany, A.C. Seward of Cambridge University and David White of the U.S. Geological Survey, and later the attention of other distinguished paleobotanists.

Both scholars spent much of their professional careers as teacher-researchers. In 1921, Sahni was appointed the first professor of botany in the Botany Department of Lucknow University. He and his students and colleagues brought paleobotany in India to Himalayan heights. Darrah, who began serious paleobotanical research as a graduate student at the Carnegie Institute in Pittsburgh in 1931, took a job at Harvard University in 1934 and within two years, was teaching biology and, later paleobotany. After Darrah vacated his position at Harvard in 1946, he was a professor of biology at Gettysburg College (1954-1974). Both paleobotanists could explain things in such comprehensible ways that students were not overwhelmed by their knowledge. Because they were gifted teachers as well as scholars, they were quick to acquire a following of students interested in paleobotany. Although Darrah's career at Harvard University was interrupted by World War II, he continued with his duties at Harvard until 1946, when he recommended his former student, Elso Barghoorn, for the position that he vacated (Lyons & Morey, 1993).

Birbal married Savitri in 1920, and Bill married Helen Hilsman in 1934. Both women were faithful and loyal companions who helped with laboratory work and accompanied their husbands in the field. Both were totally devoted to their husbands' careers. Savitri (1902-1985) was fully committed to Birbal's dream of a Paleobotanical Institute of international stature, to which she left all of her worldly goods. Helen Darrah was to be Bill's lifelong assistant in his various scholarly works and made contributions to the improvement of the peel technique (Darrah, 1936).

Sahni and Darrah were energetic and tireless scholars. Birbal's treks by foot in the Himalaya to study modern plants (1907-1911, 1923-1944), as told by his younger brother, M.R. Sahni (1952), gave Birbal a broad grasp of plant biology, distribution, and ecology, which, together with his geological background, was to give him incredible insight into the nature of fossil plants. Bill, at the age of 17, began collecting plant fossils in the Appalachian basin and tabulated 16,000 specimens from one horizon alone. Later at Harvard, in the late 1930's and early 1940's, he and Helen produced thousands of peel slides from the Iowa coal balls. Serge Mamay of the U.S. National Museum relates a humorous story told by Elso Barghoorn, who was asked by a paleobotanist about some peel slides from Harvard's collection. Barghoorn replied, "How many



**Figure 2.** Paleobotany Section, Sixth International Botanical Congress, Amsterdam, The Netherlands, September 2-7, 1935. Front row (left to right): Miss Berridge, R. Kraüsel, R.G. Koopmans, H.H. Thomas, J. Pai, Mrs. A.C. Seward, A. Ranier, A.C. Seward, T.G. Halle, W.J. Jongmans, F.E. Weiss, B. Sahni, J. Walton, P.B. Bertrand, W. Gothan, Miss M. Benson, W.L. Jepson, Mrs. H.H. Thomas. Back Row (left to right): W. Reichardt, C.A. Arnold, G. Erdtman, H. Gerth, Miss S. Leclercq, Th. Reinhold, R. Florin, M. Himer, T.M. Harris, W. Zimmermann, F. Knoll, Mrs. W.C. (Helen) Darrah, Miss H.V. Krick, Miss F. Hoffman, Mrs. P. Ledoux, F. Stockmans, W.N. Edwards. (From the W.C. Darrah Collection).

quarts of *Cordaianthus* would you like to see?" Mamay's anecdote is great testimony to Darrah's tireless efforts.

In an effort to enhance the collections at their institutions, Sahni and Darrah made their own collections, encouraged donations of collections, and were involved in exchanges with other institutions. Sahni, according to his brother (M.R. Sahni, 1952), was determined, that plant fossils collected in India by Indian paleobotanists and geologists should remain in India for study and not be shipped to foreign institutions, as was the common practice in India before 1920. Shortly after Birbal returned to India in 1919, he was paid a great compliment by Seward, who declined to undertake a study of some collections from India because he felt that his distinguished student should have the "first right" (M.R. Sahni, 1952). Eventually, the specimens made their way to Birbal for study. Darrah enhanced the collections at Harvard University with his own from Europe and the United States; with donations from amateur collectors, notably Fred Thompson; with the hiring of John Herron, funded by the Thompson Trust, to collect Mazon Creek fossils; and with exchanges with European institutions in Heerlen, Liege, and Stockholm (Lyons & Morey, 1993). Although Harvard had a good start with its Carboniferous collections, including many of Lesquereux's type specimens, as well as collections from Fred Thompson and some collections of the Boston Society of Natural History, Darrah's efforts greatly enhanced the collections, one of his many legacies to Harvard University.

Both paleobotanists became famous for their work on petrifications. Sahni studied the Jurassic (now Early Cretaceous) Rajmahal flora and the Eocene (now Late Cretaceous-Early Tertiary) Deccan Intertrappean flora, which are discussed at length by Halle (1952) in his tribute to Birbal Sahni. Halle noted that a number of unusual fossil plants occurred in the Rajmahal flora, including a new genus, *Homoxylon* Sahni (1932a), which Sahni believed was related to a modern *Magnolia*. This interpretation became a subject of controversy as to the angiospermous or cycadeoid origin of this genus (Halle, 1952). Darrah (1939a) agreed with Sahni that it was angiospermous. This flora contained *Williamsonia* (Sahni, 1932b), and Sahni's investigations of this genus made a valuable contribution to the order Bennettitales, as related by Halle (1952). Later Sahni discovered a new group of gymnosperms, the Pentoxyleae (Sahni, 1948), which combines features of Coniferales, Bennettitales, and the Cycadales (Halle, 1952). Appropriately, the design for the seal of the Birbal Sahni Institute of Paleobotany is based on *Pentoxylon*, the first natural genus in this new group of gymnosperms in the Rajmahal flora. In the Deccan Intertrappean flora, Sahni discovered a water-fern, *Azolla intertrappea*, an abun-

dance of palm woods (Sahni, 1931; Sahni & Rao, 1941) and fruit including about 45 species (most new to science), 2 genera of conifer cones, and other remains (Halle, 1952). Darrah similarly made extensive collections of the Iowa coal balls (Carboniferous) which contained about 60 species, including 5 new ones named by Darrah (Summary by Darrah, 1941). Darrah's *Cordaianthus schuleri* is one of the best known of these new species. Darrah (1940) noted that this *Cordaites* (or *Mesoxylon*) species was the only one then known that was based on both male and female cones having preserved pollen and ovules. Both Sahni and Darrah made striking discoveries of delicately preserved plant components. Sahni and Rao (1941) found, in the Intertrappean flora, megaspore walls having delicate fibrils that contain "massulae containing microspores...attached by the anchor-like tips of their glochidia apparently in preparation...for future fertilization" (Halle, 1952). Darrah discovered the female gametophyte of a Carboniferous *Selaginella* (Darrah, 1938a, b).

Both scholars published books at very young age. At the age of 28, while still a student at Cambridge University, Sahni co-authored with J.C. Willis a revised edition of "Lawson's Textbook of Botany" (1919, Indian edition), which was based partly on Sahni's extensive knowledge of Indian plants. At the age of 30 Darrah published two textbooks, "Principles of Paleobotany" (Darrah, 1939b), and "Textbook of Paleobotany" (Darrah, 1939a) which reveal Darrah's grasp of the entire field of paleobotany.

One aspect of the brilliant mind is its ability to venture into entirely new fields, straying away from its central avenue of research (in this case, Paleobotany). This trait could be seen in both Sahni and Darrah. Sahni produced a "masterly monograph" on Indian coin moulds (Sahni, 1945), which set a new standard of research in this field and for which he received the Nelson Wright Medal of the Numismatic Society of India (A.R. Rao, 1952). Darrah wrote two authoritative books on the history of photography (Darrah, 1977, 1981), for which he twice received the Benjamin Award of the Association of American Publishers (Morey & Lyons, 1990; Lyons & Morey, 1993).

Both scholars received honorary degrees in recognition of their research. Sahni received an honorary Doctor of Science (*Honoris Causa*) from the Universities of Allahabad and Patna, India, for his research in botany and paleobotany. In 1977, after he retired from Gettysburg College, Bill Darrah received an honorary Doctor of Humane Letters from Gettysburg College (Morey & Lyons, 1990). Darrah had never received his doctorate degree because his mentor at Harvard, Oakes Ames, the orchidologist, counseled that he could become renowned without it.

### Interactions between Sahni and Darrah (1935-1948)

The Sahnis and Darrahs met for the first time in 1935 during the 6th International Botanical Congress in Amsterdam. During this time (Figs 3-5) the Sahnis and the Darrahs met to have dinner on several occasions.

After their meeting in The Netherlands and shortly after he returned to the United States, Bill Darrah wrote Birbal Sahni and offered him 11 pounds of plant fossils for his paleobotanical collections at the University of Lucknow. Sahni wrote on February 3, 1936, thanking Darrah for his thoughtfulness and offered information on shipment to India. In March 1937, Sahni contacted Darrah about sending a reprint of his paper "Antarctic fossil plants" (Darrah, 1936).

Sahni had hoped to see Darrah at the 17th International Geological Congress in Moscow (1937) or at the 7th International Botanical Congress in Stockholm in 1940. These hopes never came to fruition because of Darrah's duties at Harvard and because of the outbreak of World War II in Europe, which severely curtailed communications and greatly interrupted paleobotanical activity in Europe and North America. In 1944, Paul Bertrand—an admired friend of both Sahni's and Darrah's—died. Bertrand was a renowned authority on zygopteridean ferns, a field in which Sahni had made notable contributions (1918-1933). Although Bertrand and Sahni had divergent views on these ferns, they "always remained fast friends" (Halle, 1952). Bertrand's widow, Cecile, also a friend of Mrs Sahni (Fig. 5), contributed four reconstructions of ancient vegetations (which Bertrand had completed a few months before his death) to the Sahni Memorial Volume (1952). Birbal had intended to publish them with a note in memory of his friend Professor Bertrand.

After World War II, paleobotanical investigations were gradually renewed in Europe and North America. Darrah had left Harvard University on "indefinite leave" in 1942 and was working as a research engineer at Raytheon, a wartime technological company, so his paleobotanical research was at a low point. He vacated his Harvard position in 1946.

On November 14, 1947, the Sahnis arrived in New York for a four month lecture-seminar-research tour of the United States and Canada. They first stayed in Cambridge, Massachusetts, for about 3 weeks, where Sahni conducted laboratory investigations at Harvard University.

Helen invited the Sahnis for dinner on November 27, 1947, at their home in Medford. Darrah was experiencing corneal ulcers in one eye, and it was a difficult time for him. Later in 1952, Darrah was to lose the sight in this eye (Lyons & Morey, 1993). The Darrah children, Barbara and Elsie, then 9 and 7 years old,

respectively, remember vividly the Sahnis' visit on that day and another one a day later. Elsie's recollection of these visits are delightful.

For Thanksgiving Day, Helen had already purchased a turkey and planned a full-course dinner. The evening before the Sahnis' arrival, Helen recalled that when they dined with them in Amsterdam, the Sahnis did not eat meat but ordered only vegetarian-style meals. She remarked to Bill, "The Sahnis are vegetarian, so we can't serve the turkey." After a careful search through the cookbooks, Helen prepared a lovely vegetarian meal instead.

As Elsie recalls, "On Thanksgiving Day, the table was set, and all the dishes of vegetables were carefully prepared. Among them was carrots with parsley. After seeing the carrots on my plate, I proceeded to pick the carrots up in my hands, pulled the carrots through my left hand, and said, 'Oooh! the carrots have parsley on them.' I promptly wiped the parsley into my linen napkin, much to the horror of my mother and to the amusement of the Sahnis. After the main meal was completed, plum pudding was served for dessert. My mother asked Dr. Sahni if he would do the honor of cutting it. He stood up to cut the pudding. Mrs. Sahni, in a gentle voice, said, 'Sahni, don't cut the plate.' When the meal was over, Birbal Sahni complimented my parents on the fine dinner, vegetarian style. He then proceeded to tell them that, over the last few days, they had been hearing from all those that they had spoken with that they would be having a traditional Thanksgiving dinner. 'We had hoped to have one here,' remarked Sahni. 'Are you vegetarian?' asked Dr. Sahni. 'No,' replied Bill. 'We thought you were. You did not eat meat when we were together in the Netherlands. Sahni replied that then they had been suffering from a stomach ailment and were not vegetarian. With that, the Sahnis were invited back the next evening to partake of a traditional Thanksgiving dinner with all the trimmings. All turned out well. The Sahnis felt that they had partaken in a fine North American tradition, thanks to the gracious hospitality of the Darrah family.

"Following dinner, Dr. Sahni smiled and said to Barbara and me, 'Come here! I have something to show you.' We timidly went up to Dr. Sahni who was sitting on the sofa smiling. Then out of his pocket peeked a monkey. We screamed, for we thought the monkey was real. It began to move its arms and legs as if it had been asleep. 'Its real!' Barbara cried as we frighteningly moved away from the monkey and hid behind the sofa. 'Help!' we cried as the monkey chased us. Dr. Sahni laughed and sat down again on the sofa. We got up our courage again to watch the antics of the monkey and ventured move to Dr. Sahni to play with it. Just then Dr.



Figure 3. (Left to right): William C. Darrah, Chester A. Arnold, and Birbal Sahni. Sixth International Botanical Congress, Amsterdam, The Netherlands, September 1935. (From the W. C. Darrah Collection.)



Figure 4. (Left to right): T.M. Harris, C.A. Arnold, T.G. Halle, W.C. Darrah (sitting), D.N. Wadia and W.N. Edwards (standing). Sixth International Botanical Congress, Amsterdam, The Netherlands, September 1935. (From the W.C Darrah Collection.)





**Figure 5.** (Left to right): Mrs. Paul (Cecile) Bertrand, Mrs William (Helen) Darrah, and Mrs Birbal (Savitri) Sahni. Sixth International Botanical Congress, Amsterdam, The Netherlands, September 1935. (From the W.C. Darrah Collection.)

Sahni stood up and threw it at us. A shriek of laughter went up. It was only a puppet monkey! It was obvious to all that Birbal Sahni has a very playful side and loved to entertain children."

Shortly after their visit to the Darrahs, the Sahnis visited Henry Andrews in St. Louis where a repeat monkey performance was presented to the Andrews children on "a rather cold December night (Andrews, 1980)."

During his stay in Massachusetts in 1947, Birbal Sahni also visited Albert F. Blakeslee, Visiting Professor of Botany and Director of Smith College's Genetics Experiment Station; Frans Verdoorn, managing editor of *Chronica Botanica* Company in Waltham; and L.R. Wilson, a palynologist at the University of Massachusetts in Amherst.

Andrews (1980) recounts Sahni's visit during December of 1947 while he was at Washington University in St. Louis. Following the Sahni's visit to the Andrews, Sahni gave a presentation on Pentoxyleae at the 42nd Botanical Society of America meeting in Chicago (December 26-31, 1947).

In 1948, the Sahnis made an extended trip to Europe. As usual, Sahni gave lectures and seminars during his visits to several institutions. In a letter to Darrah dated April 21, 1948, from London, Sahni mentions another trip to North America, during which he met Darrah again as well as many other paleobotanists. In the same letter, Sahni also mentions Professor Verdoorn's idea of an annual report by an "international committee of paleobotanists". He also alludes to the fact that the Darrahs had been putting aside Iowa coal balls and peels for his new Institute of Paleobotany to be built in Lucknow. Sahni wanted Pennsylvanian floras available for study at the Institute. In the same letter, Sahni outlines the rest of his itinerary in Europe: May 3-7, O.A. Hoeg (Oslo); May 8-26, T.G. Halle (Stockholm); June, Professor A. Heim (Zurich).

### TRIBUTES TO SAHNI

After hearing of the sad and untimely death of Sahni, at the age of 57, on April 10, 1949, Darrah wrote the following tribute to Birbal Sahni:

April 10, 1949

Dear Mrs. Sahni,

*We can scarcely believe that so soon our joy would be turned to sorrow. Scarcely two weeks has passed since we joined your countless friends in celebrating the occasion of laying the foundation stone of the Institute of Paleobotany. Today we read that your distinguished husband, our sincere friend, has been taken from us.*

*Professor Sahni belonged to that small company of great scholars whose dreams extended beyond the confines of academic interests and whose greatness did not destroy humility and simplicity in spreading international good will and in giving of himself to create opportunities for others, he exemplified the true humanitarian and the true scientist. The Institute will be a loving and living memorial to his character and achievement.*

*We spent happy hours together when you and Professor Sahni visited us a year ago. Barbara and Elsie were delighted by his affectionate attention; we were charmed by his simplicity and rare sense of humor. Somehow it seems as if we have known you both for a long time. We shall treasure Doctor Sahni's memory.*

*These words of sympathy cannot mitigate your bereavement, but in your sorrow take some measure of comfort in the realization of your husband's dream of great Institute of Paleobotany and in knowing of the respect with which he will be remembered - even in the years to come.*

Sincerely yours,

William C. Darrah

The following tribute from the Paleobotanical Section of the Botanical Society of America (Report No. 1, June, 1949) reflects the high esteem in which Sahni, who was a corresponding member of this section, was held by his other North American colleagues:

*The sudden death of Professor Birbal Sahni, dean of Indian paleobotanists, on April 10, 1949, just six days after the cornerstone-laying ceremony for the unique Institute of Paleobotany at Lucknow, India is a real blow to all paleobotanists. The founder and guiding hand of this Institute, the organizer of "the Paleobotanical Society" for India, and one of the great figures in paleobotany, Professor Sahni had friends the world over. On his recent trip to United States he made the acquaintance and friendship of most of the active paleobotanists in America. Those of us who had the good fortune to be hosts to him and his brilliant, charming wife during his brief tour will be humbled by his passing. The great achievement of the founding of the Paleobotanical Institute, the only one of its kind, where it is planned to assemble some of the more promising paleobotanists to further the science in India and elsewhere, comes at the climax and end of a great, long and successful career. We extend our sympathy to Mrs. Sahni and to his many close friends.*

*It was only in September, 1948, that Professor and Mrs. Sahni returned to India after their tour of North America and Europe that lasted ten and one half months. It is most earnestly hoped that Professor Sahni's colleagues in India will be able to continue paleobotanical research in the country along the lines he laid down.*

## DARRAH'S INTERACTIONS WITH OTHER INDIAN PALEOBOTANISTS (1949-1972)

After Sahni's death, Darrah continued to keep in touch with Indian paleobotanists. He prepared a paper entitled "The materials and methods of paleobotany" for the Birbal Sahni Memorial Volume (1952). He also exchanged paleobotanical reprints and specimens.

Darrah continued his policy of exchanging of peel specimens and microscope slides of Carboniferous plant fossils, primarily from Iowa. Exchanges occurred with P. Maheswari of the University of Delhi. Maheswari, like Darrah and Sahni, also was a stamp collector, and they had all exchanged stamps as well. Verdoorn of Chronica Botanica Company worked with Sahni, Darrah, and Maheswari to publish their paleobotanical work and also enjoyed the exchange of ideas for the annual report put out by an international committee of paleobotanists (an ad hoc group).

Darrah, like Sahni, always had an interest in furthering the education and careers of others. In this regard, he served as an outside reviewer to evaluate three Indian candidates for the Doctor of Philosophy degree. In 1968, he evaluated Shri E.M.V. Nambudiri's dissertation entitled "Investigations of fossils plants from the Deccan Intertrappean flora of India" which was submitted to the University of Bombay. Nambudiri later wrote Darrah in 1970 to inform him that he had been awarded his Ph.D. degree. In 1971, Darrah was asked to evaluate two more dissertations: Shri M.T. Shaikh's "Investigation of the Deccan Intertrappean flora of India" and of G.V. Patil's "Studies in the Deccan Intertrappean flora of India". Both candidates were awarded their Ph.D. degrees from Nagpur University.

Exchanges of ideas also continued with other Indian paleobotanists. V.B. Shukla was pleased to find reference to *Sahnianthus parijai* in the second edition of Darrah's *Principles of Paleobotany* (Darrah, 1960). Shukla mentioned that the details of this specimen were superb, as was its fruit, *Enigmocarpon parijai* Sahni. Shukla had students collecting with him from the Jurassic (now Early Cretaceous) of the Rajmahal Hills and from the Tertiary of the Deccan Intertrappean Series. Darrah received a shipment of this Jurassic material and reciprocated by sending some microscopic slides, primarily from Iowa coal balls. Shukla was interested in receiving representative microscope slides of cordaitan and pteridospermic material. Darrah's retirement from Gettysburg College in 1974 ended his exchanges with Indian paleobotanists.

## CLOSING THOUGHTS

Birbal Sahni and Bill Darrah were kindred spirits, born almost two decades apart, whose paths crossed

three times (1935, 1947, 1948) during their scholarly journeys. Each gave impetus to the other; each reciprocated kindness and friendliness, which bonded them together in their quest for outstanding achievement, both as scholars and as human beings. Both were earthy yet scaled the lofty mountains of the unknown. They have left rich legacies to us in the paleobotanical community because, above all else, they dreamed and achieved in paleobotany.

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