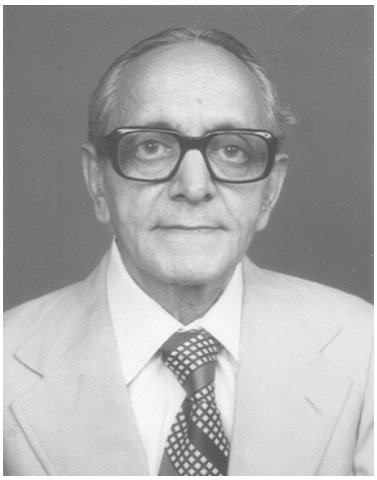
R. N. Lakhanpal (1923–2012)

Rajendra Nath Lakhanpal passed away in Lucknow on 19 January 2012 after an attack of pneumonia followed by respiratory failure. His death removes from our midst a distinguished scientist known for his dedication to the subject of his study and his integrity and humanism as a person. He was a palaeobotanist of great distinction whose contributions gained international acclaim and recognition. Lakhanpal was born on 5 August 1923. He earned his Master's degree in botany from the University of Lucknow in 1944. His research career began in January 1945 when he joined Birbal Sahni in Lucknow University as a Research Fellow of the Burmah Oil Company to carry out research in palaeobotany. In 1947, he was appointed Senior Research Assistant under Sahni in a scheme on the Measurement of Geological Time sponsored by CSIR. When the Institute of Palaeobotany was founded in Lucknow in 1949, he was appointed Junior Scientific Officer in the Institute. His studies on Tertiary plant fossils of India and on microfossils of the Salt Range, Punjab, carried out under the supervision of Sahni earned for him the Ph D degree of the Lucknow University in 1952. This work also earned him in the same year an UNESCO scholarship to pursue palaeobotanical research with R. W. Chaney at University of California, Berkeley. The visit abroad gave him the opportunity to visit centres of palaeobotanical studies in USA, UK, France, Belgium and The Netherlands, and benefit from interactions with leading scientists in these centres. He then returned to the Institute (now the Birbal Sahni Institute of Palaeobotany [BSIP]) where he was promoted as Senior Scientific Officer. From then on Lakhanpal served as Scientist, Assistant Director, Deputy Director, Distinguished Scientist (1984) and finally Emeritus Scientist (1984–1988) at the Institute. He also organized the Fossil Plant Collection and was an active participant in the many activities concerned with the development of the Institute in its formative years.

During his fruitful career as a scientist, Lakhanpal embraced three areas: palaeobotany, palaeoecology and palynology, a reflection of the breadth of his interests. His outstanding work was quite clearly on the floristic composition, palaeoecology and phytogeography of the Tertiary flora of India, and those of Central Africa and northwestern USA. Indeed, he is reckoned an authority on Tertiary floras. His division of the Tertiary floras into Palaeogene and Neogene is widely accepted. Based on his studies, Lakhanpal surmised that water was the main factor that influenced plant distribution in the tropics. On the other hand, distribution of temperate floras was chiefly dependent on temperature. According to him, temperate elements entered the Himalayan flora in the Miocene. His discovery of guttiferous remains (*Calophyllum* and other taxa) from the early Tertiary of Rajasthan pointed to the existence of a rich vegetation in western Rajasthan during that period. His discovery of *Nipa sahnii* from the Tertiary of Assam was suggestive of the northward extension of the Bay of Bengal during



Miocene. Much of his work, significantly, had a bearing on phytogeography. His presentation of the Rujada flora of West Central Oregon was the first detailed discussion of the forests that thrived during the Upper Oligocene along the coast of northwestern USA. As noted by Maheshwari and Kapil (1963) in their authoritative review of *Fifty Years of Progress in Botany in India*, Lakhanpal therein 'provided important data about the palaeoecology and palaeogeography of that region'. According to them, 'It represents an ecotone between the forests of the interior and the coast which is a rather rare phenomenon in fossil floras'. In the course of his studies on Tertiary flora of India, Lakhanpal described some new fossil genera (*Mallaoxylon keriense* gen. et sp. nov. from the Deccan Intertrappean Series and *Mesuoxylon arcotense* gen. et sp. nov. from Tertiary of Arcot District in southern India), some new species, besides many other taxa already known. His discovery of *Nelumbium* in the Tertiary of Assam gains significance when viewed in the light of recent findings on angiosperm phylogeny. Especially relevant and significant is his work on a number of dicotyledonous fossil woods unearthed from the Tertiary, again viewed from the angle of phylogeny. Of particular interest is his discussion of the nomenclature of fossil woods (*Bull. Bot. Surv. India* **10**, 289–292). Geological history was always in focus as we see from his work on the Dipterocarpaceae, a subject which continues to receive attention. The Deccan Intertrappean fossils he discovered and described include new species such as *Palmoxylon surangei* and *Tetrameloxylon prenudiflora*. Discovery of fossil Rhamnaceae from Lower Siwalik beds (Himachal Pradesh), and fossil *Ficus* are among his other works. His collection of Tertiary wood, leaves and fruits forms a most valuable addition to the collections at BSIP. His paper on Tertiary floras of India and their bearing on the historical geology of the region in *Taxon* (1970, **19**, 675–694) is widely quoted. Good work is never an end in itself. Judging from the impact of his pioneering work on Tertiary floras initiated under the tutelage of his teacher, one notes that the impact was positive in stimulating a great deal of work at BSIP and elsewhere.

Lakhanpal pioneered palynological studies in India and several students trained by him continued research on Recent and Quaternary palynology initiated by him at BSIP. Naturally, palynological research flourished.

Apart from his many original papers, Lakhanpal authored a book, *The Antiquity of Angiosperms* (1979). He also co-authored the *Catalogue of Indian Fossil Plants* published in 1975.

Lakhanpal was elected to the Fellowship of the Indian Academy of Sciences in 1974. He was also a Fellow of the Indian National Science Academy and the National Academy of Sciences, India. He led the Indian team in the Indo-

Japanese Expedition to Eastern Himalayas in the summer of 1960. He was President, Palaeobotanical Society (1983), was Editor-Secretary and Chief Editor, *Palaeobotanist* (1976–1984) and Chief Editor, *Geophytology* (1971–1973). He was a recipient of the Birbal Sahni Medal of the Indian Botanical Society (1983) and of the XII International Botanical Congress Medallion presented to him at the Congress in Leningrad in 1975.

I first met Lakhanpal at the International Botanical Congress at Edinburgh in 1964. I had the pleasure of meeting him again at the International Botanical Congress in Seattle in 1969, where he had been invited to participate in the Congress Symposium on Interfaces between Botany and Geology. The high esteem in which he was regarded by the international community of botanists and palaeobotanists was obvious to me even then. In later years during my close association with Lucknow, I saw a great deal of Lakhanpal: I saw in him a gentleman and scholar of dignity, modesty and friendliness. In summation of his contributions I should say that much of it has a direct bearing on angiosperm phylogeny, which is a subject as fascinating as it is intriguing, and of great current (and, indeed, perennial) interest. His long and classic innings at BSIP from the time he joined the Institute at the time it was founded (1949) until 1988, is a genuine measure of the beauty of interaction, of how well he got on with his colleagues. Interestingly, Lakhanpal was a Founder Member of the Society for Scientific Values, whose objective was to promote integrity, objectivity and ethical values in the pursuit of science. There is much to learn from the science and humanism of Lakhanpal for those in the pursuit of not only botany and palaeobotany but also other disciplines, many of which are closely related.

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Sardul Singh Guraya (1930–2012)

Sardul Singh Guraya, born on 12 October 1930 at Kotmajlis, Gurdaspur District, Punjab breathed his last on 8 July 2012. He is survived by his wife Surinder Kaur, two sons and a daughter. He graduated from Punjab University and obtained the doctoral degree under the supervision of Vishwa Nath. He carried out postdoctoral research with G. S. Greenwald at Kansas University Medical Center, USA (1962–64). My first encounter with Guraya was in 1969 when I was attending a six-month training workshop in 'Reproductive biology' organized by the Indian Council of Medical Research, New Delhi. He delivered lectures and demonstrated some histochemical techniques to the participants.

During the course of my doctoral research on amphibian reproduction I came across a large number of his contributions that ranged from invertebrates and protochordates to all classes of vertebrates (fishes, amphibians, reptiles, birds and mammals) including man. He wrote many reviews and published them in reputed journals like *Physiological Reviews* and *International Review of Cytology*. In the latter alone, he contributed over 20 reviews. Many of his publications are single author contributions.

Guraya studied comparative aspects of vertebrate reproduction by elucidating the ultrastructural, cytochemical and histochemical changes occurring during oogenesis, folliculogenesis, oocyte maturation, follicular atresia and origin of interstitial gland cells in vertebrate ovaries, spermatogenesis, sperm capacitation, acrosome reaction, Leydig cell and Sertoli cell functions and, localization of steroid synthesizing cellular sites in the

gonads of different groups of chordates and some invertebrates. Being in an agricultural university, he also made in depth studies on the reproduction of farm animals like, goat, sheep and buffaloes. Though he used simple histological and histochemical techniques available then, his understanding and interpretations were most modern.

Guraya authored the following books: *Biology of Ovarian Follicles in Mammals* (Springer-Verlag, 1985), *Ovarian Follicles in Reptiles and Birds* (Springer-Verlag, 1989), *Biology of Spermatogenesis and Spermatozoa in Mammals* (Springer, 1987), *Cellular and Molecular Biology of Gonadal Development and Maturation in Mammals* (Springer, 1998), *Ovarian Biology in Buffalos and Cattle* (ICAR, New Delhi), *Cellular and Molecular Biology of Gonadal Development and Maturation in Mammals: Fundamentals and Biomedical Implications* (Narosa, 1998) and *Comparative Testicular Biology in Animals* (Oxford & IBH, 1999).

I had the good fortune of having personal interaction with Guraya. His coming to Dharwad had a special meaning to me. In the early 1980s the situation in Punjab was such that people felt unsafe to move freely from place to place. Yet, he visited Dharwad twice on official work. He firmly believed, and rightly so, that delays in filling faculty positions and awarding doctoral degrees can harm the interests of institutions and individuals.

During one of his visits, I proposed to Guraya that we jointly edit a book on *Reproductive Cycles of Indian Vertebrates*, he readily endorsed the idea and suggested that I edit the book. His encouragement formed the backbone of my efforts in publication of this book (Allied Publishers, 1989). Working in a small state university where academic atmosphere is often missing my interaction with Guraya enlightened me and gave the needed inspiration and encouragement to pursue higher research. He provided purpose and meaning to my academic life.

It was a matter of great pleasure having Guraya in scientific meetings. He invariably brought vibrancy with ques-