

HISTORICAL NOTES

Nehru and Indira Gandhi, and counselled the Government through its various committees and bodies, e.g. of the CSIR, UGC and ICAR (of the Ministry of Agriculture) and helped with the selection of candidates for the administrative services. The United States Educational Foundation in India depended on PM for selection of Fulbright scholars and sought his advice on other programmes. He was Editor of Publications of the National Academy of Sciences. The additional responsibilities apparently did not weigh him down and many wondered how he was able to pack so much in a day and still be up to date in his academic pursuits. A prodigious photographic memory was certainly an asset and so was skillful management of time. Generally all his serious study was confined to the early hours of the morning.

Honours and distinctions

PM was a scientific citizen of the world and many academies were honoured to make him a Foundation Fellow or Corresponding Member. In 1947, he was made a Foreign Fellow of the American Academy of Arts and Sciences. During the same year he became a Foreign Fellow of the Bota-

anical Society of America. He was President of the newly created Embryology Section of the Seventh International Botanical Congress in Stockholm in 1950, and Vice-President of the Eighth International Botanical Congress held in Paris in 1954. In 1959, he was decorated with the degree of D Sc *honoris causa* of McGill University, Montreal on the occasion of the 9th International Botanical Congress. He was elected Foreign Fellow of the Kaiserliche Deutsche Akademie der Naturforscher Leopoldina in 1959, the Deutsche Botanische Gesellschaft in 1961 and of the Royal Dutch Botanical Society in 1963.

Turning to recognitions at home, in 1934 he became a Fellow of the Indian Academy of Sciences, Bangalore. The Indian Botanical Society honoured him with the Birbal Sahni Medal in 1958, while the National Institute of Sciences of India, of which he was a Foundation Fellow since 1935, honoured him with the Sunderlal Hora Memorial Medal in 1964. In 1966, he was made an Honorary member of the Botanical Society of Bengal. He was President of the Indian Botanical Society in 1944. He was President of the National Academy of Sciences of India in 1964 and General President-elect of the Indian Science Congress Association for 1968, a role he could not fulfil on

account of his untimely death. He was elected Fellow of the Royal Society in 1965. It was typical of him that he did not disclose this even to his family members, who learnt about it only through newspapers.

The end

PM was so full of life and excited about many of his projects getting completed to his satisfaction that he ignored the illness which was gradually descending on him, an illness which started when he was returning from London after signing the Charter Book of the Fellows of the Royal Society. The end came on 18 May 1966 and with that the botanical community suddenly lost one of the most extraordinary figures of recent times. Men of his stature are rarely born, but leave behind them footprints on the sands of time.

NIRMALA MAHESHWARI

International Centre for Genetic Engineering and Biotechnology, Aruna Asaf Ali Marg, New Delhi 110 067, India
e-mail: maheshwari_nirmala@yahoo.co.in

Remembering my guru P. Maheshwari

The year 2004 is special for me as it marks the birth centenary of my guru, Panchanan Maheshwari (PM), who had a significant influence in transforming my career and life. I pay my homage to him on this special occasion. There are several accounts on his life and work¹⁻⁴. The well-researched essay by Kapil⁵ sums up Maheshwari's major achievements and those of his students. A short biographical sketch of Maheshwari by Rangaswamy⁶ has appeared recently. Here I wish to bring out the qualities that made him an eminent scientist, teacher, builder of a great institution and as an ardent promoter of plant sciences in India. I would also recall the environment in which I grew up as a young teacher and the impact our guru had on the development of his students.

After obtaining the B Sc degree (1950) and serving as a demonstrator in botany for one year at St Philomena's College, Mysore, I proceeded to pursue my M Sc

degree at B.R. College (later R.B.S. College) Agra in 1951. Bahadur Singh, who was heading the department in that college



guided my M Sc dissertation on the embryology of Asclepiadaceae. He was a student of Panchanan Maheshwari, the leading plant embryologist of the world. Reading Maheshwari's book taught me the fundamentals of embryology and opened my mind to the enormous potential applications of the subject.

After securing my M Sc degree I went back to my Alma Mater in Mysore as a lecturer. In early October 1953, I received a call from the Registrar of the University of Delhi, asking me to appear for a Botany Lecturer's interview on 10 October. After arriving in Delhi I reached Jubilee Hall, a hostel for postgraduate male students. I took a stroll in the spacious garden around the Vice-Chancellor's office, which was formerly the Viceregal lodge.

The Selection Committee consisted of two experts – B. P. Pal (at that time Director of the Indian Agricultural Research Institute) and R. Misra (Head of the Department

of Botany, Banaras Hindu University), besides P. Maheshwari and G. S. Mahajani, the Vice-Chancellor. My interview lasted 50 minutes. I was amazed (but relieved!) when told that I was selected as lecturer and should report to duty on Monday, 12 October 1953. This was a break I needed in my life and I am grateful for it. When I tiptoed to Maheshwari's room on Monday morning, a surprise awaited me. He said, 'Mohan Ram, start teaching embryology to the students of third year B Sc (Hons) and conduct the taxonomy practical for M Sc Ist year'. I said that I had come to learn embryology from him and how could I start teaching the subject straight away. Maheshwari's reply was that it was the best way to learn and that I should show him the outlines of my lectures when I started teaching. He also became my research guide and mentor.

I was overawed by the set-up of the department. The laboratories, classrooms and staff rooms were arranged in a neat and orderly way. Classes were held regularly, research scholars were disciplined and put in long hours of work, all seven days of the week. Known for the value he placed on hard work, Maheshwari set an example to others by arriving in the laboratory at 8.00 in the morning and being the last one to leave. He was fully informed about each activity carried out by every member of the department. He ensured that the scholars received their stipends every month. They could meet him any time in the office, without appointment. He regularly examined microscopic preparations of the research scholars, including those who were registered with his colleagues. He gave many useful suggestions regarding the fixation, dehydration, embedding, sectioning, staining, mounting and interpretation of the observed embryological events.

Although the resources of the department were meagre compared with the present-day standards, there was a greater sense of academic purpose, utter commitment, industry and a considerable output of high-quality publications.

Maheshwari neither had his education abroad (like many of his contemporaries) nor believed that there was any need for research scholars to go overseas to obtain a Ph D degree. This confidence must have been developed by Maheshwari due to the influence of his teacher, Winfield Dudgeon, an American missionary who came to India and taught at the Ewing Christian College, Allahabad. Dudgeon

was a student of the renowned botanist C. J. Chamberlain of the University of Chicago. Dudgeon is also remembered as the founder-president of the Indian Botanical Society (1920).

In Maheshwari's considered opinion, a doctoral degree was only a license to practice research. He felt that the essential requirements of a research scholar were: selection of a worthwhile topic, pursuing it with intense focus, perseverance, critical analysis of the findings and their presentation with accuracy and elegance. He also did not think that a scholar should necessarily stick to the same discipline after completing the Ph D degree. He believed that contact with great minds and opportunities to work in laboratories of international repute were necessary after Ph D to broaden one's mental horizon, receive stimulation, develop new ideas, learn the latest techniques and sustain a perennial interest in scholarship. He wanted our scholars not to go out merely to learn but also to share their own skills, knowledge, insight and experience with people abroad.

Until 1973, apart from the M Sc and Ph D programmes, a three year B Sc (Hons) course (with the exception of one college) was taught in the Department of Botany in Delhi University (whereas currently the B Sc (Hons) course is taught in the colleges, rather than in the main Botany Department of the university). Students came after 11 years of schooling and were just 16 years old when they arrived as undergraduates. Their number was small, but they had immense opportunities to learn. It was inspiring to be taught by Maheshwari and to see research being done in the laboratories at such a tender age. There were other teachers who had specialized in nearly all branches of botany. Thus, the students received a balanced basic botanical education. Moreover, to meet and listen to a galaxy of biologists who visited the department was indeed a rare privilege for them. Delhi was a Mecca for botanists. During the decade 1956–66, nearly 300 visitors came to give lectures or seminars in the department. A few names that I recall are: K. V. Thimann (Harvard), E. J. H. Corner (Cambridge), Theodosius Dobzhansky (Columbia), J. B. S. Haldane (Calcutta), Sir Otto H. Frankel (Canberra), M. Yakovlev (Leningrad), Academician Takhtajan (Leningrad) and F. C. Steward (Cornell). Leading botanists of India visited the department several times. This trend continued in the post-Maheshwari period and many courses

were conducted by visiting scientists – P. R. White, J. Heslop-Harrison and Peter R. Bell.

He suggested research problems to even undergraduate students, which they carried out during summer, autumn and winter breaks. In addition, they were also given training during holidays in microtechniques with plant materials used in research projects of the senior faculty members, which built up their competence and confidence. They continued to work on their assignments in their Master's course. Some of the M Sc dissertations were subsequently published in international journals and were cited in reviews and books. Maheshwari also realized that not all students who took the B Sc General course will be generators of knowledge and will enter other professions as well. They would be users of science and technology and would also need to employ the methods of science in their own professions. He therefore emphasized thoroughness in whatever was to be done, punctuality, promptness, cleanliness, time-management and integrity – which are time-honoured values that form the core of a professional in any walk of life. Many students who later took up government or corporate jobs remember Maheshwari for imparting them durable truths.

Maheshwari was an outstanding teacher who made elaborate preparations for his lectures. He constantly updated information by consulting a wide variety of books and journals. He marshalled his facts, and spoke clearly and loudly. With a beautiful handwriting, he used the blackboard effectively. In the M Sc practical classes, his method of teaching was quite distinct. He would carry papers or books written by established botanists and would ask the students to compare what they had observed in their preparations with the descriptions in published works. This practice of critical verification of findings gave an excellent training for future scholars.

Maheshwari corresponded with leading plant scientists of the world. He travelled widely and was able to procure for his students research materials for studying the embryology of rare and taxonomically ill-defined families from Australia, New Zealand, Malaysia, Indonesia, North and South America and the former USSR. His collection of portraits of famous biologists, and pictures of rare and unique plants were exquisite. He kept in touch with fellow botanists in India and wrote letters of appreciation even to young persons, whenever he read good papers pub-

lished by them. Promoting talent was his mission and countless number of scientists remember him for helping them in securing jobs and opportunities to work in India and abroad.

When caste politics entered Mysore (later Karnataka) in the 1950s, Maheshwari came to learn that some highly meritorious teachers of botany had been denied well-deserved advancement; he helped them procure key positions in the Botanical Survey of India and other Central Government establishments.

The departmental colloquium held every week was attended by all teachers and research scholars. The members followed by discussion entrusted a convener, elected from among the scholars, to organize talks on scientific topics. Another unique activity started by Maheshwari was demonstration of the work of research scholars, open to everyone. It used to be held in one or two large laboratories. Stained preparations would be mounted on microscopes arranged on long tables for critical viewing. Inked camera lucida drawings and photographic plates were also displayed. Demonstrations helped solve many doubts by the peers before important papers were communicated to journals or a Ph D thesis was submitted. This activity enabled scholars to become acquainted with the work done by others and a healthy competition ensued. I remember seeing the demonstration of excellent serial sections of the early stages of the peculiar features of embryo development in *Paonia* by M. S. Yakovlev, a noted embryologist from Komarov Botanical Institute of the USSR Academy of Sciences (presently Russian Academy of Sciences), Leningrad (St. Petersburg) in March 1964.

Maheshwari strongly believed that effective communication in speech and writing was as important as doing excellent research. Realizing that research scholars were poor in writing in English, he gave a course on scientific writing. He brought out all the common errors committed by Indian students. Each of us was asked to buy a personal copy of *A Manual of Style* published by the Chicago University Press, which was instructive in matters of writing, printing, proof-reading and publishing. He encouraged the frequent use of dictionaries, thesaurus and encyclopaedias to enrich the knowledge and vocabulary of students. This course was useful and was subsequently given by N. S. Rangaswamy and Manohar Lal. Maheshwari's insistence that talks should be rehearsed

before giving them in important meetings set a high standard for oral presentation.

On the basis of his experience as a member or chairman of various selection committees for appointment of scientists, Maheshwari noted that most botanists were poor in their general knowledge and current awareness. He introduced a weekly seminar in the department on only non-botanical topics. This enlivened the scholars as the discussions were like spices added to the routine life of staining, sectioning and drawing. One of the greatest benefits that his students, grand-students and great grand-students have derived is the meticulous care in planning and organizing scientific meetings and in preparing scientific documents. One quality which stood out in Maheshwari was his keenness to train and encourage the office and laboratory staff.

When he was alive, it was difficult to know what he really thought about me or for that matter of many of my younger colleagues. It was only last year, 37 years after of the demise of Maheshwari that I came to know from Ramesh Maheshwari, my former student and the youngest son of the professor, that he was really fond of me. It was not easy to meet PM's expectations. As I am now past 74, I realize the value of the training he gave me and the trust he had imposed in me. He promoted youngsters in many ways and never took any credit for it. I still wish he had patted me on my back at least once in his lifetime, so that I could have smiled back to express my gratitude. I have to content myself with what Ramesh told me.

When I was 34 years old, PM told me that he would nominate me for the post of Secretary-Treasurer of the International Society of Plant Morphologists, which he had founded. I argued that I had no experience in handling accounts and would be unable to shoulder such a heavy responsibility. His answer settled the matter. 'Do you think I am not confident that you can do it? If you have any difficulty you can always consult me or Dr Johri'. Probably entrusting greater responsibility was his way of expressing his appreciation. I was elected and I carried on this job for the next 21 years till I was able to save a large amount of money in fixed deposits, received entirely from membership and subscriptions to its journal *Phytomorphology*, especially from overseas.

Another new job entrusted to me by Maheshwari in early 1966 was to plan an entirely new block for the botany building with an area of 21,000 sq ft, funded by

the University Grants Commission. I had to design a new tissue-culture laboratory, staff rooms, seminar room, several individual laboratories for the faculty members, etc. Interacting with Raj Rewal, the architect (who later designed the National Institute of Immunology, International Centre for Genetic Engineering and Biotechnology, National Centre for Biological Sciences and the Brain Research Centre and many other buildings), was a rewarding experience.

For Maheshwari, botany was not a narrow discipline but had a wide scope dealing with the form, structure, development, function, genetics, ecology, taxonomy, economic, cultural and evolutionary aspects not only from algae to flowering plants, but also interaction of plants with viruses, bacteria, fungi, nematodes, insects, amphibians, reptiles, mammals and humans. He was a voracious reader and had wide interests. He encouraged photography of plants, collection of paintings (M. S. Randhawa's paintings of trees and flowers were hung on the walls of his office and museum), poems, stories, and references to plants in Indian classics, the *Bible* and the *Koran*. He also encouraged collection of stamps bearing pictures of plants, cartoons, proverbs and plant motifs in arts and crafts. In other words, anything botanical interested him deeply.

One of the areas in which he encouraged me to take a special interest was economic botany. This subject deals with the history of domestication, introduction, cultivation, processing, utilization, extraction of active compounds and international trade. He was keen to produce a book on the subject with me, which unfortunately did not materialize. I taught economic botany (besides physiology and tissue culture) for many years and this has helped me formulate and support various research projects in the country dealing with coffee, tea, spices, medicinal plants, mulberry, and non-wood forest products. I recall one small incident in this connection. Maheshwari had agreed to give a talk on 'Plants and Women' in the department. Just two days before the lecture was to be delivered, he had to attend an important meeting. He asked me to give that talk. No amount of pleading would convince him about my inability. I had no alternative but to accept it as a challenge. My wife Manasi and I spent two sleepless nights collecting information and pictures dealing with textiles, soaps, hair oils, shampoos, body creams, face powder, deodorants, depilatories, cosmetics, dyes, per-

fumes, flowers, jewellery, medicines, tonics and contraceptives from various women's magazines. To my great embarrassment Maheshwari came to my lecture and explained that his meeting was over earlier than he had anticipated. He sat through my talk and saw a large number of pictures projected through the epidiascope (overhead projectors had not yet become popular then). He was pleased that I had not let him down. He teased me by saying that he was not aware that I had an admirable expertise on the wide range of botanical items ladies used for beautification and well-being. Whether or not he had played a trick on me is still not clear.

In the summer of 1959, Maheshwari spent a few weeks at the Urbana Campus at the University of Illinois, USA as a visiting professor. At that time I was working with F. C. Steward, a noted plant physiologist, as a Fulbright Smith-Mundt Scholar at Cornell University, Ithaca, N.Y. As my wife was to join me as a Fulbright Grantee in August that year, I had rented a ground-floor flat. Maheshwari was invited to visit Cornell and to drive down to Montreal along with the Stewards to attend the International Botanical Congress.

Maheshwari reached Montreal with the Stewards as scheduled. A few young researchers working with Steward and I drove separately to Montreal. Maheshwari had organized a symposium on the Embryology of Angiosperms at the International Botanical Congress in which he had invited me to speak. I was nervous and messed up my presentation and I was quite ashamed that I had let my guru down. All that Maheshwari told me was, 'I think your preparation was not adequate'. The few Indians who were attending the Congress were proud that Maheshwari was honoured with a D Sc degree *honoris causa* of the McGill University at a special convocation along with two other great names in botany – Irene Manton and C. W. Wardlaw. After the deliberative assembly, he removed the ceremonial robe and joined us and never spoke a word about the honour he had received. He was modest to the core.

Steward and Maheshwari became good friends. The Stewards visited Delhi in March 1966, two months before Maheshwari's death and enjoyed his hospitality.

One of Maheshwari's dreams was to see that his family and the later generations be recognized as famous scientists. I understand that he had collected biographical information and pictures of well-known

families of scientists – Darwins, Huxleys, Bonners, etc. He had high expectations from his children, whom he guided, encouraged and monitored regularly. Growing up under an overbearing father whom they respected and feared, may have been a burden on them. Among his three sons and three daughters, two sons S. C. Maheshwari and Ramesh Maheshwari have continued their father's legacy and have received much recognition in their fields.

His large collection of books included not only those dealing with various branches of botany but also zoology, natural history, travels, biographies, encyclopaedias, dictionaries, literature and history. He frequented second-hand bookshops in search of rare books whenever he went abroad. The most enviable was his collection of reprints of papers on plant embryology up to 1966. These were kept in cardboard boxes in alphabetical order of author's surnames and neatly arranged in special almirahs. Xeroxing was not yet in vogue and he was generous to mail reprints to specialists in various parts of India and abroad. When I worked as Head of the Department of Botany from 1973 to 1976, I had got all his reprints indexed. After Maheshwari's death his entire collection of books and reprints was donated to the Department of Botany by his family at a ceremony chaired by C. D. Deshmukh, Vice Chancellor, University of Delhi. This valuable collection, called the Professor Panchanan Maheshwari Memorial Library, is housed in Room No. 1 in the department.

One of Maheshwari's greatest contributions to plant sciences was his book *Introduction to the Embryology of Angiosperms* (1950), a classic and the first book by an Indian author to be published by the then prestigious McGraw Hill Book Company, USA. All the groundwork for this book was done when Maheshwari was teaching at the University of Dacca. The manuscript was finalized with the professional advice of R. H. Wetmore (Biological Laboratories, Harvard University, Cambridge, Mass., USA) and A. F. Blakeslee (Smith College, Northampton, Mass., USA). Maheshwari's book has inspired botanists of several generations and is still studied by students and researchers all over the world. An Indian student studying in Wales wrote to Maheshwari that he felt proud that there is at least one Indian author whose book was prescribed as reading material. The book not only deals with the descriptive, comparative and

phylogenetic aspects of plant embryology, but opens up the experimental approaches with significant bearing on morphogenesis, physiology, genetics and plant breeding. This book was translated to Russian in 1959. Maheshwari subsequently edited *Recent Advances in the Embryology of Angiosperms* (1963), an authoritative volume highly useful to researchers.

Two other lasting contributions of Maheshwari were the founding of the International Society of Plant Morphologists and starting of its journal *Phytomorphology*, and the establishment of the Delhi University Botanical Society. The objective of the latter was to encourage students to organize field trips, lectures, debates, quizzes, competitions of various kinds and bring out its magazine *Botanica*, in which he himself contributed interesting articles, some under the pseudonym 'The Idler'.

Realizing the need for improving school education, he edited a seven-volume inspiring and well-illustrated *Textbook of Biology for Secondary Schools in India* (1964–67) with his junior colleague Manohar Lal for the National Council of Educational Research and Training (NCERT) New Delhi. I was an author of two chapters in this work. This experience later stimulated me to accept the Chairmanship of the Biology Textbooks Development Committee to bring out four volumes of *Biology – A Textbook for Senior Secondary Schools* (1988–89) with profuse colour illustrations under the aegis of NCERT.

Besides being a keen observer, micro-technician, illustrator and communicator (in great demand for delivering public lectures), Maheshwari was an able organizer and manager. He stood out in any meeting, assembly or conference and effused confidence. Tall, well-built and erect, he walked briskly with an imposing gait, his head held high. His face was generally stern, but it was lit up with a beautiful smile.

He never bragged about his achievements nor praised his students openly. Quite often, the news of the honours bestowed on him reached his family and colleagues through the press.

The Maheshwaris were excellent hosts and many leading botanists of India stayed as guests in their spacious bungalow at 29, Probyn Road on the campus and later at 7, University Road. Batches of students were invited to tea and informal conversation as well.

Although strict about the research work of his students, PM was broad minded about their personal lives and did not in-

terfere with the free mixing of men and women scholars. A few intra-departmental marriages resulted from this tolerance, starting with mine with Manasi Ghosh, followed almost immediately by that of Maheshwari's son Satish with Nirmala Mathur. This tradition seems to have continued! Although he appreciated the research talents of women scholars, for some reason he did not appoint any woman to the faculty.

Maheshwari liked to listen to devotional music. He had a good collection of gramophone records of D. V. Paluskar, Juthika Roy and M. S. Subbulakshmi. He would occasionally invite Manik Sane, Chhaya Biswas, R. N. Chopra or me to sing bhajans in his residence or during the annual day function of the Delhi University Botanical Society. Film music, ghazals and love songs were strictly forbidden.

On the basis of its outstanding contributions to botany in general and morphology and embryology in particular, the department was elevated to the status of a Centre of Advanced Study by the University Grants Commission in 1963. This helped in the expansion of the faculty and brought funds for building new laboratories and purchase of equipment. Election of Maheshwari to the fellowship of the Royal Society, London brought greater prestige to the department and also to the practitioners of botany in India.

After signing the Charter Book of the Royal Society in London on 11 April 1966, Maheshwari was about to leave for Japan in the second week of May from Delhi. He developed high fever on 10

May and had to be admitted to a nursing home. As he developed severe convulsions, he was shifted to the Willingdon Hospital (presently Ram Manohar Lohia Hospital), New Delhi, where his condition was diagnosed as meningitis. As he could not breathe on his own, he was put in an iron lung. The sound made by the mechanical pumps that forced air into his lungs still haunts my mind. All members of the botany department spent several days under the shade of trees in the dust and heat of Delhi, in the hospital, seriously worried about the deteriorating condition of the professor. His end came on 18 May, casting a deep gloom over all of us. We carried his body on our shoulders from his residence to Nigambodh Ghat for cremation. As we crossed the Delhi Ridge, the amaltas trees had put out chandelier-like racemes of bright yellow flowers, as if to bid him goodbye.

Sadly though, his cherished desire that his end should come in the laboratory on a Sunday was denied. The practice of suspending work as a mark of respect on the death of a person was anathema to him and so we all went back to work after the cremation. A condolence meeting was held a few days later in the New Convocation Hall – the largest such meeting I have ever attended in the 50 years of my association with the University of Delhi. Several persons paid glowing tributes to Maheshwari on this occasion. Maheshwari was an atheist. T. R. Seshadri, the distinguished Professor of Chemistry, his neighbour, friend and a Vedantist, stated that Maheshwari, who worshipped work,

symbolized the highest attainment of human quality.

To sum up Panchanan Maheshwari was a leader with an international standing in botany. An outstanding teacher who imparted the basic values of academic rigour, commitment and utter dedication to learning and quest for excellence, he built a rich tradition in Delhi. He has left behind a worthy academic genealogy of botanists such as B. M. Johri, V. Puri, Bahadur Singh, Reayat Khan and their students, who have made a mark in India and abroad. In the history of botany in India, Maheshwari stands alongside Shiv Ram Kashyap, Birbal Sahni and M. O. P. Iyengar in the establishment of active schools of botanical research.

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H. Y. MOHAN RAM

*Centre for Environmental Management
of Degraded Ecosystems,
University of Delhi
Delhi 110 007, India
e-mail: mohan.ram@indiatimes.com*