

BOOK REVIEWS

would give leverage to counter disease and nutritional issues in burgeoning human populations. The book is well structured and lists the potential applications of *Moringa* species using chemical and pharmacological profiles. We could spot certain omissions/errors in the first chapter (p. 5): Under section *Moringa* it has been stated that 'this description was made to include', to refer to circumscription; similarly *comb. & stat. nov.* is appended to section *Donadsonia*; authorities of plant names are italicized (not

conventional) and there are misspelt botanical terms for perigynous (pergynous) and hypogynous (hypoglynous). These omissions have no bearing on the focused content of the publication and can be corrected in a future edition. The numerous published works of the author cited at the end of each chapter add valued authenticity to the book. The author deserves to be congratulated for bringing out a truly informative and useful book on the subject. It would serve as a good reference for herbalists, agriculture/phar-

macy students, and researchers/scientists in drug research in the years to come.

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PERSONAL NEWS

Lalji Singh (1947–2017)

The recent unfortunate demise of Prof. Lalji Singh, also known as the 'Father of DNA Fingerprinting in India' on 10 December 2017 in Varanasi, at the age of 70 years, has created a void among the biotechnology fraternity spread all over the country. Singh was an excellent scientist, a talented administrator, institution-builder and a social worker. He followed the maxim 'simple living and high thinking', which advocates that a person should lead his life with minimum wants, but one's thinking should be high to serve the people with great deeds. He was born on 5 July 1947 in a small village named Kalwari in Jaunpur district, Uttar Pradesh, India. His father Suryanarayan Singh was a farmer and Mukhiya (Head) of the village. Singh completed his primary and secondary school education at Kalwari and Pratapganj villages respectively. He obtained his B Sc degree in Zoology and Cytogenetics in 1964 from Banaras Hindu University (BHU), Varanasi, followed by an M Sc degree with gold medal for having secured first rank in the merit order. In 1971, he was awarded his doctoral degree at BHU, for his work on the 'Evolution of karyotypes in snakes' under the guidance of S. P. Ray Chaudhuri. A summary of his findings was published in *Chromosoma*¹.

Singh's direct and indirect contributions to science are countless; however, his major achievements include the setting up of several institutions and laboratories in India, starting with the Centre

for DNA Fingerprinting and Diagnostics (CDFD) in 1995, National Facility for Transgenic and Gene Knockout Mice, Society for Mitochondrial Research and Medicine, Advanced Laboratory for Structural Biology Research, a center for undertaking research aimed at conservation of endangered species (LaCONES)



in 1998, biosafety level (BSL)-II and BSL-III facilities for undertaking research on infectious diseases, Genome Foundation in 2004, and a dedicated centre for translational research on regenerative medicine (CRF), etc. which have catered to the needs of Indian citizens and nourished the minds of budding biotechnologists of the Indian subcontinent.

Singh's contribution in the field of molecular basis of sex determination: During the initial days of his research career at the Institute of Animal Genetics, University of Edinburgh, UK, Singh focused on sex chromosome associated satellite DNA, particularly female specific satellite IV DNA. Singh *et al.*² studied the molecular significance of heterochromatin in sex chromosomes of snakes and reported the conserved nature of satellite DNA sequences of W chromosome during evolution. Singh returned to India in 1987 and started his career as a senior scientist at Centre for Cellular and Molecular Biology (CCMB), Hyderabad and became its Director in 1998. CCMB was Singh's main centre of action and contemplation for more than 24 years, enabling him to collaborate with Kumarsamy Thangaraj, A. Govardhana Reddy and Ganeshhwer Chaubey and publish more than 200 papers (almost 90% of total publications)³.

Pioneer in DNA fingerprinting technology in India: Singh *et al.*⁴ developed a Bkm-derived probe for DNA fingerprinting to study the genetic variability and evolutionary relationship in various eukaryotes. The group identified and isolated Bkm sequence (mainly consisting of tandem repeats of tetranucleotide GATA) from the genomic DNA of female Indian banded krait that later on was widely used as an effective probe for genetic fingerprinting. This probe has

varied applications in forensic science, veterinary science for pedigree confirmation, medical field for diagnosis of genetic diseases and in agriculture for germ-plasm identification. The interesting studies on DNA fingerprinting of Asiatic lions and tigers helped Singh's group in identifying individuals with high genetic variable for conservation breeding programmes⁵.

Involvement in wildlife conservation and forensics: Singh and his team established LaCONES in Hyderabad and succeeded in developing a semen cryobank of tigers, lions and leopards. He also emphasized that modern biotechnological tools alone can save the species that are headed towards extinction and took initiative on a project to clone extinct Asiatic cheetah. The group requested the Government of India to import a live Cheetah/live tissues from Iran, so that they could take the genetic material from live cheetah cells and fuse it with empty leopard eggs followed by implantation of the embryos to leopard surrogates. Singh materialized many forensic cases in Indian courts several times, including that of the assassination of India's former Prime Minister Rajiv Gandhi, the 1995 Naina Sahni tandoor murder case, the 1996 Priyadarshini Mattoo murder case, Swami Shraddhananda case of Bengaluru, assassination case of Beant Singh (former Chief Minister of Punjab) and many more. He made history by presenting DNA fingerprinting evidence for the first time, that was accepted by the Court. His significant contribution to-

wards the Roopkund skeleton mystery attracted the attention of the viewers of National Geographic across the globe.

Role in Molecular Diagnostics and Genome Foundation: Singh and his group confirmed that deletion of 25 bp in a myosin-binding protein-C gene is the main cause of inheritable cardiomyopathy in Indian population by screening a nationally representative sample⁶. He was also an active member in the establishment of CDFD, Hyderabad, with the mandate of DNA fingerprinting and diagnostics for all species and diseases. Singh conceptualized an Indian non-profit foundation, viz. the Genome Foundation India with the aim to provide affordable genetic diagnostic services to the rural communities in the country, with the support of charitable organizations, the government, local authorities, doctors, scientists and local volunteers. The Foundation aims to establish a pan-India network of centres to set-up diagnostic services at reasonable costs for the masses and also reduce the technology gap between the rich and the poor.

Genetic resemblance of Andaman tribes: Singh's population genetics studies also led him to prove that native Andamanese are genetically unique and the first descendants of modern humans who migrated out of Africa, thereby sorting out the evolution and migration of humans by southern coastal route to India rather than northern route of migration via Middle East, Europe, Southeast Asia and Australia about 60,000 years ago⁷.

With his demise, we have lost a committed and devoted scientist. However, the enlightenment that Lalji Singh has brought to the world of science will remain forever and pave the path for young researchers.

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