

# **ARCHANA SHARMA**

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*Hechana Sharma*



# ARCHANA SHARMA

(1932-2008)

Elected Fellow 1977

On 14<sup>th</sup> January 2008 the scientific community lost one of the finest cytogeneticists, Professor Archana Sharma, who was the founder of the journal, *The Nucleus*. She brought out the December 2007 issue to its completion in the Golden Jubilee Year of the journal. Till her last day she was busy thinking about science, national issues, about the journal and her students.

## BACKGROUND, EARLY EDUCATION AND PROFESSIONAL CAREER

ARCHANA SHARMA was born on 16th February, 1932 in Pune, Maharashtra in the family of Professor NP Mookherjee, a Professor of Chemistry at Bikaner. Archana had her early education in Rajasthan. After obtaining her BSc in first division from Bikaner, she joined the Department of Botany, University of Calcutta and obtained her MSc in 1951 in first division, PhD in 1955 under Professor AK Sharma, and DSc in 1960. In fact she was the second lady to have been awarded DSc by the University of Calcutta.

Archana Sharma joined the Department of Botany at Calcutta University as faculty in 1967 and became Professor of Genetics in 1972. Along with Professor AK Sharma she initiated the formation of School of Cytogenetics and developed the Centre for Advanced Studies in Cell and Chromosome Research, a place that became Mecca for cytogenetic studies in India. In 1980, Archana became the Head of the Department of Botany. During her stay at Calcutta University, Archana supervised over 70 PhD students in the area of cytogenetics, human genetics, and environmental mutagenesis and through these efforts made highly significant contributions. The Alumni Association of the post-graduate department of botany, University of Calcutta, brought out a special issue of *Pallav* in honour and memory of Professor Archana Sharma. The articles in this issue are in Bengali and in English by her former students and colleagues. Each one of them has described their experience in the lab of Archana Di. She cared for each of her student, not only in his or her scientific studies but also taking care of their personal requirements and gave her best to bring out their best as a true scientist and an elevated human being. My own interactions with her revealed that she had deep knowledge of the subject and was a very kind person. She was the true combination of beauty with brains, knowledge with compassion and desire with a will to achieve.



**SCIENTIFIC CONTRIBUTIONS**

Dr Archana Sharma, along with Professor AK Sharma, developed novel methods of pre-treatment and staining cells to visualize chromosome structure. These techniques could be used for different plant cells and became very popular throughout the world. Based on their original work and the follow up investigations in their laboratory and others, Archana Sharma jointly with AK Sharma, published a book on Chromosome techniques—theory and practice in 1965 by Butterworths, London. This soon became a standard text-cum-reference book all over the world and the names Sharma and Sharma became synonymous with plant chromosome investigations. The second edition of this book was published in 1972 and the third one in 1980.

One of important contributions that came from Archana's laboratory was on the new concept of speciation in vegetatively reproducing plants. This work was published, among other important journals, in *Nature*. The question that many had in mind was how plant species, that propagate asexually, evolve themselves into newer species. On analysis of somatic karyotypes of a large number of taxa, mainly Monocots, she found inconstancy in chromosome complement in the somatic tissue and production of chromosomally variant cells in daughter shoots which later may lead to new genotypes in vegetatively reproducing plants. This regular occurrence of chromosome mosaicism in asexual species indicates genetic control facilitating origin of new species. She also studied the induction of cell division in adult nuclei and the cause of polyteny in differentiated tissues in plants. Some of her studies on cytotaxonomy of flowering plants have brought out new findings and concepts.

Dr Archana Sharma, during her advancing career developed other research interests. She spent lot of her time in the area of human genetics. More specifically she looked into genetic polymorphism in normal human populations in eastern India and compared these with pathological conditions. In other studies she looked into the differentiated states in human fibroblasts in relation to polyteny during the process of ageing which could be induced by various environmental agents. This led her to another important area of studying the effects of different pesticides and a large number of metals on different biological systems. Taking clue from her studies, her group checked for these effects in populations that are constantly exposed to hazardous environmental agents and correlating the end result with the use of dietary factors. The contributions of her group on effect of arsenic in water are very noteworthy. She also studied the effect of plant products in modifying the cytotoxicity of known pollutants. In these studies she looked into clastogenic and mutagenic effects on multiple test systems.



During her career, Professor Archana Sharma supervised about 70 PhD students. And she published over 400 research papers. She founded an international journal of cytology and allied topics, named Nucleus and remained its editor till 2007. In addition, she has written ten books. I have mentioned the titles of a few to reflect the areas of her interest, at the end of this write up along with a few of her important publications. She also edited a large number of proceedings and volumes, about 15, for CRC Press, USA; Oxford and IBH, New Delhi, Kluwer Academic (Netherlands) and Gordon and Beach UK. And a series of focal theme volumes for Indian Science Congress (about 7) as the president and also with successive presidents between 1977 to 1983.

If one reads the above paragraph once more, you wonder how someone can contribute so much in ones life time. This reflects on the commitment that Professor Archana Sharma had towards science. Both she and her husband, Professor AK Sharma, with whom she has been co-author on many books and articles, has been role model for many in the field of plant sciences in particular and in the scientific community at large.

### CONTRIBUTIONS OUTSIDE THE DOMAIN OF HER LABORATORY

By being a member and office bearer in different professional societies and Government agencies, Professor Sharma made contributions by sharing her thoughts, and ideas by frank discussions and comments. She served two terms as Member of the University Grants Commission, one term with the National Commission for Women, three consecutive terms in Science and Engineering Research Council, Department of Science and Technology, one term with Environment Research Council, Department of Environment, two terms as Member of the Overseas Scientific Advisory Committee and also Chairperson, Task Force on Integrated manpower development of the Department of Biotechnology, Member, panel for cooperation with UNESCO of the Ministry of Human Resource and Development and many other committees in various science ministries. She was also a member of the committee on Population, Environment and Development of the American Association for the Advancement of Sciences, Washington and committee for Capacity Building in Science, constituted by ICSU, Paris. In all these committees and panels, Prof Sharma's views were particularly elicited. She always made very valuable contributions which resulted in many policy changes and their implementation. In participating in these meetings she always had at the back of her mind to improve science research and teaching in Indian Universities and Institutions. Towards this end she also took up membership of the National Board of Accreditation of the All India Council of Technical Education.



## AWARDS AND HONOURS

Professor Archana Sharma was one of the few scientist decorated with many recognitions. She received the most coveted Shanti Swarup Bhatnagar Prize of the CSIR in 1976 in the field of Biological Sciences. Earlier she was awarded first JC Bose award in Life Sciences by the University Grants Commission. In 1983, she received FICCI award, and in 1984 the Indian Botanical Society recognized her work by selecting her for the Birbal Sahni Medal. At the Indian Science Congress Association meeting in 1989, Professor Sharma was selected for delivering the Platinum Jubilee Award Lecture and later the Association awarded her 15<sup>th</sup> GP Chatterjee Memorial Award in 1994 and Sir Asutosh Mukherjee Medal in 1999. The National Academy of Sciences, Allahabad, selected her for SG Sinha Memorial Lecture Award in 1995.

Professor Sharma was elected to the Fellowship of all the Science Academies of the country, viz. Indian National Science Academy, New Delhi, Indian Academy of Sciences, Bangalore and National Academy of Sciences of India, Allahabad. She was Member of the Executive Committee and Treasurer and General Secretary of the Indian Science Congress Association between 1982 to 1984 and then became its General President in 1986-1987. She became treasurer of the Botanical Society of Bengal and also of the Society of Cytologists and Geneticists. She was elected member of the Executive Council of the Indian National Science Academy (1980-1982) and National Academy of Sciences of India for a very long time since 1983. She also took up the responsibility as the President, Biological Sciences during the annual meeting of the National Academy of Sciences in 1985. In 1989, she also took over as the President of the Indian Botanical Society. In 1990, Professor Sharma also became a member of the International Academy of Sciences, Germany.

In 1984, Professor Archana Sharma was conferred **Padma Bhushan**—one of the highest civilian Award by the President of India, which in itself speaks volumes about her contributions in the field of science and education and to the society.

## AS A TEACHER AND AS A PERSON

While I was not a direct student or a close colleague of Professor Archana Sharma, I had contacts with some of her students who always spoke very high about her qualities as a teacher and supervisor. One has to see a special issue of Pallav (volume 3, 1998) that was brought out by the Alumni Association of the Post-Graduate Department of Botany, University of Calcutta. In this issue her students and colleagues, who currently occupy important position in various Universities, Institutions and other Organizations, have written about the abilities, qualities and on the personality of Professor Sharma. Many articles are in Bengali but many others are English. I would like to recount from a few of these articles to reflect on the personality of Professor Sharma. One of her students, Dr Lavania, who is currently at CIMAP, Lucknow, and has taken over as an Editorship of *Nucleus* from Professor



Sharma, writes " Archana di had a very affectionate and commanding personality... she felt concerned about the personal comforts and social well being of her associates... "One Dr TP Singh wrote " training us in handling of chromosome in Sharma style...serving the humanity through teaching and research was undoubtedly the first and foremost objective.of your life... Dr Suchitra from CIMAP writes "her eyes were always filled with oceans of truthfulness and rush of a mother's love. Other comments are " dedicated her career for the noble profession of teaching and research...."(YK Bansal); " she wanted to dwell deep in mysteries of nature encoded in chromosomes and genes...with her pleasing personality, patient hearing to what others had to say and refined manners, she would soften the ruffed feelings of others"...(MK Peer), " she was very fond of animals and pets..... Her sincerity, brightness and dedications both as a teacher and also as a researcher are traits that I admire and respect.... (Amita Pal, Bose Institute), "...I was only a student in her classroom lectures, yet she made an immense impression on my mind, of strength and beauty and of human understanding... (Sumita Mukherjee, CU)...

One can go on and quote many more statements made by her students and colleagues, within the department of Calcutta University and also from without. Everyone I have met and talked to has the same impression about her qualities as a teacher, scientist and a concerned human being. For her contributions to teaching she was awarded Eminent Teacher of Distinction by the University of Calcutta during Convocation of 2006.

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### BIBLIOGRAPHY

#### (a) Books

- 1965 (With SHARMA AK) Chromosome Techniques-Theory and Practise Butterworths (London) second, 1972, third, 1980.
- 1978 The Chromosomes Oxford and IBH Co New Delhi second, 1985 and third, 1991.
- 1983 (With TALUKDAR G and MUKHERJEE SK) Methods in Human Genetics. Kalyani Publishers and National Book Trust, Delhi.



- 1994 (With SHARMA AK) Chromosome Techniques—A Manual Harwood Academic Publications, Switzerland.
- 1999 (With SHARMA AK) Plant Chromosomes—Analysis, Manipulation and Engineering Harwood Academic Publications, Switzerland.
- 2001 (With SHARMA AK) Chromosome Painting Kluwer Academic, Netherlands.
- 2002 (With SEN S) Chromosome Botany Science Publishers, USA.
- 2003 (With SHARMA AK) Plant Genome Biodiversity and Evolution A 7 volume series dealing with Lower groups, Phanerogams (Angiosperms: Monocots and Dicots and Gymnosperms) Science Publishers, Einfield, NH USA.

**(b) Research Papers**

- 1956 (With SHARMA AK) Fixity in chromosome numbers of plants. *Nature* **177**: 335-336.
- 1958 (With SHARMA AK) Recent advances in the study of chromosome structure *Bot Rev* **24**: 511-550.
- 1959 Tumor production in plants by plant extract *Nature* **184**: 1083-1084.
- 1961 (With SHARMA AK) Cytology of some members of the family *Iridaceae* *Cytologia* **26**: 274-284.
- 1971 (With HAZRA RR) Chromosome studies in different species and varieties of *Sida* with special reference to accessory chromosomes *Cytologia* **36**: 285-297.
- 1979 (With SWAIN BK and TALUKDAR G) Electrophoretic analysis of plasma protein variability in the determination of twin zygosity *Acta Anthropogenetica* **3**: 127-132.
- 1980 (With NIGLI M and TALUKDAR) Review: Sex chromosomal abnormalities in India. *Tropical and Geographical Medicine* **32**: 206-215.
- 1984 (With GIRI AK, SINGH OP, SANYAL R and TALUKDAR G) Comparative effect of chronic treatment of certain metals on cell division *Cytologia* **49**: 659-665.
- 1986 (With GIRI AK and TALUKDAR G) Sister chromatid exchanges induced by metanil yellow and nitrite singly and in combination *in vivo* on mice *Cancer Letters* **3**: 299-303.
- 1987 (With MUKHERJEE A) Effects of cadmium and zinc on cell division and chromosome aberrations in *Allium sativum* *Curr Sci* **56**: 1097-1011.
- 1988 (With MUKHERJEE A, GIRI AK and TALUKDAR G) Relative efficacy of short term tests in detecting genotoxic effects of cadmium chloride in mice *in vivo*. *Mutation Research* **206**: 285-295.
- (With MUKHERJEE A, GIRI AK and TALUKDAR G) Sister chromatic exchanges and micronuclei formation induced by sorbic acid and sorbic acid-nitrite *in vivo* in mice. *Toxicol Lett* **42**: 47-53.
- 1989 (With SEN S and TALUKDAR G) Induction of unscheduled DNA synthesis in gastric mucosa treated *in vivo* with betel ingredients *Int J Crude Drug Res (Netherlands)* **27**: 74-80.
- 1990 (With AGARWAL K and TALUKDAR G) Clastogenic effects of copper sulphate on the bone marrow chromosomes of mice *in vivo*. *Mutation Research* **243**: 1-6.
- 1992 (With DHIR H, GHOSH S and TALUKDAR G) Interaction between two group IV metals-lead and zirconium on bone marrow cells of *Mus musculus in vivo*. *Biometals* **5**: 81-86.
- 1994 (With PALIT S and TALUKDAR G) Effects of cobalt on plants *Bot Rev* **60**: 149-181.



- 1994 (With SEN-RAYCHAUDHURI S and TALUKDAR G) Chromosome composition and DNA content in relation to familial hypogonadism *Biomedical Lett* **49**: 53-56.
- 1999 (With MUKHERJEE P, PODDAR S and TALUKDAR G) Protection by black tea extract against chromosome damage induced by two heavy metals in mice *Pharmaceu Biol* **37**: 243-247.
- 2000 (With BANDOPADHYAY B) Multivariate analysis in the use of karyotype to determine relationships between species of *Opuntia* (Cactaceae) *Caryologia* **53**: 121-126.
- (With PATRA M) Mercury toxicity in plants some aspects *Bot Rev* **66**: 379-423.

