

CONTENTS

A. Cursetjee	1
Nain Singh Rawat	6
J. C. Bose	10
P. C. Ray	14
Ruchi Ram Sahni	18
D. N. Wadia	22
S. Ramanujan	26
C. V. Raman	30
S. K. Mitra	35
Birbal Sahni	39
J. B. S. Haldane	44
P. C. Mahalanobis	49
M. N. Saha	53
S. N. Bose	57
S. S. Bhatnagar	61
Yellapragada SubbaRow	65
Salim Ali	69
K. S. Krishnan	74
V. N. Shirodkar	78
T. R. Seshadri	82
P. Maheshwari	86
Irawati Karve	90
B. P. Pal	94
D. D. Kosambi	98
Homi Bhabha	103
Subrahmanian Chandrasekhar	107
Vikram Sarabhai	111
Kamala Sohoni	115
Laurie Baker	119
Anna Mani	123
C. Gopalan	127
V. Ramalingaswami	131
G. N. Ramachandran	135
Harish Chandra	139
A. S. Paintal	142
A. P. Mitra	146
Vainu Bappu	150
P. K. Sethi	154
Shivramakrishna Chandrasekhar	158
Anil Agarwal	162

FOREWORD

It is with great pleasure that I commend to readers, particularly young ones, *BRIGHT SPARKS*, written so beautifully by Arvind Gupta and illustrated equally beautifully by Karen Haydock. As part of the Platinum Jubilee celebrations, the Indian National Science Academy (INSA) has been pursuing a vigorous publication programme this year. Most of the publications we have brought out are scholarly scientific volumes. We also felt the need for a publication to introduce in an appealing manner great past Indian scientists to the public, especially the young. It was when I was toying with this idea that I happened to chair the lecture by Arvind Gupta when he received the INSA Indira Gandhi Award for Science Popularisation on Science Day in February, 2008. After listening to him, I had no doubt as to whom we should invite to write such a book. Arvind Gupta graciously accepted our invitation to do so. He recruited the services of Karen Haydock to prepare illustrations. My distinguished colleagues Jayant Narlikar, Madhav Gadgil and T. Padmanabhan kindly agreed to function as an Advisory Committee in the preparation of the book. All then worked well and we now have this wonderful book. I thank the author, the illustrator and the Advisory Committee for producing it. I am sure it would inform, inspire and entertain a wide cross section of children and adults.

M. Vijayan
President
Indian National Science Academy

Introduction

The idea of this book was born on the National Science Day (28 Feb 2008) at the Indian National Science Academy (INSA), New Delhi. I was there to receive the *Indira Gandhi Award for Science Popularisation* from Prof. M. Vijayan – President of INSA. In a brief conversation Prof. Vijayan requested me to write a popular book on past Indian scientists as part of INSA's Platinum Jubilee Celebrations. The brief given was to write “*a thoroughly readable book with good visual content so that it appeals to children.*”

Prof. Vijayan pursued it seriously. A few days later he contacted Prof. Jayant Narlikar – who agreed to Chair and steer the advisory panel. Prof. Narlikar in turn roped in Prof. Madhav Gadgil and Prof. T. Padmanabhan as panel members. I am deeply indebted to this extremely eminent advisory panel – all great scientists and also very sensitive human beings.

Choice of scientists

After a couple of meetings a list of 40 past scientists was homed upon. How were they chosen? The first criterion was to include all those who had won the Nobel Prize – undoubtedly the world's greatest award. The second criterion was to include all those who had been elected as Fellows of the Royal Society (FRS). Nain Singh Rawat's name was suggested as a pioneering surveyor – someone who surveyed large tracts of the Himalayas - Tibet and Lhasa in which the British had themselves failed. For this feat he was bequeathed the Victoria Medal. INSA suggested the names of Ruchi Ram Sahni – a pioneering science populariser from Punjab and Yellapragada SubbaRow – whose discovery of the antibiotic *tetracycline* saved millions of lives throughout



the world. Salim Ali – India’s most famous ‘*Birdman*’ and Vikram Sarabhai – architect of India’s Space Programme were of course included. Some unsung heroes were added to the list - D. D. Kosambi – Mathematician and Indologist, Shirodkar – inventor of the *Shirodkar Stitch*, P. K. Sethi designer of the world famous *Jaipur Foot*, environmentalist Anil Agarwal and Laurie Baker – who built houses for the millions. I was privileged to be apprenticed under Laurie Baker. So I was elated when his name was included.

Why so few women?

“*Where are the women scientists?*” asked Prof. Gadgil and suggested the inclusion of Irawati Karve as a pioneering anthropologist. As luck would have it a landmark book *Lilavati’s Daughters* was just published. This pioneering book documented the experiences and struggles of 100 women Indian scientists. This helped us add the names of Anna Mani and Kamala Sohoni two pioneering women who struggled very hard to make a mark in the world of science dominated by men.



This brings us to the very moot point – why only three women in a galaxy of 40 eminent scientists? Why not twenty out of forty? For one - odds were heavily stacked against women. There was a general consensus in society at that time that education for women should be tailored to their roles as women and homemakers. In a feudal and patriarchal society only a select and privileged group of women belonging to the high caste/class had access to higher education. Even this minority had to struggle hard to gain entry into the magical world of science.



Kamala Sohoni the topper of Bombay University was refused admission by Sir C. V. Raman – India’s Nobel Laureate. “*I am not going to take any girls in my institute.*” When confronted, he finally relented and admitted Kamala though not as a regular student. Kamala distinguished herself and later earned a PhD from Cambridge. The few defiant women who triumphed had to struggle against all odds to gain acceptance in the male-dominated world of science. Their struggles and sacrifices paved way for other

women. Things have changed and according to one estimate there are over a million women scientists in India today. The fact that one out of four scientists in India today is a woman is something to rejoice.



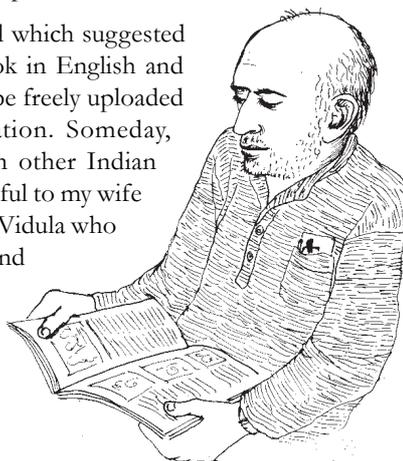
After taking up the task I got sucked into it and enjoyed it immensely. I was singularly fortunate to get Dr. Karen Haydock to illustrate and design the book. Karen is a biophysicist who has been in India for over two decades. Both her parents were artists. Her sensitive and realistic illustrations had imbued the *Hoshangabad Science* activity books with life. Once she agreed to illustrate and design I was assured of a first-rate book. My own attempts at writing this book have been modest. If at all this book will be read widely it will be because of the very unique presentation by Karen.



The stereotypical image of a scientist is that of a uni-dimensional man immersed in his lab, cut-off from the wider world. But, scientists like other human beings have many facets to their character. I have attempted to give their life-sketches along with their contributions. Did a childhood experience inspire them to take up science? Was it a kindred teacher or the loving mother? A few vignettes of their human nature have been woven – some wrote poems, some sketched and some loved to speed on big motorbikes at full throttle! Interesting personal anecdotes have been added to lend depth to their character.

I am grateful to the Advisory Panel which suggested that apart from publishing the book in English and Hindi its digitized versions should be freely uploaded on the web for wider dissemination. Someday, hopefully this book will appear in other Indian languages too. I am extremely thankful to my wife Sunita and my wonderful colleague Vidula who suffered reading all what I wrote and suggested appropriate changes.

Arvind Gupta
2nd October 2009
email: arvindtoys@gmail.com



The word 'scientist' often conjures an image of an isolated man in a lab, surrounded by books, expensive instruments, test tubes, and beakers belching out strange fumes. But actually, scientists have many facets to their character. Some of the scientists in this book wrote stories and poems; others had a passion for art - while a few loved speeding around on motor bikes! Many scientists passionately engaged with the society outside their labs and worked hard to make the world a better place.

Apart from their life sketches interesting personal anecdotes have been added to lend depth to their character. What made them take up science? Did a childhood experience inspire them? Was it a kindred teacher or a loving parent? What odds did the men, and particularly the women have to face and overcome? Hopefully, their lives will inspire the young.

Bright Sparks chronicles the lives and contributions of 40 inspiring Indian scientists of the past.



Arvind Gupta is known throughout India as a science populariser and toymaker. He has conducted thousands of workshops in India and abroad, and made numerous TV shows on making science toys from 'junk'. He writes, translates, and shares his passion for books and toys through his popular website arvindguptatoys.com

Arvind obtained a BTech from IIT Kanpur in 1975. He opted out of a lucrative career to devote his life to science popularisation. Currently, he works at the Muktagan Science Centre for Children located at the Inter-University Centre for Astronomy & Astrophysics (IUCAA) in Pune. He has been conferred numerous awards for his work, including the inaugural National Award for Science Popularisation amongst children (1988) and the Distinguished Alumnus Award by IIT / Kanpur (2000).



Karen Haydock has illustrated numerous books and textbooks for children during her last 20 years in India. In addition to her work as an artist, she has been teaching, training teachers, developing teaching methods, and writing books. She was originally trained as a biophysicist, having completed her PhD and post-doctoral research in USA.



A publication of the Indian National Science Academy