



Kulkarni





Tamirisa

Tamirisa



Simhambhatla

Genius is often associated with high creativity, originality, and insight. Curiosity can be seen as a precursor to discovery, innovation, and creativity. Creativity and teamwork can be cultivated and trained. So we attempted to cultivate these qualities in students through this book.

High school students in the USA, Qatar, and India present the path of 14 Nobel laureates, one each, from their student days to the Nobel-winning research. This book could be inspirational to millions of other student around the world!



Ruhaan Sahni



Ruhika

Sahana Sundar



Samaira Pawa



Samyukt Nathan



Saumya Gokhale







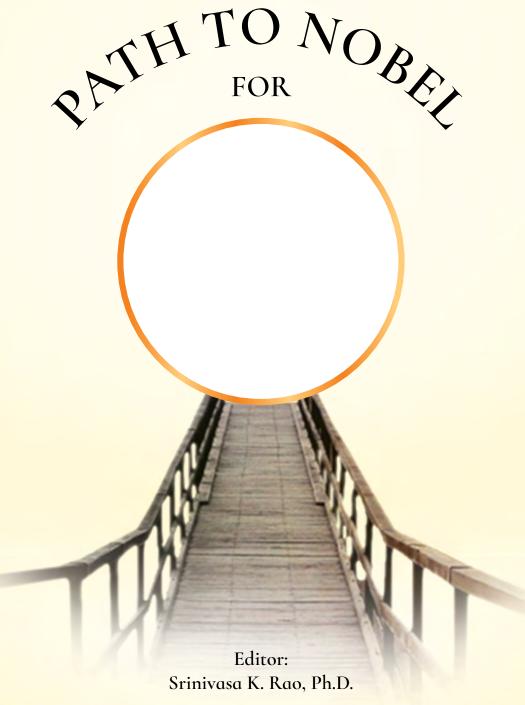


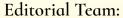




# PATH TO NOBEL

by Students for Students





Rashmi Kulkarni, Ph.D., Kavitha Viswanathan DDS, Ph.D., Sreedhara Voleti, Ph.D., Rakesh K Arya, Ph.D., Haritha Ronanki, Ph.D.







# PATH TO NOBEL

## **Editor:**

Srinivasa K. Rao, Ph.D.

### **Editorial Team:**

Rashmi Kulkarni, Ph.D., Kavitha Viswanathan DDS, Ph.D., Sreedhara Voleti, Ph.D., Rakesh K Arya, Ph.D., Haritha Ronanki, Ph.D.



Copyright © Association for Human Development (AFHD) 2023 All Rights Reserved.

ISBN 979-8-88909-994-9

This book has been published with all efforts taken to make the material error-free after the consent of the author. However, the author and the publisher do not assume and hereby disclaim any liability to any party for any loss, damage, or disruption caused by errors or omissions, whether such errors or omissions result from negligence, accident, or any other cause.

While every effort has been made to avoid any mistake or omission, this publication is being sold on the condition and understanding that neither the author nor the publishers or printers would be liable in any manner to any person by reason of any mistake or omission in this publication or for any action taken or omitted to be taken or advice rendered or accepted on the basis of this work. For any defect in printing or binding the publishers will be liable only to replace the defective copy by another copy of this work then available.

## **Dedication**

Dedicated to the Gurus who put us on this path!

**Dr. P.M. Bhargava,** CCMB, Hyderabad Dr. Srinivasa K. Rao

**Prof. S. N. Jogdand,** KBP College, Navi, Mumbai Dr. Rashmi Kulkarni

**Prof. Sri. Lakshminarayanan,** Sai Kripa, Chennai Dr. Kavita Viswanathan DDS

**Prof. Asish K. Chandra,** IISc, Bangalore Dr. Sreedhara Voleti

**Dr. Dipak Datta,** CDRI, Lucknow Dr. Rakesh K Arya

**Prof. Ramana Terli,** Andhra University, Visakhapatnam Dr. Haritha Ronanki

# Acknowledgements

This book project is a spontaneous one that emerged to help the students get inspired and have a vicarious experience of what a Nobel laureate could be. It took off from the idea stage in my head to the project stage in the world with the encouragement of Dr. Vasundhara D. Kalasapudi, Mr. Ramesh Simhambhatlam and, the enthusiasm of student Ms. Mahitha Simhambhatlam. I acknowledge Dr. Yelloji Rao Mirajkar for introducing Dr. Rashmi Kulkarni, who nurtured the project to make it a reality. Ms. Brahashita Gupta and other friends spread the word about the project to attract interested and talented students to write chapters. Dr. Ayanampudi Subba Rao helped the publication part of the project by introducing the Notion Press. We thank Pragati Art Printers, Hyderabad for making this a 'special production' and Parrot Communications, Hyderabad. A special thanks to Mr. Hardik Yaji, who presented a copy of Scientists Greater than Einstein and inspired me.

We thank the parents of all the students for their support.

# **Contents**

Curious, Genius Path to Nobel		1
1	Dr. Sydney Brenner	3
2	Dr. Mario Ramberg Capecchi	19
3	Dr. Martin Chalfie	29
4	Dr. Bruce Beutler	45
5	Dr. Robert Lefkowitz	57
6	Dr. Martin Karplus Dr. Michael Levitt Dr. Arieh Warshel	69
7	Dr. May-Britt Moser	85
8	Dr. John O'Keefe	93
9	Dr. Aziz Sancar	99
10	Dr. Richard Henderson	109
11	Dr. Gregg L. Samenza	121
12	Dr. Charles M. Dr. Rice	131
13	Dr. Emmanuelle Charpentie Dr. Jennifer A. Doudna	143
14	Dr. Ardem Patapoutian Dr. David Julius	155

# **Editorial Team Profiles**

## **Editorial Team**

#### Srinivasa K. Rao, Ph.D.

He is a New York-based biomedical scientist with a Ph.D. from the University of Paris. In 1988. Since then, he has been living and working in New York. He worked as a scientist and teacher at Columbia University, Albert Einstein College of Medicine, and the City University of New York. He worked in the vaccine industry. He published 30+ peer-reviewed scientific papers and participated internationally in several scientific meetings. He has been publishing articles on food, nutrition, and health and developing Edible Plant Food Museum.

#### Rashmi Kulkarni, Ph.D.

She is a Doha, Qatar-based entrepreneur, and co-founder of ARNA Genext Solutions Pvt Ltd. She has a Ph.D. in Molecular Genetics from The Ohio State University, followed by postdoctoral research at IMCB, Singapore and Weill Cornell Medicine-Qatar, Doha. Her current role is as director in her company, providing specialized courses, educational apps, research projects, health transformations, and outreach programs based on the human microbiome. She is the coordinator for "Aahaar Kranti," a nationwide nutritional awareness and solutions initiative in India.

#### Kavitha Viswanathan, DDS, Ph.D.

She is an American Board of Pediatric Dentistry (ABPD)-certified pediatric dentist in good standing and in clinical practice since 2008 in Dallas, Texas. She has a Doctorate in Psychoneuroimmunology, Masters in Oral Biology, and Certificate in Pediatric Dentistry, all from The Ohio State University, Ohio. She currently serves as an examiner for the ABPD, a peer reviewer for Journals of Pediatric Dentistry, Dental Education and Clinical Dentistry for Children and teaches first and second year pediatric dental residents at The Texas A&M Baylor College of Dentistry on a part-time basis.

#### Sreedhara Voleti Ph.D.

Sree is a practitioner of multidisciplinary research encompassing the applications of computational chemistry in Biology, Chemistry, and Engineering since 1996 after his PhD from IISc, Bengaluru and two postdoctoral fellowships (U. Mass and WSU) and working with pharmaceutical companies (UCB-Pharma) in Boston, USA and Ranbaxy, India. He is an entrepreneur, Co-founded Theraxel Discoveries and INDRAS, (WWW.INDRAS.IN) in India that consults, contracts, and collaborates on therapeutic invention and Healthcare aspects through New Drug Discovery and Drug Repurposing. He mentors students, faculty, and researchers towards innovation through Startups for entrepreneurship development in academic organizations and incubators.

#### Rakesh K Arya, Ph.D.

He is a multidisciplinary researcher with a Ph.D. from CSIR-Central Drug Research Institute, India in cancer biology followed by a postdoctoral fellowship at the University of Maryland and Cleveland clinic. He is currently a research associate at Cleveland Clinic, Ohio, encompassing his research in understanding the distinct mechanisms that mediate hepatic cell death during the progression of alcoholic and nonalcoholic fatty liver disease. He has authored/co-authored more than 20 research articles or book chapters in peer-reviewed international journals. He is a guest editor for the journal -Veterinary Sciences and a reviewer for more than 10 international journals.

#### Haritha Ronanki, Ph.D.

She is an Associate Professor of Biotechnology in India. She is the administrator of the Internal Quality Assurance Cell. A double gold medalist with a Doctorate from Andhra University. She has published more than 20 research articles in leading international. journals and several book chapters. She has organized 15 national workshops for students in leading colleges across the country. She worked on green nanoparticles research. She has developed e-content, podcasts, and video content on the Biotechnology curriculum. She is a regular presenter in the Andhra Pradesh MANA TV.

## Curious, Genius Path to Nobel

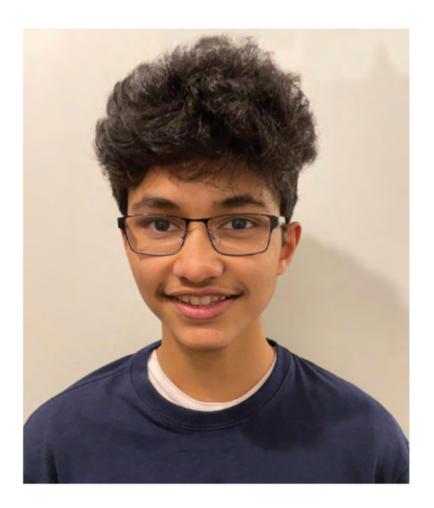
Man is Curious. Curiosity is the desire to learn or know more about. Nature refers to the physical world and everything in it, including all living and nonliving things. Further, Nature can also refer to the intrinsic characteristics or qualities of something or someone. Curiosity gave us a wealth of knowledge.

Of the Billions of people who have lived since human inception, they have contributed significantly to enriching our knowledge, and some are called Genius. Genius is often associated with high levels of creativity, originality, insight, and the ability to think and work independently or in teams. Curiosity can be seen as a precursor to discovery, innovation, and creativity. Curiosity can be cultivated and trained to some extent. Curious genius persons who have made outstanding contributions to their respective fields are awarded - some of them with a Nobel prize by the Nobel Foundation. Reading and understanding the path the 'Curious Genius Nobel Laureates' have taken from their student days to receiving the Nobel Prize can excite, stimulate, inspire, and help young minds to pursue the path to success.

With this hope, we encouraged and guided 14 high school students in the USA, Qatar, and India to write about the Path to Nobel chapters. This book could be inspirational to millions of other students around the world!

> Srinivasa K. Rao, Ph.D. New York 8<sup>th</sup> February 2023

## Ruhaan Sahni



About the author

Ruhaan Sahni is a freshman at the Princeton International School of Mathematics and Science in New Jersey. He has a keen interest in biology and is looking to major in it. He is a frequent participant in STEM competitions and has earned medals in nationwide events like Science Olympiad and Odyssey of the Mind. Ruhaan is an avid storyteller, writer, and tennis player who loves to joke and make people smile. This is his first published work.