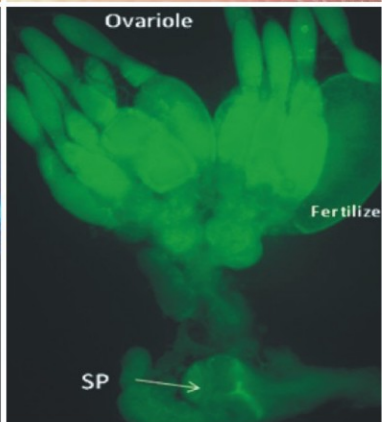
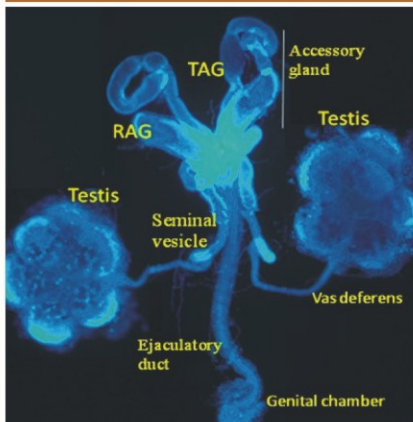
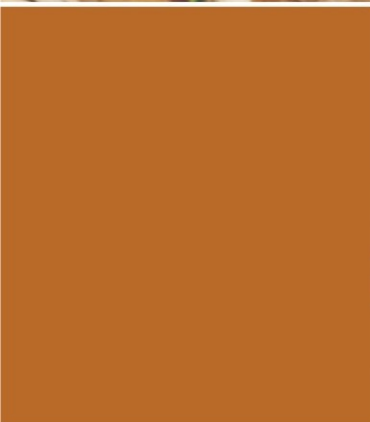
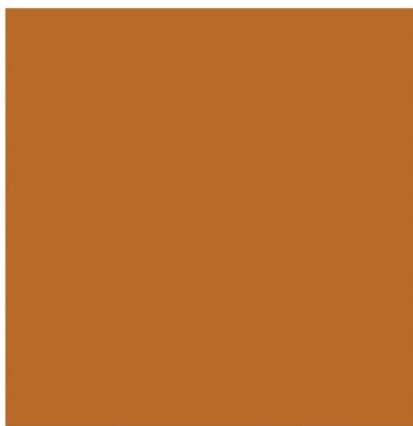




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Entomology

Ecology & Biodiversity



ENTOMOLOGY

Ecology and Biodiversity

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With a Foreword by:

***Prof. M.S. Swaminathan, The Father of
Green Revolution in India***



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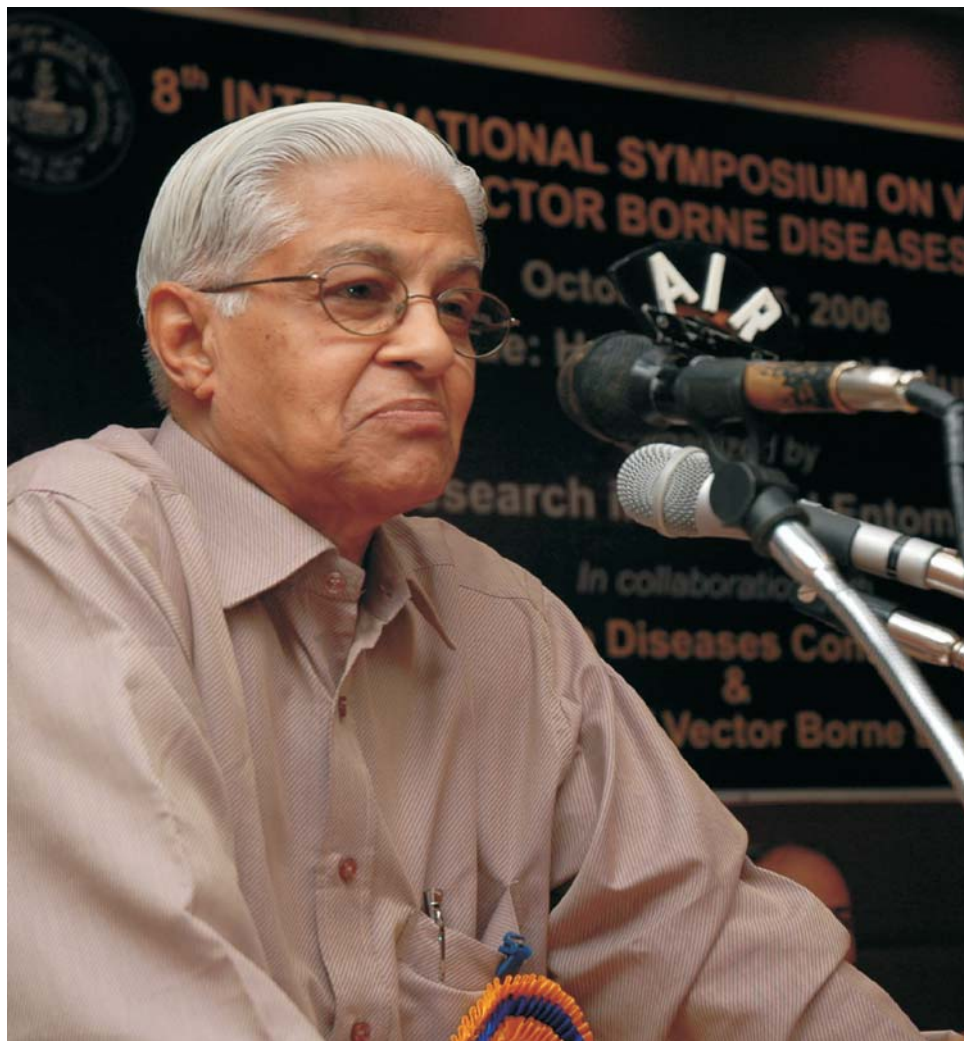
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*This festschrift is dedicated in the honour of
the doyen of entomological sciences and the
“Father of Indian Entomology”*



Professor Dr T.N. Ananthakrishnan

(b. 15th December, 1925)

A teacher, scientist and academic statesman of global
significance in the entomological realms

Dedicated to

Teachers who made us what we are today – a focused and hardworking scientist dedicated to constitute the nation's strong backbone to generate good health and economy.

Prof. M.S. Swaminathan

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FOREWORD

I am extremely happy a Festschrift titled “Entomology: Ecology and Biodiversity” is being brought out to commemorate the 85th birthday of Prof T N Ananthakrishnan. We are indebted to Prof B K Tyagi for getting this most timely and authoritative book compiled. This is a fitting tribute to the life and work of one of the greatest scientists of India, who is a living legend.

I have known Prof Ananthakrishnan for more than fifty years. From the very first day of my meeting him, I developed the highest respect for his scholarship, commitment to science and devotion to both education and research. He developed an outstanding school of Entomology in the Loyola college of Chennai. Normally colleges do not nurture outstanding research schools, but the Loyola College has been an exception, thanks to the efforts of Prof Ananthakrishnan. Prof Ananthakrishnan has devoted his life to research on Thysanoptera on the one hand, and to breeding outstanding young entomologists on the other.

Towards the later part of his life he planned and organized an outstanding scientific symposium on a topic of national and global importance towards the end of every year. In recent years, these annual meetings, which used to remind me of famous series

Contd...

like the Cold Spring Harbor Symposia, were very well organized with the participation of some of the leading scientists of our country. At the end of each such meeting, Prof Ananthakrishnan compiled and brought out an outstanding publication.

Ecology and Biodiversity are subjects which are very dear to Prof Ananthakrishnan's heart. His emphasis is always been on the mainstreaming of ecology in entomology research. The only other scientist who has done so much for the advancement of science in India after formal retirement, is the late Prof C V Raman. Prof Raman used to organize every year an outstanding symposium and also deliver a scholarly lecture containing the data of the work he had done during that year. He will never repeat what he said in an earlier year. Prof Ananthakrishnan belongs to that category of rare scientists whose life revolves around the pursuit of excellence in science.

I am confident that this book will inspire large numbers of young scholars and scientists and lead them to take to research in the field of biodiversity and ecology as related to entomology. The importance of biodiversity for human security was highlighted by the United Nations by declaring 2010 as the International Year of Biodiversity. Also, an International Conference on Biodiversity was held at Nagoya in Japan this year. This conference resulted in the setting up of an Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES). The present book will be an important contribution to the work of IPBES.

I pray for the long life and continued scientific leadership of Prof T N Ananthakrishnan. He is a scientists' scientist and is a role model for the younger generation. I also thank Prof B K Tyagi and all the contributors to this excellent book for choosing the most appropriate way of expressing our admiration and gratitude to Prof Ananthakrishnan for his life long contributions to science, scholarship and society.


(M.S. Swaminathan)

PREFACE

There are more kinds of insects than all other animals taken together, most of which are found in the tropical regions of the world. Estimates of the actual number of insects now living stay anywhere above 3 million. The dominance of insects amongst all living organisms on earth, coupled with infinite wealth of knowledge so important for our own existence, is a fundamental scientific fact which is yet to be widely acknowledged. This dominance means that in numbers of species beyond our comprehension these animals permeate diverse and essential natural processes in Earth's terrestrial, aerial and freshwater ecosystems, contributing to the function of the natural world as a self-sustaining biological system. Invariably insects, joined by other jointed-legs, are an integral and complex part of the terrestrial and freshwater ecosystems with which the future of humans is inextricably linked. Borne some 400 million years ago, in the Devonian period, insects have of course achieved, to the utter envy of all other arthropods, a formidable diversity on Earth so much so that they have virtually stolen the entire show and captivated human attention for centuries. Generally, insects are beneficial organisms, however, many of them are important pests and/or vectors to a large number of parasites and other microbial pathogens to both human being, his associates and the plants. The burden caused by their infestation or infection run up to several million-zillion rupees annually. This scenario makes insects the most formidable competitor to man for his successful survival. Therefore, knowledge about extreme biodiversity and ecological relationships of these animals is a practical necessity – in the man's own interest to sustain the species.

This book, comprising 25 articles written on a variety of entomological subjects (e.g., morphology, taxonomy and systematics of selected insect orders, families, genera and/or species, physiology, behavior and ecology, control of pests, application of GIS in mapping and modeling, bioinformatics etc.) by experts in their respective field, will hopefully provide students, research scholars, academicians and scientists alike with an advanced introduction to entomology by way of original and novel information about insects' diversity and ecology. Detailed description of certain chosen insect groups will provide ample opportunity to the reader to comprehend not only the harmful nature of certain species, but also the beneficial aspects of their life. The book truly establishes a foundation in

basic entomology through varied and diverse treatment to entomology, while focusing on specialized topics in insect ecology and biodiversity, forensic and medical entomology. Additionally, the book offers an updated bio-bibliography of Prof. Ananthakrishnan which must inspire young researchers and academicians towards performance with excellence!

Professor Dr. T.N. Ananthakrishnan, Emeritus Scientist and the Ex-Director, Entomology Research Institute, Chennai as well as Zoological Survey of India, Kolkata is a globally respected teacher and researcher, besides being world's one of the most reputed entomologists. He will be turning 85 on 15th December, 2010 – a great day indeed necessitating celebration of his huge academic and scientific accomplishments in diversified fields of entomology, spanning over nearly 65 years! As a scientific community, with which Prof. T.N. Ananthakrishnan was ever so intimately linked throughout his life, it will be only befitting to dedicate in his honour this book, “**Entomology: Ecology & Biodiversity**” - a subject very dear to him since his formative days in science albeit his world class status of a complete zoologist!

Dr. B.K. Tyagi
&
Dr. Vijay Veer

15th December, 2010

ACKNOWLEDGEMENT

We foremost wish to express our deep sense of gratitude to Prof. M.S. Swaminathan for generously contributing the most significant "*Foreword*" to the festschrift in the honour of Prof. T.N. Ananthakrishnan.

Such a massive treatise on entomology would not have been possible without the unstinting support and encouragement of our most revered and worthy contributors of the scientific writings and, therefore, we are foremost indebted to all of them.

Prof. T.N. Ananthakrishnan's biobibliography is a very diverse subject and has always been a challenge to make it updated since it incessantly increases in its wealth of knowledge and inspirational anecdotes every day! We have made every endeavour to make it complete both in its bibliographic and biographic compositions, authenticated further by Prof. Ananthakrishnan himself to whom our heartfelt thanks are always due.

We had sown the thoughtful seed of writing this book as a festschrift for celebrating the 85th birthday of Prof. T.N. Ananthakrishnan during the spring 2006. Since then, during last four years of this young sapling's full development to a blooming tree to finally bear the fruits, we have been working relentlessly to connect with a large number of selected scientists and academicians. The task undertaken was immense and needed a most conducive environment, besides plentiful time to devote to the project. To this effect our wives, Mrs. Ajita Tyagi and Mrs. Dr. Neena Vijay Veer, generously provided a most educative ambience and kept us tick to our commitment despite many constraints, and for which we are very grateful to them.

Lastly, but not the least, we are extremely thankful to Shri Pawan Sharma and Shri Tanay Sharma, Directors, Scientific Publishers (India), Jodhpur, for their unflinching trust in our capability and commitment, on one hand, and providing all help in timely bringing out this highly educative book for all strata of our learned society – the undergraduate and post-graduate students, the research scholars, the scientists and the academicians alike, on the other.

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