

# Entomology in the Doon Valley (Garhwal Himalaya)

## A stronghold for insect research

(Addressing questions in systematics, ecology, behaviour, conservation  
and economic importance of the magnificent insect fauna)

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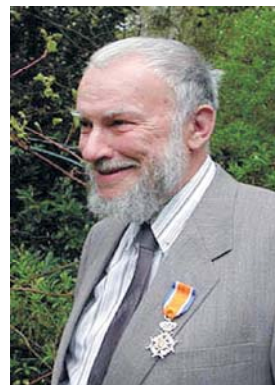
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## Foreword



Prof. B. Kiauta,  
photographed on the occasion of being  
honoured in 2002 by Her Majesty -  
the Queen of The Netherlands,  
with the highest civilian award,  
*Knighthood In The Order Oranje-Nassau*)

The great mountain ranges and rivers of India are creating some of the most marvelous valleys of the world. Among these, the Doon Valley stands out as one of the most beautiful valleys of the Himalayan foothills. Had the King Jehangir first come to this area, there is hardly any doubt that he would have extolled its beauty by resonating what he said of the elegant Kashmir Valley: ‘*Agar Firdaws ba roy-i zamin ast, hamin ast-u hamin ast-u hamin ast*’, meaning ‘*If there is a Paradise on Earth, it is this, it is this, it is this*’. The Doon Valley, with its undulating landscapes, scores of rivers and streams, sparkling cascades, torrents, waterfalls, lakes and, above all, the lush greenery and fragrant forests dotted with villages, represents one of the most attractive sets of the Indian ecosystems and harbours an exceptionally rich fauna and flora.

The history of forest and insect explorations in Dehra Dun covers a century, includes the names of dozens of prominent Indian workers and research institutions, among these, for example, the legendary Professor M.S. Mani, and it resulted in a large number of papers and monographs, containing also the descriptions of numerous new species, some of these endemic. Now certainly the time has arrived to present a well-balanced review of the fauna, filling up the gaps and pointing out the lacunae in our knowledge that need further research in the future.

This is done in the present volume, written with much skill and a profound knowledge of the subject. The Doon Valley research experience and the related personal bibliography of the two authors are appreciable, hence they are exceptionally qualified to conclude this project. Dr Brij Kishore Tyagi published a score of papers pertaining to the odonate and termite fauna of the Doon Valley, including a widely

acknowledged PhD dissertation on chromosome cytology of over 40 of its odonate species. Likewise, Dr Vijay Veer's thysanopterological work is highly notable.

The book will be certainly much appreciated by professionals and non-professionals alike and it will serve as an indispensable tool to regional nature conservationists for a long time to come.

**Dr B. Kiauta**, D.Sci.  
Professor Emeritus of Invertebrate  
Cytogenetics and Cytotaxonomy of  
the University of Utrecht;  
Past-Head of the Netherlands  
Centre for Alpine Biological  
Research, Utrecht;  
Past Executive Editor of *Odonatologica*;  
etc., etc.



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Dated, the

15<sup>th</sup> April, 2016

#### FOREWORD

The Doon landscape is one of the most affluent ecosystems in the country, full of life with its highly rich fauna and flora, undulating landscapes, beautiful glens and vales, scores of rivers and rivulets, sparkling cascades, magnificent lakes and above all lush green and fragrant forests inter alia dotted with villages known worldwide for their hospitality. It is also a home to one country's best educational, scientific, research and defense institutions.

Due to its valuable assets, Dehradun was considered appropriate location for establishing the country's first ever Forest Research Institute. With the century old history of forestry research, including appreciable quantum of entomological investigations, the Doon Valley really boasts of unparalleled annals of information on a variety of disciplines pertaining to insect/pest ecology, biology, corogeography and its control. The erstwhile FRI & Colleges, Dehradun now popularly known as Forest Research Institute under the aegis of Indian Council of Forests & Research Education has to its credit some of the greatest entomologists and their legacies in Forest & Research Education has to its credit some of the greatest entomologists and their legacies in forest research on timber-insect interaction. Outstanding research explorations on agriculture-pest interrelationship and environment bioremediation using certain insect groups as bioindicators has been carried out in association with equally significant institutions of ZSI and the DAV (PG) College, at Dehradun. Though, huge entomological data on various research activities in different time periods is recorded in assorted documents and treatises, but a comprehensive monograph detailing not only the achievements in different insect orders but also the gaps in research for future has been lacking.

This book entitled, "Entomology in the Doon Valley (Garhwal Himalaya)", authored by Dr. B.K. Tyagi and Dr. Vijay Veer - the Doon Valley's very own researchers is indeed a welcome addition to the knowledge of the Doonites on this very important subject of entomology. The layout with the aim to provide insect order-wise information; the lucid language and the comprehensible format of the book has made the book a highly readable material not only for the professionals but also for the amateur biologists, nature lovers and those involved in conservation of natural resources.

  
15/04/2016  
(Dr. Savita)





## Preface

*“It is singularly appropriate that the first comprehensive discussion of the ecology of high altitude insects should come from India, for the most extensive mountainous areas of the world are in and adjacent to India.”*

– Gordon Alexander, 1962

The Doon Valley in the foothills of Himalaya is an unparalleled conservative natural habitat inhabited by thousands of insect species, many of them endemic to the valley, and representing virtually all the orders. With the establishment of the world famous the then Forest Research Institute & Colleges more than a century ago the research in timber-interacting insect species, mostly as pests, the science of forest entomology got hugely strengthened and diversified. Enormous amount of research was carried out on the insect pest-host plant species interrelationship under the phenomenal guidance of a streak of dedicated foresters and forest entomologists such as E.P. Stebbing, C.F.C. Beeson, A.D. Imms, M.L. Roonwal, R.N. Mathur, P.K. Sen-Sarma, Pratap Singh, just to exemplify. The classics penned by each of Stebbing (*Insect intruders in Indian homes*, 1909), Beeson (*Ecology and control of forest insects in India and neighbouring countries*, 1941) and Imms (*A General Textbook of Entomology*, 1925) remain the most exhibitivite cornerstones in the evolution of both the forest and general entomology. Particularly Imms's *magnum opus* attracted entomologists most and it became, as it still is, the premier entomological textbook for next nine decades. The value of this masterpiece was so high that it was revised repeatedly under the wise care of Owain Richards and Richard Gareth Davies who were able to bring out their final edition, the tenth, in 1977. Currently this is revised in a two-volume set, and continues to remain an inevitably indispensable reference work of general entomology both for the seasoned and amateur entomologists alike. With the arrival of Dr. M.L. Roonwal, as the Forest Entomologist in-Charge of the Forest Entomology Division at the FRI & Colleges, another golden era began through diverse research programmes on the bioecology and control of serious pest species of forest timber. This legacy was discernibly upheld by his successors, e.g., Dr. P.K. Sen-Sarma, an authority on forest entomology especially with reference to the insect order Isoptera (Termites). Dr. Roonwal and Dr. Sen-Sarma made significant contributions to the knowledge on morphology, taxonomy, biology, ecology and control of termites. Besides discovering several new taxa including a new family (Indotermitidae), Dr. Roonwal co-authored two books on termites, viz., *Contributions to the Systematics of*

*Oriental Termites* and *Fauna of India (Isoptera)*. One of the outstanding contributions of Dr. Roonwal and Sen-Sarma had been the elucidation of evolutionary and taxonomic significance of wing microsculpturing.

Close on the heels of this outstanding Roonwal/Sen-Sarma era of forest entomology, another wonderful school of odonatological and thrips research was slowly emerging in the historical Department of Zoology of the D.A.V. College, Dehradun mentored by Dr. S.K. Sangal and Dr. S.K. Kulshrestha, respective Head of the Department of Zoology between 1980 and 2000. Professor Dr. Bastian Kiauta of Institute of Genetics, Utrecht University, The Netherlands and himself a great odonatologist, had once written to Dr. Sangal about his influence in promoting odonatological research in the majestic Doon Valley as “developing into a stronghold for dragonfly research” – subsequently amply justified by the masterly works of Dr. Arun Kumar and Dr. M. Prasad of Zoological Survey of India, Dehradun and Dr. B.K. Tyagi at the DAV College. Thysanoptera or thrips got shot in arm with the extraordinary research investigations by Dr. Vijay Veer, Dr. Neena Chauhan, Dr. A.K. Shrivastava. Together they have described over a dozen new species of dragonflies and thrips. The Doon Valley earned such a high reputation for its wealth of insect fauna that even the legendary Prof. M.S. Mani, accompanied by Dr. Santokh Singh, a coleopterologist, and Dr. H.N. Bajjal, a collembologist, paid it a visit *en route* to his epochial three high alpine entomological expeditions in 1950s and 1960s (Mani, 1968).

So much and more had been entomologically explored on the Doon Valley's fauna, yet it is surprising that there was not a single treatise or monograph which could summarise or at least address to the entire range of insect orders with respect to questions pertaining to systematics, ecology, behaviour, conservation and economic importance of these magnificent creatures of the Valley. The present book is therefore written with a clear view to characterize all the insect orders as prevailing in the Doon Valley, hoping that both the undergraduates and the postgraduates, as well as research scholars, will be benefitted in their quest for knowledge on insects of this grandiose ecosystem, the Doon Valley.

**Dr. B.K. Tyagi**  
**Dr. Vijay Veer**

18<sup>th</sup> April, 2016, Dehradun

*Dedicated*

to our

beloved teachers, guides and mentors

*Dr. S.K. Sangal,*

*Dr. P.K. Sen-Sarma, Dr. T.N. Ananthakrishnan,*

*Dr. S.K. Kulshrestha and Dr. B. Kiauta*



## Acknowledgement

In completing this book we have received enormous help from several friends, colleagues and well-wishers. To all of them we duly acknowledge their help and guidance, and offer them our deep sense of gratitude.

As always in past our wives, *Ajita* (Dr. B.K. Tyagi) and *Neena* (Dr. Vijay Veer) have silently endured our long absences for months from extending a helping hand in their daily chores but, at the same time, obliged by their unfailing support for our book to be timely completed in all its details. We remain thankful to them.

Our thanks also go to Shri Pawan Kumar Sharma, Scientific Publishers (India), Jodhpur for encouraging throughout the course of preparation of this book, and ensuring to bring about timely the publication. He has been indeed very courteous, motivative and committed towards this literary achievement.

