

Preface

Here, in a small bungalow on the southern border of the Genting Tea Estate, on the last day of my 3-week study period and with my eyes still full of the colours and shapes of a sunny day spent in the surrounding forest, I thought it was the perfect moment to write a short presentation to this book. Genting Tea Estate (or GTE according to a Malaysian custom to indicate places with their initials) is a lovely area of secondary growth forest, property of an English amateur naturalist, Mr Henry Barlow, well known in science as an authority on East Asian moths. The estate is located on the pass crossed by an ancient road connecting the West coast to the tin mines and by the modern Leburahia Pantai Timur (the East Coast Highway). Here in this ground, I have spent several weeks almost every year since 1984, studying hover wasps, Stenogastrinae for science and “pegnangat” for the village people.

Now that I am not sure whether I shall be able to come back again next year because of the critical situation of research funding in Italy, it is even more obvious to me how important this book is in providing a summary of the knowledge acquired on these wasps over the past 32 years. Looking at the hills on the other side of the valley, that year after year have become barer and barer as the forest has slowly been replaced by plantations of green beans, subjected to massive pesticide treatments, I wonder how long this area will be suitable for hosting insect populations. In particular for these wasps, one of the infinite essences of a forest which never ceases to furnish surprise after surprise to anyone willing to observe and study it.

Yes, I think this book is necessary—it will leave future generations an outline of the biology of a group of insects which still represent, from many aspects, an enigma of the evolution of social life. In its seven chapters, the book traces a trail that, starting from a concise presentation of these wasps and of the researchers who mainly contributed to their study, weaves through the description of the principal characteristics of morphology, anatomy of the adults and development of larvae: a subject still full of questions to which it is difficult to reply. The following chapters review the main aspects of the behaviour of males and females, in comparison with that of other species of social wasps. The characteristics of the social organisation

of the very few species in which this has been studied are then considered and commented. Communication is the main characteristic by which social relationships between individuals are possible in a wide range of organisms. This aspect is treated in a special chapter in which the different information channels found in these insects are reviewed. But these insects differ from all the other members of the social club for the architecture of their nests, a special character that makes it easier to recognise different species in the field. This is treated in the longest chapter of the book with various references to the better known species. Finally, the last chapter, after a concise exposition of the fundamental problems regarding the evolution of social life in insects, tries to summarise the main steps in the evolution of sociality in these wasps, furnishing a personal interpretation that sometimes matches and sometimes contrasts those of friends and colleagues.

The information reported in the volume is the result of research which began over a century ago and of work by scholars and students from various countries. I think that the contribution from my group has been important, as well as that of English, American and Japanese researchers, but recently Malaysian and Vietnamese entomologists have also begun to show an interest in the study of these insects. This is very important. Indeed, it will be the younger generations of those countries where these insects live who will find the answers to a whole range of yet unsolved problems regarding the biology of these wasps and contribute to the systematic description of new species.

Writing this book would never have been possible without the help of many students of mine who, mission after mission, gave more or less important and more or less successful (in terms of publications) contributions to the research. Some of them have continued to work in the scientific field, but for most spending some time in the context of scientific work in our team has remained a sort of life experience that, I hope, has brought them other interior rewards. I am particularly indebted to Rita Cervo, Matthew Sledge, Elisabetta Francescato, Daniele Fanelli, Christina Coster-Longman, Monica Landi, Angelo Fortunato, Francesca Romana Dani, Leonardo Dapporto, Duccio Lambardi, Irene Ortolani, Iacopo Petrocelli and, more recently, to David Baracchi who is the student who has spent most time in Malaysia, producing important contributions to the study of several species. Other students and researchers have helped me in Italy by studying the material collected during the various missions. I have to thank in particular Gloriano Moneti and Giuseppe Pieraccini of the Mass Spectrometry Centre of the University of Florence (C.I.S.M.) who have been reference points for me and my students for studies performed with Mass Spectrometry techniques.

A particular acknowledgment goes to my Malaysian friends and colleagues who in the course of the years have become more and more interested in collaborations, giving important contributions to research, including logistic and organisational aspects. First of all professor Rosli Bin Hashim, at present director of the Institute Sains Biologi of the Universiti Malaya, and also Prof. Yong Hoi Sen and Prof. Sofian Azirun of the same University. Special thanks go to Mr. Henry Barlow who, beyond his logistic support and personal encouragement in writing this book, revised and corrected the very first version of the piece of writing destined to

become the basis of the book. Mr. Hok Kim Loong has been of invaluable help in the field and often solved various kinds of problems for us.

I must also thank my colleagues and friends who reviewed corrected and discussed the different chapters, offering important suggestions. First of all my friend (but also scientific guide) Mary Jane West-Eberhard who discussed the general plan of the work with me as well as the critical first and last chapters of the book and accepted to write the Foreword. Mike Hansell, who was my fellow in Papua New Guinea searching for some of the most elusive hover wasps, as one of the world authorities on animal construction reviewed the longest chapter of the book, that on nest architecture.

Ragavendra Gadagkar reviewed and commented on the last chapter and that on behaviour that was also reviewed by Joan Strassmann.

Jeremy Field, who with his group has provided important findings on the sociobiology of *Liostenogaster flavolineata* over the last few years, reviewed and commented the chapter on Colonial Dynamics.

An important contribution to the revision of the chapters on the morphology and anatomy and on the systematic position of the Stenogastrinae came from James Carpenter, reference authority on the systematics and phylogeny of the Vespidae, who also read and commented the concluding chapter furnishing stimulating counter opinions about the evolutionary route to sociality of these wasps.

Francesca Romana Dani reviewed the chapter on Communication.

Chris Starr, finally, also responsible for the Archive of the International Union for the Study of Social Insects (IUSI), reviewed and commented the paragraphs on the story of the research on hover wasps.

Particular thanks are due also to my ex-student Christina Coster-Longman, who was with me in various missions to Malaysia and who reviewed the final version of the English text, and to David Baracchi who helped me in editing the bibliography and tables.

The photographs, pictures and figures are the result of the work of various students and technicians who were my fellows during various study campaigns in Java, Peninsular Malaysia and Sabah and Papua New Guinea. Mr. Riccardo Innocenti, photographer of the Zoological Institute of the University of Florence, was the very first, followed by Mr. Saulo Bambi. Credits for the various pictures are reported, when possible, in the respective legends.

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Finally, last but not least, I want to thank my family for their patience and support and for the understanding of my work and interests during the past years.

I would like this book to be only a starting point for future studies on these insects that, I hope, will be carried on by young scientists of the countries where hover wasps live and are an important component of the entomological fauna. But

the hover wasps are not only one of the infinite groups of insects populating South East Asian forests but also are somewhat special for the characteristics of living together and represent, perhaps, a unique output of social evolution.

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