

---

Ji-Shen Wang • Bao-Zhen Hua

# A Color Atlas of the Chinese Mecoptera



天龙昆虫学基金  
Tianlong Entomological Foundation

 河南科学技术出版社  
HENAN SCIENCE AND TECHNOLOGY PRESS

 Springer

Ji-Shen Wang  
College of Agronomy and Biosciences  
Dali University  
Dali, Yunnan, China

Bao-Zhen Hua  
College of Plant Protection  
Northwest A&F University  
Yangling, Shaanxi, China

ISBN 978-981-16-9557-5      ISBN 978-981-16-9558-2 (eBook)  
<https://doi.org/10.1007/978-981-16-9558-2>

© Henan Science and Technology Press 2022

Jointly published with Henan Science and Technology Press

The print edition is not for sale in China (Mainland). Customers from China (Mainland) please order the print book from: Henan Science and Technology Press. This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publishers, the authors, and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publishers nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publishers remain neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.  
The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore



---

## Foreword (First Edition)

Speaking of insects, some common groups immediately appear in our minds: butterflies, dragonflies, bees, mosquitos, flies, and cockroaches. These insects are closely related to the daily life of humans and frequently occur in the screen and other cultural works. Few people know, however, that among over a million species of extant insects, there are a group of peculiar members with elongated rostrum in their heads; some of them have enlarged and recurved male genitalia resembling the tail of scorpions, hence the common name “scorpionflies”; their external morphology and biological characteristics are highly varied; and they play a significant role in the study of the evolution and phylogeny of the order Insecta. This group of insects has been assigned in the order Mecoptera by entomologists. Because of the lack of specific literatures, the identification of Mecoptera is relatively difficult in a long period for the general entomological researchers and hobbyists.

The extant Mecoptera, a small relic order in the class Insecta, consists of over 700 species in nine families and ca. 40 genera. By contrast, the fossil Mecoptera includes ca. 620 species in more than 40 families and 210 genera; a great number of new taxa (families, genera, and species) have unceasingly been found. Among them, more than three-fourths of families were extinct. Mecopterans have a long history of origin and evolution, with the earliest fossil records in the Early Permian (ca. 270 mya). The Mesozoic era (252–65 mya) was an important period which links the past with the present days for the evolving Mecoptera. The mecopterans reached their peak of diversity in this era and held a large proportion in the Mesozoic fossil records of Holometabola. Nine extant families in Mecoptera have been found in the Jurassic-Cretaceous period. Many extinct families (e.g., Cimbrophlebiidae, Orthophlebiidae, and Choristopsychidae) not only enrich our knowledge of the diversity of Mecoptera, but also provide precious and solid evidence for the study of the origin and evolution of this order.

The mecopterans have their mouthparts, wings, and genitalia highly varied among different groups, corresponding to their diverse biological characteristics. Frequently, by comparing ancient, extinct mecopterans with extant ones, we are so amazed at their highly varied biological characteristics. For instance, members of the families Aneuretopsychidae, Mesopsychidae, and Pseudopolycentropodidae were ancient pollinators sharing a complex co-evolution with plants, and their special, slender siphoning mouthparts were able to feed the pollination drops of the gymnosperms; *Juracimbrophlebia ginkgofolia*, belonging to the family Cimbrophlebiidae, has a complex mimicry and symbiotic relationship with the plant *Ginkgo*, the relationship between them lasted over a hundred million years; some male insects in the family Holcorpidae have exaggeratedly elongated abdomen and genitalia, special structures not only utilized to forcedly fight with other males, but also an sexual display to the females. There are enormous number of unknown structures, biological characteristics, and evolutionary laws await our further discovery and research.

For the past many years, the research team of Mecoptera, Northwest A&F University, leading by Professor Bao-Zhen Hua, dedicated to the study of morphology, behaviors, taxonomy, and phylogeny of Mecoptera and made a lot of remarkable achievements. They published some excellent works in many Chinese and abroad journals, making Northwest A&F University one of the global centers of the study on Mecoptera. Meanwhile, professor Bao-Zhen Hua also dedicated to teaching works and trained a group of young entomologists. His college courses

such as scientific writing, general entomology, insect morphology, and insect taxonomy are popular among students. A title of “Prominent Educator of Shaanxi” was granted for his unique teaching idea and rigorous working attitude.

A Color Atlas of the Chinese Mecoptera is a valuable and unmatched work, in which all the aspects of knowledge of Mecoptera are shown by distinct elegant pictures and accurate scientific texts. It is a great original work that gathered scientific, artistic, and enjoyable qualities, suitable for the general entomological researchers and hobbyists, and a practical reference for the forefront workers in agriculture and forestry. I am honored to recommend this atlas to the readers. Meanwhile, I also expect more excellent discoveries from the research team of Mecoptera leading by professor Bao-Zhen Hua.

Capital Normal University, Beijing, China  
September 2018

Dong Ren

---

## Preface (Second Edition)

Mecoptera is a small order of holometabolous insects and consists of over 700 known species worldwide, including scorpionflies and hangingflies, etc. They are important indicators of ecological environments and are often ideal materials for behavioral studies due to their interesting courtship and mating behaviors. They are ancient members in Holometabola and play a significant role in the evolutionary research of Insecta.

China is rich in Mecoptera all over the world. More than 300 species in 11 genera of three families have been recorded in China hitherto. However, literature regarding the identification of the Chinese Mecoptera is very scarce. Hence, we spent three years to compile the first edition of this color atlas based on the abundant collections from the Entomological Museum, Northwest A&F University, and our intensive field investigations in recent years, to introduce the common species of the Chinese Mecoptera. In the second edition, we list and illustrate 242 species (updated from 170 species in the previous edition) of the Chinese Mecoptera. It is often difficult to identify to the species-level based exclusively on live photographs without careful examinations under a microscope. Therefore, we also provide many pictures of pinned or alcohol-preserved specimens. For most species, we present pictures of the adults, and the male and female genitalia. A geographical distribution map is also provided for each species.

This work cannot be finished without the generous helps from numerous friends and colleagues during our writing and editing courses. For the identifications of species, we mostly benefit from the late Professor Io Chou, who had collected specimens and literature and initiated the studies of the Chinese fauna of Mecoptera decades ago. We also profited from the postgraduate students of the research team of Mecoptera, Northwest A&F University, including Peng-Ying Huang, Jiang-Li Tan, Jing Chen, Li-Jun Cai, Na Ma, Wen Zhong, Lu Jiang, Qiong-Hua Gao, Meng Wang, Gui-Lin Hu, Ying Miao, Sha Xie, Tao Peng, Xiao-Yan Hou, Shu-Yu Liu, Gang Yan, Hao Xu, Xue Li, Qiang Fu, Jun-Xia Zhang, Chao Gao, Wei Du, and Kai Gao.

Our sincere thanks also go to Yan-Dong Chen, Zhi-Wei Dong, Kai-Wen Gao, You-Jing Gong, Li He, Zhu-Qing He, Zheng-Kun Hu, Gui-Qiang Huang, Si-Yao Huang, Ri-Xin Jiang, Shi-Xiang Jiang, Zhuo-Heng Jiang, Qi-Long Lei, Ze-Jian Li, Ye-Jie Lin, Lin Lyu, Jian-Yue Qiu, Lu Qiu, Hong-Jian Wang, Yong Wang, Chao Wu, Hao Xu, Qi-Cheng Yang, Qiao-Zhi Yang, Mao Ye, Kun Yu, Cheng-Hui Zhan, Jie Zhang, Ming-Zhi Zhao, Yu-Chen Zheng, Chao Zhou, De-Yao Zhou, Dan-Chen Zhu, and Wen-I Chou (Taiwan). They collected many valuable specimens and made it feasible to show those species to the readers.

We thank Jun Chen and Hong Liu (IZAS), Li Chen and Zhu Li (ISWU), Pavel Chvojka and David Král (NMCZ), Xing-Yue Liu and Yu-Chen Zheng (ECAU), Toshiya Hirowatari and Satoshi Kamitani (KYSU), Li-Zhen Li and Zi-Wei Yin (SHNU), Hong Pang and Bing-Lan Zhang (SYSU), Dong Ren (CANU), Min Wang and Xing-Min Wang (SCAU), Mei-Cai Wei (CUFT), Jian-Yue Qiu, Cheng-Bin Wang, and Hao Xu (MYNU), Shinji Yano (OMGM), and the late George W. Byers (EDKU) for arranging the access to examine and loan of the specimens.

Our recent field works were greatly supported by Yan-Qing Hu, Shuang Xue, Yuan Hua, Finks Bakrie (Indonesia), and Sepni Juhansah (Indonesia). We would also like to express our thanks to Dalton S. Amorim (Brasil), Cristiano Lopes-Andrade (Brasil), Tomoya Suzuki

(Japan), and Jason G.H. Londt (South Africa) for fervidly sending precious literatures. We also thank John Horstman, Lu Jiang, Bo Lei, Ye-Chan Lin (Taiwan), Wei-Liang Xie, Han Xu, Wei-Wei Zhang, and Wen Zhong for allowing the use of their beautiful photographs. A special thank is due to Messrs Ben-Qing Zhou and Yi-Kun Li from the Henan Science and Technology Press. Under their encouragement, this atlas began to compile. The publication of the current form is also due to their excellent editorial work.

This work was financially supported by the Tianlong Entomological Foundation, the National Natural Science Foundation of China (Grant Nos. 30070101, 30370179, 30670255, 30970386, 31172125, 31301898, and 31672341), the 2018 National Publication Foundation of China, and the Starting Foundation for the High-level Talents, Dali University (Grant No. KY2096124040).

Due to our limited knowledge, there might be some mistakes and flaws in this atlas. We expect criticism and correction from experts and readers.

Dali, China  
October 2021

Ji-Shen Wang

---

# Contents

## Part 1 Introduction

<b>1</b>	<b>Systematic Status</b> .....	3
<b>2</b>	<b>Historical Review</b> .....	5
<b>3</b>	<b>Classification System</b> .....	7
<b>4</b>	<b>Geographical Distribution</b> .....	9
4.1	Bittacidae .....	9
4.2	Panorpidae .....	10
4.3	Panorpodidae .....	11
<b>5</b>	<b>Morphology</b> .....	13
5.1	Bittacidae .....	14
5.1.1	General Information .....	16
5.1.2	Adult .....	16
5.1.3	Egg .....	17
5.1.4	Larva .....	17
5.1.5	Pupa .....	17
5.2	Panorpidae .....	18
5.2.1	General Information .....	18
5.2.2	Adult .....	18
5.2.3	Egg .....	28
5.2.4	Larva .....	28
5.2.5	Pupa .....	28
5.3	Panorpodidae .....	28
5.3.1	General Information .....	28
5.3.2	Adult .....	30
5.3.3	Larva .....	30
5.3.4	Pupa .....	30
<b>6</b>	<b>Biology</b> .....	31
6.1	Bittacidae .....	31
6.2	Panorpidae .....	33
6.3	Panorpodidae .....	37
<b>7</b>	<b>Collecting and Rearing</b> .....	41
7.1	Collecting Techniques .....	41
7.2	Specimen Preservation .....	43
7.3	Rearing .....	43

<b>8</b>	<b>Guide to the Use of This Atlas</b> .....	45
8.1	Terminology .....	45
8.2	Specimen Repositories .....	45
8.3	Maps .....	45
8.4	Figure Credits .....	45
<b>Part II</b>	<b>Taxonomy</b>	
<b>9</b>	<b>Family Bittacidae Handlirsch, 1906</b> .....	49
9.1	Genus <i>Bicaubittacus</i> Tan & Hua, 2009 .....	50
9.1.1	<i>Bicaubittacus appendiculatus</i> (Esben-Petersen, 1927) .....	51
9.1.2	<i>Bicaubittacus burmanus</i> (Tjeder, 1973) .....	52
9.1.3	<i>Bicaubittacus longiprocessus</i> (Huang & Hua, 2005) .....	53
9.1.4	<i>Bicaubittacus mengyangicus</i> Tan & Hua, 2009 .....	54
9.1.5	<i>Bicaubittacus yangi</i> Tan & Hua, 2009 .....	54
9.2	Genus <i>Bittacus</i> Latreille, 1802 .....	55
9.2.1	<i>Bittacus acutus</i> Zhang, Du & Hua, 2020 .....	57
9.2.2	<i>Bittacus bifurcatus</i> Hua & Tan, 2008 .....	58
9.2.3	<i>Bittacus choui</i> Hua & Tan, 2007 .....	58
9.2.4	<i>Bittacus cirratus</i> Tjeder, 1956 .....	59
9.2.5	<i>Bittacus diaoluoshanus</i> Chen & Hua, 2011 .....	60
9.2.6	<i>Bittacus flavidus</i> Huang & Hua, 2005 .....	61
9.2.7	<i>Bittacus gressitti</i> Cheng, 1957 .....	62
9.2.8	<i>Bittacus hainanicus</i> Tan & Hua, 2008 .....	62
9.2.9	<i>Bittacus lii</i> Zhou, 2003 .....	63
9.2.10	<i>Bittacus longantennatus</i> Chen, Tan & Hua, 2013 .....	64
9.2.11	<i>Bittacus longilobus</i> Zhang, Du & Hua, 2020 .....	65
9.2.12	<i>Bittacus malaisei</i> Tjeder, 1973 .....	66
9.2.13	<i>Bittacus monastyrskiyi</i> Bicha, 2007 .....	67
9.2.14	<i>Bittacus obscurus</i> Huang & Hua, 2005 .....	67
9.2.15	<i>Bittacus pieli</i> Navás, 1935 .....	68
9.2.16	<i>Bittacus planus</i> Cheng, 1949 .....	69
9.2.17	<i>Bittacus puripennis</i> Cai & Hua, 2006 .....	69
9.2.18	<i>Bittacus setigerus</i> Chen, Tan & Hua, 2013 .....	71
9.2.19	<i>Bittacus shaoguanensis</i> Zhang, Du & Hua, 2020 .....	72
9.2.20	<i>Bittacus sinensis</i> Walker, 1853 .....	73
9.2.21	<i>Bittacus sinicus</i> Issiki, 1931 .....	74
9.2.22	<i>Bittacus strigatus</i> Hua & Chou, 1998 .....	75
9.2.23	<i>Bittacus tienmushana</i> Cheng, 1957 .....	76
9.2.24	<i>Bittacus trapezoideus</i> Huang & Hua, 2005 .....	76
9.2.25	<i>Bittacus ussuriensis</i> Plutenko, 1985 .....	78
9.2.26	<i>Bittacus zhejiangicus</i> Tan & Hua, 2008 .....	78
9.3	Genus <i>Terrobittacus</i> Tan & Hua, 2009 .....	79
9.3.1	<i>Terrobittacus angustus</i> Du & Hua, 2017 .....	80
9.3.2	<i>Terrobittacus echinatus</i> (Hua & Huang, 2008) .....	80
9.3.3	<i>Terrobittacus implicatus</i> (Huang & Hua, 2006) .....	81
9.3.4	<i>Terrobittacus rostratus</i> Du & Hua, 2017 .....	82
9.3.5	<i>Terrobittacus wui</i> (Zhou, 2001) [New Combination] .....	83
9.3.6	<i>Terrobittacus xiphicus</i> Tan & Hua, 2009 .....	85
<b>10</b>	<b>Family Panorpidae Latreille, 1802</b> .....	87
10.1	Genus <i>Neopanorpa</i> van der Weele, 1909 .....	92
10.1.1	<i>Neopanorpa chillcotti</i> Byers, 1971 .....	93

---

10.1.2	<i>Neopanorpa hushengchangi</i> Hua & Chou, 1999.....	94
10.1.3	<i>Neopanorpa liuxingyuei</i> Wang, 2021 .....	95
10.1.4	<i>Neopanorpa wuchaoi</i> Wang, 2021.....	96
10.1.5	<i>Neopanorpa chaohsiufui</i> Wang & Hua, 2017 .....	100
10.1.6	<i>Neopanorpa choui</i> Cheng, 1949 .....	101
10.1.7	<i>Neopanorpa diancangshanensis</i> Wang & Hua, 2018 .....	102
10.1.8	<i>Neopanorpa hainanica</i> Hua & Chou, 1998.....	103
10.1.9	<i>Neopanorpa harmandi</i> Navás, 1908 .....	104
10.1.10	<i>Neopanorpa hualizhong</i> i Hua & Chou, 1998 .....	105
10.1.11	<i>Neopanorpa jigongshanensis</i> Hua, 1998.....	106
10.1.12	<i>Neopanorpa leigongshana</i> Zhou & Zhou, 2007 .....	108
10.1.13	<i>Neopanorpa lifashengi</i> Hua & Chou, 1999.....	109
10.1.14	<i>Neopanorpa longiprocessa</i> Hua & Chou, 1997.....	110
10.1.15	<i>Neopanorpa longistipitata</i> Wang & Hua, 2018.....	111
10.1.16	<i>Neopanorpa luojishana</i> Wang & Hua, 2019 .....	112
10.1.17	<i>Neopanorpa maai</i> Cheng, 1957.....	113
10.1.18	<i>Neopanorpa magnatitilana</i> Wang & Hua, 2018 .....	114
10.1.19	<i>Neopanorpa malaisei</i> Byers, 1999 .....	115
10.1.20	<i>Neopanorpa mangshanensis</i> Chou & Wang, 1988 .....	116
10.1.21	<i>Neopanorpa minuta</i> Chou & Wang, 1988.....	118
10.1.22	<i>Neopanorpa moganshanensis</i> Zhou & Wu, 1993 .....	119
10.1.23	<i>Neopanorpa mutabilis</i> Cheng, 1957 .....	120
10.1.24	<i>Neopanorpa nigrilis</i> Carpenter, 1938 .....	121
10.1.25	<i>Neopanorpa ovata</i> Cheng, 1957 .....	122
10.1.26	<i>Neopanorpa pennyi</i> Byers, 1999 [New Record to China].....	123
10.1.27	<i>Neopanorpa pielina</i> Navás, 1936 .....	124
10.1.28	<i>Neopanorpa puripennis</i> Chou & Wang, 1988 .....	125
10.1.29	<i>Neopanorpa quadristigma</i> Wang & Hua, 2018.....	126
10.1.30	<i>Neopanorpa retina</i> Chou & Li, 1988.....	127
10.1.31	<i>Neopanorpa semiorbiculata</i> Wang & Hua, 2018 .....	128
10.1.32	<i>Neopanorpa setigera</i> Wang & Hua, 2018 .....	130
10.1.33	<i>Neopanorpa tibetensis</i> Hua & Chou, 1999 .....	131
10.1.34	<i>Neopanorpa tienpingshana</i> Chou & Wang, 1988 .....	132
10.1.35	<i>Neopanorpa tincta</i> Wang & Hua, 2018 .....	133
10.1.36	<i>Neopanorpa triangulata</i> Wang & Hua, 2018 .....	134
10.1.37	<i>Neopanorpa xingmini</i> Wang & Hua, 2019 .....	135
10.1.38	<i>Neopanorpa zhengyucheni</i> Wang, 2021.....	136
10.1.39	<i>Neopanorpa brisi</i> Navás, 1930 .....	138
10.1.40	<i>Neopanorpa fangxianga</i> Zhou & Zhou, 2007 .....	139
10.1.41	<i>Neopanorpa pendula</i> Qian & Zhou, 2001.....	140
10.1.42	<i>Neopanorpa cavaleriei</i> Navás, 1908 .....	142
10.1.43	<i>Neopanorpa chelata</i> Carpenter, 1938 .....	144
10.1.44	<i>Neopanorpa clara</i> Chou & Wang, 1988 .....	145
10.1.45	<i>Neopanorpa claripennis</i> Carpenter, 1938 .....	146
10.1.46	<i>Neopanorpa cuspidata</i> Byers, 1965 .....	147
10.1.47	<i>Neopanorpa formosana</i> Navás, 1911 .....	148
10.1.48	<i>Neopanorpa gulinensis</i> Zhou & Zhou, 2005.....	150
10.1.49	<i>Neopanorpa hei</i> Zhou & Fan, 1998.....	151
10.1.50	<i>Neopanorpa hunanensis</i> Hua, 2002.....	152
10.1.51	<i>Neopanorpa k-maculata</i> Cheng, 1952.....	153
10.1.52	<i>Neopanorpa lungtausana</i> Cheng, 1957.....	154
10.1.53	<i>Neopanorpa magna</i> Issiki, 1927 .....	155
10.1.54	<i>Neopanorpa nielsen</i> i Byers, 1965 .....	156

10.1.55	<i>Neopanorpa ocellaris</i> Navás, 1908	157
10.1.56	<i>Neopanorpa pulchra</i> Carpenter, 1945	158
10.1.57	<i>Neopanorpa sheni</i> Hua & Chou, 1997	160
10.1.58	<i>Neopanorpa siamensis</i> Byers, 1965	161
10.1.59	<i>Neopanorpa spatulata</i> Byers, 1965	162
10.1.60	<i>Neopanorpa caveata</i> Cheng, 1957	164
10.1.61	<i>Neopanorpa gradana</i> Cheng, 1952	165
10.1.62	<i>Neopanorpa jiulongensis</i> Zhou, 1993	166
10.1.63	<i>Neopanorpa sauteri</i> Esben-Petersen, 1912	167
10.1.64	<i>Neopanorpa tienmushana</i> Cheng, 1957	168
10.1.65	<i>Neopanorpa translucida</i> Cheng, 1957	169
10.2	Genus <b>Cerapanorpa</b> Gao, Ma & Hua, 2016	170
10.2.1	<i>Cerapanorpa baimaensis</i> Gao & Hua 2019	172
10.2.2	<i>Cerapanorpa bicornifera</i> Chou & Wang, 1981	173
10.2.3	<i>Cerapanorpa brevicornis</i> Hua & Li, 2007	174
10.2.4	<i>Cerapanorpa byersi</i> Hua & Huang, 2007	175
10.2.5	<i>Cerapanorpa centralis</i> Tjeder, 1936	176
10.2.6	<i>Cerapanorpa dubia</i> (Chou & Wang, 1981)	177
10.2.7	<i>Cerapanorpa emarginata</i> Cheng, 1949	178
10.2.8	<i>Cerapanorpa funiushana</i> Hua & Chou, 1997	180
10.2.9	<i>Cerapanorpa liupanshana</i> Gao, Ma & Hua, 2016	181
10.2.10	<i>Cerapanorpa minshana</i> Gao, Li & Hua 2020	182
10.2.11	<i>Cerapanorpa nanwutaina</i> Chou, 1981	183
10.2.12	<i>Cerapanorpa obtusa</i> Cheng, 1949	184
10.2.13	<i>Cerapanorpa protrudens</i> Gao, Ma & Hua, 2016	186
10.2.14	<i>Cerapanorpa qinlingensis</i> Gao, Li & Hua, 2020	187
10.2.15	<i>Cerapanorpa reni</i> (Chou, 1981)	188
10.2.16	<i>Cerapanorpa sinuata</i> Gao, Ma & Hua, 2016	190
10.2.17	<i>Cerapanorpa taizishana</i> Gao & Hua, 2019	191
10.2.18	<i>Cerapanorpa wangwushana</i> Huang, Hua & Shen, 2004	192
10.2.19	<i>Cerapanorpa xuebaodinga</i> Gao & Hua, 2019	193
10.2.20	<i>Cerapanorpa yanggashana</i> Gao & Hua, 2019	194
10.3	Genus <b>Dicerapanorpa</b> Zhong & Hua, 2013	196
10.3.1	<i>Dicerapanorpa baiyunshana</i> Zhong & Hua, 2013	198
10.3.2	<i>Dicerapanorpa hualongshana</i> Hu & Hua, 2019	199
10.3.3	<i>Dicerapanorpa magna</i> Chou, 1981	200
10.3.4	<i>Dicerapanorpa minshana</i> Hu & Hua, 2019	201
10.3.5	<i>Dicerapanorpa shennongensis</i> Zhong & Hua, 2013	202
10.3.6	<i>Dicerapanorpa bifurcata</i> Hu & Hua, 2020	203
10.3.7	<i>Dicerapanorpa dicer</i> MacLachlan, 1894	204
10.3.8	<i>Dicerapanorpa degenensis</i> Hu, Wang & Hua, 2019	205
10.3.9	<i>Dicerapanorpa kimminsi</i> Carpenter, 1948	206
10.3.10	<i>Dicerapanorpa lativalva</i> Hu & Hua, 2019	208
10.3.11	<i>Dicerapanorpa luojishana</i> Hu & Hua, 2019	209
10.3.12	<i>Dicerapanorpa macula</i> Hu, Wang & Hua, 2019	210
10.3.13	<i>Dicerapanorpa stotzneri</i> Esben-Petersen, 1934	211
10.3.14	<i>Dicerapanorpa tanae</i> Hu, Wang & Hua, 2019	212
10.3.15	<i>Dicerapanorpa tenuis</i> Hu, Wang & Hua, 2019	213
10.3.16	<i>Dicerapanorpa tjederi</i> Carpenter, 1938	214
10.3.17	<i>Dicerapanorpa triclada</i> Qian & Zhou, 2001	215
10.3.18	<i>Dicerapanorpa yijunae</i> Hu & Hua, 2019	216
10.3.19	<i>Dicerapanorpa zhengkuni</i> Hu & Hua, 2020	217
10.3.20	<i>Dicerapanorpa zhongdianensis</i> Hu, Wang & Hua, 2019	218

10.4	Genus <i>Furcatopanorpa</i> Ma & Hua, 2011 . . . . .	219
10.4.1	<i>Furcatopanorpa longihypovalva</i> Hua & Cai, 2009 . . . . .	220
10.5	Genus <i>Megapanorpa</i> Wang & Hua, 2019 . . . . .	221
10.5.1	<i>Megapanorpa absens</i> Wang & Hua, 2019 . . . . .	222
10.5.2	<i>Megapanorpa gaokaii</i> Wang & Hua, 2019 . . . . .	223
10.5.3	<i>Megapanorpa grandis</i> Wang & Hua, 2019 . . . . .	224
10.5.4	<i>Megapanorpa jiangorum</i> Wang & Hua, 2019 . . . . .	225
10.5.5	<i>Megapanorpa wanghongjiani</i> Wang & Hua, 2019 . . . . .	226
10.6	Genus <i>Panorpa</i> Linnaeus, 1758. . . . .	227
10.6.1	<i>Panorpa kongosana</i> Okamoto, 1925 . . . . .	228
10.6.2	<i>Panorpa okamotona</i> Issiki, 1927 . . . . .	229
10.6.3	<i>Panorpa jinhuaensis</i> Wang, Gao & Hua, 2019 . . . . .	230
10.6.4	<i>Panorpa menqiuleii</i> Wang, Gao & Hua, 2019 . . . . .	232
10.6.5	<i>Panorpa waongkehzengi</i> Navás, 1935 . . . . .	233
10.6.6	<i>Panorpa amurensis</i> MacLachlan, 1872 . . . . .	234
10.6.7	<i>Panorpa baohwashana</i> Cheng, 1957 . . . . .	236
10.6.8	<i>Panorpa caoweii</i> Wang, 2021 . . . . .	239
10.6.9	<i>Panorpa dali</i> Wang, 2021 . . . . .	240
10.6.10	<i>Panorpa decolorata</i> Chou & Wang, 1981 . . . . .	242
10.6.11	<i>Panorpa duanyu</i> Wang & Gong, 2021 . . . . .	243
10.6.12	<i>Panorpa filina</i> Chou & Wang, 1987. . . . .	244
10.6.13	<i>Panorpa furcata</i> Zhou & Zhou, 2007 . . . . .	245
10.6.14	<i>Panorpa guttata</i> Navás, 1908. . . . .	246
10.6.15	<i>Panorpa hani</i> Wang, 2021 . . . . .	248
10.6.16	<i>Panorpa hirundo</i> Wang, 2021 . . . . .	249
10.6.17	<i>Panorpa huangguiqiangi</i> Wang, 2021 . . . . .	250
10.6.18	<i>Panorpa jiangrixini</i> Wang, 2021 . . . . .	251
10.6.19	<i>Panorpa jinfoshana</i> Wang, 2021 . . . . .	252
10.6.20	<i>Panorpa kunmingensis</i> Fu & Hua, 2009 . . . . .	253
10.6.21	<i>Panorpa latiloba</i> Wang, 2021 . . . . .	254
10.6.22	<i>Panorpa liaoi</i> Zhou & Zhou, 2007 . . . . .	255
10.6.23	<i>Panorpa nanzhao</i> Wang, 2021 . . . . .	256
10.6.24	<i>Panorpa parallela</i> Wang & Hua, 2016 . . . . .	257
10.6.25	<i>Panorpa reflexa</i> Wang & Hua, 2016 . . . . .	258
10.6.26	<i>Panorpa stella</i> Wang, 2021 . . . . .	259
10.6.27	<i>Panorpa substricta</i> Wang, 2021 . . . . .	260
10.6.28	<i>Panorpa xiaofeng</i> Wang & Gong, 2021 . . . . .	262
10.6.29	<i>Panorpa xuzhu</i> Wang & Gong, 2021 . . . . .	263
10.6.30	<i>Panorpa gressitti</i> Byers, 1970 . . . . .	264
10.6.31	<i>Panorpa implicata</i> Cheng, 1957 . . . . .	266
10.6.32	<i>Panorpa longiramina</i> Issiki & Cheng, 1947 . . . . .	267
10.6.33	<i>Panorpa obliquifascia</i> Chou & Wang, 1987 . . . . .	268
10.6.34	<i>Panorpa peterseana</i> Issiki, 1929 . . . . .	269
10.6.35	<i>Panorpa sibirica</i> Esben-Petersen, 1915. . . . .	270
10.6.36	<i>Panorpa bifasciata</i> Chou & Wang, 1981 . . . . .	272
10.6.37	<i>Panorpa cheni</i> Cheng, 1957. . . . .	273
10.6.38	<i>Panorpa choui</i> Zhou & Wu, 1993 . . . . .	274
10.6.39	<i>Panorpa cladocerca</i> Navás, 1935 . . . . .	275
10.6.40	<i>Panorpa trifasciata</i> Cheng, 1957. . . . .	276
10.6.41	<i>Panorpa tritaenia</i> Chou & Wang, 1987. . . . .	277
10.6.42	<i>Panorpa emeishana</i> Hua, Sun & Li, 2001 . . . . .	278
10.6.43	<i>Panorpa semifasciata</i> Cheng, 1949 . . . . .	279
10.6.44	<i>Panorpa dashahensis</i> Zhou & Zhou, 2005 . . . . .	281

10.6.45	<i>Panorpa quadrifasciata</i> Chou & Wang, 1987 . . . . .	282
10.6.46	<i>Panorpa stigmalis</i> Navás, 1908 . . . . .	283
10.6.47	<i>Panorpa anrenensis</i> Chou & Wang, 1987 . . . . .	285
10.6.48	<i>Panorpa aurea</i> Cheng, 1957 . . . . .	286
10.6.49	<i>Panorpa auripennis</i> Bicha, 2019 [New Record to China]. . . . .	287
10.6.50	<i>Panorpa brevititilana</i> Issiki, 1929 . . . . .	288
10.6.51	<i>Panorpa esakii</i> Issiki, 1929 . . . . .	290
10.6.52	<i>Panorpa flavicorporis</i> Cheng, 1957. . . . .	291
10.6.53	<i>Panorpa flavipennis</i> Carpenter, 1938. . . . .	292
10.6.54	<i>Panorpa fukiensis</i> Tjeder, 1950 . . . . .	293
10.6.55	<i>Panorpa guidongensis</i> Chou & Li, 1987 . . . . .	294
10.6.56	<i>Panorpa insularis</i> Hua & Chou, 1998 . . . . .	295
10.6.57	<i>Panorpa lutea</i> Carpenter, 1945 . . . . .	296
10.6.58	<i>Panorpa mangshanensis</i> Chou & Wang, 1987 . . . . .	297
10.6.59	<i>Panorpa mokansana</i> Cheng, 1957. . . . .	298
10.6.60	<i>Panorpa pectinata</i> Issiki, 1929 . . . . .	299
10.6.61	<i>Panorpa pingjiangensis</i> Chou & Wang, 1987 . . . . .	300
10.6.62	<i>Panorpa sextaenia</i> Zhou & Bao, 2002. . . . .	301
10.6.63	<i>Panorpa sonani</i> Issiki, 1929 . . . . .	302
10.6.64	<i>Panorpa subambra</i> Chou & Tong, 1987 . . . . .	303
10.6.65	<i>Panorpa taiwanensis</i> Issiki, 1929 . . . . .	304
10.6.66	<i>Panorpa tetrazonia</i> Navás, 1935 . . . . .	305
10.6.67	<i>Panorpa cornigera</i> MacLachlan, 1887 . . . . .	306
10.6.68	<i>Panorpa bashanicola</i> Hua, Tao & Hua, 2018 . . . . .	308
10.6.69	<i>Panorpa biclada</i> Zhang & Hua, 2012 . . . . .	310
10.6.70	<i>Panorpa chengi</i> Chou, 1981 . . . . .	311
10.6.71	<i>Panorpa curva</i> Carpenter, 1938. . . . .	312
10.6.72	<i>Panorpa curvata</i> Zhou, 2006. . . . .	313
10.6.73	<i>Panorpa davidi</i> Navás, 1908 . . . . .	314
10.6.74	<i>Panorpa difficilis</i> Carpenter, 1938. . . . .	315
10.6.75	<i>Panorpa diqingensis</i> Li & Hua, 2020 . . . . .	316
10.6.76	<i>Panorpa dispergens</i> Li & Hua, 2020. . . . .	317
10.6.77	<i>Panorpa fructa</i> Cheng, 1949 . . . . .	318
10.6.78	<i>Panorpa fulvastra</i> Chou, 1981. . . . .	319
10.6.79	<i>Panorpa gaokaii</i> Li & Hua, 2021 . . . . .	320
10.6.80	<i>Panorpa jinchuana</i> Hua, Sun & Li, 2001 . . . . .	322
10.6.81	<i>Panorpa neospinosa</i> Chou & Wang, 1981. . . . .	323
10.6.82	<i>Panorpa qinlingensis</i> Chou & Ran, 1981 . . . . .	324
10.6.83	<i>Panorpa sexspinosa</i> Cheng, 1949 . . . . .	325
10.6.84	<i>Panorpa typicoides</i> Cheng, 1949. . . . .	326
10.6.85	<i>Panorpa uncinata</i> Li & Hua, 2021 . . . . .	327
10.6.86	<i>Panorpa yangi</i> Chou, 1981 . . . . .	328
10.6.87	<i>Panorpa yaoluopingensis</i> Li & Hua, 2021 . . . . .	330
10.6.88	<i>Panorpa horiensis</i> Issiki, 1929 . . . . .	331
10.6.89	<i>Panorpa kiautai</i> Zhou & Wu, 1993 . . . . .	332
10.7	Genus <b><i>Sinopanorpa</i></b> Cai & Hua, 2008. . . . .	333
10.7.1	<i>Sinopanorpa baokangensis</i> Wang, 2021 . . . . .	334
10.7.2	<i>Sinopanorpa digitiformis</i> Huang & Hua, 2008 . . . . .	335
10.7.3	<i>Sinopanorpa nangongshana</i> Cai & Hua, 2008 . . . . .	336
10.7.4	<i>Sinopanorpa tincta</i> Navás, 1931 . . . . .	337

---

<b>11 Family Panorpodidae Byers, 1965</b> .....	339
11.1 Genus <i>Panorpodes</i> MacLachlan, 1875 .....	339
11.1.1 <i>Panorpodes komaensis</i> Okamoto, 1925.....	339
<b>Checklist of the Chinese Mecoptera</b> .....	343
<b>References</b> .....	349