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ODONATA OF GUANGXI ZHUANG AUTONOMOUS REGION, CHINA, PART I: ZYGOPTERA

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Taxonomic and faunistic information is provided on the Zygoptera of Guangxi Zhuang Autonomous Region, China. *Megalestes haui* sp. n. (holotype: ♂, Shiwandashan), *M. tuska* sp. n. (holotype: ♂, Dayaoshan), *Rhipidolestes laui* sp. n. (holotype: ♂, Cenwanglaoshan), *Calicnemia haksik* sp. n. (holotype: ♂, Cenwanglaoshan), *Coeliccia galbina* sp. n. (holotype: ♂, Longrui) and *Drepanosticta magna* sp. n. (holotype: ♂, Cenwanglaoshan) are described. *Sinolestes truncata* Needham is synonymised with *Sinolestes edita* Needham. The hitherto unknown male of *Indocypha katharina* (Needham) and female of *Schmiditiphaea vietnamensis* (van Tol & Rozendaal) are described. *Devadatta ducatrix* Lieftinck, *Euphaea guerini* Rambur, *Euphaea superba* Selys, *Schmidtiphaea vietnamensis* van Tol & Rozendaal, *Indocnemis ambigua* (Asahina), *Calicnemia miles* (Laidlaw), and an undescribed species of *Drepanosticta* are recorded from China for the first time. The status of Guangxi as an important centre of odonate biodiversity is discussed.

INTRODUCTION

With the exception of Guilin, Guangxi Zhuang Autonomous Region is perhaps one of the least explored regions for Odonata in tropical southern China. This report provides the first comprehensive account of Guangxi's zygopteran fauna. The published records for Guangxi are sparse and are summarised below.

In his manual of the dragonflies of China NEEDHAM (1930) recorded 13 zygopterans from Guangxi, notably *Archineura incarnata* (Karsch), *Caliphaea consimilis* McLachlan and *Philosina buchi* Ris. The manual also included the original descriptions of *Bayadera bidentata* and *Megalestes distans*, which were both partly based on material collected from Guangxi. ASAHINA (1977) examined part of Needham's material, originally identified as *Pyrrhosomma tinctipennis*, and reidentified it as *Calicnemia eximia* (Selys).

Table I
Checklist of odonate species from Guangxi Zhuang Autonomous Region

Species	Source
Philoganga r. robusta Navás, 1936	this paper
Devadatta ducatrix Lieftinck, 1969	this paper
Archineura incarnata (Karsch, 1982)	NEEDHAM, 1930 as *Echo incarnata* (Lo-chen--hsien, Guangxi)
Caliphaea consimilis McLachlan, 1894	NEEDHAM, 1930 (Pinglan, Shan-fang, Lo-chen--hsien, Guanxgi)
Calopteryx atrata Selys, 1853	SUI & SUN, 1984
Calopteryx melli Ris, 1912	this paper
Matrona b. basilaris Selys, 1853	this paper
Mnais mneme Ris, 1916	this paper
Neurobasis andersoni Sjoestedt, 1926	ASAHINA, 1979
Neurobasis c. chinensis (Linnaeus, 1758)	SUI & SUN, 1984
Vestalis miao Wilson & Reels, 2001	this paper
Vestalis smaragdina velata Ris, 1912	this paper
Indocypha katharina (Needham, 1930)	this paper
Libellago l. lineata (Burmeister, 1939)	this paper
Rhinocypha drusilla Needham, 1930	this paper
Rhinocypha fenestrella (Rambur, 1842)	NEEDHAM, 1930 as *Rhinocypha cuneata* not of (Selys, 1853) (Shi-an, Ling-yuen-hsien)
Rhinocypha p. perforata (Percheron, 1835)	this paper
Anisopleura furcata Selys, 1891	SUI & SUN, 1984. Note ASAHINA (1985b)
Anisopleura yunnanensis Zhu & Zhou, 1999	this paper
Anisopleura qingyuanensis Zhou, 1982	this paper
Bayadera bidentata Needham, 1930	NEEDHAM, 1930. (Type-loc. Chekiang)
Bayadera brevicauda continentalis Asahina, 1973	this paper
Bayadera melanopteryx Ris, 1912	this paper
Dysphaea basitincta Martin, 1904	this paper
Euphaea decorata (Selys, 1853)	NEEDHAM, 1930 (Ma-tun-kow, Lo-chen-hsien, Guangxi)
Euphaea guerini Rambur, 1842	this paper
Euphaea masoni Selys, 1879	this paper
Euphaea superba Kimmins, 1936	this paper
Schmiditiphaea vietnamensis (Van Tol & Rozendaal, 1995)	this paper
Megalestes distans Needham, 1930	NEEDHAM, 1930 (Lin-yung-hsien, Guangxi)
Megalestes haui sp. n.	this paper
Megalestes tuska sp. n.	this paper
Sinolestes edita Needham, 1930	this paper
Orolestes selysi McLachlan, 1895	this paper
Agriomorpha fusca May, 1933	this paper
Lestes p. praemorsus Hagen, 1862	this paper
Lestes nodalis Selys, 1891	this paper
Philosina buchi Ris, 1917	NEEDHAM, 1930 (Lo-chen-hsien, Guangxi)
Priscagrion pinheyi Zhou & Wilson 2001	ZHOU & WILSON, 2001
Rhipidolestes alleni Wilson, 2000	WILSON, 2000. (Type-loc, Damingshan, Guangxi)

Table I, continued

Rhipidolestes laui sp. n.	this paper
Aciagrion tillyardi (Laidlaw, 1919)	this paper
Agriocnemis femina oryzae (Lieftinck, 1962)	this paper
Agriocnemis lacteola Selys, 1877	this paper
Agriocnemis pygmaea (Rambur, 1842)	this paper
Ischnura senegalensis (Rambur, 1842)	this paper
Ischnura sp. (*rufostigma* Selys, 1876-group)	NEEDHAM, 1930 (Lin-yung-hsien, Guangxi)
Cercion calamorum dyeri (Fraser, 1919)	this paper
Ceriagrion auranticum ryukyuanum Asahina, 1967	this paper
Ceriagrion fallax fallax Ris, 1914	this paper
Ceriagrion melanurum Selys, 1876	this paper
Pseudagrion microcephalum (Rambur, 1842)	this paper
Pseudagrion pruinosum fraseri Schmidt, 1934	NEEDHAM, 1930 as *Pseudagrion elongatum* (Lin--yung-hsien, Guangxi)
Pseudagrion r. rubriceps Selys, 1876	this paper
Pseudagrion spencei (Rambur, 1842)	this paper
Calicnemia eximia (Selys, 1863)	NEEDHAM, 1930 as *Pyrrhosomma tinctipennis* (McLachlan) from Guangxi, reidentified by ASAHINA (1977).
Calicnemia miles (Laidlaw, 1917)	this paper
Calicnemia haksik sp. n.	this paper
Coeliccia cyanomelas Ris, 1912	this paper
Coeliccia didyma (Selys, 1863)	NEEDHAM, 1930. Possible misidentification of *Coeliccia cyanomelas* Ris.
Coeliccia galbina sp. n.	this paper
Copera ciliata (Selys, 1863)	ASAHINA, 1984
Copera marginipes (Rambur, 1842)	this paper
Indocnemis ambigua (Asahina, 1997)	this paper
Indocnemis orang Förster in Laidlaw, 1907	this paper
Sinocnemis yangbingi Wilson & Zhou, 2000	this paper
Drepanosticta brownelli (Tinkham, 1938)	this paper
Drepanosticta magna sp. n.	this paper
Drepanosticta sp.	this paper
Protosticta beaumonti Wilson, 1997	this paper
Prodasineura autumnalis (Fraser, 1922)	this paper
Prodasineura croconota (Ris, 1916)	this paper
Prodasineura verticalis (Selys, 1860)	this paper

Later ASAHINA (1979) recorded *Neurobasis andersoni* Sjoestedt and ASAHINA (1984) documented *Copera ciliata* (Selys). SUI & SUN (1984) added three species from Guangxi, including *Calopteryx atrata* Selys and *Anisopleura furcata* Selys. WILSON (2000) described *Rhipidolestes alleni* from Damingshan, Guangxi and ZHOU & WILSON (2001) described *Priscagrion pinheyi*, also from Damingshan.

Seventy-four species are listed in the checklist provided at Table I. Where previously published records are known to exist, the original source is given. Fifty-five of these taxa are recorded from Guangxi for the first time and six new species are described.

Fig. 1. Map of Guangxi province, showing main areas surveyed.

The Anisoptera will be treated in Part 2, to be published at a later date.

Guangxi Zhuang Autonomous Region is situated between latitudes 22°54'-26°23'N and longitudes 104°28'-112°04'E. It has a total land area of 273,000 km², which is slightly larger than the United Kingdom (241,590 km²) and exactly 50% of the land area of France (545,630 km²). It is bordered by Vietnam to the west and within China is surrounded by Guangdong, Guizhou, Hunan and Yunnan provinces. Much of the area is dominated by karst limestone formations, which cover approximately half the region. Craggy karst limestone hills give rise to spectacular topography across much of Guangxi. The picturesque town of Guilin is a famous tourist destination renowned for its karst limestone scenery, with its hills deeply incised by the meandering Xiang Jiang river. About 22% is forested but most of the primary rainforest has been destroyed. The climate is subtropical with cool dry winters and long, hot, wet summers. The odonate fauna is nevertheless dominated by tropical species with few Palaearctic representatives.

According to (MACKINNON et al., 1996) the region has the highest number of endangered and protected plant species in China. Over 6,000 plant species are known from the region, which is the third highest in China behind Yunnan and Guangdong. Three hundred and thirteen species of protected birds have been recorded. The area is home to the Chinese endemic White-headed Leaf Monkey, *Presbytis leucocephalus*, which is found only in Guangxi. The Qian Jiang is a major tributary of the Zhu Jiang (Pearl River). It flows eastward through Guangxi to Guangdong and together with the Yon Jiang/Yong Jiang tributary, which originates in Yunnan and flows through Nanning, makes up approximately 85% of the region's catchment. Over 200 species of freshwater fish are known from the region. Most of these fish belong to the Cyprinidae family. Globally, more species of fish belong to the cyprinid family than any other fish family and the Pearl River catchment has the highest 'per kilometre' biodiversity of cyprinids of any river system in the world (WINFIELD & NELSON, 1991). This paper will reveal the zygopteran fauna to be extremely rich, containing many restricted species, indicating Guangxi is also an important area for odonate biodiversity.

1997-2002 SURVEYS

Dragonflies were collected by a team from the Hong Kong based Kadoorie Farm and Botanic Garden during May 1997, May-October 1998, July to August 1999, September/2000 and May 2002. The authors, Keith Wilson and Graham Reels, collected the majority of odonates, with assistance from Billy Hau Chi-hang, Michael Lau and John Fellowes. The sites surveyed are listed in Table II. The programme was conducted in collaboration with the Forestry Department of Guangxi Zhuang Autonomous Region, Guangxi Institute of Botany and the South China Agricultural University.

Selected synonimic notes are provided for poorly known species newly recorded from Guangxi. Details of material belonging to common species with widespread distributions are tabulated in Table III.

Holotypes and where available, paratype material of newly described species will be temporarily deposited

Table II
Locations surveyed

Site	Date
Shiwandashan, southwest Guangxi	May 1997 & September 2000
Damingshan, central Guangxi	May 1997 & September 2000
Nonggang, Longzhou, southwest Guangxi	May 1998
Qinglongshan, southwest Guangxi	May 1998
Chunxiu, southwest Guangxi	May 1998
Longrui, near Longzhou, southwest Guangxi	May 1998
Fusui N. R., southwest Guangxi	May 1998
Mulun, north Guangxi	July 1998
Jiuwanshan, north Guangxi	July 1998
Qingshitan, northeast Guangxi	August 1998
Maoershan, northeast Guangxi	August 1998
Huaping, northeast Guangxi	August 1998
Dayaoshan, east Guangxi	September 1998
Dapingshan, east Guangxi	September 1998
Xidamingshan, southwest Guangxi	October 1998
Diding, west Guangxi	July 1999
Gulongshan NR, west Guangxi	July 1999
Baidu Village, Nonghua N. R., west Guangxi	July 1999
Daxin NR, west Guangxi	July 1999
Cenwanglaoshan, northwest Guangxi	July-August 1999 & May 2002
Dawangling, northwest Guangxi	August 1999

at Tai Lung Experimental Station, Agriculture, Fisheries and Conservation Department, Lin Tong Mei, Sheung Shui, Hong Kong SAR, China prior to transfer to Guangxi. Transfer to Guangxi will take place when suitable premises have been identified or established.

DIPHLEBIIDAE

PHILOGANGA ROBUSTA ROBUSTA NAVÁS, 1936

Philoganga robusta: NAVAS, 1936: 43-44, (Guling, Jiangxi); CHAO, 1953: 137-143, pl. 1., figs 1-2, 7-8, (Fujian, Guizhou, Jiangxi & Sichuan); WILSON & REELS, 2001: 151, 153-155, figs 1a & 1b, "Hainan".

Material. – 1 ♂, 3 ♀, Shiwandashan, 8-V-1997, coll. K.D.P. Wilson.

Measurements (mm). – ♂ abd. + app. 60.0, hindwing 53.0; ♀ abd. + app. 45.0-48.0, hindwing 50.0-53.0.

DISTRIBUTION. – China (Fujian, Guangxi, Guizhou, Hainan, Jiangxi and Sichuan). *Philoganga robusta infantua* YANG & LI (1994: 460-462, Figs 10-14) is also known from Shaanxi.

Table III

Details of common species material, with widespread distributions, collected from Guangxi as part of the 1998-2002 odonate survey

Species	Material
Matrona b. basilaris Selys, 1853	1 ♂, 1 ♀, Shiwandashan, 8-V-1997, coll. K.D.P. Wilson; 1 ♂, Mulun, 20--VII-1998, G.T. Reels leg.; 1 ♂, do., 21-VII-1998; 1 ♂, do., 22-VII-1998; 2 ♂, Jiuwanshan, 27-VII-1998, G.T. Reels leg.; 1 ♂, do., 27-VII-1998; 1 ♂, Huaping, 16-VIII-1998, G.T. Reels leg.; 2 ♂, do., 19-VIII-1998; 2 ♂, Maoershan, 24-VIII-1998, G.T. Reels leg.; 1 ♂, 1 ♀, Qingshitan, 26-VIII--1998, G.T. Reels leg.; 4 ♂, 3 ♀, Dayaoshan, 15,16,17,23-IX-1998, G.T. Reels leg.; 3 ♀, Damingshan, 23-IX-2000, B. Hau leg.
Mnais mneme Ris, 1916	2 ♂, Nonggang, Longzhou, 21-V-1998, coll. K.D.P. Wilson; 1 ♂, Chunxiu, 24-V-1998, B. Hau leg.
Neurobasis c. chinensis (Linnaeus, 1758)	2 ♂, Nonggang, Longzhou, 21-V-1998, coll. K.D.P. Wilson; 2 ♂, Nonggang, 22-V-1998, coll. K.D.P. Wilson; I ♂, Qinglongshan, 24-V-1998. coll. K.D.P. Wilson; 1 ♂, Chunxiu, 24-V-1998, B. Hau leg.; 1 ♂, Mulun, 20--VII-1998;1 ♂, 1 ♀, Dayaoshan, 15-1X-1998, G.T. Reels leg.
Libellago l. lineata (Burmeister, 1939)	1 ♂, Nonggang, 22-V-1998, coll. K.D.P. Wilson; 1 ♂, do., 23-V-1998; 1 ♂, Chunxiu, 24-V-1998, B. Hau leg.; 2 ♂s, 1 ♀, Qinglongshan, 24-V--1998, G.T. Reels leg.; 1 ♂, Longrui, 27-V-1998, coll. K.D.P. Wilson; 2 ♂, 1 ♀, Fusui N. R., 28-V-1998, coll. K.D.P. Wilson.
Rhinocypha p. perforata (Percheron, 1835)	2 ♂, 2 ♀, Shiwandashan, 8-V-1997, coll. K.D.P. Wilson; 2 ♂, Chunxiu, 24-V-1998, B. Hau leg.; 1 ♂, Qinglongshan, 24-V-1998, coll. K.D.P. Wilson; 2 ♂, Mulun, 20-VII-1998, G.T. Reels leg.; 2 ♂, do., 20-VII-1998; 1 ♂, 1 ♀, Dayaoshan, 15-IX-1998, G.T. Reels leg.; 1 ♂, Dayaoshan, 20--IX-1998, G.T. Reels leg.
Euphaea decorata (Selys, 1853)	2 ♂, 3 ♀, Shiwandashan, 10-V-1997, coll. K.D.P. Wilson; 1 ♂, Chunxiu, 24-V-1998, B. Hau leg.; 1 ♂, Mulun, 19-VII-1998, leg. G.T. Reels; 1 ♂, do., 20-VII-1998; 1 ♂, Maoershan, 23-VIII-1998, G.T. Reels leg.; 1 ♂, Diding, 8-VII-1999, G.T. Reels leg.; 2 ♂, Dawangling 5-VIII-1999, G.T. Reels leg.; 2 ♂, Dayaoshan, 15-IX-1998, G.T. Reels leg.
Agriomorpha fusca May, 1933	1 ♂, Chunxiu, 24-V-1998, B. Hau leg.; 2 ♂, Diding, 8-VII-1998, G.T. Reels leg.
Lestes p. praemorsus Hagen, 1862	3 ♂, 3 ♀, Longrui, 27-V-1998, coll. K.D.P. Wilson; 1 ♂, Baidoxiang, Nonghua N. R., 13-VII-1999, G.T. Reels leg.
Lestes nodalis Selys, 1891	4 ♂, 1 ♀, Nonggang, 23-V-1998, coll. K.D.P. Wilson; 1 ♂, Longrui, 27-V-1998, coll. K.D.P. Wilson.
Aciagrion tillyardi (Laidlaw, 1919)	3 ♂, Shiwandashan, 10-V-1997, coll. K.D.P. Wilson; 1 ♀, Mulun, 20--VII-1998, G.T. Reels leg.; 1 ♀, do., 21-VII-1998, 1 ♂, Damingshan, 23--IX-2000.
Agriocnemis femina oryzae (Lieftinck, 1962)	1 ♂, Longrui, 27-V-1998, coll. K.D.P. Wilson; 1 ♂, Mulun, 21-VII-1998, G.T. Reels leg.
Agriocnemis lacteola Selys, 1877	1 ♀, Mulun, 20-VII-1998, G.T. Reels leg.; 1 ♂, 1 ♀, Dayaoshan, 15-IX--1998, G.T. Reels leg.
Agriocnemis pygmaea (Rambur, 1842)	1 ♀, Mulun, 20-VII-1998, G.T. Reels leg.; 2 ♂, Daxin, 15-VII-1999, leg. G.T. Reels; 1 ♂, Longrui, 27-V-1998, coll. K.D.P. Wilson
Ischnura senegalensis (Rambur, 1842)	Observed, K.D.P. Wilson, Longrui, 27-V-1998

Table III, continued

Cercion calamorum dyeri (Fraser, 1919)	1 ♂, Nonggang, 21-V-1998, coll. K.D.P. Wilson.
Ceriagrion auranticum ryukyuanum Asahina, 1967	2 ♂, Longrui, 27-V-1998, coll. K.D.P. Wilson; 2 ♂, Fusui N. R., 28-V--1998, coll. K.D.P. Wilson.
Ceriagrion f. fallax Ris, 1914	1 ♂, Maoershan, 23-VIII-1998, G.T. Reels leg.; 1 ♂, Dayaoshan, 17-IX--1998, G.T. Reels leg.; 1 ♂, Dawangling, 5-VIII-1999, G.T. Reels leg.; 2 ♂, Cenwanglaoshan, 28-V-2002, M. Lau leg.
Ceriagrion melanurum Selys, 1876	2 ♂, 2 ♀, Huaping, 16-VIII-1998, G.T. Reels leg.; 1 ♂, 1 ♀, do., 20-VIII--1998.
Pseudagrion microcephalum (Rambur, 1842)	3 ♂, 1 ♀, Nonggang, 22-V-1998, coll. K.D.P. Wilson; 1 ♂, do., 23-V--1998; 1 ♂, Dayaoshan, 15-IX-1998, G.T. Reels leg.
Pseudagrion pruinosum fraseri Schmidt, 1934	4 ♂, Nonggang, 22-V-1998, coll. K.D.P. Wilson; 1 ♂, Fusui N. R., 28-V--1998, coll. K.D.P. Wilson; 1 ♂, Dayaoshan, 15-IX-1998, G.T. Reels leg.; 1 ♂, Gulongshan, 10-VII-1999, G.T. Reels leg.
Pseudagrion r. rubriceps Selys, 1876	1 ♂, Longrui, 27-V-1998, coll. K.D.P. Wilson; 2 ♂, Fusui N. R., 28-V--1998, coll. K.D.P. Wilson; 1 ♂, Daxin, 15-VII-1999, G.T. Reels leg.
Pseudagrion spencei (Rambur, 1842)	1 ♂, Nonggang, 23-V-1998, coll. K.D.P. Wilson; 5 ♂, 1 ♀, Fusui N. R., 28-V-1998, coll. K.D.P. Wilson.
Coeliccia cyanomelas Ris, 1912	7 ♂, 1 ♀, Damingshan, 13-V-1997, coll. K.D.P. Wilson; 2 ♂, 1 ♀, Mulun, 21-VII-1998, G.T. Reels leg.; 3 ♂, Jiuwanshan, 26-VII-1998, G.T. Reels leg.; 1 ♂, Huaping, 16-VIII-1998, G.T. Reels leg.; 3 ♂, do., 19-VIII-1998; 2 ♂, 2 ♀, Maoershan, 23-VIII-1998, G.T. Reels leg.; 1 ♂, Qingshitan, 26-VIII--1998, G.T. Reels leg.; 4 ♂, 1 ♀, Dayaoshan, 16-IX-1998, G.T. Reels leg.; 1 ♂, Dapingshan, 25-IX-1998; 1 ♂, Cenwanglaoshan, 31-VII-1999, G.T. Reels leg.
Copera ciliata (Selys, 1863)	1 ♂, 2 ♀, Qinglongshan, 24-V-1998, coll. K.D.P. Wilson; 1 ♂, 1 ♀, Maoershan, 23-VIII-1998, G.T. Reels leg.
Copera marginipes (Rambur, 1842)	1 ♀, Shiwandashan, 8-V-1997, coll. K.D.P. Wilson; 1 ♂, Nonggang, 23--V-1998, coll. K.D.P. Wilson; 2 ♂, 1 ♀, Chunxiu, 24-V-1998, B. Hau leg.; 2 ♂, Fusui N. R., 28-V-1998, coll. K.D.P. Wilson; 1 ♂, Mulun, 20--VII-1998, G.T. Reels leg.; 1 ♂, Jiuwanshan, 25-VII-1998, G.T. Reels leg.
Prodasineura autumnalis (Fraser, 1922)	1 ♂, 1 ♀, Shiwandashan, 9-V-1997, coll. K.D.P. Wilson; 1 ♂, Chunxiu, 24-V-1998, B. Hau leg.

AMPHIPTERIGIDAE

DEVADATTA DUCATRIX LIEFTINCK, 1969

Devadatta ducatrix: LIEFTINCK, 1969: 205-207, figs 1-2, "Than Moi, Tonkin".

Material. – 1 ♂, Chunxiu, 24-V-1998, B. Hau leg.

DISTRIBUTION. – China (Guangxi), Laos and Vietnam.

CALOPTERYGIDAE

ARCHINEURA INCARNATA (KARSCH, 1892)

Echo incarnata: NEEDHAM, 1930: 203-204, pl. 16, fig. 1, "West China and Foochow".
Archineura incarnata: ASAHINA: 1977: 488, (Sichuan).

Material. – 2 ♂, 1 ♀, Jiuwanshan, 26-VII-1998, G.T. Reels leg.; 1 ♂, Huaping, 16-VIII-1998, G.T. Reels leg.; 1 ♂, 1 ♀, Maoershan, 23-VIII-1998, G.T. Reels leg.; 2 ♂, 1 ♀, Dayaoshan, 17-IX-1998, G.T. Reels leg.

Measurements (mm). – ♂ abd. + app. 65.0-71.0, hw. 47.0-49.0; ♀ abd. + app. 62.0-65.5, hw. 53.0-55.0.

DISTRIBUTION. – China (Fujian, Guangdong, Guangxi and Sichuan).

REMARKS. – A wary, metallic green calopterygid of gigantic proportions with brilliant carmine red basal wing colouration. In early spring, hundreds of freshly emerged males of this species, perched in crowds on streamside vegetation, is a spectacular sight.

CALIPHAEA CONSIMILIS MCLACHLAN, 1894

Caliphea consimilis: NEEDHAM, 1930: 211-212, pl. 16, fig. 4, "Kwangsi & Western China"; ASAHINA, 1956, 205-206, "Chekiang"; ASAHINA, 1977: 487-488, fig. 29, "Szechuen"

Material. – 1 ♂, 2 ♀, Huaping, 20-VIII-1998, G.T. Reels leg.; 4 ♂, 1 ♀, Dayaoshan, 19-IX-1998, G.T. Reels leg.; 4 ♂, Cenwanglaoshan, 2-VIII-1999, G.T. Reels leg.; 1 ♂, Cenwanglaoshan, 26-V-2002, M. Lau leg.

DISTRIBUTION. – China (Guangxi, Sichuan, Yunnan and Zhejiang).

REMARKS. – According to ASAHINA (1956) *C. consimilis* was erroneously synonymised with *C. confusa* Hagen by Fraser in 1929 (FRASER, 1934). The inferior appendages of the two species are quite distinct. *C. nitens* (Navás) is considered a synonym of *C. consimilis*. As pointed out by Hämäläinen in DAVIES & YANG (1996) it was CHAO's (1962) probable intention to synonymise *C. nitens* with *C. consimilis* but due to a numbering error it was inadvertently synonymised with *Bayadera melanopteryx* Ris. Matti Hämäläinen (pers. comm.) is of the opinion that *C. nitens* may be a good species, which is smaller and slighter than *consimilis*. The Guangxi material belongs to the '*nitens*' form.

CALOPTERYX ATRATA SELYS, 1853

Agrion atratum: NEEDHAM, 1930: 196-197, "China generally"; SUI & SUN, 1984: 189-190, fig. 120, (Beijing, Fujian, Guangxi, Hunan, Jiangsu, Shaanxi, Zhejiang and NE China)

Material. – 1 ♂, 1 ♀, Mulun, 20-VII-1998, G.T. Reels leg.

Measurements (mm). – ♂ abd. + app. 54.5 mm, hw., 42.0; ♀ hw. 38.0.

DISTRIBUTION. – China (Beijing, Fujian, Guangxi, Hunan, Jiangsu, Shaanxi, Zhejiang and NE China), Japan and Korea, Russia and Vietnam?

REMARKS. – *C. atrata* is very similar to *C. grandaeva* Selys, which has been recorded from neighbouring Vietnam (VAN TOL & ROZENDAAL, 1995: 92-93). The hindwing of *grandaeva* is broader than *C. atrata.* A photograph of a male *grandaeva* specimen, kindly forwarded to me by Matti Hämäläinen, has a hindwing ratio of 1.0 : 3.08. The wings of Mulun male specimen are not as broad, with a hindwing ratio of 1 : 3.42. *C. grandaeva* is known from Vietnam, Sichuan and Zhejiang.

CALOPTERYX MELLI RIS, 1912

Calopteryx melli: RIS, 1912: 55-56, pl. 3 (fig. 3), "Tsaiyiusan, Kwungtung"; WILSON & REELS, 2001: 155, "Hainan".
Agrion melli: NEEDHAM, 1930: 195, "Tsaiyiusan, Kwungtung".

Material. – 1 ♂, Huaping, 19-VIII-1998, G.T. Reels leg.; 3 ♂, Qingshitan, 26-VIII-1998, G.T. Reels leg.; 2 ♂, 1 ♀, Dayaoshan, 22-IX-1998, G.T. Reels leg.; 2 ♂, 1 ♀, Dapingshan, 25-IX-1998; 1 ♂, 1 ♀, Damingshan, 23-IX-2000, B. Hau leg.

DISTRIBUTION. – China (Guangdong, Guangxi and Hainan).

VESTALIS MIAO WILSON & REELS 2001

Figures 2-3

Vestalis miao: WILSON & REELS, 2001: 154-156, figs 2-6, "type-loc, Diaoluoshan, Hainan".

Material. – 1 ♀, Dayaoshan, 19-IX-1998, G.T. Reels leg.; 1 ♂, 1 ♀, Dapingshan, 23-IX-1998.

REMARKS. – The thoracic pattern and complex penile organ of the type material are the same as Hainan material. The superior appendages (Figs 2-3) are fractionally longer and slightly finer but these are minor differences.

DISTRIBUTION. – China (Guangxi and Hainan).

VESTALIS SMARAGDINA VELATA RIS, 1912

Vestalis smaragdina: NAVÁS 1936: 42, "Kuling"
Vestalis smaragdina veluta: RIS, 1912: 56-57, "type-loc. Tsa-Yiu-San", Guangdong; ASAHINA, 1977: 434, 492-493, figs 25-27, (Fujian, Sichuan).

Material. – 2 ♀, Huaping, 17-VIII-1998, G.T. Reels leg.; 2 ♀, do., 19-VIII-1998; 1 ♂, Maoershan, 23-VIII-1998, G.T. Reels leg.; 2 ♂, 1 ♀, Qingshitan, 26-VIII-1998, G.T. Reels leg.

DISTRIBUTION. – China (Fujian, Guangdong, Guangxi, Jiangxi and Sichuan).

REMARKS. – The nominate subspecies *V. s. smaragdina* is known from Bengal, Burma, India, Nepal, Thailand and Vietnam.

CHLOROCYPHIDAE

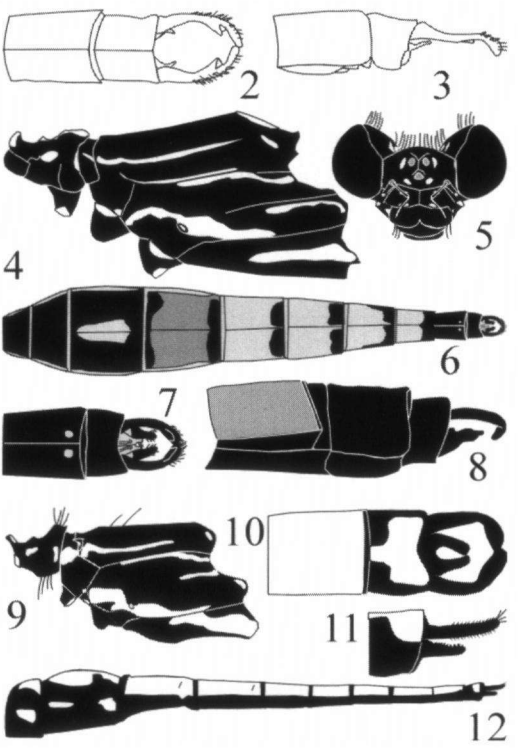
INDOCYPHA KATHARINA (NEEDHAM, 1930) COMB. NOV.

Figures 4-8

Rhinocypha katharina: NEEDHAM, 1930: 222-223, (2 ♀, type-loc. Suifu, Sichuan); DAVIES & TOBIN, 1984: 19, "China".

Material. – 1 ♂, Longrui, 27-V-1998; coll. K.D.P. Wilson; 1 ♂, 1 ♀, Mulun, 20-VII-1998, G.T. Reels leg.; 1 ♂, do., 22-VII-1998.

DESCRIPTION. – First ♂: Large blackish chlorocyphid with predominantly brick red abdomen. Labium, labrum and clypeus black. Clypeus extremely protruded. Frons, genae and top of head black with two pairs of pale spots adjacent to occipital margin, a further two pairs of pale spots adjacent to the ocelli and another two pairs of spots on the frons (see Fig. 5). Thorax is mainly black with pale cream pattern as illustrated in Figure 4. Legs black with inner margins bright white. Wings hyaline with base pale amber below nodus. Segments 1-3 of abdomen predominantly black with pale lateral margins and borders. Large elongate pale cream spot in dorsal centre of segment 3. Segments 4-8 mainly brick red with broad black distal borders. Segments 9-10 and caudal appendages black. The abdomen has no pruinescence.



Figs 2-12. [2-3] *Vestalis miao*, ♂, Guangxi: (2) caudal genitalia, dorsal; – (3) caudal genitalia, lateral; – [4-8] *Indocypha katharina*, ♂, Guangxi: (4) thorax, lateral; – (5) head, frontal; – (6) abdomen, dorsal; – (7) caudal genitalia, dorsal; – (8) caudal genitalia, lateral; – [9-12] *Rhinocypha drusilla*, ♂, Guangxi: – (9) thorax, lateral; – (10) caudal genitalia, dorsal; – (11) caudal genitalia, lateral; – (12) abdomen, lateral.

The pattern of the abdomen is illustrated in Figure 6. The caudal appendages are shown in Figures 7 and 8.

REMARKS. – The senior author is grateful to Matti Hämäläinen, who has studied Needham's type of *katharina*, for pointing out its wing venation indicates it belongs to *Indocypha*. NEEDHAM's (1930) description of *katharina* is more or less identical to the female from Mulun. The male of *katharina* has not previously been described and hitherto the status of *katharina* as a valid species was undecided. It was considered a possible synonym of *I. vittata* (Selys). The male of *I. vittata* has a clearly different abdominal pattern, which becomes pruinosed, basally with age.

ASAHINA (1988) described a male *Rhinocypha* species from Sichuan, which he considered might represent the undescribed male of *katharina*. However, the species he described was a true *Rhinocypha* and not an *Indocypha*, with 1A joining the hind base of the wing, distal to the level of the first antenodal cross-vein. In true *Indocypha* the 1A vein joins the base of the wing proximal to the level of the first antenodal cross--vein. The species described by ASAHINA (1988: 2-4, figs 7-10) may represent *Rhinocypha drusilla* Needham, which is treated below and illustrated in Figures 9-12. The caudal genitalia and thoracic patterns are similar.

RHINOCYPHA DRUSILLA NEEDHAM, 1930

Figures 9-12

Rhinocypha drusilla: NEEDHAM, 1930: 221-222, pl. 16, fig. 9, "Chekiang and Fukien"; VAN TOL & ROZENDAAL, 1995: 98-99, fig. 12, "♂ holotype, Cornell Univ. Holotype No. 976"; HÄMÄLÄINEN & DIVASIRI: 1997: 204, "Fujian".

Material. – 1 ♂, Dayaoshan, 19-IX-1998, G.T. Reels leg.

DISTRIBUTION. – China (Guangxi, Fujian and Zhejiang).

REMARKS. – This species was not described by NEEDHAM (1930) from fresh material. Its body colour is predominantly black with pale yellow markings on the head and thorax. The dorsum of the abdomen is bright orange red and not brown as indicated by NEEDHAM (1930). Comments on the *drusilla* holotype male were made by HAMALAINEN & DIVASIRI (1997), who also pointed out the true colour pattern of *drusilla*, based on a study of better preserved males, housed in the RMNH (Leiden Museum), collected from Fujian Province by T.C. Maa during the 1940's. It is easily separated from other Chinese *Rhinocypha* by its distinctive pterostigmas, which are black with distal third of forewing and distal half of hindwing whitish cream.

RHINOCYPHA FENESTRELLA (RAMBUR, 1842)

Rhinocypha cuneata not of (Selys, 1853): NEEDHAM, 1930: 223-224, "Guangxi & Tibet".

Rhinocypha fenestrella: FRASER, 1934: 17-20, "Burma, India, P. Malaysia".

Aristocypha f. fenestrella: VAN TOL & ROZENDAAL, 1995: 94, "Vietnam".
Rhinocypha (Aristocypha) fenestrella: ASAHINA, 1996: 189-190, "Vietnam".
Rhinocypha f. fenestrella: WILSON & REELS, 2001: 156-157, "Hainan".

Material. – 1 ♂, Diding, 8-VII-1999, G.T. Reels leg.; 2 ♂, Dawangling, 5-VIII-1999, G.T. Reels leg.

DISTRIBUTION. – Burma, China (Guangxi, Hainan, Tibet and Yunnan), India, Laos, Nepal, Peninsular Malaysia, Thailand and Vietnam.

EUPHAEIDAE

ANISOPLEURA YUNNANENSIS ZHU & ZHOU, 1999

Anisopleura yunnanensis: ZHU & ZHOU, 1999: 33-35, "type-loc. Yunnan".

Material. – 2 ♂, Diding, 8-VII-1999, G.T. Reels leg.

DISTRIBUTION. – China (Guangxi and Yunnan).

REMARKS. – Five of the nine known species of *Anisopleura* are recorded from China. The additional species include *A. qingyuanensis* Zhou, *A. comes* Hagen also known from Bangladesh and Thailand, *A. furcata* Selys, which also occurs in Burma and Thailand and *A. zhengi*, YANG (1996) described from Shaanxi, China. *A. lestoides* Selys is known from neighbouring Vietnam, India and Nepal. The remaining two species *A. vallei* St. Quentin and *A. lieftincki* Prasad & Ghosh are confined to India. According to ZHU & ZHOU (1999) *A. yunnanensis* differs from the closely related *A. subplatystyla*, known from India and Thailand, by the colour of the prothorax, legs and abdomen and by the structure of the anal appendages.

ANISOPLEURA QINGYUANENSIS ZHOU, 1982

Anisopleura qingyuanensis: ZHOU, 1982: 65-66, figs 1-3, "type-loc. Qingyuan, Zhejiang".

Material. – 2 ♂, 2 ♀, Huaping, 19-VIII-1998, G.T. Reels leg.; 1 ♂, 1 ♀ Maoershan, 23-VIII-1998, G.T. Reels leg.; 1 ♂, do., 24-VIII-1998; 1 ♀, Qingshitan, 26-VIII-1998, G.T. Reels leg.; 2 ♂, Dayaoshan, 15-IX-1998, G.T. Reels leg.; 1 ♂, do., 16-IX-1998; 1 ♂, 1 ♀, do., 17-IX-1998; 3 ♂, 1 ♀, Diding, 6-VII-1999, G.T. Reels leg.; 3 ♂, do., 8-VII-1999; 3 ♂, 1 ♀, Cenwanglaoshan, 31-VII-1999, G.T. Reels leg.; 1 ♂, Dawangling, 5-VIII-1999, G.T. Reels leg.

DISTRIBUTION. – China (Guangdong, Guangxi and Zhejiang) extending to Indochina.

REMARKS. – A widespread species in southern China apparently extending to Indochina. ASAHINA (1985b) shed doubt on NEEDHAM's (1930) Sichuan records of *A. furcata* Selys when he remarked this material strongly resembled *qingyuanensis*. According to YANG (1996) *A. zhengi* differs from *A. qingyuanensis* only slightly. The

prothorax middle lobe of *zhengi* has a different pattern of spots and the anal appendages are unique. The stout lateral projection of the superior appendage is visible when viewed dorsally in *zhengi* whereas this projection is masked by the main flattened body of the superior appendage in *qingyuanensis*.

BAYADERA BIDENTATA NEEDHAM, 1930

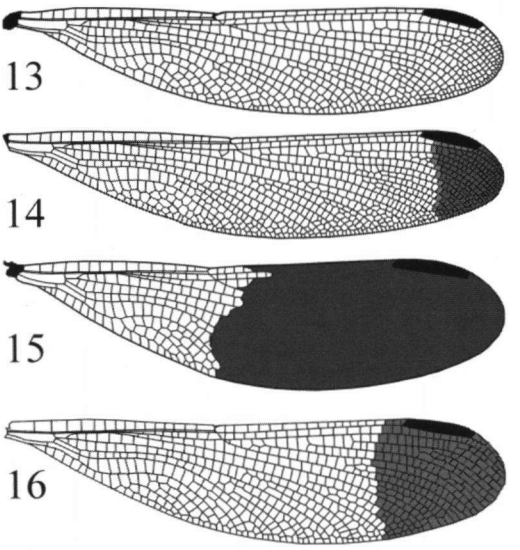
Figure 13

Bayadera bidentata: NEEDHAM, 1930: 218-219, pl. 16, fig. 7, "Guangxi & type-loc. Chekiang"; DAVIES & YANG, 1996: 151-153(key), figs 29-30, "Hubei".

Material. – 5 ♂, 2 ♀, Diding, 8-VII-1999, G.T. Reels leg.; 1 ♂, Dawangling, 5-VIII-1999, G.T. Reels leg.

DISTRIBUTION. – China (Guangxi, Hubei and Zhejiang).

REMARKS. – All previous records of *B. bidentata* refer to material with hyaline wings (see Fig. 13). All the Diding specimens have hyaline wings but the extreme wing tips of the Dawangling male are tipped dark brown distal to the pterostigma. The closest congener is *B. kirbyi* WILSON & REELS (2001), from Hainan, which has wings tipped dark brown from middle of pterostigma (see Fig. 14). The wings of these two species are otherwise very similar in overall shape and structure, both being relatively narrow compared to other species of *Bayadera* (see remarks for *B. melanopteryx* below). However, the nodus in *kirbyi* is located much closer to the wing centre than is the case with *bidentata*. In addition, inter alia, the inner, upper halves of the mid and hind femora are coloured creamy white, whereas the legs of *kirbyi* are entirely black.



Figs 13-16. [13] *Bayadera bidentata*, ♂, Guangxi, hindwing; – [14] *B. kirbyi* Wilson & Reels, ♂, Hainan, hindwing; – [15-16] *B. melanopteryx*, ♂, Guangxi: (15) NE Guangxi, hindwing; – (16) W Guangxi, hindwing.

BAYADERA BREVICAUDA CONTINENTALIS ASAHINA, 1973

Bayadera hyalina not of (Selys, 1879): RIS, 1912: 52, "Tsa-Yiu-San, Guangdong".
Bayadera brevicauda continentalis: ASAHINA, 1973: 455-457, figs 40-41, 44-49, "Fujian"; ASAHINA, 1978: 4, "Fujian".

Material. – 13 ♂, 3 ♀, Damingshan, 12/13-V-1997, coll. K.D.P. Wilson; 2 ♂, 2 ♀, Cenwanglaoshan, 25-V-2002, M. Lau leg.

DISTRIBUTION. – China (Fujian, Guangdong and Guangxi).
REMARK. – This is the first record of *B. b. continentalis* from Guangxi.

BAYADERA MELANOPTERYX RIS, 1912
Figures 15-21

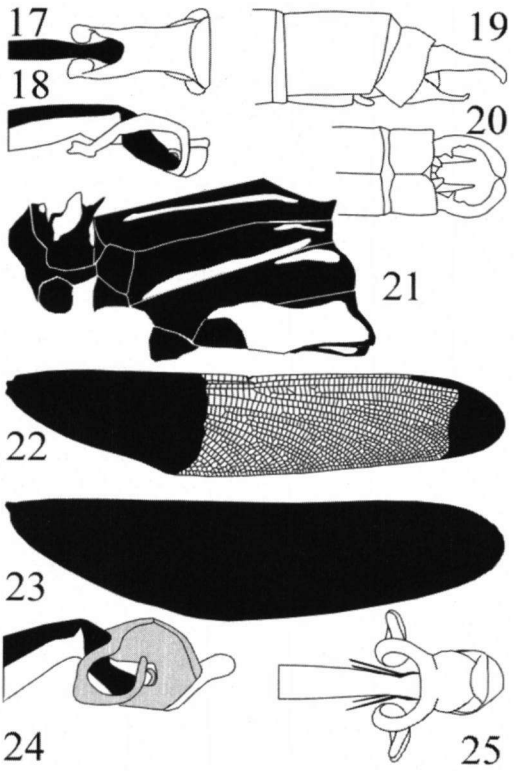
Bayadera melanopteryx: RIS, 1912: 48-50, figs 2a-2b, "Tsa-Yiu-San, Kwungtung"; NEEDHAM, 1930: 216, "Szechuen and Kwangtung"; ASAHINA, 1956: 206-209, fig. 3, 227, pl. (fig. 2), "West-Tien-Mu-Shan, Suenson leg., Chekiang"; DAVIES & YANG, 1996: 151-153, figs 31-32, "Hefeng, Hubei".

Material. – 1 ♂, 1 ♀, Jiuwanshan, 26-VII-1998, G.T. Reels leg.; 1 ♂, 1 ♀, do., 27-VII-1998; 1 ♀ Huaping, 16-VIII-1998, G.T. Reels leg.; 1 ♀, do., 17-VIII-1998; 2 ♂, do., 19-VIII-1998; 2 ♂, Maoershan, 23-VIII-1998, G.T. Reels leg.; 1 ♂, do., 24-VIII-1998; 3 ♂, 1 ♀, Cenwanglaoshan, 2-VIII-1999, G.T. Reels leg.

DISTRIBUTION. – China (Guangdong, Guangxi, Hubei, Sichuan and Zhejiang).
REMARKS. – The extent of the dark colouration at the apical tip of the wings, as pointed out by ASAHINA (1956), is variable. Specimens from Zhejiang are coloured from before the mid-point of the wing (ASAHINA, 1956, 15, fig. 2). DAVIES & YANG (1996) comment, in their key, that *melanopteryx* wings (material examined from Hubei) have the apical one-third coloured dark brown. Our west Guangxi specimens from Cenwanglaoshan have the apical wing tips coloured dark brown from approximately 2-4 cells proximal to the pterostigma (Fig. 16). The specimens collected from northeast Guangxi from Huaping, Maoershan and Jiuwanshan are more extensively coloured with more than half the wing deeply pigmented brown (Fig. 15). The senior author has carefully examined males and females from both regions within Guangxi and can find no overt structural differences apart from very minor differences in wing structure. The Cenwanglaoshan specimens have wings, which are relatively narrower, with a nodus located slightly closer to the wing centre than north-eastern forms. Within each region the extent of the dark brown wing tip colouration is similar in both forewing and hindwing and males and females are identical. With more information on the distribution of the various forms of *melanopteryx* throughout China the western form may prove to be a separate taxon at species level.

B. melanopteryx superficially resembles *B. kirbyi* WILSON & REELS (2001) from

Hainan. The wings of *melanopteryx* are considerably broader than those of *kirbyi*. The hindwing width to maximum length ratio of *melanopteryx* is 1:4 (Figs 15-16 and ASAHINA, 1956: 15, fig 2), whereas this ratio is closer to 1:5 in the hindwing of *kirbyi* (Fig. 14). The comparatively undeveloped tubercle distal to the basal projection of the superior appendage (Fig. 20), the structure of the penile organ, illustrated in Figures 17-18, and much broader hindwings will serve to separate these two species. The thorax and abdomen of the male is entirely black. The female thorax is illustrated in Figure 21. The female synthoracic pattern is unusual amongst *Bayadera*, since there is no antehumeral stripe and the entire metepimeron is yellow. These characters are shared with the female of *Bayadera nephelopennis* DAVIES & YANG (1996: 147, fig. 12).



Figs 17-25. [17-21] *Bayadera melanopteryx*, Guangxi: – (17) penile organ, ventral; – (18) penile organ, lateral; – (19) ♂, caudal genitalia, lateral; – (20) ♂, caudal genitalia, dorsal; – (21) ♀, thorax; – [22-24] *Dysphaea basitincta*, ♂, Guangxi: (22) hindwing, normal form; – (23) hindwing, black form; – (24) penile organ, lateral; – [25] *Euphaea opaca* Selys, ♂, Fujian: penile organ, ventral.

DYSPHAEA BASITINCTA MARTIN, 1904

Figures 22-24

Dysphaea basitincta: MARTIN, 1904: 218-219, "Tonkin"; WILSON & REELS, 2001: 158, figs 7-11, "Hainan".

Material. – 2 ♂, Nonggang, 23-V-1998. coll. K.D.P. Wilson; 1 ♂, Chunxiu, 24-V-1998, B. Hau leg.; 2 ♂, Fusui N.R., 28-V-1998, coll. K.D.P. Wilson; 1 ♂, Mulun, 20-VII-1998, G.T. Reels leg.; 1 ♂, Daxin, 15-VII-1999, G.T. Reels leg.

DISTRIBUTION. – China (Guangxi and Hainan) and Vietnam.

REMARKS. – The penile organ is illustrated in Figure 24. There are slight differences when compared to the penile organ of *basitincta* from Hainan (WILSON & REELS, 2001), with the curled horns possessing a broadened base, when viewed laterally. However there is much variability amongst the *basitincta* penile organs and at least one of the Guangxi males does not possess this feature. Two extraordinary males, one collected from Nonggang near the Vietnamese border, and another from Mulun, possessed entirely blackened wings. Several other males were observed at these sites, which possessed wings with normal pigmentation, as illustrated in Figure 22. The entirely black hindwing is illustrated in Figure 23.

EUPHAEA GUERINI RAMBUR, 1842

Figures 26-27

Euphaea guerini: MARTIN, 1904: 218, "Cochinchine, Annam, Tonkin"; VAN TOL & ROZENDAAL, 1995: 102-104, figs 20-21, "Vietnam".
Euphaea g. guerini: ASAHINA, 1985b: 27, "key to sspp., range of *E. g. guerini*, Cochin, China"; ASAHINA, 1996: 191-192, 195, figs 1-2, 11, "North Vietnam".

Material. – 5 ♂, 3 ♀, Shiwandashan, 8-V-1997, coll. K.D.P. Wilson.

DISTRIBUTION. – Cambodia, China (Guangxi), Laos and Vietnam.

REMARKS. – An attractive species with wholly black wings, which show brilliant flashes of metallic green in flight. The fore- and hindwings are illustrated in Figures 26-27. For differentiation from *E. masoni* Selys and the recently described *E. hirta* see HÄMÄLÄINEN & KARUBE (2001).

EUPHAEA MASONI SELYS, 1879

Euphaea masoni: MARTIN, R., 1904: 204: 218, (Tonkin, Annam); ASAHINA, 1985b: 24-27, figs 21-24, 60-61, "Thailand"; VAN TOL & ROZENDAAL, 1995: 102-105, figs 22-23, "Vietnam".

Material. – 2 ♂, 2 ♀, Chunxiu, 24-V-1998, B. Hau leg.

DISTRIBUTION. – India (Nagaland), Burma, China (Guangxi, Yunnan), Laos, southern Thailand and Vietnam.

REMARKS. – As pointed out by VAN TOL & ROZENDAAL (1995) males of *E. masoni* are easily separated from the similar *E. guerini* by the absence of a tuft of long hairs at the ventral base of segment 9 and vesicles without a sharp edge at their outermost corners. Chunxia is located adjacent to the border with N. Vietnam and is just over 100 km northwest of the location of the above-recorded *E. guerini*. If these two species are parapatric, as VAN TOL & ROZENDAAL (1995) suggest they are in Vietnam, then the distribution boundary must pass through the Ningming area of southwest Guangxi.

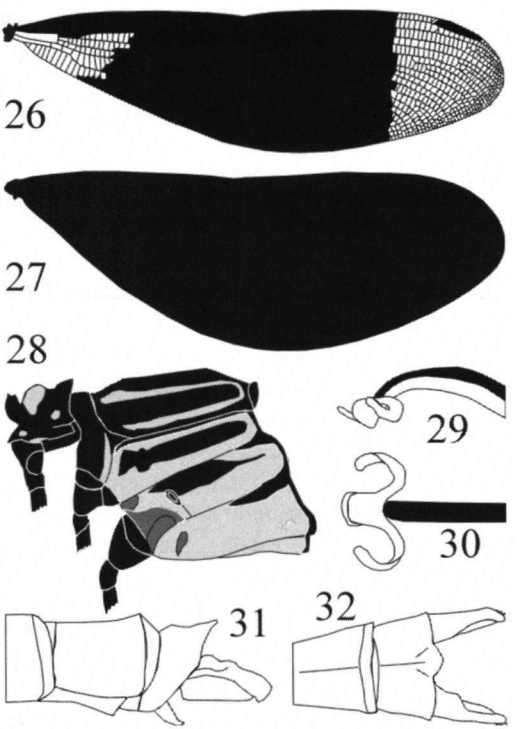
However, according to HÄMÄLÄINEN & KARUBE (2001) both *guerini* and *masoni* are widely distributed in Vietnam and have been recorded from southern, central and northern parts of the country. The subspecies *inoue* Asahina, 1977, belongs to *masoni* and in view of the clinal variation of *masoni* throughout its range its subspecific status is considered doubtful (HÄMÄLÄINEN & KARUBE, 2001).

EUPHAEA SUPERBA KIMMINS, 1936

Figures 28-32

Euphaea superba: KIMMINS, 1936: 147- 149, figs 1-4, "Tonkin, leg. H. Fruhstorfer"

Material. – 3 ♂, Mulun, 20-VII--1998, G.T. Reels leg.



Figs 26-32. [26-27] *Euphaea guerini*, ♂, Guangxi: (26) forewing; (27) – hindwing; – [28-32] *E. superba*, ♂, Guangxi: (28) thorax, lateral; – (29) penile organ, lateral; – (30) penile organ, ventral; – (31) caudal genitalia, lateral; – (32) caudal genitalia, dorsal.

REMARKS. – We originally assumed the Guangxi material belonged to *E. opaca* Selys on account of the three males' uniformly chocolate brown coloured wings. ASAHINA (1973: 457-459, figs 60-64) figured *E. opaca* from Fujian and included a drawing of the penile organ. The *opaca* penile organ is quite different from *superba*. It has spiralled tips, each of which completes a full 360° spiral. The Guangxi material does have highly curved horn-shaped penile tips, but these do not form a spiral (Figs 29-30). The senior author is grateful to Dr Matti Hämäläinen for the loan of an *opaca* specimen collected from Fujian, collected by Maa, belonging to the RMNH (Leiden Museum) collection. Its penile organ is illustrated in Figure 25. The Guangxi material thorax and caudal appendages are illustrated in Figures 28, 31-32, respectively. Our material and drawings agree with the illustrations and description of *superba* given by KIMMINS (1936).

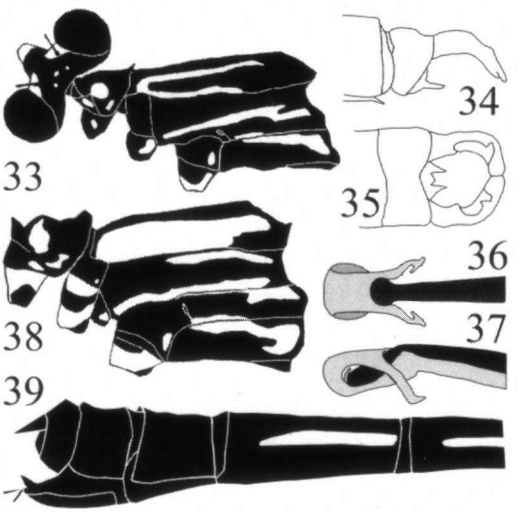
DISTRIBUTION. – China (Guangxi) and Vietnam. *E. opaca* is known from Fujian with an historical record from Hong Kong (LAI, 1971).

SCHMIDTIPHAEA VIETNAMENSIS (VAN TOL & ROZENDAAL, 1995) COMB. NOV.
Figures 33-39

Bayadera vietnamensis: VAN TOL & ROZENDAAL, 1995: 100-103, figs 13-18, "north Vietnam".

Material. – 3 ♀, 1 ♂, Shiwandashan, 8-V-1997, coll. K.D.P. Wilson; 8 ♂, 8 ♀, do., 10-V-1997.

DESCRIPTION. – First ♀: Fine bodied euphaeid with long, hyaline narrow wings and bright orange patterned thorax. Labium blackish brown with bluish white or pale yellow lateral lobes. Labium glossy bright orange with fine dark brown distal border. Mandibles glossy bright orange with fine black borders. Clypeus shining black. Lower face and sides of face below and next to antenna shining orange. Antennae dark brown with anterior of first segment pale. Prothorax matt-black with large central lateral pale spot coloured bright orange. Synthorax black with bright orange pattern on dorsum as illustrated in Figure 33. Orange pattern is paler at sides of synthorax. Legs brownish black with anterior side of trochanters and femora pale. Wings hyaline with dark venation. Cubital space with between 2-5 cross-veins, typically 4 or 5. Discoidal cell of a single female specimen with a single cross-vein in hind wings otherwise all wings free of such cross-veins. Abdominal segments 1-6 dark brown and segments 7-10 black. Segments 1-2 with pale or orange lateral stripes. Segments 2-6 with small pale or orange basal lateral spot followed by a lateral stripe, which approaches the distal margin. Caudal segments and genitalia illustrated in Figure 39.



Figs 33-39. *Schmidtiphaea vietnamensis*, Guangxi: (33) ♂, head and thorax; – (34) ♂, caudal genitalia, lateral; – (35) ♂, caudal genitalia, dorsal; – (36) penile organ, ventral; – (37) penile organ, lateral; – (38) ♀, thorax, lateral; – (39) ♀, caudal abdomen, lateral.

Male. – Labium blackish brown with bluish white or pale yellow lateral lobes. Labium glossy bluish yellow or glossy pale blue with fine dark brown distal border. Mandibles glossy bluish yellow or glossy pale blue with fine black borders. Clypeus shining black. Frons and vertex matt-black with shining pale yellow or pale blue triangles anterior to base of antennae extending laterally to eye margin, as shown in Figure 10. Antennae dark brown with anterior of first segment pale. Prothorax (Fig. 38) matt-black with large central lateral pale spot coloured pale azure blue or

pale violaceous. Synthorax (Fig. 38) black with pale azure blue or pale violaceous pattern as illustrated in Figure 10. Legs brownish black with anterior side of trochanters and femora pale blue or pale violaceous. Wings hyaline and narrow with dark venation. Cubital space with between 2-5 cross-veins, typically 4 or 5. Discoidal cell of one male specimen with a single cross-vein in hind wings otherwise all male wings free of such cross-veins. Abdomen dark brown with blue spot at lateral centre of segment one and small blue spot at lateral base of segment 3. Caudal genitalia illustrated in Figures 34--35 and penile organ Figures 36-37.

Measurements (mm). – ♂: abd. + app. 43.5-45.0, hw. 29.0-30.0; ♀ abd. + app. 32.0-34.0, hw. 29.5-31.0.

DISTRIBUTION. – China (Guangxi) and Vietnam.

REMARKS. – VAN TOL & ROZENDAAL (1995) described *vietnamensis* based on three male specimens. The senior author is grateful to Dr J. Van Tol for the loan of one of the paratype males of *vietnamensis* from Vietnam (Nghe Tinh Province, Thang Chuong District, Doi Khe Lao, altitude 100 m, 18°40'N 105°15E, VII-1990, F.G. Rozendaal leg.). There are a few minor differences. VAN TOL & ROZENDAAL (1995) indicate the postclypeus has, "basal third in outer corners with elongate pale stripe". This stripe was pale but clearly evident on loaned specimen. The postclypeus of the Guangxi specimens is entirely black. The strikingly colourful dimorphic female is described here for the first time. The contrast between the pale blue pattern of the males compared to the bright orange appearance of the females is not so evident in the two closely allied species, which comprise *S. schmidi* ASAHINA (1978) and *S. yunnanensis* DAVIES & YANG (1996).

ASAHINA (1978) established the genus *Schmidtiphaea* to receive the species *schmidi*. The genus is characterised, amongst other features, principally by its extremely fine wings, long body, cross-veins in the cubital space and partly fused R_{2+3} with R_1. This latter feature is characteristic of the genus *Bayadera*. The ratio of the hindwing width to length ratio is approximately 1:6. This feature is between 1:4 and 1:5 in species of *Bayadera*, the closest genus. The narrow wing character may be a recent development, in comparison with the much broader wings of its closest congener *Bayadera*. Perhaps this was made possible by a greatly reduced body mass.

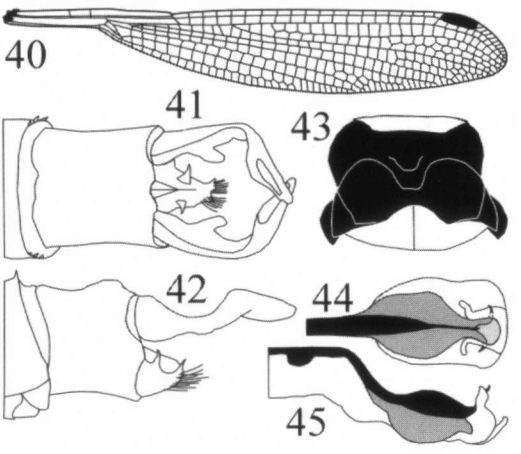
SYNLESTIDAE

MEGALESTES DISTANS NEEDHAM, 1930

Figures 40-45

Megalestes distans: NEEDHAM, 1930: 231, pl. 16, fig. 20, "Kwangsi, Szechuen"; KLOTS, 1947: 11-12, "Szechuen"; ASAHINA, 1969: 193-197, figs 1-8, "Hubei"; ASAHINA, 1973: 449, "Szechuen"; ASAHINA, 1997b: 112-113, fig. 16, "Vietnam".

Material. – 4 ♂, Damingshan, 14-V-1997, coll. K.D.P. Wilson; 5 ♂, Cenwanglaoshan, 2-VIII--1999, G.T. Reels leg.; 1 ♂, Cenwanglaoshan, 28-V-2002, M. Lau leg.; 1 ♂, do, 29-V-2002.



Figs 40-45. *Megalestes distans*, ♂, Guangxi: (40) hindwing; – (41) caudal genitalia, dorsal; – (42) caudal genitalia, lateral; – (43) prothorax, dorsal; – (44) penile organ, ventral; – (45) penile organ, lateral.

Measurements (mm). – ♂ abd. 55.0-63.0, hw. 37.0-45.0.

DISTRIBUTION. – China (Guangxi, Hubei, Yunnan and Sichuan) and Vietnam.

REMARKS. – The specimens examined match NEEDHAM's (1930) original description based on material from Sichuan and Guangxi. Notably the drawing of the type caudal appendages is identical with inferior appendages possessing two pairs of curved, sharply pointed spines (Figs 41--42). ASAHINA (1969) illustrated inferior appendages of material from Suisapa, Hubei Province, identified as *M. distans*, with the basal pair of spines possessing quadrate tips. ASAHINA's (1969) drawing of the complex penile organ is similar to the Guangxi material. The tip of the penile organ is bifurcated to form sharply pointed tips, which penetrate a reflexed fold, which shrouds the tip (Figs 44-45). The male hindwing and prothorax are illustrated in Figures 40 and 43, respectively.

MEGALESTES HAUI SP. NOV.

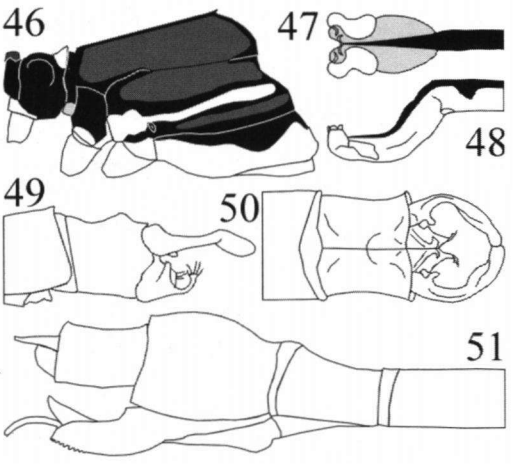
Figures 46-51

Material. – **Holotype**: ♂, Shiwandashan, 26-IX-2000, B. Hau leg. **Paratypes**: 2 ♂, 3 ♀, do., 26--IX-2000, B. Hau leg. Holotype will be deposited at Tai Lung Experimental Station, Agriculture, Fisheries and Conservation Department, Lin Tong Mei, Sheung Shui, Hong Kong SAR, China.

Etymology. – Named after Billy Hau, who collected the type and paratype specimens.

DESCRIPTION. – Male. – A medium sized *Megalestes* with majority of thorax coloured bright metallic green, which is pruinosed with oily whitish deposits in mature males. Labium pale creamy-brown. Mandibles are bright pale yellow with broad black dorsal margin and tips. Clypeus blackish brown. Rear of head, posterior to ocelli matt, blackish metallic green. Antennae black. Remainder of head is shiny metallic green with bluish highlights. Prothorax (Fig. 46) blackish with central lobes with blackish metallic green reflections, frontal lobe dull blackish brown and posterior lobe pale yellowish brown. Sides of prothorax with anterior ventral margin pale yellowish brown. Dorsum of synthorax (Fig. 46), and mesepimeron bright metallic green with humeral (mesopleural) suture and dorsal carina black. Metepisternum blackish metallic green or bright metallic green with yellow central horizontal stripe, which is expanded anterior

to spiracle. Metepimeron pale yellowish brown below and blackish metallic green above. Lower prothorax and synthorax pruinosed with oily whitish deposits. Coxae pale yellowish brown. Legs blackish with posterior face of femora pale brown. Wings very palely enfumed amber. Pterostigmas black, subtending three cells, braced at proximal border. Segment 1 of abdomen yellow with quadrate metallic green spot at distal border of dorsum. Segment 2 dark brown with metallic green highlights or bright metallic green. Segments 3-6 mid brown or dark brown with dark brown bands with metallic green highlights at distal borders. Segments 7-10 dark brown. Segment 10 with tubercle-like mound at rear of dorsum. Small patch of pruinosed whitish deposit at proximal base of mound. Caudal appendages blackish brown (Figs 49-50). Penile organ is illustrated in Figures 47-48. There is a large cavity below the heavily sclerotised penile shaft towards the tip of the penile organ.



Figs 46-51. *Megalestes haui* sp. n., Guangxi: (46) ♂, thorax, lateral; – (47) penile organ, ventral; – (48) penile organ, lateral; – (49) ♂, caudal genitalia, lateral; – (50) ♂, caudal genitalia, dorsal; – (51) ♀, caudal abdomen, lateral.

F e m a l e. – Very similar to male and also brightly coloured with metallic green. Yellow horizontal stripe on metepisternum is slightly wider than male and broadly expanded, proximal to spiracle. Segment 10 of abdomen relatively elongate at two-thirds of segment 9 (Fig. 51).

M e a s u r e m e n t s (mm). – ♂ abd. + app. 56.1-58.0, hw. 35.0-38.0; ♀ abd. + app.47.0-53.5, hw. 36.0-41.

REMARKS. – The closest congener is the generally larger *M. distans,* which has similar overall colouration and similarly shaped superior caudal appendages. *M. distans* has inferior appendages with two pairs of sharply pointed spines, which are bluntly tipped in *haui*. The penile organ of *distans* is superficially of a similar style but does not possess the large cavity towards the tip. In addition *haui* has a broader tip, with more complex ridged folds than *distans.* Other differences include a much darker, matt, metallic green area posterior to ocelli in *haui*, which is a brightly coloured matt metallic green in *distans*. The dorsum of the first abdominal segment of *distans* is dark brown with metallic green reflections, unlike *haui*, which is yellow basally with a quadrate dark brownish/metallic green spot distally.

MEGALESTES TUSKA SP. NOV.
Figures 52-58

Material. – **Holotype**: ♂, Dayaoshan, 19-IX-1998, G.T. Reels leg. **Paratype**: 1 ♂, Damingshan, 23-IX-2000. Holotype will be deposited at Tai Lung Experimental Station, Agriculture, Fisheries and Conservation Department, Lin Tong Mei, Sheung Shui, Hong Kong SAR, China.

Etymology. – The name is a reference to the tusk-like projections emerging from the base of the penile organ.

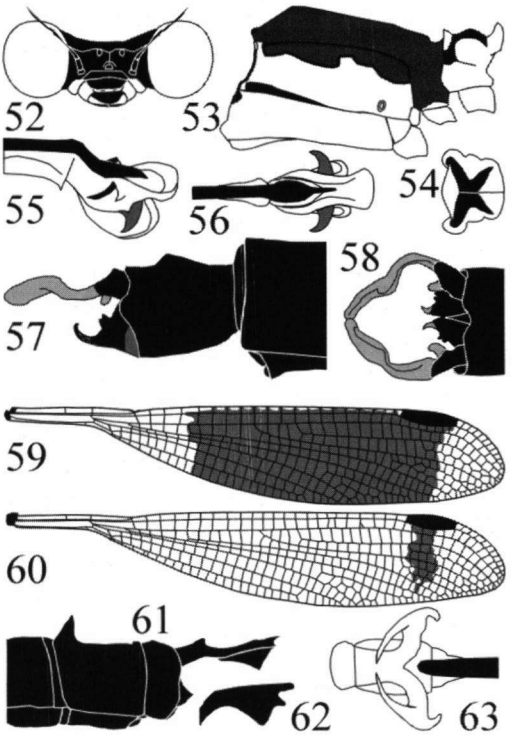
DESCRIPTION. – Male. – A relatively small *Megalestes* with bright metallic green upper thorax and dull blackish brown abdomen with metallic hues. Labium pale creamy--brown. Mandibles are shiny pale yellow with black tips. Labrum pale yellow with large semicircular metallic green spot arising from base as shown in Figure 52. Paratype male has labrum mainly ochreous yellow with base finely bordered blackish. Face and remainder of head bright metallic green with area posterior to rear ocelli matt blackish metallic green. Rear of head also metallic green. Antennae dull blackish brown. Prothorax (Fig. 54) pale yellow with broad central blackish green band covering the dorsum, which is invaded laterally with pale yellow. Dorsum of synthorax (Fig. 53) metallic green above and upper two-thirds of mesepimeron. Synthorax pale yellow below with posterior half of metapleural suture bordered above with an elongate narrow blackish triangular stripe, which is widest at the posterior margin. Legs pale brown with outer, ventral margin of fore and hind femora blackish. Wings are hyaline and slightly enfumed pale yellowish amber. Pterostigma black subtending slightly over two cells with proximal border braced. Dorsum of abdomen dull blackish-brown above with pale metallic blue highlights. Segments 1-2 pale yellow below. Base of segments 3-7 broadly ringed at base with abdomen dull blackish-brown, otherwise pale below. Segments 8-10 black with ventral border of 8 invaded with semi-circular pale yellow spot. Superior caudal appendages (Figs 57-58) pale creamy brown with blackish brown bases. Large peg--like protrusion directed inward and downward at inside base of superior appendage. Inferior appendages with two pairs of projections. The basal pair with sharply pointed, bifurcated tips. The paratype male has pointed tips with no bifurcation. The distal pair formed by numerous, pale coloured, stout hairs, which forms an upwardly curved tip to the inferior appendages. The penile organ (Figs 55-56) is highly characteristic for this species. It has tusk-like protrusions from its base, which are directed anteriorly. The penile tip is smoothly curved and spoon-shaped. The sides of the penile organ are flanked with two narrow ridged projections.

Measurements (mm). – ♂ abd. + app. 49.0, hw. 31.5.

REMARKS. – The penile organ is closest to *M. maai* CHEN (1947) from Taiwan, which also possesses two pairs of prominent projections. The superior appendages of *tuska* are finer than *maai*. In addition the inferior appendages of *maai* lack the bifurcated or pointed tips of the basal pair of pegs and lack the sharply pointed distal tip. *M. chengi* CHAO (1947) from Fujian province is also closely related. It has stouter more uniformly curved superior appendages and inferior appendages with pointed but not

bifurcated basal spines. In addition abdominal segments 3-7 of *chengi* are tinged with red. It is likely that *M. riccii* NAVÁS (1935) is also very closely related. It has a predominantly yellow prothorax with a brief T-shaped mark on central lobe and simple, uniformly curved superior appendages, which are entirely yellow, with basal inwardly directed pegs typical of the genus.

M. suensoni ASAHINA (1956) was described from a single female collected from Zhejiang province. This specimen was described with a broad yellow stripe running along the top of the synthorax. CHAO (1947) remarked that teneral specimens of *Megalestes* are, "always adorned with a median yellow stripe extending from the crest of the synthorax to the anterior lobe of the prothorax and a transverse yellow band in the middle of the occiput". ASAHINA (1985c) synonymised *Megalestes suensoni* with *Megalestes heros* Needham. The male of *M. micans* has a yellow transverse mark at center of occiput, which is presumably present in mature specimens. *M. heros* NEEDHAM (1930) differs from other Chinese *Megalestes* by having a distinctive red coloured abdomen.



Figs 52-63. [52-58] *Megalestes tuska* sp. n., ♂, Guangxi: (52) head, frontal; – (53) thorax, lateral; – (54) prothorax, dorsal; – (55) penile organ, lateral; – (56) penile organ, ventral; – (57) caudal genitalia, lateral; – (58) caudal genitalia, dorsal; – [59-60] *Sinolestes edita*, ♂, Guangxi: (59) hindwing, '*truncata*' form; – (60) hindwing, normal form; – [61-63] *Rhipidolestes alleni*, ♂, Guangxi: (61) caudal abdomen, lateral; – (62) right, superior appendage, inside lateral view; – (63) penile organ, ventral.

There are 12 extant species of *Megalestes* listed by BRIDGES (1994) including *suensoni*, all of which are confined to Asia. There are two main centres of distribution; India and China. Eight species are now known from China with three species occurring in Guangxi.

SINOLESTES EDITA NEEDHAM, 1930
Figures 59-60

Sinolestes edita: NEEDHAM, 1930: 242-243, pl. 16, fig. 20, (holotype ♀, Zhejiang); CHAO, 1947: 21, "Fujian"; ASAHINA, 1956, 214-218, figs 16-19, "Zhejiang".
Sinolestes ornata: NEEDHAM, 1930: 242-245, pl. 16, fig. 19, (holotype ♂, Zhejiang); MAY, 1933: 259, (Guangzhou, Guangdong).
Sinolestes truncata: NEEDHAM, 1930: 242-244, pl. 16, fig. 18, (holotype ♂, Guangxi) **syn. nov.**

Material. – 12 ♂, 4 ♀, Damingshan, 11/14-V-1997, coll. K.D.P. Wilson.

DISTRIBUTION. – China (Fujian, Guangdong, Guangxi and Zhejiang).

REMARKS. – CHAO (1947) synonymised *S. edita* and *S. ornata*. Two of the 12 males collected from Damingshan possessed wings coloured with a broad blackish cross band, covering more than one half of the wing. The remaining ten were coloured with a narrow blackish cross band, hardly wider than pterostigma. ASAHINA (1956) suggested, "it is likely that *truncata* is a synonym of *edita* since the only stated difference is the width of the brownish wing band". The occurrence of both forms in the same population confirms the synonymy of *edita* and *truncata*. Both wing forms are illustrated in Figures 59 and 60.

LESTIDAE

OROLESTES SELYSI McLACHLAN, 1895

Orolestes selysi: LIEFTINCK et al., 1984: 17, "Taiwan".

Material. – 1 ♂, 1 ♀, Nonggang, 20-V-1998, coll. K.D.P. Wilson; 10 ♂, 1 ♀, do., 21-V-1998; 1 ♂, do., 22-V-1998, coll. K.D.P. Wilson; 4 ♂, 1 ♀, Longrui, 25-V-1998, coll. K.D.P. Wilson; 8 ♂, 1 ♀, do., 26-V-1998.

DISTRIBUTION. – China (Guangxi and Taiwan), Indonesia, Laos, and Vietnam.

REMARKS. – The majority of males possessed wings with wings heavily pigmented with black and white. A significant proportion of the Guangxi male material (i.e. eight specimens) had hyaline wings. At Longrui several hundred males and a few females were found aggregated in a copse, comprised of low trees and bushes in a small dry sump, surrounded by karst limestone hills. The water level in this limestone area had not yet risen to ground level following the long, dry, winter season. The adults had presumably over-wintered and were no doubt waiting for the imminent, annual surfacing of rising ground water at their breeding site.

MEGAPODAGRIONIDAE

PHILOSINA BUCHI RIS, 1917

Philosina buchi: RIS, 1917: 185-191, (type-loc. Fujian); NEEDHAM, 1930: 240-241, pl. 16, fig. 17, "Fujian & Guangxi"; ASAHINA, 1979: 330-332, figs 1-5, "Fujian"; WILSON, 1999: 27-28, "Guangxi".

Material. – 1 ♂, Mulun, 19-VII-1998, G.T. Reels leg.; 1 ♂, do, 20-VII-1998.

DISTRIBUTION. – China (Fujian, Guangdong [unpubl.] and Guangxi).

PRISCAGRION PINHEYI ZHOU & WILSON, 2001

Priscagrion pinheyi: ZHOU & WILSON, 2001: 117-121, figs 8-14, "type-loc. Damingshan, Guangxi".

Material. – 1 ♂, Cenwanglaoshan, 23-V-2002, M. Lau leg.; 1 ♀, do, 25-V-2002; 1 ♂, do, 29-V--2002.

DISTRIBUTION. – China (Guangxi). – The new genus *Priscagrion* was recently created to receive two species; one from Damingshan, Guangxi and one from Guizhou (ZHOU & WILSON, 2001).

RHIPIDOLESTES ALLENI WILSON, 2000

Figures 61-63

Rhipidolestes alleni: WILSON, 2000: 45-47, figs 1-6, "type-loc. Damingshan, Guangxi".

Material. – 2 ♂, 1 ♀, Chunxiu, 24-V-1998, B. Hau leg.

DISTRIBUTION. – China (Guangxi).

REMARKS. – A large-sized, robust *Rhipidolestes*, predominantly black, with bright ochreous-yellow labrum and broad, ochreous-yellow band across the face. The superior appendages and penile organ differ very slightly from the type material collected from Damingshan, which is located some 200 km northeast of Chunxiu. The blade-like lobe at the tip of the superior appendages possess a small additional finger-like protrusion just below the main finger-like tip of the appendage (Figs 61-62). The outside margin of the horns of the penile organ have a small additional flattened, hooked, bulge at the point where the horns rest on the ventrum of the abdomen (Fig. 63).

RHIPIDOLESTES LAUI SP. NOV.

Figures 64-69

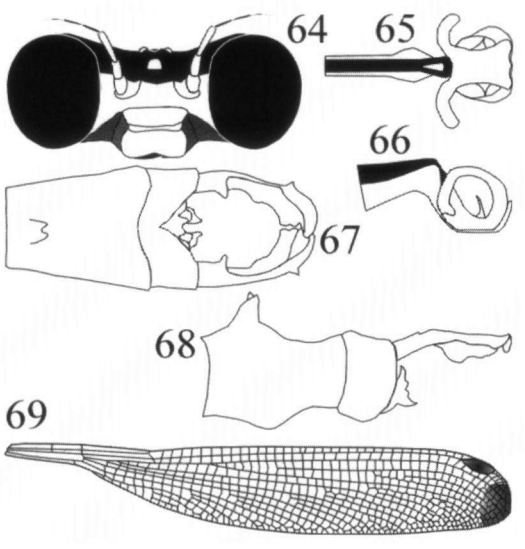
Material. – **Holotype**: ♂, Cenwanglaushan, Guangxi, China, 23-V-2002, Michael Lau leg.

Paratype: 1 ♂, do, 29-V-2002. Holotype will be deposited at Tai Lung Experimental Station, Agriculture, Fisheries and Conservation Department, Lin Tong Mei, Sheung Shui, Hong Kong SAR, China.

Etymology. – Named in honour of the discoverer Michael Lau.

DESCRIPTION. – Large-sized *Rhipidolestes* with ochrous face. Males with bifurcated conical projection on dorsum of ninth abdominal segment and inferior appendage with upward and outward sharply pointed projections.

Male. – Labrum blackish-brown. Labium pale reddish-brown. Mandibles blackish-brown with base blackish-yellow. Lower sides of face (genae) blackish-brown. Clypeus, frons, antennae and face, between bases of antennae and clypeus, ochreous yellow (Fig. 64). Top of head and vertex uniformly matt-black throughout with numerous extremely fine puncti. Occipital margin uniformly straight with fringe of long pale hairs. Prothorax matt-black with a pair of broad pale yellow dorso-lateral stripes. Dorsum of synthorax black with broad, yellow antehumeral stripes, which fall short of the posterior margin below the wings, typical of the genus. Sides of thorax black with broad ochreous yellow metepisternal stripe covering the spiracle. Metaposternum pale yellow. Coxae matt black with narrow, pale posterior margins middle and posterior coxae. Legs ferruginous. Wings have dense venation with pale reddish-coloured pterostigmas subtending 5 cells. Extreme wings tips with smokey-brown patches as shown in Figure 69. Abdomen uniformly blackish-brown with prominent, bifurcated, projection on dorsum of ninth at its base. Superior appendages black with short, inwardly pointing, basal projection, minute outward pointing projection towards tip and short finger-like projection at tip (Figs 67-68). Inferior appendages black with dorsal upwardly and sharply pointed, curved projection and ventral, outwardly and sharply pointed, curved projection. Penile organ with pair of curved horns as shown in Figures 65-66.



Figs 64-69. *Rhipidolestes laui* sp. n. ♂, Guangxi: (64) head, frontal; – (65) penile organ, ventral; – (66) penile organ, lateral; – (67) caudal appendages, dorsal; – (68) caudal appendages, lateral; – (69) hindwing.

Measurements (mm): abd. + app. 50.5-53.0, hw 32.5-38.0.

DIFFERENTIAL DIAGNOSIS. – This *Rhipidolestes* can be separated from all other congeners by the following characters; (i) bifurcated dorsal projection at the dorsal base of the ninth abdominal segment, (ii) ochreous face, (iii) penile organ with pair of simply curved cow-

horn shaped projections, and (iv) inferior appendages with upward and outward projections. The closest congeners are *R. aculeatus* RIS (1912) and *R. janetae* WILSON (1997), which share the first three characters listed above with *laui.* The penile organ of *aculeatus* has broadly tipped, square-shaped, non-reflexed lobes. The inferior appendages of *janetae,* a smaller species, have dorsal upwardly pointed projections but no ventral outwardly pointed projections.

COENAGRIONIDAE

ISCHNURA SP. (*RUFOSTIGMA* SELYS, 1876-GROUP)

Ischnura sp. (*rufostigma* Selys, 1876-group): HAMALAINEN & PINRATANA, 1999: 47, "Thailand".

Ischnura rufostigma annandalei (f. *carpentieri*)(?): ASAHINA, 1991: 7-11, 15, 17-18, 20, figs 26-60, 88, "Vietnam, Assam (Imphal), Thailand, Laos, China".

Ischnura rufostigma: NEEDHAM, 1930: 276: 277-278, "Szechuen and Fukien"

Ischnura mildredae: WILSON, 1997a: 20, "Hong Kong".

Ischnura rufostigma mildredae: ASAHINA, 1965: 494-495, figs. 1-2, "Hong Kong"

Material. – 1 ♂, Mulun, 21-VII-1998, leg. G.T. Reels.

DISTRIBUTION. – India (Imphal), China (Fujian, Guangxi, Hong Kong, and Sichuan), Laos, Thailand, Vietnam.

REMARKS. – *Ischnura mildredae* Fraser, 1927 described from Burma, is a member of the *rufostigma* group of *Ischnura,* which all possess males with predominantly orange abdomens. There is considerable confusion over the taxonomic status of this group. ASAHINA (1970) placed *carpentieri* Fraser and *annandalei* Laidlaw in the synonymy of *mildredae*. VICK (1986) emphasized the specific status of *rufostigma* (India), *annandalei* (Bangladesh, Burma, China, Laos, Nepal, Thailand, Vietnam), *mildredae* (Burma) and *carpentieri* (Nepal, Vietnam). PINRATANA et al. (1988) treated Thai material as *mildredae* but later, following ASAHINA's (1991) review of '*rufostigma*', in HAMALAINEN & PINRATANA, (1999) treated Thai material as *Ischnura* sp. (*rufostigma* Selys, 1876-group). According to BRIDGES (1994) *mildredae* is a subspecies of *annandalei*. ASAHINA (1991) considers *mildredae* to be nothing but an aberrant male form of *rufostigma annandalei*. ASAHINA's (1991) provides a key to the *rufostigma*-group and describes male *I. r. annandalei* (f. *carpentieri*) as possessing abdominal segments 7-10 black with 8th segment always broadly blue on dorsum. Asahina tentatively ascribed all Chinese material to *I. r. annandalei* (f. *carpentieri*). In Asahina's key, male *I. r. annandalei* (f. *annandalei*) is described with segments 7-10 entirely black or with 8th segment with occasional small blue spot on dorsum. ASAHINA (1991) confounded his review by adding a postscript to his paper, postulating an alternative arrangement, whereby all Chinese material and material from Assam, Laos, Thailand and Vietnam are treated as *I. annandalei carpentieri* Fraser, 1946. In view of

the confusion and complexity of the *rufostigma* group we have followed HÄMÄLÄINEN & PINRATANA, (1999) and not identified the Guangxi specimen beyond *rufostigma*-group.

ASAHINA (1991) raised concern, regarding Hong Kong, Chinese material, since his records from Ho Chung, Kowloon, Hong Kong, were all taken at low altitude at or near sea level. Other *rufostigma annandalei* (f. *carpentieri*) group material has all been taken at much higher altitude in mountainous regions. We would add that many sites at Hong Kong, despite being located near sea level are nevertheless montane in nature. Many montane species, such as *Drepanosticta, Protosticta* and *Calicnemia* can be found at sites in Hong Kong at altitudes just above sea level; a consequence of the dramatic rise in sea level since the Holocene.

PLATYCNEMIDIDAE

CALICNEMIA EXIMIA (SELYS, 1863)

Figures 70-73

Pyrrhosoma tinctipennis: (part material not of McLachlan) NEEDHAM, 1930: 245, "Szechuen and Kwangsi"; KLOTS, 1947: 12, "Yunnan"

Calicnemia eximia: MARTIN, 1904: 221, "Sikkim, Tonkin"; ASAHINA, 1977: 481--483, figs 1-2, 4-12 "Szechuen"; LIEFTINCK, 1984: 353, 360-363, fig. 2, key, "Sikkim"; LIEFTINCK et al., 1984: 20, "Taiwan"; ASAHINA, 1997a: 22, figs 18-19, "Vietnam".

Material. – 1 ♂, 1 ♀, Jiuwanshan, 26-VII-1998, G.T. Reels leg.

DESCRIPTION. – Male. – A blood red coloured *Calicnemia* with prominent yellow/orange antehumeral stripes. The head is illustrated in Figure 71. Labium pale. Labrum, genae and clypeus are bright, shiny ochreous yellow. Frons, antennae and top of head as far as posterior ocelli matt ochreous yellow. Posterior of head black with elongate pale creamy yellow postocular spots. Back of head mainly black but with large lateral, quadrate patches of pale cream. Dorsum of prothorax black and sides yellow. Synthorax marked bright yellowish orange and black pattern as shown in Figure 70. Legs reddish orange. Abdomen brick red from segments 1-5 with segments 6-8 becoming dull brownish red. Segments 9-10 and caudal appendages dull ferruginous brown. Caudal appendages illustrated in Figure 73. Penile organ is illustrated in Figure 72.

DISTRIBUTION. – Afghanistan, China (Guangxi, Taiwan, Sichuan and Yunnan), India, Iran, Nepal and Vietnam.

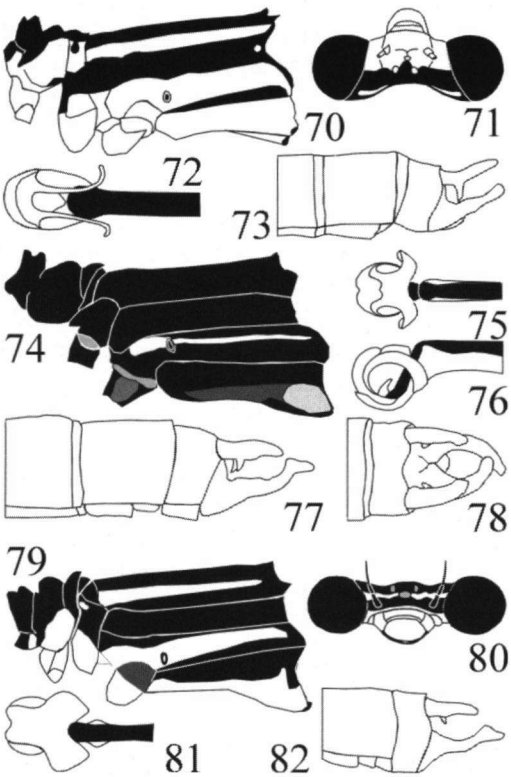
REMARKS. – ASAHINA (1977) examined NEEDHAM's (1930) and KLOT's (1947) material, identified as *Pyrrhosoma tinctipennis,* and reidentified it as *C. eximia.* Part of Needham's material was confirmed as true *P. tinctipennis* (McLachlan).

CALICNEMIA HAKSIK SP. NOV.
Figures 74-78

M a t e r i a l. – **Holotype**: ♂, Cenwanglaoshan, Northwest Guangxi, 1-VIII-1999, G.T. Reels leg. **Paratypes**: 2 ♂, Cenwanglaoshan, 1-VIII-1999, G.T. Reels leg.; 2 ♂, Cenwanglaoshan, 26-V-2002, M. Lau leg. Holotype will be deposited at Tai Lung Experimental Station, Agriculture, Fisheries and Conservation Department, Lin Tong Mei, Sheung Shui, Hong Kong SAR, China.

E t y m o l o g y. – 'Hak sik' is romanised Cantonese meaning 'black colour' referring to the predominantly black coloured thorax and abdomen.

DESCRIPTION. – M a l e. – A predominantly black *Calicnemia* with basal quarter of abdomen brick red. Labium dark amber. Labrum black with distal border dark centrally but broadly pale laterally. Anteclypeus dark reddish brown. Postclypeus shiny black. Genae, below line of postclypeus, amber. Top of head and frons black and finely pitted to give matt appearance. A pair of inconspicuous dark brown spots between bases of antennae and lateral ocelli. Antennae black. Prothorax entirely black. Synthorax (Fig. 74) black with pale spot anterior to spiracle on metepisternum. In one specimen the spot is continued as a narrow stripe through the spiracle, which falls just short of the posterior border of metepisternum. The metepimeron is black above but fades to an inconspicuous patchy dark brown or patchy pale yellow. Trochanters black with paler centres. It appears to be typical of many *Calicnemia* with the thorax becoming increasingly darker with age. Legs black with narrow stripe on outer face of hind tibia and pale inconspicuous spots at bases of all femora. Wings hyaline, ptero-



Figs 70-82. [70-73] *Calicnemia eximia*, ♂, Guangxi: (70) thorax, lateral; – (71) head, dorsal; – (72) penile organ, ventral; – (73) caudal abdomen; – [74-78] *C. haksik* sp. n., ♂, Guangxi: (74) thorax, lateral; – (75) penile organ, ventral; – (76) penile organ, lateral; – (77) caudal abdomen, lateral; – (78) caudal genitalia, dorsal; – [79-82] *C. miles*, ♂, Guangxi: (79) thorax, lateral; – (80) head, frontal; – (81) penile organ, ventral; – (82) caudal appendages, lateral.

stigma black. Abdomen predominantly black with brick red base. Segment 1 and 2 entirely brick red apart from brown or blackish intersegmental membranes. Segment 3 is entirely brick red at base but quickly fades to black at the halfway point on the dorsum and about one third the length of the segment ventrally. The remainder of the abdomen is entirely black apart from ventrum of segment 10 which is pale yellow. Caudal appendages black except basal third of inferior appendages which are pale cream. The superior appendage (Figs 77-78) has a stout basal projection located towards the ventral base, which is differentiated into two sharply pointed pegs. Penile organ is illustrated in Figures 75-76. The penile organ is divided into two broadly curved horn--shaped tips.

Measurements (mm). – ♂ abd. + app. 31.0-34.0, hw. 23.5-24.5.

REMARKS. – Including *C. haksik* there are now 16 species of *Calicnemia* recognised. Most species are found at altitude in montane forest and all are confined to Asia. The distribution is centred in the Himalayan range. Five species are now known from southern China. LIEFTINCK (1984) divided all the members of *Calicnemia* into two main groups; those with a finely divided penile organ and those with a broadly divided tip. *C. haksik* belongs to the latter group. The closest congener to *C. haksik* is *C. mortoni* (Laidlaw), which has similar body colouration, with black thorax and black abdomen, apart from segments 1-2, and base of segment 3 which are brick red. *C. mortoni* differs in several respects. Perhaps the most significant are the broad flaps of the recurved ligula of *mortoni*, which have deeply serrated ends and the thoracic dorsum, which has a narrow pair of slaty-blue antehumeral stripes. ASAHINA (1997a) recently described *C. uenoi* from Vietnam, which he described as having a pterothorax as, "entirely black", and the distal half of the abdomen as being black. The thorax is however illustrated with extensive pale colouration. The superior appendages of this latter species possess a fine ventral median spine, which differs markedly from the stout, basally located, bifid spinal process of *haksik*.

CALICNEMIA MILES (LAIDLAW, 1917)

Figures 79-82

Calicnemia miles: FRASER, 1933: 176-181, "upper Burma"; LIEFTINCK, 1984: 352--367, "key to ♂"; ASAHINA, 1985a: 4-6, figs 9-16, "Thailand"; ASAHINA, 1997a: 21, figs 12-13, "Vietnam".

Material. – 1 ♂, Chunxiu, 24-V-1998, Billy Hau leg.; 1 ♂, Jiuwanshan, 27-VII-1998, G.T. Reels leg.; 1 ♂, 2 ♀, Cenwanglaoshan, 26-V-2002, M. Lau leg.

DISTRIBUTION. – Burma, China (Guangxi), Thailand and Vietnam.

REMARKS. – The front of the head is illustrated in Figure 80. The Guangxi material has a more or less black dorsal surface to the pronotum (Fig. 79). One older male specimen has reduced areas of yellow on the lateral pronotum and lower sides of the synthorax. The synthorax has a prominent, orange-red dorsal stripe, widest at base.

The penile organ is the most useful character to identify members of this genus. The Guangxi penile organs have lobes, without filaments, which are not quite as pointed as Thai material, when viewed directly from above (Fig. 81). Caudal appendages as illustrated in Figure 82.

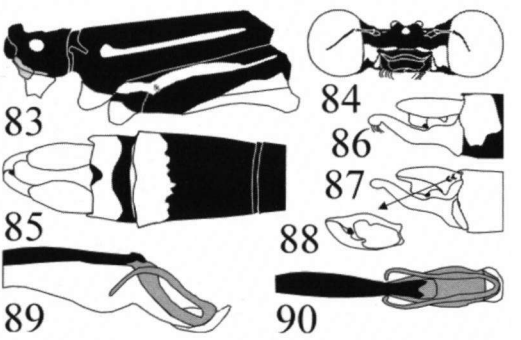
COELICCIA GALBINA SP. NOV.

Figures 83-90

Material. – **Holotype**: ♂, Longrui, 26-V-1998, coll. K.D.P. Wilson. **Paratype**: (teneral) 1 ♂, Longrui, 26-V-1998, coll. K.D.P. Wilson. Holotype will be deposited at Tai Lung Experimental Station, Agriculture, Fisheries and Conservation Department, Lin Tong Mei, Sheung Shui, Hong Kong SAR, China.

Etymology. – From Latin 'galbinus' meaning a 'greenish yellow colour'.

DESCRIPTION. – Male. – Large, long bodied *Coeliccia* with long, narrow bluish yellow antehumeral stripes and side of synthorax marked pale greenish yellow stripes. Face of head is illustrated in Figure 84. Labium pale. Labrum black. Genae white to level of frons, bordered with black below. Clypeus shiny black. Frons and top of head matt black with a pair of small white oblong spots between base of antennae and lateral ocelli and small white, oblong postocular spots. Prothorax matt black above and pale below laterally with small round pale blue spot on central lobe (Fig. 83). Synthorax matt black with narrow pale bluish yellow antehumeral stripes. Metepisternum black with pale greenish yellow stripe passing through spiracle. Metepisternum pale greenish yellow at posterior corner as illustrated in Figure 83. Trochanters and base of femora pale with the rest of legs dark brown. IR3 arises distal to subnodus and R4 arises proximal to it. Pterostigma reddish brown; subtending slightly more than two cells. Abdomen dark brown with pale greenish blue spots at sides of segment 1 and dorsum of segments 9 and 10 pale orange with hint of blue colouration (the latter segments shown in Fig. 85). Caudal appendages pale with superior appendages with minute blackish tipped ventral prominence. Side of caudal appendages are illustrated in Figure 86 and also Figure 87 where the right superior appendage has been removed to reveal the ventral structure of the left superior appendage. The ventral view of the right superior



Figs 83-90. *Coeliccia galbina* sp. n., ♂, Guangxi: (83) thorax, lateral; – (84) head, frontal; – (85) caudal abdomen, dorsal; – (86) caudal genitalia, lateral; – (87) caudal genitalia, lateral, right superior appendage removed; – (88) right superior appendage, ventral; – (89) penile organ, lateral; – (90) penile organ, ventral.

appendage is illustrated in Figure 88 to reveal one main prominence and two minor pegs. The penile organ is illustrated in Figures 89-90. It's terminal lobe is deeply divided and ends in a pair of long, fine whip-like processes.

Measurements (mm). – ♂ abd. + app. 46.0-48.0, hw. 31.0.

REMARKS. – The penile organ and caudal appendages are closely allied to *C. didyma* (ASAHINA, 1984: 2-4, figs 1-8) and *C. erici* (LAIDLAW, 1932: 20-21, pl. I, figs 13, 25; pl. II, figs 1-2; pl. III, fig. 11). However, the thoracic patterns of these two species are distinct. It is also noteworthy that *Indocnemis orang* Förster in Laidlaw also possesses a penile organ of very similar structure (cf. Figs 103-104). NEEDHAM (1930) recorded *C. didyma* from Guangxi but this may have been a mistaken identification of the very similar *C. cyanomelas* Ris, which is common throughout southern China.

INDOCNEMIS AMBIGUA (ASAHINA, 1997) COMB. NOV.

Figures 91-98

Coeliccia ambigua: ASAHINA, 1997a: 29-30, figs 53-58, "type loc. Tam Dao, Vietnam".

Material. – 2 ♂, 1 ♀, Damingshan, 14-V-1997, coll. K.D.P. Wilson; 3 ♂, Baidu Village, Nonghua N.R., 13-VII-1999, G.T. Reels leg.; 3 ♂, Dayaoshan, 16-IX-1998, G.T. Reels leg.

Measurements (mm). – ♂ abd. + app. 50.0, hw. 32.0.

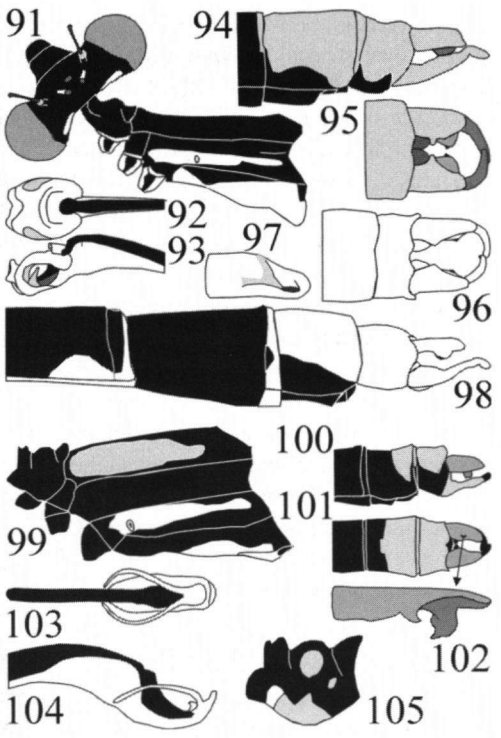
DISTRIBUTION. – Vietnam, China (Guangxi).

REMARKS. – First record for China. Large-sized blackish platycnemidid with black thorax with slight whitish pruinescence on synthoracic dorsum and pale blue markings on sides of synthorax (Fig. 91). Caudal tip of abdomen including the caudal appendages pale cyan blue (Figs 94-95).

ASAHINA (1997a) pointed out that the venation of *ambigua* was not consistent with the genus *Coeliccia* but with the genus *Indocnemis* Laidlaw, since the anal crossing (Ac) ends on the anal bridge vein (ab) and not on the wing margin, accept for one male specimen out of four examined. There is currently only one recognised species of *Indocnemis*, which is *I. orang* (FÖRSTER in Laidlaw, 1907). In *orang* the point along ab, where Ac joins, is at a distance of more than one length of Ac, from the wing margin. In *ambigua* the point on ab, where Ac joins, is about the length of ac away from the wing margin. This character is also variable. The senior author has several specimens of *Coeliccia cyanomelas* with the Ac/ab venational character approaching that of *ambigua*.

Another characteristic of the genus *Indocnemis* is the presence of four cells between the discoidal cell and the oblique vein, whereas *Coeliccia* has just three cells. *I. ambigua* has three cells, which is consistent with *Coeliccia*. We have placed *ambigua* in *Indocnemis* since the main wing venational character is more consistent with *Indocnemis* than *Coeliccia*. The penile organ is nevertheless simple and quite unlike the penile organ of *orang*, which is closer to *C. didyma* (see remarks for *C. galbina* sp. n. above).

The three male specimens from Dayaoshan collected 16-IX-1998 were slightly



Figs 91-105. [91-98] *Indocnemis ambigua*, (Asahina), ♂, Guangxi: (91) head and thorax; – (92) penile organ, ventral; – (93) penile organ, lateral; – (94) caudal abdomen, lateral; – (95) caudal genitalia, dorsal; – (96) caudal genitalia, dorsal, Dayaoshan; – (97) right superior appendage, ventral, Dayaoshan; – (98) caudal abdomen, lateral, Dayaoshan; – [99-105] *I. orang*, Guangxi: (99) ♂, thorax, lateral; – (100) ♂, caudal genitalia, lateral; – (101) ♂, caudal genitalia, dorsal; – (102) ♂, right superior appendage, lateral; – (103) penile organ, ventral; – (104) penile organ, lateral; – (105) ♀, prothorax, lateral.

different from the other male specimens collected from Damingshan and Baidoxiang, Nonghua N. R. The penile organ of these males is illustrated in Figures 92-93 and the caudal appendages 96-98. The ventral view of the right superior appendage is shown in Figure 97. The main difference was the colour of these males' caudal abdomen and anal appendages, which was pale orange. In preserved specimens of *Indocnemis* it is not unusual for the males to loose their pale blue colouration, even if preserved in acetone, since this colour is formed by light scattering of fine particles and is not formed from a pigment i.e. the Tyndall effect. In addition these three males lacked any sign of pruinescence on the thorax.

INDOCNEMIS ORANG (FÖRSTER in Laidlaw, 1907)

Figures 99-105

Trichocnemis orang: FÖRSTER in Laidlaw, 1907: 2-4, "Perak, Malaya"
Coeliccia (?) *orang*: RIS, 1912: 67-68, "Tsa-Yiu-San, Kwangtung Province"
Indocnemis orang: ASAHINA, 1985a: 8-11, figs 22-32 & 36, "Peninsular Malaysia, Thailand, China (Fukien & Szechuan)"
Indocnemis orang forma *kempi*: ASAHINA, 1997a: 31-34, figs 66-73, "Vietnam".

Material. – 1 ♂, Jiuwanshan, 26-VII-1998, G.T. Reels leg.; 1 ♂, 1 ♀, Huaping, 19-VIII-1998, G.T. Reels leg.; 2 ♂, 1 ♀, Maoershan, 23-VIII-1998, G.T. Reels leg.; 1 ♀, do., 24-VIII-1998; 1 ♂, 1 ♀, Dayaoshan, 19-IX-1998, G.T. Reels leg.; 1 ♂, Damingshan, 25-IX-2000, B. Hau leg.

DESCRIPTION. – Male. – Very large, blackish platycnemidid with large, broad, purple, oval stripes dominating the dorsum of the synthorax. Labium dark brown. Labrum and clypeus shiny black. Rest of head matt black with a pair of yellowish white transverse postocular spots. Prothorax black. Synthorax black with a pair of large, purple, oval, stripes on dorsum (Fig. 99). In many specimens this mark has faded to pinkish orange or just pinkish brown. Metepisternum with yellowish white stripe expanded at spiracle. Metaposternum predominantly yellowish white. Abdomen black with cyan blue dorsum on segment 10 and distal half of 9. Superior anal appendages also cyan blue but faded to pale brown on many specimens (Figs 100-101). The superior right superior appendage is illustrated in lateral view in Figure 102. Inferior appendages pale with black tips (Fig. 100). Male penile organ is illustrated in Figures 103-104.

Female. – Also very large but marked quite differently from male. The head has a pair of forward slanted transverse stripes arising at lateral ocelli, which do not quite reach the border of the eye in addition to the postocular spots and a pair of pale spots between the base of the antennae and the lateral ocelli. The prothorax is marked with prominent pale bluish green spots on the central lobes, lateral base and a small bluish green on the side as shown in Figure 105. The synthorax is mainly black but more extensively marked with pale stripes. The females have no broad dorsal stripes but a narrow bluish green antehumeral stripe. The metaposternum has a broad pale yellowish stripe and the metepimeron is pale yellowish below.

Measurements (mm). – ♂ abd. + app. 49.0-51.0, hw. 33.0-36.0; ♀ abd. + app. 43.0-52.0, hw. 33.0-36.0.

DISTRIBUTION. – China (Fujian, Guangdong, Guangxi and Sichuan), India, Peninsular Malaysia and Thailand.

REMARKS. – Apart from *I. ambigua* treated above, only one other species of *Indocnemis* is currently recognised, namely *I. orang* Förster in Laidlaw. FRASER (1933) described male *I. kempi* Laidlaw, which was originally described from Assam, possessing narrow cyan blue antehumeral stripes. ASAHINA (1985a) synonymised *I. kempi* with *I. orang*, based on a comparison of Thai and Malay *orang* and material collected from Assam, which all possessed narrow blue antehumeral stripes.

According to ASAHINA (1997a) there are two forms of *I. orang*; a small form (e.g. abd. 46mm, hw. 33mm) with a narrow pale antehumeral stripe and a large forma *kempi* (e.g. abd. 51mm, hw. 38mm) with a pale broad dorsal stripe. ASAHINA (1997a) does not describe the colour of the dorsal stripes but refers to his material as having pale thoracic stripes, which darken with age. It is likely that Asahina had not seen live specimens of *orang* and could not assess the true original colour of his preserved material. The pale blue colouration of the small form is in marked contrast to the deep purple or mauve colouration of the broad dorsal stripe in the large mature male material collected from Guangxi and southern China. ASAHINA (1997a) also records the smaller form from Vietnam. According to Asahina there are no structural differences between the two forms. The senior author has collected *orang* material from penisular Malaysia. The Malay male material possessed broad, mauve coloured dorsal thoracic stripes

identical to Guangxi material. The striking mauve or purple colour is not observed in preserved material from China or Malaysia.

ASAHINA's (1997) treatment of *orang* and its "*kempi*" form is somewhat confusing. His figures of male typical "*orang*" material from Cuc Phuong, Vietnam, with have narrow dorsal stripes, resemble the "*kempi*" form. In contrast his figures (66-67), labelled as forma "*kempi*", resemble the typical form of *orang* as described by FORSTER in Laidlaw (1907).

In the original description of *I. orang* from Perak, the thorax colour pattern was described as follows, "Ein grosses keilförmiger silberfarbener Fleck jederseits der Mitte nimmt fast die ganze Vorderseite ein. Derselbe is im Leben vielleicht silberblau oder weissblau, ebenso eine schmale Interalarbinde der Thoraxseiten" i.e. the thorax has, "a large wedge-shaped silvery patch on both sides (of middorsal carina), covering most of the dorsal side. In living insects this is perhaps silvery-blue or whitish blue". Of course we now know that living material has broad purple thoracic stripes, which fade on preservation. The extent of the pale dorsal stripe also appears to diminish in some specimens.

SINOCNEMIS YANGBINGI WILSON & ZHOU, 2000

Sinocnemis yangbingi: WILSON & ZHOU, 2000: 174-177, figs 8-16, "Sichuan, China".

Material. – 2 ♂, 1 ♀, Cenwanglaoshan, 29-V-2002, M. Lau leg.

DISTRIBUTION. – China (Guangxi, Sichuan).

PLATYSTICTIDAE

DREPANOSTICTA BROWNELLI (TINKHAM, 1938)

Drepanosticta brownelli: TINKHAM, 1938: 17-19, figs. 1-2, "Guangdong"; WILSON, 1997b: 59-63, figs 26-27, 30-31, "Guangdong"; WILSON, 1999: 39 & 50, fig. 26D, "Guangdong".

Material. – 1 ♂, Jiuwanshan, Guangxi, 26-VII-1998, G.T. Reels leg.

DISTRIBUTION. – China (Guangxi, Guangdong).

REMARKS. – The single male specimen resembles material from Dinghu Shan, Guangdong in size and colouration. It has a 26.0 mm hind wing and the abdomen plus appendages are 37.5 mm. The prothorax is black, accept the anterior lobe of the prothorax which is pale, and the dorsum of abdominal segments 8-10 are predominantly coloured greyish white.

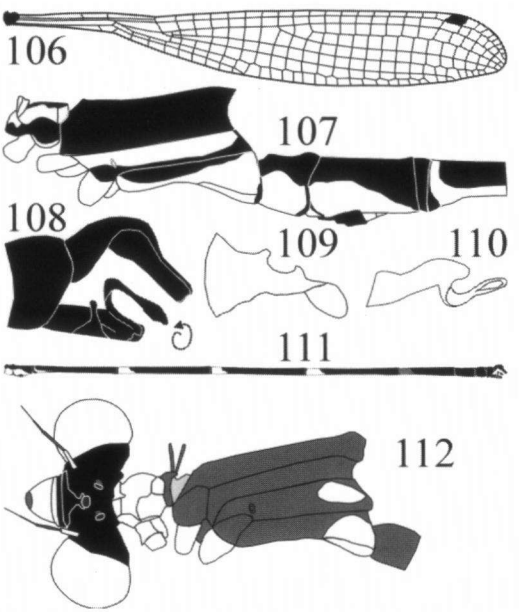
DREPANOSTICTA MAGNA SP. NOV.

Figures 106-111

M a t e r i a l. – **Holotype**: ♂, Cenwanglaoshan, 28-V-2002, M. Lau leg. Holotype will be deposited at Tai Lung Experimental Station, Agriculture, Fisheries and Conservation Department, Lin Tong Mei, Sheung Shui, Hong Kong SAR, China.

E t y m o l o g y. – From the Latin 'magnum' meaning of great size.

DESCRIPTION. – *Protosticta* with an extremely long abdomen almost 6 cm in length, coloured mainly black with white markings throughout and a large hooked process at tip of inferior appendages. Labium pale creamy-white. Basal three quarters of labrum pale yellow with darkish metallic hue and distal quarter black, broadest in middle. Base of mandibles and clypeus pale whitish-yellow. Frons and top of head black with dark brown antennae. Prothorax blackish-brown with frontal lobe pale creamy-yellow and a broad dorso-lateral pale creamy-yellow stripe. Synthorax mainly black with metepisternum predominantly striped pale creamy-yellow covering spiracle (Fig. 107). Lower metepimeron and metaposternum pale creamy-yellow. Coxae and legs pale creamy-yellow with hind face of femora streaked with brown. Wings hyaline (Fig. 106). Pterostigma black with fine outer white ring, subtending just over one cell. Abdomen extremely long and fine (Fig. 111). S1-2 pale below blackish--brown above. S3-6 dark brown with basal pale ring, widest at ventral border. S7 dark brown with mid brown ring at base. S8--10 and caudal appendages blackish brown (Figs 108-110). Inferior appendages with an extraordinary hooked process at tip.



Figs 106-112. [106-111] *Drepanosticta magna* sp. n., ♂, Guangxi: (106) hindwing; – (107) thorax; – (108) caudal appendages, lateral; – (109) left superior appendage, dorsal oblique; – (110) left inferior appendage, ventral oblique; – (111) abdomen, lateral. – [112] *Drepanosticta* sp., ♀, Guangxi: head and thorax.

M e a s u r e m e n t s (mm). – ♂ abd. 59.0, hw. 30.

REMARKS. – Collected from an area of bamboo forest. This is the largest of the five Chinese *Drepanosticta* now recorded from Chinese territory, exceeding in length the extremely long *D. elongata* (WILSON & REELS, 2001) recently described from Hainan.

DREPANOSTICTA SP.
Figure 112

Material. – 1 ♀, 14-V-1997, Damingshan, coll. K.D.P. Wilson.

DESCRIPTION. – Male. – Head predominantly matt black with white labium tipped with brown and white clypeus. The basal segments of the antennae are pale whitish brown. Rear of head with a flat occipital ridge with lateral and central projections. Prothorax mainly pale white with posterior lobe mid brown. A curious pair of long flattish, mid brown, lateral projections arise from the central border of the posterior lobe (Fig. 112). Synthorax mid brown, with two pale white spots; one on the posterior metepisternum and one covering the posterior metepimeron and metaposternum. Abdomen with segments 1-2 mid brown and segments 3-5 predominantly dull mid brown. Segments 3-5 ringed with pale white at base. Remainder of abdomen missing.

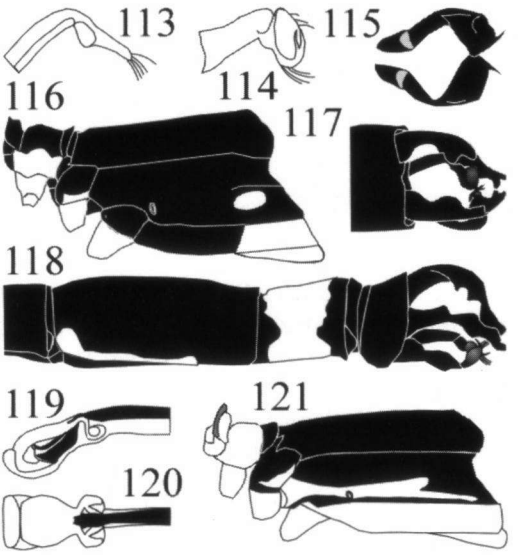
REMARKS. – The single teneral female collected from Damingshan was found freshly emerged and somewhat damaged. With its unique projections (at least for Chinese *Drepanosticta*) on the anterior lobe of the pronotum it undoubtedly represents a new species of *Drepanosticta*. Since the only specimen is teneral, incomplete and female we have refrained from naming this new taxon. These unusual prothoracic projections also occur in male and female material of *D. exoleta* Lieftinck, 1932 and *D. clavata* Lieftinck, 1932 and in female *Drepanosticta* material the senior author has collected from north Sulawesi.

PROTOSTICTA BEAUMONTI WILSON, 1997
Figures 114-121

Protosticta sp.: WILSON, 1995: 21, 23, 78-79, 81, 83, 85, "photos, Hong Kong".
Protosticta beaumonti: WILSON, 1997b: 57-59, Figs 11-16, "Hong Kong, Guangdong".

Material. – 2 ♂, Diding, 8-VII-1999, G.T. Reels leg.

DESCRIPTION. – Male. – Blackish, elongate, short-winged protostictid. Labium pale brown. Labrum ivory white with distal margin broadly bordered blackish brown. Mandibles are predominantly black with ivory white above adjacent to clypeus. Clypeus ivory white at front and shiny blackish brown above. Antennae mid brown. Remainder of head blackish brown. Prothorax blackish brown above and creamy white laterally (Fig. 116). Thorax blackish brown with small oval white spot at metepisternum towards wing base and hind one third of metepimeron is creamy white. Trochanters and legs pale creamy brown with dark joints between tibiae and femora. Wings hyaline with blackish brown pterostigma subtending slightly more than one cell. The pterostigma is broadest at base and framed with very fine white border. Abdomen generally mid brown with large white spot on segment 9. Segments 1 mid brown with pale ventrum. Segment 2 mid brown with basal half of ventrum pale. Segments 3-7 mid brown with



Figs 113-121. [113] *Protosticta curiosa* Fraser, ♂, Thailand: right superior appendage, dorsal; – [114-120] *P. beaumonti*, ♂, Guangxi: (114) right superior appendage, dorsal; – (115) inferior appendages, ventral; – (116) thorax, lateral; – (117) caudal genitalia, dorsal; – (118) caudal abdomen, lateral; – (119) penile organ, lateral; – (120) penile organ, ventral; – [121] *P. beaumonti*, ♂, Hong Kong: thorax, lateral.

distal one fifth ringed darker and basal one fifth of ventrum pale. Segment 8 blackish brown with basal two-thirds ventrum pale. Segment 9 mainly creamy white above with basal and distal borders diffusely blackish brown. Segment 10 and caudal appendages blackish brown. Caudal appendages are illustrated in Figures 114-115, 117-118. Dorsal side of club-tipped inferior appendages has a cupped socket at the tip with a prominent spine at the distal border. Penile organ is illustrated in Figures 119-120.

Measurements (mm). – ♂ abd. + app. 45.0-45.5, hw. 24.0-25.5.

REMARKS. – Only three species of *Protosticta* are presently known from the Chinese region. *P. kiautai* ZHOU (1986) was described from Zhejiang province and *P. taipokauensis* ASAHINA & DUDGEON (1987) is known from Hong Kong and possibly Fujian. The senior author has closely compared the Guangxi *beaumonti* material from Diding with *beaumonti* material collected from Hong Kong. There are no overt structural differences between the material, including the caudal appendages and penile organs. However, the material is easily separated by their thoracic colour patterns. *P. beaumonti* from Hong Kong has a prothorax, which is predominantly yellowish white with only the anterior border of fore lobe pale or smoked dark brown, and hind lobe blackish (Fig. 121). In addition the metepisternum and metepimeron of Hong Kong *beaumonti* are predominantly white with a dark brown dividing suture. The principle author has examined many specimens of *beaumonti* from Hong Kong and this material does not possess the distinct thoracic colour patterns exhibited by the Diding material. Material from Dinghu Shan, Guangdong resembles Hong Kong material. Since the colour patterns between Diding and Guangdong/Hong Kong material are so different there is a possibility the Diding material belongs to a new taxon, but more information is required from material between west Guangxi and central Guangdong and Hong Kong to clarify the situation. Since no structural differences can be identified the Diding material is treated here as *beaumonti*. Outside of China the closest congener to *beaumonti* is *Protosticta curiosa* Fraser, 1934.

This species is easily separated by the structure of tip of the male inferior appendage, which is elongated beyond the cup-shaped socket (Fig. 113, based on material, collected Phuket, Thailand, 2 ♂, 20-IV-2000, coll. K.D.P. Wilson).

PROTONEURIDAE

PRODASINEURA VERTICALIS (SELYS, 1860)

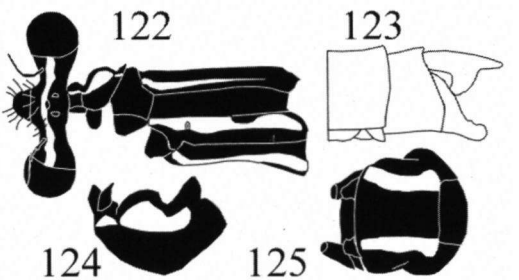
Figures 122-125

Alloneura verticalis: SELYS, 1860: 453, "type-loc. Borneo"
Cacaneura verticalis verticalis: FRASER, 1934: 213-218, "Lower Burma".

Material. – 3 ♂, Mulun, 20-VII-1998, G.T. Reels leg.; 2 ♀, Mulun, 19-VII-1998, G.T. Reels leg.

DISTRIBUTION. – Burma, China (Guangxi and Yunnan), India, Laos and E. Malaysia (Borneo & Sarawak).

REMARKS. – HÄMÄLÄINEN & PINRATANA (1999) assigned Asahina's Thai records of *P. verticalis* (ASAHINA, 1983) to *Prodasineura* sp. (nec. *verticalis* Selys, 1860). Indeed the drawing of the thoracic dorsum, provided by ASAHINA (1983: 97, fig. 28), does not resemble *P. verticalis* but appears to be closer to *P. auricola* (Fraser). ASAHINA (1997a) describes a *Prodasineura* identified tentatively as *Prodasineura* sp. (*verticalis* Selys?) as a pale bluish striped species, which is curious, as *verticalis* is orange coloured. The senior author is very grateful to T.W. Donnelly for the opportunity to examine male specimens of *P. verticalis* collected from Korma Falls, Puttur, India, 23-V-1980, male *P. verticalis* collected from Sarawak, 12-VII-1997 and male *P. auricola* collected from Doi Inthanon, Thailand, 23-VI-1980. The extent of the orange colouration on the head and thorax of the Guangxi *verticalis* is closer to *verticalis* from Sarawak. The dorsal stripes of Guangxi material are narrow and taper to a fine point falling short of the wing bases (Fig. 122). There are no obvious structural differences, when comparing caudal genitalia, between East Malaysia, India and Guangxi material (Fig. 123). The Guangxi female prothorax is illustrated in Figures 124-125. The frontal lobe is deeply cleft with a prominent broad, stout projection directed forward.



Figs 122-125. *Prodasineura verticalis*, Guangxi: (122) ♂, head and thorax; – (123) ♂, caudal genitalia, lateral; – (124) ♀, prothorax, lateral; – (125) ♀, prothorax, dorsal.

DISCUSSION

Relatively few comprehensive accounts of odonate fauna exist for continental southeastern Asia and China. Detailed information has been published for Hainan, Hong Kong, Malaysia, Thailand, Taiwan and Vietnam. According to HÄMÄLÄINEN & PINRATANA (1999) Thailand has a zygopteran fauna comprised of 44 genera and 132 species. Thailand has a total land area of 514,000 km², nearly twice the area of Guangxi, covering a much higher range of latitude. At the generic level there are few differences between Thailand and Guangxi. About a quarter of Thai Zygoptera species and just over three quarters of Thai genera have been recorded in Guangxi. Thailand has ten genera not represented in Guangxi, and of 38 genera found in Guangxi five are not represented in Thailand. Thailand has more species representatives in all families except two, which are the Euphaeidae and Synlestidae. Both these families are especially well represented in southern China.

VAN TOL & ROZENDAAL (1995) postulated a biogeographical subregion for Odonata, extending from the northernmost part of Thailand to northern and central Vietnam, and reaching northwards up to the southern Chinese provinces, possibly also including Hainan. With such close similarity between the fauna of Guangxi and Thailand the inclusion of Guangxi in the biogeographical subregion suggested by van Tol & Rozendaal appears to be corroborated.

The Odonata Specialist Group (OSG) of the IUCN (MOORE, 1997) considered the main centres of endemism for Odonata in Asia to comprise the mountains of Myanmar, Thailand, Cambodia, Laos and Vietnam, Indonesia, the Philippines, and the Ryukyu Islands. The OSG also provided a list of areas, which it considered to be of high priority for study on the status of endemic species, due to known high biodiversity, lack of information and recognised threats. The forests, especially montane forests in southern China were included in this list together with Cambodia, Indonesia, Laos, Philippines and Vietnam from Southeast Asia. If information on the southwest Chinese fauna had been available to the OSG it is likely this part of China would have been included as one of the main centres for Southeast Asian odonate biodiversity.

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REFERENCES

ASAHINA, S., 1956. Dragonflies from West Tien-Mu-Shan, Central China. *Ent. Meddr.* 27: 204-228.
ASAHINA, S., 1965. The Odonata of Hong Kong. *Kontyû* 33 (4): 493-506.

ASAHINA, S., 1969. Notes on Chinese Odonata, 2. *Kontyû* 37 (2): 192-201.
ASAHINA, S., 1970. Burmese Odonata taken by Mr. Y. Inoue. *Jap. J. Zool.* 10(1): 1-18.
ASAHINA, S., 1973. Notes on Chinese Odonata, 4. *Kontyû* 41 (4): 446-460.
ASAHINA, S., 1977. Notes on Chinese Odonata, 6. *Kontyû* 45 (4): 479-494.
ASAHINA, S., 1978. Notes on Chinese Odonata, 9. *Tombo* 11 (1/4): 2-14.
ASAHINA, S., 1978. A remarkable new damselfly allied to Bayadera (Odonata, Euphaeidae). *Proc. Jpn Soc. syst. Zool.* 14: 43-46.
ASAHINA, S., 1979. Notes on Chinese Odonata, 8: three small collections in the U.S. National Museum of Natural History. *Kontyû* 47(3): 328-334.
ASAHINA, S., 1983. A list of the Odonata recorded from Thailand, 2: Protoneuridae. *Kontyû* 51(1): 90-99.
ASAHINA, S., 1984. Copera annulata (Selys) composed of two different species! *Chô Chô* 7(7): 2-10.
ASAHINA, S., 1985a. A list of the Odonata recorded from Thailand, 5: Platycnemididae 2 (Calicnemia and Indocnemis). *Chô Chô* 8(1): 2-12.
ASAHINA, S., 1985b. A list of Odonata recorded from Thailand, 11: Euphaeidae. *Chô Chô* 8(12): 18-38.
ASAHINA, S., 1985c. Contributions to the taxonomic knowledge of the Megalestes species of continental South Asia (Odonata, Synlestidae). *Chô Chô* 8(10): 2-18.
ASAHINA, S., 1991. A taxonomic revision of the Ischnura rufostigma Group of Southeast Asia. *Tombo* 34(1-4): 2-22.
ASAHINA, S., 1996. Records of the northern Vietnamese Odonata taken by the expedition members from the National Science Museum, Tokyo, 4: Libellaginidae, Euphaeidae, Calopterygidae and Amphipterygidae. *Bull. natn. Sci. Mus., Tokyo* (A) 22(4): 189-198.
ASAHINA, S., 1997a. Records of the northern Vietnamese Odonata taken by the expedition members from the National Science Museum, Tokyo, 5: Coenagrionidae, Protoneuridae and Platycnemididae. *Bull. natn. Sci. Mus., Tokyo* (A) 23(1): 17-34.
ASAHINA, S., 1997b. Records of the northern Vietnamese Odonata taken by the expedition members from the National Science Museum, Tokyo, 6: Platystictidae, Megapodagrionidae, Lestidae and Synlestidae. *Bull. natn. Sci. Mus., Tokyo* (A) 23(2): 107-113.
ASAHINA, S. & D. DUDGEON, 1987. A new platystictid damselfly from Hong Kong. *Tombo* 30(1/4): 2--6.
CHAO H-F., 1947. On the systematic position, nymphal characters and new species of the genera Megalestes and Sinolestes (Odonata) *Biol. Bull. Fukien christ. Univ.* 6: 15-25.
CHAO, H-F., 1953. A study of Chinese dragonflies of the genus Philoganga Kirby. *Acta ent. sin.* 3: 137--145.
CHAO, H-F., 1962. A study of Navasian types of Chinese dragonflies (Odonata), 1. *Acta ent. sin.* 11 (Suppl.): 25-31.
CHEN, C-W., 1947. On a new damselfly from Formosa (Odonata: Synlestidae). *Biol. Bull. Fukien. christ. Univ.* 6: 27-31.
BRIDGES, C.A., 1994. *Catalogue of the family-group, genus-group and species-group names of the Odonata of the World* [3rd edn]. Bridges, Urbana/IL.
DAVIES, D.A.L. & P. TOBIN, 1984. *The dragonflies of the world: a systematic list of the extant species of Odonata*, Vol. 1: *Zygoptera, Anisozygoptera*. Soc. Int. Odonatol., Utrecht.
DAVIES, D.A.L. & B. YANG, 1996. New species of Bayadera Selys and Schmidtiphaea from China (Odonata, Euphaeidae). *Tijdschr. Ent.* 139: 145-155.
FÖRSTER, F. in F.F. LAIDLAW, 1907. (Anthropological and zoological results of an expedition to Perak and the Siamese Malay States). Report on the dragonflies, 2: the legions Platycnemis and Protoneura. *Facs. malayense* (Zool.) 4: 1-15.
FRASER, F.C., 1933. *Fauna of British India, including Ceylon and Burma. Odonata*, Vol. 1. Taylor & Francis, London.
FRASER, F.C., 1934. *Fauna of British India, including Ceylon and Burma. Odonata*, Vol. 2. Taylor & Francis, London.

HÄMÄLÄINEN, M., 1988. Dragonfly collecting in Thailand, 3: September-November 1986. *Malangpo* 5: 23-27.

HÄMÄLÄINEN, M. & A. PINRATANA, 1999. *Atlas of the dragonflies of Thailand.* Chok Chai, Bangkok.

HÄMÄLÄINEN, M. & S. DIVASIRI, 1997. Rhinocypha arguta n. sp., a new jewel-damselfly from north--east Thailand (Odonata: Chlorocyphidae). *Ent. Z.* 107(5): 201-204.

KIMMINS, D.E., 1936. A new species of Euphaea (Odonata). *Ann. Mag. nat. Hist.* (X)17: 147-149.

KLOTS, E. B., 1947. The dragonflies (Odonata) in the American Museum of Natural History. *Am. Mus. Novit.* 1341: 1-15.

LAI, Y-L., 1971. An introduction to the Odonata of Hong Kong. *New Asian Coll. Acad. Annu.* 13: 1-48. – [Chin., with Engl. s.].

LAIDLAW, F.F., 1932. A revision of the genus Coeliccia (order Odonata). *Rec. Indian Mus.* 34: 7-42, 3 pls.

LIEFTINCK, M.A., 1969. Two new Odonata from Southeast Asia with comments on previously described species *Dt. ent. Z.* 16: 205-215.

LIEFTINCK, M.A., 1984. Further notes on the specific characters of Calicnemia Strand, with a key to the males and remarks on some larval forms (Zygoptera: Platycnemididae). *Odonatologica* 13(3): 351-375.

LIEFTINCK, M.A., J.C. LIEN & T.C. MAA, 1984. *Catalogue of Taiwanese dragonflies (Insecta: Odonata).* Asian Ecol. Soc., Taichung.

MACKINNON, J., M. SHA, C. CHEUNG, G. CAREY, Z. XIANG & D. MELVILLE, 1996. *A biodiversity review of China.* World Wide Fund Nat. Int. China Progr.

MARTIN, R., 1904. Liste de neuroptères de l'Indo-Chine. *Mission Pavie Indo-Chine* 3: 204-221.

MAY, E., 1933. Odonatologische Mitteilungen, 1: Bemerkungen über das Genus Sinolestes Needham, 1930. *Senckenbergiana* 15 (3/4): 256-260.

MOORE, N.W., 1997. *Dragonflies: status survey and conservation action plan.* IUCN/SSC, Gland.

NAVAS, L., 1935. Névroptères et insectes voisins. Chine et pays environnants, 2(8). *Notes ent. Chin.* 2(5): 85-103.

NAVÁS, L., 1936. Névroptères et insectes voisins. Chine et pays environnants, 9. *Notes ent. Chin.* 3(4): 37-62.

NEEDHAM, J.G., 1930. A manual of the dragonflies of China. *Zool. sin.* 11(1): i-xi, 1-344, 20 pls excl.

PINRATANA, A., B. KIAUTA & M. HÄMÄLÄINEN, 1988. *A list of the Odonata of Thailand and annotated bibliography.* Viratham Press, Bangkok.

RIS, F., 1912. Neue Libellen von Formosa, Südchina, Tonkin, und den Philippinen. *Supplta ent.* 1: 44-85, 3 pls excl.

RIS, F., 1917. Eine neue Agrioniden-Gattung der "Légion Podagrion" (Odonata) aus China. *Tijdschr. Ent.* 60(1): 185-191.

SELYS-LONGCHAMPS, M.E. De., 1860. Synopsis des agrionines. Dernière légion: Protoneura. *Bull. Acad. r. Belg.* (2)10: 431-462.

SUI, J-Z. & H-G. SUN, 1984. *Common species of dragonflies from China.* Agric. Publ. House, Beijing.

TINKHAM, E.R., 1938. A new species of Ceylonosticta Fraser from South China (Odonata: Zygoptera, Coenagrionidae). *Lingnan Sci. J.* 17(1): 17-19.

VAN TOL, J. & F.G. ROZENDAAL, 1995. Records of Calopterygoidea from Vietnam, with descriptions of two new species (Zygoptera: Amphipterygidae, Calopterygidae, Chlorocyphidae, Euphaeidae). *Odonatologica* 24(1): 89-107.

VICK, G.S., 1986. A note on the group of species allied to Ischnura rufostigma Selys (Zygoptera: Coenagrionidae). *Odonatologica.* 15(3): 347-351.

WILSON, K.D.P., 1995. *Hong Kong dragonflies.* Urban Council, Hong Kong.

WILSON, K.D.P., 1997a. An annotated checklist of the Hong Kong dragonflies with recommendations for their conservation. *Mem. Hong Kong nat. His. Soc.* 21: 1-68, pl. 1.

WILSON, K.D.P., 1997b. The Platystictidae of Hong Kong and Guangdong with descriptions of a new genus and two new species (Zygoptera). *Odonatologica* 26(1): 53-63.

WILSON, K.D.P., 1999. The dragonflies (Odonata) of Dinghu Shan Biosphere Reserve, Guangdong province, China. *Int. J. Odonatol.* 2(1): 23-53.

WILSON, K.D.P., 2000. Distributional notes on the genus Rhipidolestes, with descriptions of two new species from South China (Zygoptera: Megapodagrionidae). *Odonatologica* 29(1): 45-50.

WILSON, K.D.P. & G.T. REELS, 2001. Odonata of Hainan, China. *Odonatologica* 30(2): 145-208.

WINFIELD, I.J & J.S. NELSON, 1991. *Cyprinid fishes-systematics, biology and exploitation.* Chapman & Hall.

YANG, Z-L. & LI, S-S., 1994. Descriptions of a new species and a subspecies of dragonflies from Shaanxi province, China (Odonata: Cordulegasteridae, Amphipterygidae). *Acta ent. sin.* 37: 458-462.

YANG, Z., 1996. A new species of the genus Anisopleura from Shaanxi, China (Odonata, Euphaeidae). *J. Hangzhou Teachers Coll.* 14: 143-144.

ZHOU, W-B., 1982. A new species of the genus Anisopleura from Zhejiang. *Entomotaxonomia* 4(1-2): 65-66.

ZHOU, W-B., 1986. Protosticta kiautai spec. nov., a new platystictid dragonfly from China (Zygoptera). *Odonatologica* 15(4): 465-467.

ZHOU W-B. & K.D.P. WILSON, 2001. Priscagrion kiautai gen. nov., sp. nov., and Priscagrion pinheyi sp. nov., new damselflies from southwestern China (Zygoptera: Megapodagrionidae). *Odonatologica* 30(1): 117-121.

ZHU, H. & W-B. ZHOU, 1999. A new species of the genus Anisopleura Selys from Yunnan (Odonata: Euphaeidae). *Wuyi Sci. J.* 15: 33-35.