Report on field surveys of dragonflies in Hainan, China, and preparation of a field guide to the Odonata of the island

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Introduction

Background

In early 2007, I was invited by Dr. Michael Lau, Head of the China Programme of Kadoorie Farm & Botanic Garden (KFBG), to write a simple guide to the Odonata of Hainan, China. KFBG is a Hong Kong-based conservation charity organization, with strong links to tropical southern China, and is conducting a project to produce a series of basic fauna and flora field guides for Hainan Island, to be published in English and Chinese, but primarily aimed at older schoolchildren in China. I previously conducted field surveys of Hainan Odonata with KFBG (as an employee or volunteer) in 1998, 1999 (twice), 2002 and 2005. Results of the three surveys conducted in 1998-1999 (one of which was also attended by Keith Wilson) were published by Wilson & Reels (2001). The results of the 2002 and 2005 surveys will appear as a chapter in a KFBG book about Hainan's Yinggeling Nature Reserve, to be published in 2010. I also published a very brief, informal account of the 2005 survey in *Agrion* (Reels, 2006). On the basis of these past experiences, I gladly accepted the opportunity to write a field guide for KFBG.

Field trips and IDF funding

I subsequently made four visits to Hainan with KFBG teams, in May and June 2007, and April and August 2008. (I also made a short private visit to Hainan in late June 2007, during which I was able to briefly conduct fieldwork.) As a volunteer, I received no remuneration from KFBG, and no funding for flights, although all of my expenses were paid once I reached the island. Since my work necessitated several flights between Hong Kong (where I live) and Hainan, I sought funding from the International Dragonfly Fund in June 2007, and this was generously granted. The money provided by IDF (US$1,000) covered the cost of the four return flights I made with KFBG from Hong Kong to Hainan in 2007-2008.

The field guide

I submitted my first draft field guide to KFBG in December 2008. The dragonfly guide was due to be launched at the same time as three other KFBG Hainan field guides (birds, amphibians and freshwater fish); unfortunately, these guides were being written by very busy KFBG employees, and were not ready by late 2008. In fact, the other three guides are still unfinished, which has necessitated several postponements of the publication date. As of February 2010, the anticipated publication launch is January/February 2011. Therefore, rather than waiting another year before writing this report, I have decided to report to IDF now, and to send IDF 20 copies of the field guide when it is eventually published.

Geography of Hainan

The Chinese island of Hainan (Fig. 1) lies entirely within the tropical zone, between 18°12'-20°10'N and 108°40'-111°03'E, and is situated in the South China Sea, east of northern Vietnam. It is a large island occupying an area of 34,000 km^2 and measuring 257km long with a maximum width of 145km. The island was formerly a part of Guangdong Province, from which it is separated by the narrow Qiongzhou Strait. It was made a province in its own right in 1988.

Geology

The oldest rocks in the island are Mesozoic granites dating as far back as the Triassic Period. These form the mountainous central and southern uplands, including many extinct volcanoes. The island's highest peak, Wuzhishan (1,867m) is located in the middle of this mountainous region (Fig. 2). Younger rocks and sediments predominate in the low-lying north and northeastern third of the island, and along the west coast. These areas mainly comprise Quaternary deposits, forming terraces, tablelands and plains lying less than 100m above sea level. Extensive low-lying Cenozoic basalts also occur in the northern plains. Hainan first became separated from the Asian continental land mass about one million years ago. However, during the periods of maximum glaciation in the Pleistocene, the South China Sea was much lower than today and as a consequence Hainan would have been intermittently re-connected to the mainland. The last such period, during which the sea level was at least 100m lower than today, was just over 20,000 years ago.

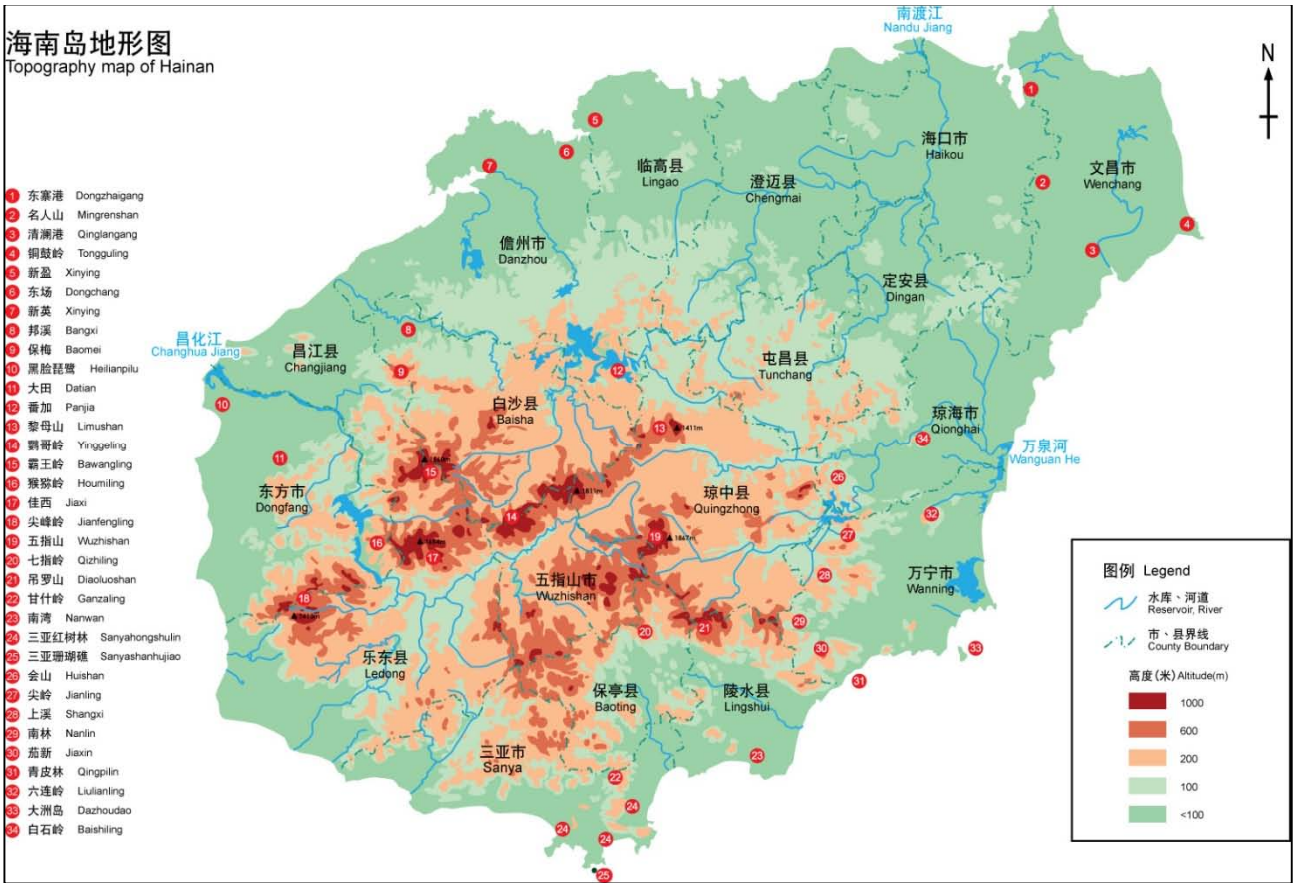

Figure 1: Relief map of Hainan (©KFBG)

Climate

Hainan has a tropical monsoon climate, with a warm summer wet season alternating with a mild winter dry season. Mean annual temperature is 22-27ºC. The average annual precipitation across most of the island is 1,500 – 2,000mm; however, annual rainfall can reach 2,400mm in central and eastern areas, and be as low as 900mm in the coastal southwest. 70% of the annual precipitation falls during the summer rainy season, which is supplemented by occasional typhoons from May to September.

Drainage and land use

Most major rivers on the island originate in the central and southern mountain ranges, from which they flow in different directions to the coast. The Nandu River, at 314km, is the longest. This river and its main tributary, the 109km long Xinwu River, rise near Limushan and drain northwards, across the northern plains to Haikou, the island's capital. The Changhua River flows westwards from Wuzhishan for 230km before reaching the west coast at the city of Changhua. The Wanguan River in the east is 162km long and similarly rises between Limushan and Wuzhishan, flowing eastwards to Zhongyuan. The rivers frequently flood in summer, but water levels are greatly reduced during

the dry season by evaporation and lower rainfall. There are very few natural lakes. Songtao Reservoir, in the central-north of the island, is the largest body of standing freshwater.

The upland areas of the interior are often well-forested, and extensive patches of primary rainforest still exist at Yinggeling, Bawangling, Wuzhishan, Jianfengling and various other upland protected areas. Elsewhere in the uplands there is secondary forest and cultivation of various crops on the hill sides, with rice grown intensively in the mountain valleys. Rice and vegetables are grown extensively in the northeast lowlands and also in the western coastal areas, while rubber is also grown in lower-lying areas across the island. Other major crops include coconuts, coffee, cocoa, pepper, mangoes and cashews. Mangroves and other estuarine habitats occur intermittently around the coast of the island, and there are extensive low-lying wetlands in the northeast. The rate of urbanisation of lowland areas has increased dramatically in the last decade. However, Hainan is not heavily industrialised and has a relatively small human population of just over eight million.

Figure 2. Wuzhishan, the highest peak in Hainan. Primary forest clads the upper slopes of the mountain. Secondary forest and various crops occupy the lower slopes. Rice paddies fill the valley bottoms

Biogeography

Hainan Island is the most tropical part of China and is rich in wildlife. Biogeographically, it is located within the Indochina bioregion (comprising southern and southwestern China, Burma, Laos, Cambodia, Vietnam and northern Thailand) of the Indomalayan 'Ecozone', also known as the Oriental Region, which includes most of tropical Asia.

The flora of Hainan is estimated at over 3,200 species, more than 500 of which are endemic. There is also a high level of endemicity amongst amphibians on Hainan, with almost one quarter of all species (9 out of 39) being found nowhere else. There are fewer endemic species amongst the more mobile animal groups, such as mammals (4 out 76), birds (2 out of 355), reptiles (9 out of 116) and freshwater fish (11 out of 106). Amongst insects, butterflies are probably the most well-studied group in Hainan. Some 550 species have been recorded on the island, with fewer than 10 endemics.

The Hainan odonate fauna

At present, 161 odonate species are known to occur in Hainan. This figure includes two species which are only known from larval specimens, and three others which are currently undescribed. At least 22 species are endemic. Twelve families of Zygoptera, and six of Anisoptera are present. It is likely that the true number of odonate species in Hainan exceeds 170. Future additions to the Hainan list are likely to include members of the cosmopolitan family Libellulidae (Skimmers, Darters, etc.), whose members mainly inhabit relatively accessible habitats such as ponds, marshes and slow-flowing rivers. These widespread lowland habitats have probably been relatively under-surveyed in Hainan, where much of the most recent surveying has focused on forested upland areas. A number of libellulid species which are distributed across southern China and the wider bioregion, and which should be present, have not yet been found. On the other hand, permanent losses of some forest-dependent species may have already occurred on the island, due to the almost complete destruction of lowland primary forest.

Previous work on Hainan dragonflies and damselflies

The first record of any odonate species from Hainan was *Rhinocypha perforate* (Fig. 3), and was published by Baron Michel Edmond de Selys Longchamps in 1873. This was followed in 1900 by William Forsell Kirby publishing details of 14 species from Hainan, including the original descriptions of *Zygonyx iris insignis* (Fig. 5) and the

Figure 3. *Heliocypha perforata* – the first odonate recorded from Hainan, described by Baron de Selys Longchamps in 1873

Figure 4. The endemic *Pseudolestes mirabilis* – described by W. F. Kirby in 1900

Figure 5. *Zygonyx iris insignis* – originally described from Hainan by W.F. Kirby in 1900

Figure 6. The endemic *Euphaea ornata* – described from Hainan by H. Campion in 1924

remarkable Hainan endemic *Pseudolestes mirabilis* (Fig. 4). The Hainan endemic species, *Euphaea ornata* (listed as *E. decorata* by Kirby) was described by H. Campion in 1924 (Fig. 6).

The American odonatologist James Needham added several more species to the Hainan list during the 1930s and early 1940s, including descriptions of four new species (*Nannophyopsis clara*, *Labrogomphus torvus*, *Paragomphus hoffmanni* and *P. pardalinus*. In 1932, Frank Fortescue Laidlaw established a Hainan endemic subspecies, *Coeliccia scutellum hainanense* (Fig. 7). Many years later, in 1950, Laidlaw also recorded a further chlorocyphid species from Hainan, *Rhinocypha (Heliocypha) biforata*. In 1940, *Oligoaeschna petalura* was described from Hainan by Maurits Lieftinck.

Figure 7. Tandem pair of *Coeliccia scutellum hainanense* – described by Frank Laidlaw in 1932

The distinguished Chinese odonatologist Chao Hsiu-fu (written as Zhao Xiufu in his later publications) added many new gomphid dragonflies to the Hainan list, beginning with *Asiagomphus hainanensis* (Fig. 8) in 1953 and, in the following year, the endemic *Lamelligomphus hainanensis.* In 1982, Chao described three more endemic species of gomphid from Hainan: *Anisogomphus wuzhishanus,*

Nychogomphus flavicaudus and *Leptogomphus celebratus.* Liu Zu-yao added yet another *Paragomphus* species, the endemic *Paragomphus wuzhishanensis*, in 1988.

Figure 8. *Asiagomphus hainanensis* – described from Hainan by Chao Hsiu-fu in 1953

In 1993, John Treadaway collected *Calicnemia eximia*, *Lyriothemis pachygastra* and an unidentified species of *Sympetrum* at Jianfengling in Hainan. These records were not published, but the specimens were deposited in the Leiden Museum in the Netherlands, where they were later examined by Matti Hämäläinen. In 1996, *Chlorogomphus usudai* was described from Hainan by Katsuyoshi Ishida.

In 2001, Keith Wilson and myself reported the results of several dragonfly surveys undertaken in Hainan under the auspices of Kadoorie Farm & Botanic Garden during the late 1990s (Wilson & Reels, 2001). We recorded a total of 127 odonates for Hainan, 70 of which had not previously been recorded for the island. We described 12 new species (one of which, *Chlorogomphus icarus*, was subsequently synonymised with *C. usudai*). At the time, we were unaware of Treadaway's collecting in 1993, and therefore the real total of Odonata known from Hainan by 2001 was 130 species.

Figure 9. The endemic *Drepanosticta elongata* – described by Wilson & Reels in 2001

Figure 10. The endemic *Burmargiolestes xinglongensis* – described by Wilson & Reels in 2001

Since 2001, a further 31 species of damselfly and dragonfly have been discovered or reported in Hainan by a variety of people, including Hua Li-zhong, Liu Weiting, Graham Reels, Keith Wilson, Yu Xin, Zhang Haomiao, Zhou Wen-bao and Zhou Xin. These have included three previously undescribed species: *Rhinocypha huai* (Zhou & Zhou), *Sinosticta sylvatica* Yu and *Trigomphus hainanensis* Zhang and Tong. In addition, yet another endemic species, *Aristocypha aino* (Fig. 11), which had formerly been recored in the Hainan list as *Rhinocypha (Aristocypha) fenestrella*, was named by Hämäläinen, Reels and Zhang in 2008 (with IDF acknowledged as a funder of my work). Wilson, Reels & Xu (2008) provided a revised checklist for Hainan, with 19 of these new additions. The remainder were established in 2008-2009, mainly by Zhang Haomiao. (For an updated checklist see **Appendix 2**)

Figure 11. The endemic *Aristocypha aino* – described by Hämäläinen, Reels and Zhang in 2008

Biogeographical affinities of the Hainan odonate fauna

The dragonfly and damselfly species which occur in Hainan are predominantly confined to the Indomalayan Ecozone, or Oriental Region – 80% of them are found only within this area. 43% of Hainan species are restricted to the Indochina bioregion of Indomalaya, 31% are only found in southern China, and just

under 15% are endemic to Hainan. As more work is done in Laos and northern Vietnam, the number of Hainan species considered endemic to southeastern China will probably shrink. An example is *Vestalaria miao* (Calopterygidae), recently discovered in northern Vietnam (Hämäläinen, in litt.). A small number of species recorded from Hainan are very widespread, and occur outside Indomalaya. For example, 7% are also found in Australasia and 4.5% in the Palaearctic. Eleven species (6%) occur in at least two other ecozones; six occur as far away as Africa, including one – *Pantala flavescens* – which is circumtropical.

Podolestes pandanus (Fig. 12) and, to a lesser extent, *Rhinagrion hainanense* (Megapodagrionidae) are of particular interest because they are the only representatives of the genera *Podolestes* and *Rhinagrion* in China. Indeed, all other *Podolestes* species, and most species of *Rhinagrion*, are found much further south, in Sundaland (western Indonesia, Malaysia and southern Thailand), while the latter also has a single representative in the Philippines and two in Indochina.

Figure 12. *Podolestes pandanus* – the northernmost *Podolestes* in the world (photo by Keith Wilson)

Field surveys 2007-2008

The four KFBG field surveys which I joined in order to gather information for the field guide focused primarily on nature reserves, with some sampling of unprotected upland and lowland habitats. The locations visited were dictated by KFBG, in close collaboration with local officials, and comprised sites in southern, central and eastern parts of the island. Field trip information is summarized in Table 1. Unfortunately, accurate GPS data for most of the survey sites are lacking. Figure 13 shows the locations of nature reserves in Hainan, including those in which field trips were conducted.

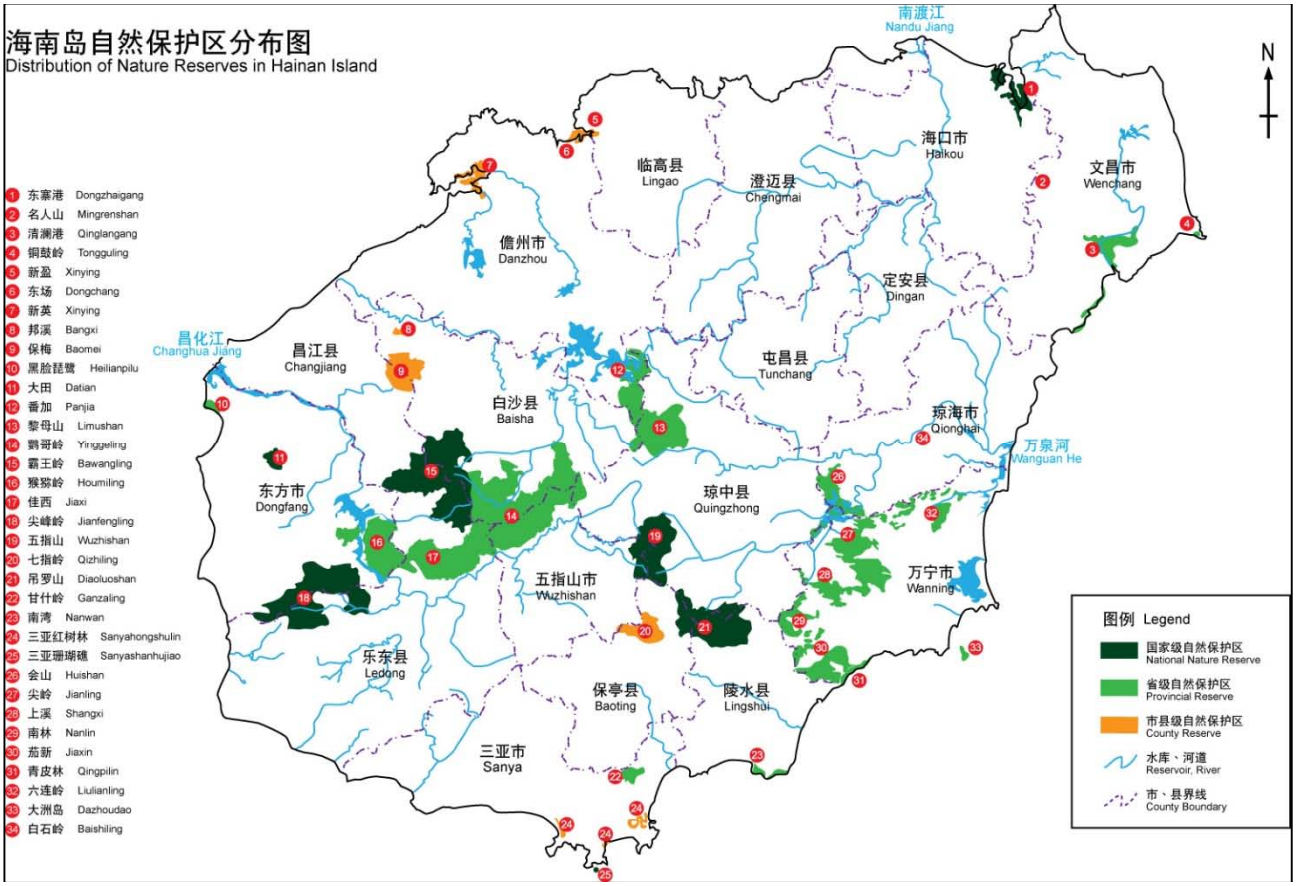

Figure 13: Nature reserves of Hainan (©KFBG)

Table 1. Field trips conducted with KFBG, 2007-2008

Field trip dates	Main survey area	Location No. according Figure 13
May 18-26 2007	Nankai River	Yinggeling, central Hainan (14)
	Namkang River	
	Upland forest above Nam-kang River	
	Nan Yi	
	Qingjie	
	Yinggezhuei	
	Ganzaling	Near Sanya, southern Hainan (22)
June 17-23 2007	Fan Jia	Near Wanning, southeast Hainan (26) (29) (30) (32)
	Xiaonanning	
	Hui Shan	
	Nanlin	
	Jiaxin – Tongtielin	
	Liulianling	
April 16-23 2008	Xi Jie	Wuzhishan, central Hainan (19)
	Wuzhishan main resort	
	Shui Man River	
	Jie Zu	
	Luo Mi	
August 8-14 2008	Wuzhishan main resort	Wuzhishan, central Hainan (19)
	River east of Wuzhishan	N18°45.91' E109°35.56' N18°46.47' E109°44.29'; N18°46.44' E109°44.73'
	Streams east of Wuzhishan	
	Stream near Tongtielin	Near Jiaxin (30), southeast Hainan
	Tian Zai stream	Near Qingpilin (31), southeast Hainan

Aims and methods

The two primary aims of my fieldwork were to expand the knowledge of species distributions across the island, and to obtain publishable photographs of the adult stages of as many species as possible, in order to gather sufficient material for a simple photographic guidebook to Hainan Odonata. Note that there was no element of scientific research, and the field trip agendas were set by KFBG and local officials, rather than being based purely on Odonata-related considerations. Nevertheless, I was able to visit numerous streams, rivers and other wetland sites, in habitats ranging from upland primary forest to lowland agricultural landscapes.

My field equipment included a dragonfly net, binoculars and DSLR camera with

monopod. At each site visited, I identified all adult odonates observed, or collected specimens for later identification. Wherever possible, I tried to take photographs of live specimens in a natural setting. In the case of rare or seldom-encountered species, this frequently left me with a dilemma as to whether to use the net or the camera first. Usually this dilemma was resolved on the basis of which piece of equipment (camera and monopod or dragonfly net) I happened to be holding when I first encountered the specimen. The downside of this approach was that, on a small number of occasions, a potentially useful specimen was photographed but flew away before it could be vouchered.

Outcomes

The following account is a brief summary of each field trip, highlighting points of interest. Full lists of species recorded during the field trips are given in **Appendix 1**, and my transcribed field notes are provided in **Appendix 3** as Electronic supplementary information on the CD attached to the print version this report.

Yinggeling and Ganzaling, central and southern Hainan, 18-26 May 2007

May 17

Upon arrival at Haikou International Airport, I was driven, along with three KFBG staff – Lee Kwok Shing (an ornithologist), Louis Fung and Hilario Padilla (a sustainable agriculture specialist), to the large Yinggeling Nature Reserve in central Hainan. At Daoyin Village on the Nankai River in Yinggeling, we met up with several other KFBG staff (including team leader Dr. Bosco Chan – an ichthyologist and excellent all-round naturalist), local KFBG collaborator Lu Gang, and local reserve wardens and officials. The village was home for the next two nights.

May 18

The team spent a day exploring the Nankai River (Fig. 14) and various tributaries of it. The Nankai River at the survey area is a broad open river flowing over exposed bedrock, with large boulders and sand accumulations. It has a low gradient and is 15-25m wide. The altitude of the survey area was about 400m.

Neurobasis chinensis (Linnaeus 1758) was the only calopterygid present, and *Heliocypha perforata* (Percheron 1835) the only chlorocyphid. However, three euphaeids were observed: *Dysphaea gloriosa* Fraser 1938, *D. basitincta* Martin 1904) (much less abundant than its congener), and the endemic *Euphaea*

ornata (Campion 1924).

Figure 14. Nankai River, Yinggeling, 400m

Four gomphids were present on the river: *Burmagomphus vermicularis* (Martin 1904), *Paragomphus pardalinus* Needham 1942, *Nihonogomphus thomassoni* (Kirby 1900) and *Gomphidia kruegeri* Martin 1904 (Fig. 15). *G. kruegeri* – a very large lindeniine – was abundant, with numerous males holding territories along the river, spaced at 10-20m intervals.

Macromia clio Ris 1916 was quite common on the main river, especially in the early morning, while *Macromidia rapida* Martin 1907 was encountered on smaller tributaries, particularly after a brief rain shower. The libellulid *Zygonyx iris* Kirby 1900 was abundant along the main river.

May 19

During this day the team walked from the Nankai River at 400m to the Namkang River - a tributary with boulder/cobble substrate – at 500m. The surrounding habitat passed from open shrubland to secondary forest.

The calopterygid *Matrona basilaris* Selys 1853 was present along the Namkang River, as were *Heliocypha perforata* and *Euphaea ornata*. No *Dysphaea* were observed. A female *Coeliccia scutellum hainanense* Laidlaw 1932 was observed

ovipositing at an isolated pool surrounded by grass / shrubs at the river margin. The endemic *Drepanosticta elongata* Wilson & Reels 2001 (Fig. 9) was also recorded.

Figure 15. *Gomphidia kruegeri* on Nankai River

The team camped in the forest at about 550m, in preparation for climbing to better forest at a higher elevation the following day. Some rice wine was consumed.

May 20

The team walked from the camp site to primary forest at about 1,000m. Small forest streams were encountered from 650m to 960m, and I keenly surveyed them for odonates. However, only a few species were encountered. These included, among others, *Agriomorpha fusca* May 1933, the endemic *Pseudolestes mirabilis* Kirby 1900, *Coeliccia cyanomelas* Ris 1912 and the endemic *Drepanosticta zhoui* Wilson & Reels 2001 (Fig. 16).

Individual males of the endemic *Chlorogomphus usudai* Ishida 1996 were observed and vouchered on two occasions, patrolling up and down a small rocky forest stream at 960m, with a very slow flight, 0.5-0.75m above the stream.

Figure 16. The endemic *Drepanosticta zhoui* at Yinggeling

Figure 17. Camp site at Namkang River, 550m. Photo by Lee Kwok Shing

In the late afternoon, the team returned to the camp site at 550m. More rice wine was consumed.

21 May

The team broke camp and descended the Namkang River and then the Nankai River, covering much of the same area as on 18 and 19 May, and ended up passing through agricultural habitats before being met by support vehicles. A male *Macromia moorei* Laidlaw 1928 was collected and photographed at ca 1420h. It was patrolling up and down a small rocky tributary of the Nankai River and on to the main river channel, at 380m. Otherwise, little of particular note was seen, although various useful photographs were obtained.

The team drove to a nearby town in the early evening.

22 May

We drove south towards Sanya, a city on the southern coast, stopping briefly en route at Ganzaling Nature Reserve, which was to be the site of our field trip the following day. Ganzaling is a small nature reserve in low hills at an elevation of about 200m, comprising shrubland/secondary forest, with small slow-flowing shady streams and pond/marsh areas. The major finding of this brief late afternoon survey was a female *Rhyothemis obsolescens* Kirby 1889 (Fig. 19) – a new record for Hainan – on a dirt track in dry secondary forest, at 1700h. The specimen was vouchered and photographed.

23 May

After spending the night at Sanya, we returned to Ganzaling for a day's field-work, arriving at 0800h. A 0.5ha marsh near to the reserve's headquarters proved particularly productive as the morning warmed up. The marsh was teeming with *Rhyothemis obsolescens*, *Rhyothemis variegata* (Drury 1773) and a black *Rhyothemis* which turned out to be *R. plutonia* Selys 1883 (Fig. 20) – another new record for Hainan. Unfortunately, the marsh was also teeming with large buffalo leeches, several of which attached themselves to my legs as I photographed and vouchered specimens. Marshes and other lentic habitats have been relatively poorly represented in recent Hainan field surveys, which may explain why such large and highly conspicuous species as *R. obsolescens* and *R. plutonia* had not previously been reported from the island.

Figure 18. 'Capturing' an odonate (probably *Heliocypha perforata*) on Namkang River. Photo by Lee Kwok Shing

Figure 19. *Rhyothemis obsolescens* at Ganzaling – a new record for Hainan

Figure 20. *Rhyothemis plutonia* at Ganzaling – a new record for Hainan

Another richly rewarding site was a large (1ha) pond, with weedy margins and swampy backwaters. The weedy margins supported good numbers of the minute libellulid *Nannophyopsis clara* (Needham 1930), while *Paracercion calamorum* (Fraser, 1919) was present in the swampy backwaters. The open water was populated by typical pond species such as *Ictinogomphus pertinax* (Hagen 1854), *Sinictinogomphus clavatus* (Fabricius 1775), *Epophthalmia elegans* (Brauer 1865), *Hydrobasileus croceus* (Brauer 1867) and *Urothemis signata* (Rambur 1842).

Heliocypha biforata was present on small, slow-flowing shady streams (from which *H. perforata*, the commonest chlorocyphid in Hainan, was absent), as was *Pseudolestes mirabilis* and several other endemic taxa, including *Euphaea ornata*, *Coeliccia scutellum hainanense*, *Drepanosticta zhoui* and *Leptogomphus celebratus* Chao 1982. A zygopteran, resembling a megapodagrionid, with a red-tipped abdomen, was briefly seen but quickly vanished into the riparian vegetation. It may have been *Rhinagrion hainanense* Wilson & Reels 2001, but from the brief view I had of it I could not be certain. I spent some time trying to find it, but was not successful.

In the evening, we drove to Bulun in the Yinggeling area.

24 May

We visited the Nanyi River, a 20m wide boulder river in shrubland/forest at 200m, fast-flowing in the steeper sections. In farmland on the approach walk to the river, I saw an individual *Rhyothemis plutonia*, which caused me to wonder even more at the fact that this species has previously been overlooked in Hainan.

On the river itself, the most notable species were *Dysphaea basitincta*, *Drepanosticta zhoui* (on a seep beside the river) and *Zygonyx takasago* Asahina 1966.

25 May

We drove up an extremely narrow dirt track at Qingjie, in Yinggeling, to an altitude of several hundred metres, before taking to a forest trail which led into primary forest. We got to an altitude of 1,000m.

Figure 21. Nanyi River, Yinggeling

Aside from an abundance of forest leeches, the fauna of interest included a number of endemic forest species, such as *Pseudolestes mirabilis*, *Burmargiolestes xinglongensis* Wilson & Reels 2001 (Fig. 10), *Drepanosticta elongata*, *D. zhoui* and *Chlorogomphus usudai*. Of particular note was an unusually robust and colourful female platystictid, caught by Hilario Padilla (with his fingers) which I initially took to be a platycnemidid. Upon later examination, it turned out to be a new, apparently endemic species of *Sinosticta*, of which three other species are known, all from tropical southeastern China (including the Hainan endemic *S. hainanense* Wilson & Reels, 2001). Male material of this species was also collected by the Chinese odonatologist Yu Xin in Hainan in 2007, and the species was subsequently described as *S. sylvatica* Yu 2009.

Also of note was an observation by Dr Bosco Chan, who reported seeing a female *P. mirabilis* ovipositing into a wet dead log beside a small mountain stream, at 1,000m.

The team drove to the town of Baisha in the evening. I was unexpectedly presented with the opportunity to collect a female *Anaciaeschna jaspidea* (Burmeister, 1839) in the restaurant where we had dinner, at 2040h.

26 May

From Baisha, we drove to Yinggezhuei, in the Yinggeling area, to visit an upland basin at 600m, containing clear rocky boulder streams in shrubland / agricultural habitats. Three gomphid species were encountered, including *Asiagomphus hainanensis* (Chao, 1953), *Merogomphus paviei* (Martin, 1904) and *Megalogomphus sommeri* (Selys, 1854). However, probably the most notable record was of *Lestes praemorsus* Selys, 1862 (Fig. 22), of which two males were seen (one photographed and vouchered) at a small buffalo wallow pond fringed with low sedges, at 600m. This is a new record for Hainan.

Figure 22. *Lestes praemorsus* at Yinggezhuei – a new record for Hainan

Wanning area, southeast Hainan, 17-23 June 2007

17 June

After driving from Haikou to Wanning on 16 June, the KFBG team including myself, Bosco Chan, Lee Kwok Shing and lepidopterist Philip Lo travelled to Fan Jia, near Lumuwan, for field work. The streams here (at 200m) were low gradient, with small boulders on the main stream, and sandy substrate in slow-flowing upstream tributaries.

On the main stream, the odonate fauna comprised widespread species such as *Neurobasis chinensis*, *Copera marginipes* (Rambur 1842), *Gomphidia kruegeri*, *Ictinogomphus pertinax*, *Trithemis aurora* (Burmeister 1839) and *Trithemis festiva* (Rambur 1842). A teneral *Libellago lineata* (Burmeister 1939), which seems to be uncommon in Hainan, was also vouchered.

Upstream in more forested areas, *Dysphaea basitincta* and *Zygonyx iris* were present, along with *Heliocypha perforata* and *H. biforata* (the latter in slow-flowing sections), among others. *Pseudolestes mirabilis* was apparently numerous on one small forested stream visited by Bosco Chan.

Figure 23. *Rhinagrion hainanense* at Fan Jia, near the type locality of Lumuwan

I was very thrilled to find a male and a female *Rhinagrion hainanense* (Fig. 23) at a shady, sandy-bottomed, slow-flowing forest stream, which had very dense marginal vegetation. The only previous Hainan record of this species (a single male) was made at Lumuwan, in 1999 (Wilson & Reels, 2001). It was previously considered endemic to Hainan, but is now known to be the same species as *R. yokoii* Sasamoto 2003 (a junior synonym of *R. hainanense*), known from Vietnam and Laos (Vincent Kalkman, pers. comm.). I spent a fruitless hour attempting to voucher the male and female, but they stubbornly remained about 0.5m within the thick riparian vegetation, where it was impossible to swing a net, and evaded all attempts at capture by hand. I was, however, able to use a 200mm macro lens to obtain photographs of both sexes. Eventually I was called away from the site because the team needed to leave for Wanning.

18 June

From Wanning, we drove to Hui Shan, also in southeast Hainan, to conduct field work in shrubland and forest, from 200m to 500m altitude. A male *Rhyothemis plutonia* was seen at a weed-choked marshy pond – confirming that this species is quite widespread on the island.

Further up, in forest, *Drepanosticta elongata*, *D. zhoui* and *Agriomorpha fusca* were all encountered, and, at a rocky forest stream, *Aristocypha aino* was present. This species was previously misidentified as the regionally widespread *Rhinocypha (Aristocypha) fenestrella*. It is in fact a new endemic species for Hainan.

Figure 24. *Vestalaria miao* at Hui Shan

In the mid-afternoon, in a rubber plantation at 180m, a single *Vestalaria miao* (Wilson & Reels 2001) (Fig. 24) was photographed and vouchered. This species was formerly considered endemic to Hainan, but has since been discovered in Vietnam (Matti Hämäläinen, pers. comm.).

19 June

The following day we took a boat across the large Hui Shan reservoir to conduct field work at a large boulder stream, moving up into forest. Many of the same species as encountered on 18 June were observed, with the addition of *Zygonyx iris* and the endemic *Pseudolestes mirabilis* and *Leptogomphus celebratus*, among others. *Vestalaria miao* was quite common in forest beside the boulder stream.

20 June

The team drove to Xiaonanning in the Wanning area, and spent a day walking through mixed shrubland and secondary forest, drained by small streams, at an elevation of 150-400m. A good range of species was encountered, including several endemics.

The first sampling location of note was a small stream at 150m which was rich in endemic zygopterans – *Burmargiolestes xinglongensis*, *Pseudolestes mirabilis*, *Coeliccia scutellum hainanense*, *Drepanosticta elongata*, *D. zhoui* and *Euphaea ornata* were all present, as was *Vestalaria miao*.

Higher up, in better forest, *Chlorogomphus usudai* was encountered at another small stream. Two males were observed (and vouchered) making slow patrolling flights up and down the stream course, at a height of 0.5m to 1m above the stream. *C. usudai* seems to be much commoner than *Chlorogomphus gracilis* Wilson & Reels 2001, the only other member of the genus in Hainan (to which it is endemic), which was not encountered in any of the 2007-2008 field trips.

Figure 25. *Indocnemis orang kempi* at Xiaonanning – a new record for Hainan

Some way up from this stream, at about 350m, I came across a very large female platycnemidid which I vouchered and subsequently identified as *Indocnemis orang kempi* Förster in Laidlaw 1907 (Fig. 25) – a new record for Hainan. The individual was several hundred metres from the nearest stream. This discovery was followed by me vouchering two males of the same species at 400m, again several hundred metres from the nearest stream, one of which was found perched above a water-filled tree-hole (Fig. 26), which begs the question as to whether this species is a tree-hole breeder. The tree-hole was being guarded by a male *Lyriothemis tricolor* Ris 1919 (Fig. 27). A female of this known tree-hole breeder was also photographed and vouchered in forest at 250m.

Figure 26. Water-filled tree-hole at which male *Indocnemis orang kempi* and *Lyriothemis tricolor* were photographed and vouchered

A small forest stream at 400m was also productive, with *Philoganga vetusta* Ris 1912, *Agriomorpha fusca*, and the endemics *Sinosticta hainanense* Wilson & Reels 2001 and *Leptogomphus celebratus* all present.

Figure 27. *Lyriothemis tricolor* male at tree-hole

21 June

The team visited a tall shrubland site at Nanling Nature Reserve, and followed a trail from about 300m to 500m. The site was not particularly promising for odonates, but a number of fairly widespread (on Hainan) species were encountered. Probably the most notable record was of numerous *Rhyothemis plutonia* at a small pond in open shrubland at 320m. The species, first discovered on Hainan in May 2007, appears to be widespread in southern and eastern parts of the island (at least), and it is puzzling that it had not previously been recorded on the island.

In the late afternoon we stopped at Qingpilin on the coast, so that I could spend an hour or so searching for *Podolestes pandanus* Wilson & Reels 2001. This interesting and apparently very rare endemic is only known from three males collected among *Pandanus* (coastal screwpine) trees at Qingpilin by Keith Wilson in 1999 (Wilson & Reels, 2001). I found none, unfortunately; either because it was the wrong time of day, or I wasn't looking in the right places.

22 June

We travelled to Jiaxin and walked through a landscape of lowland secondary forest/shrubland, with sandy-bottomed slow-flowing streams, at an altitude of generally less than 50m (one excursion through secondary forest took us to about 150m, and *Leptogomphus celebratus* and *Agriomorpha fusca* were discovered here at a small trickle, but the trail died out and had to be abandoned).

Rhinagrion hainanense (but not, unfortunately, *Podolestes pandanus*) was present in dense *Pandanus* vegetation at a swampy stream backwater, making this the third known Hainan site for this species. *Heliocypha biforata* was the only chlorocyphid present, which was not surprising given the habitat.

Figure 28. Team leader Bosco Chan recovering after ascent of steep gorge at Liulianling

23 June

The final day of this field trip took us to Liulianling, also in the Wanning area, where we walked, in debilitating heat, through rice paddies at 50m, before scrambling up a steep rocky gorge, to a small reservoir at 300m. The reserve wardens who guided us on this particular route had warned us that the trail

was not good. In fact, it was non-existent and on several occasions we found ourselves dangerously exposed on steep rock walls as we climbed up. From an odonatologist's viewpoint, these difficulties were only just worth the considerable effort. The most useful records were of *Anax immaculifrons* Rambur 1842, and *Megalogomphus sommeri*, individual males of which were netted (the latter by lepidopterist Philip Lo), photographed and vouchered.

Ganzaling, southern Hainan, 30 June 2007

This was essentially a private visit, which I made during a family holiday at Sanya, in order to try to find the elusive megapodagrionid seen at Ganzaling on 23 May. Unfortunately, the weather was dreadful – heavy rain for most of the day – and I saw very few species. I managed to photograph a female *Copera ciliata* (Selys, 1863), and also caught a tantalizing glimpse of what appeared to be a female *Indocnemis orang kempi* – which would have represented the second site record for this species in Hainan, if I had managed to voucher it. Unfortunately it had disappeared by the time I had managed to manoeuvre my soaking net into position.

Wuzhishan, central Hainan, 16-23 April 2008

This field trip was led by Michael Lau of KFBG, with Philip Lo and a Taiwanese lepidopterist, Hui Wing-leung, and involved surveys in a number of locations in the large Wuzhishan National Nature Reserve. We arrived at our first stopping point, a reserve warden station at Xi Jie, late in the afternoon on 15 April, having driven from Haikou.

16 April

We spent a day walking through shrubland and good secondary forest from 400m to 700m, drained by small streams and seeps. In spite of the abundance of leeches, it was an enjoyable and productive day.

Large numbers of *Chlorogomphus usudai* were seen soaring above the forest, while the open shrubby areas were good locations for three common and widespread species of *Orthetrum* and also *Tramea virginia* (Rambur 1842). Once inside the forest, a good range of forest-dependent species was found, with highlights including all four Hainan platystictid species (*Drepanosticta elongata*, *D. zhoui*, *Sinosticta hainanense* and *S. sylvatica*), *Aristocypha aino*, *Burmargiolestes xinglongensis*, *Pseudolestes mirabilis* and *Leptogomphus celebratus*, all of which are endemic.

Most remarkably, a small boggy area at 600m within the secondary forest yielded two males of the highly elusive forest libellulid, *Hylaeothemis clementia* Ris, 1909 (Fig. 29). This species was first collected in Hainan by Bosco Chan (Fig. 28) of KFBG, during a visit to upland primary forest at Yinggeling in May 2005. Bosco had passed the specimen to me but, having no reference material to hand, I could not be sure whether the single, poorly preserved male specimen was *H. clementia* (which was the most obvious conclusion, since *H. clementia* is the only member of the genus found in Indochina) or another, possibly new, species of *Hylaeothemis*.

In 2007, however, whilst conducting a dragonfly survey with Rory Dow in Sarawak, Malaysia, we came across a boggy site in secondary woodland where several *H. clementia* were seen, photographed and vouchered. The Sarawak specimens were slightly smaller than the Hainan material, and extensively marked with pale blue, in contrast to the Hainan specimens which are marked less extensively, with vibrant yellow (but this may possibly fade to blue in older specimens). This led me to wonder if the Hainan material might not be *H. clementia*. The taxon, which represented a new genus for China, was unfortunately deleted from the Hainan checklist – not my suggestion – published in *Agrion* by Wilson, Reels & Xu (2008).

After consulting Asahina & Kitagawa (1992), examining the *Hylaeothemis* material at the BMNH in 2008, and ruling out the two Indian species, I obtained SEM images of genitalia of the Hainan and Sarawak material from Dirk Gassmann at the Leiden Museum. I found the evidence pointing towards the Hainan material being *H. clementia*, which is the only *Hylaeothemis* species known from Indochina and Sundaland, in spite of the superficial differences with Sarawak *H. clementia*. Interestingly, Asahina & Kitagawa (1992) figured *H. clementia* from northern Thailand with markings intermediate between the Hainan material and the Sarawak material. In the meantime, *H. clementia* was reported from Yunnan in China by Wang, Huang & Wang (2009), thus removing Hainan's status as the first Chinese location reported for the genus.

Figure 29. *Hylaeothemis clementia* at Wuzhishan – a new record for Hainan, first collected in 2005

At the end of the day I counted my leech bites and discovered I had 18, which is a personal record for me. They are the bane of fieldwork in forested uplands of Hainan.

17 April

After spending a second night at the ranger station at Xi Jie, the team walked a different route (also leech-infested), mainly through good forest. A notable finding on this day was *Rhipidolestes cyanoflavus* Wilson 2000 (Fig. 32) – the second record of this species from Hainan; the first specimen having been collected by Michael Lau in Yinggeling in 2005.

Figure 30. *Sinosticta hainanense* at Wuzhishan

Figure 31. *Sinosticta sylvatica* at Wuzhishan

Figure 32. *Rhipidolestes cyanoflavus* at Wuzhishan

After arriving back at the ranger station in the afternoon, we found our support vehicle had returned to evacuate us back to the town of Wuzhishan, due to an approaching typhoon. We spent the following day holed up in the town as the typhoon blew through.

19 April

The team drove to the main resort in Wuzhishan National Nature Reserve, located at 700m on the slope of Mount Wuzhi (Hainan's highest peak). I did not have to walk far from here to encounter a variety of habitats supporting a large number of odonate species, starting with a male *Tetrathemis platyptera* Selys 1878 in my hotel room, and a male *Indocnemis orang kempi* in the resort grounds – the second confirmed locality in Hainan for this species.

A small shallow weedy pond in the resort grounds supported large numbers of *Ceriagrion fallax* Ris 1914, a species which I had not previously photographed. At a small boulder/gravel stream just outside the resort I found many of the usual hill stream species. Notably, a female *Nihonogomphus thomassoni* was seen ovipositing over a shallow sandy riffle section. *Zygonyx takasago* was patrolling the stream course.

Later, at a larger, fast-flowing boulder stream, a female *Macromia moorei* was observed ovipositing over a shallow gravel section between large boulders, at 1700h. *Pseudolestes mirabilis* was plentiful on this stream and I spent an hour making observations of a pair of males holding adjacent territories and engaging in agonistic flights. These observations were published in *Agrion* (Reels, 2008); I regret that I forgot to acknowledge IDF in this short article. As dusk fell, males and females of *Periaeschna magdalena* Martin 1909 began flying frenziedly over the river.

20 April

We drove to the Shui Man River, a broad, open aspect stream at about 400m, with a gentle gradient, boulders, large cobbles and sand, surrounded by agricultural land and shrubby vegetation, grading into forest at higher elevations. A number of widespread zygopterans were present, including two species of *Pseudagrion* (*P. pruinosum* Schmidt 1934 and *P. rubriceps* Selys 1876), two of *Copera* (*C. ciliata* and *C. marginipes*) and two of *Prodasineura* (*P. autumnalis* (Fraser 1922) and *P. croconota* (Ris, 1916)). The calopterygids *Neurobasis chinensis* and *Matrona basilaris* were also present in good numbers. Higher up in the forest, a single *Sinosticta sylvatica* (Fig. 31) was observed.

Figure 33. *Onychothemis testaceum* at Shui Man River, Wuzhishan

However, the anisopteran fauna was more striking. More than 50 male *Gomphidia kruegeri* were counted holding territory along the stream course, and at least 10 individuals of the *Macromia*-like libellulid *Onychothemis testaceum* Martin 1904 (Fig. 33). *Nihonogomphus thomassoni* and *Zygonyx iris* were common, while *Asiagomphus hainanensis* (Chao 1953), *Stylogomphus chunliuae* Chao 1954 and *Tetracanthagyna waterhousei* McLachlan 1898 were also recorded.

We returned to the main Wuzhishan resort in the evening.

21 April

The morning was spent conducting fieldwork in the vicinity of the Wuzhishan resort. I headed for the large boulder stream and climbed up it to an elevation of about 850m, hoping to find *Bayadera kirbyi* Wilson & Reels, of which the type series was collected by me, on this same stream, in 1999. I was unsuccessful in this venture, but still managed to make some useful records, including *Aristocypha aino*, *Burmargiolestes xinglongensis*, *Agriomorpha fusca* and *Sinosticta hainanense* (Fig. 30). Philip Lo also netted *Chlorogomphus usudai* and *Philoganga vetusta* from lower down the mountain.

In the afternoon we drove to another part of Wuzhishan reserve, and set up camp in the concrete shell of a house that was under construction – one of the strangest camp sites I have ever slept in. This was home for the next three nights, in the care of four boisterous young reserve wardens.

22 April

The team walked out from the half-built house to the nearby Jie Zu village, where we walked up a broad boulder stream in open country, from 400m to about 520m. The odonate fauna was broadly similar to that recorded along the Shui Man River on 20 June, with notable additions such as *Merogomphus paviei* and *Chlorogomphus usudai* (a female of which was observed flying down to the river to drink, affording excellent views of this spectacular dragonfly). A trail through woodland beside the stream also yielded *Vestalaria miao* and *Leptogomphus celebratus*.

The most remarkable sight of the day was seen in late afternoon, on a small cobble stream running through agricultural land adjacent to the camp site. *Neurobasis chinensis* was super-abundant along a 100m stretch of this stream, with an adult perched on almost every boulder.

23 April

The team travelled a short distance to Luo Mi, where another large stream, structurally very similar to that of the preceding day, was surveyed from 450m to 500m. More or less the same assemblage of species was encountered.

It was a good day for oviposition observations. I was able to watch a female *Euphaea ornata* submerging herself in a small side stream, presumably to oviposit beneath a leaf pack. This observation, together with a similar one from Ganzaling, was described in detail in a brief paper published in *Agrion* (Reels & Wilson, 2009), and yet again I must apologize to IDF for neglecting to acknowledge its contribution.

I also saw a female *Nihonogomphus thomassoni* (Fig. 34) releasing eggs in flight over a shallow, open sandy section of the main stream, and an un-identified *Macromia* female, which somehow evaded capture (I was having a 'bad net day'), ovipositing over a shallow pool.

Figure 34. *Nihonogomphus thomassoni* female in oviposition flight at Luo Mi stream

In the evening, the four young wardens invited us to partake of their home-

made fermented rice wine, which they produced in two large plastic flagons. This being the final night of the field trip, we readily obliged, with predictable results. I fell off my chair twice. Other team members were more powerfully affected.

Wuzhishan and Wanning area, central and southeast Hainan, 8-14 August 2008

I arrived at Haikou international airport at 1410h on 7 August, and was met by Lu Gang. We took a taxi into Haikou and waited for the long-distance bus to Wuzhishan. This took 3hrs 40mins, and we got to Wuzhishan town at 1820h. Here we were met by Bosco Chan, Lee Kwok Shing, Philip Lo and Director Zhang of Wuzhishan. By the time we left for the resort (2100h) I was feeling ill from a cold. The weather was not good – a typhoon had just breezed through and we were suffering the rain in its wake.

Philip Lo passed me a specimen of *M. sommeri* ♂ which I believe he had collected on 5 August, at Wuzhishan (the large Shui Man river).

8 August

The day was spent at the main Wuzhishan resort. No proper field work was conducted today due to bad weather. I saw *Agriocnemis femina* (Lieftinck 1962) at the small pond within the resort complex, and also *Coeliccia cyanomelas* at the boulder stream at ca 650m, below the resort. Philip Lo netted an *Onychargia atrocyana* Selys 1865 female which unfortunately flew away when I stupidly tried to photograph it.

Olympic fever had gripped the nation, and everywhere around the resort I was treated to the sound of the Chinese national anthem, as television channels endlessly repeated screenings of the medal award ceremonies, dominated by China's finest.

9 August

The day was overcast, with rain in the early afternoon. I was still feeling weak from my cold, so I had a gentle morning's fieldwork at the stream below the resort. There is a 200m stretch which is gentle and with sandy substrate. About 100m of this is open aspect.

On a forest ride down to the stream, at about 0920h, I saw and collected a

Lyriothemis tricolor male, perching high up. *Pseudolestes mirabilis*, *Drepanosticta zhoui* and *Euphaea ornata* were also seen along this track nearer to the stream, plus a high-perching gomphid which I could neither catch nor identify.

At the flat, open stream ca 650m (which also had a couple of buffalo ponds beside it in a clearing), there were a number of fairly widespread species, including *Agriocnemis femina*, *Orthetrum pruinosum* (Rambur 1842), *O. glaucum* (Brauer 1865), *Trithemis festiva*, *Neurobasis chinensis*, *Matrona basilaris* and *Euphaea ornata*. Also, *Zygonyx takasago* was quite numerous. Two more gomphids were seen perching frustratingly high up on the branches of a tree in the clearing – these could not be confidently identified. A male *Pseudagrion pruinosum* was seen flying along edge of vegetation on the open aspect sandy stretch of the stream.

By 1000h, I was enjoying the sight of several males of *Lamelligomphus camelus* (Martin 1904) (Fig. 35) actively patrolling short stretches along the open aspect sandy-bottomed stretch of the stream (about 1 – 2m wide). A single female was observed forming a tandem with one of the males and flying off.

Figure 35. *Lamelligomphus camelus* male, patrolling sandy-bottomed stream at Wuzhishan

At ca 1100h I went to the nearby boulder stream and spent about 45 minutes here, but there was little activity. *Euphaea ornata*, *Coeliccia cyanomelas*, *Pseudolestes mirabilis* and *Matrona basilaris* were seen.

Back on the sandy stream, I explored the closed canopy section in deteriorating weather, and added *Vestalaria miao* to the day's list. On an open track leading back to the road, at 1400h, I saw *Pantala flavescens* (Fabricius, 1798), flying in light rain.

10 August

We drove eastwards, out of Wuzhishan, and stopped to conduct field work at a large, broad, open aspect stream, ca 10m wide, with small boulders and sandy substrate, at 450m. I did not catch the name of the location, but it was at N18°45.905' E109°35.559'.

The weather was initially overcast, with drizzle, and few odonates were active. I detached myself from the group to explore the river, where I recorded *Euphaea ornata* at the upper reaches of the section. *Neurobasis chinensis* was common, while *Pseudagrion pruinosum*, *Copera marginipes*, *Potamarcha congener* (Rambur, 1842) (on the road beside the river), *Pantala flavescens*, and *Heliocypha perforata* were observed. A species of *Zygonyx* was also present but was not close enough to capture or identify.

Heavy rain fell from 1130h onwards, forcing me to abandon fieldwork. I took shelter in a Miao village, where I was given bananas and sweet corn by a friendly shop-owner. Half of the village population, seemingly, had assembled in the shop to watch the triumphal coverage of the Olympics on the shop-keeper's large television set. Eventually the rest of the team drove up and we returned to the town of Wuzhishan.

11 August

There was continuing heavy rain throughout the night and during the day. No fieldwork was attempted. We drove south to the town of Baoting, passing very swollen rivers and flooded areas.

12 August

The weather was improving; this day was overcast with sunny periods. Bosco Chan, Lee Kwok Shing and I drove to 'Shi Dai' river, near Diaoluoshan, arriving at 1115h. The survey location was unnamed but located at N18°46.467'

E109°44.289', at an altitude of 200m. It was a 10m wide, open aspect boulder river with shallow gradient, fast-flowing due to the previous heavy rain, and only two species – *Potamarcha congener* and *Zygonyx takasago* – were observed.

We drove a short distance upriver, to N18°46.442' E109°44.729', at 215m. Here we found a shallow, 5m wide tributary stream with cobbles, boulders and sand, and a partially closed canopy. This site was much more productive, wih *Merogomphus paviei*, *Lamelligomphus hainanensis* and *Macromia calliope* all present, among others.

The very attractive small libellulid *Palpopleura sexmaculata* (Fabricius 1787) (Fig. 36) was plentiful in an area of small flooded marshy fields. In the late afternoon we drove on to the city of Wanning in southeast Hainan.

Figure 36. *Palpopleura sexmaculata* female at Shi Dai

13 August

The three of us drove out to a lowland stream near Tongtielin, primarily so that Bosco Chan could conduct fish survey work. The 5m wide stream was in open country, and had a gentle gradient, with sandy/cobble bottom

substrate. Short *Pandanus* plants and thorny scrub lined the banks, with small isolated woodland patches.

Heliocypha biforata was present, particularly in the shady, sluggish sections of the stream, while *H. perforata* predominated in faster flowing reaches. A range of typical widespread lowland stream species was also present, with the less frequently encountered *Onychothemis testaceum*. In addition, I twice saw a large, colourful *Macromia*, probably *M. katae* Wilson 1993, fly over the stream course, but on both occasions it was too far away to catch, and I was unable to confirm the species.

To add to my frustration, I saw and photographed a male *Gynacantha*, but failed to voucher it as it flew deep into a woodland patch. I did, however, photograph and collect a male *Zyxomma petiolatum* Rambur 1842 (Fig. 37) roosting in another small woodland patch. This represented the first record of this species for Hainan.

Figure 37. *Zyxomma petiolatum* at Tongtielin – a new record for Hainan

The stream was very full and fast-flowing from the heavy rain of a couple of

days ago – this probably had a detrimental effect on the presence of various odonate species, particularly gomphids.

14 August

This was my final day of fieldwork for the Hainan dragonfly guide. We drove from Wanning to Tian Zai stream, near Qingpilin, in hot sunny weather. The stream was broad and with an open aspect, with surrounding shrubland, at 20m. Substrate was cobble/sand and the stream had a gentle gradient with some riffle sections. The species recorded were basically the same as those seen the previous day, with no surprises.

In the afternoon, we returned to the Jiaxin – Tongtielin site visited on 22.06.07, where *Rhinagrion hainanense* had been recorded. I searched in suitable habitat but found no sign of this or *Podolestes pandanus*. In fact, it was a rather disappointing day.

Remarks

The four surveys undertaken with the aid of the IDF grant considerably expanded the current knowledge of distribution and composition of the odonate fauna of Hainan. However, much remains to be done. This is very well demonstrated by the Guangdong-based dragonfly student Zhang Haomiao, who has made a number of focused field trips to Hainan in the past two years, and added several species (some through larval rearing) which I have missed. It seems highly likely that a figure in excess of 170 species will eventually be reached for the island. It is unfortunate that the recent surveys have not included western and northern parts of the island, which means that the species distribution information I have been able to provide in the text of the field guide is very limited. I can only hope that further opportunities will arise for me to continue my fieldwork in the future.

Acknowledgements

Conducting fieldwork of this kind in Hainan is not easy, particularly for non-Chinese. Much depends on gaining permission and logistical support from the authorities, which organizations such as KFBG work hard to achieve. I could not have done this work without the dedicated support of KFBG, and the active encouragement of the official Hainan Wildlife Conservation Centre. I am profoundly indebted to IDF for the grant which enabled me to fly to the island four times.

On an individual basis, I take this opportunity to thank Rory Dow, for the loan of Sarawak *Hylaeothemis clementia* material; Dirk Gassmann for his SEM work (for which he waived his fee) on *Hylaeothemis* specimens; Jan van Tol for his efforts to acquire Indian *Hylaeothemis* material from BMNH, and Vincent Kalkman for sending me a copy of the original description of *H. clementia*.

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Appendix I

Appendix 1.1. Yinggeling and Ganzaling dragonfly survey, 18-26 May 2007. Checklist of species recorded. (1) Nankai River, 18.5.07 & 21.5.07; (2) Nankai & Namkang Rivers, 19.5.07; (3) Upland forest above Namkang River, 20.5.07; (4) Nan Yim 24.5.07; (5) Qing-jie, 25.5.07; (6) Yinggezhuei, 26.5.07; (7) Ganzaling, 22.5.07 & 23.5.07

Species / Locality	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Matrona basilaris Selys, 1853	+	+	+			+	
Mnais mneme Ris, 1916			+		+		+
Neurobasis chinensis (Linnaeus, 1758)	+	+		+		+	
Heliocypha p. perforata (Percheron, 1835)	+	+		+		+	
Heliocypha b. biforata Selys, 1859							+
Euphaea ornata (Campion, 1924)	+	+		+	+	+	+
Dysphaea basitincta Martin, 1904	+			+			
Dysphaea gloriosa Fraser, 1938	+						
Lestes praemorsus Selys, 1862						+	
Agriomorpha fusca May, 1933			+		+		
Burmargiolestes xinglongensis Wilson & Reels, 2001					+		
Pseudolestes mirabilis Kirby, 1900			+		+		+
Agriocnemis femina (Lieftinck, 1962)						+	
Paracercion calamorum (Fraser, 1919)							+
Ceriagrion auranticum (Asahina, 1967)							+
Ceriagrion indochinense Asahina, 1967		+					
Onychargia atrocyana Selys, 1865							+
Pseudagrion microcephalum (Rambur, 1842)							+
Pseudagrion rubriceps Selys, 1876	+	+					
Coeliccia scutellum hainanense Laidlaw, 1932	+	+					+
Coeliccia cyanomelas Ris, 1912			+		+		
Copera marginipes (Rambur, 1842)		+					
Copera ciliata (Selys, 1863)							+
Drepanosticta zhoui Wilson & Reels, 2001			+	+	+		+
Drepanosticta elongata Wilson & Reels, 2001		+			+	+	

Sinosticta sylvatica Yu, 2009					+		
Prodasineura autumnalis (Fraser, 1922)	+			+			+
Chlorogomphus usudai Ishida, 1996			+		+		
Anax guttatus (Burmeister, 1839)	+						
Polycanthagyna erythromelas (McLachlan, 1896)		+					
Asiagomphus hainanensis (Chao, 1953)						+	
Burmagomphus vermicularis (Martin, 1904)	+						
Merogomphus paviei (Martin, 1904)						+	
Leptogomphus celebratus Chao, 1982							+
Paragomphus pardalinus Needham, 1942	+						
Nihonogomphus thomassoni (Kirby, 1900)	+						
Megalogomphus sommeri (Selys, 1854)						+	
Ictinogomphus pertinax (Hagen, 1854)							+
Sinictinogomphus clavatus (Fabricius, 1775)							+
Gomphidia k. kruegeri Martin, 1904	+						
Epophthalmia elegans (Brauer, 1865)							+
Macromia clio Ris, 1916	+						
Macromia moorei Laidlaw, 1928	+				+		
Macromidia rapida Martin, 1907	+						
Nannophyopsis clara (Needham, 1930)							+
Tetrathemis platyptera Selys, 1878	+						
Cratilla lineata (Brauer, 1868)		+					
Pseudothemis zonata (Burmeister, 1838)				+			
Orthetrum chrysis (Selys, 1891)				+			+
Orthetrun glaucum (Brauer, 1865)				+			
Orthetrum pruinosum neglectum (Rambur, 1842)	+						
Orthetrum s. sabina (Drury, 1770)							+
Orthetrum t. triangulare (Selys, 1878)	+	+					
Potamarcha congener (Rambur, 1842)	+						
Brachythemis contaminata (Fabricius 1793)	+						
Neurothemis fulvia (Drury, 1773)	+						+
Neurothemis tullia (Drury, 1773)							+

Trithemis aurora (Burmeister, 1839)	+					+	
Trithemis festiva (Rambur, 1842)	+					+	
Pantala flavescens (Fabricius, 1798)							+
Rhyothemis obsolescens Kirby, 1889							+
Rhyothemis plutonia Selys, 1883				+			+
Rhyothemis variegata aria (Drury, 1773)							+
Hydrobasileus croceus (Brauer, 1867)							+
Urothemis signata (Rambur, 1842)							+
Zygonyx iris insignis Kirby, 1900	+						
Zygonyx takasago Asahina, 1966				+			

Appendix 1.2. Wanning area dragonfly survey, 17-23 June 2007. Checklist of species recorded. (8) Fan Jia, 17.06.07; (9) Hui Shan Site 1, 18.06.07; (10) Hui Shan Site 2, 19.06.07; (11) Xiaonanning, 20.06.07; (12) Nanling, 21.06.07; (13) Jiaxin – Tongtielin, 22.06.07; (14) Liulianling, 23.06.07

Species / Locality	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Philoganga vetusta Ris, 1912				+			
Mnais mneme Ris, 1916				+			
Vestalaria miao (Wilson & Reels, 2001)		+	+	+			
Neurobasis chinensis (Linnaeus, 1758)	+		+			+	+
Aristocypha aino sp. nov. Hämäläinen, Reels & Zhang, 2008		+	+				
Heliocypha p. perforata (Percheron, 1835)	+		+				
Heliocypha b. biforata Selys, 1859	+					+	
Libellago lineata (Burmeister, 1939)	+						
Euphaea ornata (Campion, 1924)	+		+	+	+		+
Dysphaea basitincta Martin, 1904	+						
Agriomorpha fusca May, 1933	+	+	+	+	+	+	
Burmargiolestes xinglongensis Wilson & Reels, 2001				+			
Pseudolestes mirabilis Kirby, 1900	+		+	+	+		+
Rhinagrion hainanensis Wilson & Reels, 2001	+					+	
Pseudagrion rubriceps Selys, 1876	+				+		+
Pseudagrion pruinosum fraseri Schmidt, 1934							+
Coeliccia scutellum hainanense Laidlaw, 1932	+		+	+	+		+
Copera marginipes (Rambur, 1842)	+		+			+	
Indocnemis orang kempi Förster in Laidlaw, 1907				+			
Drepanosticta zhoui Wilson & Reels, 2001		+	+	+			
Drepanosticta elongata Wilson & Reels, 2001		+	+	+			
Sinosticta hainanense Wilson & Reels, 2001				+			
Prodasineura autumnalis (Fraser, 1922)						+	+
Prodasineura croconata (Ris, 1916)			+	+			
Chlorogomphus usudai Ishida, 1996				+			

Anax guttatus (Burmeister, 1839)							+
Anax immaculifrons Rambur, 1842							+
Polycanthagyna erythromelas (McLachlan, 1896)	+						
Leptogomphus celebratus Chao, 1982			+	+		+	
Megalogomphus sommeri (Selys, 1854)							+
Ictinogomphus pertinax (Hagen, 1854)	+				+		+
Gomphidia k. kruegeri Martin, 1904	+						
Macromia urania Ris, 1916					+		
Idionyx victor Hämäläinen, 1991				+	+	+	
Tetrathemis platyptera Selys, 1878	+						
Lyriothemis tricolor Ris, 1919				+			
Orthetrum chrysis (Selys, 1891)		+					
Orthetrun glaucum (Brauer, 1865)			+		+		
Orthetrum pruinosum neglectum (Rambur, 1842)	+					+	
Orthetrum s. sabina (Drury, 1770)	+				+	+	+
Orthetrum t. triangulare (Selys, 1878)		+					
Potamarcha congener (Rambur, 1842)	+						
Acisoma p. panorpoides Rambur, 1842					+		
Crocothemis servilia (Drury, 1770)	+				+		+
Diplacodes trivialis (Rambur, 1842)					+		
Neurothemis fulvia (Drury, 1773)		+					
Trithemis aurora (Burmeister, 1839)	+		+		+		+
Trithemis festiva (Rambur, 1842)	+		+				
Pantala flavescens (Fabricius, 1798)					+		+
Rhyothemis plutonia Selys, 1883		+			+	+	
Rhyothemis variegata aria (Drury, 1773)							+
Tramea virginia (Rambur, 1842)					+		+
Zygonyx iris insignis Kirby, 1900	+		+			+	+

Appendix 1.3. Wuzhishan dragonfly survey, 16-23 April 2008. Checklist of species recorded. (15) Xi Jie Site 1, 16.04.08; (16) Xi Jie Site 2, 17.04.08; (17) Wuzhishan station site 1, 19.04.08; (18) Shui Man River, 20.04.08; (19) Wuzhishan station site 2, 21.04.08; (20) Jie Zu, 22.04.08; (21) Luo Mi, 23.04.08

Species / Locality	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Philoganga vetusta Ris, 1912	+	+			+		
Matrona basilaris Selys, 1853			+	+	+	+	+
Mnais mneme Ris, 1916			+		+		
Vestalaria miao (Wilson & Reels, 2001)						+	
Neurobasis chinensis (Linnaeus, 1758)	+			+		+	+
Aristocypha aino Hämäläinen, Reels & Zhang, 2008	+				+	+	+
Heliocypha p. perforata (Percheron, 1835)	+		+	+	+	+	+
Euphaea ornata (Campion, 1924)	+		+	+	+	+	+
Agriomorpha fusca May, 1933		+			+		
Burmargiolestes xinglongensis Wilson & Reels, 2001	+	+			+		
Rhipidolestes cyanoflavus Wilson, 2000		+					
Pseudolestes mirabilis Kirby, 1900	+	+	+		+	+	
Agriocnemis lacteola Selys, 1877				+			
Ceriagrion auranticum (Asahina, 1967)			+				
Ceriagrion fallax Ris, 1914			+				
Pseudagrion rubriceps Selys, 1876				+			
Pseudagrion pruinosum fraseri Schmidt, 1934				+			
Coeliccia scutellum hainanense Laidlaw, 1932	+				+	+	
Coeliccia cyanomelas Ris, 1912	+	+			+		
Copera marginipes (Rambur, 1842)	+			+		+	
Copera ciliata (Selys, 1863)		+		+			
Indocnemis orang kempi Förster in Laidlaw, 1907			+				
Drepanosticta zhoui Wilson & Reels, 2001	+						
Drepanosticta elongata Wilson & Reels,	+						

2001							
Sinosticta hainanense Wilson & Reels, 2001	+	+			+		
Sinosticta sylvatica Yu, 2009	+	+		+			
Prodasineura autumnalis (Fraser, 1922)			+	+		+	+
Prodasineura croconata (Ris, 1916)				+		+	
Chlorogomphus usudai Ishida, 1996	+		+		+	+	
Polycanthagyna erythromelas (McLachlan, 1896)			+				
Tetracanthagyna waterhousei McLachlan, 1898				+			+
Periaeschna magdalena Martin, 1909			+				
Asiagomphus hainanensis (Chao, 1953)							+
Heliogomphus scorpio (Ris, 1912)				+			
Merogomphus paviei (Martin, 1904)						+	+
Stylogomphus chunliuae Chao, 1954				+			
Leptogomphus celebratus Chao, 1982	+					+	
Nihonogomphus thomassoni (Kirby, 1900)		+	+	+		+	+
Gomphidia k. kruegeri Martin, 1904			+	+		+	+
Macromia moorei Laidlaw, 1928			+		+		
Idionyx victor Hämäläinen, 1991							+
Tetrathemis platyptera Selys, 1878			+			+	
Hylaeothemis clementia Ris, 1909	+						
Orthetrun glaucum (Brauer, 1865)						+	+
Orthetrum pruinosum neglectum (Rambur, 1842)	+		+		+	+	+
Orthetrum s. sabina (Drury, 1770)	+					+	+
Orthetrum t. triangulare (Selys, 1878)	+				+		
Potamarcha congener (Rambur, 1842)						+	+
Acisoma p. panorpoides Rambur, 1842		+					
Crocothemis servilia (Drury, 1770)						+	
Diplacodes trivialis (Rambur, 1842)						+	
Neurothemis fulvia (Drury, 1773)		+	+		+		

Trithemis aurora (Burmeister, 1839)		+					+
Trithemis festiva (Rambur, 1842)	+		+			+	+
Palpopleura sexmaculata (Fabricius, 1787)		+				+	
Onychothemis testaceum Martin, 1904				+		+	+
Tramea virginia (Rambur, 1842)	+						
Zygonyx iris insignis Kirby, 1900				+		+	+
Zygonyx takasago Asahina, 1966			+				

Appendix 1.4. Wuzhishan and Wanning area dragonfly survey, 8-14 August 2008. Check-list of species recorded. (22) Wuzhishan station site 1, 08.08.08 & 09.08.08; (23) River east of Wuzhishan, 10.08.08; (24) Streams east of Wuzhishan, 12.08.08; (25) Lowland stream near Tongtielin, 13.08.08; (26) Tian Zai stream near Qingpilin, 14.08.08

Species / Locality	(22)	(23)	(24)	(25)	(26)
Matrona basilaris Selys, 1853	+				
Vestalaria miao (Wilson & Reels, 2001)	+				
Neurobasis chinensis (Linnaeus, 1758)	+	+	+	+	+
Heliocypha p. perforata (Percheron, 1835)		+	+	+	
Heliocypha b. biforata Selys, 1859				+	+
Euphaea ornata (Campion, 1924)	+	+	+	+	+
Pseudolestes mirabilis Kirby, 1900	+				
Agriocnemis femina (Lieftinck, 1962)	+				
Onychargia atrocyana Selys, 1865	+				
Pseudagrion rubriceps Selys, 1876				+	+
Pseudagrion pruinosum fraseri Schmidt, 1934		+		+	
Coeliccia cyanomelas Ris, 1912	+				
Copera marginipes (Rambur, 1842)		+		+	+
Drepanosticta zhoui Wilson & Reels, 2001	+				
Prodasineura autumnalis (Fraser, 1922)				+	+
Merogomphus paviei (Martin, 1904)			+		
Lamelligomphus camelus (Martin, 1904)	+				
Lamelligomphus hainanensis Chao, 1954			+		
Macromia calliope Ris, 1916			+		
Lyriothemis tricolor Ris, 1919	+				
Orthetrun glaucum (Brauer, 1865)	+				
Orthetrum pruinosum neglectum (Rambur, 1842)	+				
Orthetrum s. sabina (Drury, 1770)				+	+
Potamarcha congener (Rambur, 1842)		+	+	+	+
Neurothemis fulvia (Drury, 1773)			+		
Trithemis aurora (Burmeister, 1839)				+	
Trithemis festiva (Rambur, 1842)	+				

Palpopleura sexmaculata (Fabricius, 1787)			+		
Pantala flavescens (Fabricius, 1798)	+	+			
Onychothemis testaceum Martin, 1904				+	+
Tramea virginia (Rambur, 1842)				+	
Zygonyx takasago Asahina, 1966	+		+		+
Zyxomma petiolatum Rambur, 1842				+	

Appendix 2

Table 2. Checklist of Odonata of Hainan (February 2010) (* = endemic to Hainan)

Zygoptera

Philogangidae

1. *Philoganga robusta* Navás, 1936
2. *Philoganga vetusta* Ris, 1912

Calopterygidae

3. *Atrocalopteryx melli* (Ris, 1912)
4. *Matrona basilaris basilaris* Selys, 1853
5. *Mnais mneme* Ris, 1916
6. *Neurobasis chinensis* (Linnaeus, 1758)
7. *Vestalaria miao* (Wilson & Reels, 2001)

Chlorocyphidae

8. *Aristocypha aino* Hämäläinen, Reels & Zhang, 2008*
9. *Libellago lineata* (Burmeister, 1939)
10. *Heliocypha biforata biforata* (Selys, 1859)
11. *Heliocypha perforata perforata* (Percheron, 1835)
12. *Rhinocypha huai* (Zhou & Zhou, 2006)*

Euphaeidae

13. *Bayadera kirbyi* Wilson & Reels, 2001*
14. *Dysphaea basitincta* Martin, 1904
15. *Dysphaea gloriosa* Fraser, 1938
16. *Euphaea ornata* (Campion, 1924)*

Lestidae

17. *Lestes concinnus* Hagen in Selys, 1892
18. *Lestes praemorsus* Selys, 1862
19. *Orolestes selysi* McLachlan, 1895

Synlestidae

20. *Sinolestes editus* Needham, 1930

Megapodagrionidae

21. *Agriomorpha fusca* May, 1933
22. *Burmargiolestes xinglongensis* Wilson & Reels, 2001*
23. *Philosina alba* Wilson, 1999
24. *Podolestes pandanus* Wilson & Reels, 2001*
25. *Rhinagrion hainanense* Wilson & Reels, 2001
26. *Rhipidolestes cyanoflavus* Wilson, 2000

Pseudolestidae

27. *Pseudolestes mirabilis* Kirby, 1900*

Coenagrionidae

28. *Aciagrion tillyardi* Laidlaw, 1919

29. *Aciagrion* sp. cf. *A. migratum*
30. *Agriocnemis femina oryzae* (Lieftinck, 1962)
31. *Agriocnemis lacteola* Selys, 1877
32. *Agriocnemis pygmaea* (Rambur, 1842)
33. *Ceriagrion auranticum ryukyuanum* (Asahina, 1967)
34. *Ceriagrion fallax* Ris, 1914
35. *Ceriagrion indochinense* Asahina, 1967
36. *Ischnura aurora* Brauer, 1865
37. *Ischnura senegalensis* (Rambur, 1842)
38. *Mortonagrion* sp.
39. *Onychargia atrocyana* (Selys, 1865)
40. *Paracercion calamorum dyeri* (Fraser, 1919)
41. *Pseudagrion australasiae* Selys, 1876
42. *Pseudagrion microcephalum* (Rambur, 1842)
43. *Pseudagrion pruinosum fraseri* Schmidt, 1934
44. *Pseudagrion rubriceps* Selys, 1876

Platycnemididae

45. *Calicnemia eximia* (Selys, 1863)
46. *Coeliccia cyanomelas* Ris, 1912
47. *Coeliccia scutellum hainanense* Laidlaw, 1932
48. *Copera ciliata* (Selys, 1863)
49. *Copera marginipes* (Rambur, 1842)
50. *Indocnemis orang* Förster in Laidlaw, 1907

Platystictidae

51. *Drepanosticta elongata* Wilson & Reels, 2001*
52. *Drepanosticta zhoui* Wilson & Reels, 2001*
53. *Sinosticta hainanense* Wilson & Reels, 2001*
54. *Sinosticta sylvatica* Yu, 2009*

Protoneuridae

55. *Prodasineura autumnalis* (Fraser, 1922)
56. *Prodasineura croconata* (Ris, 1916)

Anisoptera

Aeshnidae

57. *Anaciaeschna jaspidea* (Burmeister, 1839)
58. *Anax guttatus* (Burmeister, 1839)
59. *Anax immaculifrons* Rambur, 1842
60. *Boyeria karubei* Yokoi, 2002
61. *Cephalaeschna* sp.
62. *Gynacantha bayadera* Selys, 1891
63. *Gynacantha* sp. cf. *G. ryukyuensis*
64. *Gynacantha saltatrix* Martin, 1909
65. *Gynacantha subinterrupta* Rambur, 1842
66. *Oligoaeschna petalura* Lieftinck, 1968*
67. *Periaeschna magdalena* Martin, 1909

68. *Planaeschna celia* Wilson & Reels, 2001*
69. *Polycanthagyna erythromelas* (McLachlan, 1896)
70. *Polycanthagyna ornithocephala* (McLachlan, 1896)
71. *Sarasaeschna niisatoi* Karube, 1998
72. *Sarasaeschna sabre* (Wilson & Reels, 2001)*
73. *Tetracanthagyna waterhousei* McLachlan, 1898

Gomphidae

74. *Amphigomphus hansoni* Chao, 1954
75. *Anisogomphus koxingai* Chao, 1954
76. *Anisogomphus wuzhishanus* Chao, 1982*
77. *Asiagomphus hainanensis* (Chao, 1953)
78. *Asiagomphus septimus* Needham, 1930
79. *Burmagomphus vermicularis* (Martin, 1904)
80. *Fukienogomphus prometheus* Lieftinck, 1939.
81. *Gomphidia abotti abbotti* Williamson, 1907
82. *Gomphidia kruegeri kruegeri* Martin, 1904
83. *Heliogomphus retroflexus* (Ris, 1912)
84. *Heliogomphus scorpio* (Ris, 1912)
85. *Ictinogomphus pertinax* (Hagen in Selys, 1854)
86. *Labrogomphus torvus* Needham 1931
87. *Lamelligomphus camelus* (Martin, 1904)
88. *Lamelligomphus hainanensis* Chao, 1954
89. *Leptogomphus celebratus* Chao, 1982*
90. *Megalogomphus sommeri* (Selys, 1854)
91. *Merogomphus paviei* Martin, 1904
92. *Nihonogomphus thomassoni* (Kirby, 1900)
93. *Nychogomphus flavicaudus* Chao, 1982*
94. *Orientogomphus armatus* Chao et Xu, 1987
95. *Paragomphus hoffmanni* Needham, 1931*
96. *Paragomphus pardalinus* Needham, 1942
97. *Paragomphus wuzhishanensis* Liu, 1988*
98. *Phaenandrogomphus tonkinicus* (Fraser, 1926)
99. *Sieboldius alexanderi* (Chao, 1955)
100. *Sinictinogomphus clavatus* (Fabricius, 1775)
101. *Stylogomphus chunliuae* Chao, 1954
102. *Stylurus amicus* (Needham, 1930)
103. *Stylurus erectocornis* Liu & Chao, 1990
104. *Trigomphus hainanensis* Zhang & Tong, 2009*

Chlorogomphidae

105. *Chlorogomphus gracilis* Wilson & Reels, 2001*
106. *Chlorogomphus usudai* Ishida, 1996*

Cordulegastridae

107. *Anotogaster* sp.

Corduliidae

108. *Epophthalmia elegans* (Brauer, 1865)

109. *Idionyx victor* Hämäläinen, 1991
110. *Macromia berlandi* Lieftinck, 1941
111. *Macromia calliope* Ris, 1916
112. *Macromia clio* Ris, 1916
113. *Macromia katae* Wilson, 1993
114. *Macromia urania* Ris, 1916
115. *Macromia* sp. cf. *M. icterica* Lieftinck, 1929
116. *Macromidia rapida* Martin, 1907

Libellulidae

117. *Acisoma panorpoides panorpoides* Rambur, 1842
118. *Brachydiplax chalybea flavovittata* Ris, 1911
119. *Brachythemis contaminata* (Fabricius, 1793)
120. *Cratilla lineata* (Brauer, 1878)
121. *Crocothemis servilia servilia* (Drury, 1770)
122. *Diplacodes nebulosa* (Fabricius, 1793)
123. *Diplacodes trivialis* (Rambur, 1842)
124. *Hydrobasileus croceus* (Brauer, 1867)
125. *Hylaeothemis clementia* Ris, 1909
126. *Lathrecista asiatica asiatica* (Fabricius, 1798)
127. *Lyriothemis pachygastra* (Selys, 1878)
128. *Lyriothemis tricolor* Ris, 1919
129. *Macrodiplax cora* (Kaup in Brauer, 1867)
130. *Nannophyopsis clara* (Needham, 1930)
131. *Neurothemis fulvia* (Drury, 1773)
132. *Neurothemis intermedia* Rambur, 1842
133. *Neurothemis tullia tullia* (Drury, 1773)
134. *Onychothemis testaceum tonkinensis* Martin, 1904
135. *Orthetrum chrysis* (Selys, 1891)
136. *Orthetrum glaucum* (Brauer, 1865)
137. *Orthetrum luzonicum* (Brauer, 1868)
138. *Orthetrum pruinosum neglectum* (Rambur, 1842)
139. *Orthetrum sabina sabina* (Drury, 1770)
140. *Orthetrum testaceum testaceum* Burmeister, 1839
141. *Orthetrum triangulare triangulare* (Selys, 1878)
142. *Palpopleura sexmaculata sexmaculata* (Fabricius, 1787)
143. *Pantala flavescens* (Fabricius, 1798)
144. *Potamarcha congener* (Rambur, 1842)
145. *Pseudothemis zonata* (Burmeister, 1838)
146. *Rhodothemis rufa* (Rambur, 1842)
147. *Rhyothemis obsolescens* Kirby, 1889
148. *Rhyothemis plutonia* Selys, 1883
149. *Rhyothemis variegata arria* (Drury, 1773)
150. *Sympetrum* sp. cf. *hypomelas*
151. *Tetrathemis platyptera* Selys, 1878
152. *Tholymis tillarga* (Fabricius, 1798)

153. *Tramea transmarina euryale* (Selys, 1878)
154. *Tramea virginia* (Rambur, 1842)
155. *Trithemis aurora* (Burmeister, 1839)
156. *Trithemis festiva* (Rambur, 1842)
157. *Urothemis signata signata* (Rambur, 1842)
158. *Zygonyx iris insignis* Kirby, 1900
159. *Zygonyx takasago* Asahina, 1966
160. *Zyxomma petiolatum* Rambur 1842