

Odonata Diversity With One New Record For Malaysia In The Kenaboi Forest Reserve, Negeri Sembilan, Malaysia

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ABSTRACT Seventy eight species of Odonata were recorded from the Kaneboi Forest Reserve, Negeri Sembilan. Twelve family groups out of 14 available for the Peninsular were represented. The major highlight is the discovery of the *Gynacantha dravida* belonging to the Family Aeshnidae as a new record for Malaysia. The distribution of species among 3 categories of habitat structure mainly, stagnant waters in ponds, slow to moderate water flow in lowland streams and fast flowing waters in rocky montane areas of waterfall indicated preferred habitat in most species. A number of elusive species were discovered, these are illustrated with diagnostic features described and portrayed. Sensitive species that warrant attention, indicative of atypical habitat requirement are also discussed.

ABSTRAK Tujuh puluh lapan spesies Odonata telah direkodkan dari Hutan Simpan Kaneboi, Negeri Sembilan. Di antara 14 kumpulan keluarga yang didapati di Semenanjung 12 darinya diwakili di sini. Penemuan untuk diawarkan adalah *Gynacantha dravida* dari Famili Aeshnidae sebagai rekod baru untuk Malaysia. Taburan spesies mempamerkan pilihan antara 3 kategori struktur habitat, khususnya, air yang bertakung seperti didalam kolam dan tasik, air yang mengalir perlahan hingga sederhana untuk anak-anak sungai dan air deras dari air terjun di kawasan tinggi berbatu. Beberapa spesies yang jarang kedapatan telah ditemui dan digambarkan untuk mempamerkan ciri diagnostik yang juga diperihalkan. Turut dibincangkan adalah spesies yang sensitif dengan keperluan habitat yang khusus digesa untuk diberi perhatian serius.

(Odonata, Kaneboi Forest Reserve, Malaysia, habitat requirement, diagnostic features, new record)

INTRODUCTION

There has been an increased interest in dragonfly work in Malaysia which is definitely encouraging. Survey has to be ongoing to compile comprehensive odonate listings for the country. Potential novel species records are still awaiting discoveries [1] although substantial numbers have been reported in the past [2, 3, 4]. Even within a localized community of odonates would reveal validity of a species and clear separation from a subspecies by the display of sympatric living [5]. Robust species such as the aeshnids are still being discovered, Karube (pers comm.) had expressed in the midst of describing two species new to science in our recent encounter in the 17th Odonatology 2006 Symposium in Hong Kong, China.

A progressive trend in the diversity numbers is reflecting the richness of the fauna within the

Malaysian boundaries. In 1995, Norma-Rashid & Van Tol [3] presented 24 species and subspecies among which were 15 taxa as new records for Malaysia preserved in the Natural History Museum in Leiden. In 1996, Hamalainen and co-workers [6] added another record belonging to the group Calopterygidae, the importance of this discovery is that it clearly distinguished the *Neurobasis longipes* as not a subspecies of *N. chinensis*. Thus with the finding the former is no longer endemic to Borneo but also found to inhabit the riverine of Sg. Selieh in Kelantan [4] and Sg. Selai in Endau Rompin National Park [7]. In 1999 Lempert [8] discovered a new species of *Gynacantha* which raised the number of the genera to six species for Peninsular Malaysia. This species he dedicated to Philip S. Corbet and named it *Gynacantha corbeti*. Here for the first time reported as a new record for Malaysia is included in the list is *Gynacantha dravida*, thus enhancing the number of the genera

to seven species for Peninsular. Detailed descriptions of the species will be separately published elsewhere [9].

METHODOLOGY

Opportunistic sampling was conducted during the months of February, April and May 2006 in the Kaneboi Forest Reserve in the state of Negeri Sembilan, West of Peninsular Malaysia.

All species recorded here were either captured as adults or naids. Several techniques of sampling were carried out. For capturing of adults, aerial nets were used as well as mist netting in order to trap aeshinids and gomphids, being fast fliers they are able to escape aerial nets. Aquatic sampling for larvae stages were done by using kick nets among rootlets, sandy, silty and vegetative substrates. Manual search was done in riverine localities of boulders and pebbly substrate. Bigger naid specimens were brought back alive to the laboratory for captivity studies.

The sampling localities can be generally categorised as:

- Stream = Lowland streams and riverlets, mostly comprised of leaf litters, pebbles, sand, silt and muddy substrates. Bank vegetation was either weeds, grasses, shrubs, herbaceous such as ginger plants and seldom trees. Representative GPS readings are 03° 08' 20''N / 102° 01' 59''E; 03° 10' 42''E / 101° 59' 11''E and 03° 10' 35''N / 101° 59' 11''E.
- Waterfall = Montane rivers with steep waterfalls, deep, swift, fast flowing waters covered with rocks and boulders. Matured trees often lining the banks. The GPS reading taken were 03° 11' 11''N / 101° 59' 02''E and 03° 11' 14''N / 101° 58' 45''E.
- Ponds = Stagnant water bodies, could either be natural or man-made for aquaculture. Bottom substrate mainly mud and silt with grassy banks. The locations indicated by the GPS reading was 03° 09' 285''N / 102° 00' 887''E.

RESULTS AND DISCUSSIONS

The odonate diversity inventory is as listed in Table 1. A grand total of 78 species were represented by twelve family groups. The sub-order Anisoptera comprised of 4 families. Firstly, the family Aeshnidae had 6 representatives, among this is the key highlight for the area is the new record for Malaysia ; *Gynacantha dravida*, *Tetracanthagyna spp.* was collected as larvae and died in captivity thus failing species identification. This also being the case for *Macromia spp.* belonging to the second family, Cordulidae but the elegant *Idionyx yolanda* (Figures 1 and 2) was captured as an adult. The third family, Gomphidae had 4 species, the cosmopolitan ones being *Actinogomphus decoratus* and *Megalogomphus sumatranus*. Finally Libellulidae, as always the case in diversity studies predominate the lists [10, 11] here represented by 38 species. Twenty-four percent were found to exploit the stagnant waters or ponds, followed by 15% found in the sun spots of streams and 12% in the waterfalls (Figure 3). The libellulids illustrate an array of captivating colors (Figures 4, 5 and 7) and fascinating behavior repertoire [12], one should truly indulge in not only photography but also observe and interpret the behavioral display of true act of possession (to the extent of aggression) and devotion in securing and courting partners (Figures 8, 9, 10 and 11). Evidence of breeding is obvious from the larvae caught within the water bodies in the area, one such example is the common Aeshnid larvae *Anax guttatus* (Figure 6).

The sub-order Zygoptera had smaller representatives both in physical outlook and in numbers for each of the 8 families. *Devadatta argoides* from Amphipterigydae are common in rivers with rocks and boulders. From the 5 species of Calopterygidae, *Echo modesta* is rather elusive species but easily recognizable with its white snout (Figure 12). The family Euphaidae is not well represented with only two species and the common *Euphae ochracea* always cohabit with the *Vestalis*. The 3 species of Chlorocyphidae favoured floating trunks lodged within rivers or streams, regardless of lowland or montane environment. The predominant zygopteran family is Coenagrionidae well exploiting stagnant waters (Figure 3). There were high density of *Coelicia albicauda* from 5 members of family Platycnemididae but more interesting is the stunning red *Calicnemia chaseni*

Table 1. Diversity List of the dragonflies (Anisoptera) and damselflies (Zygoptera) in 3 Habitat Categories found in Kaneboi Forest Reserve

Species List	Waterfall	Streams	Ponds
AESHNIDAE			
<i>Anax guttatus</i>			X
<i>Gynacantha bayadera</i>	X		
<i>Gynacantha dravida</i>		X	
<i>Gynacantha limbalis</i>		X	
<i>Indaeschna grubaueri</i>	X	X	
<i>Tetracanthagyna spp.</i>		X	
CORDULIIDAE			
<i>Idionyx yolanda</i>		X	
<i>Macromia spp.</i>		X	
GOMPHIDAE			
<i>Heliogomphus kelantanensis</i>		X	
<i>Ictinogomphus decoratus</i>		X	X
<i>Macrogomphus phalantus</i>		X	
<i>Megalogomphus sumatranus</i>		X	
LIBELLULIDAE			
<i>Acisoma panorpoides</i>			X
<i>Aethriamanta gracilis</i>			X
<i>Agrionoptera insignis</i>	X		
<i>Agrionoptera sexlineata</i>		X	
<i>Brachythemis contaminata</i>			X
<i>Bracidiplax farinosa</i>			X
<i>Bracidiplax chalybea</i>			X
<i>Crocothemis servilia</i>			X
<i>Cratilla lineata</i>	X	X	
<i>Cratilla metallica</i>	X	X	
<i>Hydrobasileus croceus</i>			X
<i>Lathrecista asiatica</i>		X	
<i>Neurothemis fluctuans</i>	X		X
<i>Neurothemis fulvia</i>			X
<i>Onychothemis culminicola</i>		X	X
<i>Onychothemis pulcherrima</i>		X	
<i>Orthetrum chrysis</i>		X	
<i>Orthetrum glaucum</i>	X	X	X
<i>Orthetrum luzonicum</i>			X
<i>Orthetrum pruinatum schneideri</i>	X		
<i>Orthetrum sabina</i>			X
<i>Orthetrum testaceum</i>	X	X	X
<i>Orthetrum triangulare</i>	X		X
<i>Pantela flavescens</i>	X		
<i>Potamarcha congener</i>			X
<i>Pseudothemis jorina</i>			X
<i>Rhyothemis phyllis</i>			X
<i>Rhyothemis plutonia</i>			X
<i>Rhyothemis triangularis</i>			X
<i>Rhodothemis rufa</i>			X
<i>Tetrathemis irregularis</i>	X	X	
<i>Tetrathemis platyptera</i>	X	X	

Species List	Waterfall	Streams	Ponds
LIBELLULIDAE (...cont.)			
<i>Tholymis tillargia</i>			X
<i>Trithemis auroura</i>			X
<i>Trithemis festiva</i>		X	
<i>Tyriobapta torrida</i>	X	X	
<i>Urothemis signata</i>		X	X
<i>Zygonyx iris</i>		X	
AMPHIPTERYGIDAE			
<i>Devadatta argyoides</i>		X	
CALOPTERYGIDAE			
<i>Neurobasis chinensis</i>	X	X	
<i>Vestalis amethystina</i>	X	X	
<i>Vestalis amoena</i>	X		
<i>Vestalis gracilis</i>	X		
<i>Echo modesta</i>	X	X	
EUPHAEIDAE			
<i>Dysphaea dimidiata</i>	X		
<i>Euphae ochracea</i>	X	X	
CHLOROCYPHIDAE			
<i>Aristocypha fenestrella</i>		X	
<i>Heliocypha biperforata</i>	X	X	
<i>Heliocypha perforata</i>		X	
COENAGRIONIDAE			
<i>Aciagrion hisopa</i>			X
<i>Agriocnemis minima</i>		X	
<i>Agriocnemis rubescens</i>			X
<i>Amphicnemis gracilis</i>	X		
<i>Ceriagrion cerinorubellum</i>	X		
<i>Ceriagrion fallax pendleburyi</i>	X		
<i>Ischnura senegalensis</i>			X
<i>Pseudagrion microcephalum</i>		X	X
PLATYCEMIDIDAE			
<i>Calicnemia chaseni</i>	X		
<i>Coeliccia albicauda</i>	X	X	
<i>Copera marginipes</i>	X	X	
<i>Copera vittata</i>		X	
<i>Indocnemis orang</i>		X	
PLATYSTICTIDAE			
<i>Drepanosticta quadrata</i>		X	
<i>Drepanosticta fontinalis</i>	X		
PROTONEURIDAE			
<i>Prodasinевра laidlawii</i>		X	
<i>Prodasinевра humeralis</i>		X	
Species Total		78	



Figure 1: The iridescent body color of *Idionyx yolanda* taken at 14x magnification

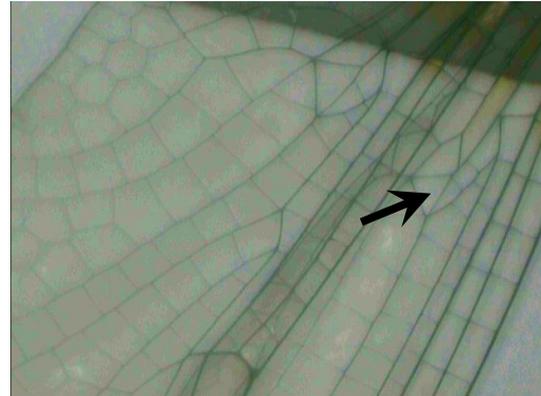


Figure 2: The wing venation showing diagnostic cells (indicated by arrow) above the triangle (15x Magnification)

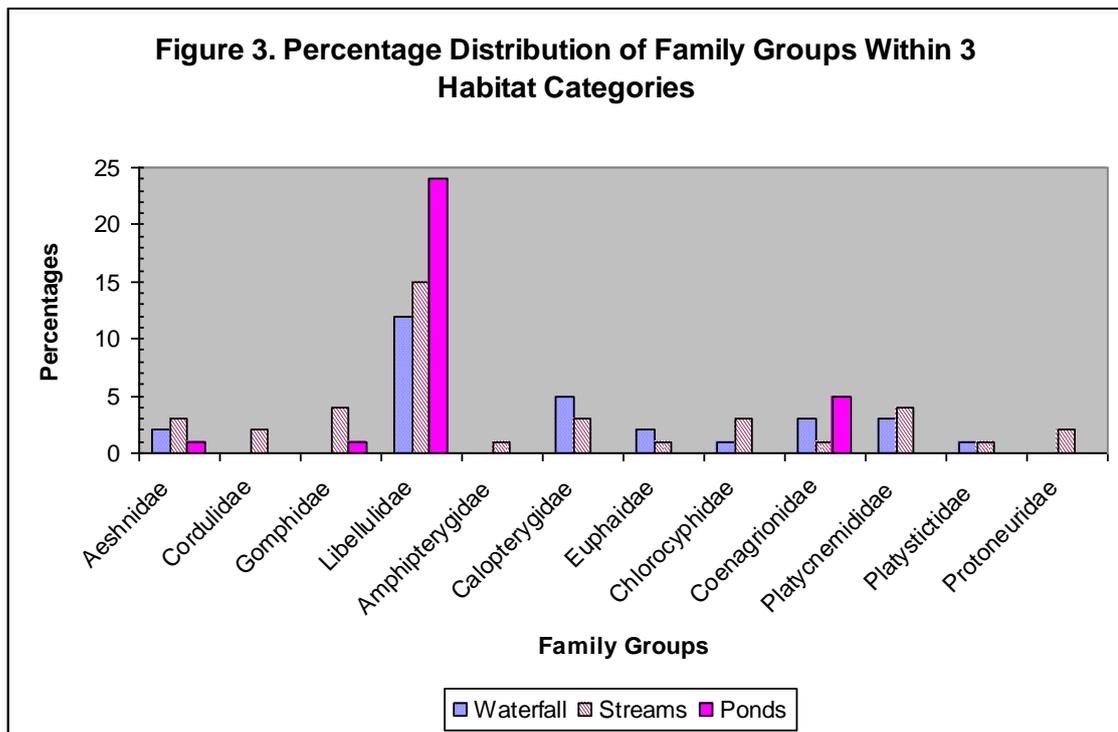




Figure 4. The spectacular indigo sheen *Rhyothemis plutonia* fluttering its wings in the in sunlit open ponded waters



Figure 7. The helicopter shaped body *Acisoma panorpoides* male on territorial display, female same body pattern but greenish colored



Figure 5. Sympatric living *Neurothemis fulvia* not as common as its cogeneric *N. fluctuans*



Figure 8. *Crocothemis servilia* pair in copulo, forming the mating wheel, male aggressively battles one another in the bright midday sun to capture light colored females that come to visit the water ready for reproductive acts



Figure 6. A naid *Anax guttatus*, a rather common Aesnid.



Figure 9. An old battered male *Neurothemis fluctuans*, may have undergone many territorial disputes in fighting to obtain mates to ensure species survival



Figure 10. *Pseudagrion microcephalum* in tandem, male has transferred the sperm to its mate who is ready to lay eggs endophytically



Figure 11. Sequential act of devotion where male does contact guarding and female oviposit totally submerged in water. This ensures passing on his genes where other males will have difficulty in trying to steal his mate, where sperm removal is common among this species



Figure 12. The diagnostic white snout (arrow) on male *Echo modesta*



Figure 13. *Calicnemia chaseni* an attractive member of the Platycnemididae

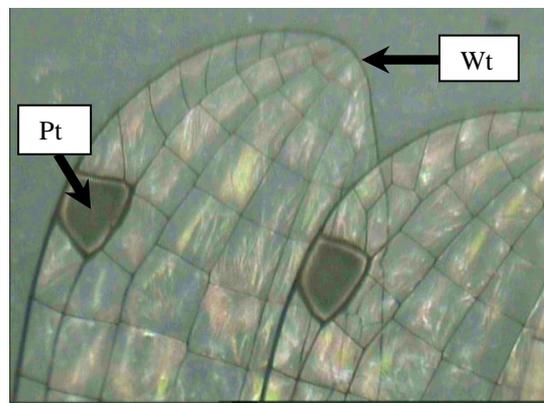


Figure 14. The falcate wing tips (Wt) and characteristic pterostigma (Pt) are obvious for *Drepanosticta* (30x)



Figure 15. A pair of *Prodasineura laidlawii* for comparison, although having similar body patterns but female are darker and therefore less blue (15x)

(Figure 13). Two of 8 *Drepanosticta* known to occur in Peninsular Malaysia are found in this forest reserve, easily recognizable as featured in Figure 14 with hooked wing tips (falcated). The protoneurids are both belonging to *Prodasineura* and a pair of *P. laidlawii* can be contrasted in Figure 15.

NOTES ON ELUSIVE SPECIES

Although a modest number, comprised 34% of the Peninsular odonate diversity thrives in the Kaneboi Forest Reserve as apparent in this report, this can be concluded to be the majority of the population. More samplings especially with success in breeding out the larvae will undoubtedly add on to the gomphid diversity and a few zygopterans may have been missed out in the collection.

But what is of concern is the protection of the dwindling population of the secretive and sensitive species. *Gynacantha dravida*, *Echo modesta*, *Calicnemia chaseni*, *Drepanosticta* and *Tetracanthagyna*, to name a few are among those that depend on specific preferred environment for example distinct substrate such as rootlets for the larvae to cling as in the aeshnids and cool temperature with high oxygen content for larvae of *Drepanosticta* to survive. Typical well shaded areas of high canopy coverage stream environment are well sought by the elusive zygopterans and thus such habitats warrant protection in order to sustain a healthy population and diversity of organisms ensuring prolonged existence on mother earth.

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