

**ZONATION OF FIREFLY SPECIES AND THEIR  
DISPLAY TREES ALONG KERTEH RIVER,  
TERENGGANU**

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**ABSTRACT**

The zonation of firefly species and their display trees in Kerteh River, Terengganu was studied in July 2009. Results showed that the adults of two firefly species, (*Pteroptyx tener* and *Pteroptyx bearni*) were congregating on 170 trees (belonging to 27 different species), located along 2-15 km from the river mouth. It was observed that the spatial distributions of the two *Pteroptyx* species were divided into three zones along the river. The mangrove habitats in the study area were in relatively good condition as evidenced from the high number of plant species, and that such condition was important for the coexistence of the two *Pteroptyx* spp.

**Keywords:** Zonation, Fireflies, Display Trees, Kerteh

## ABSTRAK

Satu kajian terhadap pengzonan oleh spesies kelip-kelip bakau di pokok peraga mereka telah dijalankan di Sungai Kerteh, Terengganu pada Julai 2009. Hasil kajian menunjukkan bahawa dua spesies kelip-kelip dewasa, (*Pteroptyx tener* dan *Pteroptyx bearni*) telah berkumpul di atas 170 pokok (terdiri daripada 27 spesies yang berbeza), terletak sepanjang 2-15 km daripada muara sungai. Penelitian menunjukkan bahawa taburan ruwang bagi dua spesies *Pteroptyx* terbahagi kepada tiga zon. Habitat bakau di kawasan kajian adalah dalam keadaan yang agak baik, buktinya adalah bilangan spesies tumbuhan yang tinggi, dan keadaan seperti itu penting untuk kewujudan bersama dua *Pteroptyx* spp.

**Kata kunci:** Pengzonan, kelip-kelip, pokok peraga, Kerteh

## INTRODUCTION

The first documented study on congregating fireflies in Peninsular Malaysia was conducted by Jean M. Bassot and Ivan Polunin in the Benut River mangrove in the west coast of Johore (see Bassot & Polunin 1967). Many years passed and then in the early 2000s, there was a surge of interest in congregating fireflies, as evidenced in scientific studies being conducted in the mangroves of several rivers: Selangor River, Sepetang River, and Rembau-Linggi Rivers (Jusoh et al. 2010a; Jusoh et al. 2010b; Kirton et al. 2006; Zaidi et al. 2006). Four species of the bent winged genus, *Pteroptyx*, (*P. gelasina* Ballantyne, *P. malacca* (Gorham), *P. tener* Olivier and *P. valida* Olivier) have been collected from Malaysian mangroves (see Ballantyne *et al.* 2011) but no information about their zonations along the river is available. Therefore, we surveyed the Kerteh River in Terengganu to map the zonation of firefly species and their display trees.

## METHODS

Our study was conducted along the Kerteh River, which is located in the east coast state of Terengganu (Figure 1), from 18 to 20 July 2009 in two survey trips. A “survey trip” here refers to a trip (usually in boat) along a riverbank. This means two trips were made to survey both sides of the riverbanks (see Jusoh et al. 2009). The data in this study were recorded in a standard datasheets developed by Jusoh et al. (2009). The datasheets consist of two types: 1. Day-time Rapid Assessment (DRA); 2. Night-time Rapid Assessment (NRA).

For the daytime survey, we observed and collected display tree specimens for identification. For the night-time survey, we recorded data on firefly species, distribution and display trees. Following the procedures of Jusoh et al. (2010b), the location of each firefly display section was recorded at night using a Global Positioning System (GPS) receiver. The term “display section” refers the continuous horizontal spread of a colony, or the diameter of a colony on the display tree(s) (Jusoh et al. 2010b). In this case, a display section can occupy one or more display trees, either of the same or different species.

During the survey, we collected six firefly specimens for identification purposes. The identification of the specimens was made by the firefly taxonomist, Dr. Lesley Ballantyne during the Training Course on Identification of South East Asian Fireflies taking place from 27 to 31 July 2010 at the Forest Research Institute Malaysia (FRIM) in Kepong. The specimens were later deposited in the Biodiversity and Conservation laboratory, Universiti Putra Malaysia and Entomology Unit of Forest Research Institute Malaysia.

## RESULTS AND DISCUSSION

We found that the firefly colonies were congregating on certain trees located between 2 km and 15 km (13 km) from the river mouth. A total of 170 firefly display sections on 27 plant species were recorded in this study. During the first survey trip, we found a total of 54 firefly display sections occupying a 12.9 km of the

river. Thirteen display sections consisted of more than one species and another 41 display sections were mainly on 13 species. The majority (17%) of fireflies were congregating on *Sonneratia caseolaris* (L.) Engl., whilst the remaining individuals were found on other display tree species, such as *Gluta velutina* Blume, *Hibiscus tiliaceus* L., *Xylocarpus granatum* J. König, *Avicennia alba* Blume, *Rhizophora apiculata* Blume, *Excoecaria agallocha* L., *Barringtonia racemosa* (L.) Spreng., *Bruguiera gymnorrhiza* (L.) Lam. and *Nypa fruticans* Wurmb. During the second survey trip, we found a total of 116 firefly display sections occupying 12.1 km of the river. Eighteen display sections consisted of more than one species and another 98 display sections were consisted of the same species as the first trip with additional species such as *Brownlowia argentata* Kurtz, *Ceriops decandra* (Griff.) Ding Hou, and *Derris trifoliata* Lour. In total, it was found that the highest number of display sections occupied by fireflies is *S. caseolaris* which was recorded 22% of total display sections. Next came *G. velutina* (15%), *H. tiliaceus* (13%), *X. granatum* (9%), *A. alba* (8%), *R. apiculata* (6%) and others were recorded between 1-5%.

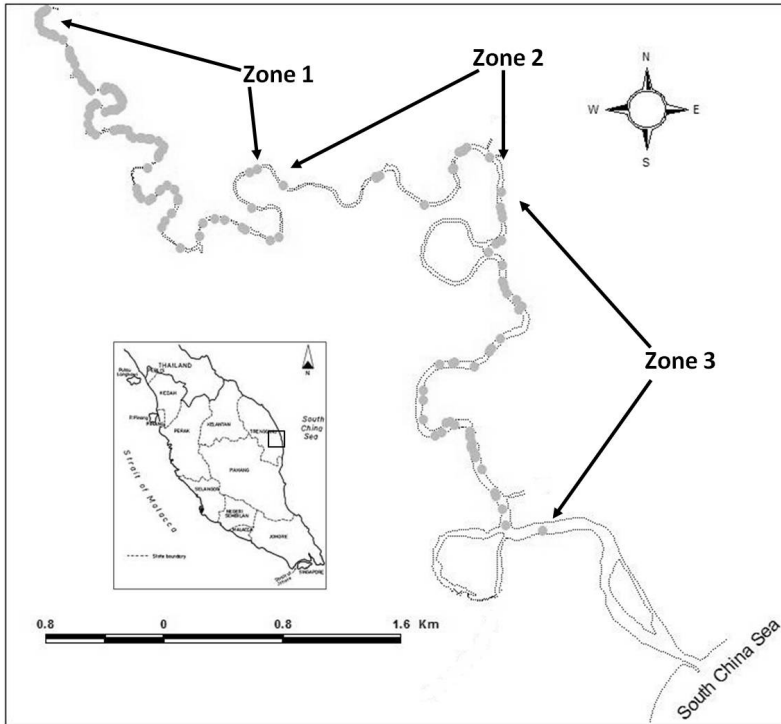
The specimens that we collected belonged to two different species of the genus *Pteroptyx*. Dr. Ballantyne identified one common synchronous flashing firefly, *Pteroptyx tener* Olivier during the workshop and recently confirmed that the other species is *Pteroptyx bearni* Olivier by comparison with the presumed type of *P. bearni* (Lesley Ballantyne, 28 August 2011, personal communication).

It was observed that the spatial distributions of the two *Pteroptyx* species were divided into three zones along the river (Table 1; Figure 1). Moving downstream, the first zone covered a distance of about six km, along which *P. tener* was the dominant species. The vegetation (such as *G. velutina*, *Barringtonia* sp., *S. caseolaris*, *H. tiliaceus*, *N. fruticans* and *B. gymnorrhiza*) along this zone is less tolerant to salt. In the second zone of about two km, both *P. tener* and *P. bearni* coexisted (Table 1; Figure 1). The vegetation along this zone included *S. caseolaris*, *H. tiliaceus*, *Excoecaria agallocha* L., *X. granatum*, *A. alba*, *R. apiculata*, *B. gymnorrhiza*, and *Ficus microcarpa* L.f. In the third zone of about

five km, only *P. bearni* was found (Table 1; Figure 1). This zone was vegetated by true mangrove species such as *X. granatum*, *R. apiculata*, *A. alba* and *E. agallocha*. Other display trees in this zone were *H. tiliaceus* and *B. argentata*, which is categorized as an IUCN data deficient species (Duke et al. 2008).

**Table 1.** Zonation of firefly species and the display trees along Kerteh River.

Zone	Main vegetation	Distribution length	Firefly species
1	<i>G. velutina</i> , <i>Barringtonia</i> sp., <i>S. caseolaris</i> , <i>H. tiliaceus</i> , <i>N. fruticans</i> and <i>B. gymnorrhiza</i>	6 km	<i>P. tener</i>
2	<i>S. caseolaris</i> , <i>H. tiliaceus</i> , <i>Excoecaria agallocha</i> , <i>X. granatum</i> , <i>A. alba</i> , <i>R. apiculata</i> , <i>B. gymnorrhiza</i> , and <i>F. microcarpa</i>	2 km	<i>P. tener</i> and <i>P. bearni</i>
3	<i>X. granatum</i> , <i>R. apiculata</i> , <i>A. alba</i> and <i>E. agallocha</i>	5 km	<i>P. bearni</i>



**Figure 1.** Map showing the geographic position of three firefly zones along Kerteh River, Terengganu. Grey dots represent the firefly display sections.

The distribution of *P. tener* along Kerteh River concentrated along the part of the river where the dominant vegetation species is *S. caseolaris*, a finding that is consistent with other studies in Peninsular Malaysia such as Selangor River (Ohba & Wong 2004), Sepetang River (Jusoh et al. 2010b) and Rembau-Linggi Rivers (Jusoh et al. 2010a). Another finding of this study, which is that the fireflies were found in different mangrove assemblages, is also consistent with our previous studies (Jusoh et al. 2010a, b). It would be interesting to investigate further the environmental factors, vegetation or prey types that influence the habitat partitioning of the two *Pteroptyx* species along the Kerteh River.

For the moment we would suggest that the mangrove habitats along Kerteh River is in relatively good condition as evidenced from the high number of plant species, and that such condition was important for the presence of two *Pteroptyx* species.

### ACKNOWLEDGEMENTS

We thank Dr. Lesley Ballantyne (Charles Sturt University, Australia) for specimen identification. This study is partially funded by the Ministry of Higher Education Malaysia through Fundamental Research Grant Scheme grant (Vote No. 5523605 to Nor Rasidah Hashim).

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