

CHECKLIST OF SPIDERS IN TASEK BERA RAMSAR SITE, PAHANG, MALAYSIA

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ABSTRACT

Established since 1995, Tasek Bera is a wetland of international importance. It comprises an area of 31,120 hectares. It is the largest natural freshwater lake in Malaysia. The natural freshwater lake is rich in local flora and fauna. A study of the biodiversity of spider was carried out during the Biodiversity Inventory Program at Tasek Bera Ramsar Site, Pahang from 20th to 26th May 2009. Throughout the program a total of 216 spiders were collected. Among them, 13 families of spider, namely the Agelenidae, Araneidae, Lycosidae, Nephilidae, Oxyopidae, Pholcidae, Pisauridae, Psechridae, Salticidae, Sparassidae, Tetragnathidae, Theridiidae, and Thomisidae were recorded. Most spiders found on web built between branches are the members of Araneidae, Nephilidae, Psechridae, Tetragnathidae, and Theridiidae while others were either foraging on trees (Oxyopidae, Pholcidae, Pisauridae, and Salticidae) or on the ground (Agelenidae, Lycosidae, and Sparassidae). A high variety of spider species were recorded.

Keywords: Spiders, Diversity, Tasek Bera, Ramsar Site, Wetland

INTRODUCTION

Tasek Bera is the largest freshwater swamp system in Malaysia. It was previously identified as one of Malaysia's most important freshwater wetlands. In November 1994, Malaysia joined the Convention on Wetlands of International Importance (Ramsar Convention) and Tasek Bera was designated as the country's first Wetland of International Importance (Ramsar Site) (<http://malaysia.wetlands.org/LIBRARY/tabid/519/mod/1570/articleType/ArticleView/articleId/1342/Default.aspx>). Tasek Bera is located at topmost reach of the southern branch of Pahang river in the Pahang State, at southern part of Peninsular Malaysia, with exact location at 3,05N, 102,38E and more than 30m above sea level. For centuries, it has been inhabited by a Malayan aboriginal tribe, Semelai (Furtado and Mori, 1982).

Tasek Bera, with an area of 31,120 hectares, is a unique and remote wetland wilderness surrounded by lowland dry dipterocarp forests and peat swamp forests which support diverse local flora and fauna. In total, there are at least 374 species of plants, 94 species of fish, 19 species of frog, 50 reptile species, 224 bird species, and 64 species of mammals living in the wetland (Cheng *et al.*, 2002).

Although Tasek Bera is known to contain forests with abundant flora and fauna, not much information on the biodiversity of spider in this wetland can be found. Hence, a study of the biodiversity of spider was carried out during the Biodiversity Inventory Program at Tasek Bera Ramsar Site, Pahang from 20th to 26th May 2009 in order to contribute to the checklist of biodiversity of this wetland.

METHODOLOGY

All spiders found through visual search were collected by hand, plastic containers and/or forceps. In order to have a clear view of burrows and tunnels as well as for night trips, torch/headlamps were used. Each specimen was kept individually to prevent them from harming each other. All collected samples were maintained in plastic containers and provided with water prior to identification.

Spiders were observed under dissecting microscope and/or a magnifying glass to disclose diagnostic characters such as chelicerae position, eye arrangement, leg arrangement and spinneret structure. Morphological identification was carried out using dichotomous key (Deeleman-Reinhold, 2001; Ubick *et al.*, 2005). Some spiders were further identified using molecular identification techniques (unpublished data).

RESULTS AND DISCUSSION

Throughout the study period a total of 216 specimens of spiders were obtained. Among them, 13 families of spiders were recorded based on their morphology. The spiders were identified belong to the Families of Agelenidae, Araneidae, Lycosidae, Nephilidae, Oxyopidae, Pholcidae, Pisauridae, Psechridae, Salticidae, Sparassidae, Tetragnathidae, Theridiidae, and Thomisidae. All spiders were found foraging on trees and the ground. A total of 76 species were estimated, however, only 54 species were confirmed up to family or species level due to insufficient specimens.

During this Biodiversity Inventory Program, most of the spiders were collected at night. A total of eight sampling sites were explored (Figure 1). Many spiders were collected along Trail TB-Belinang (50%) and trail TB-Semelai (19%) as these areas are less sloppy and very near to the lake. This in turn provide abundance of insects as a food source to spiders. Moreover, trail TB-Belinang contains many areas full with leaf litters. These are some of the factors that are suitable for the spiders to grow, hide and hunt their prey. The relatively moist areas also provide suitable habitat for spiders.

Among all the spiders collected, spiders from Family Sparassidae yield the highest number of individuals (58) (Figure 2). Sparassids were found in all the trails except kitchen and TB-Carpark. They were mostly found along trail TB-Belinang usually on the ground covered with leaf litters. They hide themselves underneath the leaf litters and seldom run around unless provoked or chasing on prey. Therefore, they are harder to be spotted at daytime. But the reflection of their eyes to light reveals them at night. Nevertheless, some of them were found on tree branch, tree trunk and tree root. In this family, three spiders were identified as *Heteropoda sp.* They are nocturnal spiders that emerge from its hiding place to search for prey at night (Hillyard, 2006). The females lay their eggs in a large, whitish, flat, cushion-shaped egg sac and they carry it under the body using their palps (Koh, 1989).

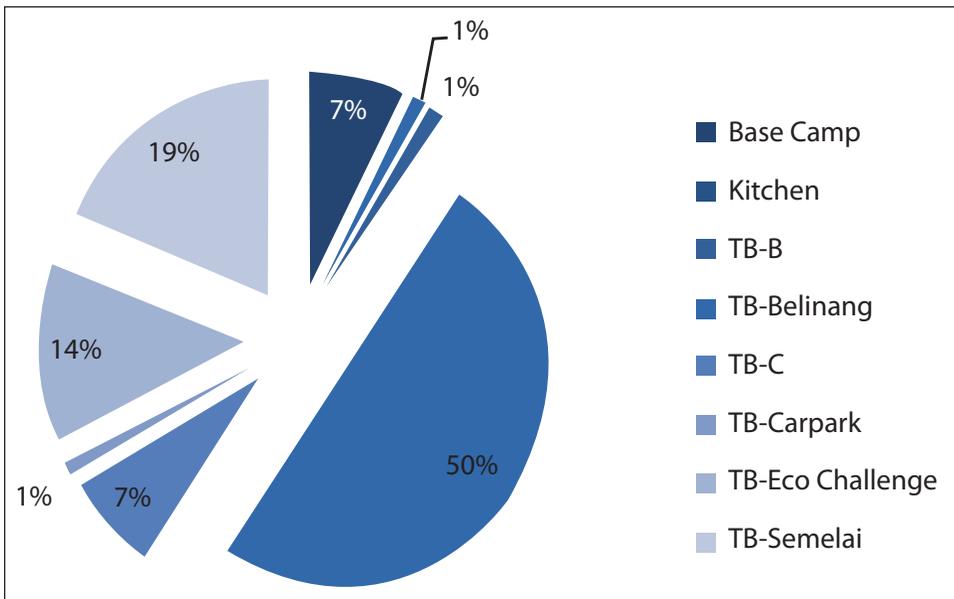


Figure 1. Percentage of spider individuals found in each trails during Biodiversity Inventory Program at Tasek Bera Ramsar Site, Pahang from 20th to 26th May 2009.

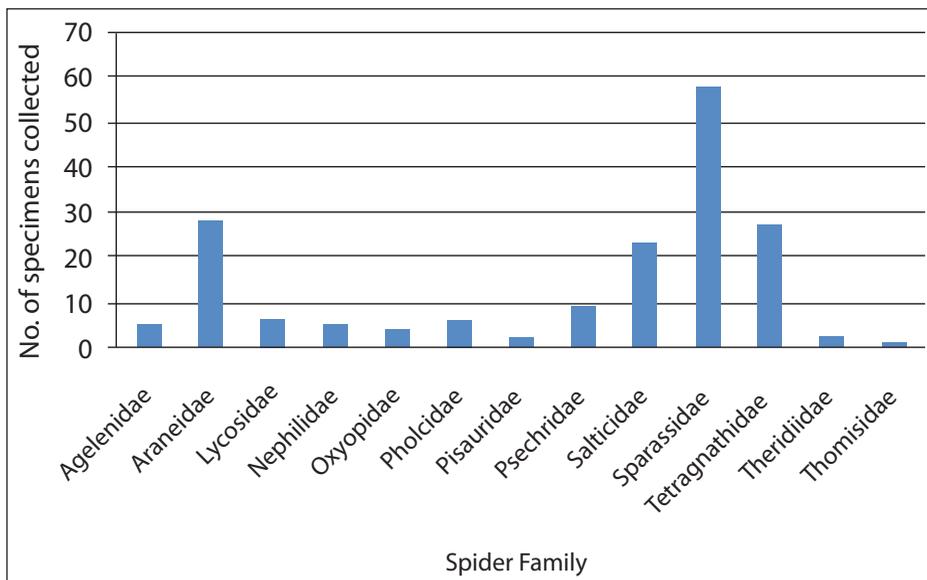


Figure 2. Number of specimens collected for each spider family.

The second highest number of spiders collected was from the family Araneidae (28) (Figure 2). In this study, all Araneidae spiders were found on orb-web built between branches. In fact, most Araneidae spiders build orb-webs which explain their common names as orb-web spiders or orb-weavers spiders (Koh, 1989). They build webs at many places, therefore, they were easily discovered in most of the trails. In this family, one spider was identified as *Parawixia hypocrita*. It has reddish-brown carapace and legs as well as a triangular shape abdomen. *Parawixia dehaani* was also identified having a reddish-brown triangular-shaped abdomen and greyish carapace. The legs' colour changes from black to greyish from coxa to metatarsus but slowly turn darker when reaching the tip. There is a white strip at the metatarsus of all the legs except the third pair of legs. Two more spiders were identified as *Gasteracantha* sp. which have hard, broad, flat abdomen armed with spines on the edge to protect themselves, as described by Koh (1989). *Gasteracantha arcuata*, another member of Araneidae, was identified having abdomen with two remarkably long curved black 'horns' similar to the one described by Hillyard (2006). The abdomen is orange in colour with black spots while the carapace and legs are brownish to dark brown. *Gasteracantha kuhli* was also identified having spiny flat abdomen with black and white spots which lead them to be named as Black-And-White Spiny Spider. Another spider was identified as *Arachnura* sp. It is in agreement with Koh (1989) where the elongated abdomen has two horns placed anteriorly and a 'tail' with a star shaped tip. When alarmed, the 'tail' curls up like a scorpion.

A total of 27 specimens from the family Tetragnathidae were collected and identified (Figure 2). Tetragnathidae are orb-web weavers that weave fine orb-webs with open hubs (Koh, 1989). Like Araneidae, they like to hang on the centre of its orb-webs built between branches. Hence, most of them were found in trails TB-Belinang and TB-Semelai where there are plenty of trees.

The fourth highest number of spiders collected was from the family Salticidae (23) (Figure 2). Salticidae are commonly named as jumping spiders (Koh, 1989) due to their good jumping ability as well as their behaviour of jumping from place to place frequently. When jump over to a place with remarkably long distance, silk was used for safety purpose. They were found in all the trails except TB-Carpark. Habitats such as tree trunk, table, leaf, curl leaf, floor and leaf litters are common to this group of spiders. Just like those mentioned by Hillyard (2006), they have two large eyes at the front and other eyes were widely spaced which grant them good vision to be agile hunters. Three of these spiders were identified as *Agorius constrictus* which are called ant mimicking jumping spiders. They have long slender legs and three-part-like body that make them looked like an ant. The first pair of legs is often raised so that they appear like a pair of antennae.

Spider from other families such as Agelenidae (5), Lycosidae (6), Nephilidae (5), Oxyopidae (4), Pholcidae (6), and Psechridae (9) were also collected (Figure 2). Agelenidae are spiders that are able to move very fast. Due to this ability, they are very good in capturing prey. They were usually found at areas with leaf litters. They were found in trail TB-C, TB-Eco Challenge and mostly in TB-Belinang.

Some of the trails visited such as TB-C and TB-Eco Challenge have plenty of dried leaves and short grasses. These environments are favoured by Lycosidae, such as the wolf spiders. The Lycosidae collected are identified as *Pardosa milvina*. They are robust and agile hunters with good eyesight which often can be seen running and hopping on the ground with dried leaves.

Nephilidae usually build large webs. Hence, they were found sitting on their web between branches in trails TB-Semelai and TB-Belinang where trees are abundant. The members were formerly grouped in the families Araneidae and Tetragnathidae. This group of spiders were identified as *Nephila* sp. The size of female golden silk orb-weavers (genus *Nephila*) is large (up to 45mm). According to Hillyard (2006)

the males are far smaller. They make strong, golden silk, across the flight path of insects between trees or plants. They can be easily spotted since they build very large webs and have abdomen with contrast colours.

Oxyopidae (Lynx spiders) were usually found on leaves of shrubs and they seldom built webs. Most of the Oxyopidae collected were found in trail TB-Eco Challenge where shrubs were abundant. They have eight eyes, with six of them arranged in a hexagon shape which is similarly to those described by Koh (1989). Oxyopidae hunts actively during daytime by springing at small insects and catches them with its long and spiny legs.

Pholcidae were found in trail TB-Eco Challenge and TB-Belinang. They are commonly called daddy long-legs spider due to their long, slender legs and an elongated abdomen (<http://en.wikipedia.org/wiki/Pholcidae>). They are sometimes known as vibrating spider because they vibrate vigorously to distract intruders when disturbed (Hillyard, 2006).

A unique morphological characteristic of Psecridae was observed. As described by Koh (1989), they have long legs possessing three claws in which the third claw has a tuft of hairs under it. *Psechrus* sp. was found in horizontal webs between tree branches or trunk valley with a retreat at one end. Hence they are abundant in trail with big trees such as TB-Belinang and TB-Semelai. They are alerted with very minor disturbance on the web and escape rapidly into the retreat. The female *Psechrus* sp. carries egg-sac in the chelicerae (Koh, 1989).

Pisauridae (2), Theridiidae (2) and Thomisidae (1) are families with the least number of spiders found. It is in agreement with Koh (1989) that Pisauridae resemble wolf spiders (family Lycosidae), but they carry their spherical egg sacs under the jaws and pedipalps like Psecridae (instead of attaching them to their spinnerets). Two spiders were identified as *Eurychoera quadrimaculata* having a vertical white line on the carapace. They were found only in trail TB-Belinang, building three-dimensional webs that appear like a tent and hide in the curl leaves hanged on the web.

Theridiidae were found in trail TB-Belinang, sitting on web built between tree branches. They are known as the tangle-web spiders and cobweb spiders (<http://en.wikipedia.org/wiki/Theridiidae>). Most members of Theridiidae own a comb of serrated short, stiff, coarse hairs on the tarsus (last segment) of the fourth leg (as observed on the collected Theridiidae). Hence they are also known as comb-footed spiders (Koh, 1989). The species collected have a triangular shape abdomen with four shiny orange spot at the ventral. Unlike other spiders, these spiders possess spinnerets pointing downwards.

Thomisidae are also known as crab spiders (Koh, 1989). They do not build webs and their first two pairs of legs are longer and stronger than the rest (Hillyard, 2006). *Dieta virens* was identified having a greenish body with yellow stripes. It is in agreement with Koh (1989) that the abdomen is long and appears like segmented.

CONCLUSION

Throughout the five days of inventory various interesting tropical spider families were found. The environment has provided a great host for a diverse group of spiders. It must be noted that the present collection and observation of spiders in the area is preliminary. This set of samples does not represent the complete inventory of Tasek Bera due to limited time of sampling and the incomplete area covered throughout the sampling. However, this information will surely assist future researchers in a further study of spiders that are found in tropical Tasek Bera Ramsar Site, Pahang.

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