



Terrestrial Invertebrates On Pulau Jarak And Pulau Lalang, Straits Of Malacca

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ABSTRACT Two visits to Pulau Jarak and Pulau Lalang of Straits of Malacca were carried out on 5-6 June 2004 and 23-28 November 2007 to document the diversity of selected taxa of terrestrial invertebrates. Various techniques such as sweep nets, pit-fall traps, flying intersection traps, Winkler method, light traps, and manual search (assisted by visual aid such as digital cameras and digital video-camera) were employed. There were great variations in diversity of terrestrial invertebrates inhabiting both islands. In Pulau Jarak, a single species of land-crab (*Gecarcoidea lalandii*), three species of butterflies, a single species of fruit fly (*Bactrocera carambolae*) and seventeen species of ants were recorded. In Pulau Lalang, there were three species of butterflies and twenty-four species of ants. However, the study period was too short for a comprehensive representation of terrestrial invertebrates species inhabiting the islands.

ABSTRAK Dua lawatan ke Pulau Jarak dan Pulau Lalang yang terletak di Selat Melaka telah dijalankan pada 5-6 Jun 2004 dan 23-28 November 2007 bagi merekodkan kepelbagaian beberapa kumpulan invertebrata daratan. Pelbagai teknik seperti jaring sapu, perangkap lubang, perangkap pintas terbang, kaedah Winkler, perangkap cahaya, dan pencarian manual (dengan bantuan peralatan visual seperti kamera digital dan kamera video digital) telah digunakan. Terdapat perbezaan besar di dalam kepelbagaian invertebrata daratan yang mendiami kedua-dua pulau. Di Pulau Jarak, satu spesies ketam darat (*Gecarcoidea lalandii*), tiga spesies rama-rama, satu spesies lalat buah (*Bactrocera carambolae*), and tujuh belas spesies semut telah direkodkan. Di Pulau Lalang, terdapat tiga spesies rama-rama dan dua puluh empat spesies semut. Walaubagaimanapun, tempoh kajian adalah terlalu singkat bagi mendapatkan senarai lengkap invertebrata daratan di pulau tersebut.

(species richness, ants, land-crab, butterfly, fruit-fly, island terrestrial fauna, ground beetles, spiders, tropical islands)

Introduction

Islands usually possess unique biodiversity since it has been isolated from larger land-masses for some time. Long-time isolation has caused island fauna to eliminate certain characteristics or develop unique features to fully utilise their habitat and increase survival. The uniqueness of island biodiversity has attracted many researchers to study animal evolutionary process. Since islands are isolated from larger land-masses, species that have limited dispersal ability will be limited to the island only and become endemic to the area [1]. Therefore, any disturbance on island habitat could threaten endemic species and possibly species

extinction. Unfortunately, the island biodiversity of Peninsular Malaysia receives little interest since some of the islands are located far away from the coast.

Two islands that are located in the middle of Straits of Malacca and rarely visited by researchers are Pulau Jarak and Pulau Lalang. Both islands are uninhabited but frequently visited by fishermen and tourists either for shelter from storm or fishing related activities. Pulau Jarak is located at 03°58.578' N and 100°06.053' E, approximately 65 kilometers from the nearest point on the Perak coast. The size of this island is about 914 meters long and 457 meters wide, with a lighthouse located



on its highest point of 154 meters. The island has lush green forest with some introduced plants at lower altitude. Among the common plant species observed on the island were those from the families Euphorbiaceae, Moraceae, Myrtaceae, Rubiaceae and Palmae [2]. About 50 kilometers from Pulau Jarak lies Pulau Lalang at 04°00.916' N and 100°32.962' E. This tiny island (about half kilometer long) is also forested but contrary to the former island, it has fresh-water supply.

Pulau Jarak and Pulau Lalang are very interesting to researchers due to their locality and physical setting that resemble an oceanic island [3]. Researchers had visited the islands in the early 1900s to collect island fauna for museum specimens [4, 5]. These visits reported that spiders and land crab were numerous, termites and ants were found but not so abundant, but other insects or invertebrates were absent. To verify these data and to investigate the current status of the island invertebrates, we conducted an initial survey in June 2004 and a follow-up visit in November 2007. During our visit in 2004, the survey was very brief and we only had a glimpse of the biodiversity of the two islands. Therefore, a detailed study in 2007 was conducted to confirm several earlier records of the presence and absence of certain unique and interesting components of the biodiversity on both islands.

METHODS

We visited both islands on 5-6 June 2004 and 23-28 November 2007. The weather was mainly sunny on our first visit, but was cloudy with light rain (on one of the days) on our second visit. During both visits, we applied various methods to acquire data. Five methods i.e. pitfall trap, a modified version of Malaise trap known as flight interception traps (FIT), Winkler trap, light trap and manual search were used to sample terrestrial invertebrates particularly ants. Pitfall traps and FIT were randomly placed on both islands. Pitfall traps were randomly sunk into the ground. A mild soap solution was used to drown invertebrates that fell in. Winkler trap was also used to collect litter invertebrates. Five one square meter of litters were collected, sieved and held in the Winkler bags for 24 hours. Light traps were set up in the evening to sample nocturnal insects. All insects and other small invertebrates that were attracted to the light were collected by forceps or hand. Day flying insects such as butterflies were

collected using sweep-nets on the forest floor both in the open and in the understory, and also in the open area by the sandy shore (except in Pulau Jarak, where sandy shore is almost non-existent). Plastic bottles containing either Cue-lure or methyl-eugenol lure were also hung on trees to attract fruit flies. Some small invertebrates were also collected manually by hand or aspirators. Manual search (assisted by visual aids such as digital cameras and video cameras) was conducted along forest tracts to record and capture terrestrial invertebrates.

RESULTS AND DISCUSSION

A total of 40 species of terrestrial invertebrates were recorded from both islands (Table 1). Ground spiders and beetles were also collected but not described here due to taxonomic difficulty. Although the total number of invertebrate species on both islands was about the same (27 species in Pulau Jarak and 21 species in Pulau Lalang), the invertebrate population on Pulau Jarak was higher than Pulau Lalang with more representatives of invertebrate taxa. Two species of invertebrates, the land-crab (*Gecarcoidea lalandii*) and fruit fly (*Bactrocera carambolae*) were absent from Pulau Lalang. Invertebrate population on both islands was dominated by ants (32 species). Only six species of butterflies were recorded from both islands (three species for each island), and a single species of fruit fly and land-crab (Figure 1).

As reported in an earlier study, common land-crab (*Gecarcoidea lalandii*), had been observed and captured in Pulau Jarak. Gibson-Hill [4] found that this nocturnal crab was numerous and occurred right up to the highest point on the island. He estimated that the population of this crab was around 200 individuals per hectare. However, during our visits we only managed to observe few individuals (less than ten), indicating that their population could have decreased enormously. One reason could be the scarcity of food resources on the island to support large populations. Four individuals of this crab were captured by box traps which were intended to trap rats; Harrison [5] made a similar observation.

Only a single species of fruit fly, *Bactrocera carambolae*, was captured in this study. All individuals were captured in Pulau Jarak but none in Pulau Lalang. They were attracted to methyl eugenol but not Cue-lure, indicating that the species

Table 1. List of invertebrate species found in Pulau Lalang and Pulau Jarak

Species	Pulau Lalang	Pulau Jarak
Butterflies		
1. <i>Hypolimnias anomala</i>	√	-
2. <i>Eurema spp.</i>	√	-
3. <i>Euploea mulciber</i>	-	√
4. <i>Graphium agamemnon</i>	-	√
5. <i>Papilio polytes</i>	√	-
6. <i>Nacaduba ruselli</i>	-	√
Fruit Flies		
1. <i>Bactrocera carambolae</i>	-	√
Ants		
1. <i>Anoplolepis gracilipes</i>	√	√
2. <i>Aphaenogaster sp.</i>	√	-
3. <i>Camponotus sp. A</i>	√	-
4. <i>Camponotus sp. B</i>	√	-
5. <i>Camponotus sp. C</i>	√	√
6. <i>Cardiocondyla sp.</i>	√	-
7. <i>Cataulacus sp.</i>	√	-
8. <i>Crematogaster sp. A</i>	-	√
9. <i>Crematogaster sp. B</i>	√	-
10. <i>Dolichoderus sp.</i>	√	√
11. <i>Echinopla sp.</i>	√	-
12. <i>Hypoponera sp.</i>	√	-
13. <i>Myrmoteras sp.</i>	-	√
14. <i>Odontomachus sp.</i>	√	-
15. <i>Odontoponera sp.</i>	√	√
16. <i>Oecophylla smaragdina</i>	√	-
17. <i>Pachycondyla sp.</i>	√	√
18. <i>Paratopula sp.</i>	√	√
19. <i>Paratrechina sp. A</i>	√	-
20. <i>Paratrechina sp. B</i>	√	-
21. <i>Paratrechina sp. C</i>	√	-
22. <i>Paratrechina sp. D</i>	-	√
23. <i>Pheidole sp.</i>	√	√
24. <i>Pseudolasius sp.</i>	√	-
25. <i>Rhoptromyrmex sp.</i>	-	√
26. <i>Strumigenys sp.</i>	-	√
27. <i>Tapinoma sp.</i>	√	-
28. <i>Technomyrmex sp.</i>	-	√
29. <i>Tetramorium sp. A</i>	-	√
30. <i>Tetramorium sp. B</i>	√	√
31. <i>Tetramorium sp. C</i>	-	√
32. <i>Tetraoponera sp.</i>	√	√
Crab		
1. <i>Gecarcoidea lalandii</i>	-	√

has a specific preference to pheromones. The latter trap did not capture any fly on both island although the traps were set up not far away from methyl eugenol traps.

An earlier study indicated that only two species of

ants and termite were present in Pulau Jarak [5]. However, there is no record of ants from Pulau Lalang. In this study we recorded 24 species of ants from Pulau Lalang and 17 species of ants from Pulau Jarak. In contrast to the previous study, we observed that ants were more diverse than spiders in Pulau Jarak and more ants could be found in Pulau Lalang (Table 1). It is assumed that these insects have been introduced into the island by boats or floating vegetational debris. Since Pulau Lalang is located closer to the mainland and more frequently visited, there is a higher chance that more ants could be introduced to the island. In Pulau Lalang, all methods were successfully captured ants. Manual collection was the most effective in capturing ants with 16 species. In Pulau Perak, none of the ant species were attracted to light and therefore the light-trap failed to collect any ants (Figure 1).

As observed by Audy et al [5], and confirmed by our visit, insect (other than ant) diversity was very low in the visited islands. Common forest insects such as cicadas, grasshoppers, mosquitoes that can be found abundant in mainland forest were not encountered on these islands. Other terrestrial invertebrates were also not recorded on the islands. Although Harrison [6] observed one small scorpion in his visit, none were seen during our visits. In addition, no centipede, millipede, snail, or wasp were observed on the islands as reported by Audy et al [5].

This study confirms the previous finding that although both islands (Jarak and Lalang) were poor in terrestrial invertebrates, the presence of previously recorded invertebrates indicates that if further studies are conducted in these islands, more animals may be recorded. Human activity on the island should be seriously monitored to ensure that there is no negative effect on the animal biodiversity. In Pulau Jarak, there is a recently built Malaysian Army Security Base whose presence as a security watch is seen as a plus factor. The main concern, however, is waste disposal and sanitation which may impact the nearby coral reefs. It was also observed that there were more traces of remains of dead animals in the forest as compared to the last visit in 2004. Although Pulau Jarak does not have diverse flora and fauna, those existing constitute part of the unique biodiversity of oceanic islands.

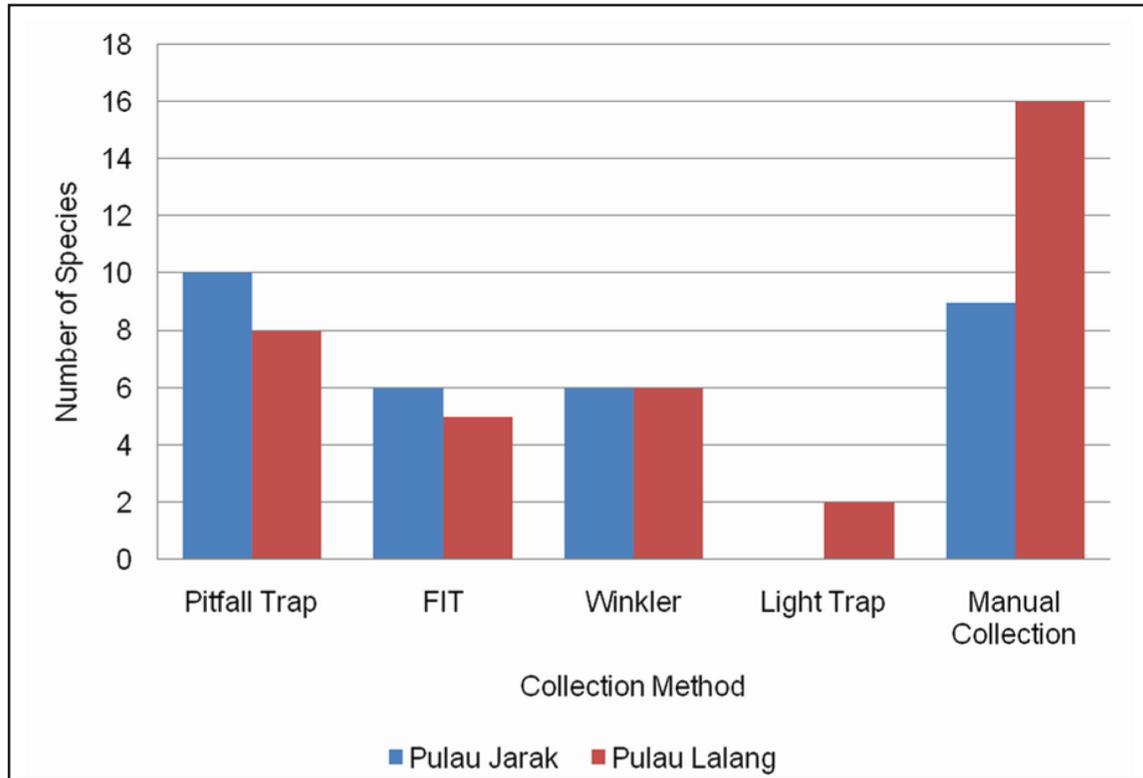


Figure 3. Number of ant species that have been captured using differences techniques

The island flora and fauna now appear to be well protected since access is limited and requires security clearance.

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