

Marine Algae of Perak Island, Jarak Island and the Sembilan Group of Islands in the Straits of Malacca

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ABSTRACT A preliminary checklist of marine algae from Pulau Jarak, Sembilan Group of Islands and Pulau Perak in the Straits of Malacca was compiled from two expeditions. The checklist of a total of 66 taxa, comprises one family of Cyanophyta with two genera and six taxa, seven families of Chlorophyta with 11 genera and 18 taxa, 12 families of Rhodophyta with 20 genera and 39 taxa, and two families of Phaeophyta with three genera and three taxa. One new record *Lyngbya confervoides f. violacea* is reported for the first time for Malaysia. The three islands have a low similarity in marine algal diversity.

ABSTRAK Satu senarai semak rintis alga marin dari Pulau Jarak, Kepulauan Sembilan dan Pulau Perak di Selat Melaka dari dua ekspedisi telah digabungkan. Senarai semak yang mengandungi sebanyak 66 taxa ini terdiri daripada satu famili Cyanophyta dengan dua genera dan enam taxa; tujuh famili Chlorophyta dengan 11 genera dan 18 taxa; 12 famili Rhodophyta dengan 20 genera and 39 taxa; serta dua famili Phaeophyta dengan tiga genera dan tiga taxa. Satu rekod baru *Lyngbya confervoides f. violacea* telah dilaporkan untuk kali pertama bagi Malaysia. Ketiga-tiga pulau ini mempunyai kesamaan yang rendah dalam kepelbagaian alga marin.

(marine algae, checklist, Pulau Perak, Pulau Jarak, Pulau Sembilan, Straits of Malacca)

INTRODUCTION

In June 2004, 32 scientists from the University of Malaya Maritime Research Centre (now known as the Institute of Ocean and Earth Sciences, IOES) went on a scientific expedition to some remote islands off the west coast of Peninsular Malaysia. This was the first of a series of Scientific Expeditions to the Seas of Malaysia (SESMA I). The islands of Perak and Jarak, in the Straits of Malacca, were last scientifically surveyed more than 50 years ago, by the British scientists from the Institute of Medical Research and the Forest Research Institute [1, 2, 3, 4, 5, 6].

Pulau Jarak (03° 58'N, 100° 06'E), a granitic island, is located 34 km from Lumut, Perak, and close to the Sembilan Islands. Pulau Jarak is about eight hectares in size, surrounded by waters of 30 fathoms

deep and is densely covered by vegetation. Audy in 1950 found that it had a "distinctive flora and fauna, very poor in tree species and containing especially rats, land-crabs and spiders". In 2004 and 2007, we found Pulau Jarak to be densely forested with rocky shores fringing most of the island's perimeter. Corals were found amongst sandy patches and here only filamentous turf algae were evident.

Sixteen kilometers south of Pulau Pangkor lies the Sembilan Group of Islands, made of Pulau Agas, Pulau Payong, Pulau Nipis, Pulau Lalang, Pulau Rumbia, Pulau Saga, Pulau Buloh, Black Rock and White Rock. Only the larger islands like Pulau Rumbia, Pulau Lalang and Pulau Buloh are vegetated. The coral reefs here harbour a high diversity of fish life.

Pulau Perak ($5^{\circ} 42' N$, $98^{\circ} 56'E$) lies north-west of Pulau Pinang and south west of Pulau Langkawi. In 1950 Gibson-Hill described it as an oval-shaped island, composed of igneous rock veined with quartz, with limestone near sea level, rising steeply to an uneven sloping summit and devoid of vegetation. The island slopes were covered by "bird-lime giving it in full sunlight, the silvery appearance from which it gets its name". Breeding populations of boobys were the most important discoveries on this island. In our 2004 visit, Pulau Perak was discovered to be vegetated with figs, ferns and herbaceous plants, causing concern to the ornithologists, who feared the competition between the plants and birds for breeding sites. The most exciting find was the island's seascape which was a continuation of the landscape which plunges 85 metres vertically into the water's depths. This vertical wall is colonized by presumably the most diverse coral populations in the Straits of Malacca. The reefs are teeming with rich fish life while marine algae compete with the corals for space on the seascape.

Marine macroalgae commonly known as seaweeds, form an important component of the coastal and marine ecosystems, providing feeding, breeding and nursery grounds for the diverse marine and fishery life. Seaweeds, together with the phytoplankton (microalgae) and the

seagrasses (marine Angiosperms), serve as the main primary producers in the oceans, contributing to photo-oxygenation of the waters as well as carbon sequestration, thus assisting in the reduction of global warming.

The present tally of marine algae in Malaysia includes 381 taxa comprising Chlorophyta (13 families, 105 taxa), Rhodophyta (27 families, 186 taxa), Phaeophyta (8 families, 73 taxa) and Cyanophyta (8 families, 17 taxa)⁷. The marine algal flora has similarities to the algal flora of the Indo-Pacific region. Coral reefs support the highest diversity of species, followed by rocky shores and sandy-muddy areas.

In 2003 and 2004 two expeditions to the Langkawi Group of Islands produced a checklist of marine algae or seaweeds, comprising 84 taxa, with one taxon of Cyanophyta, 24 taxa of Chlorophyta, 49 taxa of Rhodophyta and 10 taxa of Phaeophyta⁸. The seaweed flora of Langkawi is quite distinct from that of Peninsular Malaysia and East Malaysia.

MATERIALS AND METHODS

The islands of Pulau Perak, Pulau Jarak and Sembilan were selected because little is known of their flora and fauna, in spite of having very

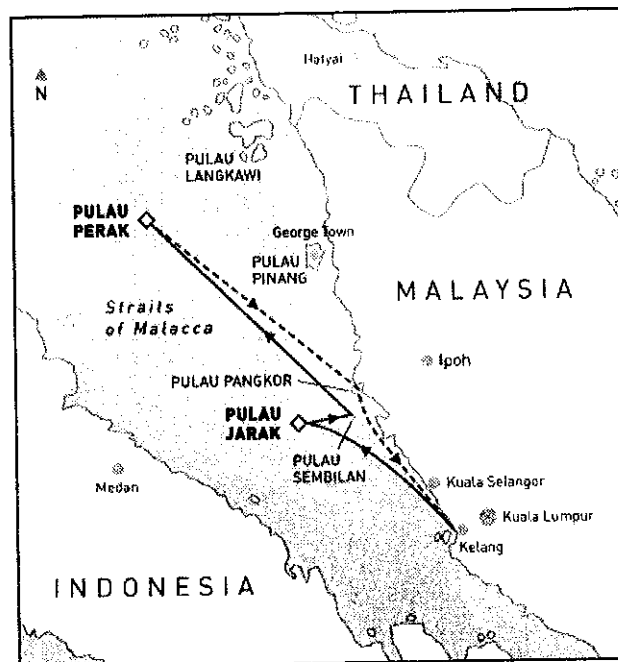


Figure 1. Route taken on the SESMA I Expedition.

interesting geological features (Figure 1). Pulau Perak is one of the furthest islands from the Malaysian shore in the Straits of Malacca, and interesting comparisons can be made of its marine algae species composition with that inhabiting the rest of the Malaysian waters. Two expeditions were made to the islands.

On the 4th of June 2004, the group of scientists set off on board the Reef Challenger, a research vessel. We arrived at Pulau Jarak at 11 am on 5 June 2004. Although three sites were surveyed in the 2004 expedition, only two sites yielded specimens. Collections were made by snorkelling and scuba, as well as from scrapings off rocks and tree roots along the shore. The journey continued on and we arrived at the Sembilan Group of Islands at 6.30am on 6 June 2004. Very strong waves and poor visibility again made the collection very difficult with samples collected only from one site at Pulau Lalang and two sites at Pulau Rumbia. We finally arrived at the highlight of the expedition, Pulau Perak in the early morning of 9 June 2004. Scuba revealed the dominance of filamentous red and green algae growing amongst the corals on the almost vertical slopes fringing the island. Collections were made at three sites, mainly by scuba.

The second expedition to Pulau Jarak and Sembilan was made from 23 to 28 November 2007. Two sites were sampled by scuba on 24 and 25 November 2007. Although two days were spent at Sembilan, algae were collected only from one site at Pulau Lalang. The absence of a prominent microalgae vegetation cover was noted especially during the second expedition (November 2007). A causal explanation of the underlying, ecological reason is difficult due to the short length of the visit to these sites, but a high abundance of grazers (especially black sea urchins) was noted. The third visit to Pulau Sembilan was made on 21-23 November 2008 and algae were collected at White Rock by snorkeling and scuba diving. All specimens were cleaned and processed into herbarium, or preserved in formalin for further examination back in the laboratory. The specimens were identified based on morphological and anatomical characteristics, using published keys and taxonomic papers. All specimens are deposited in the University of Malaya Seaweeds and Seagrasses Herbarium.

RESULTS AND DISCUSSION

A preliminary checklist (Table 1) with a total of 66 taxa was produced. It comprises one family of Cyanophyta with two genera and six taxa, seven families of Chlorophyta with 11 genera and 18 taxa, 12 families of Rhodophyta with 20 genera and 39 taxa, and two families of Phaeophyta with three genera and three taxa (Figures 2-17). One new record *Lyngbya confervoides* f. *violacea* is reported for the first time for Malaysia. Seven Rhodophyta specimens remain unidentified. Insufficient materials, especially reproductive plants and the need to study the life-cycle of the specimens make the identifications difficult.

As most of the collections came from rock surfaces, amongst corals and epiphytic on artificial substrata like strings, the algae identified belonged mainly to filamentous species. Of the Chlorophytes, the only macroscopic species belonged to *Ventricaria*, *Valonia*, *Valoniopsis*, *Bryopsis* and *Caulerpa*. The Rhodophytes were the dominant group, as is expected of deep waters. They also belonged mainly to the filamentous types except for the coralline *Jania* and *Peysonnelia*. The largest algae belonged to the Phaeophytes, being *Dictyota*, *Lobophora* and *Hydroclathrus*.

Of the 36 genera, eight genera were common to Pulau Jarak and Pulau Sembilan, five genera common to Pulau Jarak and Pulau Perak and seven common to Pulau Sembilan and Pulau Perak. Only three genera (*Enteromorpha*, *Polysiphonia* and *Ceramium*) were found in all three sites.

CONCLUDING REMARKS

The waters around Pulau Jarak and Pulau Perak are relatively pristine as they are sited a distance from the west coast of Peninsular Malaysia, and therefore away from the effects of coastal pollution. The waters are also relatively deep, and quite different from other habitats which have contributed to the checklist of the marine algae of Malaysia. The present checklist comprises one family of Cyanophyta with two genera and six taxa, seven families of Chlorophyta with 11 genera and 18 taxa, 12 families of Rhodophyta with 20 genera and 39 taxa, and two families of Phaeophyta with three genera and three taxa. The marine algal flora of the three islands have a low similarity. These islands



Figure 2. *Lyngbya*



Figure 3. *Oscillatoria*



Figure 4. *Enteromorpha*



Figure 5. *Bryopsis pennata* (Herbarium specimen)



Figure 6. *Cladophora*



Figure 7. *Caulerpa peltata*

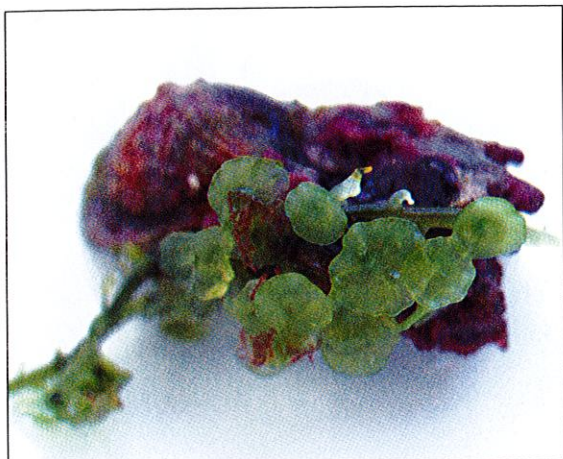


Figure 8. *Caulerpa peltata*

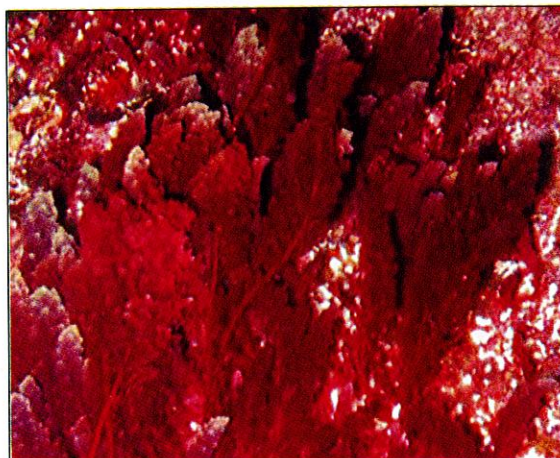


Figure 9. *Asparagopsis*



Figure 10. *Hypnea*

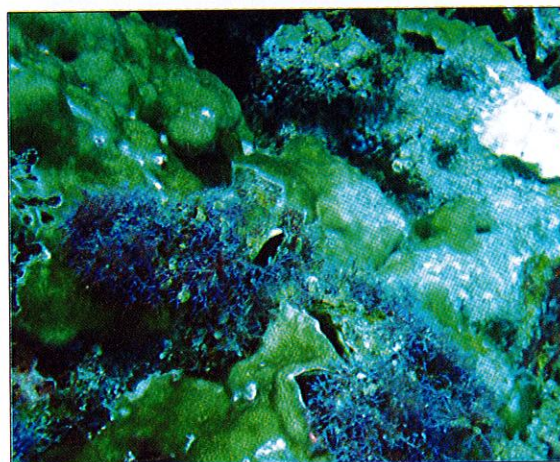


Figure 11. *Jania*

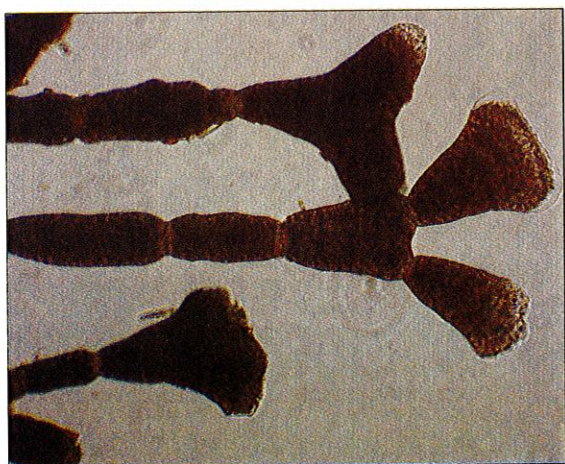


Figure 12. *Jania*



Figure 13. *Antithamnion*

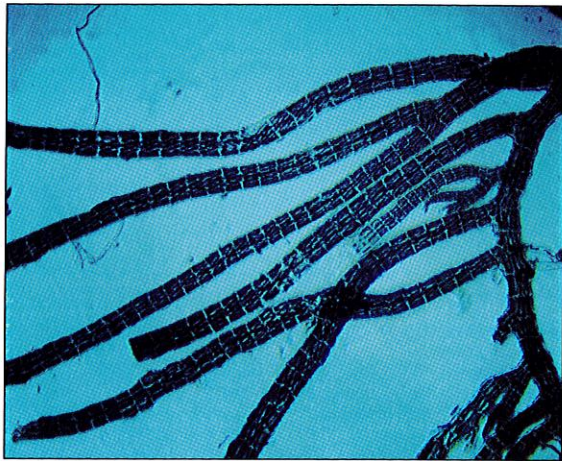


Figure 14. *Herposiphonia*

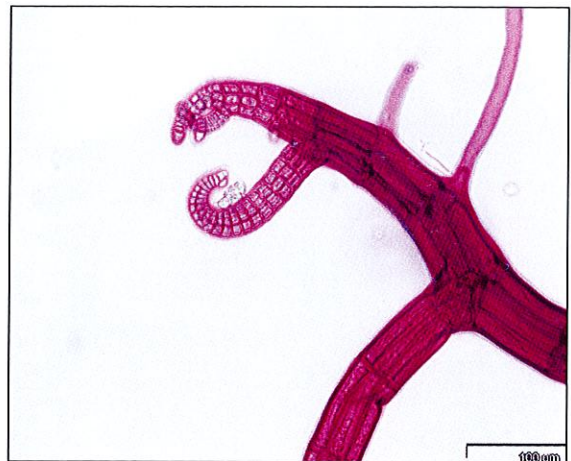


Figure 15. *Herposiphonia*



Figure 16. *Dictyota friabilis* (Herbarium specimen)



Figure 17. *Lobophora variegata*

Table 1. Preliminary Checklist of Marine Algae (seaweeds) from Jarak Island, Perak Island and the Sembilan Group of Islands, Straits of Malacca.

Taxa	Collection No.	Date	Location	Coordinates		Substratum
				Latitude	Longitude	
Division CYANOPHYTA						
Order Oscillatoriales						
Family Homoeotrichaceae						
* <i>Lyngbya confervoides</i> f. <i>violacea</i> C. Agardh						
	PSM 9308	5-Jun-04	Pulau Jarak	03°58'31"N	100°05'55"E	rocks
	PSM 9309	5-Jun-04	Pulau Jarak	03°58'31"N	100°05'55"E	rocks
	PSM 9310	5-Jun-04	Pulau Jarak	03°58'31"N	100°05'55"E	rocks
	PSM 9413	26-Nov-07	Pulau Lalang Selatan	04°00'39"N	100°54'38"E	sandy & rocky
	PSM 9414	26-Nov-07	Pulau Lalang Selatan	04°00'39"N	100°54'38"E	sandy & rocky
	PSM 9315-2	5-Jun-04	Jetty, Pulau Jarak	03°58'34"N	100°06'04"E	nylon string
	PSM 9316-3	5-Jun-04	Jetty, Pulau Jarak	03°58'34"N	100°06'04"E	rocks
	PSM 9321	5-Jun-04	Jetty, Pulau Jarak	03°58'34"N	100°06'04"E	rocks
	PSM 9404	24-Nov-07	Jetty, Pulau Jarak	03°58'32"N	100°06'10"E	sandy & rocky
	PSM 9329	7-Jun-04	Pulau Lalang Selatan	04°00'23"N	100°32'49"E	
<i>Lyngbya</i> sp. 1 C. Agardh						
<i>Lyngbya</i> sp. 2 C. Agardh						
Order Ulotrichales						
Family Ulotrichaceae						
	PSM 9336	9-Jun-04	Pulau Perak	05°40'50"N	98°56'11"E	
	PSM 9337	9-Jun-04	Pulau Perak	05°40'50"N	98°56'11"E	
	PSM 9338	9-Jun-04	Pulau Perak	05°40'50"N	98°56'11"E	
	PSM 9358-1	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	corals
	PSM 9359-1	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	corals
	PSM 9360-1	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	corals
	PSM 9361-1	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	corals
	PSM 9395	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	corals
	PSM 9396	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	corals
<i>Oscillatoria</i> sp. 1 Vaucher						
<i>Oscillatoria</i> sp. 2 Vaucher						
Division CHLOROPHYTA						
Order Ulotrichales						
Family Ulotrichaceae						
	PSM 9348	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	on concrete support of jetty
	PSM 9349	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	on concrete support of jetty
<i>Ulothrix</i> Kützting						

Taxa	Collection No.	Date	Location	Coordinates		Substratum
				Latitude	Longitude	
	PSM 9350	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	on concrete support of jetty
	PSM 9354	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
	PSM 9358-2	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	corals
	PSM 9359-2	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	corals
	PSM 9360-2	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	corals
	PSM 9361-2	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	corals
Order Ulvales						
Family Ulvaceae						
<i>Enteromorpha</i> sp. 1 Link	PSM 9334	7-Jun-04	Pulau Rumbia			
<i>Enteromorpha</i> sp. 2 Link	PSM 9386	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
<i>Enteromorpha</i> sp. 3 Link	PSM 9410	25-Nov-07	Pulau Jarak	03°58'32"N	100°06'10"E	tree trunk
Order Cladophorales						
Family Cladophoraceae						
<i>Cladophoraceae</i>						
<i>Chaetomorpha</i> sp. 1 Kützing	PSM 9372-3	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	coral wall
	PSM 9325	7-Jun-04	Pulau Lalang Selatan	04°00'23"N	100°32'49"E	
	PSM 9326	7-Jun-04	Pulau Lalang Selatan	04°00'23"N	100°32'49"E	
	PSM 9330	7-Jun-04	Pulau Lalang Selatan	04°00'23"N	100°32'49"E	
	PSM 9332	7-Jun-04	Pulau Rumbia			
<i>Chaetomorpha</i> sp. 2 Kützing	PSM 9411	25-Nov-07	Pulau Jarak	03°58'32"N	100°06'10"E	tree trunk
<i>Chaetomorpha</i> sp. 3 Kützing	PSM 9306	5-Jun-04	Pulau Jarak	03°58'31"N	100°05'55"E	tree trunk
<i>Cladophora</i> cf. <i>patentiramea</i>	PSM 9307	5-Jun-04	Pulau Jarak	03°58'31"N	100°05'55"E	tree trunk
<i>Cladophora</i> cf. <i>rhizoclonioides</i> van den Hoek & Womersley	PSM 9415	26-Nov-07	Pulau Lalang Selatan	04°00'39"N	100°54'38"E	sandy & rocky
<i>Cladophora</i> Kützing	PSM 9335-2	7-Jun-04	Pulau Rumbia			
Family Siphonocladaceae						
<i>Boodlea</i> G. Murray & De Toni	PSM 9387	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
<i>Struvea</i> Sonder	PSM 9405	24-Nov-07	Pulau Jarak	03°58'32"N	100°06'10"E	on net
<i>Ventricaria ventricosa</i> (J. Agardh) Olsen & J. West	PSM 9372-4	9-Jun-04	Pulau Perak	05°41'00"N	98°56'23"E	

Taxa	Collection No.	Date	Location	Coordinates		Substratum
				Latitude	Longitude	
Family Valoniaceae						
<i>Valonia aegagropila</i> C. Agardh	PSM 9399-2	9-Jun-04	Pulau Perak	03°58'31"N	100°05'55"E	rocks
<i>Valoniopsis</i> cf. <i>pachynema</i> (G. Martens) Bergesen	PSM 9312	5-Jun-04	Pulau Jarak	03°58'34"N	100°06'04"E	dead corals
	PSM 9317	5-Jun-04	Jetty, Pulau Jarak			Growing on tree trunk
	PSM 9331	7-Jun-04	Pulau Rumbia			
	PSM 9333	7-Jun-04	Pulau Rumbia			
Order Bryopsidales						
Family Bryopsidaceae						
<i>Bryopsis pennata</i> Lamouroux	PSM 9390	9-Jun-04	Pulau Perak			corals
	PSM 9391	9-Jun-04	Pulau Perak			corals
	PSM 9392	9-Jun-04	Pulau Perak			corals
	PSM 9393	9-Jun-04	Pulau Perak			corals
	PSM 9394	9-Jun-04	Pulau Perak			corals
	PSM 9402	9-Jun-04	Pulau Perak			corals
<i>Bryopsis</i> Lamouroux	PSM 9810	22-Nov-08	Pulau Sembilan	04°00'16"N	100°30'34"E	dead corals / rock in swell zone
	PSM 9379-1	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	coral wall
Family Caulerpaceae						
<i>Caulerpa peltata</i> Lamouroux	PSM 9353	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	corals
	PSM 9353	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	corals
	PSM 9364	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	coral wall
	PSM 9365	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	coral wall
	PSM 9403	9-Jun-04	Pulau Perak			
Division RHODOPHYTA						
Order Gelidiales						
Family Gelidiaceae						
Gelidiaceae	PSM 9335-1	7-Jun-04	Pulau Rumbia			
<i>Gelidium</i> sp. 1 Lamouroux	PSM 9314	5-Jun-04	Pulau Jarak	03°58'31"N	100°05'55"E	

Taxa	Collection No.	Date	Location	Coordinates		Substratum
				Latitude	Longitude	
<i>Gelidium</i> sp. 2 Lamouroux	PSM 9416	26-Nov-07	Pulau Lalang Selatan	04°00'39"N	100°54'38"E	sandy & rocky
<i>Pterocladia</i> J. Agardh	PSM 9374	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
Family Gelidiellaceae						
<i>Gelidiella</i> sp. 1 J. Feldmann & G. Hamel	PSM 9316-4	5-Jun-04	Jetty, Pulau Jarak	03°58'34"N	100°06'04"E	rocks
<i>Gelidiella</i> sp. 2 J. Feldmann & G. Hamel	PSM 9401-1	9-Jun-04	Pulau Perak			coral wall
<i>Gelidiella</i> sp. 3 J. Feldmann & G. Hamel	PSM 9312-1	5-Jun-04	Pulau Jarak	03°58'31"N	100°05'55"E	rocks
Order Bonnemaisoniales						
Family Bonnemaisoniaceae						
<i>Asparagopsis</i> Montagne	PSM 9347	9-Jun-04	Pulau Perak	05°40'50"N	98°56'11"E	
	PSM 9389	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	on rope
Order Cryptonemiales						
Family Halymeniaceae						
<i>Cryptonemia</i> J. Agardh	PSM 9370	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	corals
	PSM 9373	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	coral wall
	PSM 9378-3	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
	PSM 9380-1	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	String
	PSM 9397-1	9-Jun-04	Pulau Perak			
Family Peyssonneliaceae						
<i>Peyssonnelia</i> Decaisne	PSM 9407	24-Nov-07	Pulau Jarak	03°58'32"N	100°06'10"E	on rock
Order Corallinales						
Family Corallinaceae						
<i>Jamia</i> sp. 1 Lamouroux	PSM 9372-1	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	coral wall
	PSM 9376	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
	PSM 9377-2	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
	PSM 9378-2	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
	PSM 9380-2	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	String
	PSM 9385-2	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	

Taxa	Collection No.	Date	Location	Coordinates		Substratum
				Latitude	Longitude	
<i>Jania</i> sp. 2 Lamouroux	PSM 9375	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	sandy & rocky
	PSM 9420	26-Nov-07	Pulau Lalang Selatan	04°00'39"N	100°54'38"E	
Order Gigartinales						
Family Hypneaceae						
<i>Hypnea</i> sp. 1 Lamouroux	PSM 9313-1	5-Jun-04	Pulau Jarak	03°58'31"N	100°05'55"E	
<i>Hypnea</i> sp. 2 Lamouroux	PSM 9316-1	5-Jun-04	Jetty, Pulau Jarak	03°58'34"N	100°06'04"E	nylon string
	PSM 9318	5-Jun-04	Jetty, Pulau Jarak	03°58'34"N	100°06'04"E	dead corals
<i>Hypnea</i> sp. 3 Lamouroux	PSM 9343	9-Jun-04	Pulau Perak	05°40'50"N	98°56'11"E	
	PSM 9345	9-Jun-04	Pulau Perak	05°40'50"N	98°56'11"E	
	PSM 9346	9-Jun-04	Pulau Perak	05°40'50"N	98°56'11"E	corals
	PSM 9357	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	corals
<i>Hypnea</i> sp. 4 Lamouroux	PSM 9362-1	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	corals
	PSM 9366	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	coral wall
	PSM 9367-2	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
	PSM 9371-2	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	coral wall
	PSM 9379-3	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	coral wall
	PSM 9382	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	coral wall
	PSM 9383	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	coral wall
	PSM 9384-1	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
Order Rhodymeniales						
Family Champiaceae						
<i>Champia</i> sp. 1 Desvaux	PSM 9362-2	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	corals
<i>Champia</i> sp. 2 Desvaux	PSM 9421	26-Nov-07	Pulau Lalang Selatan	04°00'39"N	100°54'38"E	sandy & rocky
<i>Gelidiopsis</i> Schmitz	PSM 9399-1	9-Jun-04	Pulau Perak			
Order Ceramiales						
Family Ceramiaceae						
<i>Ceramium</i> sp. 1	PSM 9372-2	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	coral wall

Taxa	Collection No.	Date	Location	Coordinates		Substratum
				Latitude	Longitude	
<i>Antithamion</i> sp. 1 Nägeli	PSM 9378-1	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	sandy & rocky
<i>Antithamion</i> sp. 2 Nägeli	PSM 9422	26-Nov-07	Pulau Lalang Selatan	04°00'39"N	100°54'38"E	String
<i>Ceramium</i> sp. 1 Roth	PSM 9380-3	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	on rock
<i>Ceramium</i> sp. 2 Roth	PSM 9408	24-Nov-07	Pulau Jarak	03°58'32"N	100°06'10"E	sandy & rocky
<i>Ceramium</i> sp. 3 Roth	PSM 9417	26-Nov-07	Pulau Lalang Selatan	04°00'39"N	100°54'38"E	dead corals
<i>Wrangelia</i> C. Agardh	PSM 9319	5-Jun-04	Jetty, Pulau Jarak	03°58'34"N	100°06'04"E	
Family Delesseriaceae						
<i>Hypoglossum</i> Kützting	PSM 9385-4	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	coral wall
Family Rhodomelaceae						
<i>Bostrychia</i> Montagne	PSM 9379-4	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	String
	PSM 9380-4	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
	PSM 9385-3	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
<i>Chondria</i> C. Agardh	PSM 9418	26-Nov-07	Pulau Lalang Selatan	04°00'39"N	100°54'38"E	sandy & rocky
<i>Herposiphonia</i> Nägeli	PSM 9311	5-Jun-04	Pulau Jarak	03°58'31"N	100°05'55"E	rock and wood
	PSM 9412	24-Nov-07	Pulau Jarak	03°58'32"N	100°06'10"E	on rock
<i>Herposiphonia</i> Nägeli	PSM 9315-3	5-Jun-04	Jetty, Pulau Jarak	03°58'34"N	100°06'04"E	nylon string
<i>Laurencia</i> sp. 1 Lamouroux	PSM 9339	9-Jun-04	Pulau Perak	05°40'50"N	98°56'11"E	corals
	PSM 9340	9-Jun-04	Pulau Perak	05°40'50"N	98°56'11"E	corals
	PSM 9341	9-Jun-04	Pulau Perak	05°40'50"N	98°56'11"E	corals
	PSM 9342	9-Jun-04	Pulau Perak	05°40'50"N	98°56'11"E	
	PSM 9355	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
	PSM 9356	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
	PSM 9363	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
	PSM 9371-1	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
	PSM 9397-2	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
<i>Laurencia</i> sp. 3 Lamouroux	PSM 9400	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
	PSM 9369	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
<i>Laurencia</i> sp. 4 Lamouroux	PSM 9377-1	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
cf. <i>Lophocladia</i> (J. Agardh) Schmitz	PSM 9313-3	5-Jun-04	Pulau Jarak	03°58'31"N	100°05'55"E	

Taxa	Collection No.	Date	Location	Coordinates		Substratum
				Latitude	Longitude	
<i>Polysiphonia scopulorum</i> Harvey	PSM 9406	24-Nov-07	Pulau Jarak	03°58'32"N	100°06'10"E	on net
<i>Polysiphonia</i> sp. 1 Greville	PSM 9313-2	5-Jun-04	Pulau Jarak	03°58'31"N	100°05'55"E	
<i>Polysiphonia</i> sp. 2 Greville	PSM 9315-1	5-Jun-04	Jetty, Pulau Jarak	03°58'34"N	100°06'04"E	nylon string
	PSM 9316-2	5-Jun-04	Jetty, Pulau Jarak	03°58'34"N	100°06'04"E	rocks
<i>Polysiphonia</i> sp. 3 Greville	PSM 9379-2	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	coral wall
	PSM 9384-2	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
	PSM 9385-1	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
	PSM 9388	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
<i>Polysiphonia</i> sp. 4 Greville	PSM 9423	26-Nov-07	Pulau Lalang Selatan	04°00'39"N	100°54'38"E	sandy & rocky
Unknown red	PSM 9322	7-Jun-04	Pulau Lalang Selatan	04°00'23"N	100°32'49"E	
Unknown red	PSM 9323	7-Jun-04	Pulau Lalang Selatan	04°00'23"N	100°32'49"E	on boulders, strong waves
Unknown red	PSM 9324	7-Jun-04	Pulau Lalang Selatan	04°00'23"N	100°32'49"E	
Unknown red	PSM 9327	7-Jun-04	Pulau Lalang Selatan	04°00'23"N	100°32'49"E	on boulders, higher shore
Unknown red	PSM 9328	7-Jun-04	Pulau Lalang Selatan	04°00'23"N	100°32'49"E	on boulders, higher shore
Unknown red	PSM 9381	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	
Unknown red	PSM 9424	26-Nov-07	Pulau Lalang Selatan	04°00'39"N	100°54'38"E	sandy & rocky
Unknown red	PSM 9398	9-Jun-04	Pulau Perak			
Division PHAEOPHYTA						
Order Dictyotales						
Family Dictyotaceae						
<i>Dictyota friabilis</i> Setchell	PSM 9344	9-Jun-04	Pulau Perak	05°40'50"N	98°56'11"E	corals
	PSM 9367-1	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	coral wall
	PSM 9401-1	9-Jun-04	Pulau Perak			coral wall
<i>Lobophora variegata</i> (Lamouroux) Womersley ex Oliveira	PSM 9368	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	coral wall
	PSM 9409	24-Nov-07	Pulau Jarak	03°58'32"N	100°06'10"E	on net
Order Scytosiphonales						
Family Scytosiphonaceae						
<i>Hydroclathrus</i> Bory de Saint-Vincent	PSM 9351	9-Jun-04	Pulau Perak	05°41'00"N	98°56'14"E	coral

*: New Record

have a low species diversity (36 genera and 66 taxa) compared to the total flora of Malaysia (381 taxa) and the flora of Langkawi (84 taxa). Pulau Perak and Pulau Langkawi only share 15 genera in common. One new record of *Lyngbya confervoides f. violacea* is reported for the first time for Malaysia. There may be a few more records which have to be confirmed with more samples. The algae flora of Pulau Perak, Jarak and Sembilan therefore offers an interesting assemblage for further studies, especially with regards to tropical marine biodiversity and biogeography. Further collections have to be made at Pulau Perak as the coral ecosystem there is unique suggesting that the algal flora may also have unique features. In order to conserve their uniqueness, Pulau Perak and Pulau Jarak should be declared marine protected area.

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