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OBSERVATIONAL STUDIES

A Preliminary Checklist of Molluscs in the Kelanang Coast at Banting: An Observational Study

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Abstract

This research aims to determine the updated species list of molluscs (Gastropods and Bivalves) populating the Kelanang coast at Banting (Selangor) in November 2022. Nine gastropod species and eight bivalve species were discovered in this study, with *Pisania striata*, *Cominella quoyana,* and *Mereterix casta* as the dominant species. This preliminary investigation could provide a continuous baseline for future taxonomical and biodiversity references as part of our efforts to develop coastal marine ecosystem management and conservation in the Banting coastal area. Further ecotoxicological studies to establish the potential biomonitors as good heavy metal pollution in the coastal waters of Banting are highly recommended.

Introduction

The studies on the taxonomical checklist of molluscs in the coastal area of Southeast Asia region is very important [1]. The status could indicate the current use of bivalves in the Southeast Asia region is whether sustainable or otherwise. Nevertheless, continuous monitoring should be conducted to provide appropriate data for proper management. Species composition and distribution of molluscs in Malaysian coastal areas have been reported by several researchers, such as [2-9]. However, a similar study on the Kelanang coast has never been reported.

Kelanang coast, which is located in Selangor (Figure 1), is one of the famous tourist hotspots on the west coast of Peninsular Malaysia. Kelanang shoreline area experiences various anthropogenic activities including gleaning for gastropods and bivalves, fishing, camping, and picnicking. Kelanang coast is fringed with mangroves and pine trees (*Casuarina* spp.). The intertidal flat and mangrove forest in this area, which spans 7 km along

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Figure 1 Kelanang coast intertidal area exposed during low tide.

the shoreline until the Morib coast, is well known for the rich biodiversity of coastal wildlife, flora and meiofauna. However, the checklist of molluscs at Kelanang coast have never been documented.

The objective of this observational study was to determine the updated species list of molluscs (gastropods and bivalves) populating the Kelanang coast at Banting (Selangor) in November 2022.

Methodology

Observational studies and samplings of molluscs were conducted in the coastal area of Kelanang, Banting (Selangor) (Figure 2) on 30 October 2022 during the low tide. Sample collection was focused on shallow waters and intertidal regions of the coast. Bivalves and gastropods found attached to sands, rocks, stones and pebbles on the shores were collected by hand-picking or scraping on the substrate. The molluscs were rinsed with seawater to remove sand particles and debris. Individual specimen was placed in a clean polythene bag and labelled. In the laboratory, the specimens' morphological features were examined. The flesh was removed and the shells were rinsed with tap water, air-dried and kept in clean containers for long-term preservation. All collected molluscs were photographed and identified to the lowest possible taxonomic level based on the online databases of the [10-16].

Results

The species list of bivalves and gastropods collected from Kelanang coast is presented in table 1. Nine gastropod species were documented, namely *Naticarius hebraeus*, *Gemmula sibogae*, *Pisania striata*, *Drupella margariticola*, *Potamides* sp., *Sinum perspectivum*, *Murex trapa*, *Volegalea cochlidium* and *Cominella quoyana* (Figure 3).

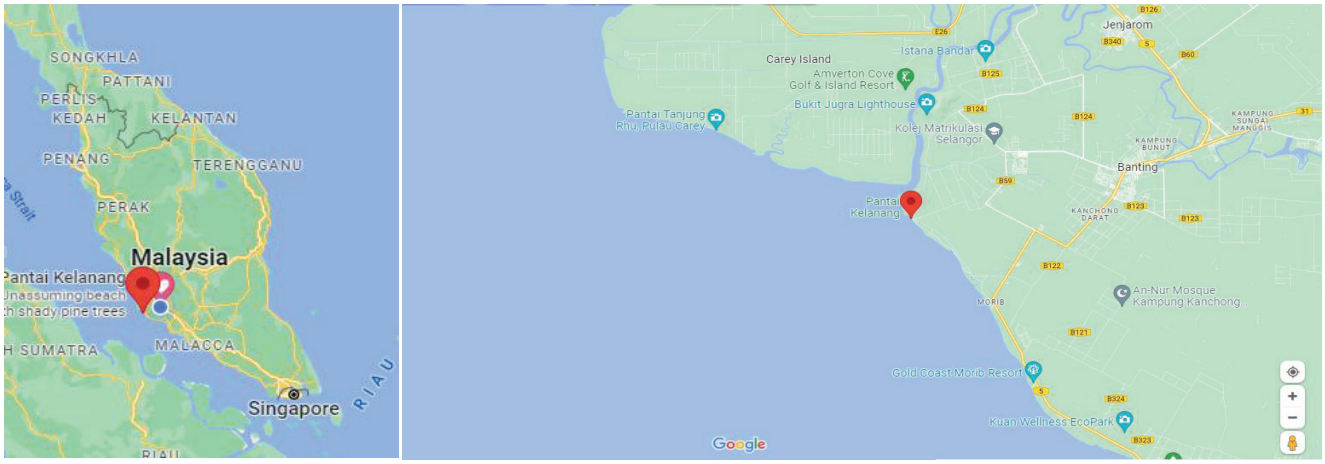

Figure 2 Map of location of Kelanang coast (coordinate: 2°47'22.6"N 101°24'42.0"E).

Table 1: Species of gastropods and bivalves found at the Kelanang coast, Selangor.

No.	Scientific Name	Common Name	Family
	gastropods		
i.	*Naticarius hebraeus* [11]	Hebrew moon-shell	Naticidae
ii.	*Gemmula sibogae* [17]	Sea snail	Cochlespiridae
iii.	*Pisania striata* [18]	Sea snail	Buccinidae
iv.	*Drupella margariticola* [19]	Shouldered Castor Bean	Muricidae
v.	*Potamides* sp. [20]	Sea snail	Potamididae
vi.	*Sinum perspectivum* [21]	White baby ear	Naticidae
vii.	*Murex trapa* Röding [12]	Rare-spined murex	Muricidae
viii.	*Volegalea cochlidium* [22]	Spiral melongena	Melongenidae
ix.	*Cominella quoyana* A. [23]	The speckled whelk	Cominellidae
	bivalves		
i.	*Mereterix casta* [24]	Backwater hard clam	Veneridae
ii.	*Solen marginatus* [25]	Grooved razor shell	Solenidae
iii.	*Saccostrea cucullata* [26]	The hooded oyster	Ostreidae
iv.	*Cochlodesma praetenue* [25]	European spoon clam	Periplomatidae
v.	*Dosinia maoriana* [27]	Venus clams	Veneridae
vi.	*Macomangulus tenuis* [26]	Thin-shelled tellina	Tellinidae
vii.	*Tegillarca granosa* [28]	Natal ark	Arcidae
viii.	*Magallana belcheri* [29]	Belcher's cupped oyster	Ostreidae

Figure 3 Nine gastropod species collected from the Kelanang coast, Selangor. i. *Naticarius hebraeus*; ii. *Gemmula sibogae*; iii. *Pisania striata*; iv. *Drupella margariticola*; v. *Potamides* sp.; vi. *Sinum perspectivum*; vii. *Murex trapa*; viii. *Volegalea cochlidium*; and ix. *Cominella quoyana*.

Eight bivalve species collected from Kelanang coast are presented in figure 4. These bivalves include *Mereterix casta*, *Solen marginatus*, *Saccostrea cucullata*, *Cochlodesma practenue*, *Dosinia maoriana*, *Macomangulus tenuis*, *Tegillarca granosa* and *Magallana belcheri.*

Discussion

The present checklist in this study is comparable to the findings of previous studies conducted in other coastal regions in Peninsular Malaysia. For example, in Pulau Gazumbo (Penang), Vian LW, et al. [30], studied the diversity of molluscs and the influence of sediment properties towards their distribution. They reported 13 species of bivalves from seven families and ten genera, and 28 species of gastropods from 16 families and 22 genera. Among all reported molluscs species, *Cerithium coralium* from *Cerithiidae* were the most dominant species.

Another study, Abdul Halim SS, et al. [2] in multiple sites around Penang waters shows that Teluk Kumbar was reported to have a high level of species diversity (H' = 1.21 ± 0.22) and species evenness (J' = 0.92 ± 0.10) of molluscs, while the species richness of Pulau Betong was higher (S = 6.60 ± 6.47). *Umbonium vestiarium* was more dominant in the fine-sanded intertidal region of Teluk Aling, which had the maximum overall abundance of 2,535 individuals m^{-3}. The highest species frequency in all sites, except in Batu Feringghi, were *Zeuxis* sp. and *Diplodonta asperoides*. There were significant environmental differences among the sediments of these study sites, such as sediment type, temperature, salinity, and organic matter. The low species diversity in Jelutong

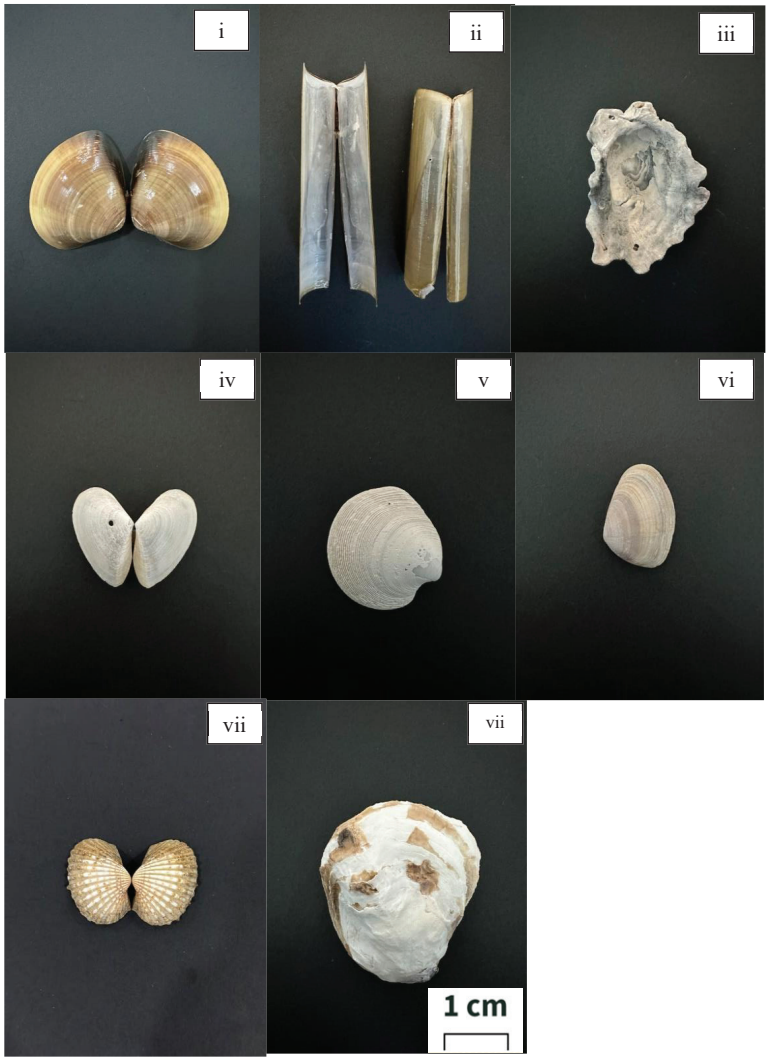

Figure 4 Eight bivalve species collected from the Kelanang coast, Selangor. i. *Mereterix casta*; ii. *Solen marginatus*; iii. *Crassostrea cucullata*; iv. *Cochlodesma practenue*; v. *Dosinia maoriana*; vi. *Macomangulus tenuis*; vii. *Tegillarca granosa*; and viii. *Magallana belcheri*.

and the absence of molluscs at Batu Feringghi could be attributed to the high anthropogenic activities in this area [2].

It also has been reported that high anthropogenic activities could directly impact the diversity of fauna and flora along the west coast of Peninsular Malaysia. For instance, Ghazaly MM, et al. [31], discovered that the diversity and distribution density of the mangrove flora and meiofauna at different intertidal zones were affected by extensive human activities. They had noticed a depletion of species diversity at different intertidal zones, where the variety of meiofauna species diminished in the mid-and high-intertidal zones.

In Kelanang coast, the diversity of molluscs could be attributed to abiotic factors such as the increased productivity of intertidal regions adjacent to the mangroves. Previous ecological studies on Kelanang coast showed that the sediment samples under the mangrove tree *Rhizophora apiculata's* roots had elevated organic matter levels. A study was conducted by Harun HH, et al. [32], on the hydrogeological characteristics that may contribute to the possible degradation of the groundwater's quality as well as the hydrogeochemistry of the groundwater in Banting, Selangor. They discovered that physical parameters such as conductivity, salinity, chemical oxygen demand and total dissolved solids could be measured through the groundwater. The groundwater samples were highly influenced by seawater intrusions, as reflected by the elevated levels of major ions. Even though the monitoring wells are in agricultural areas, non-point pollution from agricultural practices does not affect groundwater quality.

Air pollutants like sulfur dioxide, nitrogen dioxide, ozone, and particulate matter can harm molluscs, affecting their populations and ecosystems. These pollutants can damage mollusc tissues, disrupt their habitats and food sources, and decrease their reproductive success. Reduced population sizes and ecological imbalances result. Reducing air pollution through emission controls and sustainable practices is crucial for protecting mollusc diversity and restoring habitats. According to Suparta W, et al. [33], Precipitable Water Vapour (PWV) index variability can detect the levels of air pollutants in Banting. Based on preliminary findings, levels of air pollution have a minor influence on the PWV index during the northeast monsoon and none in the southwest monsoon. The PWV index declined, whereas air pollution concentrations increased during the haze period. Asfahani J, et al. [34] used natural gamma ray well logging methods to understand the vertical and lateral radioactivity (GR) laterally in the Banting district of southwest Peninsular Malaysia. They identified that the silty clay layers, along with uranium and thorium, are the primary reasons for the elevated radioactivity ranges and heat generation.

Ikram MM, et al. [35] collected mudskippers, *Periophthalmodon schlosseri*, and surface sediments from the intertidal mudflat area of Morib, West Coast of Peninsular Malaysia, to study their levels of Cd, Cu, Pb, and Zn. They proposed that mudskippers are useful biomonitoring species to assess pollution and bioavailability of heavy metals in intertidal coastal mudflats. Physico-chemical parameters and bacterial pollution can significantly impact the diversity of molluscs. Changes in water temperature, pH levels, salinity, and dissolved oxygen can disrupt their habitats and physiological functions. Additionally, bacterial pollution from sewage and industrial waste can introduce pathogens and toxins, leading to mortality and reduced population sizes. These factors pose threats to the diversity and health of molluscs. Jalal KCA, et al. [36] conducted a study on physico-chemical parameters and bacterial pollution in *Orbicularia orbiculate* [37] and *Tegillarca granosa* (Previously known as *Anadara granosa*) at Pahang. The results show that the Pahang Estuary's edible molluscs were contaminated with pathogenic bacteria and would be unsafe for human ingestion. In addition, to enhance the identification precision of ambiguous species, the combined use of morphological traits, DNA barcoding, and molecular elucidation is highly recommended [38-41].

Conclusion

The findings of this study can be used as foundation data for an updated checklist and accurate taxonomy database of molluscs at the Kelanang coast of Banting, Selangor. However, the challenges in species identification, the absence of a thorough taxonomical reference of local molluscs species, and a lack of understanding of the identifier's malacology may undermine this study's importance. Due to the identification difficulties of some molluscs species, which are caused by interspecific variations of shell morphology, the species diversity may be underestimated or overestimated. Nevertheless, the present finding highlighted the importance of future human health risk assessment of potentially

toxic metals on the edible molluscs from Kelanang coast. More ecotoxicological studies to establish the potential molluscs as good biomonitors of metal pollution are highly needed in the future.

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