

# **BASIC KNOWLEDGE IN MARINE SCIENCES**

Edited by

Normawaty Mohammd-Noor



IIUM Press

Published by:  
IIUM Press  
International Islamic University Malaysia

First Edition, 2011  
©IIUM Press, IIUM

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without any prior written permission of the publisher.

Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

Normawaty Mohammd-Noor: Basic Knowledge in Marine Sciences

ISBN: 978-967-418-199-4

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM  
(Malaysian Scholarly Publishing Council)

Printed by :

**IIUM PRINTING SDN. BHD.**

No. 1, Jalan Industri Batu Caves 1/3

Taman Perindustrian Batu Caves

Batu Caves Centre Point

68100 Batu Caves

Selangor Darul Ehsan

## Table of Contents

| Chapter  | Page |
|--|------|
| <b>Part 1 Algae</b>  |      |
| <hr/>  |      |
| <b>Chapter 1 Algae</b>   |      |
| <i>Normawaty Mohammad-Noor</i> .....   | 2    |
| <b>Chapter 2 Microalgae</b>  |      |
| <i>Normawaty Mohammad-Noor</i> .....   | 7    |
| <b>Chapter 3 Seaweed</b>   |      |
| <i>Normawaty Mohammad-Noor</i> .....   | 12   |
| <b>Chapter 4 Importance of Algae</b>   |      |
| <i>Anidha Visvanathan &amp; Normawaty Mohammad-Noor</i> .....                  | 17   |
| <b>Chapter 5 Toxic Microalgae</b>  |      |
| <i>Anidha Visvanathan &amp; Normawaty Mohammad-Noor</i> .....                  | 23   |
| <b>Chapter 6 Benthic Dinoflagellates</b>                                       |      |
| <i>Anidha Visvanathan &amp; Normawaty Mohammad-Noor</i> .....                  | 28   |
| <b>Chapter 7 Diatoms</b>   |      |
| <i>Anies Aznida Sa'ari &amp; Normawaty Mohammad-Noor</i> .....                 | 34   |
| <b>Chapter 8 Techniques to Collect Benthic Dinoflagellates</b>                 |      |
| <i>Anidha Visvanathan &amp; Normawaty Mohammad-Noor</i> .....                  | 42   |
| <b>Chapter 9 Techniques to Collect Sand-Dwelling Dinoflagellates</b>           |      |
| <i>Asilah Al-Has &amp; Normawaty Mohammad-Noor</i> .....                       | 47   |
| <b>Chapter 10 Technique to Collect and Determination of Algal Cell Density</b> |      |
| <i>Normawaty Mohammad Noor, Anies Aznida Sa'ari &amp; Asilah Al-Has</i> .....  | 53   |

**Chapter 11 Technique to Establish Microalgae into Pure Culture**

*Normawaty Mohammad-Noor & Mohamad Fuad Mohamad Anuar*.....58

**Chapter 12 Media for Microalgae Culture**

*Normawaty Mohammad-Noor & Mohamad Fuad Mohamad Anuar*.....63

**Chapter 13 Scanning Electron Microscopy**

*Normawaty Mohammad-Noor & Asilah Al-Has*.....69

**Chapter 14 Making Seaweed Herbarium**

*Normawaty Mohammad-Noor*.....74

**Part 2 Beach Profile and Sediment Characteristics**

---

**Chapter 15 Beach Profile**

*Shahbudin Saad*.....80

**Chapter 16 Littoral Environmental Observation**

*Shahbudin Saad*.....90

**Chapter 17 Grain-Size Analysis**

*Shahbudin Saad*.....97

**Part 3 Coral Reef**

---

**Chapter 18 Suspended Sediment in Coral Reef Area**

*Shahbudin Saad*.....113

**Chapter 19 Line Intercept Transect**

*Shahbudin Saad*.....118

## **Chapter 20 Coral Recruitment**

*Shahbudin Saad*.....127

## **Chapter 21 Coral Reef Fish Assemblages**

*Shahbudin Saad*.....132

## **Chapter 22 Determination of Coral Cover (Coral Lifeforms) in Marine Environment**

*Mohamed Kamil Abdul Rashid*.....137

## **Part 4 Marine Pollution**

---

## **Chapter 23 Determination of Aliphatic and Aromatic Hydrocarbons in Marine Environment**

*Mohamed Kamil Abdul Rashid*.....144

## **Chapter 24 Determination of Dissolved Inorganic Nitrogen (DIN) in Marine Environment.**

*Mohamed Kamil Abdul Rashid*.....151

## **Chapter 25 Water Sampling Techniques**

*Anies Aznida Sa'ari, Kamaruzzaman Yunus & Akbar John*.....158

## **Chapter 26 Determination of Fecal Coliform and *Escherichia coli* (*E. coli*) in Marine Environment**

*Mohamed Kamil Abdul Rashid*.....163

## **Chapter 27 Determination of Organochlorine Insecticides in Oyster and Marine Sediment**

*Mohamed Kamil Abdul Rashid*.....170

## **Chapter 28 Detection of Heavy Metals in Sediment and Biological Samples**

*Anies Aznida Sa'ari, Akbar John & Kamaruzzaman Yunus*.....179

## **Chapter 29 Laboratory Protocols - Sediment Sample Analysis**

*Anies Aznida Sa'ari, Kamaruzzaman Yunus & Akbar John*.....186

**Chapter 30 *Anadara granosa* – A Potential Bioindicator in Coastal Waters of Langkawi Island, Malaysia**

*Kamaruzzaman Yunus, Mohd Zahir Md Suhaimi, Fikriah Faudzi, Mohd Fuad Miskon & Akbar John* .....195

**Chapter 31 Bioaccumulation of Selected Metals in Commercially Important Marine Fishes from Selangor Coastal Waters, Malaysia**

*Kamaruzzaman Yunus., Rina Sharlinda Zabri, Fikriah Faudzi, Mohd Fuad Miskon & Akbar John*... ..206

**Part 5 Fish**

---

**Chapter 32 Larval Feeding Behavior and Sensory Organs**

*Yukinori Mukai*.....215

**Chapter 33 Procedure of Histological Experiment**

*Yukinori Mukai*.....221

## Chapter 12 Media for Microalgae Culture

Normawaty Mohammad-Noor & Mohamad Fuad Mohamad Anuar

Institute of Oceanography and Maritime Studies, Kulliyah of Science, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, Bandar Indera Mahkota, 25200 Kuantan

### Introduction

There are many different types of media that have established to culture microalgae. The choice of media depends on species that going to be cultivated. Some media is enriched with other substances such as soil extract to enhance the growth of the microalgae.

In preparing media for marine microalgae, the seawater used must be clean. Therefore to avoid collecting polluted seawater, offshore seawater can be an option. All apparatus such as flasks, blue-cap bottles and pipettes used need to be sterilized. Stock media that have been prepared have to be kept in the refrigerator. Label clearly the date and the name of the stock media. In this chapter several recipes of media that are commonly used are listed.

#### A. BBM (Bold Basal Media)

##### 1. Stock

|                                      |        |
|--------------------------------------|--------|
| NaNO <sub>3</sub>                    | 10.0 g |
| MgSO <sub>4</sub> .7H <sub>2</sub> O | 3.0 g  |
| K <sub>2</sub> HPO <sub>4</sub>      | 4.0 g  |
| KH <sub>2</sub> PO <sub>4</sub>      | 6.0 g  |
| CaCl <sub>2</sub>                    | 1.0 g  |
| NaCl                                 | 1.0 g  |

Each stock is dissolved with 400 ml distilled water separately.