

MFT 00203

Science Foundation **BIOLOGY**

Wong Hie Ling
Aainaa Syazwani Mohamad Amir Hamzah
Nurul Irene Hanie

Copyright UMK PRESS, 2022

All rights reserved. No part of this publication may be reproduced, stored in production transmitted in any form, whether electronic, mechanical, photocopying, recording or otherwise, without having permission from the UMK Press.

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

Wong, Hie Ling

MTF 00203 : Science Foundation : BIOLOGY / Wong Hie Ling, Aainaa Syazwani

Mohamad Amir Hamzah, Nurul Irene Hanie.

ISBN 978-967-0021-13-3

1. Biology.

2. Cells.

3. Government publications--Malaysia.

I. Aainaa Syazwani Mohamad Amir Hamzah. II. Nurul Irene Hanie.

III. Title.

570

Executive Producer: Azman Hashim. Copy Editor: Amirul Firdaus Zilah,

Raihana Sulaiman. Acquisition Editor: Nur Fatihah Pahazri.

Concept & Typesetting: Fatinah Ilias. Proof Reader: Zaliha Noor

Technical Assistant: Mohd Suhairi Mohamad.

Published by:

UMK Press

Universiti Malaysia Kelantan

Office of Library and Knowledge Management

16300 Bachok, Kelantan

(Member of Malaysian Scholarly Publishing Council (MAPIM))

(Member of Malaysian Book Publishers Association (MABOPA))

Membership Number : 201903)

Printed by:

Graham Media Enterprise

Lot 2720, Ground Floor, Jalan Permata 4

Taman permata Hulu Kelang,

53300 Kuala Lumpur

Your scientific journey begins here.



CONTENT

LIST OF ILLUSTRATIONS	xi
LIST OF TABLES	xvii
LIST OF ABBREVIATIONS	xix
PREFACE	xxi
CHAPTER 1 Cell Structure and Organisation	1
Cells: Prokaryotic and Eukaryotic	1
General Structures of Animal and Plant Cells	5
Tissues and Organs in Organisms	8
The Endosymbiotic Theory	9
What Are the Structures and Functions of a Cell?	10
CHAPTER 2 Cell Division and Life Cycle	27
The Concept of Cell Division	27
Life Cycle of a Cell	28
Mitosis	30
Meiosis	32
Binary Fission	35
Alternation of Generations	36
CHAPTER 3 Biological Membranes	41
Structure of A Plasma Membrane	41
Properties of The Plasma Membrane as A Semipermeable Membrane	43
What Are Hypotonic, Hypertonic and Isotonic Solutions?	50
Plasmolysis, De-plasmolysis, Haemolysis and Crenation	51
How Does Plant Root Hairs Absorb Water?	54
How Does Plant Root Hairs Uptake Ions?	55

CHAPTER 4 Molecules of Life	59
Physical, Chemical Properties and Physiological Roles of Molecules of Life	59
Water	59
Carbohydrates	64
Lipids: Oils and Fats	69
Proteins and Amino Acids	74
Nucleic Acids	78
CHAPTER 5 Biocatalysis	85
Properties of Enzyme and Mechanism of Actions	85
Inhibition: Reversible and Irreversible	87
Enzyme Classification According to Common Name and IUB into Six Classes of Enzymes	90
CHAPTER 6 Cellular Respiration	97
Types of Respiration: Aerobic and Anaerobic	97
Aerobic Respiration	97
Cellular Respiration Stage I: Glycolysis	100
Cellular Respiration Stage II: The Krebs Cycle	101
Cellular Respiration Stage III: Electron transport	103
Alternative Sources of Energy	104
CHAPTER 7 Photosynthesis	109
Overview of Photosynthesis	109
The Absorption Spectrum of Photosynthetic Pigments	111
Light Dependent Reaction	114
Light Independent Reaction / Calvin Cycle	114
Alternative Mechanism of Carbon Fixation	117
CHAPTER 8 Mendelian Genetics	123
Monohybrid Cross	123
Mendel's Law of Segregation	124

Dihybrid Cross	125
Test Cross	127
Trihybrid Cross	128
Non-Mendelian Inheritance	129
CHAPTER 9 Extension of Mendelian Genetics	135
Multiple Alleles	135
Lethal Alleles	136
Epistatic and Hypostatic	138
Polyploidy	139
Mutation	140
Sex-Linked Genes	141
Sex-Influenced Genes	143
Sex-Limited Genes	143
BIBIOGRAPHY	147
INDEX	149
AUTHORS' BIOGRAPHIES	151