



AIN SHAMS UNIVERSITY
Women's College for Arts, Science and Education
Zoology Department

DNA Barcoding of Some Common Fish Species in Kuwait's Bay

**A Thesis Submitted for the
Ph. D. degree of Science "Molecular Biology"**

By
BAHEYAH HETEEMY JALAWY RASHED ALZAFIRI

Under supervision of

Prof. Dr. Ramadan Ahmed Mohamed Ali

Professor of Cytogenetics and Molecular Biology, Women's College for Arts,
Science and Education, Ain Shams University

Prof. Dr. Mohamed Abd El-Salam Rashed

Professor of Molecular Biology, Genetics dept., Faculty of Agriculture,
Ain Shams University

Dr. Mahmoud Magdy Abdallah Awad

Doctor of Molecular Biology, Genetics dept., Faculty of Agriculture,
Ain Shams University

2018



AIN SHAMS UNIVERSITY
Women's College for Arts, Science and
Education
Zoology Department

DNA Barcoding of Some Common Fish Species in Kuwait's Bay

A Thesis Submitted

By

BAHEYAH HETEEMY JALAWY RASHED ALZAFIRI

School Senior Teacher of Sciences - Kuwait
(M.Sc., 2004, King Saud University, KSA)

For the Degree of Ph. D. in Zoology
(Molecular Biology)

2018

Name: Baheyah Heteemy jalawy Rashed Alzafiri

Title: DNA Barcoding of Some Common Fish Species in Kuwait's Bay.

Scientific degree: Doctor of Philosophy (Ph. D).

Supervisors:

1- Prof. Dr. Ramadan Ahmed Mohamed Ali

Professor of Cytogenetics and Molecular Biology, Women's College for Arts, Science and Education, Ain Shams University.

2- Prof. Dr. Mohamed Abd El-Salam Rashed

Professor of Molecular Biology, Faculty of Agriculture, Genetics dept., Ain Shams University.

3- Dr. Mahmoud Magdy Abdallah Awad

Doctor of Molecular Biology, Faculty of Agriculture, Genetics dept., Ain Shams University.

Approval Sheet

Name: Baheyah Heteemy jalawy Rashed Alzafiri

Title: DNA Barcoding of Some Common Fish Species in Kuwait's Bay.

Scientific degree: Philosophy of Science (Ph. D).

This thesis has been approved by:

1. Prof. Dr. Nagwa Hassan Ali Hassan

Professor of Zoology, Faculty of Science, Ain Shams University.

2. Prof. Dr. Akmal Abdel-Hamied Al-Ghour

Professor of Zoology, Faculty of Science, Cairo University.

3. Prof. Dr. Mohamed Abdel-Salam Rashed

Professor of Molecular Genetics, Faculty of Agriculture, Ain Shams University.

4. Prof. Dr. Ramadan Ahmed Mohamed Ali

Professor of Cytogenetics and Molecular Biology, Women's College for Arts, Science and Education, Ain Shams University.

Head of Zoology Department

Women's College for Arts, Science and Education

Ain Shams University

Declaration

This thesis has not been previously submitted for any degree at this or any other university. The references in the text will show specifically the extent to which I have availed myself of the work of other authors.

Baheyah Heteemy jalawy Alzafiri

ACKNOWLEDGEMENTS

ACKNOWLEDGEMENTS

*"Sincere and humble gratitude to the all mighty **Allah** who helped me to finish this work"*

This research would have been impossible without the support of my supervisors and professors, Prof. Dr. Mohamed Abdel-Salam Rashed, Prof. Dr. Ramadan Ali and Dr. Mahmoud Magdy.

I would like to take this time to graciously thank my colleagues in the laboratory of molecular genetics - Genetics Department, in the Faculty of Agriculture, Ain Shams University for all their time and continuous patience and support through this lengthy work process (especially, Dr. Ahmed Mamoon, Samah Soliman, Hatem Sayed, Hagar Tarek, Yousr Feteha and Moustafa Nafee).

Special gratitude and respect to Prof. Dr. Mohsen Al-Husaini from Kuwait Institute for Scientific Research, Kuwait; for his great hospitality, guidance and support during the morphological identification of the species under study, and his precious comments and criticism of the current results.

A special thanks to Prof. Dr. Nadia Hussein in the Zoology Department - College of Women for Arts, Science and Education, Ain Shams University for her moral support and encouragement.

ACKNOWLEDGEMENTS

Special gratitude and thanks to my husband Mr. Thamer Alzafiri, my children and family; without your care and support I would never have had the motivation to keep going.

To Sara, my first granddaughter; I dedicate this work to you and all my future grandchildren, to always be an example for you to keep going in whatever you start.

LIST OF CONTENTS
