The Living Fossil (Horseshoe crab)

Kamaruzzaman Yunus
Akbar John
Ahmed Jalal Khan Chowdhury
Zaleha Kassim

IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

The Living Fossil

(Horseshoe crab)

Editors,

Kamaruzzaman Yunus

Akbar John

Ahmed Jalal Khan Chowdhury

Zaleha Kassim

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

Kamaruzzaman Yunus
The Living Fossil (Horseshoe crab)
Kamaruzzaman Yunus
Include index
Bibliography: p.
ISBN

ISBN: 978-967-418-042-3

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 – 25

Revision on the molecular phylogeny of horseshoe crabs – Part 2

[1]Akbar John, B., [2]Prasanna Kumar, [1]Kamaruzzaman, B.Y., [1]Jalal, K.C.A.

[1]Institute of Oceanography and Maritime studies (INOCEM), Kulliyyah of Science, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, Bandar Indera Mahkota, 25200, Kuantan Pahang, Malaysia

[2]Centre of Advanced Studies in Marine Biology (CASMB), Annamalai University, Tamil Nadu, India

Abstract

Close genetic relatedness of horseshoe crabs with insects showed that they might have been evolved from ancient aquatic insects. The efficiency of cytochrome oxydase C subunit 1 gene in species level identification evolutionarily conserved horseshoe crab genome was clear in both the phylogram together with the precise identification of their differential developmental stages to the species level. Nucleotide Substitution pattern study portrayed the higher number of transitional mutations (Ti) over transversional mutation (Tv) in the mitochondrial genome.

Key words: Genetic distance, transitional mutations, transversional mutation, mitochondrial genome

Introduction

These are known as living fossils, have maintained their morphology almost unchanged for the past 150 million years. The little morphological differentiation among horseshoe crab lineages has resulted in substantial controversy concerning the phylogenetic relationship among the extant species of horseshoe crabs, especially among the three species in the Indo-Pacific region. Earlier studies suggest that the three species constitute a phylogenetically irresolvable trichotomy (Xia, 2000). For elucidating their phylogenetic relationships, two proteins, coagulogen and hemocyanin, have been investigated (Shishikura *et al.*, 1982; Srimal *et al.*, 1985; Sugita, 1988). Miyazaki *et al.* (1989) first investigated tropomyosin which is one of the major structural proteins involved in many types of cells, to elucidate prevailing phylogenetic relationships