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A STUDY ON PIGMENTATION CHARACTERISTICS AND CORAL COLOR OF SELECTED CORALS IN TERENGGANU

By

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Research Report submitted in partial fulfillment of the requirements for the degree of Bachelor of Science (Marine Biology)

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PENGAKUAN DAN PENGESAHAN LAPORAN PROJEK PENYELIDIKAN I DAN II

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk:

A Study on Pigmentation Characteristics and Coral Color of Selected Corals in Terengganu oleh Chua Chia Miin No. Matrik UK 8019 telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Samudera sebagai memnuhi sebahagian datipada keperluan memperolehi Ijazah Sarjana Muda Sains (Biologi Marin) Fakulti Sains dan Teknologi, Kolej Universiti Sains dan Teknologi Malaysia.

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LIST OF ABBREVIATIONS

A.h	-	*Acropora hyacinthus*
P.d	-	*Pocillopora damicornis*
A.f	-	*Acropora formosa*
P.f	-	*Pavona frondifera*
M.a	-	*Montipora aequituberculata*
Chlo	-	Chlorophyll
Caro	-	Carotenoid
Abs	-	Absorbance
nm	-	nanometer
Stdev	-	standard deviation
m	-	meter
ml	-	mililitre
°C	-	celcius
mg/l	-	milligram per litre
ppt	-	part per thousand
µ/mol	-	microns per mol
µg cm^{-2}	-	microgram per unit centimeter square
µg$cells^{-1}$	-	microgram per unit cell

ABSTRACT

Attempts have been made by some scientists to use coral color as an assessment to the health status of corals especially in relation to bleaching events. The 'Coral Watch' program from the University of Queensland, Australia, monitors coral reefs for their color using a color chart as an assessment of coral health. This study attempts to relate the coral color with photosynthetic pigment characteristics in determination of coral health status and as a future reference for bleaching events. Coral samples from 5 species (*Acropora formosa, Montipora aequituberculata, Pocillopora damicornis, Acropora hyacinthus* and *Pavona frondifera)* were collected from Redang Island from July to October 2005. Chlorophyll extraction was done immediately on fresh collected samples. Chlorophyll pigment analysis was done using standard methods. Among the pigments studied, chlorophyll a had the highest absorbance values for all the samples analyzed. Samples with different color codes: green (B), red (C), peach (D) and brown (E) showed no significant difference in their spectral characteristics. However there are some differences between color categories in terms of absorbance value. *Montipora aequituberculata* samples showed high photosynthetic pigment concentration (chlopophyll a and carotenoid) and high zooxanthellae density. This may be due to its growth form that encourages light absorption in shallow area. Of all the species of corals examined, only *P. damicornis* showed a direct correlation between coral colour intensity with zooxanthellae density and chlorophyll pigment density.

ABSTRAK

Pelbagai kajian telah dijalankan menggunakan warna batu karang sebagai penilaian ke atas status kesihatan serta kaitannya dengan fenomena 'bleaching'. 'Coral Watch' program daripada University Queensland, Australia, memantau terumbu karang berdasarkan warna mereka dengan menggunakan carta warna khas dalam penilaian kesihatan terumbu karang. Cubaan dilakukan dalam kajian ini untuk mehubungkait warna batu karang dengan ciri-ciri pigment fotosintesis dalam menentukan status kesihatan batu karang serta menjadikannya rujukan untuk fenomena 'bleaching' yang bakal berlaku. Sampel daripada 5 species batu karang (*Acropora formosa, Montipora aequituberculata, Pocillopora damicornis, Acropora hyacinthus* and *Pavona frondifera)* dikumpul dari Pulau Redang dari bulan July hingga Oktober 2005. Pengekstrakan klorofil dijalankan serta merta ke atas sampel yang segar. Pigment yang diekstrak dianalisis menggunakan aturcara piawai. Antara pigmen-pigmen yang dikaji, klorofil a mempunyai nilai 'absorbance' yang tertinggi. Sampel dengan kod warna yang berbeza: hijau (B), merah (C), pic (D) and perang (E) tidak menunjukkan perbezaan yang signifikan antara satu sama lain dalam bentuk spectrum. Walaubagaimanapun, terdapat juga sedikit perbezaan antara kelas-kelas warna dari segi nilai 'absorbance'. Sampel *M. aequituberculata* menunjukkan nilai kepekatan pigmen berfotosintesis (klorofil a dan carotenoid) dan juga kepadatan zooxanthellae yang tinggi. Ini mungkin disebabkan oleh bentuk pertumbuhan spesies tesebut yang mengalakkan penyerapan cahaya di kawasan cetek. Hanya *P. damicornis* menunjukkan hubungan kolerasi selari antara pewarnaan batu karang dengan kapadatan zooxanthellae dan juga kepekatan pigment berfotosinthesis.