

ความหลากหลายของชนิดและความชุกชุมของแมงกะพรุนในกลุ่ม RHIZOSTOMEAE  
ไฟลัม CNIDARIA บริเวณชายฝั่งจังหวัดชลบุรีและเพชรบุรี



นางสาวนนทิวิชญ์ ตัณทวณิช

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต

สาขาวิชาวิทยาศาสตร์ทางทะเล ภาควิชาวิทยาศาสตร์ทางทะเล


คณะวิทยาศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

ปีการศึกษา 2544

ISBN 974-03-0833-3

ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

SPECIES DIVERSITY AND ABUNDANCE OF RHIZOSTOME SCYPHOZOANS  
(PHYLUM CNIDARIA) ALONG THE COASTS OF CHON BURI AND  
PHETCHABURI PROVINCES



Miss Nontivich Tandavanitj

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

A Thesis Submitted in Partial Fulfillment of the Requirements  
for the Degree of Master of Science in Marine Science

Department of Marine Science

Faculty of Science

Chulalongkorn University


Academic Year 2001

ISBN 974-03-0833-3

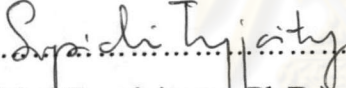
Thesis Title SPECIES DIVERSITY AND ABUNDANCE OF RHIZOSTOME  
SCYPHOZOANS (PHYLUM CNIDARIA) ALONG THE  
COASTS OF CHON BURI AND PHETCHABURI PROVINCES  
By Miss Nontivich Tandavanitj  
Field of Study Marine Science  
Thesis Advisor Assistant Professor Ajcharaporn Piumsomboon, Ph.D.

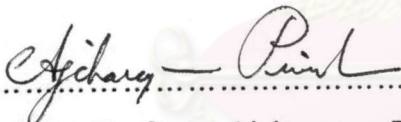
---

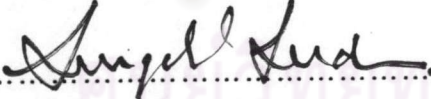
Accepted by the Faculty of Science, Chulalongkorn University in Partial  
Fulfillment of the Requirements for the Master's Degree

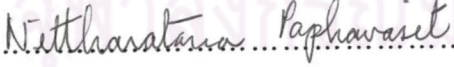
  
..... Deputy Dean for Administrative Affairs  
Acting Dean, Faculty of Science  
(Associate Professor Pipat Karntiang, Ph.D.)


#### THESIS COMMITTEE

  
..... Chairman  
(Supichai Tangjaitrong, Ph.D.)

  
..... Thesis Advisor  
(Assistant Professor Ajcharaporn Piumsomboon, Ph.D.)

  
..... Member  
(Assistant Professor Suraphol Sudara, Ph.D.)

  
..... Member  
(Associate Professor Nittharatana Paphavasit)

  
..... Member  
(Apichart Termvidchakorn, D.Agri.(Fish.))

นวนิทัศน์ ตันทวนิช: ความหลากหลายของชนิดและความชุกชุมของแมงกะพรุนในกลุ่ม RHIZOSTOME ไฟลัม CNIDARIA บริเวณชายฝั่งจังหวัดชลบุรีและเพชรบุรี (SPECIES DIVERSITY AND ABUNDANCE OF RHIZOSTOME SCYPHOZOANS (PHYLUM CNIDARIA) ALONG THE COASTS OF CHON BURI AND PHETCHABURI PROVINCES) อาจารย์ที่ปรึกษา: ผศ.ดร. อัจฉราภรณ์ เปี่ยมสมบุญรณ์, 113 หน้า. ISBN 974-03-0833-3.

งานวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาความหลากหลายของชนิดและปริมาณแมงกะพรุนในกลุ่ม Rhizostomeae บริเวณชายฝั่งจังหวัดชลบุรีและเพชรบุรีซึ่งเป็นแหล่งทำประมงแมงกะพรุนที่สำคัญ ในการเก็บตัวอย่างทุกเดือนเริ่มตั้งแต่เดือนธันวาคม 2542 ถึงเดือนธันวาคม 2543 พบแมงกะพรุนในกลุ่ม Rhizostomeae ทั้งหมด 6 ชนิด แบ่งออกเป็น 2 ประเภท ได้แก่ ประเภทที่นำมาบริโภคได้ คือ *Rhopilema hispidum* (Vanhöffen, 1888) หรือแมงกะพรุนหน้าง และ *Lobonema smithii* Mayer, 1910 หรือแมงกะพรุนลอดช่อง และชนิดที่ไม่ถูกนำมาบริโภค คือ *Cassiopea andromeda* (Forskål, 1775), *Acromitus flagellatus* (Maas, 1903), *Acromitus hardenbergi*, และ *Catostylus townsendi* Mayer, 1915 โดยผลการศึกษาพบแมงกะพรุนหน้างที่ชลบุรีมากกว่าที่จังหวัดเพชรบุรีและพบแมงกะพรุนลอดช่องเฉพาะที่จังหวัดเพชรบุรีเท่านั้น ตลอดการศึกษาพบปริมาณแมงกะพรุนสูงที่สุดในเดือนมีนาคม 2543 ที่บริเวณชายฝั่งจังหวัดชลบุรี โดยมีปริมาณ > 23 ตัวต่อปริมาตรน้ำ  $10^4$  ลูกบาศก์เมตรและในเดือนพฤศจิกายน ที่บริเวณชายฝั่งจังหวัดเพชรบุรี โดยมีปริมาณ > 302 ตัวต่อปริมาตรน้ำ  $10^4$  ลูกบาศก์เมตร *A. flagellatus* เป็นชนิดที่พบในปริมาณมากโดยพบในทั้งสองบริเวณที่เก็บตัวอย่าง โดยมีปริมาณ > 300 ตัวต่อปริมาตรน้ำ  $10^4$  ลูกบาศก์เมตรในเดือนพฤศจิกายน 2543 นอกเหนือจากการศึกษาในด้านความหลากหลายของชนิดแมงกะพรุนที่พบแล้วยังศึกษาปัจจัยสิ่งแวดล้อมที่ส่งผลต่อปริมาณของแมงกะพรุน พบว่า ปัจจัยสิ่งแวดล้อมที่มีผลต่อปริมาณของแมงกะพรุนคือ ความเค็ม กระแสน้ำ ปริมาณแพลงก์ตอนสัตว์ตลอดถึงวงจรชีวิตของแมงกะพรุนแต่ละชนิด

ภาควิชา.....วิทยาศาสตร์ทางทะเล.....ลายมือชื่อนิสิต.....Norwich Gondavanit.....  
สาขาวิชา.....วิทยาศาสตร์ทางทะเล.....ลายมือชื่ออาจารย์ที่ปรึกษา.....  
ปีการศึกษา.....2544.....ลายมือชื่ออาจารย์ที่ปรึกษาร่วม.....

##4172317023 MAJOR MARINE SCIENCE

KEY WORD: SPECIES DIVERSITY, ABUNDANCE, RHIZOSTOMEAE, JELLYFISH, THAILAND

NONTIVICH TANDAVANITJ: SPECIES DIVERSITY AND ABUNDANCE OF RHIZOSTOME SCYPHOZOANS (PHYLUM CNIDARIA) ALONG THE COASTS OF CHON BURI AND PHETCHABURI PROVINCES. THESIS ADVISOR: ASSIST. PROF. AJCHARAPORN PIUMSOMBOON, Ph.D., 113 pp. ISBN 974-03-0833-3.

This study focuses mainly on the species diversity, as well as the abundance, of rhizomedusae along the coasts of Chon Buri and Phetchaburi Provinces, where jellyfish fisheries are carried out annually. Samplings were conducted from December 1999 to December 2000 in the Inner Gulf of Thailand. Consequently, 6 species of rhizomedusae were obtained. They are *Cassiopea andromeda* (Forskål, 1775), *Acromitus flagellatus* (Maas, 1903), *Acromitus hardenbergi*, *Catostylus townsendi* Mayer, 1915 and two well-known commercial species, which are *Lobonema smithii* Mayer, 1910 and *Rhopilema hispidum* (Vanhöffen, 1888). *R. hispidum* was predominantly found along the coast of Chon Buri Province while *L. smithii* was found exclusively along the coast of Phetchaburi Province. The results revealed the highest abundance of rhizomedusae in March 2000 ( $> 23 \text{ individuals} \cdot 10^4 \text{ m}^{-3}$ ) and November 2000 ( $> 302 \text{ individuals} \cdot 10^4 \text{ m}^{-3}$ ) for Chon Buri and Phetchaburi, respectively. Among the 6 species obtained, *A. flagellatus*, a relatively small noncommercial species, was the most common species found in both provinces and yielded the highest abundance in term of density ( $> 300 \text{ individuals} \cdot 10^4 \text{ m}^{-3}$  in November 2000). The environmental factors, which affected the abundance and size structure of rhizomedusae at both provinces, were salinity, water current, and zooplankton concentration in addition to the life history of the medusae themselves.

Department..... Marine Science..... Student's signature *Nontivich Tandavanitj*  
Field of Study..... Marine Science..... Advisor's signature *Ajcharaporn Piumsomboon*  
Academic Year..... 2001..... Co-advisor's signature..... -.....

## ACKNOWLEDGEMENTS

First and foremost, I would like to express sincere gratitude to my thesis advisor, Assist. Prof. Dr. Ajcharaporn Piumsomboon, for her advice and encouragement that I'd received throughout the length of my study. I would also like to thank Assist. Prof. Dr. Suraphol Sudara for his advice and endless sense of humor, Assoc. Prof. Nittharatana Paphavasit for her encouragement and reassurance, and Dr. Apichart Termvidchakorn for his advice.

I would also like to thank all my “teachers” at the Department of Marine Science, Faculty of Science, Chulalongkorn University for the valuable lessons both in marine science and in life.

Thank you to all my colleagues, at the Department of Marine Science, for their assistance in the field and their moral supports, this would have been impossible with out all of you.

Last but not least, I would like to thank my parents for their undoubted loves, patience, understandings, and supports. I'm forever grateful for all you've given me and made me the person I am today. Thank you to my beloved brother and sister for always being there.

This work was supported by the TRF/BIOTEC Special Program for Biodiversity Research and Training grant T-144002.

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

## CONTENTS

	Page
ABSTRACT (English).....	iv
ABSTRACT (Thai).....	v
ACKNOWLEDGEMENTS.....	vi
CONTENTS.....	vii
LIST OF TABLES.....	ix
LIST OF FIGURES.....	x
CHAPTER	
1. INTRODUCTION	
I.    Introduction.....	1
II.   Classification.....	2
III.  General Characteristics of Scyphozoans.....	2
IV.   Biology.....	6
A.    General Biology.....	6
B.    Reproductive Biology and Alternation of Generations.....	6
C.    Feeding Biology.....	11
V.    Locomotion.....	14
VI.   Ecological Importance and Trophic Relationship.....	15
VII.  Important Environmental Parameters.....	17
A.    Physical Factors.....	17
B.    Biological Factors.....	19
VIII.  Economic Importance.....	20
IX.   Rhizostome Scyphozoans in Thai Waters.....	22
2. MATERIALS AND METHODS	
I.    Preliminary Survey.....	24
II.   Scyphomedusae Sampling.....	25
A.    Collection.....	25
B.    Fixation and Preservation.....	27
C.    Identification.....	28
D.    Abundance.....	28
E.    Gonad Analysis.....	29
III.  Zooplankton Sampling.....	30

## CONTENTS (Cont.)

	Page
A. Collection .....	30
B. Fixation and Preservation .....	30
C. Identification .....	30
D. Abundance .....	30
IV. Physical Parameters .....	31
3. RESULTS	
I. Rhizostome Scyphozoans Diversity .....	33
II. Abundance of Rhizostome Scyphozoans .....	43
III. Size Distribution .....	54
IV. Gonads .....	64
V. Environmental Parameters .....	70
4. DISCUSSION	
I. Taxonomy of Rhizomedusae .....	83
II. Species Diversity and Abundance .....	85
III. Size Distribution .....	90
A. <i>Cassiopea andromeda</i> .....	90
B. <i>Acromitus flagellatus</i> .....	92
C. <i>Acromitus hardenbergi</i> .....	93
D. <i>Catostylus townsendi</i> .....	94
E. <i>Lobonema smithii</i> .....	94
F. <i>Rhopilema hispidum</i> .....	94
5. CONCLUSIONS .....	97
REFERENCES .....	99
APPENDIX .....	102
VITAE .....	113



## LIST OF TABLES

Table	Page
1. Prey composition of some field-caught scyphomedusae.....	16
2. Annual jellyfish production from 1992-1996.....	21
3. Jellyfish production in the Gulf of Thailand and the Andaman Sea in 1996.....	21
4. List of rhizomedusa species found worldwide and in Thailand.....	22
5. Summary of interviews carried out in Chon Buri, Samutsakorn, Samutsongkram, and Phetchaburi Provinces.....	24
6. Species, frequency of occurrence, maximum, and minimum abundance of rhizomedusae at Chon Buri and Phetchaburi Provinces.....	44
7. Species and abundance of scyphomedusae obtained from 3 sampling transects at Chon Buri Province from December 1999 to December 2000.....	45
8. Species and abundance of scyphomedusae obtained from 3 sampling transects at Phetchaburi Province from December 1999 to December 2000.....	45
9. Sexual maturation stages of 6 species of rhizomedusae obtained from this study.....	64
10. Nematocysts of each species of rhizomedusae.....	84
11. Summary of size distribution of rhizostome species found at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	95

  
 ศูนย์วิทยทรัพยากร  
 จุฬาลงกรณ์มหาวิทยาลัย

## LIST OF FIGURES

Figure	Page
1. Stauromedusa <i>Haliclystus salpinx</i> .....	3
2. Young coronate scyphozoan <i>Periphylla periphylla</i> .....	4
3. Semeostome scyphozoan <i>Aurelia aurita</i> .....	5
4. Rhizostome scyphozoan <i>Cassiopea xamachana</i> .....	6
5. The ovary of <i>Aurelia aurita</i> .....	7
6. Distal part of the testes of <i>Aurelia aurita</i> .....	7
7. Life cycle of rhizostome scyphozoan <i>Stomolophus meleagris</i> .....	8
8. Sampling boat equipped with push net.....	25
9. Map of sampling areas.....	26
10. Physical characteristics used in the identification of scyphomedusae.....	28
11. Sampling gears/equipment for physical and biological environmental parameters.....	32
12. <i>Cassiopea andromeda</i> .....	34
13. <i>Acromitus flagellatus</i> .....	36
14. <i>Acromitus hardenbergi</i> .....	37
15. <i>Catostylus townsendi</i> .....	38
16. <i>Lobonema smithii</i> .....	41
17. <i>Rhopilema hispidum</i> .....	42
18. Abundance of rhizomedusae.....	43
19. Abundance and average weight of rhizomedusae at Chon Buri Province from December 1999 to December 2000.....	48
20. Abundance and average weight of rhizomedusae at Phetchaburi Province from December 1999 to December 2000.....	50
21. Monthly variation in species abundance at Chon Buri Province from December 1999 to December 2000.....	52
22. Monthly variation in species abundance at Phetchaburi Province from December 1999 to December 2000.....	53
23. Size class distribution for <i>Cassiopea andromeda</i> at Chon Buri Province from December 1999 to December 2000.....	55
24. Size class distribution for <i>Cassiopea andromeda</i> at Phetchaburi Province from December 1999 to December 2000.....	56

## LIST OF FIGURES (Cont.)

Figure	Page
25. Size class distribution for <i>Acromitus flagellatus</i> at Chon Buri Province from December 1999 to December 2000.....	57
26. Size class distribution for <i>Acromitus flagellatus</i> at Phetchaburi Province from December 1999 to December 2000.....	58
27. Size class distribution for <i>Acromitus hardenbergi</i> at Chon Buri Province from December 1999 to December 2000.....	59
28. Size class distribution for <i>Acromitus hardenbergi</i> at Phetchaburi Province from December 1999 to December 2000.....	61
29. Size class distribution for <i>Catostylus townsendi</i> at Phetchaburi Province from December 1999 to December 2000.....	62
30. Size class distribution for <i>Lobonema smithii</i> at Phetchaburi Province from December 1999 to December 2000.....	63
31. Size class distribution for <i>Rhopilema hispidum</i> at Chon Buri Province from December 1999 to December 2000.....	63
32. Size class distribution for <i>Rhopilema hispidum</i> at Phetchaburi Province from December 1999 to December 2000.....	64
33. Gonad development of <i>Cassiopea andromeda</i> .....	66
34. Gonad development of <i>Acromitus flagellatus</i> .....	67
35. Gonad development of <i>Acromitus hardenbergi</i> .....	68
36. Gonad development of <i>Catostylus townsendi</i> .....	69
37. Gonad development of <i>Lobonema smithii</i> .....	69
38. Gonad development of <i>Rhopilema hispidum</i> .....	69
39. Average salinity at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	70
40. Average pH at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	71
41. Average dissolved oxygen content at Chon Buri and Phetchaburi Provinces from February 2000 to December 2000.....	72
42. Average temperature at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	72
43. Average zooplankton concentration and composition.....	73

### LIST OF FIGURES (Cont.)

Figure	Page
44. Abundance of hydromedusae at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	74
45. Abundance of scyphozoa larvae at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	74
46. Abundance of ctenophores at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	75
47. Abundance of polochaetes at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	75
48. Abundance of barnacle larvae at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	76
49. Abundance of cladocerans at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	76
50. Abundance of amphipods at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	77
51. Abundance of gastropods at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	77
52. Abundance of bivalves at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	78
53. Abundance of copepods at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	78
54. Abundance of lucifers and lucifer larvae at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	79
55. Abundance of shrimps and shrimp larvae at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	79
56. Abundance of juvenile crabs and crab larvae at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	80
57. Abundance of larvaceans at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	80
58. Abundance of juvenile fish and fish larvae at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	81

### LIST OF FIGURES (Cont.)

Figure	Page
59. Abundance of planktonic eggs at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	81
60. Abundance of chaetognaths at Chon Buri and Phetchaburi Provinces from December 1999 to December 2000.....	82
61. Types of nematocysts found in rhizomedusae.....	85
62. The comparison between average salinity and abundance of rhizomedusae.....	87
63. Water circulation in the Upper Gulf of Thailand.....	91



ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย