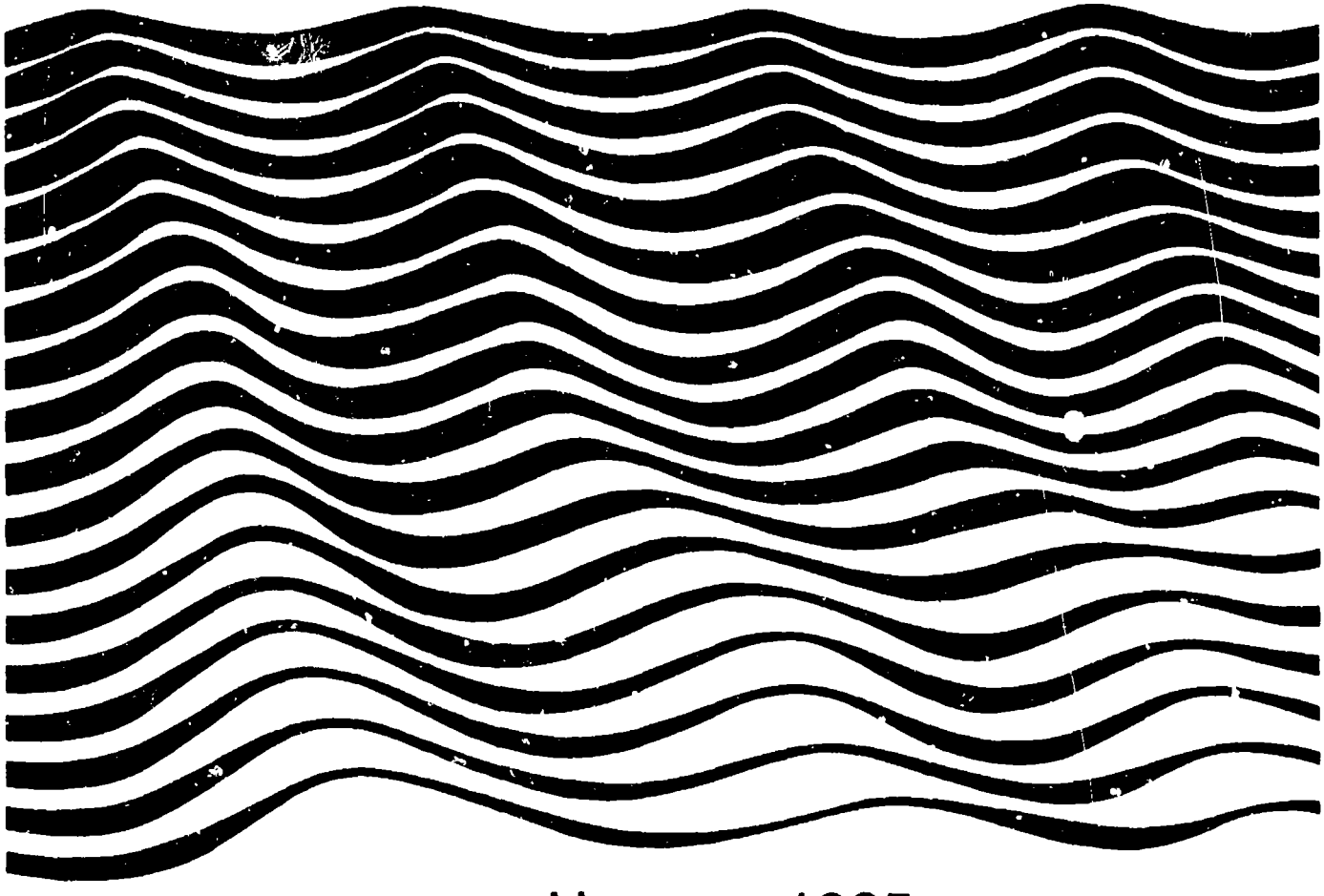
Unesco reports
in marine science 33

Coral taxonomy

Results and recommendations
of a regional Unesco (COMAR) / UNEP
Workshop with advanced training

Phuket Marine Biological Centre
Thailand, 10-26 February 1984



Unesco, 1985

UNESCO REPORTS IN MARINE SCIENCE

No.		Year
1	Marine ecosystem modelling in the Eastern Mediterranean Report of a Unesco workshop held in Alexandria, Egypt, December 1974 English only	1977
2	Marine ecosystem modelling in the Mediterranean Report of the Second Unesco Workshop on Marine Ecosystem Modelling English only	1977
4	Syllabus for training marine technicians Report of an IOC/Unesco workshop held in Miami, Florida, 20-26 May 1978 Available in English, French, Russian and Spanish	1979
5	Marine science syllabus for secondary schools Report of an IOC workshop held at United World College of the Atlantic, United Kingdom, 5-9 June 1978 Available in Arabic, English, French, Russian and Spanish	1979
6	Organization of marine biological reference collections in the Mediterranean Arab countries Expert meeting held in Tunis, 20-23 September 1978 Available in Arabic, English and French	1979
7	Coastal ecosystems of the southern Mediterranean: lagoons, deltas and salt marshes Report of a meeting of experts, Tunis, 25-27 September 1978 Available in Arabic, English and French	1979
8	The mangrove ecosystem: Human uses and management implications Report of a Unesco regional seminar held in Dacca, Bangladesh, December 1978 English only	1979
9	The mangrove ecosystem: scientific aspects and human impact Report of the seminar organized by Unesco at Cali, Colombia, 27 November-1 December 1978 Available in English and Spanish	1979
10	Development of marine science and technology in Africa Working Group of Experts sponsored by ECA and Unesco, Addis Ababa, 5-9 May 1980 Available in English and French	1980
11	Programa de Plancton para el Pacífico Oriental Informe final del Seminario-Taller realizado en el Instituto del Mar del Perú, El Callao, Perú, 8-11 de septiembre de 1980 Spanish only	1981
12	Geología y geoquímica del margen continental del Atlántico Sudoccidental, Informe final del Taller de Trabajo organizado por la Unesco en Montevideo, Uruguay, 2-4 de diciembre de 1980 Spanish only	1981
14	Marine science and technology in Africa: present state and future development Synthesis of Unesco/ECA survey missions to African coastal states, 1980 Available in English and French	1981
15	Fishery science teaching at the university level Report of a Unesco/FAO workshop on university curricula in fishery science, Paris, May 1980 Available in Arabic, English, French, Russian and Spanish	1981
16	Marine and coastal processes in the Pacific: ecological aspects of coastal zone management Report of a Unesco seminar held at Motupore Island Research Centre, University of Papua New Guinea, 14-17 July 1980 English only	1981
17	The coastal ecosystems of West Africa: coastal lagoons, estuaries and mangroves A workshop report, Dakar, 11-15 June 1979 Available in English and French	1981
18	Coral reef management in Asia and the Pacific: some research and training priorities Report of a Unesco workshop held in Manila, Philippines 21-22 May 1981 English only	1982
19	Mareas rojas en el Plancton del Pacífico Oriental Informe del Segundo Taller del Programa de Plancton del Pacífico Oriental, Instituto del Mar, Callao, Perú 19-20 de noviembre de 1981 Spanish only	1982
20	Quantitative analysis and simulation of Mediterranean coastal ecosystems: The Gulf of Naples, a case study Report of a workshop on ecosystem modelling Ischia, Naples, Italy, 28 March to 10 April 1981 Organized by the United Nations, Educational, Scientific and Cultural Organization (Unesco) and the Stazione Zoologica, Naples English only	1983
21	Comparing coral reef survey methods A regional Unesco/UNEP workshop, Phuket Marine Biological Centre, Thailand, December 1982 English only	1983
22	Guidelines for marine biological reference collections Prepared in response to a recommendation by a meeting of experts from the Mediterranean Arab countries Available in English, French and Arabic	1983
23	Coral reefs, seagrass beds and mangroves: their interaction in the coastal zones of the Caribbean Report of a workshop held at West Indies Laboratory, St. Croix, U.S. Virgin Islands, May, 1982 English only	1983
24	Coastal ecosystems of Latin America and the Caribbean The objectives, priorities and activities of Unesco's COMAR project for the Latin America and Caribbean region Caracas, Venezuela, 15-19 November 1982 Available in English and Spanish	1983
25	Ocean engineering teaching at the university level Recommended guidelines from the Unesco/IOC/ECOR workshop on advanced university curricula in ocean engineering and related fields, Paris, October 1982 Available in English, French, Spanish, Russian, Arabic and Chinese	1983
26	Global survey and analysis of post-graduate curricula in ocean engineering English only	1984
27	Productivity and processes in island marine ecosystems. Recommendations and scientific papers from the Unesco/IOC sessions on marine science co-operation in the Pacific, at the XVth Pacific Science Congress, Dunedin, New Zealand, February 1983 English only	1984
28	Oceanographic modelling of the Kuwait Action Plan (KAP) Region. Report of simposium/workshop; University of Petroleum and Minerals, Dhahran, Kingdom of Saudi Arabia 15-18 October 1983 English only	1984
29	Eutrophication in coastal marine areas and lagoons: a case study of 'Lac de Tunis' Report prepared by Dr M. Kelly and Dr M. Naguib English only	1984
30	Physical oceanography of the Eastern Mediterranean: an overview and research plan Report of a workshop held in Lerici, La Spezia (Italy), September 1983 English only	1984
31	MABAHISS/John Murray 50th anniversary: Marine science of the North West Indian Ocean and adjacent waters Report of a symposium on the occasion of the 50th anniversary of the MABAHISS/John Murray Expedition (1933/34), University of Alexandria, Egypt, 3 to 7 September 1983 English only	1985
32	L'estuaire et la mangrove du Sine Saloum Résultats d'un Atelier régional Unesco-COMAR tenu à Dakar (Sénégal) du 28 février au 5 mars 1983 French only	1985
33	Coral taxonomy Results and recommendations of a regional Unesco (COMAR)/UNEP Workshop with advanced training Phuket Marine Biological Centre Thailand, 10-26 February 1984 English only	1985

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Published in 1985 by the United Nations
Educational, Scientific and Cultural Organization
7, place de Fontenoy, 75700 Paris
Printed in Unesco's workshops

Printed in France

RÉSUMÉ

Les priorités en matière de formation ayant été déterminées à la Réunion de travail de l'Unesco sur l'aménagement des récifs de corail en Asie et dans le Pacifique (Manile, Philippines, 21 et 22 mai 1981) et à la suite du séminaire Unesco/PNUE sur les méthodes de recensement des récifs de corail (Phuket, Thaïlande, 1982), une réunion de travail et un stage de formation sur la taxinomie des coraux ont eu lieu en février 1984 au Centre de biologie marine de Phuket. La réunion de travail était animée par M. M.J.E.N. Veron, de l'Institut australien des sciences de la mer, C.C. Wallace, de James Cool University of North Queensland (Australie), H. Ditlev, d'Abyhoj (Danemark), les représentants de l'Unesco et du PNUE (M. M.J.R.E. Harger, ROSTSEA/Unesco, Djakarta, et M. E. Gomez, Centre de la Science de la mer, Université des Philippines, Quezon City) et M. Hansa Chansang, du Centre de biologie marine de Phuket. Le stage de formation a été suivi par des scientifiques de huit pays de la région Inde-Pacifique: Thaïlande, Malaisie, Philippines, Indonésie, Singapour, Sri Lanka, Maldives et Micronésie. La participation des scientifiques et des deux instructeurs a été prise en charge conjointement par l'Unesco et le PNUE; celle de M. Ditlev, par DANIDA.

Les objectifs ci-après ont été atteints:

1. Une liste de contrôle des espèces de corail figurant dans les collections du Centre de biologie marine de Phuket (y compris les nouveaux spécimens recueillis pendant la réunion de travail) a été établie.
2. Le point a été fait des études taxinomiques entreprises dans les pays participants et des recommandations relatives à la taxinomie et au recensement des coraux dans ces pays ont été formulées.
3. Un manuel sur les caractéristiques des coraux de la région a été établi sur la base des notes utilisées pour le stage de formation.
4. Les participants ont évalué le stage et des recommandations ont été formulées en vue de l'organisation de stages futurs.
5. Une collection de référence aux fins de la recherche a été constituée pour le Centre de biologie marine de Phuket.

L'ouvrage de base utilisé pour la réunion de travail au point de vue taxinomique était la monographie en cinq parties **Scleractinia of Eastern Australia** (Veron et Pichon, 1976, 1980, 1982: Veron et autres auteurs, 1977; Veron et Wallace, 1984, Australian Institute of Marine Science Monograph Series 1, 3, 4, 5, 6), qui vise 90 % des scleractinia des récifs asiatiques.

RESUMEN

Una vez identificadas las prioridades en materia de formación establecidas en el Seminario de la Unesco sobre ordenación de los arrecifes de coral en Asia y el Pacífico, celebrado en Manila (Filipinas) los días 21 y 22 de mayo de 1981, y como resultado de las discusiones del Seminario Unesco/PNUMA sobre métodos de vigilancia de los arrecifes de coral (Phuket, Tailandia, diciembre de 1982) en febrero de 1984, se celebró un seminario y un curso de formación sobre la taxonomía de los corales en el Phuket marine Biological Center. El seminario fue organizado por el Dr. J.E.N. Veron, del Australian Institute of Marine Science, el Dr. C.C. Wallace, de la James Cook University de North Queensland (Australia), el Sr. H. Ditlev, de Abyhoj (Dinamarca), por varios representantes de la Unesco y del PNUMA (Dr. J.R.E. Harger, Unesco/ROSTSEA, Yakarta, y Dr. E. Gómez, Marine Science Centre, Universidad de Filipinas, Quezon) y por el Dr. Hansa Chansang, del Phuket Marine Biological Centre. Asistieron al curso de formación científicos de ocho países de la región de los Océanos Índico y Pacífico: Tailandia, Malasia, Filipinas, Indonesia, Singapur, Sri Lanka, Maldivas y Micronesia. La asistencia de los científicos y de los instructores fue financiada conjuntamente por la Unesco y por el PNUMA; la asistencia del Sr. H. Ditlev fue financiada por el DANIDA.

Se lograron los objetivos siguientes:

1. Se compiló una lista de referencia de especies de corales presentes en las colecciones del Phuket Marine Biological Center (incluidos los nuevos especímenes reunidos durante el seminario).
2. Se evaluó el estado de los estudios taxonómicos en los países participantes y se formularon recomendaciones sobre la manera de realizar la taxonomía y las identificaciones de los corales en esos países.
3. A partir de las notas utilizadas en el curso de formación, se compiló un manual sobre los rasgos distintivos de los corales en la región.
4. El curso fue evaluado por los participantes, y se formularon recomendaciones para la realización de cursos futuros.
5. Se compiló una colección de referencia con miras a investigaciones para el Phuket Marine Biological Center.

La base taxonómica del seminario fue la monografía en cinco países **Scleractinia of Eastern Australia** (Veron and Pichon 1976, 1980, 1982; Veron y otros 1977; Veron and Wallace 1984 (Australian Institute of Marine Science Monograph Series 1, 3, 4, 5, 6)) que abarca 90 % de las escleractinias de los arrecifes asiáticos.

РЕЗЮМЕ

После определения приоритетов в подготовке кадров в ходе учебно-практического семинара ЮНЕСКО по управлению коралловыми рифами в Азии и бассейне Тихого океана, проведенного 21-22 мая 1981 г. в Маниле, Филиппины, и в результате дисуссий, состоявшихся на семинаре ЮНЕСКО/ЮНЕП по методам наблюдения за коралловыми рифами (Пукет, Таиланд, 1982 г.), в феврале 1984 г. в Морском биологическом центре г. Пукет были организованы учебно-практический семинар и курсы подготовки по таксономии кораллов. Учебно-практический семинар проводили д-р Дж. Е. Н. Верон из Австралийского института морских наук, д-р К. К. Уоллес из Университета им. Джеймса Кука, Северный Квинсленд, Австралия, г-н Х. Дитлев, Абидхой, Дания, представители ЮНЕСКО и ЮНЕП (д-р Дж. Р.Е. Харгер, ЮНЕСКО/РОСТСЕА, Джакарта, и д-р Е. Гомес, Научный центр морских наук, Филиппинский университет, Кесон Сити), а также д-р Ганза Чансанг из Морского биологического центра г. Пукет. На курсах подготовки присутствовали ученые из восьми стран региона Индийского и Тихого океанов: Таиланда, Малайзии, Филиппин, Индонезии, Сингапура, Шри Ланки, Мальдивских островов и Микронезии. Участие ученых и двух инструкторов финансировалось совместно ЮНЕСКО и ЮНЕП, участие д-ра Х. Дитлева - ДАНИДА.

Были достигнуты следующие цели:

1. Составлен перечень коралловых видов, представленных в коллекциях Морского биологического центра г. Пукет (включая новые виды, собранные в ходе учебно-практического семинара).
2. Проведена оценка положения в области таксономических исследований в участвующих странах и сделаны рекомендации в отношении проведения таксономии и определения кораллов в этих странах.
3. Составлен справочник отличительных особенностей кораллов, встречающихся в регионе, на основе записок, использованных на курсах подготовки.
4. Проведена оценка курсов их участниками и сделаны рекомендации в отношении организации будущих курсов.
5. Составлена справочная научная коллекция для Морского биологического центра г. Пукет.

Таксономической основой для этого семинара явилась монография **Scleractinia of eastern Australia** (Veron & Pichon 1976, 1980, 1982; Veron et al. 1977; Veron & Wallace 1984 (Australian Institute of Marine Science Monograph Series 1, 3, 4, 5, 6)) из пяти частей, которая охватывает 90 % кораллов семейства scleractinia на рифах Азиатского региона.

ملخص

فى أعقاب تحديد أولويات التدريب الذى تم فى حلقة عمل اليونسكو بشأن ادارة الشعاب المرجانية بمنطقة آسيا والمحيط الهادى والتى عقدت فى مانيلا، الفلبين من ٢١ الى ٢٢ مايو/أيار ١٩٨١ ونتيجة للمناقشات التى دارت فى حلقة التدارس المشتركة بين اليونسكو وبامت بشأن أساليب مسح الشعاب المرجانية (بهوكت، تايلاند ديسمبر/كانون الأول ١٩٨٢)، عقدت حلقة عمل ودورة تدريب بشأن تصنيف الشعاب المرجانية فى فبراير/شباط ١٩٨٤ فى مركز بهوكت للبيولوجيا البحرية. وقام بادارة حلقة العمل الدكتور ج.أ.ن. فيرون بالمعهد الاسترالى للعلوم البحرية، والدكتور س.س. والاس بجامعة جيمس كوك بشمال كوينزلاند، استراليا، والسيد/هـ. ديتليف من أبيهوج، الدنمارك، وممثلا اليونسكو وبامت (الدكتور ج.ر.أ. هارجر، اليونسكو/روستسى، جاكارتا، والدكتور أ. غوميس، مركز علوم البحار، جامعة الفلبين، مدينة كويزون) والدكتور هانسا شانسانغ بمركز بهوكت للبيولوجيا البحرية. وحضر دورة التدريب علميون من ثمانية بلدان بالمنطقة الهندية من المحيط الهادى : تايلاند وماليزيا والفلبين واندونيسيا وسنغافوره وسرى لانكا والمالديف وميكرونيزيا. وقامت اليونسكو بالاشتراك مع « بامت » بتمويل حضور العلميين واثنين من المعلمين بينما موّلت الوكالة الدانمركية للتنمية الدولية « دانيدا » حضور السيد/هـ. ديتليف.

وقد أحرزت الأهداف التالية :

١ ـ أعدت قائمة حصر لأنواع الشعاب الموجودة فى مجموعات مركز بهوكت للبيولوجيا البحرية (بما فى ذلك النماذج الجديدة التى جمعت أثناء حلقة العمل).

٢ ـ تم تقييم حالة الدراسات التصنيفية فى البلدان المشتركة ووضعت توصيات بشأن اجراء تصنيف للشعاب المرجانية وتحديدها فى هذه البلدان.

٣ ـ جُمِع دليل ارشادى للسمات المميزة للشعاب المرجانية فى المنطقة استنادا الى المذكرات التى استخدمت فى دورة التدريب.

٤ ـ قام المشتركون بتقييم الدورة ووضعوا توصيات بشأن تنظيم الدورات فى المستقبل.

٥ ـ جمع مركز بهوكت للبيولوجيا البحرية مجموعة مرجعية للبحوث.

وكان الأساس التصنيفى لحلقة العمل هو المونوغراف ذو الخمسة أجزاء المعنون **الحيوانات والطحالب البحرية المتحجرة فى شرق استراليا**، فيرون وبيشون ١٩٧٦، ١٩٨٠، ١٩٨٢؛ وفيرون وآخرين ١٩٧٧؛ فيرون ووالاس ١٩٨٤ (سلسلة مونوغرافات المعهد الاسترالى للعلوم البحرية ١ و٣ و٤ و٥ و٦) الذى يغطى ٩٠ ٪ من الحيوانات والطحالب البحرية المتحجرة فى الشعاب المرجانية الآسيوية.

概 要

继1981年5月21—22日在菲律宾马尼拉举办的关于亚太地区珊瑚礁管理的教科文组织讲习班确定了培训优先事项之后，并且作为教科文组织／联合国环境规划署珊瑚礁调查方法研究班（泰国，普吉，1982年12月）讨论的结果，于1984年2月在普吉海洋生物学中心举办了一个珊瑚分类学讲习培训班。讲习班由下述人士主持：澳大利亚海洋学研究所的J·E·N·Veron博士、澳大利亚北昆士兰詹姆斯·库克大学的C·C·Wallace博士、丹麦Abyhoj的H·Ditlev先生、教科文组织和环境规划署的代表（雅加达教科文组织东南亚地区科技办事处的J·R·E·Harger博士，以及奎松市菲律宾大学海洋科学中心的E·Gomez博士）以及普吉海洋生物学中心的Hansa Chansang博士。参加培训班的有来自印太地区下述八个国家的科学家：泰国、马来西亚、菲律宾、印度尼西亚、新加坡、斯里兰卡、马尔代夫和密克罗尼西亚。这些科学家和两名讲师的参加费用由教科文组织和环境规划署共同支付；H·Ditlev的参加费用由丹麦国际开发署支付。

实现了下列目标：

1．为普吉海洋生物学中心收集的珊瑚种类编制了清单（包括讲习班期间收集的新标本）。

2．对参加国中分类学研究的地位进行了估计，并就这些国家如何进行珊瑚分类和鉴定提出了建议。

3．根据培训班使用的讲义编纂了有关该地区各种珊瑚的特征的手册。

4．参加者对培训班进行了评价，并提出了今后如何举办培训班的建议。

5．为普吉海洋生物学中心编辑了一本研究参考汇编。

讲习班的分类学基础是一本包含五部分的专题著作《澳大利亚东部的硬放目》（Veron et Pichon 1976，1980，1982；Veron et al 1977；Veron et Wallace 1984；《澳大利亚海洋科学研究所专题丛书》1、3、4、5、6），其中介绍了90%的亚洲礁硬放目。

PREFACE

Unesco Reports in Marine Science are designed to serve specific programme needs and to report on developments in projects conducted by the Unesco Division of Marine Sciences, including those involving collaboration between the Division and the Intergovernmental Oceanographic Commission, particularly in the field of training, education, and mutual assistance in the marine sciences.

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Place de Fontenoy
75700 Paris
France.

NOTES

The workshop was organised on a cooperative basis by the Unesco Regional Office for Science and Technology for South East Asia, the Phuket Marine Biological Centre of Thailand and the UNEP Project on the Study of Coral Resources and Effects of Pollutants and Other Destructive Factors on Coral Communities and Related Fisheries in the East Asian Seas Region. The latter project is coordinated by the Natural Resources Management Centre of the Philippines.

The authors and participants are responsible for the choice and presentation of the facts contained in this book and for the opinions expressed therein, which are not necessarily those of Unesco or the United Nations Environment Programme and do not commit the organisations in any way.

The designation employed and the presentation of material throughout the publication do not imply the expression of any opinion whatsoever on the part of Unesco or the United Nations Environment Programme concerning the legal status of any country, territory, city, or area of its authorities, or concerning the delimination of its frontiers or boundaries.

CONTENTS

SUMMARY

Following the identification of training priorities made at the UNESCO Workshop on Coral Reef Management in Asia and the Pacific held at Manila, The Philippines 21-22 May 1981 and as the result of discussions held at the UNESCO/UNEP seminar on Coral Reef Survey Methods (Phuket, Thailand, December 1982), a workshop and training course on Coral Taxonomy was held in February 1984, at the Phuket Marine Biological Center. The workshop was conducted by Dr J.E.N. Veron of the Australian Institute of Marine Science, Dr C.C. Wallace of James Cook University of North Queensland, Australia, Mr H. Ditlev of Abyhoj, Denmark, UNESCO and UNEP representatives (Dr J.R.E. Harger, UNESCO/ROSTSEA, Jakarta and Dr E. Gomez, Marine Science Centre, University of the Philippines, Quezon City) and Dr Hansa Chansang of the Phuket Marine Biological Centre. The training course was attended by scientists from eight countries in the Indo-Pacific Region: Thailand, Malaysia, Philippines, Indonesia, Singapore, Sri Lanka, Maldives and Micronesia. Attendance of the scientists and the two instructors was funded jointly by UNESCO and UNEP; attendance of H. Ditlev was funded by DANIDA.

The following objectives were achieved:

1. A checklist was compiled of coral species present in the collections at Phuket Marine Biological Center (including new specimens collected during the workshop).
2. The status of taxonomic studies in participating countries was assessed and recommendations were made regarding the conduct of coral taxonomy and identifications in these countries.
3. A handbook of distinguishing features of corals in the region was compiled from notes used in the training course.
4. The course was assessed by participants, and recommendations were made for the conduct of future courses.
5. A research reference collection was compiled for the Phuket Marine Biological Center.

The taxonomic basis for the workshop was the five part monograph **Scleractinia of eastern Australia** (Veron & Pichon 1976, 1980, 1982; Veron et al. 1977; Veron & Wallace 1984 (Australian Institute of Marine Science Monograph Series 1, 3, 4, 5, 6)) which covers 90% of the scleractinia of Asian reefs.

RECOMMENDATIONS

Having recognised the importance of coral reefs as highly productive ecosystems which contribute immensely to the socio-economic well-being of coastal populations of countries that are fortunate to possess them;

Having recognised the contribution of coral reefs to the fisheries and tourist industries as well as their importance as nursery and breeding grounds of fish and other marine organisms, as buffers that prevent sea erosion and storehouses of medicinally important compounds;

Having recognised the need for basic studies such as coral taxonomy for a better understanding of the coral reefs and their ultimate rational management;

Having recognised the concern of UNESCO-UNEP for the rational management of coral reefs of the Asia-Pacific region and

Having recognised the need for a concerted effort by scientists of the Asia-Pacific region to overcome discrepancies in coral taxonomy;

The participants recommend that:

1. Each participating country
   a. Update its checklist of scleractinian corals (indicating species names with taxonomic problems according to principles set up at the present coral taxonomy training course) and identify a National Focal Point for its coral reference collections.
   b. Update its coral reference collections to include a range of ecomorphs as well as representative corals of the entire Asia-Pacific region and that UNESCO-UNEP explore the possibility of providing facilities for exchange of coral specimens among participating countries and for the identification of specimens where such facility is not available in the region.

2. All participating countries exchange research publications and other information on coral taxonomy with each other as well as using the existing communication facilities in the region and in Australia such as:
   a. The Coral Reef Newsletter published by the Pacific Science Association's Scientific Committee on coral reefs and the Marine Laboratory, University of Guam.
   b. The University of Guam Marine Laboratory which has agreed to act as a repository for coral reef literature of the Asia-Pacific region and supply copies at cost to scientists in the region.
   c. The Australian Institute of Marine Science, Queensland, Australia which keeps a computer record of species distribution of corals.

3. UNESCO-UNEP
   a. Explore the possibility of convening a coral taxonomy symposium as a follow-up to the present training course at a meeting to coincide with the 5th International Coral Reef Symposium scheduled to be held in 1985. This would allow representatives of participating countries to up-date their check-lists and allow for discussion of problems relating to the taxonomy of scleractinian corals in their countries, and also the possibility of convening regular meetings at intervals of 2 years to discuss problems pertaining to coral reefs in the Asia-Pacific region.
   b. Identify other countries in the Asia-Pacific region that should be included in the Asia-Pacific working group on coral reefs.
   c. Integrate the recommendations made at previous workshops, symposia and conferences on coral reefs when planning future workshops on corals and coral reefs.
   d. Make known to the respective governments of the participating countries the recommendations of the present training course.
   e. Suggest to the governments of Sri Lanka, Maldives, Indonesia and Malaysia the need for a reference collection of scleractinian corals in their countries.

INTRODUCTION

E.D. Gomez

During the UNESCO/UNEP workshop on Coral Reef Survey Methods held in Phuket, Thailand, in December 1982, discussions were held regarding prospects for a workshop and training course on coral taxonomy to be organised the following year. The proposed workshop was intended to bring in specialists to the region, specifically to Phuket, to address problems in coral taxonomy and to upgrade the status of the collection at the Phuket Marine Biological Center. The training course was to be held in tandem to take advantage of the presence of taxonomic specialists. The course was intended for participants from Asia and the Pacific who would have need of good training in taxonomy, whether for basic research or as a tool in addressing ecological and environmental problems. It was recognised that the participants would include both beginners and those with some proficiency in coral systematics.

The workshop and training course fell within the interests of both UNESCO and UNEP. The UNESCO interests are principally associated with the Major Inter-Regional Project on Research and Training leading to the Integrated Management of Coastal Systems (COMAR). This programme aims at establishing a scientific basis for understanding the characteristics and functions of coastal systems and is implemented by the UNESCO Division of Marine Sciences. The present workshop and training course forms part of the continuing COMAR programme in support of the management and evaluation of coral reefs in Asia and the Pacific. A follow-up COMAR activity on assessment of coral reef damage caused by human activities is planned to be held in Indonesia during 1985.

The UNEP Regional Seas Programme for East Asia includes a project on corals entitled "Assessment of Pollution and Degradative Factors on Coral Reef Ecosystems and Related Fisheries". This is co-ordinated by the Natural Resource Management Center in the Philippines, and participated in by Indonesia, Malaysia, the Philippines and Thailand. In addition to this, two other regions, the South Pacific and South Asia have coral reef problems which could be better addressed if the taxonomy of corals were in a better state.

Consequently, at the Second Meeting of the Co-ordinating Body of the Seas of East Asia (COBSEA), held in Yogyakarta in March 1983, it was suggested that the co-operative programme between UNESCO and UNEP/COBSEA be continued in the field of coral reef analysis through the joint workshop/training course on coral taxonomy.

In the planning and execution of the proposal, the Phuket Marine Biological Center played a key role, particularly in the person of Dr Hansa Chansang. Two Australian coral taxonomists, Dr J.E.N. Veron and Dr Carden Wallace agreed to come to the workshop as course instructors, with the assistance of Dr Hans Ditlev who was supported by DANIDA. UNESCO support was realised through the initiative and efforts of Dr Robin Harger of the Regional Office for Science and Technology for South East Asia (ROSTSEA). The UNEP sponsorship came through the UNEP/COBSEA coral project co-ordinated by the Natural Resources Management Center.

WORKSHOP ON CORAL SPECIES PRESENT IN THAILAND AND STATUS OF CORAL TAXONOMY IN CENTRAL INDO-PACIFIC COUNTRIES

1. *Aims*

The workshop was conducted for six days prior to the training course as well as concurrently with the training course. It had the following aims:

a) To assist research on coral reefs in Thailand by determining which species occur in Thai waters and by identifying specimens at Phuket Marine Biological Center.

b) To place Thai reefs in biogeographical context relative to what is presently known of the distribution of Indo-Pacific corals.

c) To assess the status of coral taxonomy in other Asian and Pacific countries and make recommendations about this.

2. *Summary of field and laboratory studies*

Coral studies conducted in Thailand consisted of the following:

a) Examination of corals in the reference collection at PMBC including those collected by H. Ditlev and by staff and students of the Center. Labelling of representative specimens of each species in the collection.

b) A three day diving trip to reefs around Ko Surin, Andaman Sea, to examine the corals *in situ*, observe habitat types and collect species or ecomorphs not present in the collection. Limited field work on reefs of Phuket Island during the training course.

3. *Tentative checklist of hermatypic coral species from Thailand*

The following species were identified from the collections of the Phuket Marine Biological Center and from collections made during the workshop. The identity of several species (indicated below) requires confirmation from specimens being sent to Australia for further study. Species are as described in 'Scleractinia of Eastern Australia'.

Family Astrocoeniidae Koby, 1890
- Genus *Stylocoeniella* Yabe & Sugiyama, 1935
  - *S. guentheri* Bassett-Smith, 1890

Family Pocilloporidae Gray, 1842
- Genus *Pocillopora* Lamarck, 1816
  - *P. damicornis* (Linnaeus, 1758)
  - *P. verrucosa* (Ellis & Solander, 1786)
  - *P. meandrina* Dana, 1846
  - *P. eydouxi* Edwards & Haime, 1860
- Genus *Seriatopora* Lamarck, 1816
  - *S. hystrix* Dana, 1846
  - *S. caliendrum* Ehrenberg, 1834
- Genus *Stylophora* Schweigger, 1819
  - *S. pistillata* Esper, 1797
- Genus Madracis Edwards & Haime, 1849
  - *M. kirbyi* Veron & Pichon, 1976

Family Acroporidae Verrill, 1902
- Genus *Montipora* de Blainville, 1830
  - *M. monasteriata* (Forskål, 1775)
  - ?*M. mollis* Bernard, 1897
  - *M. peltiformis* Bernard, 1897
  - *M. spongodes* Bernard, 1897
  - *M. spumosa* (Lamarck, 1816)
  - *M. verrucosa* (Lamarck, 1816)
  - *M. foveolata* (Dana, 1846)
  - ?*M. angulata* (Lamarck, 1816)
  - *M. digitata* (Dana, 1846)
  - *M. hispida* (Dana, 1846)
  - *M. aequituberculata* Bernard, 1897
  - *M. crassituberculata* Bernard, 1897

Genus *Acropora* Oken, 1815
A. humilis (Dana, 1846)
A. gemmifera (Brook, 1892)
?*A. monticulosa* (Brüggemann, 1879)
A. samoensis (Brook, 1891)
A. digitifera (Dana, 1846)
A. verweyi Veron & Wallace, 1984
A. lovelli Veron & Wallace, 1984
A. robusta (Dana, 1846)
A. danai (Edwards & Haime, 1860)
A. palmerae Wells, 1954
A. nobilis (Dana, 1846)
A. listeri (Brook, 1893)
A. formosa (Dana, 1846)
A. grandis (Brook, 1892)
A. acuminata (Verrill, 1864)
A. microphthalma (Verrill, 1869)
A. horrida (Dana, 1846)
A. vaughani Wells, 1954
A. austera (Dana, 1846)
A. aspera (Dana, 1846)
A. pulchra (Brook, 1891)
A. millepora (Ehrenberg, 1834)
A. tenuis (Dana, 1846)
A. selago (Studer, 1878)
A. donei Veron & Wallace, 1984
A. dendrum (Bassett-Smith, 1890)
A. cytherea (Dana, 1846)
A. hyacinthus (Dana, 1846)
A. latistellata (Brook, 1892)
A. aculeus (Dana, 1846)
A. cerealis (Dana, 1846)
A. nasuta (Dana, 1846)
A. valida (Dana, 1846)
A. secale (Studer, 1878)
A. lutkeni Crossland, 1952
A. clathrata (Brook, 1891)
A. divaricata (Dana, 1846)
A. echinata (Dana, 1846)
A. subglabra (Brook, 1891)
A. carduus (Dana, 1846)
A. longicyathus (Edwards & Haime, 1860)
A. loripes (Brook, 1892)
A. florida (Dana, 1846)
Genus *Astreopora* de Blainville, 1830
A. myriophthalma (Lamarck, 1816)
A. moretonensis Veron & Wallace, 1984
Family Poritidae Gray, 1842
Genus *Porites* Link, 1807
P. lobata Dana, 1846
P. murrayensis Vaughan, 1918
P. lutea Edwards & Haime, 1860
P. stephensoni Crossland, 1952
P. cylindrica Dana, 1846
P. nigrescens Dana, 1846
P. vaughani Crossland, 1952
P. rus (Forskal, 1775)
Genus *Goniopora* de Blainville, 1830
G. djiboutiensis Vaughan, 1907
G. stokesi Edwards & Haime, 1851
G. lobata Edwards & Haime, 1860
G. columna Dana, 1846

?*G. tenuidens* (Quelch, 1886)
G. minor Crossland, 1952
G. pandoraensis Veron & Pichon, 1982
G. fruticosa Saville-Kent, 1893
G. stutchbury Wells, 1955
Genus *Alveopora* de Blainville, 1830
A. allingi Hoffmeister, 1925
A. spongiosa Dana, 1846
Family Siderastreidae Vaughan & Wells, 1943
Genus *Pseudosiderastrea* Yabe & Sugiyama, 1935
P. tayami Yabe & Sugiyama, 1935
Genus *Psammocora* Dana, 1846
P. digitata Edwards & Haime, 1851
P. contigua (Esper, 1797)
P. profundacella Gardiner, 1898
Genus *Coscinaraea* Edwards & Haime, 1848
C. columna (Dana, 1846)
C. wellsi Veron & Pichon, 1980
C. sp. cf. *monile* (Forskal, 1775)
Family Agariciidae Gray, 1847
Genus *Pavona* Lamarck, 1801
P. cactus (Forskal, 1775)
P. decussata (Dana, 1846)
P. explanulata (Lamarck, 1816)
P. clavus (Dana, 1846)
P. minuta Wells, 1956
P. varians Verrill, 1864
P. venosa (Ehrenberg, 1834)
P. maldivensis (Gardiner, 1905)
P. sp.
Genus *Leptoseris* Edwards & Haim, 1849
L. papyracea (Dana, 1846)
L. gardineri van der Horst, 1921
L. explanata Yabe & Sugiyama, 1941
L. scabra Vaughan, 1907
L. hawaiiensis Vaughan, 1907
L. mycetoseroides Wells, 1954
L. foliosa Dinesen, 1980
Genus *Gardineroseris* Scheer & Pillai, 1974
G. sp.
Genus *Coeloseris* Vaughan, 1918
C. mayeri Vaughan, 1918
Genus *Pachyseris* Edwards & Haime, 1849
P. rugosa (Lamarck, 1801)
P. speciosa (Dana, 1846)
Family Fungiidae Dana, 1846
Genus *Cycloseris* Edwards & Haime, 1849
C. cyclolites (Lamarck, 1801)
C. costulata (Ortmann, 1889)
C. marginata (Boschma, 1927)
Genus *Diaseris* Edwards & Haime, 1849
D. distorta (Michelin, 1843)
Genus *Fungia* Lamarck, 1801
Subgenus *Fungia* Lamarck, 1801
F. (F.) fungites (Linnaeus, 1758)
Subgenus *Danafungia* Wells, 1966
F. (D.) valida Verrill, 1864
Subgenus *Verrillofungia* Wells, 1966
F. (V.) repanda Dana, 1846
F. (V.) granulosa Klunzinger, 1879
F. (V.) concinna Verrill, 1864
Subgenus *Pleuractis* Verrill, 1864

F. (P.) scutaria Lamarck, 1801
F. (P.) paumotensis Stutchbury, 1833
F. (P.) moluccensis van der Horst, 1919
Subgenus *Ctenactis* Verrill, 1864
F. (C.) echinata (Pallas, 1766)
Genus *Herpetoglossa* Wells, 1966
H. simplex (Gardiner, 1905)
Genus *Herpolitha* Eschscholtz, 1825
H. limax (Houttuyn, 1772)
H. weberi (van der Horst, 1921)
Genus *Polyphyllia* Quoy & Gaimard, 1833
P. talpina (Lamarck, 1801)
Genus *Halomitra* Dana, 1846
H. pileus (Linnaeus, 1758)
Genus *Sandalolitha* Quelch, 1884
S. robusta Quelch, 1886
Genus *Lithophyllon* Rehberg, 1892
L. edwardsi Rousseau, 1854
Genus *Podabacia* Edwards & Haime, 1849
P. crustacea (Pallas, 1766)
Family Oculinidae Gray, 1847
Genus *Galaxea* Oken, 1815
G. astreata (Lamarck, 1816)
G. fascicularis (Linnaeus, 1767)
Family Pectiniidae Vaughan & Wells, 1943
Genus *Echinophyllia* Klunzinger, 1879
E. aspera (Ellis & Solander, 1788)
Genus *Oxypora* Saville-Kent, 1871
O. lacera (Verrill, 1864)
Genus *Mycedium* Oken, 1815
M. elephantotus (Pallas, 1766)
Genus *Pectinia* Oken, 1815
P. lactuca (Pallas, 1766)
P. paeonia (Dana, 1846)
P. alcicornis (Saville-Kent, 1871)
P. teres Nemenzo, 1981
Family Mussidae Ortmann, 1890
Genus *Cynarina* Brüggemann, 1877
C. lacrymalis (Edwards & Haime, 1848)
Genus *Australomussa* Veron, 1984
A. rowleyensis Veron, 1984
Genus *Acanthastrea* Edwards & Haime, 1848
A. echinata (Dana, 1846)
Genus *Lobophyllia* de Blainville, 1830
L. hemprichii (Ehrenberg, 1834)
L. diminuta Veron, 1984
L. hataii Yabe, Sugiyama & Eguchi, 1936
Genus *Symphyllia* Edwards & Haime, 1848
S. recta (Dana, 1846)
S. radians Edwards & Haime, 1849
S. agaricia Edwards & Haime, 1849
Family Merulinidae Verrill, 1866
Genus *Hydnophora* Fischer de Waldheim, 1807
H. rigida (Dana, 1846)
H. exesa (Pallas, 1766)
H. microconos (Lamarck, 1816)
Genus *Merulina* Ehrenberg, 1834
M. ampliata (Ellis & Solander, 1786)
M. sp. cf. *speciosa* Verrill, 1864
Genus *Scapophyllia* Edwards & Haime, 1848
S. cylindrica Edwards & Haime, 1848

Family Faviidae Gregory, 1900
Genus *Favia* Oken, 1815
F. stelligera (Dana, 1846)
F. laxa (Klunzinger, 1879)
F. helianthoides Wells, 1954
F. pallida (Dana, 1846)
F. speciosa (Dana, 1846)
F. favus (Forskal, 1775)
F. lizardensis Veron, Pichon & Wijsman-Best, 1977
F. mattai Vaughan, 1918
F. rotumana (Gardiner, 1899)
F. maxima Veron, Pichon & Wijsman-Best, 1977
Genus *Barabattoia* Yabe & Sugiyama, 1941
B. amicorum (Edwards & Haime, 1850)
Genus *Favites* Link, 1807
F. abdita (Ellis & Solander, 1786)
F. flexuosa (Dana, 1846)
F. pentagona (Esper, 1794)
F. bennettae Veron, Pichon & Wijsman-Best, 1977
Genus *Goniastrea* Edwards & Haime, 1848
G. retiformis (Lamarck, 1816)
G. edwardsi (Chevalier, 1971)
G. aspera Verill, 1905
G. pectinata (Ehrenberg, 1834)
G. palauensis (Yabe, Sugiyama & Eguchi, 1936)
Genus *Platygyra* Ehrenberg, 1834
P. daedalea (Ellis & Solander, 1786)
P. sinensis (Edwards & Haime, 1849)
P. pini Chevalier, 1975
P. verweyi Wijsman-Best, 1976
Genus *Leptoria* Edwards & Haime, 1848
L. phrygia (Ellis & Solander, 1786)
Genus *Oulophyllia* Edwards & Haime, 1848
O. crispa (Lamarck, 1816)
Genus *Montastrea* de Blainville, 1830
M. curta (Dana, 1846)
M. magnistellata Chevalier, 1971
M. valenciennesi (Edwards & Haime, 1848)
Genus *Oulastrea* Edwards & Haime, 1848
O. crispata Lamarck, 1816
Genus *Plesiastrea* Edwards & Haime, 1848
P. versipora (Lamarck, 1816)
Genus *Diploastrea* Matthai, 1914
D. helipora (Lamarck, 1816)
Genus *Leptastrea* Edwards & Haime, 1848
L. purpurea (Dana, 1846)
L. transversa Klunzinger, 1879
L. pruinosa Crossland, 1952
Genus *Cyphastrea* Edwards & Haime, 1848
C. serailia (Forskål, 1775)
C. chalcidicum (Forskål, 1775)
C. microphthalma (Lamarck, 1816)
Genus *Echinopora* Lamarck, 1816
E. lamellosa (Esper, 1795)
E. horrida Dana, 1848
Family Trachyphylliidae Verrill, 1901
Genus *Trachyphyllia* Edwards & Haime, 1848
T. geoffroyi Audouin, 1826
Family Caryophylliidae Gray, 1847
Genus *Euphyllia* Dana, 1846
E. glabrescens (Chamisso & Eysenhardt, 1821)
E. ancora Veron & Pichon, 1980

Genus *Plerogyra* Edwards & Haime, 1848
P. sinuosa (Dana, 1846)
Genus *Physogyra* Quelch, 1884
P. lichtensteini Edwarsd & Haime, 1851
Family Dendrophylliidae Gray, 1847
Genus *Turbinaria* Oken, 1815
T. peltata (Esper, 1794)
T. frondens (Dana, 1846)
T. mesenterina (Lamarck, 1816)
T. stellulata (Lamarck, 1816)
Genus *Heteropsammia* Edwards & Haime, 1848
H. cochlea (Spengler, 1781)

4. *Assessment of status of coral taxonomy in participating countries*

The status of current taxonomic research in participating countries varies widely (table 1). All countries have researchers who are required to identify corals in the course of research and management duties. In four of the countries, there are no resident coral taxonomists to advise on this task (table 1).

The Philippines is the most advantaged country in this regard, with many publications by Nemenzo from 1950 to the present, and the current taxonomic studies of five other taxonomists, some of whose work is at a very high level. The present need and emphasis in this country is for field studies to determine species limits and variability.

Coordinated field and laboratory studies are underway in Thailand, Indonesia and Micronesia. Thailand has the reference facility at Phuket, the recent publication of Ditlev, the results of the present workshop, and an ongoing commitment to stabilising its taxonomy. The obvious "next step" for taxonomic revision is Indonesia. In this country, coral diversity reaches its peak, making the taxonomic tasks most difficult, but their resolution most rewarding and useful to the whole region.

Some of the other countries (especially Singapore and Malaysia) have had taxonomic studies carried out from time to time by visiting or resident workers, but do not have a stable taxonomic work relating field descriptions to skeletal descriptions. In some (particularly the Maldives, Malaysia, Sri Lanka) there is an urgent need for a reference facility in which taxonomic collections can be housed and their study commenced.

Table 1. Assessment of the status of coral taxonomy in participating countries

Country	*Status*	*No. of practising taxonomists*	*No. of additional researchers involved in coral identification*
Indonesia	R	4	4
Malaysai	R	0	2
Maldives	N	0	1
Micronesia	B	1	6
Philippines	A-R	6	2
Singapore	R	0	1
Sri Lanka	N	0	1
Thailand	A*	3	5
Total:		**14**	**22**

Symbols:
R revision required
N never studied, except in early expeditions
B study commenced
A study in advanced stages
* some localities not studied

5. The distribution patterns of Indo-Pacific genera of hermatypic corals

Table 2 shows the genera of hermatypic corals present, or likely to be present, on reefs belonging to countries represented at this workshop.

The table illustrates the high degree of similarity in the faunas of Asian countries, a similarity repeated at species level. This allows the monograph *Scleractinia of Eastern Australia* (distributed to workshop participants) to be useful for identifications of most Asian species of corals. It also means that a high degree of collaboration between coral research workers in these countries and Australian specialists is not only possible but highly desirable.

Table 2. The probable occurrence of reef coral genera in the vicinity of Asian countries participating in the workshop. A 'cross' (x) indicates that the genus has been recorded from that country, or that the country falls within the distribution range of the genus.

Genus	Maldives	Sri Lanka	Thailand	Singapore	Malaysia	Philippines	Indonesia	Micronesia
Porites	x	x	x	x	x	x	x	x
Pocillopora	x	x	x	x	x	x	x	x
Psammocora	x	x	x	x	x	x	x	x
Favia	x	x	x	x	x	x	x	x
Favites	x	x	x	x	x	x	x	x
Pavona	x	x	x	x	x	x	x	x
Montipora	x	x	x	x	x	x	x	x
Acropora	x	x	x	x	x	x	x	x
Turbinaria	x	x	x	x	x	x	x	x
Cyphastrea	x	x	x	x	x	x	x	x
Platygyra	x	x	x	x	x	x	x	x
Leptastrea	x	x	x	x	x	x	x	x
Goniastrea	x	x	x	x	x	x	x	x
Montastrea	x	x	x	x	x	x	x	x
Hydnophora	x	x	x	x	x	x	x	x
Fungia	x	x	x	x	x	x	x	x
Cycloseris	x	x	x	x	x	x	x	x
Lobophyllia	x	x	x	x	x	x	x	x
Stylophora	x	x	x	x	x	x	x	x
Galaxea	x	x	x	x	x	x	x	x
Echinopora	x	x	x	x	x	x	x	x
Astreopora	x		x	x	x	x	x	x
Herpolitha	x	x	x	x	x	x	x	x
Leptoseris	x		x	x	x	x	x	x
Goniopora	x	x	x	x	x	x	x	x
Coscinaraea	x	x	x	x	x	x	x	x
Acanthastrea			x	x		x	x	x
Leptoria	x	x	x	x	x	x	x	x
Alveopora	x	x	x	x	x	x	x	x
Echinophyllia	x	x	x	x	x	x	x	x
Symphyllia	x	x	x	x	x	x	x	x
Seriatopora	x		x	x	x	x	x	x
Stylocoeniella	x		x	x	x	x	x	x
Plesiastrea	x	x	x	x	x	x	x	x
Pachyseris	x	x	x	x	x	x	x	x
Merulina	x	x	x	x	x	x	x	x
Euphyllia	x	x	x	x	x	x	x	x
Oxypora	x	x	x	x	x	x	x	x
Oulophyllia	x	x	x	x	x	x	x	x
Mycedium	x	x	x	x	x	x	x	x
Polyphyllia	x	x	x	x	x	x	x	x
Podabacia	x	x	x	x	x	x	x	x
Gardineroseris	x		x	x	x	x	x	x
Diploastrea	x	x	x	x	x	x	x	x
Halomitra	x		x	x		x	x	x
Pectinia	x	x	x	x	x	x	x	x

Physophyllia			x	x		x	x	
Diaseris	x	x	x	x	x	x	x	x
Caulastrea	x			x	x	x	x	x
Sandalolitha			x	x	x	x	x	x
Pierogyra	x	x	x	x	x	x	x	x
Physogyra	x		x	x	x	x	x	x
Scapophyllia			x	x	x	x	x	x
Herpetoglossa	x	x	x	x	x	x	x	x
Scolymia						x	x	x
Trachyphyllia	x		x	x	x	x	x	
Oulastrea			x	x	x	x	x	
Lithophyllon			x	x		x	x	x
Coeloseris			x		x	x	x	x
Cynarina	x	x	x	x	x	x	x	x
Catalaphyllia				x	x	x	x	
Anacropora	x			x	x	x	x	x
Acrhelia						x	x	x
Blastomussa	x					x	x	x
Heliofungia				x	x	x	x	x
Barabattoia			x			x	x	
Moseleya							x	
Pseudosiderastrea			x	x	x	x	x	
Clavarina				x			x	
Stylaraea						x	x	
Palauastrea		x	x	x		x	x	
Wellsophyllia						x	x	

TRAINING COURSE ON CORAL TAXONOMY

1. *Aims and participants' expectations*

At the beginning of the training session participants were asked to note the major learning goals they would like to achieve through the course. A frequency distribution of the principal responses (table 3) shows clearly that the major field of interest concerned problems directly associated with the identification of corals. The most important requirement was to learn to identify corals in the field (item 1); however more concise identification was also of concern (items 2 to 4).

Additional items such as gaining an understanding of the ecomorph concept and distribution patterns were also regarded as important. Problems associated with reference and museum collections, construction of keys, and classificatory schemes completed the list of identified dominant goals. Most items mentioned only once or twice were related to systematic and classificatory questions and came from the more experienced members of the participants.

Table 3. Frequencies of major items identified as being desirable learning goals for the training course.

Item	Learning goal	Frequency of notation
1.	Identify living corals in field	7
2.	Understand taxonomic terminology	7
3.	Identify common species in laboratory	6
4.	Learn to distinguish between species	6
5.	Understand the ecomorph concept	6
6.	Gain insight into distribution patterns	5
7.	Deal with problems of reference collections	4
8.	Construct a simple key for Region	3
9.	Learn history of coral taxonomy	2
10.	Gain introduction to taxonomic literature	2
11.	Establish contact with other coral biologists	2
12.	Understand species concept for corals	1
13.	Preparation for teaching coral taxonomy and biology	1
14.	Learn new techniques, e.g. computer aids	1
15.	Understand causes of coral diversity	1
16.	Understand reef ecology/food web relationships	1

2. *Course topics and field study sites.*

The course included the following topics:

Introductory theoretical sessions:

The basis of the classificatory system for corals
Structures and terms used in coral taxonomy
The construction of identification keys

Core sessions:

Daily lecture/practical sessions in the laboratory covered each coral family.

Evening sessions:

Evening sessions included periferal topics, including:
- Reef and coral communities of Thailand
- Reproduction in corals
- Population biology of corals
- Biogeography of corals
- Variability in corals and the ecomorph concept

Field study sites

Field studies were carried out on the reefs adjacent to the P.M.B.C., at Kata Beach, Patong Beach and nai Yang Beach National Park.

3. *Notes on corals studied (compiled for the workshop by Dr Veron).*

FAMILY ASTROCOENIIDAE Koby, 1890

Only one living genus, *Stylocoeniella*, is included in this otherwise fossil family of colonial, hermatypic corals.

Stylocoeniella has close affinities with the Pocilloporidae.

GENUS *STYLOCOENIELLA* Yabe & Sugiyama, 1935

3 nominal species, 2 true species.

Characters

Colonies are massive, columnar or encrusting. Corallites are immersed, circular, with 2 unequal cycles of septa and a style-like columella. The coenosteum is covered with fine spinules and also by larger pointed styles which are almost as numerous as the corallites.

Polyps have not been observed extended.

Similar genera

Stylocoeniella resembles *Porites* and *Palauastrea* underwater. Both the latter are distinguished by their lack of coenosteum styles. Corallites of *Stylocoeniella, Palauastrea,* and *Stylaraea* are curiously similar, considering that they belong to 3 different families.

FAMILY POCILLOPORIDAE Gray, 1842

Characters

Colonial and mostly hermatypic. Colonies are submassive and ramose or arborescent. Corallites are immersed to conical, small, have well developed columellae and neatly arranged septa of two cycles or less, some of which are usually fused with the columella. The coenosteum is covered with spinules.

The genera

Five genera: *Pocillopora, Seriatopora, Stylophora, Palauastrea* and *Madracis.*

GENUS *POCILLOPORA* Lamarck, 1816

Approximately 35 nominal species, 7-10 true species.

Characters

Colonies are submassive to ramose with branches tending to be blade-like or else fine and irregular. Colonies are covered with verrucae.

Corallites are immersed. They may be devoid of internal structures or have a low solid columella and two unequal cycles of septa. The coenosteum is usually covered by granules.

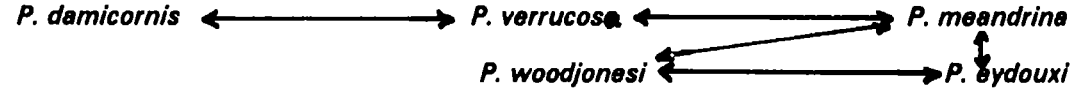
Polyps are usually extended only at night.

Similar genera

Pocillopora is a well defined genus readily distinguished from others by the presence of verrucae.

The Species of *Pocillopora*

These may be difficult to identify as they form a continuing series:



GENUS *SERIATOPORA* Lamarck, 1816

26 nominal species, approximately 5 true species.

Characters

Colonies form compact bushes with thin anastomosing branches.

Corallites are arranged in neat rows along the branches. They are mostly immersed and have poorly developed internal structures except for solid style-like columellae. Usually one, sometimes two cycles of septa are developed and are fused to the columella. The coenosteum is covered by fine spinules.

Polyps are extended only at night.

Similar genera

Seriatopora is a well defined genus closest to, but clearly distinct from, *Stylophora.*

GENUS *STYLOPHORA* Schweigger, 1819

24 nominal species, at least 4 true species.

Stylophora pistillata Esper, 1797

Characters

Colonies are ramose with blunt ended branches becoming thick and submassive.

Corallites are immersed, conical or hooded. They have a solid style-like columella, 6 primary septa which may be short or fused with the columella, and sometimes 6 short secondary septa. the coenosteum is covered by fine spinules.

Polyps are extended only at night.

Colour is a uniform cream, pink, blue or green.

Similar species

Stylophora is a well-defined genus closest, but clearly distinct from, *Seriatopora.* Underwater it can be confused with *Palauastrea ramosa.*

GENUS *PALAUASTREA* Yabe & Sugiyama, 1941

Only one species.

Palauastrea ramosa Yabe & Sugiyama, 1941

Characters

Colonies are ramose with anastomosing blunt-ended, terete branches.

Corallites are immersed, circular, with a blunt style-like columella and 2 unequal cycles of septa that do not fuse with the columella. The coenosteum is covered by fine spinules.

Polyps are usually extended only at night.

Colour is cream or pinkish-brown.

Similar species

Palauastrea is most readily confused underwater with the much more abundant *Porites digitata* which may have exactly the same colony shape. Corallites of *Palauastrea* appear star-like on closer inspection. They resemble those of *Stylocoeniella* without the coenosteum styles, but these genera are readily distinguished by their differing growth forms.

GENUS *MADRACIS* Edwards & Haime, 1849

This genus is primarily ahermatypic but the only Australian species *M. kirbyi,* is hermatypic.

Madracis kirbyi Veron & Picon, 1976

Characters

Colonies are laminar, encrusting or columnar, columns being club-shaped.

Corallites are subcerioid, closely compacted, angular in outline, with a solid conical columella. Usually 10 septa are present and these are fused with the columella. The coenosteum is covered by fine spinules.

Polyps are extended only at night.

The oval disc is green, the coenosteum is brown.

Similar species

Madracis is a well-defined genus. It can be confused underwater with *Stylocoeniella* because both genera are basically encrusting and cryptic but the larger, angular corallites of *Madracis* and lack of coenosteum styles make these genera easy to distinguish on close inspection.

FAMILY ACROPORIDAE Verrill, 1902

Characters

Colonial, hermatypic, mostly extant. Colonies have all growth forms known for hermatypic corals.

Corallites (except *Astreopora*) are small with septa in 2 cycles or less, poorly developed columellae.

The genera
Montipora, Anacropora, Acropora and *Astreopora.*

GENUS *MONTIPORA* de Blainville, 1830

211 nominal species. The number of true species is unknown, but at least 38 have been recognised from Australia.

Characters
Colonies are submassive, laminar, foliaceous, encrusting or ramose.

Corallites are very small. Septa are in 2 cycles with inward projecting teeth. Columellae are absent. Corallite walls and the coenosteum are porous and may be highly elaborated.

Polyps are usually extended only at night.

Similar genera
Montipora is most readily confused with *Porites.*

GENUS *ANACROPORA* Ridley, 1884

10 nominal species, 6 true species.

Characters
Colonies are arborescent with thin tapered branches, without axial corallites.

All corallites are radial. They are small and immersed. Septa are in 2 cycles with inward projecting teeth. Columellae are absent. Corallite walls and the coenosteum are porous, without elaboration.

Polyps are extended day and night and are widely spaced, small, with fine tentacles.

Similar genera
Anacropora has *Montipora*-like corallites combined with an *acropora*-like arborescent growth form. Unlike *Acropora* there are no terminal corallites.

GENUS *ACROPORA* Oken, 1815

365 nominal species. The number of true species is unknown, but 73 species have been recognised from eastern Australia.

Characters
Colonies are rarely encrusting or submassive. They are usually ramose to arborescent, bushy or plate-like.

Corallites are of two types, axial and radial. Septa are usually in two cycles. Columellae are absent. Corallite walls and the coenosteum are porous.

Polyps are usually extended only at night.

Similar genera
Only *Cyphastrea japonica* and the ahermatypic *Arcohelia* have distinct axial and radial corallites.

GENUS *ASTREOPORA* de Blainville, 1830

28 nominal species, approximately 15 true species.

Characters
Colonies are massive, laminar, encrusting or foliaceous. Corallites are immersed or conical with short, numerous, neatly spaced short septa. Columellae are deep-seated, compact. Corallite walls are slightly porous and the coenosteum and walls have few elaborations.

Polyps are extended only at night.

Similar genera
Astreopora is a well-defined genus which can be confused only with *Turbinaria.*

FAMILY PORITIDAE Grey, 1842

Colonial, hermatypic, mostly extant. Colonies usually massive, laminar or ramose.

Corallites have a wide size range but are usually compacted with little or no coensosteum. Walls and septa are porous.

The genera

The Poritidae are an isolated family including 4 extant hermatypic genera. *Stylaraea* is very rare, monospecific, and clearly related to *Porites* (and has previously been considered a subgenus of *Porites*). *Porites* and *Goniopora* are very different but can be shown to be related by their patterns of septal fusion. *Alveopora* has very tenuous affinities with *Goniopora*. Family Poritidae, therefore, is essentially a heterogenus assembly of distantly related genera.

GENUS *PORITES* Link, 1807

Approximately 122 nominal species, the majority of which are invalid. The number of true species is unknown.

Characters

Colonies are flat (foliaceous or encrusting), massive or branching. Massive colonies are spherical or hemispherical when small and helmet or dome-shaped when large and are commonly over 5 meters diameter.

Corallites are small, immersed, with calices less than 2 mm diameter and filled with septa.

Polyps are usually extended only at night.

Similar genera

Porites resembles *Montipora* and also *Stylaraea*.

Porites differ from *Montipora* by many differences in growth form. Corallites are usually larger and more compacted and lack the elaborate thecal and reticulum spinules and tuberculae which characterise *Montipora*. *Porites* also have corallites filled with septa whereas those of *Montipora* contain only inward projecting septal teeth.

GENUS *STYLARAEA* Edwards & Haime, 1851

One species

Stylaraea punctata (Linneaus, 1758)

Characters

Colonies are circular, encrusting. They are less than 15 mm diameter and are thus smaller than any other species. They have up to 12 septa which resemble those of *Porites*.

Similar genera

Stylaraea resembles *Porites* except that septa are short, are in 2 cycles, and do not fuse.

GENUS *GONIOPORA* de Blainville, 1830

39 nominal species, an unknown number of true species, 14 from Australia.

Characters

Colonies are usually columnar or massive but may be encrusting.

Corallites have thick but porous walls and calices are filled with compacted septa and columellae.

Polyps are long and fleshy and are normally extended day and night. They have 24 tentacles. Different species have polyps of different shapes and colours, which allow them to be identified underwater.

Similar genera

Goniopora is like *Alveopora* but, as illustrated, all skeletal structures are better developed. Polyps of these genera are similar except that *Goniopora* has 24 tentacles while *Alveopora* as 12.

GENUS *ALVEOPORA* de Blainville, 1830

27 nominal species, at least 16 true species, 8 from Australia.

Characters

Colonies are massive or branching, often with irregular shapes.

The skeletal structure is very light consisting of interconnecting rods and spines. Corallites have porous walls and septa and mostly composed of fine spines which may meet in the centre forming a columella tangle.

Polyps are large and fleshy and are normally extended day and night. They have 12 tentacles, often with swollen knob-like tips.

Similar genera

Alveopora is like *Goniopora* which has 24 tentacles and much greater skeletal development.

FAMILY SIDERASTREIDAE Vaughan & Wells, 1943

Characters

Colonial (except for some fossil genera), hermatypic.

Corallites are immersed with poorly defined walls formed by thickening of the septo-costae. Septa are usually fused to form fan-shaped groups, they have granulated upper margins, are closely compacted and equally spaced.

The genera

The Siderastreidae includes 6 extant hermatypic genera, the above 3 which are Australian as well as *Siderastrea* from the Atlantic and Indian Ocean and the Red Sea, and *Anomastrea* and *Horastrea* from the western Indian Ocean. The distinction between *Psammocora* and *Coscinaraea* may be uncertain with some species. *Pseudosiderastrea* is monospecific.

GENUS *PSEUDOSIDERASTREA* Yabe & Sugiyama, 1935

3 nominal species, 1 true species.

Pseudosiderastrea tayami Yabe & Sugiyama, 1935

Characters

Colonies are encrusting to massive, dome-shaped, up to 160 mm diameter.

Corallites are cerioid, polygonal, 3-6 mm diameter. Septa are evenly spaced and fuse with each other. They have fine, saw-like teeth. Columellae consist of 1-4 pinnules.

Colour is pale grey or pink with distinctive white corallite walls.

Similar genera

Pseudosiderastrea is a well-defined genus which may resemble *Coscinaraea* and superficially resembles *Coeloseris*, and *Leptastrea*. *Coscinarea* has true affinities with *Pseudosiderastrea* but corallites are not cerioid. Septa are coarser and have their own distinctive patterns. *Coeloseris* has no columella and has smooth-sided septa which seldom fuse. *Leptastrea* is subcerioid (i.e. corallites are separated by a groove), septa seldom fuse and only rarely do they have saw-like teeth.

GENUS *PSAMMOCORA* Dana, 1846

Characters

Colonies are massive, columnar, laminar, foliaceous, or encrusting.

Corallites are very small and shallow, sometimes in shallow valleys. Walls are indistinct. A small number of primary septo-costae are imbedded in secondary septo-costae, forming distinctive species-specific patterns. Septo-costae have finely granulated margins. Columellae consist of groups of pinnules.

Polyps are usually extended only at night.

Similar genera

Psammocora is readily confused with *Coscinaraea*. The latter is initially distinguished by having larger corallites with much larger calices. *Psammocora explanulata*, in particular, is like *Coscinaraea wellsi*.

GENUS *COSCINARAEA* Edwards & Haime, 1848

Approximately 14 nominal species, 8 true species.

Characters

Colonies are massive, columnar, encrusting or laminar.

Corallites are in short valleys or are irregularly scattered and shallow. Corallite walls are indistinct. Columellae consist of groups of pinnules. Septo-costae are fused in distinctive patterns and have finely serrated to heavily granulated margins.

Polyps are usually extended at night and sometimes during the day. Retracted polyps have a rough appearance.

Similar genera

Coscinarea resembles *Pseudosiderastrea* but is readily confused with *Psammocora* being primarily distinguished by the larger size of the corallites.

FAMILY AGARICIIDAE Gray, 1847

Colonial (except for some fossil genera), hermatypic. Colonies are massive, laminar or foliaceous.

Corallites are immersed with poorly-defined walls formed by thickening of the septo-costae. Septa seldom fuse and are continuous between adjacent corallite centres. They have smooth or finely serrated margins and are closely packed.

The genera

Agariciidae includes 6 extant hermatypic genera, the following five and *Agaricia* from the West Indies. The distinction between *Pavona* and *Leptoseris* may be uncertain with some species, the remainder are well-defined.

GENUS *PAVONA* Lamarck, 1801

Approximately 50 nominal species, and 12 true species.

Characters

Colonies are massive, laminar or foliaceous, the latter usually being bifacial.

Corallites have poorly-defined walls. They are small shallow depressions usually with a central columella, sometimes separated by ridges. Corallites are interconnected by prominent septo-costae.

Except for *P. explanulata,* polyps are extended only at night.

Similar genera

Pavona is close to *Leptoseris* which has similar corallites but finer septo-costae. Foliaceous colonies are unifacial in *Leptoseris* but the distinction between these genera may sometimes be unclear.

GENUS *LEPTOSERIS* Edwards & Haime, 1849

25 nominal species, approximately 14 true species.

Characters

Colonies are foliaceous, sometimes laminar or encrusting, the former usually being unifacial. They frequently have a distinctive central corallite.

Corallites have poorly-defined walls. They are small shallow depressions with a central columella, usually separated by ridges and interconnected by fine septo-costae.

Similar genera

Leptoseris is close to *Pavona.*

GENUS *GARDINEROSERIS* Scheer & Pillai, 1974

Characters

Colonies are massive to encrusting, sometimes with laminar margins.

Corallites have poorly-defined walls but are separated by acute ridges so that each corallite or group of corallites is at the bottom of a neat excavation. Columellae are present and septo-costae are very fine and even.

Polyps are extended only at night
Colour is usually purple-grey, sometimes brown or yellow.

Similar species
Gardineroseris is a well-defined genus closest to *Leptoseris.*

GENUS *COELOSERIS* Vaughan, 1918

Number of species of the genera
3 nominal species, 1 true species.

Coeloseris mayeri Vaughan, 1918

Characters
Colonies are massive either rounded or hillocky.

Corallites are cerioid, without columellae and with *Pavona*-like septocostae.

Polyps are extended only at night.

Colour is pale green, yellow or brown with darker calices.

Similar species
Coeloseris is a well-defined genus closest to *Pavona.*
12 nominal species most of which are synonyms of the 2 true Australian species.

GENUS *PACHYSERIS* Edwards & Haime, 1849

Characters
Colonies are laminar and unifacial, to branching and bifacial. Branches are usually highly contorted. The surface is a series of concentric ridges parallel with the margins.

Corallite centres are not discernable. Valleys are concentric and parallel to the corallum edge. Columellae are wall-like with lobed upper margins or absent. Septo-costae are very fine, even and tightly compacted.

Extended polyps have never been observed day or night.

Similar genera
Pachyseris is a well-defined genus resembling only *Agaricia* from the West Indies.

FAMILY FUNGIIDAE Dana, 1846

Characters
Solitary or colonial, free living or attached, mostly hermatypic and extant. Colonial genera are derived from solitary genera and each has septo-costal structures corresponding to those of a solitary genus. These septo-costae radiate from the mouth on the oral surface (as septa) and from the centre of the aboral surface (as costae).

The Fungiidae are an Indo-Pacific family with the following extant genera as well as *Zoopilus*, which is a very distinctive genus forming large dome-shaped, free-living colonies which are very delicate and have septo-costae like *Fungia (Ctenactis)* and *Herpetoglossa.*

Fungiacyathus is the only extant ahermatype.

GENUS *CYCLOSERIS* Edwards & Haime, 1849

15 nominal species.

Characters
Corals are solitary, free-living, flat or dome-shaped, circular or slightly oval in outline, with a central mouth. Septa had fine teeth, costae are fine.

Polyps are usually extended only at night. Fine tentacles cover the upper surface of the disc.

Similar genera
Cycloseris is close to *Fungia* and resembles *Diaseris.*

Fungia grow to much larger sizes than *Cycloseris*, may be elongate, have septa with large teeth and costae composed of rows of spines.

Diaseris is composed of wedge-shaped segments giving an irregular shape, septa are thick with blunt teeth.

GENUS *DIASERIS* Edwards & Haime, 1849

4 nominal species.

Characters

Corals are solitary, free-living discs, flat, composed of several fan-shaped segments, with a mouth situated at the point of divergence of the segments. Septa are thick with blunt teeth resembling rows of granules.

Similar genera

Diaseris resembles only *Cycloseris.*

GENUS *HELIOFUNGIA* Wells, 1966

Characters

Corals are solitary, free-living (except for juveniles), flat with a central mouth. Septa have large lobed teeth.

Polyps are extended day and night and are the largest of all corals. They have long dark purple or green tentacles with pale tips, very similar to those of giant anemones. The oral disc is striped, there is one mouth up to 30mm wide.

Similar species

Heliofungia skeletons are similar to those of *Fungia. Fungia* polyps have short tapering tentacles extended only at night.

GENUS *FUNGIA* LAMARCK, 1801

Approximately 22 nominal species.

Characters

Corals are solitary, free-living (except for juveniles), flat or dome-shaped circular or elongate in outline, with a central mouth. Septa have large or small, rounded to pointed teeth, costae consist mostly of rows of spines. The disc is perforated in small and sometimes in large specimens.

Polyps are extended only at night and have short, widely spaced, tentacles.

Similar genera

Fungia is distinguished from *Heliofungia* by the latter's large, lobed septal teeth and large anemone-like polyps. *Fungia* is distinguished from *Cycloseris* by growing much larger, frequently being elongate, by having septa with large teeth, costae with large spines and sometimes having a perforated disc.

GENUS *HERPETOGLOSSA* Wells, 1966

One species

Herpetoglossa simplex (Gardiner, 1905)

Type locality the Maldives.

Identifying characters

Colonies are free-living, elongate, with an axial furrow extending almost to the corallum ends. Several centres, corresponding with mouths, are arranged along the axial furrow but do not occur outside the furrow. Septa have lobed dentations similar to those of *Fungia (Ctenactis).*

Polyps are extended only at night. Tentacles are short and widely spaced, like *Fungia.*

Similar species

Herpetoglossa is like *Herpolitha* species but the latter develops secondary centres outside the axial furrow and has septa like *Fungia (Pleuractis).*

GENUS *HERPOLITHA* Eschscholtz, 1825

9 Nominal species, 2 true species.

Characters

Colonies are free-living, elongate, with an axial furrow that may extend to the corallum ends. Several centres, corresponding with months, are arranged along the furrow and secondary centres are distributed over the rest of the upper surface. Septa have dentations similar to those of *Fungia (Pleuractia)* and *Polyphyllia.*

Polyps are extended only at night. Tentacles are short and widely spaced, like *Fungia.* Secondary centres have single tentacles.

Similar genera

Herpolitha is like *Herpetoglossa. It also has similarities with Polyphyllia* although the latter has very distinct septa and more numerous centres.

GENUS *POLYPHYLLIA* Quoy & Gaimard, 1833

11 nominal species, 3 true species.

Polyphyllia talpina (Lamarck, 1801)

Type locality Indonesia.

Characters

Colonies are free-living, elongate, with an axial furrow that may become indistinct. Centres are evenly distributed over the upper surface. Primary septa are short, elliptical or petaloid, secondary septa usually fuse around the primaries to form a fused background matrix.

Polyps are usually extended during the day. Tentacles are long and numerous.

Colour is grey or cream with white tentacle tips.

Similar species

None.

GENUS *HALOMITRA* Dana, 1846

6 nominal species, probably only 1 true species.

Halomitra pileus (Linnaeus, 1758)

Type locality Indonesia.

Characters

Colonies are large, free-living, circular, dome or bell-shaped, thin and delicate, without an axial furrow. Corallites are widely spaced. Septo-costae are similar to those of *Fungia fungites*.

Polyps are extended only at night. Tentacles are small and widely spaced.

Colour is pale brown, frequently with bright pink or purple margins.

Similar species

Halomitra is similar to *Sandalolitha*. The latter is of much heavier construction with corallites closer together and septo-costae are more prominent and have the characters of *Fungia (Verrillofungia)* and *Podabacia*.

GENUS *SANDALOLITHA* Quelch, 1894

4 nominal species, 2 true species.

Type locality Indonesia

Characters

Colonies are large, free-living, circular to oval, dome-shaped, heavily constructed, without an axial furrow. Corallites are compacted. Septocostae are similar to those of *Fungia (Verrillofungia)* and *Podabacia*.

Polyps are extended only at night.

Colour is usually pale or dark brown, sometimes with purple margins.

Similar species

Sandalolitha is similar to *Halomitra*. The latter is of much lighter construction, with corallites further apart and septo-cortae have the characters of *Fungia fungites*.

GENUS *LITHOPHYLLON* Rehberg, 1892

7 nominal species, 2 true species.

Lithophyllon edwardsi Rousseau, 1854

Characters

Colonies are attached, encrusting or laminar, unifacial. Colonies are up to 80mm diameter but may be several metres diameter in other parts of the species' range.

A central corallite is usually distinguishable. Septo-costae similar to *Diaseris*.

Polyps are usually extended only at night.

Colour is dull green or brown with white margins.

Similar species

Lithophyllon is most similar to small colonies of *Podabacia*. The latter are readily distinguished by their lack of a central corallite and by having septo-costal structures similar to *Fungia (Verrillofungia)* and *Sandalolitha*.

GENUS *PODABACIA* Edwards & Haime, 1849

4 nominal species, 1 true species.

Podabacia crustacea (Pallas, 1766)

Characters

Colonies are attached, encrusting or laminar, unifacial, up to 1.5 metres across.

A central corallite is sometimes distinguishable. Septo-costae are similar to those of *Fungia (Verrillofungia)* and *Sandalolitha*.

Polyps may be extended day or night.

Colour is dark coloured except for the septo-costae which are cream.

Similar species

Podabacia is most similar to *Lithophyllon*.

FAMILY OCULINIDAE Gray, 1847

Characters

Colonial, hermatypic and ahermatypic.

Corallites are thickened and linked by smooth coenosteum. Septa are very exsert.

The genera

The Oculinidae are ahermatypic except for the two genera *Galaxea* and *Acrhelia* which are readily distinguished by their different growth forms, the former being massive, encrusting, columnar or irregular, the latter being arborescent or bulky.

GENUS *GALAXEA* Oken, 1815

Approximately 24 nominal species, less than 5 true species.

Characters

Colonies are massive, columnar, encrusting or irregular.

Corallites are cylindrical, thin walled, separated by a blistery coenosteum. Columellae are weak or absent. Septa are very exsert.

Polyps are sometimes extended during the day. They have two circles of tentacles, usually with white tips.

Similar genera

Galaxea is close to *Acrhelia* which differs in being arborescent or bushy.

GENUS *ACRHELIA* Edwards & Haime, 1849

One species.

Acrhelia horrescens (Dana, 1846)

Characters

Colonies are arborescent, either bushy or open-branches.

Corallites are tubular, thin walled with flaring rims. Columellae are absent. Septa are very exsert.

Polyps are usually extended only at night. They have tapering translucent tentacles with white tips.

Colour is pale brown or green with white branch ends.

Similar genera *Galaxea*

FAMILY PECTINIIDAE Vaughan & Wells, 1943

Characters

Colonies are basically laminar, composed of thin plates. Corallite walls are absent or formed by the non-porous costate coenosteum of the laminae.

The genera

The Pectinidae are a small distinct family with only 5 extant genera, all hermatypic: the following 4 genera and *Physophyllia*. The latter is common in the south Japanese islands but is not widely distributed elsewhere.

GENUS *ECHINOPHYLLIA* Klunzinger, 1879

5 nominal species, 4 true species from Australia.

Characters

Colonies are encrusting, laminar or foliaceous.

Calices are round or oval in shape, immersed to tubular, not strongly inclined on the corallum surface. Septa are numerous, columellae are well developed. The coenosteum is pitted at the insertion of new septo-costae.

Polyps are extended only at night.

Similar genera

Echinophyllia is readily confused with *Oxypora* and also with *Echinopora* and *Mycedium*.

GENUS *OXYPORA* Saville-Kent, 1871

Characters

Colonies are primarily foliaceous usually with very thin folia.

Calices are round or oval in shape, irregular, shallow, not strongly inclined on the corallum surface. Septa are few, columellae are poorly developed. The coenosteum is pitted at the insertion of new septo-costae.

Polyps are extended only at night.

Similar genera

Oxypora is readily confused with *Echinophyllia*, especially when colonies become thickened. See also *Echinopora* and *Mycedium*.

GENUS *MYCEDIUM* Oken, 1815

3 nominal species, 1 true species in Australia.

Similar genera

Mycedium is closest to *Echinophyllia* but is distinguished by its outwardly inclined nose-shaped corallites and the absence of pits in the coenosteum.

Mycedium elephantotus (Pallas, 1766)

Type locality Indian Ocean.

Identifying characters

Colonies are laminar or foliaceous.

Corallites are nose-shaped facing outward towards the corallum perimeter. Septa and columellae are well developed and costae form outwardly radiating ribs on the corallum surface which may become highly elaborated on corallite walls. The coenosteum is never pitted at the insertion of new septo-costae.

Polyps are extended only at night.

Colour is usually a uniform brown, grey, green or pink but may have green or red oral discs and may have a coloured margin around the colony.

Similar species

None.

14 nominal 'species', 7 true species.

GENUS *PECTINIA* Oken, 1815

Characters

Colonies are laminar to subarborescent, covered with high, thin, acute, irregular walls usually arranged as short wide valleys. Valleys may be as short as they are wide and the walls may form tall spires, becoming subarborescent.

Corallite centres occur in any position. Septo-costae are well developed and may form the start of walls or spires.

Polyps are only extended at night and then only rarely. A circle of long tubular tentacles surrounds each corallite centre.

Similar genera

Pectinia resembles only *Physophyllia*

FAMILY MUSSIDAE, Ortmann, 1890

Characters

All hermatypic, solitary or colonial, extant and fossil.

Skeletal structures are solid. Corallites and valleys are large. Septa have large teeth or lobes. Columellae and walls are thick and well developed.

The genera

All Indo-Pacific genera occur in Australia. All are restricted to the Indio-Pacific except *Scolymia* which also occurs in the West-Indies and Brazil. There are 5 more mussid genera, all restricted to the Atlantic: *Mussa, Isophyllia, Isophyllastrea* and *Mycetophyllia* from the West Indies and *Mussismillia* from Brazil.

GENUS *BLASTOMUSSA* Wells, 1961

3 true species.

Characters

Colonies are phaceloid with irregularly spaced sprawling corallites.

Corallites have one centre with a weakly developed columella. Septa slope gently to the corallite centre and have lobed teeth. Corallite walls are enveloped with, and often joined by, epitheca.

Polyps have fleshy mantles extended during the day to form a continuous cover obliterating the phaceloid colony structure underneath. Polyps are extended only at night. Both species have two colour morphs, one being red.

Similar genera

Caulastrea also has phaceloid colonies which are usually green but corallites do have mantles and septa are fine, without lobed teeth.

GENUS *CYNARINA* Brüggemann, 1877

9 Nominal species, 1, possibly 2, true species.

Cynarina lacrymalis (Edwards & Haime, 1848)

Type locality Philippines.

Characters

Corals are monocentric, oval or circular, cylindrical with a base for attachment or with a pointed base and free-living.

Primary septa are thick and have very large teeth. Paliform lobes are usually well developed. Columellae are broad and compact.

Polyps are extended only at night. They are translucent so that the toothed primary septa are clearly seen within lobes of the polyp wall.

Colour is various mixtures of almost all colours.

Similar species

Cynarina does not closely resemble any other genus.

GENUS *AUSTRALOMUSSA* Veron, 1985

Australomussa rowleyensis Veron, 1985

Type locality Dampier Archipelago, Western Australia.

Identifying characters

Colonies are flattened, helmet- or dome-shaped and are covered with short-shallow valleys 8-20mm wide separated by thick walls.

Colour is a uniform blue-grey or valleys may have concentric cream and green colours.

Similar species

None.

GENUS *ACANTHASTREA* Edwards & Haime, 1848

Approximately 13 nominal species, 6 true species.

Characters

Colonies are massive, usually flat.

Corallites are cerioid or subplocoid, monocentric, either circular or angular in shape. Septocostae are thick near the corallite wall, becoming thin near the columella, and have tall mussid teeth.

Polyps are thick walled and are extended only at night.

Similar genera

Acanthastrea does not resemble any other mussid genera except for *A. hillae* which is sometimes *Symphyllia*-like. However, *Acanthastrea* is readily confused with faviidae, especially *Favites* (in the case of *A. echinata*) and *Moseleya* (in the case of *A. hillae* and *A. bowerbanki*).

GENUS *LOBOPHYLLIA* de Blainville, 1830

22 nominal species, 5 true species

Characters

Colonies are phaceloid to meandro-phaceloid either flat-topped or dome-shaped.

and compact.

Polyps are extended only at night. Tentacles usually have white tips.

Similar genera

Only *Symphllia* has coarse skeletal structures comparable to *Lobophyllia*, but only *L. hattai*, which is partly meandroid, can be confused with *Symphyllia*.

GENUS *SYMPHYLLIA* Edwards & Haime, 1848

13 nominal species, 5 true species

Characters

Colonies are meandroid, either flat-topped or dome-shaped.

Valleys are wide. A groove usually runs along the top of the walls. Septa are large with very large teeth. Columella centres are broad and compact.

Polyps are extended only at night.

Similar genera

Only *Lobophyllia* has coarse skeletal structures comparable to *Symphyllia*.

FAMILY MERULINIDAE Verrill, 1866

Characters

All genera are extant, hermatypic and colonial.

Skeletal structure are faviid-like but are highly fused, without paliform lobes. Valleys are or become obscured because of fanwise spreading or contortions.

The genera

The Merulinidae are composed of 5 genera, *Hydnophora, Merulina, Clavarina, Scapophyllia* from the north-west Pacific.

GENUS *HYDNOPHORA* Fischer de Waldheim, 1807

Characters

Colonies are massive, encrusting or arborescent.

The genus is characterised by the presence of hydnophores formed where sections of common wall between corallites intersect and develop into conical mounds. Hydnophores cover the surface make this genus immediately recognisable.

Polyps are usually extended only at night (except *H. exesa* and *H. pilosa*.) Short tentacles the of each hydnophore, one tentacle between each pair of septa.

Similar genera

Hydnophora may superficially resemble *Australogyra* but the latter does not have hydnophores. Fine branch tips of *Hydnophora* have sometimes been confused with *Merulina* and also resemble *Clavarina*.

GENUS *MERULINA* Ehrenberg, 1834

6 nominal species, one true species.

Merulina ampliata (Ellis & Solander, 1786)

Characters

Colonies are laminar, and foliaceous or subarborescent with different growth forms occurring in the one colony.

Valleys are short, straight, and spread fanwise then divide. They radiate from the colony on flat surfaces but are highly contorted on branches. Flat surfaces often have concentric lines.

Polyps are usually extended only at night.

Has a variety of pale colours, usually pink or pale brown.

Similar species

Branch tips of *Merulina* may resemble *Clavarina* and *Hydnophora*. Laminar pieces have the structure as *Scapophyllia* except that the latter do not have valleys spreading fanwise.

GENUS *CLAVARINA* Verrill, 1864

3 nominal species, 2 true species.

Clavarina triangularis Veron, Pichon and Wijsman-Best, 1979

Type locality Bushy Island, Great Barrier Reef.

Characters

Colonies consist of a network of anastomosing branches, either compacted or open, which are frequently over 2 metres diameter. They are triangular in section.

Valleys are short and shallow with thick columellae and septa which fuse, except near branch tips, into one solid structure.

Polyps are extended only at night and have long, fine tentacles which occupy most of the space between branches.

Colour is pale yellow or cream.

Similar species

Branch tips of *Clavarina* may resemble those of *Hydnophora* and *Merulina* but are readily distinguished from both by their triangular section, shallow valleys and highly fused skeletal elements.

GENUS *SCAPOPHYLLIA* Edwards & Haime, 1848

Scapophyllia cylindrica Edwards & Haime, 1848

Type locality, South China Sea

Characters

Colonies are composed of blunt-ended columns which may divide, combined with thick laminar bases.

Valleys are meandroid and sinuous. Septa are thick in the valleys and fuse irregularly with other and with the few thick septal teeth that comprise each columella.

Polyps are usually extended only at night and have long tapering tentacles of uniform length.

Colour is usually cream or yellow-brown.

Similar species

Laminar pieces of *Scapophyllia* skeleton resemble *Merulina* but the latter have short valleys spreading fanwise, not sinuous valleys.

FAMILY FAVIIDAE Gregory, 1980

The genera

Two Indo-Pacific faviids, Favia and *Montastrea* also occur in the Atlantic and there are five Atlantic (West Indian) faviids *Diploria, Colpophyllia, Manicinia, Sclerastrea* and *Cladocora* not found in the Indo-Pacific.

Two Indo-Pacific faviids, *Astreosimilia* and *Erythrastrea*, are restricted to the western Indian Red Sea (respectively).

Characters

All extant species are hermatypic and colonial. Septa, paliform lobes, columellae and wall present, are all structurally similar. Septal structures are simple, columellae are a simple tangle of elongate septal teeth, walls are composed of thickened septa and cross-linkages.

GENUS *CAULASTREA* Dana, 1846

8 nominal species, probably 4 true species.

Characters

Colonies are phaceloid.

Corallites have numerous fine septa and well developed columellae..

Polyps are sometimes extended during the day.

Similar genera

Caulastrea is close to *Astreosmilia* from the western Indian Ocean.

GENUS *FAVIA* Oken, 1815

Approximately 70 nominal species.

Characters

Colonies are usually massive, either flat or dome-shaped.

Corallites are monocentric and plocoid i.e. each corallite projects slightly above the colony surface and has its own wall. Daughter corallites are formed by intra-tentacular division.

Polyps are extended only at night and have a simple circle of tapering tentacles, often with a pigmented tip.

Simple genera

Favia is similar to *Favites* but the latter has cerioid corallites. This distinction is sometimes arbitrary in which case *Favia* corallites are further characterised by subdividing equally, where-*Favites* corallites usually subdivide unequally, producing daughter corallites of different sizes.

Favia is distinguished from *Barabattoia* by having less protuberant corallites.

GENUS *BARABATTOIA* Yabe & Sugiyama, 1941

Probably 4 nominal species.

Barabattoia amicorum (Edwards & Haime, 1850)

Type locality Tonga.

Identifying characters

Colonies are massive.

Corallites are plocoid to dendroid i.e. they are protuberant tubes rather than conical.

Polyps are extended only at night.

Colour is usually mottled brown and green or brown and cream.

Similar species

Barabattoia amicorum was for a time included in *Favia* but is distinguished from *Favia* by having protuberant corallites which resemble those of *Bikiniastrea laddi* Wells, 1954. The latter may also be in *Barabattoia*.

GENUS *FAVITES* Link, 1807

Approximately 23 nominal species.

Characters

Colonies are usually massive, either flat or dome-shaped.

Corallites are monocentric and cerioid or subplocoid. Adjacent corallites mostly share Paliform lobes are seldom well developed.

Polyps are extended only at night and have a single circle of tapering tentacles like *Favia*.

GENUS *GONIASTREA* Edwards & Haime, 1848

Approximately 34 nominal species.

Characters

Colonies are massive, usually spherical or elongate.

Corallites are monocentric and cerioid to polycentric and meandroid. Paliform lobes are well developed. Meandroid colonies have well-defined columella centres.

Polyps are extended only at night.

GENUS *PLATYGYRA* Ehrenberg, 1834

Approximately 26 nominal species.

Characters

Colonies are massive, either flat or dome-shaped. Corallites are rarely cerioid, common lobes are not developed, columellae do not form centres nor are they wall like.

Polyps are usually extended only at night.

GENUS *AUSTRALOGYRA* Veron & Pichon, 1982

One species.

Australogyra zelli (Veron, Pichon and Wijsman-Best, 1977)

Type locality Palm Islands, Great Barrier Reef.

Identifying characters

Colonies are meandroid, forming short valleys. Columellae are absent.

Polyps are extended only at night.

Colour is grey-green to grey-brown.

Similar species

Australogyra is similar to *Platygyra*.

It superficially resembles branching *Hydnophora* but the latter have distinctive hydnophores.

GENUS *LEPTORIA* Edwards & Haime, 1848

Three nominal species, one true species.

Leptoria phrygia (Ellis & Solander, 1786)

Characters

Colonies are massive with an even surface and dense skeleton.

Corallite valleys are highly meandroid and very uniform. Septa are uniformly spaced and are of equal size. Columellae are wall-like with a lobed upper margin and do not form centres. Paliform lobes are absent.

Polyps are extended only at night.

Colour is a uniform dull cream, brown or green.

Similar species

Leptoria is similar to *Platygyra* and also *Goniastrea.*

Goniastrea is less meandroid than *Leptoria*, has columellae forming distinct centres and well developed paliform lobes.

GENUS *OULOPHYLLIA* Edwards & Haime, 1848

Approximately 11 nominal species, probably one true species.

Oulophyllia crispa (Lamarck, 1816)

Type locality, Indian Ocean.

Identifying characters

Colonies are usually massive and are frequently over 1 metre diameter.

Valleys are short, broad (up to 20mm) and V-shaped. Septa are usually thin and slope uniformly to the columellae which usually form well-defined centres. Paliform lobes may be present. Valley walls have acute upper margins.

Polyps are extended only at night and are large and fleshy with conspicuous white tips to tentacles When retracted, polyps have a coarse reptilian texture. Mouths are conspicuous.

Colour

Dark brown walls contrast strongly with pale cream or pink valley floors.

Similar species

Oulophyllia has skeletal characters closest to *Favites* but is clearly distinguishable by being meandroid.

GENUS *MONTASTREA* de Blainville, 1830

10 nominal species, 7 from the Indo-Pacific, 5 true species known from the Indo-Pacific.

Characters

Colonies are massive, either flat or dome-shaped.

Corallites are monocentric and plocoid. Daughter corallites are predominantly formed by extratentacular budding, i.e. budding from the wall of parent corallites. Some intratentacular budding may also occur.

GENUS *OULASTREA* Edwards & Haime, 1848

3 nominal species, probably 1 true species.

Oulastrea crispata Lamarck, 18167

Identifying characters

Colonies are encrusting and grow to only a few centimetres diameter. Corallites are like a small *Montastrea*. The skeleton remains black with white septa when dried.

Living colonies are black and white, like the dried coralla.

Similar species

None.

GENUS *PLESIASTREA* Edwards & Haime, 1848

9 nominal species, 2 true species.

Plesiastrea versipora (Lamarck, 1816)

Characters

Colonies are flat and are frequently lobed.

Corallites are monocentric and plocoid. Daughter corallites are produced by extratentacular budding. Corallites have calices approximately 2.5mm diameter. Paliform lobes form a neat circle around small columellae.

Polyps are usually extended only at night. Tentacles are short and are of two alternating sizes.

Colour

Yellow, cream, green or brown, usually pale-coloured in the tropics and brightly coloured in high latitude areas.

Similar species

Plesiastrea versipora is close to *Montastrea* but has smaller corallites with better developed paliform lobes. It is more readily confused with other faviid species with corallites of similar size and shape notably *Favia stelligera* and *Cyphastrea*.

Favia stelligera has more conical corallites with thicker walls and intratentacular budding. *Cyphastrea* usually has poorly developed paliform lobes and the coenosteum between corallites is characteristically covered with granules.

GENUS *DIPLOASTREA* Matthai, 1914

One species.

Diploastrea heliopora (Lamarck, 1816)

Type locality Indian Ocean.

Characters.

Colonies are dome-shaped with a very even surface and may be up to 2 metres high and 7 metres diameter. The skeleton is very dense.

Corallites are plocoid. Columellae are large. Septa are equal and are thick at the wall and thin where joining the columellae.

Polyps are extended only at night.

Colour is uniform cream, grey or green.

Similar species

None. This is one of the most easily recognised of all corals.

GENUS *LEPTASTREA* Edwards & Haime, 1848

16 nominal species, 6-8 true species.

Characters

Colonies are massive, usually flat or dome-shaped.

Corallites are subcerioid to plocoid. Costae are poorly developed or absent. Columellae consist of vertical pinnules. Septa have inward projecting teeth.

Polyps are usually extended only at night (except *L. pruinosa*).

GENUS *CYPHASTREA* Edwards & Haime, 1848

Approximately 26 nominal species, probably less than 8 true species.

Characters

All species, except for *C. japonica* (which is arborescent with axial and radial corallites) are massive or encrusting.

Corallites are plocoid, with calices less than 3mm diameter. Costae are generally restricted to the corallite wall; the coenosteum is granulated.

Polyps are extended only at night.

GENUS *ECHINOPORA* Lamarck, 1816

Approximately 30 nominal species, 5-7 true species.

Characters

Colonies are massive, arborescent or foliaceous or mixtures of these forms.

Corallites are plocoid with calices up to 5mm diameter. Septa are exsert and irregular. Columellae are usually prominent. Costae are usually restricted to the corallite wall. The coenosteum is granulated (except *E. mammiformis*).

Polyps are extended only at night.

Similar genera

Echinopora has a superficial resemblance to *Echinophyllia echinoporoides*.

GENUS *MOSELEYA* Quelch, 1884

One species.

Moseleya latistellata Quelch, 1884

Characters

Colonies are flat, submassive, usually disc-like, and sometimes free-living.

Corallites are cerioid with a large central calice (up to 35mm diameter) surrounded concentrically with angular daughter calices. Septa have fine teeth and usually prominent paliform lobes.

Polyps are extended only on dark nights.

Colour is pale to deep green or brown.

Similar species

None. *Moseleya* may resemble *Acanthastrea* which can have the same colony and corallite shapes. *Acanthastrea* has more fleshy polyps, much larger septal teeth and never has paliform lobes.

FAMILY TRACHYPHYLLIIDAE Verrill, 1901.

Characters

Solitary to colonial, hermatypic.

The family is separated from the Faviidae by growth form, the presence of large paliform lobes and fine teeth on the septa.

Related family

Trachyphylliidae is very close to the Faviidae, especially to genus *Moseleya*, so much so that its status is somewhat arbitrary.

The genera

The family contains only two genera, *Trachyphyllia* and *Wellsophyllia*. The latter is presently known only from museum specimens, and records from the Philippines.

GENUS *TRACHYPHYLLIA* Edwards & Haime, 1848

Probably 6 nominal species, 2 true species.

Trachyphyllia geoffroyi Audouin, 1826

Characters

Colonies are flabello-meandroid and free-living. They are usually bilaterally symmetrical, up to 80mm in length with 1-3 separate mouths.

Valleys have large, regular septa and paliform lobes, and a large columella tangle.

Polyps are fleshy. When retracted during the day a large mantle extends well beyond the perimeter of the skeleton, but this retracts if disturbed. At night tentacles in several rows are extended from the expanded oral disc inside the mantle. The mouth is about 10mm across.

Polyps, especially the mantles, are brightly coloured, commonly yellow, blue or green.

Similar species

Wellsophyllia radiata.

GENUS *WELLSOPHYLLIA* Pichon, 1980

One species.

Wellsophyllia radiata Pichon, 1980

Type locality, Indonesia.

Identifying characters

Colonies are hemispherical, like *Trachyphyllia* but adjacent valleys become fused.

Colour

Unknown.

Similar species

Trachyphyllia geoffroyi is similar but walls of adjacent valleys are not fused.

FAMILY CARYOPHYLLIIDAE Gray, 1847

Characters

This large family is usually divided into 6 subfamilies, only one of which is hermatypic. The latter have phaceloid, meandroid or phacelo-meandroid colonies with large, unperforated, and widely spaced septa with little or no ornamentation. Corallite walls are of similar structure. The ahermatypic subfamilies are solitary or form phaceloid or dendroid colonies usually with large lobed septa and paliform lobes. All Caryophylliidae usually have a membraneous epitheca.

The genera

Hermatypes: Of the extant genera, 3 are central Indo-Pacific, *Gyrosmilia* is restricted to the western Indian Ocean and Red Sea, and *Eusmilia* occurs in the West Indies.

Ahermatypes: Most occur in deep water where little or no light penetrates, but some occur in reefal areas, usually in caves or under rocks. Except for *Heterocyathus*, they are all poorly known and seldom encountered. *Heterocyathus* is partly hermatypic.

GENUS *EUPHYLLIA* Dana, 1846

15 nominal species.

Characters

Colonies are flabelloid, phaceloid or meandro-phaceloid, the latter usually dome-shaped.

Walls are thin and imperforate. Columellae are mostly absent. Septa are prominent, smooth-edged and imperforate.

Polyps are extended day and night, are large and fleshy and have tentacles which vary in shape for each species. Two species, *E. divisa* and *E. ancora*, can only be distinguished by their tentacles.

GENUS *CATALAPHYLLIA* Wells, 1971

Characters

Colonies are flabelloid, phaceloid or meandro-phaceloid.

Walls are thin and imperforate. Columellae are poorly developed. Septa have straight edges and form V-shaped valleys. They are smooth-edged and imperforate.

Polyps are extended day and night, are large and fleshy.

Similar genus

Euphyllia.

Catalaphyllia jardinei (Saville-Kent, 1893)

Characters

Colonies are phacelo-meandroid with straight-edged septa forming V-shaped valleys.

Polyps have tubular tentacles extending from a large, fleshy oral disc.

Colour is green with pink tentacle tips and a striped oral disc.

GENUS *PLEROGYRA* Edwards & Haime, 1848

6 nominal species, 3 true species.

Plerogyra sinuosa (Dana, 1846)

Type locality Indonesia.

Characters

Colonies are phaceloid to meandro-phaceloid with valleys more or less connected by a light blistery coenosteum.

Septa are large, imperforate, smooth-edged, very exsert and widely spaced. Walls are imperforate. Columellae are absent.

Polyps are extended only at night. During the day polyps extend clusters of grey vesicles the size and shape of large grapes. These can retract only slowly, if at all, when disturbed.

Colour is bluish-grey.

Similar species

Living colonies of *Plerogyra* resemble those of *Physogyra* except that the polyp vesicles of the latter are smaller and more retractable. Skeletons of *Physogyra* are meandroid, not meandro-phaceloid as with *Plerogyra*.

Plerogyra skeletons may resemble *Euphyllia* as both have imperforate walls and septa and similar growth forms. *Euphyllia* has less exsert, more numerous and more regular septa and there is little development of a blistery coenosteum. Living colonies are distinct, *Euphyllia* having tentacles, *Plerogyra* having vesicles during the day.

GENUS *PHYSOGYRA* Quelch, 1884

5 nominal species, 3 true species.

Physogyra lichtensteini Edwards & Haime, 1851

Type locality Indonesia.

Characters

Colonies are meandroid with short, widely separated valleys inter-connected with light blistery coenosteum.

Septa are large, imperforate, smooth-edged, exsert and widely spaced. Walls are imperforate. Columellae are absent.

Polyps are extended only at night. During the day the whole colony surface is covered with a mass of vesicles the size and shape of small grapes. These retract when disturbed.

Colour is pale grey.

Similar species

Physogyra resembles only *Plerogyra*. .

GENUS *MONTIGYRA* Matthai, 1928

3 nominal species, 1 true species.

Montigyra kenti Matthai, 1928

Type locality, Lacepede Islands, north-west Australia.

Characters

This species and genus is known from a single specimen. It is hemispherical, submeandroid with groups of septa fused into hydnophores. Septa are thin and compact.

Neither the genus nor the species have any clear affinities.

GENUS *HETEROCYATHUS* Edwards & Haime, 1848

11 nominal species, an unknown number of true species.

Heterocyathus aequicostatus Edwards & Haime, 1848

Type locality unrecorded.

Characters

Sometimes hermatypic. Corals are solitary, free-living, and have a flat base. They have a commensal relationship with a sipunculid worm (*Aspidosiphon corallicole*). The sipunculid moves the coral about on soft substrates and prevents it from becoming buried.

Polyps are extended only at night. Polyp larvae initially settle on dead micro-molluscs which become imbedded in the corallum.

Similar species

Heterocyathus and *Heteropsammia* are homoeomorphs.

FAMILY DENDROPHYLLIIDAE Gray, 1847

Characters

Solitary or colonial, mostly ahermatypic. Corallite walls are porous, usually composed of coenosteum. Septa are fused in a distinctive pattern.

The genera

Hermatypes: The family contains only 3 hermatypic genera. Superficially they are completely different; *Turbinaria* forms large colonies with a primarily laminar growth form and is very common and widespread with many species. *Duncanopsammia* forms dendroid colonies, and is rare with one species. *Heteropsammia* is small, free-living, and usually solitary.

Ahermatypes: These are mostly from deep water but include the 2 most prominent ahermatypic genera from reef waters, *Dendrophyllia* and *Tubastrea*.

GENUS *TURBINARIA* Oken, 1815

80 nominal species, 10 true species.

Characters

Colonies are massive, columnar, and laminar or foliaceous with foliae frequently centred.

Corallites are round, immersed to tubular and have porous walls with the same structure as the surrounding coenosteum. Septa are short and neat, columellae are broad and compact.

Polyps, except for those of *T. peltata* are usually extended only at night.

GENUS *DUNCANOPSAMMIA* Wells, 1936

One species.

Duncanopsammia axifuga (Edwards & Haime, 1848)

Characters

Colonies are dendroid, composed of long tubular corallites which all face upward.

Corallites are round, 10-14 mm diameter, have well developed septa which follow Pourtales Plan, broad deep-seated columellae, and walls composed of porous coenosteum.

Polyps are extended day and night. Tentacles form a continuous mat concealing the shape of the underlying colony.

Colour is green or blue-grey.

Similar species

None.

GENUS *HETEROPSAMMIA* Edwards & Haime, 1848

9 nominal species but probably only 1 true species.

Heteropsammia cochlea (Spengler, 1781)

Type locality unrecorded.

Characters

Corals are solitary or form small colonies and are free-living with 1 or 2 calices on a base that is flat or keeled according to the nature of the substrate. They have an obligate commensal relationship with a sipunculid worm (*Aspidosiphon corallicola*) and usually have one parasitic mussel (*Lithophaga lessepsiana*) imbedded above the sipunculid. The sipunculid moves the coral about on soft substrates and prevents it from becoming buried.

Corallites are round or laterally constructed up to 25mm diameter, have well developed septa which follow Pourtales Plan, broad, compact, deep-seated columellae, and walls composed of porous coenosteum.

Polyps are extended only at night. They are hermatypic in tropical localities but are possibly ahermatypic in high latitute locations.

Polyp larvae initially settle on dead micro-molluscs which became imbedded in the corallum.

Colour is grey or brown.

Similar species

Heteropsammia, Heterocyathus and *Psammoseris* are homoeomorphs.

GENUS *DENDROPHYLLIA* Blainville, 1830

Approximately 18 nominal species, an unknown number of true species.

Characters

Ahermatypic, colonies are dendroid becoming bushy by extratentacular budding.

Corallites are tubular with septa fused according to Pourtales Plan.

Polyps are extended mostly at night and are large and fleshy.

GENUS *TUBASTREA* Lesson, 1834

Approximately 15 nominal species, an unknown number of true species.

Characters

Ahermatypic, colonies are dendroid up to 1m tall.

Corallites are tubular with septa of immature corallites only following Pourtales Plan.

Polyps are extended mostly at night and are large and fleshy.

GENUS *BALANOPHYLLIA* Wood, 1884

Six nominal species have been recorded from eastern Australia, *B. bairdiana* Edwards & Haime, *B. affinis* (Semper), *B. incisa* Crossland, *B. yongei* Crossland, *B. buccina* Tenison-Woods and *B. elliptica* Tenison-Woods. Some of these may be variants of the same species, *B. bairdiana*, which also occurs along the Victoria and South Australian coasts.

Characters

Ahermatypic, solitary or corallites in small attached clumps.

Corallites are elongate, tapering, elliptical in cross-section. Walls are thick, composed of coenosteum with costae. Septa are fused according to Pourtales Plan.

Polyps are usually extended during the day and are bright orange.

SUMMARY OF PARTICIPANTS' REACTIONS TO THE COURSE

by E.D. Gomez

At the end of the training course, an open forum was held to elicit participants's reactions to the organization and conduct of the course. This was undertaken so that the organizers and their instructors could get constructive criticism on ways to improve the programmes for the future.

The participants were unanimous in considering the training course as a success. They were particularly happy to learn the use of keys and references in identifying corals. The mix of lecture, laboratory, and field work was regarded as a good balance. The participants were also impressed by the quality and competence of the instructors. The facilities, accommodation and service of the Phuket Marine Biological Center were commended and all the participants were grateful to UNESCO and UNEP for their sponsorship.

A number of suggestions were made for further improvement of training courses of this or a similar nature. With regard to the field work, it was felt that labelling some corals *in situ* might be done for better identification underwater. Further, diving teams led by the instructors or the more proficient participants may prove more beneficial to the beginner. After the field work, more intensive debriefing sessions might be held to compare notes and observations, thus achieving better interaction amongst participants. For laboratory work, identifications might be improved by more illustrations or drawings. The participants may also be given more practice in preparing identification keys for use in their own countries, as well as in preparing descriptions of species for publication.

A future workshop/training course might be organized with two tiers of participants. One tier would consist of more advanced workers who would participate in the workshop component to look at problematic taxa. They in turn, could serve as instructors or leaders of the second tier, the beginning coral taxonomists.

A few expressed the desire that the week might be divided by having researchers in various countries focus on specific taxa, for which they would become the specialists. For a future workshop, participants should also make country checklists and perhaps bring specimens to the workshop for study by all.

APPENDIX 1.

List of participants

Country	Name	Address
Federation of Micronesia	Mr Spensin James	Community College of Micronesia P.O. Box 1591 Kolonia Ponape Federated States of Micronesia 96941
Indonesia	Dr Sukarno	National Institute of Oceanology Jalan Pasir Putih No.1 Ancol Timure P.O. Box 500 Jakarta Indonesia
Indonesia	Dr Lachmuddin Sya'rani	Fisheries Department Diponegoro University Semarang Indonesia
Malaysia	Dr M.W.R.N. De Silva	Faculty of Fisheries and Marine Science Universiti Pertanian Malaysia Serdang, Selangor Malaysia
Malaysia	Mr Ridzwan Bin Abdul Rahman	Faculty of Fisheries and Marine Science University Pertanian Malaysia Serdang, Selangor Malaysia
Philippines	Mr Porfirio Miel Alino	University of the Philippines Marine Sciences Center P.O. Box 1, Diliman Quezon City Philippines
Philippines	Mr Lawton Chua Alcala	Marine Laboratory Silliman University Dumaguete City 501 Philippines
Philippines	Mr Jaime Sy	Coral Reef Research Section Bureau of Fisheries and Aquatic Resources Quezon Blvd, Quezon City Philippines
Maldives	Mr Hassan Maniku	Ministry of Fisheries Male Republic of Maldives
Singapore	Dr Chou Loke Ming	Department of Zoology National University of Singapore Kent Ridge, Singapore 0511
Sri Lanka	Miss Mala Kanakaratne	National Aquatic Resources Agency Crow Island, Mattakkuliya, Colombo — 15 Sri Lanka
Thailand	Mr Anond Snidvongs	Faculty of Science Chulalongkorn University Bangkok 10500 Thailand

Thailand	Mr Niphon Phongsuwan	Graduate School Prince of Songkhla University Haadyai, Songkla Thailand
Thailand	Mr Pichai Sonchang	Srinakarintharaviroj U. Bang Saen Campus Cholburi Thailand
Thailand	Mr Mickmin Charuchinda	Phuket Marine Biological Center P.O. Box 60 Phuket Thailand

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UNEP representative:

Dr Edgardo Gomez
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Resource Persons:

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Australia

Dr C.C. Wallace
James Cook University
Queensland 4811
Australia

Mr H. Ditlev
Bragesvej 39
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Organizing Committee at Phuket Marine Biological Center:

Mr Boonlert Passart, Director
Dr Hansa Chansang
Mr Anuwat Nateewathana
Mr Potchana Boonyanate

APPENDIX 2.

Introductory Addresses

a. Dr Boonlert Passart, Director PMBC.

Dr Boonlert welcomed participants to Phuket, and expressed his country's ongoing interest in understanding and conserving its coral reef resources. He expressed his pleasure at once again hosting a UNESCO/UNEP workshop, particularly since the present workshop was a result of discussions carried out at the Workshop on Coral Reef Survey methods, Phuket, 1982.

The Phuket Marine Biological Center has a very strong commitment to the study and teaching of taxonomy of the local reef fauna, as shown in its history of teaching workshops on coral reef fishes and molluscs. With the facilities provided jointly by the governments of Thailand and Denmark, it is in an excellent position to back this commitment with carefully curated reference collections, and it is keen to see these collections utilized by biologists from other countries in the region.

He wished participants every success over the coming ten days.

b. Dr J.R.E. Harger, Unesco/ROSTSEA

Mr Boonlert Passart, Director PMBC, Dr J. Veron, Dr C. Wallace; Dr Hansa Chansang; Contributors from Denmark, Visitors and guests, Participants,

I would like to say how pleased I am that after almost two and a half years of planning we are able to open this UNESCO/UNEP Coral Taxonomy Workshop and Training Course here at PMBC.

I would like to thank you all individually for making your time available to attend this meeting, which is part of UNESCO's COMAR (Coastal Marine Resources) Programme and follows on from initiatives concerning regional scientific work in the study of coral reefs undertaken in Motopoure Island (1980), in Manila (1981) and more recently in Phuket at the end of 1982.

In particular, I would like to thank the Government of Thailand and the Director and staff of PMBC for provision of facilities and to mention DANIDA with special thanks for the contribution to the activity.

As you know, the need for holding a coral taxonomy training course has been indicated because of the large number of differences of opinion that have arisen in day to day studies concerning coral reefs and their associated species.

As the resource value of coral reefs increasingly becomes apparent to developing economies in the region, more and more formal study is being directed at reef structure and function. We are particularly fortunate in having the assistance of resource people from Australia and Denmark in order that an indepth study of coral taxonomy can be promoted throughout this region.

Taxonomy, or the ordering and classification of living form was one of the earliest expressions of systematic thinking about the natural world. From an appreciation of taxonomy was derived the present superstructure of scientific practice involving living systems.

Since there is a convergence of interests among various United Nations organizations and among individual countries, a situation well-illustrated by this workshop and training course, collaborations in activities of this nature is indeed called for. With resources becoming more limited, joint undertakings are desirable and practical.

Let me conclude my remarks by expressing the gratitude of the UNEP Regional Seas Programme Activity Centre and the Natural Resources Management Center to the Phuket Marine Biological Center for hosting this excellent workshop and training course, and to the instructors from Australia and Denmark for their efforts in making its success.

APPENDIX 3.

Closing Remarks

Dr E.D. Gomez, UNEP

Dr Hansa Chansang, Acting Director, PMBC, Dr J. Veron, Dr C. Wallace, Mr H. Ditlev, Participants, Staff and Guests.

This farewell dinner of the UNESCO/UNEP Workshop and Training Course on Coral Taxonomy is indeed a happy occasion as we have just completed a highly successful undertaking. All the participants are unanimous in agreeing that the objectives have been met and that the arrangements made by the Phuket Marine Biological Center have been excellent. The only regret that any of us have is that the time was too short and that we have to go our separate ways tomorrow. But the interactions among the fifteen participants from eight different countries and the three instructors from two more countries have been stimulating and fruitful. I am also certain that the work done on the reference collection of the Center during the workshop and the training course is highly appreciated. Scientists and other individuals can now visit the center to study an improved scleractinian collection.

All of us are cognizant of the importance of coral taxonomy as an indispensable ingredient to the understanding of important marine environmental and management problems. This regional activity has made possible the formation of a core of coral taxonomists who can serve as nuclei in their own countries to improve the state of coral reef research, whether for its own value or for utilitarian purposes. Needless to say much follow up work needs to be done. Hence, this occasion should not be considered as an ending of activities but rather as a beginning of more.

The UNEP Regional Seas Programme is happy to have co-sponsored the workshop and training course through the East Asian Seas Project co-ordinated by the Natural Resources Management Center of the Philippines. The East Asian Seas Programme is only one of seven regions in the UNEP Regional Seas network where coral reefs abound. We can therefore expect more support for coral reef studies in the future.

Today as we seek to understand the factors governing distribution, abundance and productivity of coral reefs with sustained management goals in mind, we realize more than ever the importance of having a common basis for our studies of these most complex marine ecosystems.

I wish you every success in your studies and ask only that you seek every opportunity to pass on the knowledge that you have gained here, when you return to your own institutions.

Thank you.

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