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# REEF ENCOUNTER

Newsletter of the International Society for Reef Studies

Number 2

June 1984

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Everything you wanted to know about sex in corals (p.5)

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In producing this issue, I should like to acknowledge help from Barbara Brown and Jill Darrell. We were not able to include all the material which was sent to us in this issue, so if you do not see your words in print this time, please be patient and watch this space, i.e. RE3.

The aim of *Reef Encounter* is to provide a magazine-style newsletter on any aspect of reefs, the livelier the better. You can construe 'reefs' as broadly as you like: living and fossil, coral, sponge, algal, rudist, mud bank or lithoherm, deep water or shallow. In addition to the usual kinds of news, meeting reports, expedition reports and announcements of events, we should especially like to have cartoons, good illustrations, personal anecdotes, newspaper and magazine cuttings, and humorous and serious quotations. Our (new) *Upwellings* feature is a forum for debate and discussion, including letters to the editor. Please use us for appeals for information and participation.

We should also like to explore the infra-scientific areas of reefs in art, films, literature, music and poetry (did you know that Elvis recorded a song called *Beyond the Reef?*). Anyone who fancies themselves as another R.M. Ballantyne can try us out for a short story or something longer in instalments. Papua New Guinea and the USA have both recently issued postage stamps bearing reef corals. Reef conservation also brings us face to face with politics and social issues, and all this still leaves us with reefs in history, archaeology and anthropology. Please note however that we do not have funds to pay authors for their efforts: *Reef Encounter* is entirely voluntary.

We are beginning to receive books for review, but please feel moved to offer unsolicited reviews or comments on publications, including the papers in *Coral Reefs*. Our *Comment* feature has become *Currents* in this issue, and is devoted to short reviews, either of recent trends and developments in reef research, or events that bear on reef studies.

We are in the process of establishing a network of Correspondents to represent particular regions in order to help obtain suitable material for *Reef Encounter*. If we haven't written to you yet, and you'd like to help us in this way, why not write to us first and let us know what region you'd like to represent? In the meantime please send all material intended for publication direct to the Editor:

Brian R Rosen, Editor, Reef Encounter, Department of Palaeontology, British Museum (Natural History), Cromwell Road, London SW7 5 BD, UK.

### NOTES FOR CONTRIBUTORS

To save time and postage, we shall not normally acknowledge submitted material, and, apart from articles for *Currents*, material will not normally be refereed or returned for corrections. Opinions expressed and errors of fact will have to remain largely authors' responsibility. No published item moreover should be taken as ISRS opinion unless we have clearly indicated this.

Please help us by sending items not more than about 2000 words in length and in double spaced typescript. You can expect some gentle editing for flow and sense and to address our readership as appropriately as possible. Illustrations should be of a size compatible with our current format. Please indicate size of reduction if applicable and ensure that your illustration will take this reduction. We are currently experimenting with reproduction of photographs, so strongly-black line drawings are preferable in the meantime. References are by footnote as in *Nature*, with World List abbreviations. We have no regular reprint system, but interested contributors should discuss this with the Editor. Please don't forget your name and full address, and any other contact address where applicable.

Deadline for copy for RE3 is October 1st 1984.

## INTERNATIONAL SOCIETY FOR REEF STUDIES

### MEMBERSHIP AND SUBSCRIPTIONS

ISRS was formed at a general meeting held at Churchill College, Cambridge, England, on Tuesday 9th December 1980, with the aim of co-ordinating research effort on coral reefs both through the publication of the journal *Coral Reefs* and through the holding of meetings and conferences on aspects of reef research.

The annual subscription for membership of the Society is £20 or US\$50. Membership includes subscription to *Coral Reefs* and to *Reef Encounter*, and members are entitled to attend meetings of the Society's conferences and other activities. Postgraduate students may take out a special student membership at £5 or US\$12 per year. This includes a subscription to *Reef Encounter*, but not to *Coral Reefs*.

Subscriptions and enquiries about the Society should be addressed to the Treasurer, Dr. P. Spencer Davies, Department of Zoology, The University, Glasgow, G12 8QQ, Scotland.

Non-members who wish to receive single issues of *Reef Encounter* or to subscribe to it should contact the Editor. There are as yet no formal arrangements for this, but they are currently under discussion.

# FROM ISRS

I am delighted to have been given the opportunity to 'steer the ship' for a while, and with your help I hope that I will be able to continue in David Stoddart's wake by contributing further toward developing ISRS into an active international society.

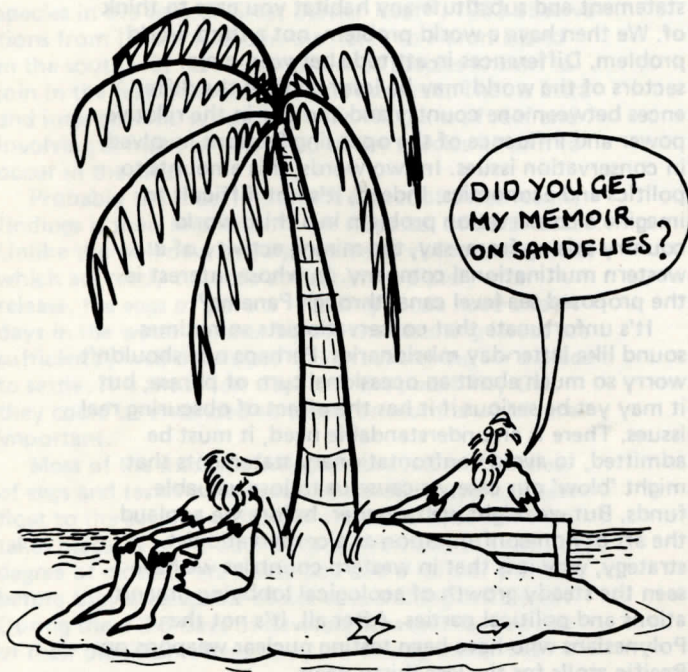
What is surely on all our minds at present is the progress of our journal, *Coral Reefs*. This publication has great potential, but it cannot go forward without every member's support. That means rallying round and making sure that noteworthy manuscripts are in constant supply. It also means doing everything that is humanly possible to promote its distribution. (Do you know any libraries that should be carrying it, for example? Let them know about it, or let us know and we will let them know.)

At our successful annual meeting in Nice in December, many members said that they would like to see more young people joining the Society. But they won't be inclined to do so unless we can think of ways to include the journal in the reduced subscription rates. Before we can do that, however, we must bring in more money. Please join me in our fund-raising efforts. Our new theme is 'attract patron membership'.

In closing, I would like to say that I will sincerely try to communicate with the membership as much as possible, and will start off by mailing the Nice Meeting Abstracts as soon as the copies are available. I would also like to hear your suggestions for improvements, so do write. And, I would very much like to see your manuscripts and the manuscripts of your colleagues pouring in!

With best wishes,  
Ian G. Macintyre, President

Department of Paleobiology, National Museum of Natural History, Smithsonian Institution, Washington DC 20560, USA.



# DIARY

1984

## May 29th–August 16th, HIMB, Coconut Island, Hawaii SOLAR RADIATION IN THE SEA

This is the continuation of the series of promised seminar courses, the first of which we reported on elsewhere in this issue. I'm afraid that by the time *RE2* reaches you, it will be too late to apply for this course, but we include some details for completeness and interest. As we have already remarked, the aim and structure seem to be especially innovative and productive.

This summer's programme is devoted to the investigation of solar radiation in the sea, and will be held at the Hawaii Institute of Marine Biology (Coconut Island), Oahu. It will consist of a graduate level course with emphasis on laboratory and field research combined with lecture and seminar presentations by participating senior scientists.

Senior participants will include: **Dr. Chalker** (Australian Institute of Marine Science) Photosynthesis-irradiance relationships and U/V absorbing pigments; **Dr. D. Crosby** (University of California, Davis) Photochemistry and photo-destruction of organic materials in the sea; **Dr. P. Spencer Davies** (University of Glasgow) Respiration/Photosynthesis relationships of reef corals; **P. L. Jokiel** (HIMB) Coral photosynthesis, ecological effects of U/V radiation; **Dr. R. Kinzie** (University of Hawaii, Zoology) Photobiology of zooxanthellae; **Dr. E. Laws** (University of Hawaii, Oceanography and HIMB) Photosynthesis and nutrient dynamics of phytoplankton; **Dr R. Smith** (University of California, Santa Barbara) Optics and measurements of solar radiation in the sea; **Dr. S. Taguchi** (University of Hawaii) Photosynthesis/irradiance relationships of phytoplankton.

The aim is to bring together senior researchers and advanced, motivated graduated students to offer unique research opportunities in marine science. The programme will consist of closely integrated lectures, seminars and research, stressing maximum interaction among participants. Senior participants will present lecture material, organize seminars and conduct research workshops in their area of expertise. Students will participate in all aspects of this part of the programme. In addition, all students will develop, design and carry out research projects of their own in conjunction with the senior scientists as well as with other student participants, and HIMB and UHM faculty and staff.

The course topics are: I. Optics of solar radiation in the sea: physics, measurement. II. Photochemistry. III. Photobiology: photosynthesis, photoinhibition.

Contact: Paul Jokiel, Hawaii Institute of Marine Biology, P.O. Box 1346, Honolulu, Hawaii 96744 (telephone 808-247-6631).

## July 3-7, Liverpool, UK. SEVENTH MEETING OF CARBONATE SEDIMENTOLOGISTS

This will be at the Jane Herdman Laboratories of Geology, University of Liverpool. The occasion is intended to give research workers in the field of carbonate sedimentology an opportunity to meet informally, concentrating on work in progress rather than on polished presentations of completed programmes.

Contact: Dr Robin G C Bathurst, The Jane Herdman Laboratories of Geology, University of Liverpool, P O Box 147, Liverpool L69 3BX, UK.

## STOP PRESS

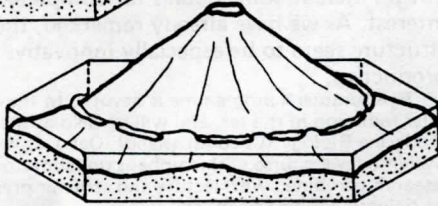
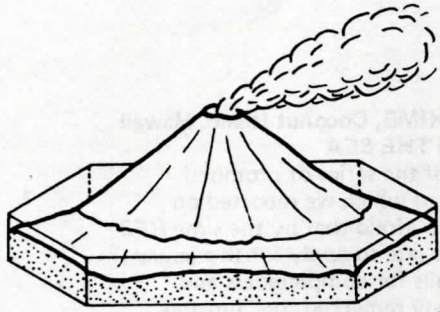
### CORAL REEF ECOLOGY: SESSILE ORGANISMS

Discovery Bay Marine Laboratory, Jamaica  
9 July to 18 August 1984

Content: a field-oriented introduction to the ecology of cnidarians, sponges, bryozoans and algae. Instructors: Buss, Land, Chornesky, Karlson, Wahle, Pomponi, Slocum, Woodley, and Land. Write: Dr. J. Lang, Zoology, University of Texas, Austin, Texas 78712; telephone: 512-471-7131.

Continued on p.20 (back cover)

# Whose world is it anyway ?



New Scientist 5 May 1983

There has been growing concern among Polynesians about the area. Some 800 Bq in the sediments of according to official records ended in 1974. In redistributed some along with other rad ashore. It produce

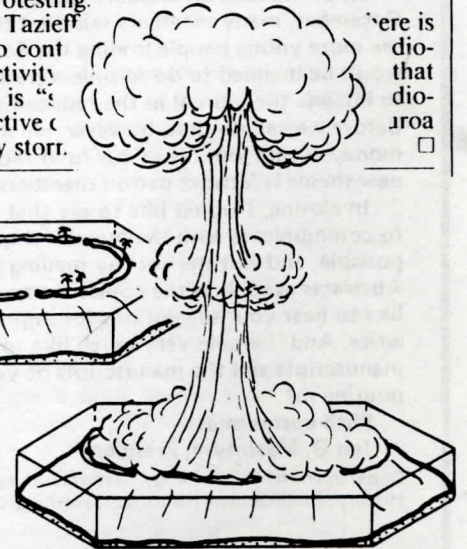
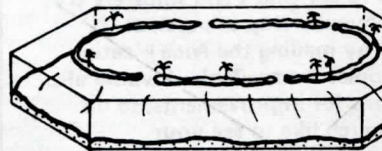
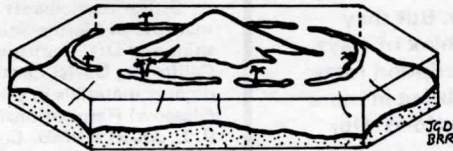
**THE RESULTS** of nuclear tests by France at Mururoa atoll in the Pacific, last month has renewed that plutonium other pollutants past tests may be spreading through the Polynesian lands. Since year's season of typhoons one cyclone, R has swept right across the atoll and on the nearby Gam islands.

In Honiara, the Pope sat in a sports stadium, ringed by about 10,000 people, and listened intently as the governor-general, Sir Baddeley Devesi, expressed concern over continuing French nuclear tests at Mururoa atoll. Sir Baddeley, a Solomon islander, said that South Pacific nations had already agreed on a concerted effort to keep their ocean free from pollution. "In this context, the Solomons Government strongly condemns the French testing of nuclear bombs at Mururoa atoll," he said.—Reuter. *Guardian May 5 '84*

None of these goings-on has done anything to calm the Polynesians. The territorial assembly has been calling for the tests to stop until proper health studies are done. Australia and New Zealand are also protesting.

Tazieff says there is no contamination activity at Mururoa. It is a very active center by itself.

There is no contamination at Mururoa. It is a very active center by itself.



Elsewhere in this issue, Tom van't Hof has responded positively to a question we posed in RE1: for whose benefit is reef conservation, tourist trade operators, local resource users or the organisms themselves? He replies by saying, simply, all three, and summarises the impeccable overall objectives of conservation in general by referring to the document, *World Conservation Strategy*.

His reply, however, invites further questions because he speaks in generalities. It would be interesting to hear about particular conservation schemes and proposals and how far they have adopted the WCS objectives. How far have they had to adapt them, or even adopt different objectives? How far have general objectives had to be spelt out in greater detail for a particular reef scheme? And passing from objectives to implementation, we can also ask whether there are problems in monitoring: how sure can we be that objectives are actually being met? This question applies as much to effectiveness of protection methods as it does to the methods by which reef environments are being monitored. We'd like to get behind the official generalities and the protocols of negotiating language to hear about real situations at the anecdotal level.

Further questions arise from van t'Hof's recognition of the social implications of conservation. He comments adversely, for example on the attitudes of developing nations, by saying that they are often exploitative rather than conservationist. The implicit comparison is presumably with enlightened attitudes in technological, advanced or western countries. Is this fair? Although conscious ideals of conservation appear to have originated in western countries, it doesn't seem that the actual conservation policies, progress or attitudes are any more advanced in western countries, overall, than in third world ones. In any case the principle of conservation has not really been an ideal exclusive to western countries. David Bellamy has often spoken of examples of religious and cultural taboos in non-western countries which can be readily interpreted in terms of conservation rules, even though these cultures have not necessarily satisfied all the criteria of good conservation practice.

When van t'Hof says that developing nations are

eager to exploit reef resources for short-term benefits only, or, even worse, to development goals, he is not really speaking of a problem unique to reefs and developing countries. Remove the word 'reef' from his statement and substitute any habitat you care to think of. We then have a world problem, not a third world problem. Differences in attitude between major sectors of the world may be less real than the differences between one country and another in the relative power and influence of the opposing factions involved in conservation issues. In two words, this amounts to politics and economics. Indeed, it's not difficult to imagine a conservation problem in a third world country arising from, say, the mining activity of a western multinational company. In whose interest is the proposed sea-level canal through Panama?

It's unfortunate that conservationists sometimes sound like latter-day missionaries. Perhaps one shouldn't worry so much about an occasional turn of phrase, but it may yet be serious if it has the effect of obscuring real issues. There is an understandable need, it must be admitted, to avoid confrontational statements that might 'blow' our case, or cause us to lose valuable funds. But we might well wonder, before we applaud the art of non-confrontation as a conservationist strategy, why it is that in western countries we have seen the steady growth of ecological lobbying organisations and political parties. After all, it's not the Polynesians who have been testing nuclear weapons on Pacific atolls for the last thirty years.

## EVERYTHING YOU WANTED TO KNOW ABOUT SEX IN CORALS\*

(\*But no one knew the answers)

### Gordon Bull

An amazing event takes place in spring every year on the Great Barrier Reef. It has been likened to an underwater blizzard. It is the night that many of the corals on the reef join together in a mass reproductive spectacle, filling the water with millions of brightly coloured eggs. A great deal of work has been focused recently on the reproductive biology of corals, but unless you are in a closely related field it may not have attracted your attention. Much of the work has still to be written up, but the story which is unfolding is fascinating and is likely to change many existing ideas and inspire some new ones.

Until relatively recently most of the substantial work on coral reproduction was centred on viviparous species<sup>3, 8</sup>; corals which brood their larvae until they are well developed and active, and release them periodically over a protracted breeding season. This concentration of attention on larval releasing species can be blamed for some widespread misconceptions about the sex lives of corals.

As more work has been done it has become apparent that many corals have a single annual gametogenic cycle and release gametes which undergo external fertilization and development.<sup>1, 2, 4, 7</sup> In fact it appears that many more species release eggs than are known to release brooded planulae<sup>5</sup>. Indeed most of the dominant corals on the Great Barrier Reef have external fertilization. The story is made even more interesting by recent descriptions from the Coral Reproduction Study Group at James Cook University of mass spawnings<sup>6</sup>.

For a couple of hours, a few nights after one full moon in spring, many of the gamete releasing species join together in a synchronous, multi-specific spawning event, the underwater blizzard. Up to the beginning of 1983 there were direct or indirect observations on 32 species in the central Great Barrier Reef<sup>6</sup>. 1983 observations from Lizard Island in the north to Heron Island in the south will take the number of species known to join in the festivities close to one hundred. That is intra- and inter-specific synchrony over 1500 km of reef and involving as many as one third of the species known to occur in the area!

Probably the most important aspect of these recent findings is their implications for dispersal of coral larvae. Unlike the well developed planulae of viviparous species which are ready to settle almost immediately after release, the eggs of gamete releasing corals need a few days in the water column before the resulting larvae are sufficiently well developed to start searching for a place to settle. It is those few days and the possibility that they could be extended to weeks or months which are important.

Most of the mass spawning species release bundles of eggs and testes which are extremely buoyant. These float to the surface and break apart. Fertilisation then takes place. It is 1-2 days before ciliated larvae with any degree of motility are developed and a further 2-3 days before they are capable of active searching behaviour. During these 3-5 days of development and for the rest of their planktonic lives, they are totally under the

influence of water currents. Localised eddies have been observed behind some of the reefs of the Great Barrier Reef, which would allow return of larvae to their parent reefs<sup>9</sup>, but it is almost certain that most would be carried well clear and into the larger regional circulation. Large scale circulation patterns in the area are relatively predictable, especially at the time of year that spawning takes place. There is thus potential for regular rather than chance dispersal over great distances.

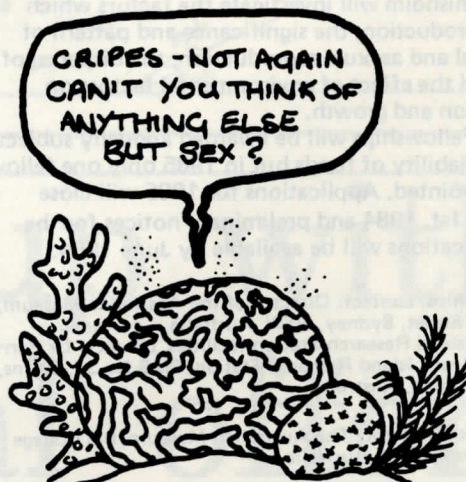
The long ignored fact that corals are planktonic animals for at least part of their lives has suddenly become significant and opens up new horizons in all sorts of fields. Reef managers can no longer draw lines around single reefs and expect the corals to look after themselves. Community ecologists may need to look much further than physical or biotic factors on their reefs to see what structures their communities. Biogeographers can now come closer to a true idea of how much gene-pool mixing really goes on and in what directions. There is also the whole sphere of study into the whys and hows of the mass spawning phenomenon itself which is only just being touched upon.

Whatever the wider implications of mass spawning of gametes by corals, there is one thing agreed on by all of us who have witnessed the event, it is certainly a spectacular sight.

- 1 Babcock, R.C. in press. *Coral Reefs*.
- 2 Bothwell, A.M., 1981. *Proc. 4th Int. Coral Reef Symp. Manila 2*, 137-144.
- 3 Harrigan, J., 1972. Dissertation, Univ. of Hawaii.
- 4 Harriott, V., 1983. *Coral Reefs 2*, 9-18.
- 5 Harrison, Babcock, Bull, Oliver, Willis & Wallace, 1983. *Proc. Great Barrier Reef Conf, Townsville 1983*, 217-219.
- 6 Harrison, Babcock, Bull, Oliver, Willis & Wallace, in press. *Science*.
- 7 Kojis, B.L. & Quinn, N.J., 1982. *Mar. Ecol. Prog. Ser. 8*, 251-255.
- 8 Rinkevich, B., & Loya, Y., 1979. *Mar. Ecol. Prog. Ser. 1*, 133-144.
- 9 Williams, D. McB., Wolanski, E. & Andrews, J.C., in prep. Transport mechanisms and the movement of planktonic larvae in the central region of the G.B.R.

Acknowledgements: The rest of the Coral Reproduction Study Group at James Cook University.

Gordon Bull  
School of Biological Sciences  
James Cook University  
Townsville 4811  
Australia.



## INAUGURAL AWARDS OF THE LIZARD ISLAND RESEARCH STATION FELLOWSHIPS

**Des Griffin**

The inaugural recipients of the Lizard Island Research Station Doctoral Fellowships have just been announced by the Director of The Australian Museum, which runs the Lizard Island Research Station, Great Barrier Reef. The successful candidates were Roland Pitcher from Griffiths University and John Chisholm of James Cook University of North Queensland.

The Director announced that two fellowships were awarded for this inaugural year because of the high quality of the applications and of the importance of stimulating graduate research on the Great Barrier Reef. The Fellowships are valued at \$12,000 over 3 years and are unique in Australia in that they provide substantial funds for travel to and from the reef, bench fees for extended periods at the Lizard Island Research Station and funds for equipment. This lack of field work money has been recognised as a major problem for graduates wishing to carry out field orientated research on the reef. The funds for these Fellowships have been donated from private industry.

Roland Pitcher is an Australian who graduated at Adelaide. His work will involve surveys of fish populations to try to build up a descriptive model of the population dynamics. He wants to look at the daily patterns of recruitment to reefs of several species from a number of families of fishes. This work is aimed at determining differences in settlement of larvae over the total area that the species occupies and whether or not there are variations in settlement times with latitude and so on. Results are likely to be directly relevant to the management of various parts of the Great Barrier Reef.

John Chisholm graduated at St. Andrews, Scotland and his work is aimed at determining how important coralline algae are in building coral reefs. Crustose coralline algae have long been regarded as fundamental to reef structure: the view currently is that coral reefs as we know them today would not exist in their absence. These plants have a major role in primary production, precipitation of calcium carbonate and, perhaps most importantly, in the cementation and consolidation of the reef matrix. Yet there are difficulties in taxonomy, field recognition and techniques for studying their ecology, physiology and reproductive biology. Chisholm will investigate the factors which induce reproduction, the significance and pattern of both sexual and asexual reproduction, the dispersal of spores, and the effect of environmental factors on reproduction and growth.

These Fellowships will be awarded annually subject to the availability of funds but in 1985 only one fellow will be appointed. Applications for 1985 will close December 1st, 1984 and preliminary notices for the 1985 applications will be available by June 1984.

For Fellowships, contact: Director of the Australian Museum, 6-8 College Street, Sydney, NSW, Australia.

For Lizard Island Research Station facilities, contact: Dr Barry Goldman, Lizard Island Research Station, PMB No.37, Cairns, 4870, Queensland, Australia.

D.J.G.Griffin, Director, The Australian Museum, 6-8 College Street, Sydney, NSW, Australia.

## CORAL DEATH IN THE JAVA SEA, INDONESIA

**Suharsono**

We have been investigating the bleaching and death of hermatypic corals in the Java Sea (Indonesia) which happened at the end of the west monsoon period, i.e. from March to May 1983. This took place in an extensive area, from the coast of Banten (West Java) to Seribu Islands (off Jakarta) and Karimunjawa Islands (Central Java). We noticed the dead corals occurring as white patches on the reef flat down to about 15 metres depth. The percentage of dead corals on the reef flat was higher than those on the reef slope. It seemed that that corals had first discoloured and then subsequently died. Polyps of the discoloured corals extended normally and continued to produce mucus. It was surprising that in the same area and depth one colony might be affected while another of the same species was not.

In April 1983 the affected area in the Pari Islands (one of the Seribu Islands) had increased and the corals which had discoloured a month before, were now dead. The discoloured corals later turned dark brown in colour and became covered by algae. In a selected area of 50m<sup>2</sup> the percent cover of the discoloured corals appeared to be 40-50% with dead coral cover being about 10-15%. In the middle of May the dead corals in the same area increased to 80-90%; by the end of July there was no further increase in dead cover and some of the colonies had actually shown signs of recovery.

The corals affected were scleractinians, hydrocorals (*Millepora*) and soft corals. A total of 72 species of scleractinians, comprising 33 genera, were affected. These included *Acropora*, *Porites*, *Pocillopora*, *Pachyseris*, *Fungia*, *Oulophyllia*, *Favites*, *Echinopora*, *Galaxea* and *Merulina*.

Histological observations on the discoloured coral tissues (endoderm) showed little or no endosymbiotic algae (zooxanthellae) while in normal tissues these algae were abundant. We do not yet know the primary cause of this discolouration and death. Perhaps it is due to an increase in water temperature because the water temperatures at Pari Island in February-May 1983 were 2-5°C higher than those of the same months in previous years.

National Institute of Oceanology, P.O. Box 580 Dak, Jakarta, Indonesia.

Raise the funds for your next research project with a two-way bet on *Diaseris*

**Coral Racing**  
A Division of the Coral Leisure Group



**SNELLIUS II EXPEDITION 1984:  
A PROGRAMME OF JOINT CORAL  
REEF RESEARCH BETWEEN INDONESIA  
AND THE NETHERLANDS**

**Maya Borel Best**

*While active support for research on living reefs has declined in many European countries, the Netherlands has embarked on a major national commitment to a ship-based reef expedition in collaboration with Indonesia. There should be something of interest here for geologists and biologists alike.*

**Coral reefs and associated environments are of great economic importance for Indonesia, particularly in the eastern half of the country. Because of the extreme vulnerability of the coral reef ecosystem to increasing rates of degradation, there is now an urgent need for a rational management of these resources.**

**Research programme**

In the framework of an expedition with a limited duration only a small number of aspects of the complicated biology and geology of coral reefs can be studied, and only a small number of the numerous coral reef areas of Eastern Indonesia can be investigated. The coral reef programme will be carried out during two cruises of four weeks each in September and October, 1984. The Expedition will start in Ambon and finish in Ujung Pandang (Sulawesi) (see map).

The first cruise will be more exploratory in character,

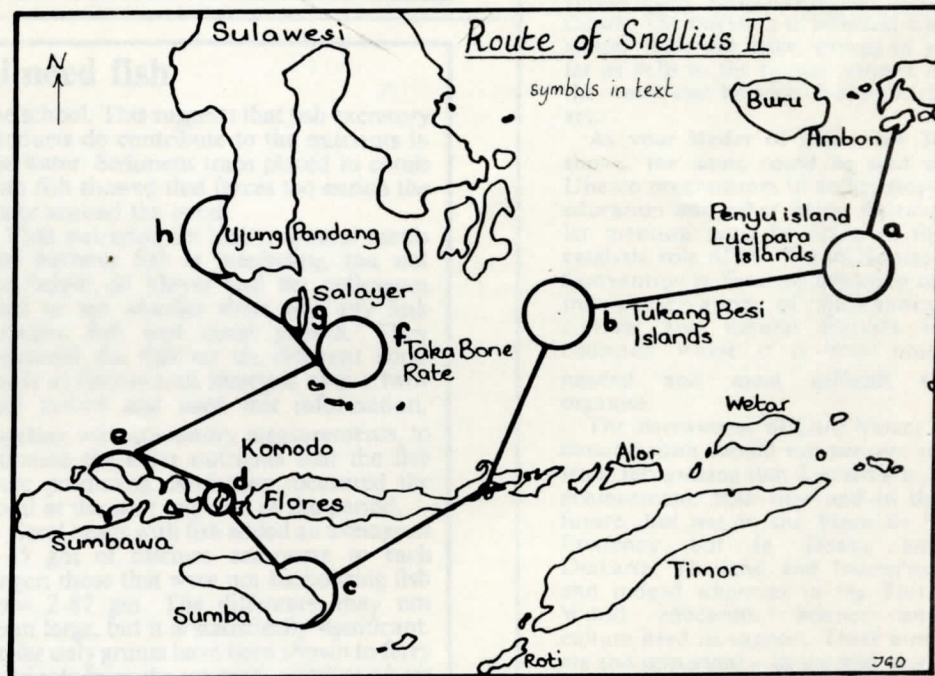
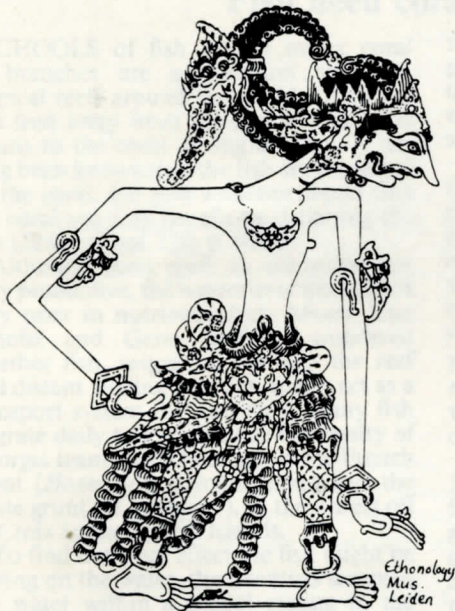
with research that can be carried out relatively rapidly, and with investigations which can benefit most from visits to a variety of environments. The second cruise will be dedicated to research for which more time is needed at any one locality. This will include the study of functional aspects for which longer term observations are essential, and other in-depth studies.

The first goal will be to describe a number of reef types, such as fringing reefs, patch reefs and atolls, as well as the different types of habitats adjoining them, including sea grass fields and lagoons. The descriptions will include a very general outline of the whole reef complex. Observations on socio-economic aspects will also be included in the general descriptions. We hope that study of functional aspects such as primary production, predation and grazing can solve some of the problems. Geologists and geomorphologists will study the reefs and sedimentary rocks that were formed during the late Tertiary and the Pleistocene. In this way reef research during the expedition will have a biological, a geological as well as a conservation aspect.

**Research area**

The choice of the reef types is based on the different degrees of their supposed environmental stability. There is a range from reefs in geologically and climatologically stable areas to very unstable reefs, e.g. in areas with much volcanic and tectonic activity, wave action or human influence. During the two cruises a certain variety of reef types with associated communities will be studied, while at the same time areas will be visited where fossil reefs and limestones are present on land.

The following choice was made out of the many



**Bass step up with  
£82m Coral offer**

suitable areas (the letters indicate the localities on the map):

(a) Pulau Pulau Penyau or Pulau Pulau Maisal (Lucipara isl.). These are very small islands in the open Banda Sea, which can only be visited during the first cruise westward from Ambon. Very little is known about these islands, but the reefs must all be in an extremely exposed situation.

(b) Tukang Besi islands. This is an archipelago with atolls of a nearly classical type with or without islands. There are some open sea atolls (e.g. Koka reef) with very large reef flats and extensive lagoons. Its structure has already been studied in great detail during Snellius I.



Binongko, Tukang Besi (Snellius I)

(c) Sumba north-east coast. Here, extensive fringing reefs are present, which are probably being intensively exploited. On land, there is a considerable number of limestone terraces, which can be traced inland well into the mountains, and which date back to the Tertiary. There has been no volcanic activity for millions of years.

(d) Komodo. This island is a world famous national park, but little is known about its surrounding reefs which are soon to be included within the park area.

(e) Sumbawa. The north coast is close to the Tambora volcano, which erupted in 1815, undoubtedly destroying all reefs in the area.

(f) Taka Bone Rate (Tiger Island). This is a very large 'pseudo-atoll' with numerous small islands and extensive reefs. To the north-east there is a large atoll (Taka Garlarang), without any island.

(g) Salayer. This island has many limestone terraces and there are very wide coastal reef flats in a relatively sheltered position.

As there is a shortage of time, many of the research investigations will barely provide more than an inventory, so further research may be carried out in cooperation with our Indonesian counterparts at the different marine stations (Jakarta, Semarang, Ambon, Ujung Pandang). One joint coral reef research programme (Project Buginesia) in Ujung Pandang (Sulawesi) (h) has already started in 1979.

Information can be obtained from: Dr. Maya Borel Best, Rijksmuseum van Natuurlijke Historie, Postbus 9517, 2300RA, Leiden, Netherlands.

# EXPEDITION REPORTS

## SEDIMENTATION IN THE INLET OF BURKAVO ON THE SOUTHERN COAST OF SOMALIA

Ruggero Matteucci

Our Italian group, consisting of A. Angelucci, F. Carbone and R. Matteucci of the University of Rome, accompanied by Said A.A. of the National Somali University and by Hilary Costa Sanseverino, archaeologist, carried out a study of present-day sedimentation in the inlet of Burkavo during the second half of the month of April 1983. This inlet is situated in a part of the Somali coast parallel to which lies the Bajuni Archipelago. Our expedition was a follow-up to the earlier work of our team from Rome which had visited this archipelago to study the fringing reef of Ilsi.<sup>1,2</sup>

The archipelago of the Bajuni Islands consists of a long barrier parallel to the coast within which the water is generally shallow and relatively calm. This environment is predominantly an area of carbonate skeletal sedimentation supporting large sea grass prairies. In areas of greater water movement and hard substrate, occasional flourishing patch reefs have developed. There are also fringing reefs present on the seaward side of many of the barrier islands.

The aim of our expedition was to study the nature of sedimentation within one of the three long, wide inlets of fluvial origin which have been cut into the southernmost part of the Somali coast. Having reached the inlet of Burkavo by sea from Kismayu, we navigated and sampled it inland for about 30Km.

Our first observations revealed that there was a great development of mangroves which in some areas extended for hundreds of metres and formed a constant, dense wall of vegetation tens of metres wide. In the outer reaches of the inlet, there is an impressive development of sea grass meadows associated with carbonate sedimentation and sorilids. The inner reaches show a gradual transition upstream to terrigenous sediment consisting of well washed quartzose sand, and, not surprisingly, there is no trace of the corals which are present in the outer part of the Bay of Burkavo, mostly around the small islands of Chekecheke. This coral community is not very flourishing however, and is dominated by encrusting-massive corals, with scattered and low colonies of ramified forms and low colonies of milleporids. A striking element is the presence of wide areas covered by encrusting corals which compete for space with the sea grass.

The first results of our research will be published shortly<sup>3</sup> and the final results will appear later in 1984.

- 1 Angelucci, A., et al, 1982 *Boll. Soc. Pal. Ital.*
- 2 Carbone, F. & Matteucci, R., 1982. Poster at ISRS Coral Reef Symposium, Leiden.
- 3 in Volume 7 for 1983 of *Quaderni di Geologia della Somalia*, Mogadishu.

Ruggero Matteucci, Istituto di Geologia e Paleontologia dell'Università degli Studi, Piazzale delle Scienze, 00100 Roma, Italy.

## Development Destroying Coral Reefs in Okinawa Waters

By KATHERINE MUZIK

March 2, 1983 *The Japan Times*

See map on next page



## In defence of Unesco

From Dr D. R. Stoddart

Sir, Lord Vaizey's views on Unesco (January 2) need to be tempered by a more sympathetic recognition of what that organization has achieved and is attempting in countries of the Third World.

I can speak only for programmes with which I am familiar, but there can be no doubt of Unesco's contribution to the understanding of mangroves, coastal lagoons, and more recently coral reefs, all vulnerable ecosystems of great importance to those tropical nations which possess them. Unesco has not only aided the flow of expertise and knowledge from the more advanced countries, but has also organised and expanded (through conferences, seminars and workshops) the often fragile regional resources on which proper use and management must be based.

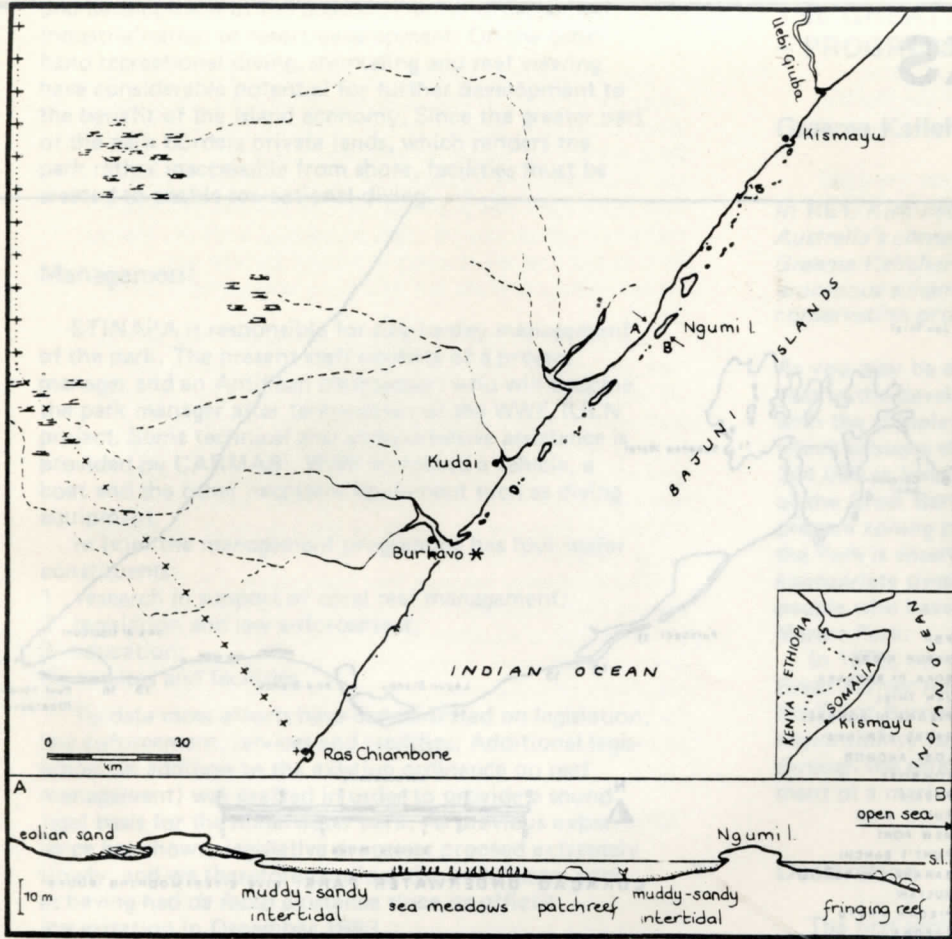
Clearly, such programmes rarely show dramatic or immediate results, but in the longer term they can make the difference between destitution and prosperity for millions of people for whom the processes of news dissemination can only have the most marginal significance. These programmes are directed by Unesco personnel of the highest professional competence, seriousness and dedication. The question of political bias simply does not arise, except in so far as help to the poorer nations of the world can be seen as a political act.

As your leader of December 30 shows, the same could be said of Unesco programmes in archaeology, education and other fields. Particular mention must be made of the catalytic role of the World Heritage Convention in focusing attention on the conservation of outstanding cultural and natural features in countries where it is both most needed and most difficult to organise.

The narrowness of Lord Vaizey's denunciation should not prevent us from recognizing that Unesco's true achievement, both now and in the future, lies not in the Place de la Fontenoy but in Dhaka and Djakarta, Thailand and Indonesia, and indeed wherever in the Third World education, science and culture need its support. These aims are too important - in the long term for all of us - to be sacrificed for the kinds of reasons Lord Vaizey adduces.

It would be shameful if such work were to be curtailed simply in order to save £5m a year. For the United States the responsibility is even greater.

Yours faithfully,  
D. R. STODDART,  
2 Chesterton Hall Crescent,  
Cambridge,  
January 3.



### Fish need coral need fish

SCHOOLS of fish resting under coral branches are a common sight on tropical reefs around the world. Often the fish feed away from the reef at night and return to the coral during the day. It has long been known that the fish are protected by the coral, but new evidence shows that the coral too may benefit by sheltering the fish (*Science*, vol 220, p 1047).

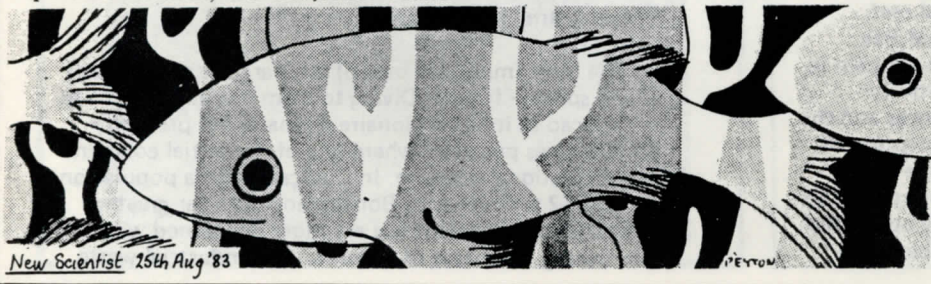
Although coral reefs as ecosystems are very productive, the waters over the reef are very poor in nutrients. Judy Meyer, Eric Schultz and Gene Helfman wondered whether fish, migrating between the reef and distant feeding grounds, might act as a transport system for nutrients. Many fish migrate daily to feed but the University of Georgia team chose to focus on the French grunt (*Haemulon flavolineatum*) and the white grunt (*H. plumieri*), in the waters off St Croix in the Virgin Islands.

To find out what effect the fish might be having on the water, the scientists sampled the water within a school resting in the coral. They found that levels of ammonium ions (a source of nitrogen), for example, were four and a half times higher inside the school than out. Phosphorus, another important nutrient, did not differ within

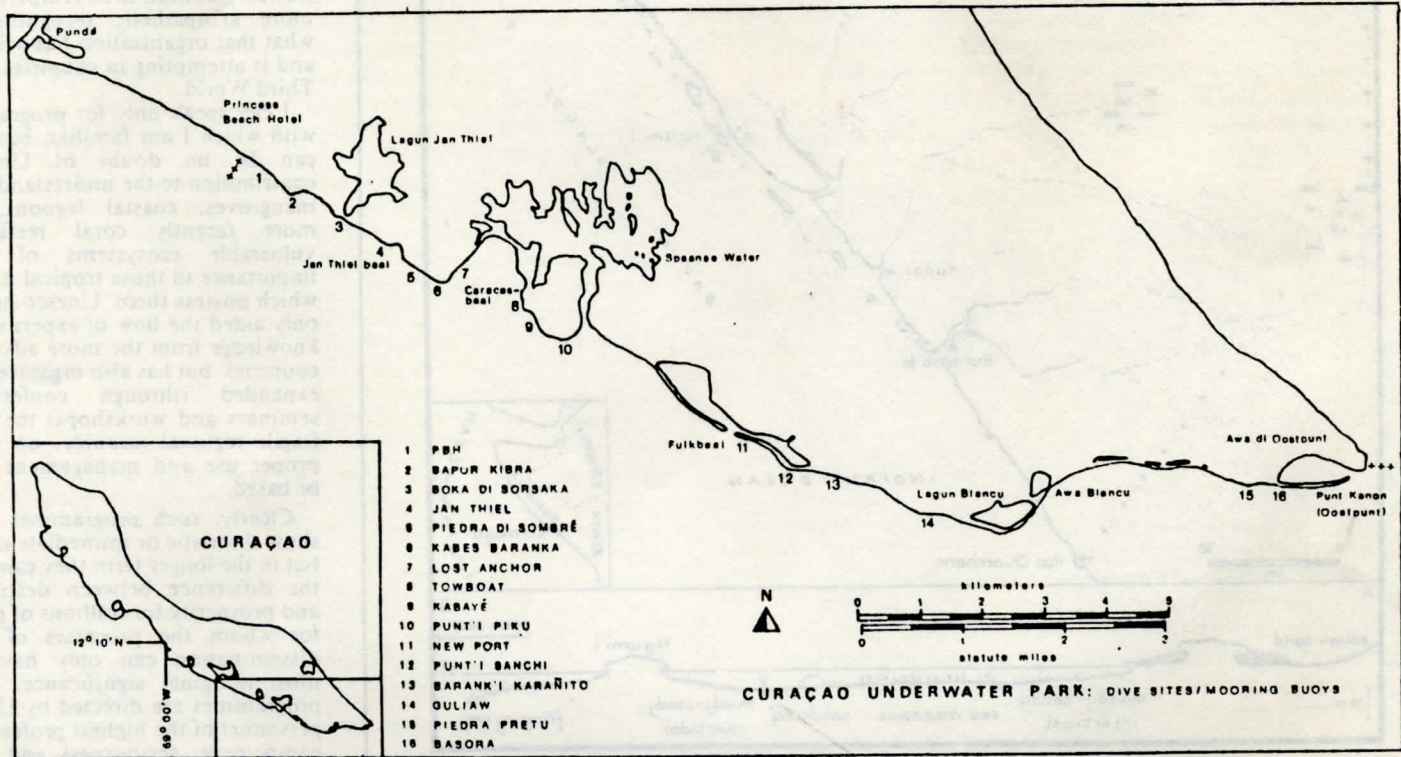
the school. This suggests that fish excretory products do contribute to the nutrients in the water. Sediment traps placed in corals with fish showed that faeces too enrich the water around the coral.

That nutrients are higher around corals that harbour fish is interesting, but not conclusive, so Meyer and her colleagues tried to see whether there was any link between fish and coral growth. They measured the fish on six different coral heads at four-month intervals over a two-year period and used this information, together with laboratory measurements, to estimate the extra nutrients that the fish were producing. And they measured the coral at the start and end of the period.

Coral heads with fish added an average of 3.45 gm of calcium carbonate to each finger; those that were not harbouring fish grew 2.87 gm. The difference may not seem large, but it is statistically significant. So far only grunts have been shown to ferry nutrients from the sea-grass pastures where they feed to the corals where they rest, but there are at least 14 other families of fish that behave in the same way and it would be very odd indeed if their coral shelters did not benefit from the association. □



# MARINE PARKS



## THE CURAÇAO UNDERWATER PARK

Tom van't Hof

After a successful project to turn Bonaire's coral reefs into a national marine park, The Netherlands Antilles National Parks Foundation (better known by the acronym STINAPA) last year embarked upon reef conservation in Curaçao. The new STINAPA project is — like the Bonaire project — supported financially by the World Wildlife Fund-Netherlands (WWF/IUCN project 3065). Its objectives are to manage the coral reefs as a marine park, to limit or outlaw activities that cause reef degradation or overexploitation and to facilitate sustainable use of the reefs.

### The proposed area

Unlike Bonaire, where the entire surrounding of the island was declared a marine park, in Curaçao an area of 20 km along the eastern part of the leeward coast was selected as the site for the underwater park (see map). The rationale for the establishment of the park and the site selection were based largely on CARMABI's (Caribbean Marine Biological Institute) coral reef research programme, directed by Dr. Rolf P.M. Bak. Fleur van Duyl's reef mapping was of particular help in planning the park. The proposed area is relatively unaffected by pollution and other interferences and the coast is essentially undeveloped with the exception of three bays. However, fishing pressure is severe in Curaçao as a whole, and low numbers of large predators as compared to nearby Bonaire are generally attributed to overfishing. In this connection it should be noted

that spearfishing was outlawed in 1976, but the law has never been enforced. The area as a whole offers a very diverse array of fringing reef types, varying in width from 16 to 230 m. By their very nature the fringing reefs offer unique possibilities for human exploration, but at the same time they are extremely vulnerable with respect to man-made disturbances. Thus the main reasons for selecting the area have been:

- 1 biological and geological diversity and aesthetic value;
- 2 low levels of interference in past and present;
- 3 fear for uncontrolled coastal development in the future.

### Legal status

In 1976 the Island Government passed the so-called reef management ordinance. This ordinance prohibits spearfishing and collecting of corals in the waters of Curaçao. Corals are defined in the ordinance as 'the skeletons of coelenterates and calcareous algae'. The ordinance allows for the possibility of designating, by decree of the Island Government, other organisms to which this prohibition should also apply. Furthermore collecting of fishes for the aquarium trade is subject to licence by the Government.

### Present and future uses

The most important uses of the park are commercial — and sport — fishing. Diving tourism has not developed in Curaçao as it has in Bonaire (Bonaire has presently 60,000 dives per year) where one of the initial concerns was recreational pressure. In Curaçao, with a population density 12 times that of Bonaire and with far greater industrial development, we are more concerned with overfishing, discharge of domestic and industrial waste

and development of the coastal zone for urbanisation, industrialisation or resort development. On the other hand recreational diving, snorkeling and reef viewing have considerable potential for further development to the benefit of the island economy. Since the greater part of the park borders private lands, which renders the park rather inaccessible from shore, facilities must be created to enable recreational diving.

## Management

STINAPA is responsible for day-to-day management of the park. The present staff consists of a project manager and an Antillean counterpart who will become the park manager after termination of the WWF/IUCN project. Some technical and administrative assistance is provided by CARMABI. WWF furnished a vehicle, a boat and the other necessary equipment such as diving equipment.

In brief the management programme has four major constituents:

- 1 research in support of coral reef management;
- 2 legislation and law enforcement;
- 3 education;
- 4 services and facilities.

To date most efforts have concentrated on legislation, law enforcement, services and facilities. Additional legislation (in addition to the existing ordinance on reef management) was drafted in order to provide a sound legal basis for the underwater park. As previous experience has shown, legislative processes proceed extremely slowly, and we therefore consider the underwater park as having had *de facto* existence since its official inauguration in December 1983.

We have also paid much attention to creating provisions that facilitate the use of the park for recreational purposes. Sixteen mooring buoys were placed in the park; they provide safe anchorage for boats of park users and prevent anchor damage. A simple and inexpensive guide to the underwater park was written, a general brochure on the park was published and a programme of guided excursions was developed for visiting and resident divers.

STINAPA will have to find alternative financial resources by the end of 1984. The need for reef conservation may be obvious to you as reef scientists, but it is certainly not always so to those who are politically in command. Therefore much energy has been and will be devoted to creating those facilities that help to visualise an environment that lies hidden to most people.

Tom van't Hof, Project manager, Curaçao Underwater Park, Stichting Nationale Parken, PO Box 2090, Netherlands Antilles.

See *Books* for details of the Bonaire Marine Park Guide.

## THE COMPLETE REEF ENCOUNTER



# THE GREAT BARRIER REEF MARINE PARK — PROGRESS REPORT

## Graeme Kelleher

*In RE1, Kirk Peterson explained the background to Australia's conservation policy for the Great Barrier Reef. Graeme Kelleher now gives us a progress report on this ambitious scheme, probably the foremost of all reef conservation programmes.*

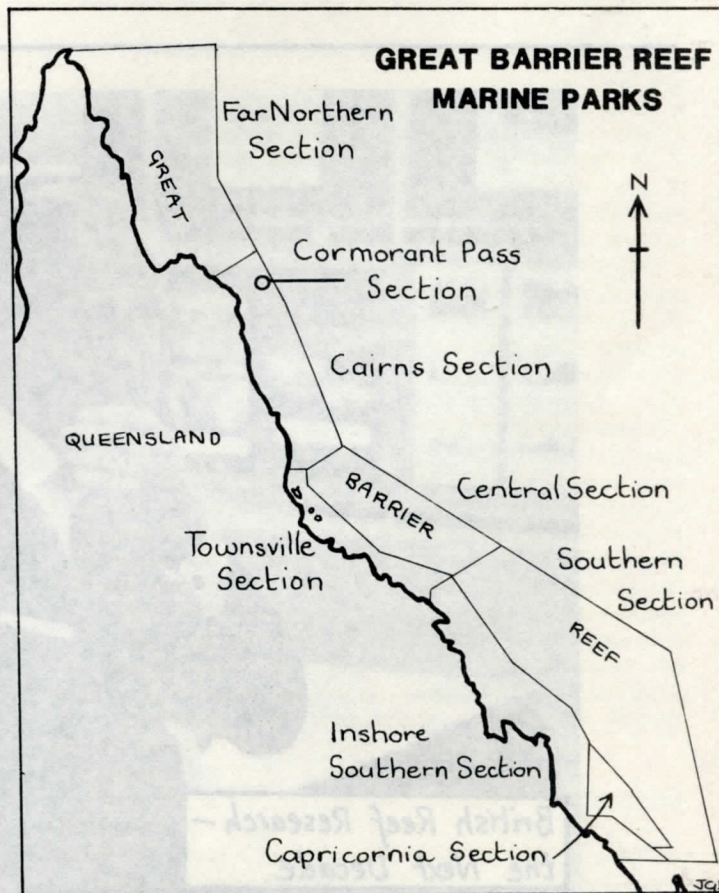
As you may be aware, 1983 proved to be a significant year in the development of the Great Barrier Reef Park with the completion of the initial declaration programme which brought the total area of the Park to some 344,000 sq kms in eight sections. The tasks now ahead of the Great Barrier Reef Marine Park Authority are to prepare zoning plans for each section and to ensure that the Park is wisely and efficiently managed. This seems an appropriate time to provide a progress report to those people who have followed the development of the Marine Park.

In 1975, the Australian Parliament enacted the *Great Barrier Reef Marine Park Act*. The act established the Great Barrier Reef Marine Park Authority with responsibility for conservation of the Great Barrier Reef through the establishment, control, care and development of a marine park in the Great Barrier Reef Region.

## Declaration

The first section of the Great Barrier Reef Marine Park, the Capricornia Section, was declared in 1979 and encompasses an area of approximately 11,800 square kilometres.

A second, much smaller section, the Cormorant Pass Section was declared in 1981 to protect a colony of potato cod of unusual size and tameness.



Later in 1981, the Cairns Section of the Marine Park was declared. This Section surrounds the Cormorant Pass Section and comprises 35,000 square kilometres.

In August 1983 a further three sections of the Marine Park, the Far Northern, Central and Southern Sections, were declared.

The remainder of the Great Barrier Reef was included in the Marine Park with the declaration in October 1983 of the Townsville and Inshore Southern Sections, bringing almost 99% of the Region within the Marine Park and the total area of the Park to approximately 344,000 sq kms — the largest Marine Park in the world.

## Zoning Plans

The *Great Barrier Reef Marine Park Act* requires the Authority to prepare a zoning plan in respect of each section of the Marine Park as soon as practicable after declaration of a section. The Act further requires the Authority to seek representations from the public on two occasions during the preparation of a zoning plan.

The main object of a zoning plan is to ensure that all reasonable activities are consistent with conservation of the Reef. The only activities specifically prohibited from the Marine Park are operations for the recovery of minerals, except for the purposes of approved scientific research. The Marine Park therefore is an example of a Multiple Use Area — Category VIII of IUCN's Classification System for Protected Areas.

To date, the Zoning Plans for the Capricornia, the Cairns and the Cormorant Pass Sections have been formally adopted.

The Authority is currently preparing a zoning plan for the Far Northern Section. The first public participation period closed on 30 November 1983 and the draft zoning plan is currently available for public review. Zoning plans for the remaining sections will be prepared as soon as staffing resources permit — it is hoped that initial zoning will be completed within two or three years and it is intended to revise zoning plans every five years.

## Management

Day-to-day management of the Marine Park is undertaken by officers of the Queensland National Parks and Wildlife Service, subject to the Great Barrier Reef Marine Park Authority, under an agreement reached between the Australian and Queensland Governments in 1979. This agreement also provides for the Australian Government to meet all capital costs associated with the Marine Park in the first three years or so and for the two Governments to share the recurrent management costs 50:50.

Resources for day-to-day management of the Marine Park include 14 staff for the Capricornia Section and 16 for the Cairns and Cormorant Pass Sections. Further staff will be required for other sections of the Marine Park as zoning plans and associated regulations come into effect. Field staff operating by boats are complemented by aircraft surveillance. To date, monitoring has shown that the incidence of infringements of zoning plans' provisions is low.

The Authority believes that management of the Marine Park principally by obtaining the co-operation of the public is essential. Major emphasis is therefore given to education, interpretation and the provision of assistance to individuals and groups to use the Marine Park in ways which are consistent with the conservation of the Reef's natural qualities.

## Research

The Great Barrier Reef Marine Park Authority is responsible for ensuring that research relevant to the Marine Park is carried out. Close co-operative arrangements have been made with all the Australian organisations with major responsibilities for funding or carrying out tropical marine research. The Authority also funds relevant research or carries out research itself.

Graeme Kelleher, Chairman, Great Barrier Reef Marine Park Authority, PO Box 791, Canberra City, A.C.T. 2601, Australia.



# UPWELLINGS

We offer this column to contributors who want to take issue with facts and views expressed in recent publications, or even *Reef Encounter*, or to give vent to any other views in the subject area of reefs.

## REEF CONSERVATION: FOR WHOSE BENEFIT?

Tom van't Hof

One of the 'random outbursts' in the editorial of *Reef Encounter* 1 deals with reef conservation. I feel the need to respond to the question, for whose benefit is reef conservation, because until now I believed the answer was obvious. Apparently our editor thinks this is not the case.

Reef conservation is not just for the benefit of tourist trade operators, or local resource users, or the reef organisms. It is for the benefit of all three, and more — at least it is if we define conservation as in *World Conservation Strategy*<sup>1</sup> (WCS). According to this document, conservation is the 'management of human use of biosphere so that it may yield the greatest sustainable benefit to the present generations while maintaining its potential to meet the needs and aspirations of future generations.' More specifically, the objectives of living resource conservation are given by the WCS as follows:

1. to maintain essential ecological processes and life support systems
2. to preserve genetic diversity
3. to ensure the sustainable utilization of species and ecosystems.

The preservation of species is indispensable to all three objectives: without species, there would be no ecological processes, no genetic diversity, and nothing to utilize. So there cannot be any doubt as to the meaning of conservation with respect to the preservation of species. On the other hand, we must also realize that present-day conservation is very much use-orientated, and rightly so. We cannot afford *not* to use species and ecosystems, when we contemplate the world's rapidly expanding population. Modern conservationist thinking is therefore shifting its emphasis from preserving particular endangered species (a luxury in the eyes of many nations) towards management of ecosystems and living resources for sustainable utilization. It is no wonder that we now hear slogans like 'conservation for development' and 'parks for sustainable development' increasingly often. This is the conservationist's response to the problem of uncontrolled exploitation of natural resources, habitat destruction and the disappearance of species from many (developing) countries.

We are desperately trying to convince government officials and policy makers that conservation is an essential constituent of development and exploitation. It is here that we find the origin of the question, 'for whose benefit is reef conservation?' Most of the world's coral reefs are found in developing nations, eager to exploit reef resources for short-term benefits only, or, even worse, to sacrifice reefs to development goals. Again, there is nothing against exploiting the reefs, provided it

is done in a sustainable manner.

I believe that, in many instances where reefs and reef-dwelling organisms are in need of conservation, we can only make this clear by first pointing out the potential value of the reef system for long-term benefits from food production and tourism before we can even touch upon the biological value of the ecosystem and the organisms which are part of it.

<sup>1</sup> International Union for Conservation of Nature and Natural Resources (IUCN), 1980. *World conservation strategy. Living resource conservation for sustainable development*. IUCN-UNEP-WWF, Gland, Switzerland [ISBN-2-88032-101-8]

Tom van't Hof, Project Manager, Curaçao Underwater Park, Stichting Nationale Parken, P.O. Box 2090, Netherlands Antilles

See also editorial: *Whose world is it, anyway?*

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## BUT DARWIN SAID . . .

K.A. Rodgers

*This article takes up some points made by Scott and Rotondo in their recent article 'A model to explain the differences between Pacific plate island-atoll types'.*

Scott and Rotondo's paper<sup>11</sup> represents a further, interesting attempt to marry the plate tectonic hypothesis to long standing problems posed by coral reefs and atolls. It is not within my competence to judge as to whether these authors' efforts have brought about a successful consummation but I would like to offer one or two observations concerning some areas with which I am familiar, without necessarily altering the main thrust of their paper.

### Raised atolls

Niue Island is a rather unfortunate choice as an example of 'a raised-atoll with typical form lost' (Scott and Rotondo,<sup>11</sup> p. 140 and 141, Fig. 2). Niue exhibits a classic raised atoll shape (eg. Schofield and Nelson,<sup>10</sup> Fig. 1). The saucer-shaped central plain is often referred to as Mutalau Lagoon; the upraised rim as Mutalau Reef. Interestingly, Forster<sup>5</sup> (p. 167) deduced the raised nature of the reef and former lagoon, while he and Cook were under more or less continual attack by the local inhabitants. He commented, 'Whether a convulsion of the globe, or any other cause, lifted such a large piece of coral rock forty feet above the water, is a point which must be left to future philosophers to determine.'

### Isostasy

Darwin's theory in no way 'infers isostatic subsidence due to the islands' own mass' as Scott and Rotondo<sup>11</sup> (p. 143) say.

Darwin's scientific method was as extremely thorough as it was elegant. He never confused cause and effect. His prime objective throughout *Coral Reefs*<sup>3</sup> was to elucidate

the nature of the event(s) that had brought the various reefs and atolls into their present forms (Darwin<sup>3</sup>, p. 1).

Having deduced that subsidence of the foundations was the theory that solves every difficulty (p. 124), he frankly stated that direct proofs of such subsiding movements were lacking (pp. 125-6, 166) but that as far as the cause underlying, the necessarily widespread movements of the earth's crust (pp. 125, 126, 150-1, *et seq*), there was a possible association with subterranean disturbances (pp. 130, 166).

For example: 'With respect to subsidence, we cannot expect to obtain in semi-civilized countries proofs of a movement that tends to conceal its own evidence . . . we know that great fissures with which some of these islands are traversed, and by the earthquakes felt under others, that subterranean disturbances are in progress. All these appearances accord well with the belief that these islands have recently subsided; though not proving the fact' (p. 166).

That Darwin was little concerned with localised subsidence of individual volcanic edifices, is clear too from his lengthy descriptions of the distribution of atoll chains and from his analysis of what he saw as possible objections to his theory: 'The vast amount of subsidence both in area and depth, necessary to have submerged every mountain, even the highest, throughout the immense spaces of the ocean now interspersed with atolls, will probably strike most persons as a formidable objection to the theory. But as continents, as large as the spaces supposed to have subsided, have been raised above the level of the sea, . . . and as no reason can be assigned why subsidence should have occurred in some parts of the earth's crust on as great a scale as elevation, this objection has little force' (pp. 150-1).

Nevertheless, it was this very point that was to concern numerous later workers and commentators. It was to lead some to seek alternative theories to that of subsidence and others to invoking mechanisms of subsidence that did not involve great crustal movements. For example, it was Molengraaff's<sup>9</sup> (p.610) opinion that, 'Depressions on such a scale' . . . were . . . 'not very likely', along with his firm conviction that the main principle of Darwin's theory was sound, that caused him to apply the principle of isostasy to the problem.

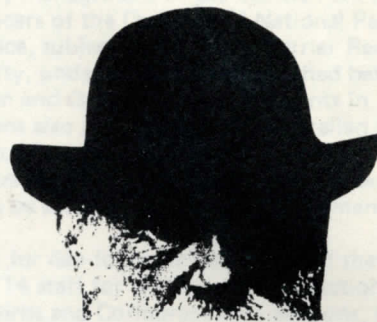
Later workers were to treat isostasy with varying degrees of enthusiasm, ranging from those who largely ignored it, through those such as Kuenen<sup>7</sup> who was prepared to recognize it as a possible alternative to tectonism, to Emiliani<sup>4</sup> who concluded that, 'All cases of subsidence in the Pacific Basin appear to be strictly local phenomena connected with volcanic intrusions and extrusions and subsequent isostatic adjustments' (p. 854).

Hamilton<sup>6</sup> was to survey this era of somewhat indecisive thinking following extensive field work among the guyots of the mid-Pacific, and to write, 'Inasmuch as appreciable increase in ocean volume, sedimentation, compacting of soft sediments, and isostatic adjustments have been discounted as major factors which could explain the submergence of guyots, probably only tectonic activity or crustal movement, together with the preceding factors, would have caused deep subsidence of the area of the Mid-Pacific Mountains' (p. 48).

A careful reader of *Coral Reefs*<sup>3</sup> could be forgiven for suspecting that the main advances on the coral reef problem up to this point, and following one hundred years of research, were largely terminological. However, Hamilton concludes, 'The results of Mid-Pac are considered as proof of subsidence and, therefore, strongly support Darwin's subsidence theory with its auxiliary hypotheses. . . ' (p. 50).

## Emergence

In this same area, Scott and Rotondo<sup>11</sup> (pp. 140-141) would seem to intimate that Darwin failed to account



for all island-atoll types and in particular did not address the question of emergence — assuming that I have interpreted this paragraph correctly. Much of Darwin's<sup>3</sup> Chapter VI (pp. 156-193) is concerned with just these points (cf. also Darwin<sup>2</sup>).

## Sea-level changes

Scott and Rotondo's model of atoll development is intriguing in that it lends primary weighting to subsidence and emergence via plate movement to generate the various island-atoll types. Other factors, such as Pleistocene sea level changes are relegated to explaining peculiarities such as raised or drowned atolls.

A contrasting approach is to be seen in the work reviewed by Baillard<sup>1</sup> concerning the development of the various island-atoll chains of French Polynesia. Here the workers have considered it necessary to integrate the various concepts of plate tectonics along with eustatic sea level changes in order to explain the various atolls, as they find them today.

The varying importance that different workers have come to place on modifying factors probably depends on whether one is content with explaining the external morphology of an atoll or is also concerned with taking account of details of the inner structures. The presence of dolostones, dedolomites, leached horizons, fossil land snails in both Tertiary and post-Tertiary levels of deeply drilled atolls (eg.<sup>8</sup>) would suggest that sea level changes are an important mechanism in atoll development. To explain too many such horizons on a plate model could require an atoll to experience quite a rough ride during its foundation's trip across the Pacific.

Perhaps, at this juncture, Hamilton<sup>6</sup> (p. 50) should have the final say: 'It is theoretically possible to get all kinds of reefs with and without submergence. No theory is all-embracing and attempts to explain all reefs with one theory are destined to failure. The happy conclusion is that almost everyone is right at some of the time and in some places. . . '.

- 1 Baillard, J.-P., 1981 *South Pacific Bull.* 31 (1), 7-13
- 2 Darwin, C., 1837. *Proc.geol.Soc.Lond.* 2, 552-554
- 3 Darwin, C., 1874. *The structure and distribution of coral reefs.* 2nd revised edition, Smith Elder, London
- 4 Emiliani, C., 1954. *Science* 119, 854
- 5 Forster, G., 1777. *A voyage around the world. . .* Vol. 2, G. Robinson, London
- 6 Hamilton, E., 1956. *Mem.geol.Soc.Am.* 64, 1-97
- 7 Kuenen, P.H., 1947. *Verh.K.ned. Akad.Wet.* 43, 1-69
- 8 Ladd, H.S. & Tracey, J.I., 1957. *Deep-Sea Res.* 4, 218-219
- 9 Molengraaff, G., 1917. *Proc.K.ned.Akad.Wet.* 29, 610-627.
- 10 Schofield, J. & Nelson, C., 1978. *Pacif.Geol.* 13, 37-48
- 11 Scott, G.A.J. & Rotondo, G.M., 1983. *Coral Reefs* 1, 139-150

K.A. Rodgers, Department of Geology, University of Auckland, Private Bag, Auckland, New Zealand.

[Must put in quick plug here for my own recent release of a discussion of coral reefs and plate tectonics in *BioScience* 32 which deals with both tectonics and eustasy. By the way, what's wrong with my first edition? Yours sincerely, Charles Darwin.]

Clive Wilkinson

*Clive has written to say that Australians have apparently been looking at ISRS and Coral Reefs with somewhat of a jaundiced eye. He means, of course, that this is not to be confused with wingeing. Anyway, being at the end of the earth (his phrase again; and we hope that by this he is not speaking for the current state of knowledge amongst Australian earth and planetary scientists), Australians received Coral Reefs a little late, and imagined, shock-horror, that it was about to evaporate. His heart is in the right place, however, as he is concerned nevertheless that Aussies should take a more active part in the affairs of the Society.*

The formation of an international society [ie. ISRS] to bring coral reef scientists together is certainly a welcome and much needed occurrence. The society brings together researchers from all parts of the globe and, through *Coral Reefs*, provides a venue for research publications on physical and biological aspects of coral reefs. Unfortunately reef scientists of some countries are not taking the organizational side seriously enough to participate in the running of ISRS. A quick glance at the table will show you that Australian reef researchers, while taking the scientific side seriously, are not involved in organiz-

ational aspects. Likewise, American scientists are similarly not as active in an administrative sense as they are with respect to the science.

This table was extracted from Volume 1 and Volume 2 (1) of *Coral Reefs* and is by necessity a small sample which would be biased against countries with few reef scientists. The relatively high publishing activity by Australian scientists is a reflection of enhanced governmental funding for marine science. For example, the Australian Institute of Marine Science is the most represented institute with 7 papers (18.4%) followed by the Smithsonian funded complex with 4 (10.5%), and the Australian Bureau of Mineral Resources (ie. Peter Davies) and the Hawaii Institute of Marine Biology, each with 3 papers (7.9%).

It is certainly a very understandable trait to stand back and leave it to those in fog-bound Britain and Europe (who can but dream of reefs) to administer the society and the journal concerned with coral reefs. This does have risks, however, in that the Council of ISRS is directly involved in appointing the Editorial Board of the journal. Thus by resting on their scientific laurels Australians and Americans are permitting others to adjudicate on who should be the final arbiters of what is published in *Coral Reefs*. The lack of activity by Australian scientists in council activities is an obvious reflection of the 'she'll be orright, mate' attitude where it is left for someone else to do it. Australian scientists should pull their socks, sorry thongs up.

Clive Wilkinson, Australian Institute of Marine Science, PMB No.3, Townsville M.C., Q4810, Australia

	U.S.A.	G.B.	France	Aust.	Israel	Canada	Germany	Others	Total
Council Members*	7 25.0%	8 28.6%	3 10.7%	1 3.6%	1 3.6%	1 3.6%	0 0	7 25.0%	28
Editorial Committee**	10 41.7%	5 20.8%	1 4.2%	3 12.5%	1 4.2%	1 4.2%	2 8.3%	1 4.2%	24
Papers	16 42.1%	4 10.5%	1 2.6%	13 34.2%	2 5.3%	1 2.6%	1 2.6%	0 0	38
Authorst	27 38.6%	6 8.6%	2 2.9%	24 34.3%	4 5.7%	3 4.3%	4 5.7%	0 0	70
Pages	115 39.5%	24 8.2%	10 3.4%	108 37.1%	17 5.8%	12 4.1%	5 1.7%	0 0	291

\* Includes councillors both past and present; Guam, St. Croix, Panamá included in U.S.A.  
 \*\* Country of origin corrected eg S.V.Smith and W.J. Weibe (sic)  
 † Authors may be included more than once

LETTER

Dear Sir,

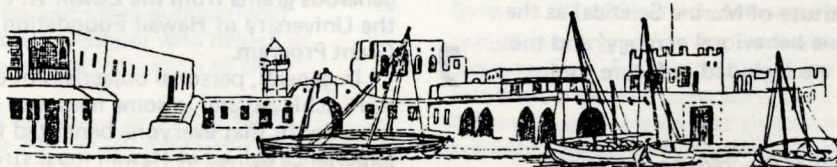
Please tell us what has happened to the Great British Reef Initiative. Some time ago, we gather, there was a party of British reef enthusiasts who met regularly and organized an annual meeting. They also produced a document entitled 'British reef research - the next decade'. Twenty percent of that decade has now passed. Although the same group of people (more or less) were also mid-wives to ISRS and *Coral Reefs*,

the burning vision of a coordinated British reef effort, however modest, seems to have bleached and perished in the recent El Niño.

We should have been happy to have lent our services to this worthy cause, but we are now otherwise engaged.

Yours prophetically,

James Cook (Capt.), Charles Darwin, J. Stanley Gardiner, Cyril Crossland.



# MEETINGS & COURSES

## CORAL REEF POPULATION BIOLOGY. GRADUATE RESEARCH AND TRAINING SUMMER PROGRAMME Hawaii, May-August 1983

*The idea of an annual summer school is an ambitious, new and promising contribution to the promotion of reef studies and it's worth quoting in full the organizers' objectives, even though this won't now be hot news . . .*

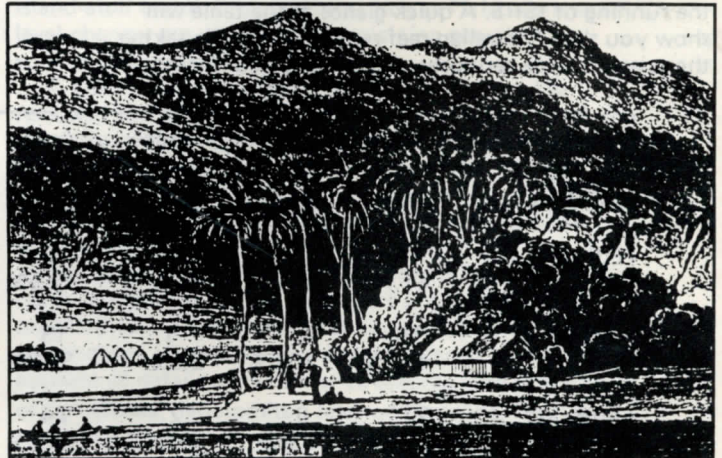
The basic philosophy of the program will be to bring together a 'critical mass' of experienced researchers and highly motivated students from all over the world. These individuals will be provided with an optimum 'total immersion' learning and research environment. The aim of this program is to offer highly advanced and highly specialized research training of a type that is unique among institutions of higher learning.

The core of this summer program is a comprehensive, graduate-level, lecture/laboratory/field course under the direction of R.A. Kinzie (Zoology Dept., Univ. of Hawaii). Students also will participate in an intensive research program. P. Glynn (Smithsonian Tropical Research Center) will serve as senior researcher. P.L. Jokiel (Hawaii Inst. Mar. Biol.) will coordinate on-site activities. The program was made possible by generous grants from the Edwin W. Pauley Foundation, the University of Hawaii Foundation and U.S. Sea Grant Program. Visiting lecturers scheduled to date include: R. Grigg, J. Maragos, S. Coles, M. Hadfield, J. Stimson, P. Castro, D. Krupp, A. Reed and R. Richmond. The lecture sessions will deal with all areas of coral population biology as well as topics covering related aspects of coral ecology. The laboratory and field sessions will focus on questions relating to the development, structure, and maintenance of reef coral populations. Examples of research topics include descriptions of the genetic structure of coral reef populations, rates of sexual and asexual reproduction in coral reef populations and their ecological consequences, patterns of larval production and their adaptive value, trophic significance of coral symbioses and commensalism, and mathematical models of coral population dynamics. Relevant methods that will be taught and used during the program include electrophoresis, immunogenetic grafting, calorimetry and respirometry. Various field methods will be used to estimate standing crop, growth rate, age structure, recruitment, mortality, predation, etc., for corals and coral commensals. Students will select a basic research topic and will work with staff and visiting investigators to develop an original research paper. These will be incorporated in a volume to be published in December 1983. The completion of a published research paper by each student is viewed as an essential part of the course. Staff and visiting investigators will also contribute research reports, review papers, and/or theoretical essays to the volume.

The summer program at HIMB will occur every year henceforth, but with totally different topics in subsequent years. The tentative schedule lists 'Solar radiation in the marine environment' for 1984, with Dr. Bruce Chalker (Australian Institute of Marine Science) as the senior researcher: 'Marine behavioral ecology' and the 'Geology of coral reefs' are included as future topic areas.

### Report by Steve Howard

Twenty eight students from six countries enjoyed a unique opportunity in the field of coral reef research in attending the Graduate Research and Training Summer Programme held at the Hawaii Institute of Marine Biology. The three month course combined a comprehensive series of lectures and seminars covering all aspects of coral reef population biology, with intensive individual and cooperative research programmes undertaken by both students and senior participants. Students had the benefit of the collective experience of many established reef workers, prominent contributions being made by Peter Glynn, Paul Jokiel, Bob Kinzie and Richard Grigg. A number of workshops were organized by Dave Krupp, Bob Richmond and Jim Stoddart which gave students the opportunity to observe and practise current techniques such as electrophoresis, calorimetry and lipid chromatography.



Early days at H.I.M.B., Coconut Island?

Research interests included reef recovery and population dynamics, genetic structure of reef populations, reproduction, interactions between reef organisms, coral-zooxanthellae physiology and coral toxicology. These research activities established valuable data bases and provided first-hand experience of the practical difficulties encountered in working with corals and other reef organisms. Much of the research conducted during the programme will form the basis of future, more comprehensive, research proposals for many years to come. It is intended that the collective fruits of research will be published in a special volume, Paul Jokiel having taken upon himself the onerous task of editing the papers which exceed fifty in number. This large number of potential papers bears testimony to the successful nature of the summer programme, a great deal of credit for which must be attributed to Paul Jokiel and the staff of the Hawaii Institute of Marine Biology, without whose efforts the programme would not have been possible. Funding for the programme was provided by generous grants from the Edwin W. Pauley Foundation, the University of Hawaii Foundation and the U.S. Sea Grant Program.

In general, personal objectives of course participants were achieved and in some instances exceeded and there is no doubt that everyone benefited from attending. The experience gained at Hawaii must strongly influence

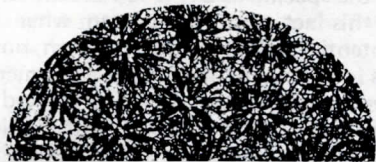
*For more on this year's Summer Programme, see Diary.*



future research activities in the field of coral reef biology and the organisers must be complimented on their vision in organising such a unique training programme.

Steve Howard, Department of Zoology, University of Newcastle upon Tyne, Newcastle upon Tyne NE1 7RU, UK.

## THE FOURTH INTERNATIONAL SYMPOSIUM ON FOSSIL CNIDARIA Washington DC August 7-12, 1983



### FOSSIL IV CNIDARIA

The Symposium opened Sunday evening, August 7, with a reception in the Marine Hall of the Museum of Natural History, and closed Friday evening with a banquet at the Marvin Center, George Washington University. Formal technical sessions included five invitational symposia (mornings) and seven half-day sessions of volunteered papers, including many on the invitational themes (afternoons). The morning symposia were (1) Taxonomic Methods in Living Corals and their Palaeontologic Implications, organised by A.G.Coates; (2) Late Precambrian and Early Paleozoic History of the Cnidarians, organised by C.T.Scrutton; (3) The Post-Paleozoic Reorganisation, Evolution and Ecologic Development of Reef-Building Cnidarians, organised by George Stanley and Erik Flugel; (4) Diagenesis of Carbonate Material: Implications for the Study of Fossil Cnidaria, organised by J.E.Sorauf and I.G.Macintyre; and (5) The Paleobiology of Sclerospores, Stromatoporoids, Chaetetids, Archeocyathids and Non-Spicular Calcareous Sponges, organised by J.A. Fagerstrom. Afternoon sessions, in addition to continuing the morning subjects, were topically organised as follows; Reefs, Biostratigraphy, Biogeography, Microstructural/Morphology, and Growth Form.

A total of 85 papers were orally presented; two more were presented as poster exhibits. Abstracts of all but three of the oral papers and one poster exhibit were published and distributed to all registrants.

Two Evening Workshops were announced in advance: Mesozoic Cnidaria and Reefs, organized by George Stanley, and Stromatoporoids, organized by J.A. Fagerstrom. Numerous additional workshops and discussion groups were held informally. A programme of three films on cnidarian biology and reefs, arranged by S.D. Cairns, was shown on Thursday evening.

Attendance at the Fourth Symposium included 114 professional registrants and 13 accompanying adults (plus 5 children).

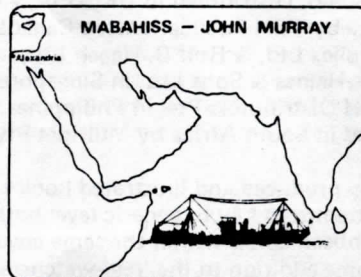
A pre-meeting field trip to New York, organized by J.E.Sorauf and W.A.Oliver Jr., was attended by 23 people; post meeting trips were to New York and Ontario (organized by J.A.Fagerstrom and C.W.Stock; approximately 11 persons) and to Jamaica (organized by A.G.Coates, approximately 18 persons).

The Organizing Committee takes this opportunity to thank the sponsors and benefactors of the Symposium (listed in our various circulars and other publications) and our numerous friends and colleagues who helped in so many ways to assure the smooth operation of the symposium.

The Organizing Committee, IV Symposium on Fossil Cnidaria, E-501 Natural History Building, Smithsonian Institution, Washington DC 20560, USA.

## MABAHISS/John Murray International Symposium on Marine Science of the North-West Indian Ocean and adjacent waters on the occasion of the 50th anniversary of the John Murray Expedition on the Egyptian Research vessel Mabahiss 1933-34 Alexandria, September 3-7, 1983

J.A. Fallows



The 50th anniversary of the John Murray expedition was recently commemorated in Alexandria, Egypt. Alexandria University hosted the meeting which was attended by a cosmopolitan audience of more than 90 people.

Papers, which were of a mixed standard, covered a wide variety of topics including chemical oceanography, deep and shallow water biology, living and non-living resources, marine geology and geophysics and marine pollution.

The final 1½ days of the proceedings were devoted to a round-table discussion aimed at establishing areas of research priority applicable to the Indian Ocean and adjacent waters. The resulting comprehensive list highlighted such problems as oil pollution and increasing tourism in the Red Sea, and the need for immediate action in their control. Other points raised included the importance of investigations dealing with commercially important fish species and the feasibility of using certain species in mariculture; the necessity for the production of a field guide on the biota of the Red Sea; and the need for accurate mapping of the region.

The proceedings of this conference will be published by Pergamon Press as a supplement to the 1984 edition (volume 31) of *Deep-Sea Research*.

J.A. Fallows, Department of Zoology, The University, Newcastle upon Tyne NE1 7RU, U.K.

*An interesting choice of journal? Deep-Sea Research won't be everyone's first choice for a reef literature search.*

## BIOLOGY AND GEOLOGY OF CORAL REEFS. MEETING OF THE INTERNATIONAL SOCIETY FOR REEF STUDIES Juan les Pins, December 8-9, 1983

Barbara Brown

Between 80-100 participants attended the Society's annual meeting which was held at the Palais des Congrès, Juans les Pins, France, on December 8th and 9th. The meeting consisted of over forty papers on the title themes. A poster paper session was also held and included presentations on conservation, physiology and repro-

# BOOKS

## Corals of the World by Dr Elizabeth Wood

256pp. TFH Publications Inc Ltd. £19.95.  
ISBN 0-87666-809-0. Distributed in UK, USA, Australia  
and South Africa by TFH Publications, in Canada by  
H. & L. Pet Supplies Ltd, & Rolf C. Hagen Ltd, in New  
Zealand by Ross Haines & Sons Ltd, in Singapore &  
Malaysia by MPH Distributors Pte, in Philippines by  
Bio-Research and in South Africa by Multipet Pty Ltd.

This handsomely produced and illustrated book represents the first attempt to key to generic level both Indo-Pacific and Caribbean corals within the same covers, and must be a welcome addition to the 'reef watchers' bookshelf. Dr Wood aims her book at 'professional marine scientists' (though not students of coral taxonomy), reef workers, students of tropical marine biology, naturalists, amateur divers and underwater photographers. An audience with such a spectrum of interests and backgrounds must have been quite a problem to cater for, but the task is made somewhat easier by including a short general account of reefs, their formation, geological history, distribution, zonation and the biology of corals, before the main working section of the book. Keys to Caribbean and Indo-Pacific corals are preceded by a brief introduction to taxonomy which encourages in situ identification of corals wherever possible. In all, 16 Families of Caribbean corals and 23 Families of Indo-Pacific corals are described, with both keys and descriptions supplemented by good quality black and white and colour photographs. One aspect which I found rather annoying, and which to amateur biologists might seem rather confusing, is the positioning of the colour photographs within the text, with illustrations of Caribbean corals appearing in the middle of descriptions of Indo-Pacific species. But then perhaps this was the printers' and publishers' final decision rather than the author's choice.

I do believe that environmental variation in skeletal morphology of corals is not given the prominence it

ductive biology of reef corals, aspects of the physiology of tropical algae and benthic reef invertebrates at sites ranging from Indonesia to French Polynesia.

Predominant geological themes in presented papers covered fossil reefs, comparative studies on Recent and fossil reefs and erosion and sedimentation processes on reefs and coralline islands. Biological papers covered a wide spectrum of topics and as such provided the most balanced meeting we have had to date. Discussion of papers centred on the population dynamics and community structure of corals with relation to their reproductive strategies; the widespread occurrence of coral bleaching and subsequent coral death during 1983 at locations as widely spread as the western Indian Ocean, Indonesia and the Caribbean; the effects of oil pollution and sedimentation on reef corals; diversity and population biology of reef fishes; abundance and behaviour of reef zooplankton; feeding strategies and reef invertebrates; and interactions of coral reefs, sea-grass beds and mangroves in the Caribbean coastal zone. Discussion was active and wide ranging, highlighting in particular our apparent continued lack of knowledge of reproductive cycles and recruitment of invertebrates into the coral reef community.

It was encouraging, once again, to see the consider-

able contribution that research students made to the meeting, both in terms of presented papers and during discussion periods. It is to be hoped that these meetings will continue to be a forum where research students can present preliminary results and discuss their results in an informal atmosphere.

The meeting programme was supplemented by a feast of underwater photography on show in neighbouring rooms of the Palais des Congrès as part of the World Festival of Underwater Photography and Cinema, and a tour of old villages in the region which culminated in a visit to the Museum of Oceanography in Monaco. The organisers, Dr. Jean Jaubert and Dr. Guy Leger are to be congratulated on organising an extremely successful and enjoyable meeting. Our thanks are due also to UNESCO for supporting the travel costs of our invited speakers and to our new President, Dr. Ian Macintyre, for arranging the printing of abstracts of the meeting for circulation to all our members, including student members. In 1984 we look forward to the ISRS AGM venue next October in Florida. The 1985 AGM of the Society will be held in Tahiti at the Fifth International Coral Reef Symposium.

deserves, particularly in the introduction to taxonomy where a section is devoted to 'misleading growths'. Many corals which non-biologists might encounter in shallow, often turbid environments — perhaps even intertidal habitats — may be considerably modified when compared with the specimens Dr. Wood describes. Recognition of this fact must be important when pointing out potential pitfalls in identification; but these are small points in the overall favourable assessment of this book. Three aspects which I particularly liked are the inclusion of tables comparing corals with similar skeletal morphologies as an aid to distinguishing different genera; the inclusion of distributional maps of the 110 coral genera mentioned in the text; and finally a useful, up to date bibliography to lead readers to the relevant literature.

At £19.95 the book is clearly good value — the next question must be, when will a modified waterproof version be available?

Barbara E. Brown, Department of Zoology, University of Newcastle upon Tyne, Newcastle upon Tyne NE1 7RU, U.K.

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## BOOKS RECEIVED OR PUBLISHED

*The Capricornia Section of the Great Barrier Reef, Past, Present and Future.*

Edited by W. T. Ward and P. Saenger  
Brisbane, 1984

A\$13.50, including postage.

Proceedings of a symposium sponsored by the Royal Society of Queensland and the Australian Coral Reef Society, held at the Kindler Theatre, Queensland College of Technology.

Contact: The Royal Society of Queensland, P.O. Box 50, St. Lucia, Queensland 4067, Australia.

*The Ecology of Deep and Shallow Coral Reefs.*

Edited by Marjorie L. Reaka

U.S. Department of Commerce, Washington D.C., 1983  
Results of a workshop on Coral Reef Ecology held by

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Barbara E. Brown, Secretary to ISRS, Department of Zoology, The University, Newcastle upon Tyne NE1 7RU, UK.

the American Society of Zoologists, Philadelphia, Pennsylvania. Symposia Series for Undersea Research. NOAA's Undersea Research Program. Vol. 1, No. 1. Contact: NOAA's Undersea Research Program, R/SE2, 6010 Executive Boulevard, Rockville, MD 20852, U.S.A.

*Guide to the Bonaire Marine Park; a Guide for Snorkelers and Divers.*

by Tom van't Hof; colour photographs by Dee Scarr and drawings by Heleen Cornet. Netherlands Antilles National Parks Foundation. Stinapa, in cooperation with Orphan Publishing Company, Curaçao. Stinapa Document Series No. 11. N.D. (?1983).

US\$13 by surface mail; \$20 air.

Profits from sale benefit the preservation of Bonaire's reefs.

Contact: Bonaire Marine Park, P.O. Box 151, Bonaire, Netherlands Antilles.

*Guide to the Coastal Resources of Guam. Volume II. The Corals.*

by Richard H. Randall, and Robert F. Myers  
University of Guam Marine Laboratory Contribution No. 189, University of Guam Press, 1983

*Oligocene Reef Tract Development, Southwestern Puerto Rico.*

Edited by S. H. Frost and others

Sedimenta IX. The Comparative Sedimentology Laboratory, Division of Marine Geology and Geophysics, Rosensteil School of Marine and Atmospheric Science, University of Miami, 1983

*Proceedings of the Fourth International Coral Reef Symposium. Two volumes.*

Edited by E. D. Gomez and others

Marine Sciences Center, University of the Philippines, Quezon City, 1982

Symposium held 18-22 May 1981, Manila, Philippines.

U.S.\$75.00 including handling and postage.

Contact: The Director, Marine Sciences Center, P.O. Box 1, University of the Philippines, Diliman, Quezon City 3004, Philippines.

*Proceedings of the Inaugural Great Barrier Reef Conference.*

Edited by J. T. Baker and others

James Cook University Press, Townsville, 1983

Symposium hosted by James Cook University and Australian Institute of Marine Science.

Contact: Inaugural Great Barrier Reef Conference, Sir George Fisher Centre, James Cook University of North Queensland, Townsville, Australia, Queensland 4811, Australia.

## ILLUSTRATION DETAILS

**p.3:** Cartoon adapted and realised by Jill Darrell and Brian Rosen.

**p.4:** (with apologies of course to Charles Darwin).

**p.5:** Cartoon adapted by Jill Darrell after the *Weekend Australian* (November 26-27th 1983), sent by Carden Wallace.

**p.8:** Typical landscape on Binongko, Tukang Besi. Fig.80 in Kuenen, P.H., 1933, Geological results. Part 2. Geology of coral reefs. *The Snellius-Expedition. Volume 5.* Kemink en Zoon N.V., Utrecht.

**p.11:** Saville Kent on one of the Thursday Island reefs of the Great Barrier Reef, Australia. 'The author's method of photographing submerged corals and bêche-de-mer.' Pl.27 in Saville Kent, W., 1893, *The Great Barrier Reef of Australia: its products and potentialities.* W.H.Allen & Co., London.

**p.14:** From Mrs Cameron's portrait of Charles Darwin at 72.

**p.15:** Suakin (Sudan) on the Red Sea coast. The Customs House and Government Buildings as they were around 1912. Fig 5 in Crossland, C., 1913, *Desert and water gardens of the Red Sea.* Cambridge University Press.

**p.16:** From 'View near Honoruru [sic], Oahu'. Engraving opposite p.109 in Lord Byron, 1826, *Voyage of HMS Blonde to the Sandwich Islands in the years 1824-1825.* John Murray, London.

# ANNOUNCEMENTS

## GRANTS AND RESEARCH SUPPORT

### Australian Coral Reef Society.

#### Postgraduate Research Grants 1985.

These grants are intended primarily to encourage field work on Australian coral reefs as part of the study for a higher degree at a recognized tertiary institution in Australia. Closing date September 28th 1984.

Contact: Dr. P.G. Flood, Department of Geology and Geophysics, University of New England, Armidale, N.S.W. 2351, Australia.

### Hawaii Undersea Research Laboratory, NOAA's National Undersea Research Program at the University of Hawaii.

Time requests are currently being considered for use of either *Makali'i* (submersible) or *Snoopy* (remote control vehicle) in any part of the Pacific. Closing dates for 1984/5 have now passed but we include this item so that you can plan for the year after. If the closing dates are the same again next year, they will be Jan 1st for notification and March 1st for full submissions. For 1984/5, four research areas are suggested by NOAA as appropriate: 1. Fisheries, 2. Pollution, 3. Sea floor properties and processes, 4. Ocean technology and services. Time requests are for facilities only. No research or travel funding is implied. There is no cost for the use of the facilities for approved research projects.

Contact: EITHER Gary M. McMurtry, Science Director OR E.H. Chave, Science Coordinator, National Undersea Research Program, University of Hawaii, 1000 Pope Road, Honolulu, Hawaii 96822, U.S.A.

### Lizard Island Research Station Fellowships, Australia.

See news item by Des Griffin, p.6.

## INFORMATION WANTED

### REEF ENCOUNTER

We should like to know of any newsletters dealing with reef or reef-related subject matter and not listed in *RE1*. We also appealed in our last issue for titles of film containing reef material.

Contact: Editor, *Reef Encounter*.

## POST WANTED

Experienced coral and reef palaeobiologist/biologist/geologist with strong interdisciplinary tendencies seeks post offering opportunities for one or more of the following: teaching, collaborative work with specialists in related fields, initiation or coordination role for long-term coral or reef project, reasonable support for or access to living or fossil reefs.

Contact: via Editor of *Reef Encounter*

## PROJECTS, EXPEDITIONS AND WORKING GROUPS

### Oxford University, U.K.

The Oxford University Expedition to the Gulf of Kutch 1984, led by Tom Edmunds, has recently returned. Its three projects included one on Mangroves and Coral Reefs.

Contact: Chris Briggs, via Editor of *Reef Encounter*.

### University College London, U.K.

Dr. Patrick Nunn is organizing a fieldwork programme on

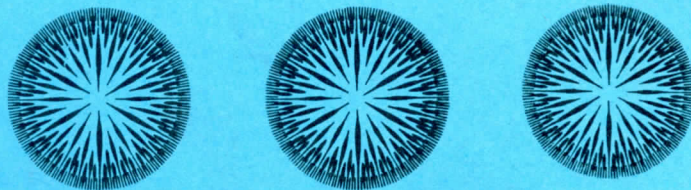
Christmas Island in the Indian Ocean, related to the evidence for late Cainozoic sea-level changes, and would be interested to hear from anyone with a research interest in the area.

Contact: Dr. Patrick Nunn, Department of Geography, University College London, 26 Bedford Way, London WC1H OAP, U.K. (telephone 01-636-8829)

**International Workshop on Cainozoic Coral Taxonomy.** At the fourth International Meeting on Fossil Cnidaria, reported on elsewhere in this issue, a small group of scleractinian coral specialists met and agreed informally to bring together Cainozoic (and this includes Recent) scleractinian specialists with the objective of encouraging a wider interest in systematic studies to complement the current emphasis on faunistic work. The initial idea is for participants to contribute to some agreed projects by post, but in the long term there should be an actual meeting-based workshop, possibly at the next Fossil Cnidaria meeting, or a similar occasion. A questionnaire has now been prepared for those interested in participating, and a full circular will be sent out in due course.

Contact: Editor of *Reef Encounter*.

November 3-4, Brisbane, Australia.  
**SECOND ANNUAL SCIENTIFIC MEETING OF THE AUSTRALIAN CORAL REEF SOCIETY.**



This meeting will be held at the University of Queensland. The main themes are expected to be: 1. Disturbance and coral reefs; 2. Science and zoning for marine parks. An interesting detail is that the ACRS will be paying for at least one student member to attend the Fifth International Coral Reef Symposium at Tahiti in 1985 and although selection will be based on a written paper, 'the selectors are bound to remember an impressive performance on the same topic in Brisbane.'

Contact: Dr P J Doherty, School of Australian Environmental Studies, Griffith University, Nathan, Brisbane, Queensland 4111, Australia.

## DIARY

*continued from p.3*

October 26-28, Miami, USA.

**ADVANCES IN REEF SCIENCE:** a joint meeting of the Atlantic Reef Committee, Rosenstiel School of Marine and Atmospheric Science, University of Miami, and The International Society for Reef Studies.



This will be held at the University of Miami's Rosenstiel School of Marine and Atmospheric Sciences on Virginia Key. Topics of special interest include: 1. Holocene history of reef development; 2. Corals under stress; 3. Scientific background for managing reef resources; 4. Coral reproduction strategies; 5. Reef mapping; 6. Reef metabolism; 7. Coral reef community ecology.

There will also be the following field trips: A. Florida Reef Tract off Key Largo, led by Eugene Shinn, Harold Hudson and Peter Glynn, Oct 24 for Oct 25; B. Looe Key Reef, led by James Bohnsack, Eugene Shinn and Harold Hudson, Oct 28-29. There will be no SCUBA diving on either trip.

Contact: Atlantic Reef Committee, University of Miami, Fisher Island Station, Miami Beach, Florida 33139, USA.

1985

May 27-June 1, Tahiti, Polynésie Française  
**REEF AND MAN. Fifth International Coral Reef Congress under the auspices of the International Coral Reef Committee of the International Association for Biological Oceanography.**

This will be held at the Research Centre of the Museum National d'Histoire Naturelle and the Ecole Pratique des Hautes Etudes in French Polynesia. There will be seminars, symposia, informal sessions, and field trips. The second announcement of further details is due very shortly. In the meantime, we have received some very plush tourist brochures which will probably confirm grant committees' worst suspicions about conferences in places like this being holidays in disguise. Notwithstanding the meeting's title, we presume that women will also be welcome.

### LOOKING AHEAD

The Royal Society will be holding a meeting on coloniality, in London in July 1985. This should be of interest to many specialists of reef organisms, especially coelenterates, sponges and bryozoans. The meeting will be devoted more or less equally to both plants and animals and the principal organizer is Professor J L Harper, assisted by Jim White and Brian Rosen.  
Contact: Editor of *Reef Encounter*.

The next meeting of the International Association for the Study of Fossil Cnidaria is scheduled for Brisbane in 1987.

Contact: Dr J S Jell, Department of Geology, University of Queensland, St Lucia, Queensland, 4067, Australia.

The possibility of another international meeting in the series on coelenterate biology is currently being discussed and enquiries being made to see if there will be sufficient support for it. Possible date: 1986 or 1988. Possible location: London or somewhere else in UK.  
Contact: via Editor of *Reef Encounter*

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