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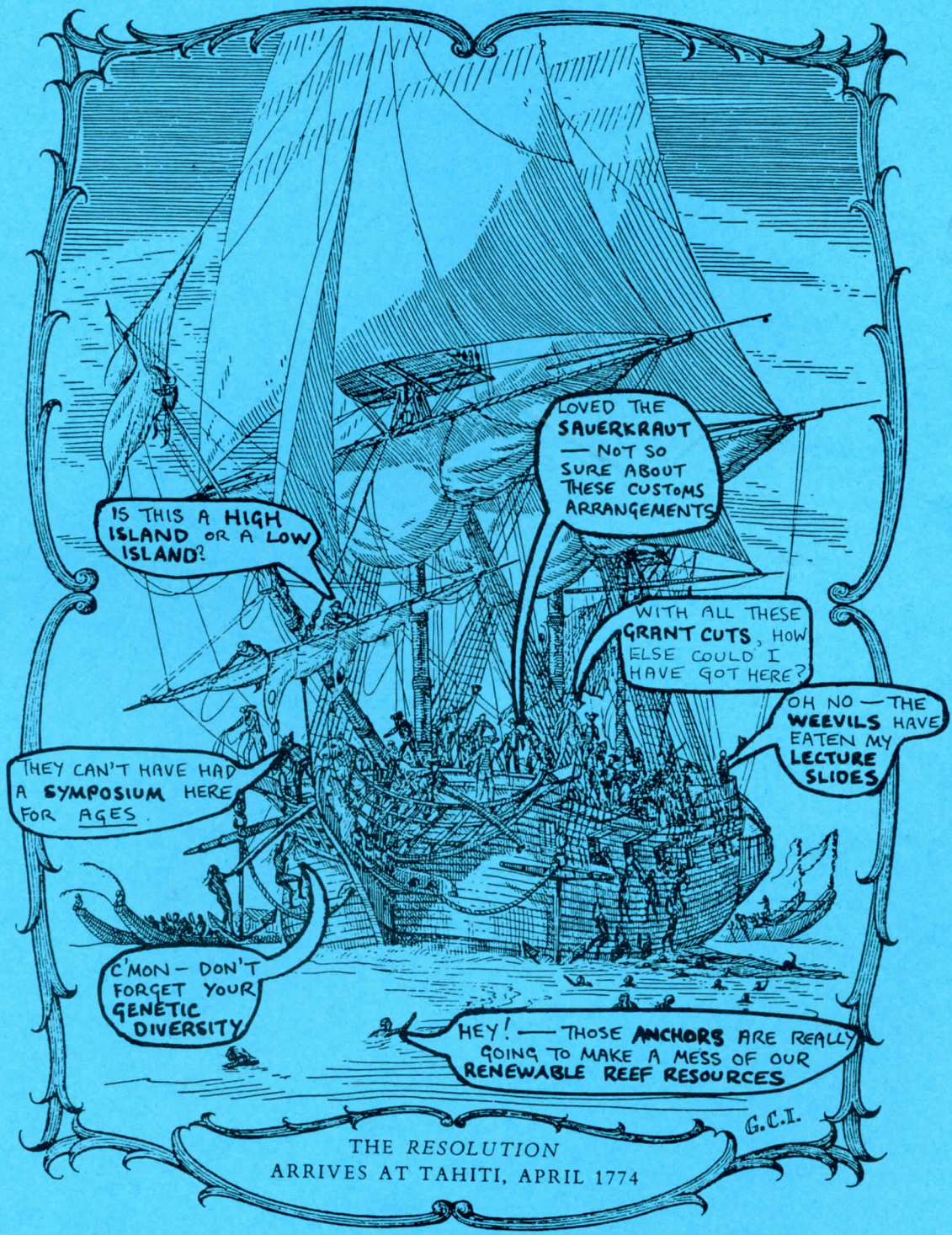
REEF ENCOUNTER

Newsletter of the International Society for Reef Studies

Number 3

February 1986 (for 1985)



THE *RESOLUTION*
ARRIVES AT TAHITI, APRIL 1774

Tahiti: Venus observed in more ways than one. p.15

REEF ENCOUNTER No.3 February 1986 (for 1985)

Newsletter of the International Society for Reef Studies

Edited and produced by Brian Rosen

contents

ISRS

The International Society for Reef Studies was founded at a meeting in Churchill College, Cambridge, England on Tuesday 9th December 1980, and asks for support.

Under the Constitution adopted since the Society's formation, the aims are:

To promote for the benefit of the public the production and dissemination of scientific knowledge and understanding concerning coral reefs, both living and fossil.

In furtherance of the above object but not further the Society shall have the following powers:

i) To hold meeting, symposia, conferences or other gatherings to disseminate this scientific knowledge and understanding of coral reefs, both living and fossil.

ii) To print, publish and sell, lend and distribute any papers, treatise or communications relating to coral reefs, living and fossil and any Reports of the Proceedings or the Accounts of the Society.

iii) To raise funds and invite and receive contributions from any persons whatsoever by way of subscription, donation or otherwise providing that the Society shall not undertake any permanent trading activities in raising funds for its primary objects.

The Society collaborates with Springer-Verlag in producing the quarterly journal Coral Reefs. This large-format journal is issued free of charge to all members of the Society, and concentrates on quantitative and theoretical reef studies, including experimental and laboratory work and modelling.

The annual subscription for membership of the International Society for Reef Studies is £30 sterling or $40 U.S. Dollars. Under the constitution subscriptions are due by 31st January each year. Student rates, which include receiving the news letter Reef Encounter, Abstracts, of the Annual Meetings and the Great Barrier Reef current awareness bulletin 'Reef', is £6 sterling or $8 U.S. Dollars.

Membership is restricted to individual reef scientists only. Institutional subscriptions to *Coral Reefs* must be placed directly with Springer-Verlag.

Non-members of the Society who wish to receive single issues of *Reef Encounter* or to subscribe to it, should contact the Editor. There are no formal subscription arrangements.

Subscriptions to the Society should be addressed to the Membership and Develpment Officer, Professor D.H. Montgomery, Biological Sciences, Cal Poly State University, San Luis Obispo, California, U.S.A., 93407.

RE3

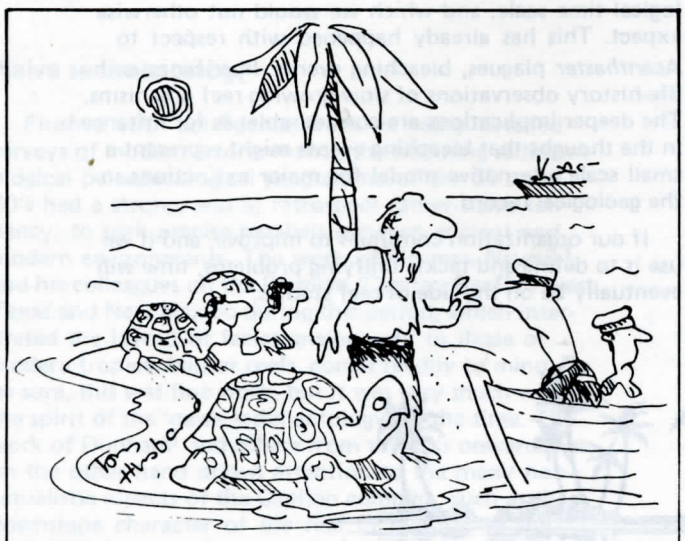
We sincerely apologise for the failure of *RE3* to appear in 1985. We are sure that readers will not want to know the inner details of the endless series of events, domestic and professional, which slowed production almost (but never quite completely) to a halt, but we should like to say that editing and production of *RE* is very much a personal affair. The task force which produces it rarely exceeds the equivalent of 2 people, so we are very vulnerable to human frailties. This issue was produced with the assistance of Jill Darrell and Barbara Brown (though responsibility for the delay rests entirely with the Editor). The typesetting was done by Lydia Woolley.

The delay means that much of our content is not as newsworthy as it should be. We have included almost all of the original projected content however, in the belief that it still makes interesting reading. (Well, we all read old mags in dentists' and doctors' waiting rooms!) If there are significant developments which have taken place since a particular item was written, then why not write an update for us?

We look forward to a better production year in 1986, for which we also wish you many happy reef encounters. We ourselves look forward to the possibility of having the assistance of some little luxuries like a word-processor, and occasional professional secretarial help, though we are not clear yet just where these will be coming from (any offers?!).

In the meantime, please don't give up sending us material. Under the circumstances we hesitate to give a firm copy deadline, but we hope we shall have enough copy — and time to turn it into *RE4* — by September 1st 1986.

Finally, something about this newsletter's name. For those who are inclined to add a final 's' to the title, and for anyone else with sufficient curiosity, here is a clue: derived not so much from extraterrestrial happenings but rather from a more down-to-earth, lean time on a British railway station. The upside-down panel on the inside of the back cover of this issue reveals all.



"I'm not going anywhere without the wife and kids!"

DIARY

1986

June 22nd to July 9th, 1986
SECOND INTERNATIONAL SYMPOSIUM ON INDO-PACIFIC MARINE BIOLOGY
UNIVERSITY OF GUAM, TRUK AND PONAPE ISLANDS.

Subjects to be covered are indicated by the following symposia, but there will also be sessions for contributed papers:

I Behaviour of marine crustaceans: recent advances
II Ecology of marine crustaceans
III Biogeography and evolution of marine crustaceans
IV Recruitment mechanisms of coral reef fish
V Introduced marine species in the Indo-Pacific
VI Recent findings in *Acanthaster* biology and implications for reef management.

There will be field trips at Guam, Truk and Ponape within the above dates. The proceedings will be published by the *Bulletin of Marine Science.*

For further details, contact: The Western Society of Naturalists, Professor David H. Montgomery, Secretary Biological Sciences Department, California Polytechnic State University, San Luis Obispo, California, 93407, USA (telephone (805) 546-2446).

continued on p.30

NOTES FOR CONTRIBUTORS

To save time and postage, we shall not normally acknowledge material submitted to us, 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 in order to address our readership as appropriately as possible.

References are by footnote, similar in style to *Nature* and *Science*, using World List abbreviations. Please use metric, or imperial-with-metric units, but not imperial units on their own. PLEASE NOTE THAT POORLY PREPARED MAPS AND DIAGRAMS HAVE COST US TIME IN RE-DRAFTING. Illustrations should be of a size compatible with our current format, whether you opt for 1:1 reproduction, or a certain amount of reduction. We prefer originals, but if you send photocopies, ensure that they are reproduced with sufficient intensity of black line to be suitable for camera-ready printing. If you specify reduction, ensure that all the details will still be clear. Diagrams should have legends and/or captions to explain all symbols, abbreviations and shading patterns (etc.). In addition, maps should have a scale, and indication of orientation. Use of an inset map to show broader geographical setting is helpful. PLEASE GIVE YOUR OWN NAME(S) AND FULL ADDRESS(ES) TOGETHER WITH ANY OTHER RELEVANT CONTACT ADDRESS AND TELEPHONE NUMBER FOR READERS, IF THESE ARE DIFFERENT FROM YOUR OWN.

We have no regular reprint system, but interested contributors should contact the Editor.

For guidelines on the kind of material we need, please refer to *RE2* (June 1984), p.2.

Brian R. Rosen, Editor, Reef Encounter, Department of Palaeontology, British Museum (Natural History), Cromwell Road, London SW7 5BD, U.K. (telephone: 01-589 6323 extension 316).

Reefs: so what's the problem?

Reef workers are gradually becoming more organized internationally. This must be a healthy situation, not because it leads to more and grander international meetings, nor even because it fosters better exchange, but because it will eventually help to draw attention to the value of working in what some countries see as an esoteric field.

We can make a rough and ready distinction between countries which have reef coastlines, and those which do not, and generally, the significance of reef research is easier to convey to your compatriots if you have reefs on your national doorstep. Even so, some reefal nations are short of their own expertise, but usually manage to invite outside participation. Conversely, some non-reefal countries have scientific and academic links (often a legacy from some bygone empire) which commits them to research in a reefal country. For yet others, what they lack in living reefs, they make up for in fossil reefs, often of economic importance. For the remaining countries, however reef research is becoming ever harder to justify against the pressures of cutbacks in scientific funding. They are being asked to concentrate their effort on matters of local interest, or on projects which, while clearly of universal scientific importance, do not cost the earth to fund. This second effect often leads to increased nation-sharing of major projects. And here lies the point and the challenge to reef workers.

Can we define one or more major scientific problems that unite the maximum range of research carried out on reefs, and which would therefore also improve interest and support? In short, are reefs really a 'problem'? One reaction might be to say that if they are a problem then we should not need to ponder the question: our very doubts give us away. But the matter is not so simple. In the nineteenth century, to be sure, everyone recognized that there was a reef problem, mainly, how did they get there? Since the apparent solution of this through the contributions of Darwin, Daly, some critical boreholes, the karstic approach and plate tectonics, this problem cannot really be said to exist any more. We might now all easily pass for a train-load of passengers without a destination. To be sure, there are lots of busy people getting on and off, changing trains for some other ulterior scientific destination. Some even stay on board working out the details, but who, or what does that leave?

Two long established reef themes are geomorphology and diversity. Their pedigree as major scientific problems however is doubtful. Are not the basic geomorphological ideas about reefs worked out, and cannot the rest be absorbed into bigger questions? And diversity, if it really is a reef problem at all, has principally led us in grand circles of competition, food webs, niche partitioning, stability, disturbance and adaptive strategies, looking for an intellectually more satisfying way out. Even the classic geological questions about reefs can be seen simply as special cases of carbonate petrology or facies analysis, and are not, therefore, peculiarly reefal.

Elsewhere in this issue, two authors, Peter Skelton and Boris Preobrazhensky, have offered some very differently expressed views about the nature and purpose of future reef research. To take up this theme therefore, here are three topics which reef workers might unite on (without of course necessarily leaving their own favoured subject).

1. The 'unusual' nature of many reef organisms, both living and fossil, especially the colonial or modular ones: they seem to be immortal, or to have life history patterns so utterly different from the standard unitary organisms beloved by most evolutionary biologists, that our basic models of evolutionary processes will probably prove to be inadequate. At the same time they are also major reef builders.

2. Oil and minerals! The economic importance of fossil reefs is beyond doubt, but the interpretation of ancient reefs and their associated strata not only requires its own geological expertise, but also good up-to-date input from biological studies of modern reefs. Unfortunately, through no real fault of their own, the reef biologists are rarely trying to answer the geologists' questions, while the geologists do not usually have the time, support or expertise to go and find the answers themselves. Sometimes they are content to use well-worn overgeneralisations, or perhaps prefer not to ask any biological questions at all. Therefore, how about a properly coordinated programme of questions? For example, can we truly yet ascribe reliable palaeoenvironmental conditions to most of the common reef organisms through geological time? Have we really yet reached the stage of being able to recognize and distinguish ecological succession from genuine changes of ambient conditions in fossil reefs?

3. Finally and inevitably perhaps, conservation: an understanding of short term changes, both biological and geological (including geomorphological), is clearly a part of conservation research. Conservation, however, is not only an applied problem critical to the protection of reef resources, but also has the promise of revealing trends of general scientific importance on an historical or ecological time scale, and which we would not otherwise expect. This has already happened with respect to *Acanthaster* plagues, bleaching events, hurricanes and life-history observations of slow-growing reef organisms. The deeper implications are considerable, as for instance in the thought that bleaching events might represent a small scale alternative model for major extinctions in the geological record.

If our organization continues to improve, and if we use it to define and tackle unifying problems, time will eventually be on the side of reef studies.

CURRENTS

The tyranny of uniformitarianism : the present as the key to geofantasies

Peter Skelton

'The present', we are all told *ad nauseam* as students, 'is the key to the past'. Useful though this elegantly simple dictum is, it is a two-edged sword. While undoubtedly valid at the level of simple physical and chemical processes, it can be seriously misleading when complex systems such as whole environments are considered. For example, the physical laws and constants controlling the transport of sedimentary particles are unlikely to have altered significantly during the Earth's history, and so inferences about original current strengths from observed grain sizes and sedimentary structures, on the basis of analogy with experimental data, can be considered reliable. Even at this level though, there is scope for uncertainty: witness the debate about the extent to which the Mg^{++}/Ca^{++} ratio of seawater may have changed through the Phanerozoic, and whether or not Palaeozoic marine ooids, for example, were therefore originally aragonitic or calcitic.

Environments of course are shaped by a great many such potentially variable, physical, as well as biotic factors. So, with the many changes in these wrought by time, ancient environments can hardly be expected to have had identical, or in some cases even remotely similar composite characters to those of their modern counterparts. This message is hardly new, and people have been formulating synthetic, often non-actualistic models of what ancient environments were like, based on amalgamations of inferred processes from simple items of geological information ('process-response' models), for some years. Yet, judging by some articles on ancient organic buildups (all too often misleadingly described as 'fossil reefs'), this message is still falling on deaf ears in some quarters.

Naive sedimentology

Flushed with confidence from its many detailed surveys of modern environments, the booming sedimentological palaeoecological programme of the 50's and 60's had a strong, and in retrospect rather naive tendency, to seek precise parallels between ancient and modern environments. The work of Norman Newell[3] and his colleagues on the Permian 'Capitan Reef' of west Texas and New Mexico during this period, which interpreted the layout of facies analogously to those of modern tropical barrier reefs, comes readily to mind. To be sure, this was fine work, but it was very much within the spirit of the 'naive sedimentology' of the time. The work of Dunham[1] and others from the 60's onwards has, on the other hand drawn attention to the many non-actualistic aspects of the Capitan complex, such as the downslope character of the reef in relation to the barrier-bank system.

Irrelevant questions

Certainly, the more I look at the Cretaceous rudist molluscan buildups on which I work, the more I am convinced in many cases of the irrelevance of certain classic key questions of fossil reef analysis and the lack of attention paid to other factors that may only be of marginal importance in today's coral reefs. One such question that appears every time fossil buildups are discussed, with the monotony of a cracked record, is whether or not the structure was 'wave-resistant'. The question seems to lead to endless quibbling about how much binding must have been present, how it should be analyzed, the relative roles of organic versus inorganic binding, where bindstones end and bafflestones begin, and so on and so on. If the structures in question occupied calm water habitats hardly if ever affected by wave currents, as seems to have been the case, say, with the hippuritid molluscan bushes of the Santonian of Provence[4], then the great 'acid test' of wave resistance simply has no interest: the question is analogous to pondering whether or not modern kelp forests are adapted to withstand the effects of forest fires.

Phoney facies

Yet, on the coat-tails of such empty questions, tends to come the whole paraphernalia of phoney facies labelling like 'fore-reef' and 'back-reef' zones, loaded with tacit assumptions of current strengths, depths, stability and levels of salinity and illumination, and other such parameters. On the other hand, factors that probably were crucial influences on the form and distribution of the hippuritid bushes, such as the frequency and form of muddy water fluxes, receive far less attention in much of the literature. I imagine that this is because such factors have only a subsidiary role in shaping modern barrier reefs.

Of course, not all current work on fossil buildups is flawed by such facile uniformitarianism. Indeed, even text-book reviews are broadening their outlook to encompass non-actualistic aspects[2] – a sure sign of acceptance of new approaches. This is not the proper place however for a full review and exhaustive argument. Here, I am just trying to make the point polemically that there still seems to be too much loose uniformitarian thinking about reefs.

Hymn-like chants

We still encounter such bald interpretations as rudist buildups being shelf-edge barrier systems, argued simply on their presence alone; linear fossil buildups being

associated with upwellings (I haven't a clue where that notion came from!); and the usual hymn-like chant of 'clear, well-lit water of normal marine salinity in tropical latitudes'. As far as I am concerned, the days of the usefulness of highlighting parallels are over: such thinking is in danger of becoming a strait-jacket. By now, we have grasped the point that the present *can* be a useful key to the past, but we must now face the fact that the past can only be reached through an elaborate system of combination locks. We need to emphasize composite differences between buildups, both modern and ancient. Only then will we be able to work towards that universally acceptable and unambiguous terminology which reef studies (in a geological context) still need so badly.

Funds?

From the point of view of research funding, moreover, it is only then that we can hope to provide the kinds of reliable facies models that really work, and for which therefore the petroleum industry (for example) might contemplate funding research. Reef geologists should now be thinking in terms of research based on illuminating the non-actualistic diversity of fossil buildups if they have hopes of continuing their studies. We should be selling this approach hard, both for the benefit of those who might provide research funds, and, of course, for ourselves – for who, these days, does not need research funding?

1 Dunham, R.J., 1972. *Capitan Reef, New Mexico and Texas: facts and questions to aid interpretation and group discussion* Publication 72-14, Society of Economic Palaeontologists and Mineralogists, Permian Basin Section.
2 James, N.P., 1983. *Mem.Am.Ass.Petrol.Geol.* 33(8), 346-440.
3 Newell, N.D., 1957. *Mem.geol.Soc.Am.* 67(2), 407-436.
4 Philip, J., 1972. *Palaeogeogr., Palaeoclimatol., Palaeoecol.* 12, 205-222

Peter Skelton, Department of Earth Sciences, Open University, Walton Hall, Milton Keynes MK7 6AA, U.K.

UNESGOING . . . GOING . . . GONE

November 1984

DR D. R. STODDART'S
BIRTHDAY MESSAGE TO THE NATION

THE TIMES TUESDAY NOVEMBER 20 1984

Leaving Unesco

From Dr D. R. Stoddart

Sir, You can scarcely be proud of Professor Gould's support (November 10) for your leader of November 5 advocating British withdrawal from Unesco. Professor Gould tells us of his association with the UK national Commission for Unesco: his letter reveals that he is incapable of appreciating the challenge and opportunities that the institution presents.

Why on earth not in an international organisation celebrate Lenin's birthday? Tragicomic (as Professor Gould asserts)? Grotesque? Sinister tomfoolery? Whatever Professor Gould's private political views, Lenin has affected the educational, scientific and social life of something like 10^9 more people than have ever heard of Professor Gould – and in the last analysis probably for the better.

The fact that we have people in public life, involved in giving advice about Unesco, who are utterly out of tune with what the Third World so desperately needs and which Unesco – temporary difficulties to one side – is uniquely fitted to provide is perhaps one reason why her Majesty's Government now seems on the verge of one of its most lamentable and demeaning decisions.

Unesco has just published a monograph on how to study mangrove swamps for the benefit of those countries whose shores are fringed by them. It is what the institution is all about, why it matters so much, and why it requires our support. Sadly, I suspect that while Lenin himself would have approved wholeheartedly of mangrove research, the Goulds among us lack the vision to recognise the real issue when they see it.

Let us hope that ministers can rise above the self-interested parochialism of much of the correspondence on this subject in your columns and recognise with Professor Skilbeck (November 8) what the important issues are.

Darwin, Freud, Marx, Mao – and Lenin: who on earth else has set the frame of our twentieth-century lives?

Yours faithfully,
D. R. STODDART,
2 Chesterton Hall Crescent,
Cambridge,
November 15.

December 1985

Britain 'out of Unesco'

By our Chief Political Correspondent

Ministers are expected to agree today t drawal from widespread op Commons. The seas and defe mittee will b prove the pro backed by Sir the Foreign Se

Many Conser as the opposit against the F reported wi Unesco, and likely to be cumbing to Am

Mr George bour foreign man, wrote t last night urgin her mind. "I'l stubborness do increase our

Labour claim

Britain dismays EEC by leaving Unesco

Getting out for no good reason

Guardian Dec 5th & 6th '85

NEWS

Threat to Shiraho Reef, Ryūkyū Letto, Japan

We have received a considerable amount of material in connection with an airport which is due to be constructed over an outstanding coral reef in the Ryukyu's, Japan, a precursor of which was our reproduction in RE2 (p.8) of a **Japan Times** [1] *headline which reached us through David George. We summarise the main points and events (to October 1984) here, but suggest that you contact Katherine Muzik and Maggie Suzuki if you want further details. Their addresses and other reading are at the end of the article.*

This is not just another pretty reef threatened by a few local spear-fishers. Here is a veritable reef epic – a complete concatenation of reef themes ranging from the biology, through local human community structure and issues, crown-of-thorns starfish plagues and adverse effects of large-scale local development, to a suspicion of darker, military motives and an active human protest, culminating to date in scenes which read more like the British coal strike than the usual idyllic pictures conjured up by the mention of coral reefs (see **The Compleat Reef Encounter No. 3***).*

Background

Shiraho Reef, Ishigaki Island, is one of the last healthy reefs remaining in the Ryūkyū Island chain, most of the others having succumbed to "development" and the Crown of Thorns starfish. It is a thriving reef, soon to be covered by a government-built airport, principally for jumbo jets to bring tourists directly from Osaka and Tokyo. Already, thousands of tourists per year come to Ishigaki Island, but a major protest has now developed over the plans for this airport.

It is not only that the Shiraho reef itself rates as "exceptional" by TMRU Reefwatch criteria, but the human occupation of the area is traditional and well adjusted. Shiraho is an ancient village, pretty and peaceful with narrow streets, stone walls and handsome old trees. The tourist trade however has already disrupted the traditional fishing and agricultural basis of the community, causing loss of jobs and deterioration of its old way of life. The Okinawa public nominated Shiraho coral reef as one of the top three out of 400 Okinawa beauty spots in a recent contest organized by the regional newspaper, the *Okinawa Times.*

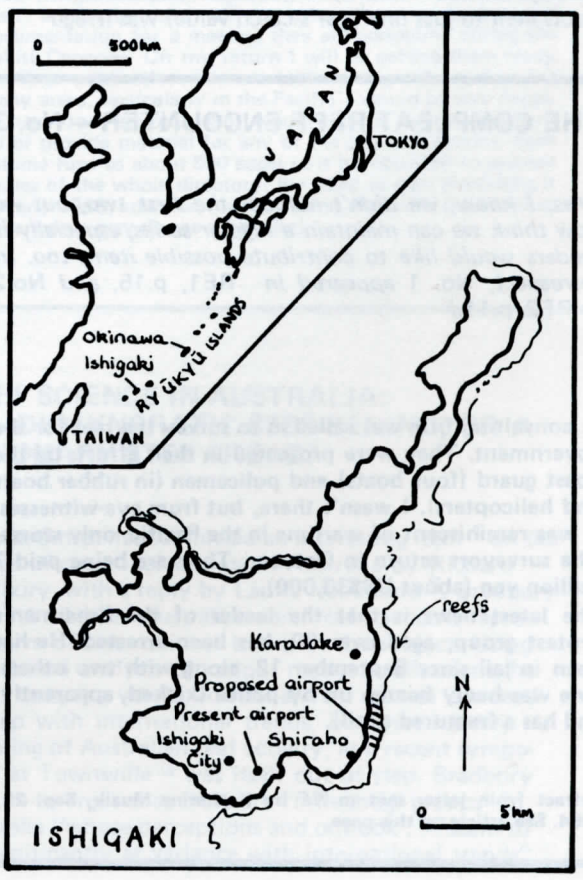
Almost all the neighbouring reefs around Shiraho reef are virtually dead, with less than 3% living coral cover. This seems to be a consequence of the intensive land clearance for pineapple plantations, major civil engineering projects and large hotel construction schemes, all of which have greatly increased the levels of terrestrial sedimentation around Ishigaki's shores. The Crown of Thorns, which appears to thrive on reefs which have been disturbed, has completed the destruction of these reefs which human development has started. Shiraho alone remains.

The plans

The airport plan consists of filling a section of reef with "dirt and concrete" by levelling a convenient nearby hill, 136m high, into the sea. The airport will cover an area of 1.3 million square metres, destroying 3.6 km of reef and lagoon. The main runway will be 2,500m long and is to be built directly over the lagoon and reef crest. Surveying, delayed recently by protesters, was re-scheduled to begin again in October 1984.

There is already an existing airport. The need for a new airport has not been adequately demonstrated. There are arguments about whether the tourism would actually increase, as promised, and whether if it were to increase, it would not exceed the ecological capacity of the island. Market produce which is perishable can already be sent on the 6 daily flights to Okinawa; other produce, such as water-melons, will probably need to be sent by ship as before. Even if the need for a new airport were confirmed on these kinds of arguments, why cannot the existing airport simply be enlarged? Or, why cannot another site be found? The airport promoters say 'no'.

Since the commercial arguments for the new airport are readily questionable, protesters have come to believe that the real reason for the airport is not commercial, but military. The location is relatively close to China and the Soviet Union, and is probably suitable too for anti-submarine reconnaissance. A military airbase would also be consistent with the increased militarization of the Pacific that stems from the American-Japanese "Protection of Pacific Sea Lanes" policy.



Military deployment of the new airport is consistently denied by the new airport's promoters. The protesters however point to the unaccustomed speed with which Japan's Finance Ministry approved the allocation of 280 billion yen (about US$ 125 million) for the airport after only a single initial survey and review, and at a time of government cut-backs in public expenditure, and without local consultation.

Protest

One of the leading figures in the protest against the airport plan is Katherine Muzik, especially in her efforts to draw the attention of English-speakers abroad to the Shiraho reef problem. She first became concerned through her work on sea fans, and she carried out a preliminary biological survey of the Shiraho reef [2,3]. She called for wider concern in her article in English in the *Japan Times* in 1983 [1], since when she has ceaselessly written, lectured and talked on TV on the threat to the Okinawa reefs. She expects to talk at the Tahiti meeting on the subject. One result of her efforts has been that Shiraho reef is being listed in the IUCN coral reef directory [4] but she fears her activitiy, and that of other protesters, has not been enough to avert the airport and save the reefs.

In Japan, Katherine Muzik's protest has been taken up by Maggie Suzuki and the Japanese Friends of the Earth [5]. The most dramatic protest action however has been by the local people themselves, as summarised in the FoE article [5] (and see also our Compleat Reef Encounter panel). In July 1983, a "People's Group to Consider the Airport Problem" was formed, and a symposium held. An "Okinawa-Yaemama-Shiraho Save the Ocean, Save our Lives Association" broadened the campaign into a conservation issue for the whole prefecture. Thirty-three local fishermen have filed a lawsuit against the Yaeyama Fisherman's Cooperative, claiming that the latter's decision to relinquish its fishing rights in exchange for 500 million yen (just over US$ 2 million, and equivalent to just one year's catch value) was irregular, and therefore null and void.

National interest in the protest has grown slowly, but Katherine Muzik claims that Japanese marine biologists have been reluctant to express their own views publicly. Jacques Cousteau has visited the reef, and Greenpeace have also added their voice to the protest. In short, Japanese opposition groups are doing all that they feel is possible, but it is likely that only widespread international concern is likely to make the Japanese government reconsider the whole project.

1. Muzik, K. 1983. *Japan Times* (March 2nd 1983), 11
2. Muzik, K. 1983. *Kogai Kenkyu* (November 1983), 13(4), 68-70 [in Japanese].
3. Muzik, K. 1984. *Kogai Kenkyu* (Summer 1984), 14(1), 70-72 [in Japanese].
4. Wells, S. 1984. *IUCN Bull.* 15(4-6), 56-57 [and see p. 9]
5. *Help save the Shiraho coral reef of Ishigaki Island, Okinawa, Japan.* Chikyo no Tomo (Friends of the Earth Japan), Tokyo, 8pp [obtainable from address below].

For further information contact:

Katherine Muzik, Okinawa Expo Aquarium, Motobu-cho Okinawa-ken, 905-03 Japan.
Maggie Suzuki, FRIENDS OF THE EARTH JAPAN, Chikyu-no-Tomo, 1-51-8 Yoyogi, Shibuya-ku, Tokyo 151, Japan. [tel.(03) 379-5966].

THE COMPLEAT REEF ENCOUNTER – No. 3

(Yes, I know, we didn't number the first two, but we now think we can maintain a regular series, especially if readers would like to contribute possible items too. In retrospect, No. 1 *appeared in* RE1, p.15, *and* No.2 *in* RE2, p.11.*)*

A consulting firm was called in to survey the reef for the government. They were protected in their efforts by the coast guard (four boats) and policemen (in rubber boats and helicopters). I wasn't there, but from eye-witnesses, it was reminiscent of wartime in the Pacific, only worse. The surveyors return in October. They are being paid 7 million yen (about US$30,000).

The latest news is that the leader of the fishermen's protest group, aged over 60, has been arrested. He has been in jail since September 12, along with two others. One was badly beaten up by police (kicked, apparently, and has a fractured skull).

Extract from letter sent to *RE* by Katherine Muzik, Sep. 23, 1984. See article on this page.

ORNAMENTAL STONY CORALS FOR CITES?

Sue Wells

A proposal may go forward to add some of the stony corals involved in the ornamental coral trade to Appendix II of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora). Appendix II listing means that commercial trade in the taxon between countries party to CITES is prohibited unless a valid export permit from the country of origin accompanies the specimen.

Commercial trade is therefore not restricted, but the permits provide a means of monitoring it. Furthermore, since importing countries are expected to inspect these permits, illegal consignments from the Philippines and other countries which ban coral exports would stand a better chance of being detected. Clearly, CITES listing does not necessarily improve enforcement of existing national legislation but it would increase public awareness of the problem and draw the attention of importing countries to the need for monitoring and controls.

A draft proposal has been drawn up and the governments of the U.K., Australia, U.S.A. and Philippines are being approached. It is hoped that one of these countries will be willing to take the proposal to the 5th Meeting of the CITES Parties in Buenos Aires in April 1985. The following genera have been put forward for listing: *Seriatopora, Pocillopora, Stylophora, Acropora, Pavona, Fungia, Halomitra, Polyphyllia, Favia, Platygyra, Merulina, Lobophyllia, Pectinia, Euphyllia, Millepora, Heliopora,* and *Tubipora.*

The proposal gives a brief summary of national and international trade, the threat to reefs from trade and the current protection status of corals around the world.

Copies of the draft CITES proposal on coral trading may be obtained from: Sue Wells, Conservation Monitoring Centre, 219c Huntingdon Road, Cambridge CB3 0DL, U.K. Comments on this draft and additional background information would be very welcome.

Ornamental stony corals for CITES?

The excreta that cannot be protected

A BIZARRE debate about whether coral is an endangered species is threatening the world's coral reefs. Switzerland (and Liechtenstein) say their trade in coral cannot be controlled under the Convention on International Trade in Endangered Species. The rest of the world says it can.

There is a large and growing world trade in coral reef which is threatening the many creatures that live on the reefs as well as the coral polyps themselves. But the Swiss Federal Veterinary Office has written to the Convention's secretariat. It argues that coral is not an animal, or a skeleton (which is covered by the treaty), but, rather, excreta. It said: "The fact that the coral skeletons are excreta . . . excludes . . . these skeletons as parts of the animals. The fact that the skeletons are structures essential for the survivial of the polyp colonies does not change this situation."

Conservationists say that the convention signatories already control the trade in other excreta, such as ambergris (from sperm whales) and musk from deer. □

New Scientist 7 November 1985

TOWARDS A GLOBAL POLICY FOR REEF CONSERVATION

Few international conservation agreements have so far listed coral reefs. The World Heritage Convention lists Aldabra, The Great Barrier Reef, Sierra Nevada de Santa Marta (Colombia, including Tayrona National Park and its coral reefs), and Sanganeb Marine National Park (Sudan) has been nominated. A few MAB biosphere reserves have reefs: Puerto Galera (Philippines), Atoll de Taiaro (French Polynesia), Malindi-Watamu and Kiunga reserves (Kenya), Everglades National Park, including Fort Jefferson NM (USA), Virgin Islands National Park (USA), and the Hawaii Islands Biosphere Reserve.

Awareness and interest in reefs has grown enormously since the advent of scuba diving and considerable conservation initiatives have been taken by individual states like those above. Stoddart [1] has emphasised the world-wide threat to coral reefs and called for action by the international community as a whole to support and strengthen these unilateral initiatives. But there is at present no obvious international structure whereby states might come together to establish a global policy, so how might this be achieved?

Wetlands

Sue Wells [2] has recently argued that the potential framework for doing this already exists in the form of the Ramsar Convention, which can reasonably be argued as covering coral reefs under its heading of "wetlands". She writes:

> At the Groningen meeting of the Ramsar Convention, IWRB's Geoffrey Matthews discussed the reasons why wetlands, of all habitats, warrant an international convention and these reasons apply to coral reefs as much as to other categories of wetlands. The IUCN Conservation Monitoring Centre in Cambridge is currently compiling a Directory of Coral Reefs of International Importance. The Neotropical volume will appear early next year [1985] and will provide a basis for the selection of reefs in particular need of conservation in that region.

Unfortunately, only a few of the countries which are party to the Ramsar Convention have jurisdiction over coral reefs, while other countries with outstanding reefs, like the Philippines and Indonesia are outside the Convention. Sue Wells believes however that the Ramsar Convention would have to develop links with competent authorities on reefs and a much broader technical capacity than it has at present. Presumably, too, many more states would need to join the convention. The Tahiti meeting should provide a suitable forum for pursuing these goals.

1. Stoddart, D.R., 1982. *Proc. 4th. int. Coral Reef Symp.* 1, 33-36.
2. Wells, S., 1984. *IUCN Bull.* 15(4-6). 56-57.

For further information contact: Sue Wells, International Union for Conservation of Nature and Natural Resources (IUCN), Conservation Monitoring Centre, 219(c) Huntingdon Road, Cambridge CB3 0DL. UK (tel. (0223) 277314 and 277420)

* Update *

Sue Wells has also now sent us an update on progress on the Coral Reef Directory:

> The latest on the Coral Reef Directory is that we now have first drafts of all three volumes (Caribbean and Eastern Pacific; Indian Ocean; Central and Western Pacific). The UNEP Regional Seas Programme contributed financially to their production and will be using them as background documentation for a meeting they are convening during the Tahiti Congress. On my return I will be getting them ready for final publication. We are still missing information for many areas, particularly in the Pacific. I would be very happy to hear from anyone who would like to review, comment on or provide material for any of the country sections. Each volume runs to about 500 pages so it is impossible to provide copies of the whole directory. We *hope* to start publishing it in early 1986; however, my sanity and the IUCN publications department may decree otherwise!

REEF SCIENCE IN AUSTRALIA: AN IDIOSYNCRATIC STEP BEHIND, OR A VISIONARY STEP AHEAD?

Peter J. Smith has submitted an interesting item [1] on the nature of coral reef science in Australia by Richard Bradbury, with a reply by Laurie Hammond [2]. Bradbury enquires whether Australian coral reef science is representative of international trends in the subject. Using a statistical analysis of various recent publications, he infers that, as a whole, Australian reef science is indeed in step with international trends, but that his key sampling of Australian reef activity, at a recent symposium at Townsville [3] was itself out of step. Bradbury goes on to argue that there are "influential groups" in Australia "whose perceptions and outlook . . . seem to be significantly at variance with international trends"

and this small elite controls the "key scientific media such as conferences and perhaps journals", so giving Australian marine science a misleadingly parochial appearance.

Hammond replied by saying that the symposium concerned [3] really had reflected a properly thought out grant-giving policy, not parochial idiosyncracy, and that as "Australia was in this respect one step *ahead* of international trends, as highlighted at the Townsville symposium, it was [ergo!] out of step".

1 Baker, J.T. *et al.* (eds). 1983. *Proceedings of the inaugural Great Barrier Reef Conference.* James Cook University Press, Townsville.
2 Bradbury, R.H., 1984. *Search* 15(1-2) (Feb 1984), 15-16.
3 Hammond, L.S., 1984. *Search* 15(1-2) (Feb 1984), 16.

ACRS GLEANINGS

At the risk of their being rather dated "news", the following items, extracted from the *Newsletter of the Australian Coral Reef Society* (Mid-Year 1984), should be of general interest.

Professor Dorothy Hill, F.R.S., probably best known outside Australia for her outstanding Treatises (1956 and 1981) and numerous other works on Palaeozoic corals, has for some time been working on a history of the Great Barrier Reef Committee, the parent body of ACRS, now incorporated within ACRS.

Isobel Bennett was awarded an Honorary Life Membership of ACRS. (Her book, *The Great Barrier Reef* (1971) is still one of the best popular reef accounts. Peter Sale, ACRS President, wrote:

> As well as contributing greatly towards the GBRC/ACRS over the years, Isobel Bennett has been instrumental in stimulating an interest in marine science in a large proportion of those actively engaged in science on the reef today.

The same *Newsletter* also contained ACRS's submissions on zoning of the Far Northern Sector of the Great Barrier Reef Marine Park for GBRMPA, and on the proposal for a Ningaloo Marine Park, together with a proposal from the Marine and Coastal Protection Groups for a National Marine Park at Shark Bay.

The Ningaloo Marine Park will be the first Marine Park in Western Australia. ACRS welcomed the original proposal as an "excellent and timely document" and made a series of recommendations intended to strengthen its effectiveness. The Shark Bay proposal would (presumably) make this area the second Marine Park in Western Australia. The proposal stresses Shark Bay's very large population of dugongs, its largest extent of seagrass beds in the world, the famous stromatolite growths of Hamelin Pool-Faure Sill, and the Human-Dolphin relationship at Monkey-Mia. (Can someone enlighten us on the last of these, before the humourists move in?)

EXPEDITION REPORT: TAHITI

[f° 149]

"*cheveux d'huile de cocos* (6). *Les femmes sont jolies et, ce qui fait l'éloge du climat, de la nourriture et des eaux, femmes, hommes, vieillards même, tous ont les plus belles dents du monde* (7). *Ce peuple ne respire que le repos et les plaisirs des sens. Vénus est la déesse que l'on y sert. La douceur du climat, la beauté du paisage, la fertilité du sol partout arrosé de rivières et de cascades, la pureté de l'air que n'infeste pas même cette légion d'insectes, le fléau des pays chauds, tout inspire la volupté. Aussi l'ai-je nommé la Nouvelle-Cythère et l'égide de Minerve y est aussi nécessaire que dans l'ancienne pour défendre contre l'influence et du climat et des mœurs de la nation.*"

Bougainville in Taillemite 1977 [see p. 32 for details]

"to deſire what they moſt wiſh for. The men, who were more plain, or rather more free, ſoon explained their meaning very clearly. They preſſed us to chooſe a woman, and to come on ſhore with her; and their geſtures, which were nothing leſs than equivocal, denoted in what manner we ſhould form an acquaintance with her. It was very difficult, amidſt ſuch a ſight, to keep at their work four hundred young French ſailors, who had ſeen no women for ſix months. In ſpite of all our precautions, a young girl came on board, and placed herſelf upon the quarter-deck, near one of the hatch-ways, which was open, in order to give air to thoſe who were heaving at the capſtern below it. The girl careleſsly dropt a cloth, which covered her, and appeared to the eyes of all beholders, ſuch as Venus ſhewed herſelf to the Phrygian ſhepherd, having, indeed, the celeſtial form of that goddeſs. Both ſailors and ſoldiers endeavoured to come to the hatch-way; and the capſtern was never hove with more alacrity than on this occaſion.

At laſt our cares ſucceeded in keeping theſe bewitched fellows in order, though it was no leſs difficult to keep the command of ourſelves. One ſingle Frenchman, who was my cook, having found means to eſcape againſt my orders, ſoon returned more dead than alive. He had hardly ſet his feet on ſhore, with the fair whom he had choſen, when he was immediately ſurrounded by a croud of Indians, who undreſſed him from head to feet. He thought he was utterly loſt, not knowing where the exclamations of thoſe people would end, who were tumultuouſly examining every part of his body. After having conſidered him well, they returned him his clothes, put into his pockets whatever they had taken out of them, and brought the girl to him, deſiring him to content thoſe deſires which had brought him on ſhore with her. All their perſuaſive arguments had no effect; they were obliged to bring the poor cook on board, who told me, that I might reprimand him as much as I pleaſed, but that I could never frighten him ſo much, as he had juſt now been frightened on ſhore."

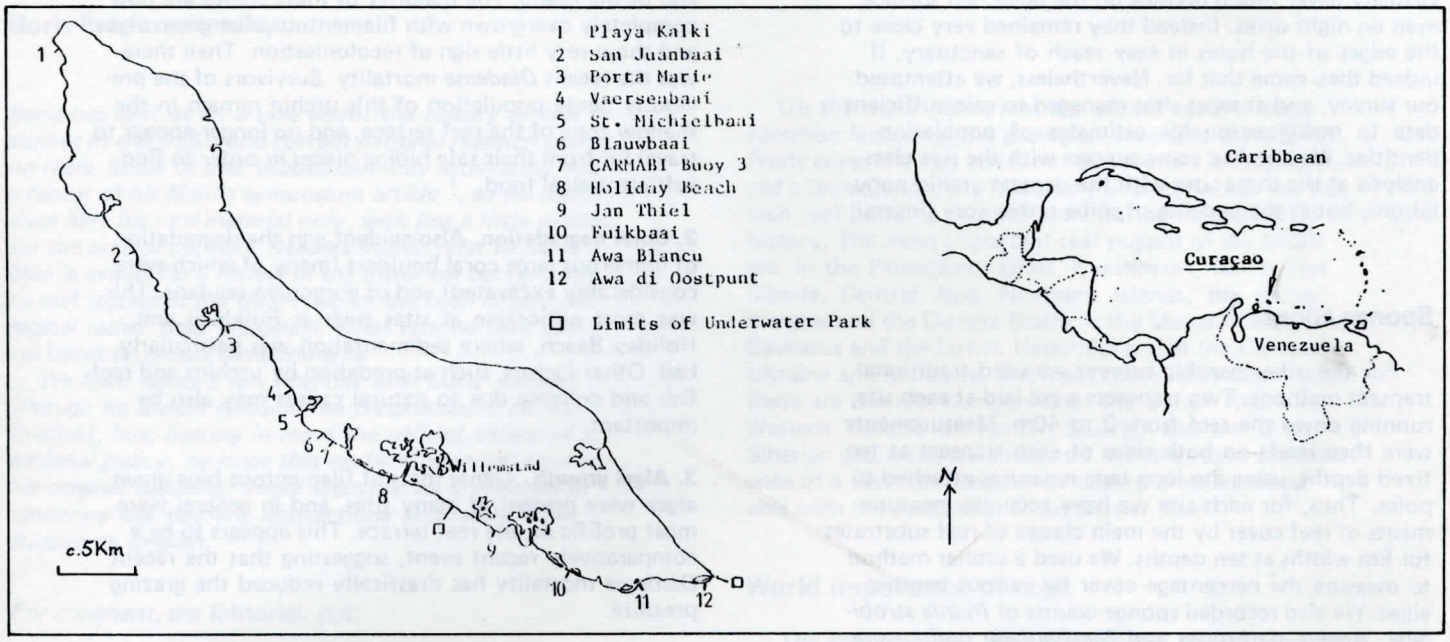
Extract, pp. 218–219, from Bougainville, L. de, 1772. A voyage round the world performed by order of His Most Christian Majesty, in the years 1766, 1767, 1768, and 1769 (translated by J.R. Forster). London: J. Nourse and T. Davies.

for the scientific significance of these encounters see p.15

EXPEDITION REPORT

The Curaçao '84 Expedition

Jon Moore, Carol Robinson & Susan Clark



On the 7th July 1984, after 12 months preparation, fourteen divers from the Newcastle University Sub-Aqua Club left Heathrow Airport for a six week expedition in order to carry out biological surveys of a Caribbean coral reef. Of the fourteen, half were marine biologists, both research staff and undergraduates; the remainder being undergraduates in a variety of subjects ranging from agricultural economics to marine engineering. This provided a collection of skills and characters that never failed to keep expedition life interesting!

Diadema depletion

Initial planning of a scientific programme began in August-September 1983 when we investigated the feasibility of three areas of research, all to be carried out in the Caribbean: 1. the mass mortality of the long-spined sea urchin *Diadema antillarum*; 2. The progression and possible cause of White Band Disease; 3. The extensive bleaching and coral mortality on the Pacific side of Panamà. Then, in reply to one of our letters, we were informed by Tom van't Hof (Project Manager of the Curaçao Underwater Park) that the *Diadema* population on Curacao had been substantially depleted, that pre-mortality data were available, and that any help we could give to survey the post-mortality population would be appreciated. Our decision was then made, and this became our main project.

Reefwatch

We were then asked by the Tropical Marine Research Unit (TMRU) at York University to carry out a "REEF-WATCH" survey, and by research staff at the Caribbean Marine Biological Institute (CARMABI) on Curaçao to perform surveys of reef algae and three species of sponge. In addition, a recent spearfishing ban (July 1983) gave us the opportunity to collect data on the most commonly speared fish within the underwater park e.g. Groupers and Snappers, and to compare these results with data collected from the same sites before the spear-fishing ban. We also extended our "REEFWATCH" survey to give more detail of substrate cover and densities of herbivorous fish. We hoped that we could integrate our findings from all the projects to obtain a better understanding of the possible impact of the *Diadema* mortality on the reef system.

After collaboration with the staff at the Caribbean Marine Biological Institute (CARMABI) we decided on twelve sites that covered the entire length of the south coast, and quickly set about testing our methods. These were simple and as objective as possible, as was necessary with a party of divers of mixed abilities, most of whom had never seen a coral reef before.

Irritating urchins

Our study of the remaining *Diadema antillarum* population very quickly underwent drastic change, when we realized that numbers were considerably less than we expected, and more importantly, were virtually confined to the shallow reef terrace (0-4m). This not only meant that our survey methods had to change, but also that measurement of densities and size classes was going to be made considerably more difficult. This was largely due to two factors. Firstly, the nature of the reef terrace, which in addition to containing large

irregular boulders of dead coral is subject to considerable wave action and swell. Secondly, the extremely irritating habit of the urchins to live deep within holes and crevices in these large coral boulders, making it almost impossible to get the prongs of the calipers across their test. We therefore decided to carry out our urchin surveys during the late afternoon and/or early evening which is when Ogden and others [1] have reported that the urchins move out of their holes at the beginning of their nocturnal feeding cycle. Admittedly there are no seagrass beds in Curaçao for the animals to graze on, but we were assured that the nocturnal feeding pattern still occurred. This however, is not the case now and we virtually never found urchins on the open reef surface, even on night dives. Instead they remained very close to the edges of the holes in easy reach of sanctuary, if indeed they came that far. Nevertheless, we attempted our survey, and at most sites managed to gain sufficient data to make reasonable estimates of population densities. We also had some success with the size class analysis at the three sites with the densest urchin populations, but at the expense of some rather sore fingers!

Sponge counts

For the other benthic surveys we used traditional transect methods. Two transects were laid at each site, running down the reef from 3 to 40m. Measurements were then made on both sides of each transect at ten fixed depths, using 2m long tape measures attached to poles. Thus, for each site we have accurate measurements of reef cover by the main classes of reef substrates for 8m widths at ten depths. We used a similar method to measure the percentage cover by various benthic algae. We also recorded sponge counts of *Ircinia strobilana, Agelus clathrodes* and *Neofibularia nolitangere* against depth.

Diplomatic diving

The fish survey (as part of "REEFWATCH") included twenty three easily recognisable species and groups. In addition we added Damsels and Parrot fish to give an indication of the densities of herbivorous fish; and Groupers and Snappers to determine whether densities of these fish had increased since the spearfishing ban. Divers simply estimated abundances of these fish whilst swimming within the transect area. This soon became a very popular project, and required diplomatic apportioning of the scheduled dives.

Overall impressions

What then can be said of the reef around Curaçao, that hasn't been said already by Dr. Rolf Bak, the Underwater Park literature [2] or the numerous papers that have come out of CARMABI since 1950? We are still in the process of analyzing our own results, and are not yet ready for publication. All the same, in the four weeks we were there, we gained an overall impression of reef instability in the form of:

1. Mortality. Most noticeable was the mortality of numerous stands of *Acropora cervicornis* at the eastern end of the island. The majority of these stands are now completely overgrown with filamentous blue-green algae, and show very little sign of recolonisation. Then there was the recent *Diadema* mortality. Survivors of the previously dense population of this urchin remain in the shallow zone of the reef terrace, and no longer appear to travel far from their safe hiding places in order to find sufficient algal food.

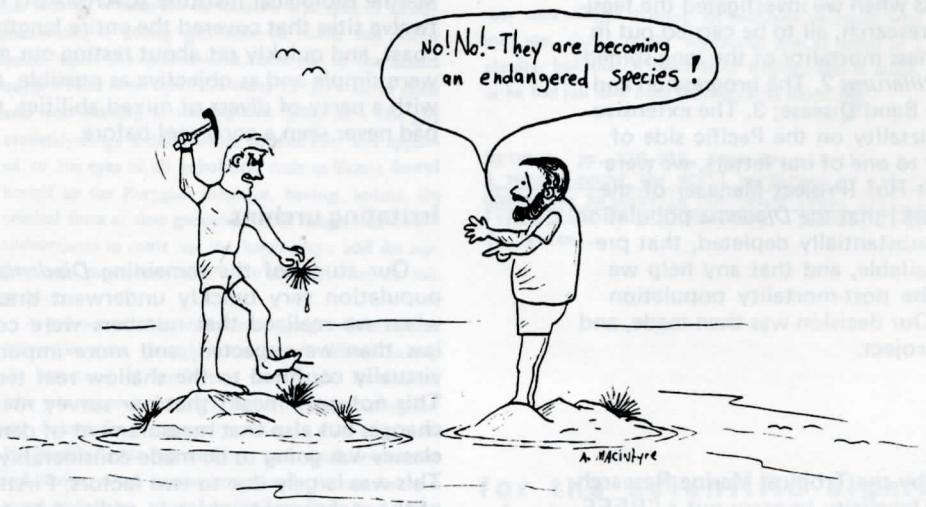
2. Coral degradation. Also evident was the degradation of numerous large coral boulders (many of which were considerably excavated) and of gorgonian sea-fans. This was most noticeable at sites such as Fuikbaai and Holiday Beach, where sedimentation was particularly bad. Other factors, such as predation by urchins and reef fish and collapse due to natural causes may also be important.

3. Algal growth. Dense mats of filamentous blue-green algae were present at many sites, and in general were most prolific on the reef terrace. This appears to be a comparatively recent event, suggesting that the recent *Diadema* mortality has drastically reduced the grazing pressure.

The question that may now be posed is — will the recent mortality of *Diadema antillarum* and *Acropora cervicornis* allow the algae to get a stranglehold on the reef (with all the possible ramifications of that situation); or will the urchin populations (or some other algal grazer) recover and restore the reef to its previous state?

1 Ogden, J.C. *et al.* 1973. *Science, N.Y.* 182, 715-716
2 van't Hof, T. 1984. *Reef Encounter* (June 1984) 2, 10-11

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



DIADEMA DILEMMA

FEATURES

On the national programme of reef studies in the USSR

Boris Preobrazhensky

Boris has sent us an article about the history of reef studies in the USSR and current national research policy on reefs. Some of this, though certainly interesting, was a repeat of his Manila symposium article [1], so we reproduce here his new material only, with just a little overlap for the sake of context. Readers should refer to Boris' Manila article for a review of the historical background to reef studies in the USSR, which has been largely geological rather than biological. What follows here concentrates on recent developments.

We have taken a few liberties with Boris' English (though he should certainly be congratulated on his English), but, bearing in mind the official nature of a national policy, we hope that we have remained true to his original meaning. There seems to be a problem in rendering the relevant abstractions accurately from Russian to English.

For comment, see **Editorial.** p.4

Reefs in the USSR

It is well known that the Soviet Union does not have reefs within its territorial and commercial waters. Even the colonial corals which occur in the rocky sublittoral areas washed by the scant warm currents in the Far East are zoological rarities.

On the other hand, reef complexes are the most common feature of the geological record in the USSR. Reefs cover the vast terrain of our country almost without a break, and there is scarcely a region which has not seen reef-building at some time during its geological history. The most important reef regions of the USSR are, in the Palaeozoic: Urals, Kazakhstan, North-East Siberia, Central Asia, Northern Islands, the Baltic margins and the Donetz Basin; in the Mesozoic: Crimea, Caucasus and the Uzbek Republic; and in the Cainozoic, Ukraine and Moldavia. The most thoroughly explored of these are the reef complexes of the Uzbek Republic, Western Yacutia (in eastern Siberia) and the Urals. Siberian geologists have recently demonstrated the existence of a vast reef complex in eastern Siberia comparable with the Australian Great Barrier Reef.

World importance of reefs

The study of reefs, both ancient and Recent, attracts specialists in many countries primarily on account of the association of reefs with oil and natural gas reservoirs. Reef-associated oil fields are well known in Canada, USA, Mexico and the USSR. There is also a large oil potential associated with Recent reefs of the islands of the Caribbean, Viet-Nam, Philippines, Polynesia and many other areas. Many ore bodies, such as those of

•GEOLOGISTS DESCENDING THE RIVER ISSETZ

manganese, phosphates, bauxites and polymetallic [sic] are also associated with reef complexes.

The great influence of Recent reef systems on the general regulation of world ocean productivity should also be mentioned, for coral seas occupy more than 117 million Km^2. Coral reefs are amongst the most productive ecosystems and are a potential prototype for marine farming. Reefs are also a peculiar example of natural coastal protection and could therefore form the basis of artificial modelling of protection systems. Reefs are one of the most sensitive indicators of sea level changes. In all, it is clear that the study of reefs is one of the most fundamental problems of the natural sciences. In the scientific world as a whole, however, there has been a distinct discordance in the methods and approaches used in the ecological interpretation of living and ancient reefs.

Geological reef problems

Fossil reef complexes present the most difficult problems in geological theory, practical identification, stratigraphical correlation and geological mapping. This is illustrated by reference to the phase-like nature of reef building through geological time, as seen in the reefs of the USSR, since this kind of periodicity is an important factor in geological correlation and mapping, palaeogeographical reconstruction and in the assessment of mineral resources associated with reef complexes. More knowledge is needed of reef biocoenoses, geomorphology, topography, facies, sedimentology and ecological succession. A general ecological and biocenological [sic] concept of reefs is needed.

Location of reef studies

By the 1950s and 1960s the development of biostratigraphical work in the USSR had generated a huge collective of palaeontologists and palaeo-ecologists working on reef-building organisms throughout the Phanerozoic. More recently however, attention has waned and many working teams have been discontinued. Certain biological and geological institutes have been able to continue nevertheless, especially at the Institute of Geology and Geophysics, Siberian Branch of the Academy of Sciences of the USSR, in the Geological Survey of the Uzbek Repbulic and in the Institute of Geology and Chemistry of the Academy of the Estonian Republic. A notable large group of researchers has been brought together in the Far-eastern Scientific Centre to work on complex problems in terms of ecostratigraphic theory, using underwater techniques in multidisciplinary studies of Recent coral reefs. Two important trends are the growth of palaeobiology and the increase in our understanding of the influence of environmental factors on morphology of reef organisms. Of great importance is the use of a Systems approach to develop generalisations about reef facies.

The collective reef encounter

From this it has become evident that a complex geological and biological programme was needed for the study of reef ecosystems. The following problems have been identified as priorities for study:

1. multidisciplinary comparative analysis of ancient and Recent reefs.
2. loss of information in the course of fossilization.
3. elucidation of ancient reef topography by inference of palaeoenvironments, etc., from reef organisms.
4. ecological and geomorphological modelling of reef communities.
5. use of ecological, morphological and lithological factors in a dynamic way to classify reefs.
6. use of lithologically homogeneous sequences of thick reef bodies to determine evolutionary phases of reef community evolution.
7. establishing ecological succession and cycles in ancient reef communities.
8. criteria for using reefs for palaeogeographical analysis and reconstruction.
9. transportation, distribution and accumulation of reef material, and the manner of its eventual fossilization.
10. lithostratigraphy of reefs and their associated strata.
11. geochemistry of reef complexes.
12. cavity formation and infilling.
13. tectonic and lithogenetic controls on initiation and development of Recent and ancient reefs.
14. mineralization of reefs.

The last two problems are particularly intriguing.

In accordance with the USSR Reef Programme, reef complexes of all ages including the Recent will be studied. For fossil reefs, the best sections in the USSR will be used, especially those of the Baltic district, Siberian platform, Uzbek Republic, Kazakhstan, Caucasus, Crimea and the Omulevsky Mountains (Kolyma River Basin). For living reefs, the most accessible reefs of the present seas will be used, through expeditions from the Far-eastern Scientific Centre. The basis throughout will be multidisciplinary comparative analysis.

National Structure

It was with the general theoretical significance of reef studies for biology, ecology, geomorphology and geology in mind, that a National Reef Committee of the USSR was established under the Committee for the Problems of the World Oceans in the Academy of Sciences of the USSR. The programme and the Working Group were ratified by the Conference held on April 29th 1982 in Moscow University, attended by 20 participants from 7 institutes. A year later, the First Conference of the Working Group of the Reef Committee was also held in Moscow and problems of organization were discussed. The National Reef Programme was eventually adopted in Dushanbe by the Fifth National Symposium on Fossil Corals and Reefs, in June 1983.

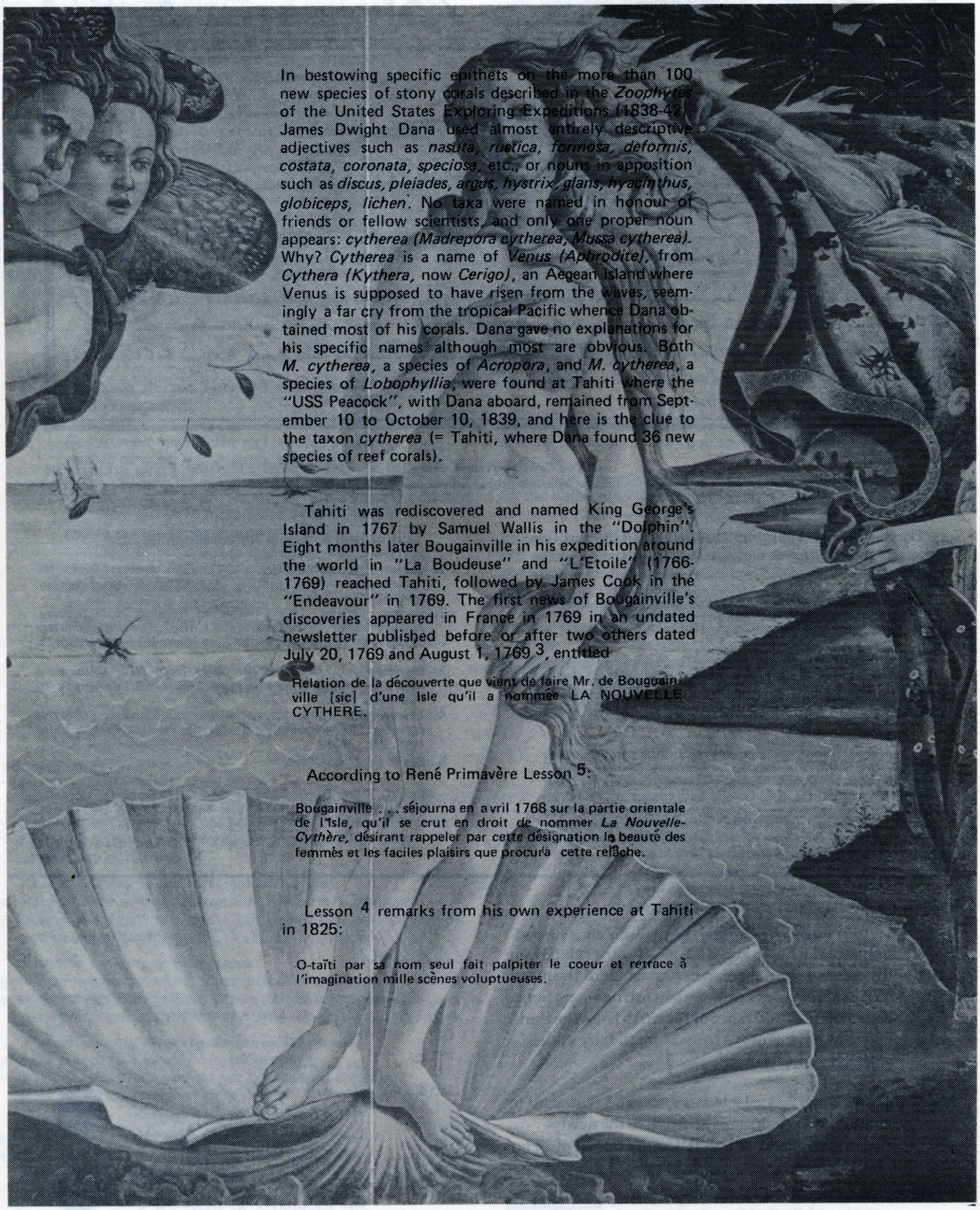
1. Preobrazhensky, B.V., 1982. *in* E.D. Gomez *et al. The reef and man. Proceedings of the Fourth International Coral Reef Symposium.* Quezon City, Philippines. Vol.1, pp. 21-24.

B.V. Preobrazhensky, Institute of Marine Biology, Far East Science Centre, Academy of Sciences of the USSR, Vladivostok 690022, USSR.

Рис. 17. Атолл, в лагуне которого сохранился остров (почти-атолл).

A note on *Madrepora cytherea* Dana 1846

John Wells



In bestowing specific epithets on the more than 100 new species of stony corals described in the *Zoophytes* of the United States Exploring Expeditions (1838-42), James Dwight Dana used almost entirely descriptive adjectives such as *nasuta, rustica, formosa, deformis, costata, coronata, speciosa*, etc., or nouns in apposition such as *discus, pleiades, argus, hystrix, glans, hyacinthus, globiceps, lichen*. No taxa were named in honour of friends or fellow scientists, and only one proper noun appears: *cytherea (Madrepora cytherea, Mussa cytherea)*. Why? *Cytherea* is a name of *Venus (Aphrodite)*, from *Cythera (Kythera*, now *Cerigo)*, an Aegean island where Venus is supposed to have risen from the waves, seemingly a far cry from the tropical Pacific whence Dana obtained most of his corals. Dana gave no explanations for his specific names although most are obvious. Both *M. cytherea*, a species of *Acropora*, and *M. cytherea*, a species of *Lobophyllia*, were found at Tahiti where the "USS Peacock", with Dana aboard, remained from September 10 to October 10, 1839, and here is the clue to the taxon *cytherea* (= Tahiti, where Dana found 36 new species of reef corals).

Tahiti was rediscovered and named King George's Island in 1767 by Samuel Wallis in the "Dolphin". Eight months later Bougainville in his expedition around the world in "La Boudeuse" and "L'Etoile" (1766-1769) reached Tahiti, followed by James Cook in the "Endeavour" in 1769. The first news of Bougainville's discoveries appeared in France in 1769 in an undated newsletter published before or after two others dated July 20, 1769 and August 1, 1769 [3], entitled

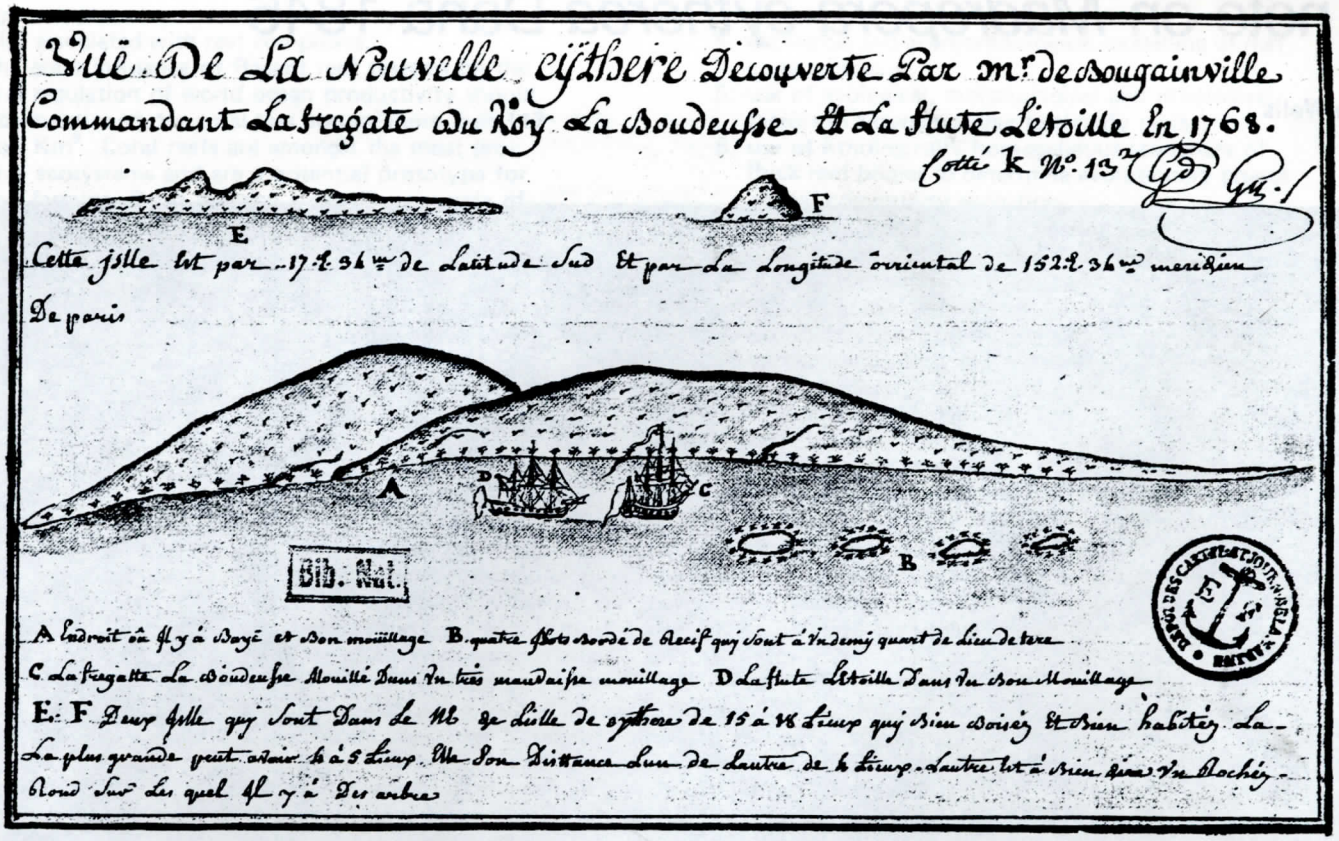
> Relation de la découverte que vient de faire Mr. de Bougainville [sic] d'une Isle qu'il a nommée LA NOUVELLE CYTHERE.

According to René Primavère Lesson [5]:

> Bougainville . . . séjourna en avril 1768 sur la partie orientale de l'Isle, qu'il se crut en droit de nommer *La Nouvelle-Cythère*, désirant rappeler par cette désignation la beauté des femmes et les faciles plaisirs que procura cette relâche.

Lesson [4] remarks from his own experience at Tahiti in 1825:

> O-taïti par sa nom seul fait palpiter le coeur et retrace à l'imagination mille scènes voluptueuses.



102. Vue de la Nouvelle-Cythère, un des rares dessins exécutés probablement par Romainville, pendant le voyage, à nous être parvenus. (SH, portefeuille 176, div. 7, pièce 1D.)

Darwin visited Tahiti in November, 1835, and like others before him, was entranced by the beauty of the island:

> Everything which former navigators have written is true: 'A new Cytharaea [sic] has risen from the ocean'.[2]

Lord George Campbell, son of the 8th Duke of Argyll, sublieutenant on the "Challenger", enjoyed the stop at Tahiti in September, 1875:

> . . . far-famed Tahiti, the gem, the queen, the paradise of the Pacific, the South Sea Capua, La Nouvelle Cythère (only a few of the names that have been lavished on it) . . . but Tahiti disappointing? No, I must half change my mind already; for that same evening on which we arrived there was a sunset, and bathed in its light — one of the most lovely effects of sunset-colouring on land and sea I have ever seen — I shall ever remember Tahiti.[1]

Tahiti is still a magnet for corallophiles.

1. Campbell, Lord George. 1877. *Log letters from the "Challenger".* 3rd Edition. Macmillan & Co, London. (p.419).
2. Darwin, Charles. 1836. [letter to Henslow from Sydney, January 1836] . *in* F. Darwin (ed.). 1887. *The life and letters of Charles Darwin . . .* 3 vols. John Murray, London. (Vol. 1, p.264).
3. Hammond, L. Davis. 1970. *News from New Cythera: a report of Bougainville's voyage 1766-1769.* University of Minnesota Press.
4. Lesson, R.P. 1829. *Voyage autour du Monde . . . sur la corvette "La Coquille".* 2 vols. P. Pourrat Frères, Paris. (Vol. 2, p. 238);
5. Same. (Vol. 2, p.241).

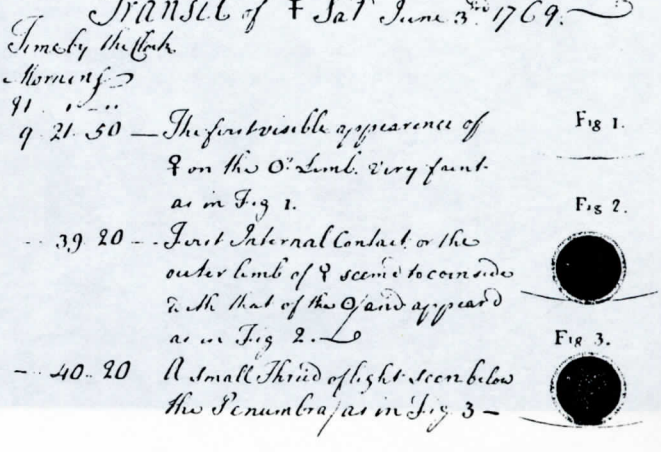
John W. Wells, Department of Geological Sciences, Cornell University, Snee Hall, Ithaca, N.Y. 14853, U.S.A.

(see also p.10)

This time, it's the planet

> In 1761 and again in 1769 the planet Venus passed between the Earth and the Sun. By observing from different parts of the Earth the passage of the planet Venus across the disk of the sun astronomers hoped to calculate the distance of the earth from the Sun and thus have a means to measure the size of the solar system.
>
> James Cook was selected in 1768 as a Lieutenant to command a scientific expedition to the newly-discovered island of Tahiti where a transit of Venus observation was to be made in 1769.

Extract (p.2) from Greenhill, B., 1970, James Cook; the opening of the Pacific. London: H.M.S.O.



Mark O'Connor's REEF POETRY

As promised, here are two poems and an excerpt from a longer poem by the poet Mark O'Connor, based on his experience of the reef environment.

Each poem we've chosen echoes major current biological themes which preoccupy reef workers, and their different style also shows something of the poet's range. *The Beginning* [2] captures in humorous vein reef workers' own long standing fascination with reef diversity. *The Spanish Dancer* [4] (actually an excerpt from *The Diver* [5]) celebrates the beauty of reef life and alludes to behaviour and adaptation. *The Fat Man* [3] uses an incongruous tourist as a pivot for what we would regard more prosaically as the conservation issue.

We first came across Mark O'Connor's poetry in GBRMPA's newsletter *Reeflections* [1] in which he also wrote about the challenge of expressing the reef world in poetry. He has written numerous other articles on this and the broader context of language and writing, and has published many of his poems, not all of which are about reefs, separately. Two of his poetry collections are now out of print, but there are two others about to appear [6]. All the poems here are printed by kind permission of Mark O'Connor himself; copyright Mark O'Connor.

1 *Reeflections* 11,2-4
2 ibid., p.3
3 *Wildlife Australia* (Winter 1984), p.19
4 ibid., p.20
5 *The Fiesta of Men* (see below)
6 The poetry collections published by Mark O'Connor are as follows:
1976 *Reef Poems*. University of Queensland Press (out of print)
1980 *The Eating Tree*. Angus & Robertson (out of print)
1983 *The Fiesta of Men*. Hale & Iremonger.
1985 *Selected Poems*. Hale & Iremonger (in press)
In preparation: *The Great Barrier Reef: poetry in pictures.*

The Beginning

God himself having that day planted a garden
walked through it at evening and knew
that Eden was not nearly complex enough.
And he said: "Let species swarm like solutes in a colloid.
Let there be ten thousand species of plankton
and to eat them one thousand zooplankton.
Let there be ten phyla of siphoning animals, and
one thousand finned vertebrate types, from
white-tipped reef shark to long-beaked coralfish,
and to each his proper niche,
and — no Raphael, I'm not quite finished yet —
you can add seals and sea-turtles and cone-shell and
penguins
(if they care) and all the good seabirds your team can
devise
oh yes, and I nearly forgot it, I want a special place
for the crabs! And now for parasites to hold
the whole system in check, let . . ."

So for five and a half days God labored
and on the seventh he donned mask and snorkel
and a pair of bright yellow flippers.
And, later, the host all peered wistfully down
through the high safety fence around Heaven
and saw God with his favorites finning slowly over the
coral
in the eternal shape of a grey nurse shark,
and they saw that it was very good indeed.

The fat man

Poor fat man in the tourist shop
you do well to complain of the service, you might well expect
for so many dollars a day, more than this island can offer
by the way of luxury.

I could tell you to take off your garish shirt,
which you wear without conviction, and to take pleasure
outside in the wheeling of terns, but your senses are mortgaged
and your time is money.

I wonder how many such places
your business has wrecked, thousands of creatures
your estate deals have killed, or more cruelly left homeless.
No wonder you do not feel at home.

Though you hope here to find spiritual peace
you are bound to a wheel of invisible gold
that your tears, which you do not cry, cannot dissolve,
your Albatross can never drop free.

I understand this damnation of yours,
you know you should be having a good trip
and you half feel you could *be having a good trip*
but it is still a bad trip for you.

The Spanish Dancer

A Spanish Dancer undulates by
in its world of similitudes
God's blue-and-orange jester.
Darkened
he shudders under the manta's black triangle.
It takes forever to pass,
self-possessed and harmlessly vast;
lingers, then flicks
like an energetic shroud,
Dracula's cape to an earthworm.
He gasps to the top and breathes,
dives while his nerve still holds.
. . . In the surface-spray
he has lost where those colours were.
He trails on forlorn
over death's bright pasture, a museum
of glittering indo-and exo-skeletons.
The moray jaws threaten his hand;
the lion-fish raises its spines. When he lingers,
the viridian anemone
clamps on his finger with sticky friendliness
inwardly tensing; its tendrils
thicken around him
dark, intuitive, suffuse.

UPWELLINGS

Scientific blinkers and the Great Barrier Reef

Ann M. Cameron

Major disagreement exists once again over the Crown-of-Thorns starfish about the extent to which it damages reefs. In Australia, opinion has recently divided into two camps, one represented in effect by Peter F. Sale, president of the Australian Coral Reef Society, who maintains that the current reports of extensive new destruction in the Great Barrier Reef region have been exaggerated (as in the past). The opposite view is led by Ann Cameron of the University of Queensland who claims that the starfish populations have been under-surveyed and therefore under-estimated. Information provided jointly for the Australian media by AIMS and GBRMPA however have contained statements which can be interpreted as tacit admissions that starfish damage is indeed more extensive than was first realized . . .

Despite warnings by R. Endean and others that outbreaks of crown of thorns starfish (*Acanthaster planci*) pose a serious threat to the ecosystem known as the Great Barrier Reef, the Chairman of GBRMPA, Mr. Graeme Kelleher, has maintained that his organisation has the situation under surveillance and that all is well.

This opinion apparently is held by the majority of ACRS Councillors under the leadership of President, Dr. Peter F. Sale, University of Sydney, although three Councillors (Dr. J. Jell, University of Queensland, Brisbane, Dr. P. Doherty, Griffith University, Brisbane and Dr. D. Williams, Australian Institute of Marine Science, Townsville) refused to sign a letter to this effect, written by Dr. Sale and the rest of the Council, and headlined in the Brisbane Courier Mail newspaper of 7th May 1984 as — Starfish risk on Barrier Reef 'small'.

However, in a media release of 27th August, 1984, Dr. John Bunt, Director of the Australian Institute of Marine Science made the following points (my emphasis added).

1. Of 30 mid-shelf reefs surveyed recently (Drs. Doherty and Williams were members of this trip), good coral cover was found on *five* "but the *majority* of the remaining reefs have exceptionally low living coral cover with *extensive dead* coral. Death appears to have occurred during the *last few years*".
2. Of the nine outer reefs surveyed, some had relatively high living coral cover and feeding crown of thorns starfish were apparent only in deeper water; on others, feeding aggregations were apparent in *shallow water or* live coral was less than *5 per cent* and few crown of thorns were present.

These points confirm the information previously supplied to GBRMPA that most of the reefs of the central third of the G.B.R. have been badly damaged by *A. planci*. However, despite the news-worthiness of Dr. Bunt's statements in the media release this "news" has not received international publicity. Since Australian scientists patently cannot cope with the responsibility of Great Barrier Reef Conservation, despite the efforts of some, and now Dr. Bunt, northern hemisphere workers must demand the conservation of this part of the world's heritage.

Ann M. Cameron, University of Queensland, Department of Zoology, St. Lucia, Brisbane, Australia, 4067.

—*Starfish risk on Barrier Reef 'small'*—

We consider that the Great Barrier Reef Marine Park Authority has to date operated very responsibly with respect to the Crown-of-Thorns "problem". It has managed an extensive monitoring program and has released the results of that program to public view.

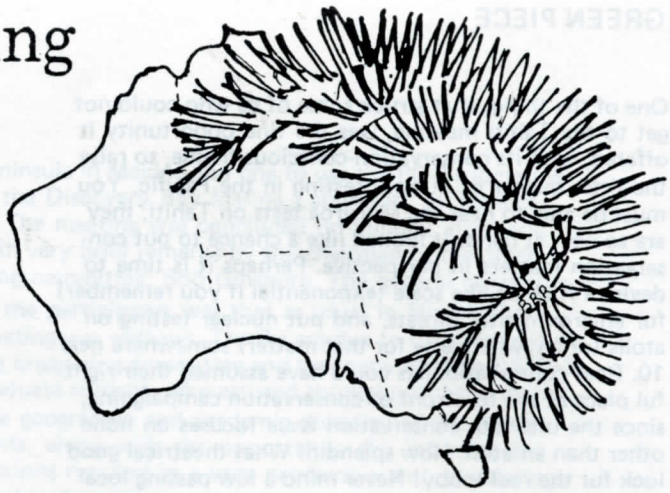
It has made great efforts to inform the media, and through them, the public, concerning the true state of affairs. Based on scientific data available, the most appropriate summary statement is that there are at present dense aggregations (40 or more starfish) on 14 percent of the reefs, but few starfish on the remaining area of the Great Barrier Reef.

Like members of the Marine Park Authority, we recognise that the population dynamics of the starfish are not fully known, and we advocate an increased research effort.

We believe that research directed at the Crown-of-Thorns starfish must be well designed, and competently carried out. It would be most unfortunate if the current "crisis" atmosphere resulted in massive amounts of research funds being poured into poorly designed, or impractical projects, simply because they dealt with the starfish. — Peter F. Sale, president, Australian Coral Reef Society, and Associate Professor of Biology, University of Sydney — signing on behalf of the following: Dr J.E.N. Veron, vice-president, ACRS, Australian Institute of Marine Science, Townsville; Dr P.G. Flood, secretary, ACRS, Department of Geology, University of New England, Armidale; Mr M. Chalupka, treasurer, ACRS, Marine Unit, Queensland National Parks and Wildlife Service, Brisbane; Associate Professor H. Heatwole, past president, ACRS, Department of Zoology, University of New England, Armidale; Dr J.T. Baker, council member, ACRS, director, Sir George Fisher Centre for Tropical Biology, James Cook University, Townsville; Dr M.A. Borowitzka, council member, ACRS, Department of Environmental and Life Sciences, Murdoch University, Perth; Dr D.J.G. Griffin, council member, ACRS, director, Australian Museum, Sydney; Dr P. Hutchings, council member, ACRS, senior research scientist, Australian Museum, Sydney; Dr B.C. Russell, council member, ACRS, Curator of Fishes, Northern Territory Museum, Darwin; Dr P. Saenger, council member, ACRS, scientific chairman, Australian Underwater Federation, Brisbane; Dr C.C. Wallace, council member, ACRS, Department of Marine Biology, James Cook University, Townsville.

Brisbane Courier Mail, May 7th 1984

Starfish claims misleading



The figure of 14 percent refers to a survey which included only about 20 percent of the reefs of the Great Barrier Reef. The critical issue is not how many reefs are under attack at a particular time during one survey, but how many reefs have been devastated during this latest wave of outbreaks.

This figure is obviously more than 14 percent because starfish are not found in dense numbers on reefs, the corals of which they have killed already.

Brisbane Courier Mail, May 16th 1984

It is unscientific to assert that "there is no evidence whatever that man's activities" have played a role in A.planci outbreaks. The relevant experiments for testing this hypothesis have simply not been done.

However, it is noteworthy that the classic cases of echinoderms known to have outbroken (and destroyed their ecosystems in the process) are those of herbivorous sea urchins in kelp beds. These outbreaks followed upon human interference, namely, removal of the predators of the sea urchins.

Extract from letter from Ann Cameron to Australian Coral Reef Society, June 5th 1984

At Council's March meeting we discussed the treatment by the media of the new outbreaks of Acanthaster on the Great Barrier Reef. All Council members agreed that the coverage was unnecessarily alarmist, and that there was a danger of it leading to unjustified "corrective" action being taken. The great majority of Councillors were able to sign a letter which was sent to a number of newspapers in an attempt to air a more balanced view. Most papers published our letter in whole or in part, and it led to a number of enquiries by the press. I believe it served its purpose, although I recognise that the "Crown-of-Thorns problem" will continue to elicit strong, and sometimes divergent opinions among reef scientists.

Peter F. Sale

August 1, 1984 Extract from Presidential Address to the Australian Coral Reef Society in the Annual Report, 1984

Receipt of Annual Report 1984

It was resolved (Chaloupka/Wallace) that the Annual Report be received.

There was brief discussion of the possibility of amending the Annual Report. Ann Cameron proposed (seconded Peter James) that paragraph 7 of the Presidential Address in the 1984 Annual Report of the Australian Coral Reef Society Incorporating the Great Barrier Reef Committee be deleted and replaced by the information that "most of the reefs on the Central Section of the Great Barrier Reef have been severely damaged by Acanthaster planci predation, this information being available from the Great Barrier Reef Marine Park Authority".

(Australian Coral Reef Society Sep 26th 1985

This motion was defeated

It was resolved (Mather/Bennett) that the Annual Report be adopted.

Cairns coral killed

The crown of thorns starfish has killed most of the Great Barrier Reef coral off Cairns, the director of the Australian Institute of Marine Science, Dr John Bunt, said today.

By NEIL DOORLEY

Brisbane Telegraph, September 3rd 1984

GREEN PIECE

One of the things that struck some of us who could not get to the Tahiti meeting, was the fine opportunity it offered, with its conservation-conscious theme, to raise the little matter of nuclear testing in the Pacific. You must be able to hear the Mururoa tests on Tahiti, they are so near at hand. It looked like a chance to put conservation matters in perspective. Perhaps it is time to devise a Richter-like scale (exponential if you remember) for environmental threats, and put nuclear testing on atolls (or anywhere else for that matter) somewhere near 10. Reef conservationists could have assumed their rightful place at the forefront of conservation campaigning, since the ultimate conservation issue focuses on none other than an atoll. How splendid! What theatrical good luck for the reef lobby! Never mind a few passing local misdemeanors committed in ignorance by local fishermen trying to make ends meet, or even the trading of corals for aquarists' amusement. This time, it was The Big One — or should have been.

In the event, the big opportunity was met by a small murmur — mostly a letter initiated not a million miles from here, and sent to the Meeting. It seemed to have caused more embarrassment than anything else. Well of course, the subject was a hot one. The host nation to the conference was the same as the one responsible for the tests. Perhaps happy, sun-loving reef-explorers did not fancy limpet mines on their Scuba tanks, for in the event, it was Greenpeace's ill-fated *Rainbow Warrior* which made the point and upstaged us all.

So, back to problems of reef monitoring, and zoning. There might still be time for someone to add *Homo sapiens* to the little red book of endangered species, or perhaps, more appropriately, to add The Whole Earth as a threatened environment.

'The Red Sea deserves better than to be polluted by technologically advanced louts.'

"I visited the little-known Gebel Elba massif, where the Palearctic and Ethiopian biological regions meet. This is now being sympathetically considered for national park status by the Governments of Egypt and Sudan.

Professor Mohammad Kassas of Cairo, currently President of the International Union for the Conservation of Nature, was a pioneer in studying the ecology of Gebel Elba. He has termed it a "mist oasis" since the Red Sea surface, here at its broadest and warmest and coming within 15 km of the mountains, brings enough moisture to support an exceptional number of trees, even up the high ravines and gulleys. These in turn attract such tropical birds as the Shining Sunbird, African Silverbill, Namaqua Dove and Rosy-patched shrike, while seasonally troops of Ostriches come by, as long as they are protected.

A national park here could embrace not only the mountains and wadis but some deserts and semi-deserts of special interest, and a coast rich in coral reefs and islands and in marine life. The right kind of facilities for the right kind of appreciative visitors could help the social and economic advancement of this hitherto neglected African shore. As it is still so largely unexplored the first step should be a comprehensive scientific survey, led by the Egyptians but with Sudanese and international participation. Plans for this are being actively studied now."

Max Nicholson was director general of the Nature Conservancy until 1966 and is President of the Royal Society for the Protection of Birds. (Guardian June 14th 1984)

LETTERS

Chappel Cottage
Coppet Hill
Goodrich
Herefordshire
19 July 1984

Dear Editor,

A recent paper in Coral Reefs was on mollusc ecology in one of the very few reef systems of the Indian Ocean which are totally unspoiled. As it involved the collection of several thousand specimens, its author felt it worth mentioning that after identification and measurement, molluscs were returned alive. An expert* referee deleted those last four words , and added in the margin "Sweet! but who gives a damn".

Those who have seen enough reefs know that we should give a damn, but from the coincidence of this event with a circular from our Chairman saying that funds are needed from other sources, I have discovered a potential money spinner. I propose that the Society should instigate an annual award for the reef-scientist-who-should-know-better. (An improved acronym is welcomed.) Candidates should be told of their candidature well in advance, however, so that they would have time to buy off their nomination with a donation to the Society. Thus a scientist whose clumsiness with rotenone wiped out an entire school of fish would have an honorable chance to keep his secret, while one whose past career involved flogging reef organisms to tourists could even be worth an annual consideration. A modest sum may even be elicited from the mollusc expert who is not adverse to reef stripping.

A trophy must be prepared for those who decline to part with some of their grant or travel budget (or valuable mollusc collection) for this purpose, and it must have a suitable conservation theme. A briefcase made from leatherback turtle hide has been suggested, as has a sperm whale tooth (mounted on Phillippine hardwood of course). Best might be an *Acropora* skelton from Murorua lagoon, set on a plinth so that its warm glow is fully appreciated by the recipient.

Yours sincerely,
Charles Sheppard

* "ex" is an unknown quantity; "spurt" is a drip under pressure.

For the acronym, how about: REEF SCientist WHO SHould KNOw Better = REEFSCHWOSHKNOB?

Dear Sir,

Seeing the account of the Leopard Reef Expedition by Frances Green in the 1st edition of Reef Encounter [RE1, Oct. 1983] prompted me to dig through the files and check our holdings. Unlike the photographs which have appeared and then disappeared, some of the corals which were collected are safely in store at Sunderland Museum and available for examination.

Several members of the expedition including Jon Moore visited Sunderland Museum in 1979 to examine the corals previously collected by the 1973 and 1975 Joint Services Expedition to Chagos prior to their visit later in the year to Kenya.

John Bainbridge, Keeper of Natural Sciences, Sunderland Museum, Borough Road, Sunderland.

MEETING REPORTS

ADVANCES IN REEF SCIENCE
Miami, USA, October 26-28, 1984

Elizabeth H. Gladfelter

The Atlantic Reef Committee (ARC) and the International Society for Reef Studies (ISRS) held a joint meeting "Advances in Reef Science", hosted by the Rosentiel School of Marine and Atmospheric Sciences of the University of Miami on 26-28 October 1984. The meeting was sponsored by the ARC of RSMAS, the U.S. Geological Survey and the Marine Sanctuaries Division of the U.S. NOAA program. About 150 participants form 15 different countries represented many fields of reef sciences including geology, biology, geography, physical oceanography, chemistry, reef management and mapping. There were four plenary talks (each given before a related scheduled talk session), 69 short research presentations, and a poster session. A very attractive feature of this meeting was the virtual absence of concurrent sessions (only one part of one afternoon) giving all the participants the option to attend all the sessions. This resulted in an active interchange of ideas about how reefs function from a variety of different viewpoints.

The plenary talks were given by members of the sponsoring groups. Alina Szmant-Froelich of RSMAS presented the results of her extensive research program which has led to a classification of reproductive strategies of Caribbean reef corals. "Coral reef management in the National Marine Sanctuary Program" was presented by the program director Nancy Foster. Gene Shinn of USGS presented an integrated picture of the geologic history of the Florida reef tract. Finally, Peter Glynn of RSMAS generated discussion about "Coral reef and recent disturbances: cause for concern?" by presenting some results of an interdisciplinary investigation of the recent bleaching of zooxanthella-bearing organisms and subsequent effects. Scheduled talks included sessions on coral reproduction and growth, community ecology, reef management and mapping, history of reef development, corals under stress, coral metabolism and coral growth.

Ample opportunity for informal discussion was provided by the various social activities associated with the meeting. In addition to two evening beer parties in the RSMAS dining area, there was a Friday evening picnic at Crandon Park on nearby Key Biscayne. Friday afternoon the RSMAS research vessel *Calanus* was available for tours. Finally the ISRS held their annual general meeting on Saturday afternoon.

Before and after the meeting, there were field trips to local Florida reefs. After the meeting a few lucky participants went on longer field excursions, one to Yucatan Peninsula in Mexico and one to use the PC-8 submarine at the Discovery Bay Marine Laboratory in Jamaica.

The meeting was concluded on Sunday afternoon with very brief remarks by the chairman of the organizing committee, Bob Ginsburg. The general consensus of the participants was that as usual in Miami, the meeting was well run. Thanks are due to the members of the organizing committee and the many capable RSMAS graduate students who assisted throughout the activities. The geographic and academic diversity of the participants, along with the opportunity for informal discussions resulted in a very productive and stimulating coral reef meeting.

Elizabeth H. Gladfelter, West Indies Laboratory, Fairleigh Dickinson University, Teague Bay, Christiansted, St. Croix, U.S. Virgin Islands, 00820

THE 289th MEETING OF THE CHALLENGER SOCIETY
Edinburgh, December 13th, 1984

Steve Howard

This one-day meeting held jointly with the Scottish Marine Biological Association (SMBA) and the Tropical Marine Research Unit (TMRU), York University, presented the results of surveys which investigated marine habitats and the flora and fauna of the coast of Oman.

The SMBA survey was conducted in North Oman in the vicinity of an oil refinery at Mina al Fahal and concentrated on describing the hydrography of the area, intertidal and shallow sublittoral benthos, and obtaining data on the primary production of inshore phytoplankton. The dominating hydrographical feature was the presence of upwelling along a considerable portion of the coastline, reducing surface water temperatures to as low as 18°C in some areas during September-October. Daily surface temperature variations of 5°C were recorded, thought to be due in part to oscillating opposing currents giving rise to movement of pockets of cool water. High nutrient levels were associated with the upwelling, permitting locally high primary productivity.

TMRU surveyed South Oman limestone and metamorphic rock coastal habitats and detailed presentations were given of algae, molluscs, crustaceans and inshore fish. Coral growth in the North and South Oman was minimal, probably as a result of upwelling of cool water along the coast. Changes in monsoon had a marked effect on intertidal algae when offshore winds resulted in drying out of the splash zone, reducing algal cover from 100% to zero within two weeks. Several new species of algae were recorded by Sue Hiscock (TMRU), one of which was the dominant alga at one study site, and in general, taxa recorded were more typical of temperate latitudes. John Taylor (British Museum) discussed the distribution of molluscs and offered a fascinating theory concerning the maintenance of Miocene relict flora and fauna along the Oman coastline, maintained within the tropics, by the upwelling waters.

Steve Howard, Oil Pollution Research Unit, Orielton Field Centre, Pembroke, Dyfed SA71 5EZ, UK

BOOKS

Oligocene Reef Tract Development, Southwestern Puerto Rico

by S.H. Frost, J.L. Harbout, D.K. Beach, M.J. Realini and P.M. Harris

Sedimenta IX, University of Miami, 1983, 144 pp. 54 figs. $11 plus $1.75 postage.

This modest paper-backed book is one of the most significant documents on Caribbean Tertiary stratigraphy. It offers both detailed measured sections and carefully thought-out reef models. These studies are the product of successful collaboration between academia, Northern Illinois University and the University of Puerto Rico, and industry represented by Gulf Oil and Exploration Company and Phillips Petroleum Company. This book was prepared for a field trip sponsored by the SEPM Cenozoic Reef Research Group in 1983. But it is more than a field guide; it is also a source of stratigraphic, paleoecologic and sedimentologic data and interpretations.

Oligocene seaward reefs and associated deposits are fully developed and exposed along the Penuelas-Guanica tract in the Ponce-Juana Diaz Embayment on the southwest coast of Puerto Rico. This Late Oligocene carbonate shelf was controlled by the interaction of tectonics, eustasy, water mass characteristics, and the constructional potential of the shelf and reef communities. During the Early to Late Miocene, deep shelf chalks buried the older shallow sediments. Diagenetic and weathering effects have been minimal, so that these strata provide a reliable model for the exploration of similar Tertiary reefs elsewhere.

Three detailed measured sections document the Upper Oligocene to Lower Miocene stratigraphy of Puerto Rico. The sections can be found by following the topographic maps provided and the outcrop photos. The distribution of coral and large foraminiferan genera are related to the facies and environmental interpretations. Four cycles of reef growth are recorded in the Upper Oligocene strata. Each cycle begins with deep fore-reef sediments with *Lepidocyclina* and interbedded reef rubble. The fore-reef corals are *Hydnophora, Leptoseris, Fungophyllia,* and *Porites.* The reef frame community consists of *Porites, Goniopora, Antiguastrea, Montastrea, Diploastrea,* and *Astreopora.* Each cycle ends with wave destruction of the reef and deposition of rubble and sand.

Porosity is not well developed in these reefal and associated facies. The authors suggest three factors that may have prevented fresh water from the island entering these strata. The downdip flow of water may have been captured by underlying sandstones. The overlying strata are poorly permeable deep water lime muds. And the reef sediments were relatively muddy and cemented early. Original pores are filled with lime mud and some early marine cement in the form of peloidal mud and isopachous rims of bladed calcite. Fine-grained equant spar fills the remaining voids. As is the case with most carbonate reservoirs other processes operate in the subsurface environment to create and preserve porosity for hydrocarbons.

On the north side of Puerto Rico a key reference section near Lares documents the Late Oligocene through Early Miocene carbonate shelf history. Here the island slope was much more gentle than on the southwest side. Consequently a broad, low relief marine platform developed upon an alluvial plain. The range of depositional environments spans from the fresh to brackish swamp, estuarine and mangrove swamp, beach, carbonate sand shoals to inshore coral thickets and coppices. An inshore fringing reef tract developed upslope from the small patch reefs. Branching *Porites* dominate these small biostromes, and massive *Porites, Colpophyllia* and *Favites* are the frame builders of the fringing reef. The two reef models from Lares and Penuelas-Guanica represent the full range of environments, fossil assemblages and lithic associations for mid-Tertiary reefs in the Caribbean and western Tethys.

The Holocene reefs and associated sediments on the southern insular shelf of Puerto Rico provide an excellent analogue for the Oligocene reefs. One day of the trip was spent examining the sediments on the shelf. The sediments are controlled by proximity to shore and physical energy conditions. Nearshore sediment tracts are dominated by terrigenous sand and mud. Progressively offshore carbonate mud and sand become more important. Near-shore patch reefs in turbid water are characterized by massive head corals of *Montastrea, Diploria, Meandrina, Porites,* and *Siderastrea.* This community also forms fringing reefs around islands on the middle-shelf platform. An older submerged barrier reef system is preserved at the edge of the shelf. It was established during a lower sea level and has been drowned by the most recent rise. Now it is encrusted by coralline algae and sparse sponges and gorgonians.

The final part of Sedimenta IX is a road log to the localities. It seemingly is easy to follow the road systems in Puerto Rico because most instructions refer to the road numbers. However the fine maps show the sites of the measured sections clearly. Throughout the book numerous photographs document outcrops, corals, foraminifers, and petrologic features. With these photos one would be able to make preliminary identifications of many of the species. However, some of the photos are not very clear; either they are overexposed or have low contrast. Aside from that, the book is well done and both the authors and the publisher have made an important contribution to the knowledge of Tertiary reefs. This study will be useful to both the explorationist and the theoretician.

Bob Scott, Amoco Production Company, 4502 East 41st Street, Post Office Box 3385, Tulsa, Oklahoma 74102, USA.

The larvae of Indo-Pacific coral reef fishes

by J.M. Leis and D.S. Rennis

New South Wales University Press & University of Hawaii Press, 1983. 269pp. A$23.95.

Not surprisingly, rather few ichthyologists have given their attention to the problems of larval fish taxonomy. The taxonomy of adult specimens is difficult and intriguing enough to satisfy most workers, who are outnumbered many times over by the 20,000 or more extant species of bony fishes; and anyhow, the classification of adults had to reach a fair level of refinement before the problems posed by larval forms could be tackled in any realistic way.

The difficulties facing systematists of fish larvae are great. In many species larval forms have particular and peculiar characteristics associated with their nursery

environments and ways of life, both of which often differ markedly from those of the adults. On the other hand, obedient to the dictates of von Baer's law, early larval stages of different species can be remarkably similar and show few obvious features linking them with their later forms. These in turn are often bizarrely unlike juvenile and adult members of their species. Essentially the problem is to develop an identification system which is both discriminating at the larval level but congruent with systems of classification and identification worked out for adults. A tough proposition, but one which has, over the last twenty years or so, attracted an increasing number of students.

Leis and Rennis must be welcomed to that group, the more so since their efforts are concentrated on the fishes of the Indo-Pacific area, a region rich in species and one with an abundance of taxonomic problems at all stages of a fish's life history. Here, as elsewhere, the work of ecologists is being hampered by lack of knowledge regarding life-histories, an especially acute problem for those studying the complexities of coral reef biology.

The authors of this book, aim, through a Gestalt or 'integrated image' approach, to guide would-be identifiers to at least a family level identity for their specimens. Some 49 families of coral reef teleosts are dealt with. That number was, to a large extent, determined by the availability of material which, by various means, could be identified with certainty as far as the family level (and not infrequently to generic level as well).

The greater part of the book deals with perciform fishes, but the myctophiforms, ophidiiforms, beryciforms, gasterosteiforms, scorpaeniforms, gobiesociforms, pleuronectiforms and tetraodontiforms are also considered. Eels and dussumierine clupeoids, which are well handled in other works, are excluded, as are the syngnathids since these, even as larvae, can be identified on adult characters. Major works covering the larvae of groups omitted from the book are listed in an introductory chapter.

As a first step towards identification, two synoptic charts are provided. These are based on the integrated image principle, and employ a variety of morphological features, in particular anatomical characters visible in the near-transparent larvae. The aim of the charts is to limit the range of choice available to the user, and thus to lead more directly to the most probable family descriptions on which the final decision will be made.

The family descriptions are very comprehensive and detailed, and are backed by figures illustrating various stages in larval development. Each gives a brief account of adult forms, spawning habits, and details of development up to the time of hatching. This is followed by a long account of larval morphology (including morphometric features and pigmentation) and, probably most important of all, a section detailing various diagnostic characters to be used in discriminating between families whose larvae are similar. Finally, there is a table of meristic features for Indo-Pacific genera belonging to the family under consideration, and information on the range and nature of the material on which the larval descriptions are based.

The introductory chapters include clearly written notes on the terminology of developmental stages (very necessary to avoid losing one's bearings in a semantic jungle), collecting methods and techniques of identification. In addition there is an illustrated glossary of anatomical and morphological terms, and a longish section supplying background information on the different features used in the family descriptions and diagnoses.

In the final analysis, any review of this book should be based on the pragmatic criterion of its utility. That, unfortunately, I am unable to do, either on the basis of preserved or of field-caught specimens. Looked at in all other respects, however, it would seem to be a model of its kind. It certainly cannot fail to be an important stimulus to further research, and a source of encouragement to the faint-hearted who might otherwise have found excuses to busy themselves in other fields of systematic ichthyology.

Humphry Greenwood, Dept. of Zoology, British Museum (Natural History), Cromwell Road, London SW7 5BD, UK.

The Corals of Hong Kong

by P.J.B. Scott

Hong Kong University Press, 139 Pokfulam Road, Bethanie, Hong Kong. 112 pp. HK$85.00 (approx £7.35), ISBN 962-209-033-8.

This is a pleasant and informative paperback book with numerous colour illustrations. Although it is 'intended for the growing generation of swimmers, snorkellers and divers who escape from the horrors of the overcrowded city', it will also be of interest to more experienced reef and coral specialists because it contains an account of Hong Kong's coral environments, previously not widely known.

Sections 1 to 4 take up about a third of the book and provide background information about corals and their habitats around Hong Kong, together with mention of other organisms. The remaining, larger part of the book is devoted to Section 5, a taxonomic guide to Hong Kong corals. The coral biology is handled competently and clearly. I would quibble only with two little items which have an undue air of certainty about them: that 'ahermatypic corals had been pushed out by competition with the more successful hermatypic species', and that reef diversity is explained by 'relative environmental predictability and ecological stability'. These are only single points of view in areas fraught with different ideas, most of which are just as difficult to test. Much more too, is now known about coral reproduction, but I imagine this work has appeared too recently for Scott to have been able to incorporate it into her text.

The taxonomic section consists of short, clear descriptions pointing out salient identification features. Each species description occupies a page and is supported by one or two colour pictures of the living coral and a black-and-white picture of its dried skeleton. Some of the colour pictures are excellent, like that of *Cyathelia* but many of the black-and-whites are relatively uninformative (e.g. the poritids), giving only the most general notion of skeletal features. There is no identification key or grouping of the corals for identification purposes, so readers unfamiliar with corals will just have to flip the pages until they find something similar to what they wish to identify. Fortunately this should not be too difficult because the total coral fauna is small, with only one or two species within each genus (50 species in all, including azooxanthellates; 26 zooxanthellate genera and 4 azooxanthellate genera). One peculiarity in this taxonomic section which attracted my attention is that *Oulastrea* is mentioned under *Cyathelia* as being a member of the same family (Oculinidae), though Scott actually places *Oulastrea* itself in its customary, uncertain position in the Faviidae.

The book concludes with a glossary, reading list and index. Even though I would claim to be a specialist, I should certainly be pleased to have a copy of this book with me if I ever go to Hong Kong.

Brian R. Rosen, Department of Palaeontology, British Museum (Natural History), Cromwell Road, London SW7 5BD, U.K.

A Natural History of the Coral Reef

by Charles R.C. Sheppard

Blandford Press, Link House, West Street, Poole, Dorset, BH15 1LL, UK, 152pp. £9.95, US$16.95, Canada $21.95.*

In recent years, with the development of SCUBA and the ease of travel to formerly inaccessible places, coral reefs have provided a fertile and stimulating meeting ground for the natural historian and the marine scientist. This book is aimed at providing the non-scientist with a view of how a coral reef works, illustrated with photographs from coral reefs all over the world.

The problem facing anyone attempting to present a short integrated account of something as complex as a coral reef is organization. Instead of the usual approach of treating the major groups of organisms first and then moving to interactions, the author discusses only corals and plants as discrete groups. Other reef organisms are introduced under broad and overlapping headings dealing with habitats, diversity, interactions, diel cycles, reef caves, the deep reef and so on. This organization is at times awkward and disjointed. Interesting topics, such as the prevalence of gorgonians on Caribbean reefs compared to Pacific reefs are covered under inappropriate headings and the photographs are occasionally out of phase with the chapter headings and text.

While not a "coffee table book", a clear dependence is placed on photography to illustrate the text. Many of the color photographs are excellent, but the black and white photographs are of uneven quality apparently because of poor reproduction from color transparencies. Inexplicably, the poorer of these are given the most space (pages 30, 36, 49, 99, 102, 137, 140, 145) and their inclusion is not always explained in the text. The location or even the ocean is not mentioned in most of the photograph legends. This is an attempt at generality but is a serious annoyance to anyone with experience on coral reefs. There is only one reef diagram in the book, in spite of relatively long discussions of features such as geomorphology of coral reefs and atolls, zonation, lagoons, food chains and energy pyramids which would all benefit from diagrammatic treatment.

The author is a keen observer and has had wide experience on coral reefs. Some of his accounts, such as energy flow and recycling, are clear and stimulating. The corals, however, are given short shrift and major questions in coral biology and ecology such as calcification, and autotrophy vs. heterotrophy in corals, are not covered. The entire subject of man's impact on coral reefs is omitted save a brief and curious reference to coral islands under cultivation, perhaps referring specifically to the author's experience on Chagos. There are relatively few errors in the text.

While the book has several notable sections and attempts a novel organization, it will not prove to be very useful to the experienced coral reef naturalist. The beginner will have to supplement it with a more organized account of corals and coral reefs taken, for example, from any of several recent texts on marine ecology.

John C. Ogden, West Indies Laboratory, St. Croix, U.S. Virgin Islands.

*We are told that this book has now been remaindered in the UK and is priced at £3.99.

BOOKS, JOURNALS AND FILMS ENCOUNTERED

Coral Reef Researchers: Pacific
L.C. Eldredge (compiler and editor)
UNEP/Pacific Science Association/South Pacific Regional Environment Program/University of Guam. UNEP Regional Seas Directories and Bibliographies, FAO, Rome. 101pp. For supplements, see Pacific Science Association Coral Reef Newsletter (July 1984) 13, and (March 1985) 14.

A Geological Guide to the Northern Great Barrier Reef
Peter G. Flood
Australasian Sedimentologists Group Field Guide Series No. 1, 1984, ISBN 0 9592233 3 9, Australia $10.
Contact: The Business Manager, Geological Society of Australia, Challis House, 10 Martin Place, Sydney 2000, Australia.

Géologie et Paléoécologie des Recifs
edited by J. Geister and R. Herb
Geological Institute of the University of Bern, 1984, approx. 525pp, distributed within the regular exchange of publications of the Geological Institute of Bern. It may also be obtained however on an individual basis by exchanging publications, especially monographs and theses, which are lacking in the Geological or Mineralogical Institutes of the University of Bern.

This is a 'camera-ready', soft-bound volume providing a course on geological aspects of reefs through time, with 32 contributions (summaries of the original lectures) by 22 distinguished reef authors from Belgium, France, Germany, Italy and Switzerland. All the chapters are in French. It is generously illustrated with line diagrams and well-reproduced photos. There are 6 sections: Quaternary (including Recent) reefs, bioconstruction through the Phanerozoic, bioconstruction by organisms other than cnidarians, palaeobiology of particular reef-builders, diagenesis of reefal limestones, and economic aspects of reefs. The geographical range of reef examples is global, principally Europe, China, Caribbean, Australia, South Pacific and North Africa. The general emphasis is on organisms rather than sediments.

Contact: Geologisches Institut der Universität Bern, Baltzerstrasse, CH-3012 Bern, Switzerland.

Corals and Coral Reefs of the Galapagos Islands
P.W. Glynn and G.M. Wellington with an annotated list of the scleractinian corals of the Galapagos by J. W. Wells.
University of California Press, 1983.

A Coral Island
Harold Heatwole
Collins, Sydney, 1981. An account of One Tree Reef and One Tree Cay. Out of print, but available from author for Australia $10 (original price Australia$16.95)
Contact: Associate Professor H. Heatwole, Department of Zoology, University of New England, Armidale, NSW, 2351, Australia

Carbonate Buildups: A Core Workshop
P.M. Harris
Society of Economic Palaeontologists and Mineralogists, Core Workshop 4, 1-593, 1983 Dallas, April 16-17.
Contact: SEPM, P.O.Box 4756, Tulsa, OK 74159-0756, USA

Living Coral Reefs of the World
Dietrich Kuhlmann
Arco Publications, Inc., New York, 1985, 185pp., 151 colour photographs, 50 figures, $24.95. This is the official translation of the German version 'Das Lebende Riff', published by Verlag Edition Leipzig, German Democratic Republic and by Landbuch Verlag Hannover, West Germany.

Modern and Ancient Carbonate Environments of Jamaica
W.D. Liddell, S.L. Ohlhurst and A.G. Coates
Sedimenta X. The Comparative Sedimentology Laboratory, Division of Marine Geology and Geophysics, Rosenstiel School of Marine Atmospheric Science, University of Miami, 1984. [Many of the other publications of this lab. are also concerned with Recent and fossil reefs.]
Contact: Univeristy of Miami, Fisher Island Station, Miami Beach, Florida 33139-7392, U.S.A.

The Fishes of the Japanese Archipelago
edited by H. Masuda, K. Amaoka, C. Araga, T. Uyeno and T. Yoshino
Koeltz Scientific Books, West Germany, 1984, US$220
Available from Koeltz Scientific Books, P.O. Box 1380, D-6240 Koenigstein, West Germany.

Coral Reefs, Seagrass Beds and Mangroves: Their Interaction in the Coastal Zones of the Caribbean
Edited by John C. Ogden and Elizabeth H. Gladfelter
Unesco Reports in Marine Science 23, Paris, 1983, 133pp. free of charge. Report of a workshop held at West Indies Laboratory, St. Croix, U.S. Virgin Islands, May, 1982., sponsored by Unesco, 10CARIBE, West Indies Laboratory, Fairleigh Dickinson University.
Contact: Marine Information Centre, Division of Marine Sciences, United Nations Educational, Scientific and Cultural Organization, Place de Fontenoy, 75700 Paris, France.

Recent Advances in the Paleobiology and Geology of the Cnidaria
Edited by W.A. Oliver, W.J. Sando, S.D. Cairns, A.G. Coates, I.G. Macintyre, F.M. Bayer and J.E. Sorauf
Palaeontographica Americana No. 54 1984. US$80 plus $5.70 for domestic postage or $7.85 for foreign postage. Proceedings of the Fourth International Symposium on Fossil Cnidaria (and Archaeocyathids and Stromatoporoids), held in Washington, DC, U.S.A., 1983.
Contact: Palaeontological Research Institution, 1259 Trumansburg Road, Ithaca. N.Y. 14850-1398, U.S.A.

Scleractinia of Eastern Australia Part V Family Acroporidae
J.E.N. Veron and Carden C. Wallace
Australian Institute of Marine Science Monograph Series Volume 6., 1984, ISBN 0-7081-1923-9
Contact: Australian Institute of Marine Science, P.M.B. No.3, M.S.O. Townsville, Queensland 4810, Australia

Diving and Marine Biology: the Ecology of the Sublittoral
G.F. Warner
Cambridge University Press, 1984, 210pp. ISBN 0 521 25751 4 £22.50

Australia's Biosphere Reserves: Conserving Ecological Diversity
Australian National Commission for Unesco, 1983, Australia $4, (plus 80c postage in Australia or $1.50 overseas). This outlines the characteristics of biosphere reserves and describes the 12 areas from Australia which have been accepted into the international network.
Contact: Mail Order Sales, Australian Government Publishing Service, GPO Box 84, Canberra ACT 2601, Australia.

Comparing Coral Reef Survey Methods
Unesco Reports in Marine Science 21, Paris, 1984, 170pp., Free of charge. Report of a regional Unesco/UNEP Workshop, Phuket Marine Biological Centre, Thailand, 13-17 December 1982.
Contact: Marine Information Centre, Division of Marine Sciences, United Nations Educational, Scientific and Cultural Organization, Place de Fontenoy, 75700 Paris, France.

Indo-Malayan Zoology. An international journal devoted to the biology, ecology, systematics and biogeography of Indo-Malayan and Melanesian animals.
Edited by Jean Bouillon and Michel Jangoux.
A.A. Balkema Publishers. First issue was due early May 1984, and twice yearly thereafter, each issue about 160pp. Annual subscription Hfl 65, US$25.00, £15 p.a. There is a special price of Hfl 35, US$13.50, £8 for individuals whose institute or firm already subscribes.
Contact: A.A. Balkema Publishers, P.O. Box 1675, Rotterdam, Netherlands (Submit manuscripts in English or in French with English abstract, to editors at: Laboratoire de Zoologie, Universite Libre de Bruxelles 50, av. F.D. Roosevelt, B-1050, Brussels, Belgium.

Journal of Coastal Research. An International Forum for the Littoral Sciences
Editor-in-Chief Charles W. Finkl, Jnr., Consulting Editor Rhodes W. Fairbridge.
Coastal Education and Research Foundation (a non-profit corporation). First issue was due in January 1985, and quarterly thereafter. (We have no information about subscription costs.)
Contact: Editorial Office, Journal of Coastal Research, P.O. Box 2473, Colee Station, Ft. Lauderdale, FL 33303, U.S.A. [telephone (305) 523-6768]

REEF. Current Awareness Bulletin
Great Barrier Reef Marine Park Authority. Free mailing. This regular list of recent publications about the Great Barrier Reef aims to offer a complete coverage of the subject. Items appearing in this Bulletin are part of the REEF bibliographic database which has been developed by the Great Barrier Reef Marine Park Authority in conjunction with CSIRO (Australia) and is held on CSIRONET.
Contact: The Editor, REEF Current Awareness Bulletin, Great Barrier Reef Marine Park Authority, P.O. Box 1379, Townsville, QLD 4810, Australia [tel. (077) 71 2191]

Understanding Reefs. A Field Course on Film
Julia Hubbard
Six discrete units, 30 minutes each, U-Matic video/16mm colour cine film formats. The units are: I The Fore Reef, II The Reef Crest, III The Patch Reefs, IV The Inner World, V The Marginal Areas, VI The Influential Lagoon. Recorded on location in Florida for research classes at London University, but includes additional material from East Africa, Australia and the Arabian Gulf.
The primary aim of this film is to convey the intimate relationship between the ecosystem and the sediments with which it must contend. The films are concerned with the genesis and distribution of carbonate rocks in all their aspects. Main emphasis is placed on familiarising the viewer with the ecosystem and the handling of data pertaining to both living, recent and fossilised or ancient materials, with particular reference to those aspects which can not be gleaned from a study of the literature.
Contact: Julia Hubbard, King's College, London, Strand, London WC2R 2LS, UK. (telex: 24655 BLPES G; telephone: (01) 836 5454).

Coral Reefs

Volume 4 Number 1 1985

M. Sato
Morality and growth of juvenile coral *Pocillopora damicornis* (Linnaeus) 27

Coral Reefs (1983) 2: 173

International Society for Reef Studies

Reer Encounter

The first Society Newsletter is now published and we are eagerly awaiting any news and views, information on

With best wishes for Christmas and the Financial Year.
Yours sincerely,

P. Spender Davies
The Treasurer

NOW IT CAN BE TOLD!

But W. Kym Murphy, project manager of the site for Disney's WED Enterprises, and Ken Green, site project manager for United Technologies of Hartford, Conn., which is sponsoring what is to become the world's largest salt water aquarium tank, can make the blueprints and dusty terrain spring to life when they talk about it.

There will be a 260-seat restaurant where diners feeding on fish can look out onto underwater divers feeding the fish.

The sides of the tank, which is 200 feet in diameter, will be covered with a coral reef that Murphy says in being constructed in Chicago, "where all coral reefs come from." It is being made from molds of real coral.

Researchers will begin collecting

MICHAEL JANUSONIS

Providence Journal 27.10.1984

ANNOUNCEMENTS & PARTICIPATION

U.K.

REEFWATCH

REEFWATCH is a project whose purpose is to increase awareness of and to generate interest in the continuing health of coral reef environments. Through active participation in simple studies focussed on threats to reefs and to their key inhabitants, members of national dive clubs, schools and visiting diving expeditions acquire first hand knowledge of problems facing reefs and can become outspoken advocates supporting resource protection, management and *sustainable* exploitation. In addition, by participation in this project, both diving expeditions and individual divers and snorkellers can contribute to our knowledge of coral reefs and provide valuable information about the extent of local and global damage to these areas.

The REEFWATCH general form (reproduced here) is designed to focus attention on the type, location and aesthetics of the reef, its degree of coral and algal cover, and the extent of any environmental damage. These categories and the information required are explained more fully in the Explanatory Notes below. This general form provides the background for a series of complementary projects which examine certain conspicuous and ecologically important reef organisms in great detail.

EXPLANATORY NOTES

to accompany and explain the general Reefwatch (RW) form

[Points about which further notes could be made in the 'comment' section of the form are given in square brackets and smaller type.]

GENERAL REEF INFORMATION

YOUR REFERENCE NUMBER – please use a reference number to distinguish your different sites. The same reference number should be used on any supplementary notes or related RW project cards which are completed. Where there are several workers at one site, please ensure that all notes and project cards relating to this site have the same reference number as the form *irrespective* of investigator or date. If more than 30 days have elapsed a second RW form should be completed and given the *same* reference number.

REGION – the island, province, or nearest large town. This is important because there are often several places with the same name in a country.

LOCALITY – the nearest place name to be found on charts or maps. This may be a village, headland, small island, or complex of reefs.

REEF NAME – the name of the individual reef. If unnamed, please say so and take special care when indicating its position on the sketch maps below.

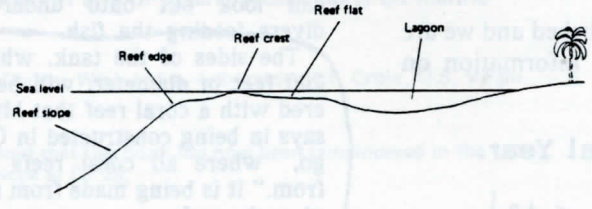
LATITUDE/LONGITUDE, MAP TYPE, NUMBER, PUBLISHER & SOURCE – please give the coordinates as accurately as possible. Admiralty Charts are often the best and most accessible maps of an area for diving purposes showing depths, general reef locations and some reef names. Please give the map details (including number) and your source. *(British Admiralty Charts can be obtained from: J. D. Potter Ltd., 145 The Minories, LONDON, EC3N 1NH, (01-709 9076), or from local ships chandlers – see Yellow Pages.)*

POSITION ACCURACY – even when a large-scale chart is available there may be uncertainty that the reef you are on is the one marked. Often the charts are based on surveys carried out many years ago without modern equipment – some reefs may have been omitted or misplaced, or the reef may have grown, have been eroded, or have changed shape. If you are unsure, please give your most likely position and then indicate how certain you are by circling the most appropriate phrase.

SKETCH GENERAL LOCATION OF REEF - this need not be especially detailed, but should show clearly the position of your reef with reference to one or more places (eg. a village, headland, or reef complex) which *are* marked on the chart. Please remember an approximate scale and mark in the direction of north.

SKETCH MAP OF REEF – this should be a rough sketch map of the actual reef. If it is offshore it will probably be less than one kilometre across and the whole reef can be sketched. If the reef runs along the coast then draw perhaps half a kilometre of coastline. The purpose is to show exactly where on the reef your dive site is (and the points at which you completed any RW study cards) since features such as the amount of coral or the numbers of sea-urchins, can vary greatly within areas of the same reef. Again, please note the approximate scale and the direction of north.

SKETCH PROFILE OF REEF OR SHORE – this is an outline side view (*elevation*) of the reef, going from shallow to deep water. It is usually fairly easy once you are in the water, particularly as there is no need to show great detail. A simplified example is given below and shows the main features of a coastal reef which are mentioned in these notes. (N8. The form of your reef may differ considerably from the diagram so be sure to draw what you see, not what you expect to see.) The reef profile may vary markedly even within a limited area. If this is the case, either draw only the profile from your point of entry into the water, or draw two or three extra profiles using dashed lines. Please mark on the profile any features of particular interest such as the position of major coral outcrops, sea urchin aggregations or extent of seagrass beds, etc. The zonation of dominant corals can also be indicated.



BOTTOM DEPTH – this is the depth at the seabed 100m seawards from the reef edge. It may be a direct observation on a shallow reef, or estimated from the charts if direct observation is impractical.

IS REEF TYPICAL? – indicate, if possible, whether the particular area of reef you have chosen to look at is typical of the surrounding reef or reefs within half a kilometre.

REEF ATTRACTIVENESS – your personal opinion is all that is required. [If the reef is exceptionally attractive, you may like to give reasons.]

DIVE SITE RATING – if you are a diver, please give your opinion here [and make notes on the features of general interest to the diver such as major wrecks and the site's accessibility, known currents, visibility, etc. In some cases, Reef Attractiveness and Dive Site Rating will be the same.]

CORAL COVER – an overall estimate by eye of the amount of *living* hard and soft coral within a 2m band along the reef edge or, where the reef is gently sloping and has no obvious edge, the depth at which coral cover appears to be highest (generally a depth between 1-5m). If possible, swim out from your point of entry until you are able to view a 20m length of reef. Consider first the overall cover of hard *and* soft coral together and then decide how much of this total is soft. Hard corals can be distinguished from soft corals by their stony skeletons and more solid appearance. The soft corals, as their name implies, are soft to the touch, generally flexible – moving to and fro with the waves – and often slimy. Do not be afraid to make very low or very high estimates if this is what you see. *Almost complete* – hard and soft coral covering all or almost all available space; *High* – extensive, but some bare patches; *Moderate* – about half of the reef covered; *Fairly low* – a fair amount of coral but most of the reef bare; *Very low* – only scattered corals.

CORAL VARIETY – a very approximate estimate of the different types of hard and soft corals which are present in the area. Look particularly at one or more points on the reef and, ignoring any differences in colour, pay attention to the detailed arrangement and structure of the polyps (the individual units which make up the coral colony). Coral identification is not easy and the RW form indicates the number of types that a non-specialist might be expected to distinguish for each category (*Exceptional; Good;* etc.). *(If you are interested to pursue this question in more detail see the Generic Guide to Common Corals by Charles Sheppard, available through TMRU (address below) at a cost of approx. £2.50 + p & p.)*

ALGAL GROWTH (between 1–3m depth) – this refers to the green/brown fuzzy lawn or film formed by filamentous algae, and coating rocky surfaces of the reef. Consider *'Extensive'* as more than one third of available rubble or rock surfaces excluding living coral. Thus, *Extensive long growth* – more than one third of rubble/rock surfaces covered with a thick dense lawn >3cm thick. *Extensive thin lawn* – length 3mm–1.5cm. *Extensive algal film* – length <3mm. (Lengths can be estimated with a pencil: the lead is usually about 3mm long, and the length of the whole sharpened end about 1.5cm.)

REEF FISH NUMBERS – these are the fish swimming in and around the coral itself and are usually brightly coloured. Pick a position where you can view a stretch of the reef edge and estimate the numbers of fish close to the coral outcrops. *Superabundant* – huge shoals of fish all around; *Abundant* – many fish and a few shoals; *Fairly numerous* – reasonable numbers but only the occasional shoal; *Limited* – relatively few fish; *Noticeably few* – very scarce.

REEF FISH VARIETY – snorkelling along the reef edge for about 10 minutes, count the different types of reef fish swimming close to the coral. As with corals, some reef fish are difficult to identify at first and the RW form indicates the numbers that a non-specialist might be expected to distinguish for each category.

PELAGIC FISH NUMBERS – these are open-water fish, almost invariably silvery-grey in colour and usually swimming a short distance away from the reef slope. They may be small such as sardines or larger and mackerel-like. (Categories as for reef fish numbers.)

ENVIRONMENTAL IMPACT – Please mark X for personal observation and (X) for estimates known from reports.

For each of the following sections further comment on possible causes, attempts at control, etc., would be very valuable, and points which you might cover are indicated in smaller type. There is no need to spend a great deal of time researching such extra details, but if you are able to pick up the information please note it down.

FISHING – all forms of conventional fishing by commercial or local fishermen on or within 100m of the reef. [What are the main fish species caught?]

SPEARFISHING – by either local fishermen or visitors. [Is the spearfishing carried out with or without SCUBA tanks?]

DIVING – include snorkelling and reef-walking by visitors.

SHELL COLLECTING – [Is this primarily for the curio trade or for food – local or export?]

BROKEN CORAL – this is intended to cover damage where coral has been broken or eroded, either from natural causes such as storms, or from man's use of the reef (ie. coral broken by anchors, combined effects of divers or snorkellers kicking or intentionally breaking off coral, or by the use of explosives by fishermen or other locals). [Where is the damage? What is the apparent cause?]

DEAD CORAL – this refers to coral which appears to have died recently but which is still in position on the reef and not broken off. The skeleton will appear whitish and will not yet have been covered by a mat of alga. It should still show the intricate pattern or latticework and will be sharp to the touch (ie. it should neither have been eroded nor substantially recolonised by other organisms). [Where is the dead coral? What is the apparent cause? eg. sedimentation, sewage or other pollution, the Crown-of-Thorns starfish *Acanthaster*, sea urchins.]

OIL SLICK – ignore any tiny thin spills of only a few square metres (these may simply have come from your own or another small boat). *Some* – one small oil slick; *Considerable* – several small slicks or one large one; *Extensive* – fouling of the whole area with oil such as might occur near an oil terminal or following a major spill. [How big? From where? When?]

BEACH OIL – check for the presence of oil and tar balls on the beach. *Some* – an occasional large tar ball; *Considerable* – numerous tar balls and perhaps a continuous oily mark along the tide line; *Extensive* – signs of a continuous band of tar half a metre wide along the tideline and/or signs of frequent or major oil spills. [From where? When?]

SEDIMENT – an estimate of the amount of sediment in the water column rather than its effect on the coral. Visibility in coral waters often corresponds roughly to the amount of sediment in the water. *Little* – a noticeable haze just above the bottom; *Some* – a noticeable decrease in visibility due to sediment in the water; *Moderate* – a fairly dense suspension of sediment in the water column; *Severe* – a very dense suspension of sediment giving visibility of less than 3m. If convenient, give a more accurate estimate by asking a colleague to hold a black and white object and move away from you along the reef edge. The object will become indistinct and finally disappear at which point the distance in metres between you and your colleague gives a good estimate of visibility which can be recorded in the table. [Please comment on obvious causes such as dredging, soil input from nearby river, etc.]

SEWAGE OR WASTE – indicate here if you can see or know that sewage, rubbish or other pollutants are entering the water within 100m of the site or near enough to be brought into it by the flow of water. [Is this from a town, rubbish dump, factory, etc.?]

OTHER – [Please explain what this is.]

ADDITIONAL COMMENTS – do not feel that you need to spend too much time researching for this section but any further information you gather about the site will be very welcome. In addition to extra notes on the above sections, a few ideas are given below and keywords have been added to the RW form as a reminder.

If the site is already within a Marine Park or Reserve, or in a designated area, it would be invaluable to know what protection this affords, whether specimen collection and spearfishing are banned and whether fishing and tourist activities are limited. To what extent are the restrictions enforced?

Are any of the following animals common in or near the site: sharks, turtles, dolphins, porpoises, dugongs, moray eels, rays, large groupers, etc.? Is the site a turtle nesting area? Are there particularly high numbers of sea birds or waders? Are there surprising numbers of dead (perhaps oiled) birds and marine animals on the shore?

The reef may be in imminent or future danger of complete destruction from reef mining, land reclamation or some other cause. Or it may be the site of fish farming schemes such as oyster culture. Is there a thriving trade in marine curios and, if so, what are the main species sold (corals, shells, pufferfish, etc.).

Any further comments

Your assistance with this project is greatly appreciated. If you have any comments on the project design or if you are in need of further information or advice please contact:

Reefwatch Coordinator,
Tropical **M**arine **R**esearch **U**nit,
Department of Biology,
University of York,
York, YO1 5DD,
England, U.K.

TMRU
JUNE 1983

REEFWATCH

Your Ref. No.

COUNTRY	REGION	LOCALITY	REEF NAME

LATITUDE deg. / min. / sec.	LONGITUDE deg. / min. / sec.	CHART TYPE & NO.	PUBLISHER/SOURCE
/ /	/ /		

POSITION ACCURACY	*Completely certain*	*Fairly certain*	*Slightly uncertain*	*Very uncertain*	DATE
					/ /

Show direction of north

SKETCH GENERAL LOCATION OF REEF — Fill in scale: km

Show direction of north — Mark dive-site location

SKETCH MAP OF REEF — Fill in scale: m

SKETCH PROFILE (SIDE VIEW) OF REEF OR SHORE (show significant coral and fish locations)

Sea level
2m
4m
6m
8m
10m
12m
14m
16m
18m
20m

Fill in scale: m

Estimate bottom depth 100 metres from reef	1–4	4–8	8–15	15–30	30–50	50–80	>80 m

Is Reef Typical	*Among best in area*	*Rather better*	*Typical*	*Rather worse*	*Can't tell*
Attractiveness	*Exceptional*	*Pretty good*	*Moderately good*	*Limited*	*Poor*
Dive Site Rating	*Exceptional*	*Pretty good*	*O.K.*	*Not very good*	*No good*
Coral Cover — *Hard and soft*	*Almost complete*	*High*	*Moderate*	*Fairly low*	*Very low*
Coral Cover — *Soft*	*Almost all*	*Most*	*About half*	*Not much*	*Almost none*
Coral Variety	*Exceptional >30 types*	*Good 20–30 types*	*Moderate 10–20 types*	*Limited 5–10 types*	*Poor <5 types*
Algal growth	*Extensive long growth >3cm*	*Extensive thick lawn >1·5cm*	*Extensive thin lawn >3mm*	*Extensive algal film <3mm*	*Little or no algal film*
Reef Fish Nos.	*Superabundant*	*Abundant*	*Numerous*	*A bit limited*	*Noticeably few*
Reef Fish Variety	*Incredibly varied varied >60*	*Pretty varied 45–60*	*Moderate variety 30–44*	*A bit limited 15–29*	*Noticeably few <15*
Pelagic Fish Nos.	*Superabundant*	*Abundant*	*Numerous*	*A bit limited*	*Noticeably few*

ENVIRONMENTAL IMPACTS	Fishing	Spear-fishing	Diving	Shell collect-ing	Broken coral	Dead coral	Oil slick	Beach oil	Sedi-ment	Sewage or waste	Other
None											
Possible/little											
Definite/some											
Considerable											
Extensive/severe											

ADDITIONAL COMMENTS (Attach supplementary notes, with ref. no., if necessary)

KEYWORDS:

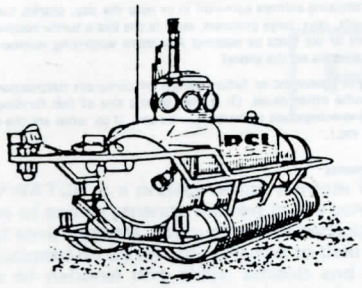
impact details	*reef mining*	*land reclamation*	*port*	*factory*	*tourism*	*Park Reserve*	*legislation*	*curios*	*fish farming*	*site access*	*currents*	*unusual species*	*interesting features*

NAME(S)	ADDRESS
	COUNTRY TELEPHONE

Approximate no. of previous diving visits (or months) in coral reef areas.	*Extensive* >6	*Moderate* 3–6	*Few* 1–2	*None*

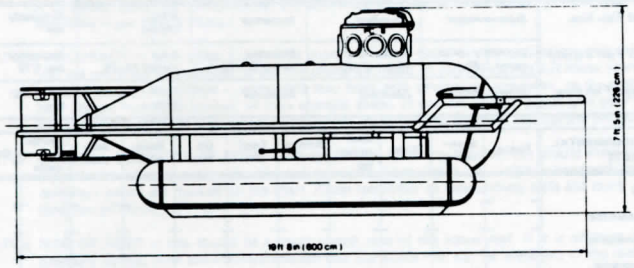
Please return to: Reefwatch Coordinator, Tropical Marine Research Unit, Department of Biology, University of York, York, YO1 5DD, England, U.K.

WEST INDIES: JAMAICA
DISCOVERY BAY MARINE LABORATORY, 22 AUGUST 1984*



The Discovery Bay Research Foundation is happy to announce that the Discovery Bay Marine Laboratory is extending its research capability through the acquistion of a manned observation submersible. This vessel, Perry PC-8B, is now operating at the laboratory, and is leased until June 1986. The submersible can take one or two observers to any depth down to -800ft (224m) for up to 8 hours. PC-8B is equipped with a 36 inch wide observation dome, an externally mounted pan-and-tilt camera, and a hydraulic manipulator.

A major factor in the success of this laboratory in coral reef science has been that the narrow north Jamaican island shelf allows easy access to coral reefs throughout their depth range. However, the physiology of deep diving severely limits one's time and ability at depth. The submarine provides the opportunity to work on the fore-reef slope, and the wall, with a clear head and ample time to observe and experiment. For the non-diving marine scientist, the submarine offers the chance of a first-hand view of his study environment.



In addition, the normally inaccessible deeper structures and communities on the wall and island slope on the fringes of the deep sea will now be available to study. These were described initially, following the short visit of NEKTON in 1972, thus we are in the advantageous position of having a baseline of observations to work from.

Nine projects have already been initiated this season on: social behaviour of deep reef fishes, sclerosponge reproduction, endolithic fungi, echinoderm feeding and reproduction, sedimentation, gastropod ecology, and deep water coral biology. The response of funding agencies to proposals has been excellent.

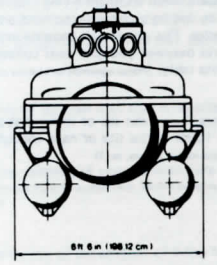
Rate schedule for scientific use of PC-8B: US$350 per two-hour dive, US$900 per six-hour day, US$4000 per five-day week; additional charges are made for use of external camera, onboard recorders etc. Rates for *individuals*, including the use of the submarine, pilot, chase/tow boat and manipulator (minimum dive duration, two hours) US$175 per two-hour dive. Day rates assume one submersion and one surfacing – a surcharge of US$ 50 will be made for each additional surfacing.

Extras: camera–video–onboard recorders. Externally mounted pan and tilt camera unit rates are as follows: 36 roll exposure roll with strobes US$30; 100 foot roll of bulk load film (investigator to supply film) US$50; onboard cassette recorders (investigator to supply cassettes) US$15.

Cheques should be made payable to: Discovery Bay Research Foundation, 7557 Rambler Road, Suite 624, Dallas, TX75231, USA. (Attention: Mr. Stephen Potts.)

If you are interested in participating in this exciting new programme please write to: M.C. Rosesmyth, Submarine Research Programme Coordinator, Discovery Bay Marine Laboratory, PO Box 35, Discovery Bay, St. Ann, Jamaica. In order to coordinate and maximise research effort we request that you send an outline of your proposal before you apply for funds to use the submersible.

** We apologise that because of delays in the production of RE3, the information about rates in this announcement may be out of date, and interested readers should check this and other information for themselves.*



Length 19'8" (6.00 m)
Breadth 6'6" (1.98 m)
Height 7'5" (2.26 m)
Weight 5.5 tons
Crew 2 + Pilot
Life Support 5 days per crew member
Max. Depth 800' (224 m)
Payload 500 lbs (227 kg)
Max Speed 3 knots
Range 8 nm at 1 knot
Duration 6-8 hours
Power 20 kwh
Main Propulsion 7.5 hp
Directional Thrusters: 2 x 70 lb (32 kg)

WEST INDIES: ST. CROIX
NEW DIVING FACILITY FOR WEST INDIES LABORATORY AT ST. CROIX

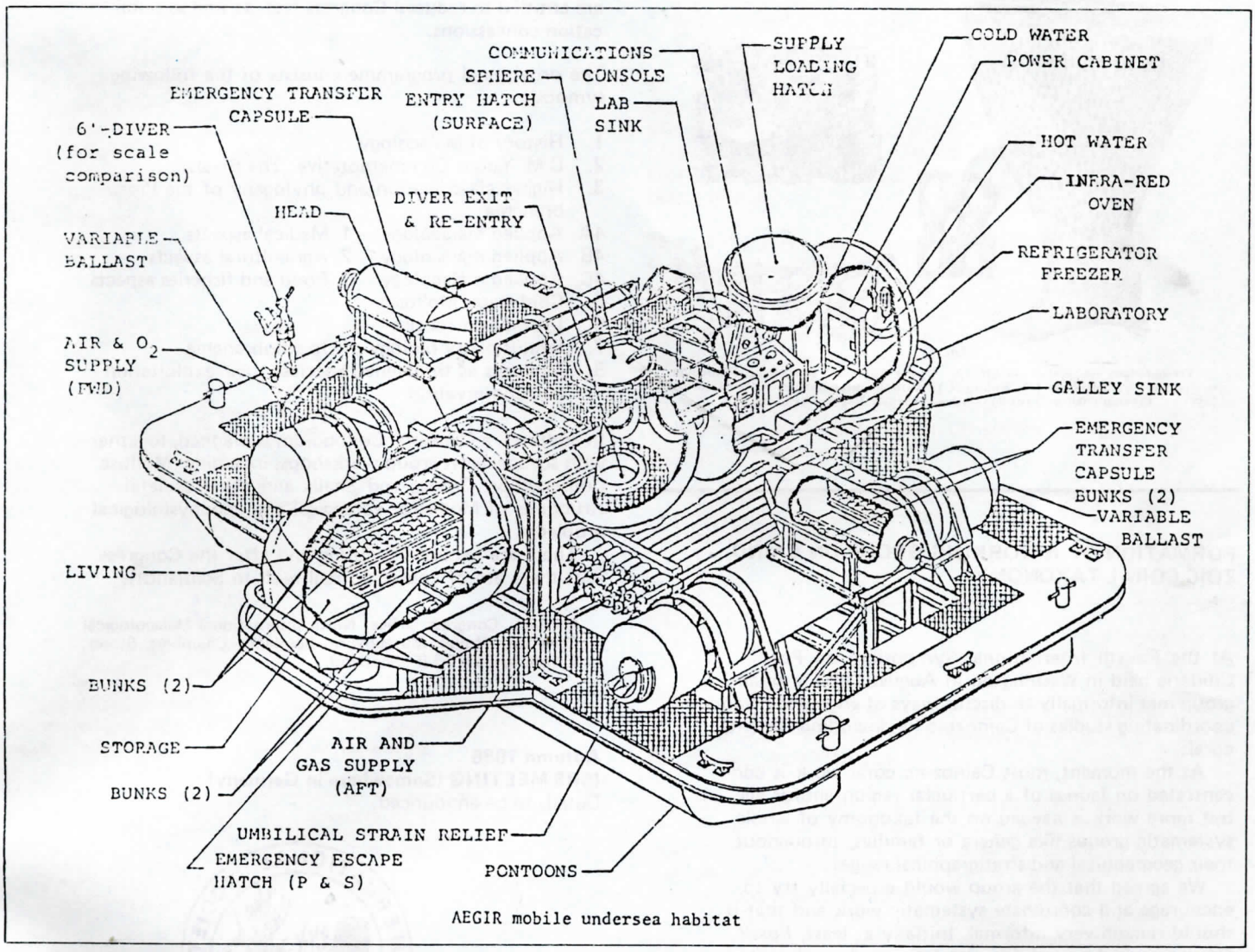
The National Undersea Research Programme at West Indies Laboratory, Fairleigh Dickinson University, announces the arrival of a new underwater habitat which will eventually replace the currently operational Hydrolab. The facility, formerly known as "AEGIR", will expand the capabilities of the programme by providing scientists working underwater with greater depth capability, longer excursion times, increased laboratory space and greater mobility. This mobile underwater habitat was previously used in scientific missions by the U.S. Navy in 1970-73 and later by the University of Hawaii. Since 1973 it has been maintained by the State of Hawaii.

The underwater laboratory system arrived at St. Croix on October 17th 1984 transported from Hawaii by the Millitary Sealift Command's 522 ft. heavy lift ship "Transcolombia". It was unloaded at the container port and is now awaiting engineering survey and refurbishment.

The design of the new underwater laboratory is the result of the combined efforts of various individuals with a great deal of experience in the fields of diving, marine engineering, and undersea work systems. The laboratory will accommodate six scientists/aquanauts for two weeks plus another week reserve to a maximum depth of 120 feet (36.6m). It is 72 ft. (22m) long, 53 ft. (16.2m) wide and draws 8 ft (2.4m) of water. Its habitable volume of 2,800 cubic feet (79.4 cubic metres) consists of three main chambers: a laboratory, a living quarter, and a wet porch for entry and exit. The habitat was designed for mixed gas diving to 580 feet(176.9m), but it will be certified and used primarily for shallow dives on air to a maximum depth of 120 feet (36.6m). The habitat is mounted on two 9 ft. (2.7m) diameter x 72 ft. (21.9m) long pontoons which act as main ballast to achieve shallow draft while it is surfaced. The hulls and additional ballast tanks can be flooded so that the habitat can achieve negative buoyancy when anchored below the surface during diving missions.

Scientific operations using the new facility will begin in 1986 in St. Croix. Eventually, a mobile support base will allow moves between the Virgin Islands and perhaps internationally. The focus of the National Undersea Research Programme at West Indies Laboratory is to understand basic processes occurring in tropical marine ecosystems. The justification for Caribbean research lies in recognition that over 20 mostly developing nations share a relatively small geographic area and all have a great dependency on marine resources. The Caribbean Basin Initiative declared by the Reagan Administration identifies the following needs in science and technology: basic marine science endeavours, coastal marine resource development, and marine resource planning. All of these needs will be addressed by the NOAA-sponsored National Undersea Research Programme.

Contact: John C. Ogden, West Indies Laboratory, St. Croix, U.S. Virgin Islands.



AEGIR mobile undersea habitat

INTERNATIONAL

INTERNATIONAL SUBCOMMISSION ON JURASSIC STRATIGRAPHY: CORALS AND SPONGES WORKING GROUP

The International Subcommission on Jurassic Stratigraphy has decided to establish a multidisciplinary programme for stratigraphic correlation tables between the different fossil groups.

A Corals and Sponges Working Group has been created, which, so far, has 22 people. The first meeting of this Working Group took place in Erlangen, Germany, on September 5th 1984.

During this first meeting, it was noted that in our current state of knowledge, it is not possible to establish, in the Jurassic, fine zonation based on Scleractinia or sponges. A better definition of the species concept in these groups is needed first, which will depend on more accurate studies of skeletal microstructure and on phenotypic and genetic variation in both living and fossil species.

But, paradoxically, it has been shown that identifications of species using the type concept, based on both qualitative and quantitative features, give results reliable enough to classify and correlate strata at the level of the

System, the Stage, and sometimes the Substage of formations from which corals and sponges have been collected.

To get a better understanding of species, and to establish stratigraphic sequences based on corals and sponges, the Working Group proposed that specialists should prepare data cards for computerized treatment, and has devised a format for these cards.

Information from: Mrs. L. Beauvais, Laboratoire de Paléontologie des Invertébrés, Université Pierre et Marie Curie, Tour 24-25, 3ème étage, 4 place Jussieu, 75230 Paris Cedex 05, France.

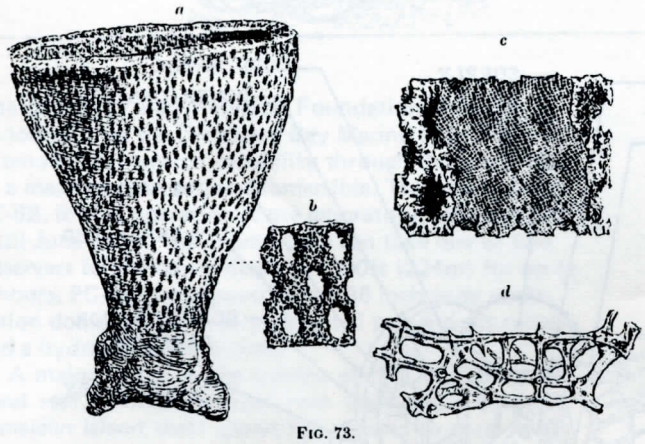


FIG. 73.

Tremadictyon reticulatum, Goldf. sp. Upper Jurassic; Streitberg, Franconia. *a*, Sponge, 2/5 natural size; *b*, Enlarged portion of outer surface without dermal layer; *c*, Portion with well-preserved dermal layer, 3/1; *d*, Skeleton, 12/1.

FORMATION OF A WORKING GROUP ON CAINOZOIC CORAL TAXONOMY

At the Fourth International Symposium on Fossil Cnidaria held in Washington in August 1983, a small group met informally to discuss ways of engouraging and coordinating studies of Cainozoic (ie. including Recent) corals.

At the moment, most Cainozoic coral work is concentrated on faunas of a partiuclar region and/or age, but more work is needed on the taxonomy of whole systematic groups like genera or families, throughout their geographical and stratigraphical ranges.

We agreed that the group would especially try to encourage and coordinate systematic work and that it should remain very informal. Initially at least, *Fossil Cnidaria* will be used for circulating information to participants.

In due course the aim is to devise and announce projects for participation by post, and perhaps, eventually, to hold workshops, e.g. in conjunction with the four-yearly Fossil Cnidaria meetings, the next being at Brisbane, Australia, in 1988 (see *Diary*).

The first task however has been to compile a list of Cainozoic (including Recent) specialists. Information is on a computer file.

So far the Group consists mostly of specialists who work mainly on fossil Scleractinia. We should therefore now especially welcome living-scleractinian specialists.

For a copy of participant form please contact: Brian Rosen, Department of Palaeontology, British Museum (Natural History), Cromwell Road, London SW7 5BD, U.K. Tel: 01-589 6323 ext. 316.

DIARY

continued from p.3

August 31st to September 6th, 1986
NINTH INTERNATIONAL MALACOLOGICAL CONGRESS
EDINBURGH, SCOTLAND

This meeting is organised by Unitas Malacologica, the International Malacological Union, members of which are entitled to reduced Congress fees, as well as publication concessions.

The provisional programme consists of the following symposia:

1. History of Malacology
2. C.M. Yonge Commemorative: The Bivalvia
3. Higher classification and phylogeny of the Prosobranchia

4A. Applied malacology – 1. Medical aspects
4B. Applied malacology – 2. Agricultural aspects
4C. Applied malacology – 3. Food and fisheries aspects

5. Cold-water Mollusca
6. Introduced species
7. Evolutionary biology of Opisthobranchia
8. Molluscs as threatened species: their exploitation and conservation

In addition, a Curators' Colloquium is planned, together with six specialist group workshops, including: Mollusc Conservation Group; and Shells and other skeletal structures of Mollusca: ecological and ecophysiological problems.

There are excursions during and after the Congress (but there are of course no real reefs in Scotland!).

Contact: Congress Office, Ninth International Malacological Congress, Royal Museum of Scotland, Chambers Street, Edinburgh, EH1 1JF, Scotland.

Autumn 1986
ISRS MEETING (Somewhere in Germany)
Details to be announced.

1987

January 27th to 30th, 1987
CANADIAN REEF RESEARCH SYMPOSIUM, BANFF, CANADA

The Canadian Society of Petroleum Geologists and the University of Calgary are organizing a meeting which is intended to be part of the Canadian Reef Inventory

Project (see *Announcements*)* The meeting will be limited to 250 registrants and will be associated with a short course on reefal carbonates to be held in Calgary with no limitation on numbers.

The meeting emphasis will be geological, especially to provide a forum for current research in "reef" [sic] sedimentology, palaeoecology, diagenesis and oil reservoir studies, and to collectively represent the state of the art. It is aimed at both the academic and the explorationist. Two kinds of papers are envisaged: 1. Those dealing with specific reefs, reef complexes, and reef trends of any age from Canada, Greenland, Alaska and contiguous parts of the USA. 2. Invited papers on reefs outside Canada, to address particular aspects of reef research to be highlighted at the Symposium. Provisional headings for these aspects are:

1. Role of diagensis in reef construction
2. Why reefs are, where reefs are?
3. Reef development and community succession: extrinsic or intrinsic controls
4. Reservoir characteristics of the reef environment: porosity and petroleum
5. Palaeoenvironmental indicators and the reef environment: absolutes and absolute uncertainties
6. Intercontinental or intersystemic comparisons of reefs

7. Reefs versus reef mounds: the evolutionary pitfalls of reef communities.

The registration charge will be $125 Canadian, and the estimated cost per head, $240 Canadian. Because of the season, there will be no symposium field trips.

For further details, EITHER write to: Canadian Reef Research Symposium, C/O The University of Calgary, Conference Office, Faculty of Continuing Education, 2500 University Drive, N.W. Calgary, Alta, T2N 1N4, Canada, OR telephone: Dr. Jeff Packard (Geological Survey of Canada) Calgary 403-284-0425, or Dr. Rand Harrison (Alberta Research Council) Edmonton 403-438-0555

* p.32

Spring 1987
BRITISH ECOLOGICAL SOCIETY
Details to be announced.

The meeting will be devoted to two ecological themes: Life histories and trophic patterns on and around coral reefs. Although speakers will be mostly from Britain, it is possible that two will be invited from elsewhere.

The meeting organizer is Dr. John Taylor, but interim enquiries may be addressed to the Society:
Dr. Adrian G. Marshall, Department of Zoology, University of Aberdeen, Aberdeen, Scotland, AB9 2TN, U.K.

August 20th to 30th, 1987
XVI PACIFIC SCIENCE CONGRESS, CORALS AND CORAL REEFS: ANCIENT AND MODERN, SEOUL, SOUTH KOREA.

Possible headings include:

1. Morphology and structure of coral reefs
2. Biotic distribution of reef organisms
3. Reef ecosystems: structure and function
4. Community studies and system modelling
5. Coral reef resources management and pollution
6. Commercial aspects of coral reef fisheries
7. Ahermatypic corals.

For further details, contact: Professor E.D. Gomez, Marine Science Center, University of the Philippines, Diliman, Quezon City, Philippines.

October 1987
SOCIETY OF ECONOMIC AND PETROLEUM GEOLOGISTS, SYMPOSIUM ON CENOZOIC REEFS: GEOLOGY MEETS BIOLOGY, MALLORCA

This will be a three-day meeting followed by a four-day field trip to the Tertiary reefs of southeastern Spain. The emphasis will be to bridge the gap in understanding between biologists and geologists studying Cenozoic reefs and to better integrate the findings of reef researchers from several countries. The fieldtrip will be coordinated by Mateu Esteban, and will provide a unique opportunity to study a spectrum of facies relationships with great detail on sedimentology, ecology and diagenesis.

For further details contact: Clif Jordan, Mobil Research and Development Corporation, 13777 Midway Road, Dallas, Texas 75234, USA.

1988

August 1st to 5th, 1988
FIFTH SYMPOSIUM ON FOSSIL CORALS, SPONGIOMORPHS AND REEFS (PROVISIONAL TITLE) BRISBANE, AUSTRALIA.

The Australian Organizing Committee (Chairman, Dr. J.S. Jell) recently changed the date of this meeting from 1987 to 1988, following a questionnaire sent to members of the Council of the convening body, the International Association for the Study of Fossil Cnidaria. This new arrangement means that the Townsville meeting (below) will follow this one almost immediately in the second half of August. 1988 is also Australia's Bicentennial, so reefs ancient and modern are obviously going to be a major part of the celebrations. Provisional subject sessions are:

1. Intraspecific variability in corals
2. Distribution patterns of corals and spongiomorphs across so-called extinction intervals

DAY FOR KNIGHT: Sir David Lean, aged 76, director of such films as Brief Encounter and Lawrence of Arabia, yesterday received his knighthood from the Queen in an investiture at Buckingham Palace
THE GUARDIAN Wednesday October 31 1984

3. Frame-building organisms: associations in ancient and modern environments
4. Early diversification and dispersal in the major coelenterate and spongiomorph groups.

Possible field excursions either before or after this meeting (but before the Townsville meeting) are: Devonian reefs of the Canning Basin, Cainozoic reefs of Papua New Guinea, Ordovician-Devonian corals of central New South Wales, Pre-Cambrian/Cambrian of South Australia, Great Barrier Reef.

For further details, contact: Dr. J. S. Jell, University of Queensland, Department of Geology and Mineralogy, St. Lucia, Queensland, Australia 4067.

August (second half), 1988
SIXTH INTERNATIONAL SYMPOSIUM ON CORAL REEFS,
TOWNSVILLE, AUSTRALIA
Details to be announced, but see notes on the Brisbane meeting, above.

1989

July 9th to 15th, 1989
INTERNATIONAL COELENTERATE CONFERENCE
LONDON, U.K.

After a somewhat nomadic existence, the date for this meeting has now settled down. It is not, as leaks from early Committee deliberations may have suggested, either 1987 or 1988.

It is intended that this meeting will also cover Ctenophore work. Subject sessions:

1. Classification of the phylum
2. Ecology, especially reproductive and population
3. Develpment
4. Physiology and behaviour 1: neurobiology, luminescence, pharmacology, immunology and nematocysts
5. Genetics and evolution: phylogeny classification, genetics and speciation.
6. Fine structure and function
7. Growth and form
8. Skeletons and biomineralization
9. Physiology and behaviour 2: feeding, digestion, intracellular symbiosis, animal associations

A first mailing is in preparation for early 1986.

For further details, contact the Committee Secretary: Dr. P.F.S. Cornelius, Department of Zoology, British Museum (Natural History), Cromwell Road, London SW7 5BD, U.K. (telephone 01-589 6323, extension 453)

illustrations

COVER
Illustration by Geoffrey C. Ingleton on p.163 in Price, A. Grenfell (ed.) The explorations of Captain James Cook in the Pacific as told by selections of his own journals 1768-1779. (With a new introduction by P.G. Adams). New York: Dover Publications, Inc. (First published by Limited Editions Club in 1957) By permission of the publisher. (Cartoon additions by Brian Rosen.)

p.2
Illustration on p.192 of Gibbings, R. 1950 Over the reefs London: J.M. Dent & Sons. By permission of the publisher.

p.4
Part of an illustration on p.109 of Gibbings, R., 1950 [above]. By permission of the publisher.

p.7
Map by Jill Darrell.

p.11
Map by the authors.

p.12
Cartoon devised by Ian Macintyre, realized by A. Macintyre.

p.13
'Geologists descending the River Issetz'. Illustration opposite p.362 in Murchison, R.I., de Verneuil, E. & von Keyserling, A., 1845. The geology of Russia and the Ural Mountains 1 (Geology). London: John Murray.

p.14
Fig. 17 in [Ravikovich, A.T., 1954, Recent and fossil coral reefs]. Moscow: Akademia Nauk. [In Russian].

p.15
Part of Botticelli's The birth of Venus.

p.16 (upper)
Fig. 102, p.313 in Volume 1 of Taillemite, E., 1977 Bougainville et ses compagnons autour du monde 1766-1769. Journaux de navigation. 2 volumes. Paris: Imprimerie Nationale. By permission of the publisher.

p.16 (lower right)
Facsimile extract from James Cook's diary as reproduced opposite p.44 in Synge, M.B., 1897, Captain Cook's voyages round the World with an introductory life. London: Thomas Nelson.

p.19
Cartoon by Brian Rosen.

p.24
Part of illustration on p.140 of Gibbings, R., 1950 [above]. By permission of the publisher.

p.28
Drawings reproduced from Discovery Bay publicity material.

p.29
Drawing reproduced from West Indies Laboratory publicity material.

p.30
Fig. 73 in Zittel, K.A. von, 1900. Text book of palaeontology (Translated and edited by Charles R. Eastman). English edition. Volume 1. London: Macmillan & Co. Ltd.

ANNOUNCEMENTS: additions

from p.30

The Canadian Society of Petroleum Geologists in cooperation with The University of Calgary is pleased to announce the Canadian Reef Inventory Project, a two-part endeavour:

1. A MAJOR RESEARCH SYMPOSIUM ON REEFS *see p. 30*
2. THE PUBLICATION OF A CANADIAN SOCIETY OF PETROLEUM GEOLOGIST MEMOIR

- Provisional title is "Canadian Reef Inventory: Case Histories of Proterozoic and Phanerozoic Buildups of Canada and Adjacent Areas".
- The memoir will contain concise case histories of reefs of all ages from within, or immediately adjacent to, Canada's national borders.
- Each article will follow a prescribed format, tailored to either surface or subsurface reef occurrence.
- Manuscripts are to be submitted by February 1st, 1987. Publication is anticipated in early 1988.
- The editors of the memoir are: N.P. James (Memorial University, St. John's), H.H. Geldsetzer (Geological Survey of Canada, Calgary), and G.E. Tebbutt (Petro-Canada, Calgary).

Should you wish to receive future fliers or additional information on either of the above mentioned projects, please contact Dr. Jeff Packard (Geological Survey of Canada, Calgary, 403-284-0425) or Dr. Rand Harrison (Alberta Research Council, Edmonton, 403-438-0555), or write Canadian Reef Research Symposium care of the address given below.

The University of Calgary, Conference Office, Faculty of Continuing Education, 2500 University Drive N.W. Calgary, Alta. T2N 1N4

Proposed New M.Sc. Course In Tropical Coastal Management

We anticipate that the course will commence in September 1987

Dr. Barbara E. Brown,
Department of Zoology,
University of Newcastle upon Tyne,
Newcastle upon Tyne NE1 7RU,
United Kingdom.