



Caribbean Marine Science

Number 2, November 2004

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Contents

Association News	1
General Interest	2
Meetings/Conferences	10
New Books	14
Change of Address Form	16
Dues/Membership Form	16
AMLC Background & Goals	17
AMLC Officers	17
Registration Forms	19

Association News

Notes from the Editors

Our greetings to all the AMLC members. We must start by thanking Clare Morral for the successful organization of the AMLC Executive Board Meeting in Grenada this past summer. We would also like to inform our readers and friends that Clare and collaborators are fine after suffering a direct hit with heavy structural and rain damage from hurricane Ivan. Many other colleagues and fellow members were also affected from this year's heavy hurricane season in the Caribbean. We are happy to report that all of them are fine. Our next Scientific Meeting will be held in Curacao in the early Summer of 2005. The early announcement and request for abstracts are included in this issue. This issue includes a report on corals, climate change and carbon dioxide that summarizes the up-to-date information and hypotheses. We have also included a couple of reports on the damaging effects of traditional fisheries and impact of fisheries in Jamaica. These include

interviews and opinions from researchers. Steve LeGore contributed with a nice review of the book "Taming of the Oyster: A History of Evolving Shellfisheries and the National Shellfisheries Association" by Mel Carriker, which can be found in the New Books section.

Once again, we would like to request contributions for the Newsletter from our members and readers. We have a very diverse membership involved in many different areas of research. Your Newsletter is an efficient way of sharing information about your projects, or even better, finding help or cooperation from other members of the Association. Please, do not hesitate if you have interesting information, a laboratory profile, an announcement, a request for information, or summer courses for the year that you want to share with the rest of us.

New AMLC List Servers

We now have two list servers dedicated to our members. The first one is for all AMLC members (including graduate students) and the second is only for AMLC student members. The purpose of these list servers is to facilitate communication and foster collaboration between and among our members. We hope all AMLC members will take advantage of this new capability – if you have any news, requests, or questions to distribute to the membership, just send a message to one of the email addresses below. We would like to especially thank Laurie Richardson and all other people involved in getting these important communication capabilities established. The NEW list server addresses are:

amlcmembers@fiu.edu (all members)

amlcstudents@fiu.edu (Only student members)

Only AMLC members who are on the list can post to the list. Any posting is first routed to the host computer at Florida International University. If it is not from a subscribed member it will not be sent to the list. Current AMLC members are automatically subscribed, and new members are added when they join AMLC. The newsletter will be now circulated electronically through our list server, which insures delivery and that only paid members are in our mailing list.

Proceedings of the Trinidad Meeting

The proceeding from our previous Scientific Meeting in Port of Spain, Trinidad are in process. The selected committee of editors have reviewed the manuscripts already which are now in the hands of the main Editor, Jorge Cortés.

Future Meetings of the AMLC

Our next Scientific Meeting will be organized by the Curacao Sea Aquarium in Curacao in June of 2005. Please go to the Meetings section at the end of the Newsletter for the information and the registration forms. One of our oldest member, the Bermuda Biological Station for Research, will host the 2006 Executive Board Meeting and the next Scientific Meeting in 2007 will be hosted by the University of the Virgin Islands.

Web site address: <http://amlc.uvi.edu>

General Interest

Corals, Climate and Carbon Dioxide.

By Brian R. Mommsen

There is an old saying; "*The whole is greater than the sum of the parts*". When we study ecological systems, large or small, we can isolate many of the separate influences, but we are never able to identify them all or completely explain their interactions, and therefore, we may never understand the total complexity of ecological systems. For this reason we can not have complete faith in the ability of any

computer models to predict future behavior of any natural system - especially a system as complex as that for the whole planet!

The Earth's climatic system is so complex that scientists still have trouble getting computer models to predict even minor climate changes for more than just a few days. Which means that there is always the opportunity for corruption of model results on longer periods of predicted global weather change that could possibly benefit the bias of those conducting the tests, and favor the political agenda of the sponsors of such testing. So we have a lot more to learn and to study about ecosystems, climate, and computer modeling before we get too emotional about the '*greenhouse effect*', and we have to be cautious about accepting any scientific information that is used in the political arena.

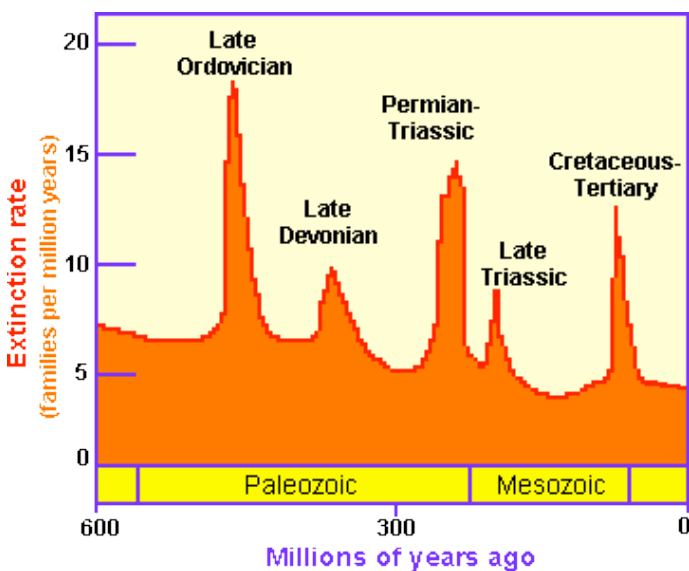
Rational study and analysis is based on data provided by objective scientific research - proven facts about our world. Hypothesis and theory are tools for the investigation of the natural world. But theories should not be confused with fact or they may lead to actions that actually hinder desired goals. The objective and rational approach to problem solving also requires making distinctions between what is known and what is conjecture. Even in those cases where science gives us the 'how' of a specific phenomenon - scientists still can not always give us the '*why*'. We can expand on the limits of our tools to dissect the universe - but we have yet to start expanding our intelligence limitations.

So what is an objective approach to the investigation and understanding of the earth's ecological systems and climate? We study the known facts and strive to recognize natural patterns. There is another saying that carries much meaning; "Correct questions are more elusive then correct answers - for in every carefully thought out question lies the key to discovering the answer". When we look at any system in the universe, we can see that they are all self-organizing and self-regulating, - from the micro (atoms) to the macro (galaxies). Recognizing the known distinct patterns of past and present weather/geological change, and how they relate to one another, is how we can find clues about the future

patterns of global climatic change, wheels within wheels.

I am not suggesting the world's ecosystem works like a simple mechanical clock - I've already said that the Earth's environment is extremely complicated. But for our purposes here I am going to try to keep to known facts and deal with them as simply as possible. Scientists have already done the basic work of identifying our past weather over millions of years and have those patterns as fact - but of course they are still looking into the causes of those patterns. What I am suggesting is that we can gain a better understanding of the present and possible future global weather by looking at the planet's weather through geological time.

What can that tell us? First of all, it tells us that the Earth has experienced several great cataclysmic events before man arrived, perhaps greater disasters than man is capable of inducing, and still our planet has evolved into our present Eden. Here is a graph of the previous '**jolts to the system**'. These extinctions have removed 90% of the species that have ever existed.



Major massive extinction events in the last 450 million years.

As to the '**causes**' of these cataclysmic events, we have the usual suspects - collisions between Earth and comets and asteroids, releases into the atmosphere of tremendous volumes of carbon dioxide and methane through tectonic plate movement and volcanism.

Besides the direct and immediate biological consequences of those deadly events, the events also put the Earth's climate through many wild swings that affected all life for tens to millions of years.

Reviewing the facts

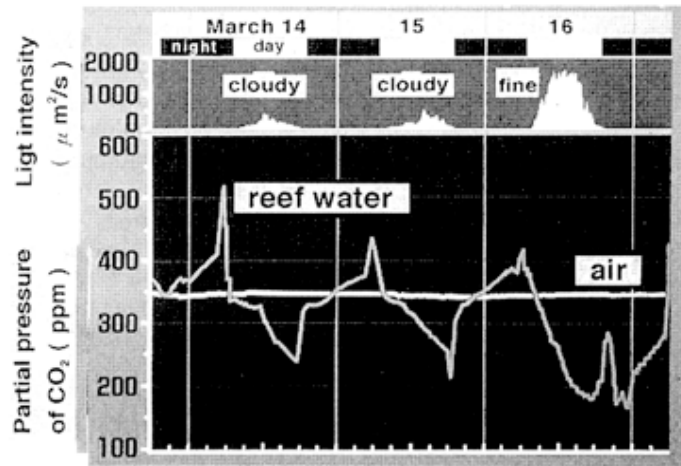
Coral reefs:

(1) Corals have been around for about 400 million years, (2) Modern day reef builders of the Scleractinia coral family have been around for 250 million years, (3) Climate (ice ages - tropical) and sea level change (+/-120 m) have been radical over geological time, (4) After 17 major oceanic and climatic earth changes of the past 250 million years, the reef building corals are still with us - they are very resilient to extreme change, (5) Modern corals have undergone their greatest growth rates and distribution during the warmest of the geological climatic periods, (6) We are in an inter-glacial period now, which means that one way or another the planet will experience another ice age - this is 'normal', (7) Ice ages are preceded by, and end with, global warming - this is the normal macro oscillation throughout Earth's climatic history. Micro oscillations also occur within each macro period (minor Earth cooling and heating periods), (8) Careful studies of the calcification rates of corals have shown much greater coral growth decreases in the 17th and 18th centuries as compared to today's rates, which further complicates the understanding of the direct effect of atmospheric CO₂ and weather on coral - but demonstrates the micro oscillations of weather and other environmental factors, (9) Scientific studies of calcification rates for the past 237 years indicates that the present decline in coral growth can be viewed as a return to a slower and more 'normal' rate of growth like those experienced in the past, (10) Coral reefs have been compared to tropical rain forests for their biodiversity. It has also been proven that reefs, like the forests, are great depositors of atmospheric CO₂, and therefore deserve the same considerations for conservation and expansion.

Man, climate, and reefs:

(1) Man's ancestors appeared at least 2 million years ago, (2) There has been no perceptible change in man's physiology in the last 40,000 years - so why

didn't agriculture and civilization begin 40,000 years ago? (3) The Earth's climate was very erratic (during this 40,000 year period) up to 10,000 years ago - when the last ice age ended, (4) After that last ice age (10,000 years ago) the weather went from erratic (normal) to stable (abnormal) and helped foster the birth of



CO₂ exchanges on the reef

civilization through predictable climate (regular seasonal cycles of temperature change and wet/dry periods) best described as the 'steady-state environment', (5) This abnormal 'steady-state' climate has made possible the progression of agriculture, which resulted in stable human societies and a greatly accelerated growth in the human population. (6) Over the past 50 years man's effect on coral reefs have been very detrimental, directly and indirectly - due to the huge growth in man's population and technology, (7) We have the knowledge to reverse the negative impact we have made on reefs and oceans, (8) We have the knowledge to reduce CO₂ in the atmosphere by reduction of emissions and enhancement of biological fixing (capture) methods, (9) It is just a matter of time and the Earth's 'hot-cold' and 'wet-dry' macro climatic cycles will take us out of the present 'steady-state' environment we have experienced over this short geological period of the past 10,000 years

Biological consequences of earth climatic change:

(1) The 'Boom and Bust' phenomena of different biological orders have occurred through geological

periods (macro change) - the age of fishes, age of amphibians, age of reptiles - resulting in some huge and widespread extinctions (with some carry-over remnants), (2) And within each 'Order' (within any geological period) there is the 'Boom and Bust' phenomenon as well (micro change) - experienced when small changes in localized and/or global weather patterns produced changes in food sources, predation, and disease. This caused populations of individual species to expand or contract, and that has a ripple effect in an ecosystem called 'trophic cascading' - often resulting in some species local extinction as well as changes in the food chain.

Earth's geological time scale

EON	ERA	PERIOD	EPOCH	MYA	Key Event	
PHANEROZOIC	CENOZOIC	QUATERNARY	RECENT	0.01	ICE AGE ENDS	
			PLEISTOCENE	1.6	ICE AGE BEGINS EARLIEST HUMANS	
		TERTIARY	PALEOGENE	PLIOCENE	5.3	
				MIOCENE	23.7	
				OLIGOCENE	36.6	
				EOCENE	57.8	FORMATION OF HIMALAYAS
			NEOGENE	PALEOCENE	66	DINOSAUR EXTINCTION ROCKY MTS. FORMED
				CRETACEOUS	144	
				JURASSIC	208	FIRST MAMMALS PANGAEA BREAK UP FIRST DINOSAURS
				TRIASSIC	245	
	MESOZOIC	PALEOZOIC	PERMIAN	286		
			PENNSYLVANIAN	320	FIRST REPTILES	
			MISSISSIPPIAN	360	FIRST AMPHIBIANS	
			DEVONIAN	408		
			SILURIAN	438	FIRST LAND PLANTS FIRST FISH	
PRECAMBRIAN	PROTEOZOIC EON	ORDOVICIAN	505			
		CAMBRIAN	570			
		ARCHEAN EON		2500	EARLIEST SHELLED ANIMALS	
				3800	EARLIEST FOSSIL RECORDED OF LIFE	
				4600		

What we know about the relationships between the ocean and carbon:

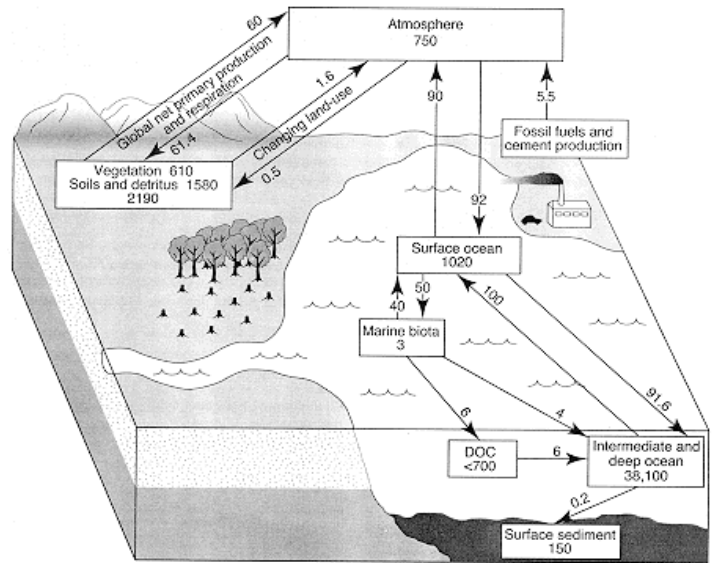
(1) Most of the Earth's carbon (including CO₂) is found in the oceans - the 'carbon bank', (2) It has been that way for millions of years with contributions of both organic and inorganic sources in the oceans, from the atmosphere (gas exchanges), and from fluvial sources (rivers and other erosion methods on land of terrestrial organic and inorganic materials), (3) At present the carbon cycle in the oceans effectively deposits into the deep ocean sediments enough CO₂ taken from the atmosphere to be labeled a CO₂ 'sink' (tectonic movement and undersea

volcanic action also release CO₂ to the atmosphere in varying amounts so that there has been periods during the earth's geological time when the ocean released more CO₂ into the atmosphere than it removed), (4) The oceans remove 30-50% of the fossil fuel carbons found in the atmosphere, (5) The removal and storage of atmospheric CO₂ by the oceans is done by biological means involving the total oceanic food chain (waste materials and dead organisms accumulating on the ocean floor) and the structural recruitment by calcifying organisms (coral reefs and limestone beds built up by corals, coralline algae, and other calcifying organisms), (6) Presently, the ocean releases less CO₂ back into the atmosphere than it removes during the 'carbon cycle' because it 'locks' a percentage of the CO₂ into limestone and ocean floor sediments, (7) How much is 'locked' into sediments and limestone depends on many factors and is very complex, but at present, it is generally agreed that the ocean is acting as a CO₂ sink, (8) The CO₂ rises to the ocean's surface for atmospheric exchange through geochemical mechanisms when there is (a) tectonic and volcanic activity, (b) upwelling of deep ocean currents which bring dissolved sediments to the surface, and (c) limestone erosion. (9) Under normal circumstances, most CO₂ released from the ocean surface is through organic activity of marine organisms (metabolic activity)

Coral reefs:

(1) Our present beneficial 'steady-state' climate has been dependent on two great influences; (a) the sun (thermal influence and photosynthesis), and (b) the oceans (the great 'Oceanic Conveyor Belt' has been identified as the ocean's special climate stabilizer for the planet), (2) The health of the sun - we have no control over that, but we do have a great impact on the oceans, (3) If the ocean's health is adversely effected by anything in the tightly interrelated influences of biological factors (over-fishing, reef destruction, and pollution) or physiological factors (surface chemistry, ocean surface currents, increased atmospheric temperatures), there will be changes in the 'Oceanic Conveyor Belt' (the 'Great Climate Stabilizer') that can trigger even greater changes in global weather, (3) The health of the oceans are dependent on their life webs - and the health of the coral reef is very important to the ocean's life webs, (4) As previously stated - coral reefs are great

'depositors' of CO₂, much in the same way that the rain forests are great 'depositors' of CO₂ in the terrestrial environment, (5) The benefits gained by reforestation of the land areas of the world to reduce atmospheric CO₂ can be matched by restoration and expansion of the ocean's gardens - the coral reefs. (6) Restoration and expansion of coral reefs are accomplished by improving water quality and the planting of cultivated corals.



Global carbon cycle showing the net gain for the oceans.

Conclusion

Future global climatic change cannot be avoided and we cannot predict the timing of those changes. We can only deal with our own direct influences on global weather - such as the **reduction of atmospheric CO₂ and the improvement of the ocean's health. Cultivating corals and using them for the restoration and expansion of tropical reefs would be very important for both of those goals.** Some say we can avoid the cataclysmic changes that have affected the planet during the geological past through technology. If that statement is addressing the possibility of deflecting or destroying the space objects that collide with Earth - we might be able to deal with that. But there is nothing we can do about future drastic changes brought about by the periodic releases of huge quantities of methane gas from the ocean floor. That geophysical phenomenon is

considered to be one of the major reasons for mass extinctions and abrupt climate change in the past. There is also the periodic magnetic pole shifts to consider. Future technology will be more important to our adaptation to climatic change - not its prevention or modification. All the more reason to go to Mars and the other planets - it will help us develop those survival technologies.

As to our present efforts to save our seas and coral reefs, it is all about quality of life in the present and our immediate future - and the fact that there are no guarantees about the life spans of species, or climate cycles, or anything! If great change and possible degradation of the planet are inevitable, then we have to make intelligent choices today as to what we can do to enjoy the highest quality of existence for the planet and ourselves - while we can.

Research report by **Brian R. Mommsen**. For the INOKI FOUNDATION - Palau

Traditional Fishing Damages Coral Reefs

Even traditional fishing methods can disturb the delicate balance of fragile ecosystems and are destroying some of the world's finest coral reefs, according to a study published recently. Although more intensive fishing was thought to pose a greater danger to reefs, a British team of scientists said that subsistence fishing also has an impact on reefs near the Fijian islands in the Pacific.

Until now, coral reefs were thought to be resilient to the effects of fishermen using age-old methods such as spears and hooks and lines for their catch. "This study suggests this may not be the case and that even low levels of fishing may cause ecosystem meltdown," said Dr. Nick Polunin of the University of Newcastle upon Tyne in northern England. He led a team of scientists who studied reefs near 13 Fijian islands for two years. They tracked populations of coral-eating crown-of-thorns starfish and found that even low intensity fishing of the starfish's predators enabled it to multiply in huge numbers and destroy the reef. "This paper does highlight that maybe these systems are surprisingly fragile and it is conceivable that a small amount of fishing, such as would have taken place prior to the last 50 years, could have had a significant impact in many cases".

Crown-of-thorns starfish, which have been increasing on Australia's Great Barrier Reef in recent decades, are a well-known threat to reefs. In one heavily fished area, the scientists discovered that as the starfish predators declined by nearly two-thirds the starfish population jumped from 10 per kilometer (0.62 mile) to hundreds of thousands. Meanwhile, healthy coral cover decreased by a third.

Scientists have warned that coral reefs, massive structures made of limestone that support 25 percent of all known marine species, are being destroyed but there has been debate about whether it was due to fishing or other factors. Polunin's findings, which are reported in the journal *Ecology Letters*, suggest the ecosystems on coral reefs are quite sensitive to the impact of fishing. Although they do not know how permanent the reef damage is, the scientists started seeing changes over two years which suggests the impact could be long-term. "The finding provide an additional challenge for biodiversity protection and coral reef management strategies," Polunin added. Coral reefs are found in more than 100 countries and cover an estimated 109,771 square miles worldwide.

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Forum on Impact of Fisheries in Jamaica

The following synopsis of responses and comments to a forum on Destructive Fishing Thread (DFT) in Jamaica was compiled by Stephen G. Dunbar and we included it here because we thought it might be helpful to many colleagues and students working with fisheries in the region.

Dr. Tom Goreau emphasized that "Jamaica's largest offshore barrier reef was completely destroyed by dynamite a couple of decades ago by fishermen who bought dynamite stolen from rock quarries from the police." However, there does not seem to be literature to support this. Goreau also stated that, "A lot of the South Coast fishermen were dynamite fishermen, with a handful of areas being especially bad. but now there is not much left for them to blow up."

John Ogden stated that there is little information on dynamite and cyanide fishing in Jamaica because these methods have not commonly been used there. While other chemicals, like bleach, have been used, Ogden said that he had never heard of dynamite being used in Jamaica. However, while there in the early 70's, he had heard of it being used elsewhere in the Caribbean. According to John, most overfishing has been by fish traps.

According to Iain Macdonald, dynamite fishing on Jamaican coast would not presently be done because: (1) there are no fish left there to make it worth doing. and, (2) Such practices are illegal and there are numerous outreach programs that reach fisherman. Macdonald thought that fish densities on the south coast may be high enough to warrant such DFP, but he was unfamiliar with that side of the island. Macdonald also stated that cyanide fishing is very limited, most likely because there are so few fish. Ornamental fish trade is probably non-existent on the north coast of the island,

Valeria Pizarro reported that some areas along the Caribbean coast of Columbia, near Santa Marta, were damaged (and remain damaged) by dynamite fishing about 10 years ago, but stated that dynamite fishing in that area now is rare.

The discussion by Alina Szmant focused on the problem of human "unbridled, uncontrolled rate of human population growth" as a key problem of all coral reef ill and other marine and terrestrial systems. While fisherman are no more ignorant now than 100 years, Dr. Szmant stated that there are more of them now, and more mouths to feed. She emphasized that although over-fishing has a severe impact on coral reef ecosystem structure, global warming/bleaching has the biggest impact. She said. "we are all guilty as charged for being alive and consuming". Szmant believes that coming up with better technologies is not the answer, since new technologies will always lag behind population growth. In her opinion, we have exceeded the capacity to feed, clothe and provide jobs and a decent standard of living for ourselves.

A substantial discussion by Jeremy Woodley who suggested that without the enlistment of local communities and the larger society in general,

education alone (especially aimed only at the fisherman) would not suffice. Woodley agreed that education was an important component of affecting change, but that it had to be ongoing. It is clear that legislation and outside management are not the keys (by themselves). These are almost certain to fail without the co-management of resources by the communities that use and are affected by the resources. Another point that Jeremy made was that without major government programs, progressive change would come slowly. Some examples of successful programs are: the Caribbean Coastal Area Management Foundation, led by Peter Espeut, in the Portland Bight Protected Area (in St. Catherine, west of Kingston), The Portland Bight Fisheries Management Council, representing thousands of fishers, has planned protected areas and drawn up regulations. You can read something about it at <http://www.unesco.org/csi/act/jamaica/jamai3e.htm>

And the work of the Fisheries Improvement Programme, founded at Discovery Bay, Jamaica, in 1988.

Some specific references provided by Jeremy:

Sary Z, Oxenford HA, Woodley JD (1997) Effects of an increase in trap mesh size on an over-exploited coral reef fishery at Discovery Bay, Jamaica. *Mar Eco Prog Ser* 154:107-120

Woodley JD, Sary Z (2002) Development of a locally-managed fisheries reserve at Discovery Bay, Jamaica. *Proc 9 ICRS* (2) 627-633

Woodley JD, Sary Z, Gayle PMH (2003) Fishery management measures instituted at Discovery Bay, Jamaica, with special reference to establishment of the Fisheries Reserve. *Gulf and Caribbean Research* 14 (2) 181-193.

Adam Payne suggested that contacts, including the Centre for Marine Sciences (CMS) at University of West Indies that are under the direction of George Warner, the Peace Corps and the Fisheries Improvement Project (FIP) at Discovery Bay Marine Lab would have current information on DFP in Jamaica. Payne stated that during his PhD research there most fishing was done by spear fishermen or traps. Although minimum mesh sizes were stated, there was little regulation or enforcement.

Reefbase was suggested by John McManus as an excellent source for literature on DFP and reef damage www.reefbase.org. Another excellent resource, provided by Judith Mendes, was Peter Espeut, a former Pew research fellow in fisheries and current director of Caribbean Coastal Area Management in Jamaica- www.ccam.org.jm. Alexander Stone of Reef Guardian International, provided their website as a source of info on fish traps and fish trap impacts. See: www.reefguardian.org.

The above synopsis of comments to the DFP in the Caribbean discussion was prepared by Steve Dunbar. I apologize for any over-simplifications or any statements that do not reflect the meanings or thoughts intended.

**Dr. Stephen G. Dunbar, PhD. Assistant Professor, Marine Biology Department of Natural Sciences
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Helping Communities to Protect Coasts and Seas

Against the background of the havoc which Hurricane Ivan and other major hurricanes have wreaked in the region recently, particularly in Bahamas, Haiti, Grenada, Grand Cayman and Jamaica, the United Nations Environment Programme (UNEP) hosted the Third Meeting of the Contracting Parties (COP) to the Protocol Concerning Specially Protected Areas and Wildlife (SPA) in the Wider Caribbean Region, in Jamaica at the Wyndham Rose Hall on 27 September 2004.

UNEP estimates that more than 70% of the 80 million inhabitants of the Wider Caribbean Region live in coastal areas, and that a large part of their economy depends on the coastal resources of tourism and the fishing industries. The Caribbean's natural resources are diminishing at an alarming rate - 35% of fish resources being over-exploited and 22% of the region's coral reef considered lost while more are threatened by anthropogenic and natural causes. Although over the past 20 years, 300 protected areas have been established, only around 30% of them are properly managed or protected.

UNEP has worked with the Governments of the region in seeking better ways to protect and ensure the sustainability of marine and coastal resources. Under its umbrella, in 1990 Governments adopted a legal instrument, the Protocol Concerning Specially Protected Areas and Wildlife (SPA). The "SPA protocol" is part of the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention), which has been operational since 1986.

SPA Programme Coordinator at UNEP, Alessandra Vanzella-Khoury says that marine and coastal resources can be protected while, at the same time, communities that are dependent on these resources utilise them in a sustainable way. The SPA Protocol addresses such management. On the other hand, once a particular resource has been depleted, at least for a number of years it should not be used, and an alternative livelihood for the community can be provided.

The Programme headed by Vanzella-Khoury is the operational arm of the SPA Protocol, and helps to establish protected areas for conservation, conducts training on managing these resources, promotes working closely with communities, encourages the inclusion of the private sector in incorporating best practices in the tourism and fishing industries. "We promote relevant projects; we assist the countries in looking for the resources but it doesn't mean that we necessarily have the funds to provide," says Vanzella-Khoury. However, SPA acts as a facilitator. There are a number of funding sources that can be accessed. Some are big and complicated, thereby posing a challenge to smaller communities in putting together proposals. Vanzella-Khoury says the important thing is that there are mechanisms and organisations in the region that can help communities to develop projects and access funding. "What we try to do is to make those mechanisms known to the region so that whichever way is the most appropriate and feasible to a particular community or organization, at the least they know how to go about it." To date, only twelve Caribbean countries have come on board the SPA Protocol. They are: Barbados, Colombia, Cuba, Dominican Republic, France, Netherlands, Panama, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago, the USA and Venezuela.

Why is it that other countries of the region are not yet parties to the Convention? Vanzella-Khoury concedes that lack of knowledge by some countries of the value of the Protocol and its implications are setbacks. "It has to do with ignorance or lack of political will, because there really is nothing in the SPAW Protocol that is very difficult to implement or goes against existing policies in countries. The Protocol is completely compatible with a global instrument, the Convention on Biological Diversity, to which almost all of the nations of the Caribbean are Party. And there is nothing between SPAW and this Convention that is contrary; they are actually mutually supportive," she emphasizes.

Chief Executive Officer of Jamaica Environmental Trust (JET), Diana McCauley is upset that Jamaica is not yet party to the Protocol. There is a foundation to be laid and agreements to be hammered out between nation States to protect shared resources. The head of JET would like to see better, faster action in States, especially in Jamaica. "I am not sure how much in Jamaica we deal with these issues; there's lots of room for more attention." With several countries now counting their losses from recent hurricanes, more so Haiti where the land has been badly depleted, McCauley says that we are not serious. She would wish to have these discussions when there is not a hurricane season because "typically what happens in the aftermath of bad weather and great catastrophe is that there is a sudden flurry of interest. When that dies down, there is not the kind of interest and action that we really need." Notwithstanding the slow pace at which some Parties are moving, Vanzella-Khoury reflects on some achievements of the past year. An example is a very good assessment on the status of coral reefs throughout the region.

The regional assessment started a number of years ago "but now it is just coming together." A report, 'Reefs at Risk,' details assessments of threats that land based activities impose on the coral reefs, and the economic implications of the threats. In addition to reefs at risk, the major environmental problems include pollution, improper coastal development, sedimentation, deforestation and over-fishing.

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By Clinton W. Pickering, Free-lance journalist, Montego Bay.

Global Database on Reef Fish Aggregations

The Society for the Conservation of Reef Fish Aggregations (SCRFA) is pleased to announce that its global database of spawning aggregations can now be searched online. The database, which currently contains details of over 400 aggregations from around the world, is accessible through the SCRFA website (www.scrfa.org). We hope the database will aid researchers already working in this field, as well as increase awareness of the vulnerability of these aggregations.

The database is an ongoing project with new data and updates being constantly incorporated. We would be pleased to learn of any additional aggregation sites for which details could be added.

Andy Cornish Ph.D,
Teaching Consultant,
Society for the Conservation of Reef Fish Spawning Aggregations
Department of Ecology & Biodiversity,
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 - Sustainable Development
 - Natural resource management

Important Dates

Deadline to submit abstracts: November 30, 2004.

Venue

Lina Hotel (*La Mancha* Room), Santo Domingo, Dominican Republic. Grand Hotel Lina and Casino. Ave. Máximo Gómez esq. Ave. 27 de Febrero, Santo Domingo, República Dominicana.
Ph: (809) 563-5000 ext.7134 to 7137
e-mail: hlina.com@codetel.net.do

Single room US \$ 85.00/night
Double US \$ 43.00/night

Other hotels are available at lower prices, please contact us as soon as possible.

Registration fee

US\$ 100.00 Foreign professionals
US\$ 60.00 Foreign students
RD\$ 2,000.00 Dominican Professionals
RD\$ 1,000.00 Dominican Students

The price includes a binder (containing abstracts, notepad and pencil), snacks during session breaks, lunches, closing night dinner, and entrance to all presentations. It does not include banquets, wine and cheese tastings, visit to national park, symposium t-shirt nor hats.

I look forward to receiving your next manuscript!

Sincerely,
Editor, Caribbean
Journal of Science. www.caribjsci.org

Meetings & Conferences

V Congress on Caribbean Biodiversity. Dominican Republic. January 25-28, 2005

The Autonomous University of Santo Domingo (UASD), the Iberoamerican University (UNIBE), Grupo Jaragua (GJ), The Nature Conservancy (TNC), Museum of Comparative Zoology (MCZ) the University of Harvard, and The Dominican Environmental Consortium (CAD) are pleased to invite the national and international scientific community to the V CONGRESS ON CARIBBEAN BIODIVERSITY that will take place from 25-28 January, 2005, in Santo Domingo, Dominican Republic. It will be a meeting place of specialists from numerous fields of knowledge and those working towards the protection of biodiversity. Works especially welcome will be those related to the following areas:

Travel Visas

Non-Dominicans need to find out visa requirements for their travel to the Dominican Republic. If a visa is required, and help is needed, please inform the organizing committee as soon as possible.

Weather

January and February are the coolest months of the year in the Dominican Republic. During the day, they vary between 22 and 27°C. During the night, they might reach a low of 18°C.

Transportation to and from Airport

Transportation to and from the airport must be covered by each participant. For persons traveling in groups or arriving on the same flight or similar hours, we will set up some options to lower transportation costs.

Presentations (with simultaneous translation)

Oral - Twenty minutes, seventeen for presentation and three for question and answer session.

Simposium- Thirty minutes, twenty-five for presentation and five for question and answer session.

Posters- These will be exhibited in a designated area, and we will schedule a time for authors to interact with participants answering questions about their work. Dimensions: Width 91 cm; length: 200 cm. Font type and size: Times New Roman 16 (Font type and size will be determined by each author.)

Please contact us if you need more information on this topic.

jeannette_mateo@hotmail.com

32nd Scientific Meeting of the Association of Marine Laboratories of the Caribbean, Curacao. June 13-17, 2005.

We are pleased to announce our upcoming scientific meeting of the Association of Marine Laboratories of the Caribbean. The meeting will be centered upon scientific presentations and will include a variety of

field trips to enjoy our locale, which this year is the island of Curacao. As in the past, presenters may submit papers of their presentations for publication in the peer-reviewed journal proceedings of the meeting. The meeting will include poster and oral presentations. In keeping with the AMLC purpose of promoting the exchange of scientific and technical information concerning Caribbean marine sciences, topic areas for this scientific meeting will include:

- Coral Reef Ecology
- Diseases of Coral Reef Organisms
- Remote Sensing and GIS in the Wider Caribbean
- Caribbean Oceanography and Coastal Processes
- Pollution and Anthropogenic Issues
- Public Awareness and Education
- Biodiversity, MPAs, and Conservation
- Fisheries and Aquaculture
- General Ecology within Caribbean Marine Sciences
- Monitoring
- Environmental Restoration
- Regional Ecological Connectivity
- Science for Resource Management

The program will also include a NOAA-sponsored session chaired by a NOAA representative, for which we wish to solicit paper submissions. Specifically, the theme will be "Applied Coral Reef Research," with the underlying thesis of research with resource management outcomes or applications. Submissions need not concern research only on Caribbean reefs, but may describe research conducted in other parts of the world with potential application to Caribbean resources.

Under the general theme of Regional Ecological Connectivity, David Wilson and Ivan Nagelkerken also wish to encourage oral presentations, posters and/or paper submissions within three major themes: 1) Larval connectivity between reefs/islands/habitats; 2) Ecological connectivity among habitats by juvenile and adult fishes and invertebrates; 3) Connectivity between habitats with respect to nutrients and other physio-chemical factors. It is their hope that sufficient interest and abstracts will be submitted to develop a full thematic session around Ecological Connectivity. If you regard your submission as appropriate for a Connectivity Session, we suggest that in addition to

the normal submission procedure, you copy your submission to David Wilson, who is on the Curacao Meeting Program Committee. His e-mail address is: dwilson@fieldstudies.org.

Other topics will be considered subject to session time limitations. Abstracts must be received by April 1, 2005, and may be in English or Spanish. Abstracts must be submitted in the form described in the attached Abstract Format instructions. Upon receipt of your abstract, a confirmation of receipt will be sent to you. Author guidelines and manuscript submission requirements will be posted soon on a new AMLC website currently under construction. It will be helpful if you assure that your e-mail address is clearly provided when you submit your abstract.

If using postal service to submit your abstract, include a hard copy and an electronic copy on diskette. If using e-mail, attach your abstract to your message – do not incorporate your abstract in the body of your message – attach it as a Word file. Submit to:

Steve Piontek
Curacao Sea Aquarium
Bapor Kibra z/n (for courier services) or
PO Box 3102 (for mail)
Curacao, Netherlands Antilles
education@curacao-sea-aquarium.com

Registration

A Registration Form accompanies this Meeting Announcement (at end of Newsletter). Please note that substantial cost saving may be realized by early (before May 1, 2005) registration. The registration fee covers the initial reception, all meetings, two coffee breaks per day, a book of abstracts, the program, the published meeting proceedings, and a souvenir T-shirt. Tickets to the closing banquet and local field trips will be sold for nominal prices at the registration desk when you arrive. The registration fee includes membership dues for one year, which will be applied to year 2005 dues or to 2006 dues if the registrant has already paid year 2005 dues.

Accommodations

The venue hotel will be the Lions Dive Hotel and

Beach Resort. Our special AMLC room rates are U.S. \$85.00 for single occupancy, and U.S. \$95.00 for double occupancy. These rates include taxes and a buffet breakfast, and are based on our renting a minimum number of rooms. We encourage all attendees to stay at the venue hotel, and we suggest you make early reservations to assure your getting these great special rates. The rooms will be held until May 1, 2005, after May 1 the rooms will be made available to the general public. You will need a credit card to confirm your reservation. To make your hotel reservations, contact:

Sales Manager / Reservations
Lions Dive Hotel and Beach Resort
Bapor Kibra z/n
Curacao, Netherlands Antilles
Tel: 05999-434-8888
Fax: 05999-434-8889
E-mail: c.winklaar@lionsdive.com
Website: www.lionsdive.com

Travel

A valid passport is needed to enter Curacao, and possibly a visa depending upon your country of citizenship. Please check with your travel agent to determine if you need a visa, and if so, secure this visa early. Because shuttle service is not provided by the hotel, we suggest using a taxi. The cost of a taxi from the airport to the Curacao Sea Aquarium / hotel is U.S. \$22.

Registration form – Please go to end of Newsletter

17th Caribbean Geological Conference. July 2005.

The Seventeenth Caribbean Geological Conference will be held in San Juan, Puerto Rico in July 2005 under the auspices of the Department of Geology of the University of Puerto Rico at Mayagüez, Puerto Rico. The Conference is dedicated to the exchange of information on all aspects of Caribbean Geology.

Correspondence

All communications should be addressed to:
Johannes H. Schellekens

General Coordinator
17th Caribbean Geological Conference
Department of Geology, UPRM
PO Box 9017
Mayagüez, Puerto Rico 00681
geolconf@uprm.edu

- Application of geology to modern cultural problems.
- Hydrogeology; Coastal conservation, etc.
- Seismology
- Karst Geomorphology and Espeleology

Papers

1. The subject matter of the papers should relate to some aspect of Caribbean Geosciences.
2. Abstracts of papers may be submitted in English, Spanish or French, but should include an English summary. All abstracts (300 words maximum) should be presented in English and should be submitted before February 28, 2005.
3. It is preferred if abstracts are sent in a digital format as Microsoft Word or Acrobat Reader submitted either by e-mail or diskette.
4. Oral presentations will be of a maximum duration of 20 minutes; five minutes will be allowed for discussion, and a further five minutes between speakers.
5. It is hoped that the Conference will be conducted in a series of symposia devoted to specific themes. Possible topics may be **(but are no way restricted to)**:

- Caribbean Stratigraphy and Sedimentology ,
- Paleontology and Palaeoecology
- Igneous Petrology and Vulcanology
- Structural Geology, metamorphism and tectonics
- Accretionary Prisms
- Caribbean Plate Tectonics
- Recent Carbonates
- Hydrocarbons in the Caribbean
- Industrial Minerals Geology
- Metalliferous deposits
- Environmental geology and hydrogeology

Simultaneous sessions may be held depending on the number of papers selected for presentation. Space will be allocated for Poster sessions.

Conference Site and Facilities

The conference will be held at the Caribe Hilton Hotel, which is a resort within the beautiful and historic city of San Juan, Puerto Rico. The hotel is located within 15 minutes of the Luis Muñoz Marin International Airport and was chosen because of its first rate facilities and ample experience hosting large conventions. Modern presentation facilities such as overhead projection, slide projection, computer power point presentation, etc. will be available in each conference room.

Accommodation

A block of rooms has been reserved for participants. Please make reservations directly with the hotel. Remember to identify yourself as a Geological Caribbean Conference attendee to obtain the special conference rate. Reservations must be made by the cut-off date of **June 17, 2005** to be certain to get the conference rate. Standard Room \$140 (single or double occupancy).

Caribe Hilton Hotel, <http://www.Caribe.Hilton.com>
Los Rosales St.
San Jerónimo Ground
San Juan, Puerto Rico 00901
Toll-free: 1 (800) 227-4231
Telephone: 1 (787) 721-0303
Fax: 1 (787) 724-6992

Registration fees* (US dollars)

	<u>Until April 15</u>	<u>After April 15</u>
Participating Members	\$195.00	\$245.00
Participating Students	\$115.00	\$170.00

*Registration includes ice breaker, coffee breaks, lunches, welcome reception, programs, book of abstracts, and the final transactions. Refunds of pre-registration fees will be made for cancellations done before May 15, 2005 (\$25.00 for administrative costs will be deducted).

Travel

Most major US carriers offer non-stop service to San Juan via their North American hub cities. Canadian travelers can reach San Juan via nonstop service from Toronto on Air Canada. Iberia Airlines offers nonstop service from Europe originating in Madrid. Other European travelers can make convenient connections through several different Caribbean portals, New York, or Miami. South American travelers will usually find Miami to be the most convenient connection. Other international travelers can easily reach San Juan through most major North American airports.

Visas

The U.S. dollar is the local currency and no visas or passports are required to enter Puerto Rico from the United States. Persons traveling from other countries should check with their travel agents about visa requirements. There are no customs duties on articles bought in Puerto Rico and taken to the U.S. mainland.

Field trips (Tentative)

Pre-Conference and Post-Conference field trips will be available. Possible field trips will be:

- Puerto Rico Quaternary Geology and Paleoseismicity
- Geology of Mona Island
- Geology of Puerto Rico
- Karst of Northern Puerto Rico
- Geology of Northern Virgin Islands\

New Books

Taming of the Oyster: A History of Evolving Shellfisheries and the National Shellfisheries Association.

Melbourne Romaine Carriker. 2003. The Sheridan Press, 450 Fame Avenue, Hanover, PA 17331 USA. 264 p.

Review by Steve LeGore

A history of the National *Shellfisheries* Association (NSA) has got to be boring, right? Well, maybe, unless it is compiled and written by Mel Carriker. I first encountered Mel at the 1973 NSA meeting in New Orleans. He presented results of his research on oyster drill mechanisms of attack for overpowering oysters by rasping a hole through the oyster's shell for three days. Mel may be the only person I know who could have filled this attack with drama, complete with frontal assaults, flanking maneuvers, desperate defenses, the joy of winning and the agony of defeat. He enthralled the entire audience for 20 minutes – one of the most remarkable feats I have ever seen. I believe he has done it again with this book.

The NSA was established in 1930, but Mel doesn't begin here. No, he chooses to begin in 1638 when oysters comprised a plentiful dietary staple among Connecticut settlers and local Indians. If one must begin, then one probably should begin at the beginning, right? But the organizational embryo of the NSA was the Oyster Growers and Dealers Association established in 1907, followed almost immediately by formation of the National Association of Shellfish Commissioners (NASC) in 1908 in response to numerous oyster industry challenges and issues. Over the next several years, an increasing influence of scientists concerned with ecological, economic, and shellfish sanitation issues, largely led by students of Dr. Louis Agassiz, led to the reorganization of these associations into the NSA. From these beginnings, the NSA evolved into a dynamic and influential association of shellfish scientists and shellfish industry specialists that can in many ways provide a model for the future of the AMLC. The NSA was established because issues

needed to be explored and questions begged to be answered, circumstances to which Caribbean ecology is no stranger.

Mel relates the subsequent history of the NSA against a backdrop of issues of the day, including World Wars, economic crises, oyster disease issues, and the development of aquaculture. The discourse therefore is alive with drama, and places decisions and research initiatives into historical perspective. It is a good read, and is replete with “who did what,” but I must admit that among my own favorite parts of the book are the pictures! I am certain that this photo collection results from monumental effort, which I, for one, genuinely appreciate. As I search through the pages I see and remember a lot of old friends, but even more intriguing is that I find pictures of them from years before I knew them, and I find others of people I know only from the literature or in some cases by legend. Robert Coker, Paul Galtsoff, Victor Loosanoff, Thurlow C. Nelson, Sewell Hopkins, Harold Haskin, Ken Chew, and yes, even Mel Carriker, are presented in their elements. Dozens of others are provided, so I will not even try to be comprehensive for fear of inadvertently omitting some very relevant personalities. There is even one taken during a sponge study off Nassau of a Dr. Smith sucking on a pipette *with his mouth* from the days when this was accepted practice!

“Taming of the Oyster” is a highly readable and valuable record documenting the evolution of American shellfisheries science and the accomplishments of worthy people with common interests and objectives. All the facts are there, but this is not the dry droning book it could have become in other hands. Broadly used anecdotal incidents provide illustrative entertainment and perspective to events affecting the NSA and its members. This book also provides insights into the lives and careers of dedicated scientists and professionals very similar to many of our friends in the AMLC, and I sincerely commend Dr. Melbourne Carriker for undertaking the clearly huge effort needed to successfully create this engaging history of a small group of professionals dedicated to making good science.

Steve LeGore

“Taming of the Oyster” is available for US \$25 plus shipping and handling through NSA President Sandy

Shumway, Department of Marine Sciences, University of Connecticut, 1080 Shennecossett Road, Groton, CT 06340 USA.

E-mail: Sandra_shumway@uconn.edu.

Coral Health and Disease

Edited by E. Rosenberg and Y. Loya

Springer (2004) – 488 pp.

Over the last two decades coral reef communities have been experiencing increasingly stressful conditions due to a combination of natural and anthropogenic factors. Coral diseases are among the most recent and destructive factors in a series of recent threats (bleaching, overfishing and coastal development). During an international meeting on coral diseases held in Eilat, Israel in 2003, leading scientist presented reviews and recent results of laboratory and field research in order to assess the current status of coral health and to understand the disease mechanisms. This book compiles the most relevant papers presented. It starts with geographic reviews of the status, prevalence and impacts of coral diseases in the different oceans, then it continues with reviews of the most relevant afflictions and their etiology and ecology, and at the end, contrasting hypotheses on the mechanisms of coral bleaching are discussed.

Book is available from Springer-Verlag

Change of Address

MOVING? To ensure that you continue to receive *Caribbean Marine Science*, notification of upcoming AMLC meetings and other AMLC information, please fill out the following change of address form and mail to:

Dr. Laurie Richardson
79 Marina Avenue
Key Largo, FL 33037
richardl@fiu.edu

Name & Title _____

Institution/Association _____

Address _____

Telephone _____

FAX _____

E-mail _____

Scientific Interests _____

Dues

Individual membership dues for 2004 are \$25.00 due March 31st, 2004. You may also help AMLC with a donation membership contribution if you wish; the schedule for these is presented below. Student dues are still \$5 per year. **The AMLC can accept credit cards payments (Visa, MasterCard or American Express) for AMLC dues.** A 5% service charge will be added to credit card payments. Checks must be in U.S. dollars, from U.S. banks (or a U.S. dollars bank draft), made out to "AMLC", and sent to Laurie Richardson.

Name & Title _____

Institution/Association _____

New Address _____

Telephone _____

FAX _____

E-mail _____

Scientific interests _____

Membership Options: Student (US\$5.00) _____
Regular (US\$25.00) _____ Sponsor(US\$30.00) _____
Sustaining Member (US\$50.00) _____ and
Patron (US\$100.00) _____.

My check (bank draft) is enclosed for US\$ _____ OR Please charge US\$ _____ to my
Visa () Mastercard () (Charge will include an additional 5% to cover handling expense)

Card # _____

Expiration Date _____

Cardholder _____

Signature _____

AMLC Background & Goals

The Association of Marine Laboratories of the Caribbean (AMLC) was founded in 1956 by marine researchers with interests in the marine science of the tropical Atlantic and Caribbean. Founded primarily as a scientific organization, the strength of the AMLC lies in the diversity of its member laboratories and the extensive expertise of its membership. Institutional, individual scientist and student memberships are available.

Annual AMLC meetings are hosted by member laboratories which are actively conducting marine research in the Caribbean. The host laboratory arranges for facilities for research presentations, copies of the presented abstracts (the proceedings) and accommodations for participants. The AMLC has no designated official language so researchers are free to make their presentations in their native language.

Caribbean Marine Science, published in English and Spanish, is the biannual newsletter of the AMLC and informs members of AMLC activities, pertinent events, and relevant research.

The purpose of the AMLC is to advance common interest in the marine sciences by:

- a. Assisting and initiating cooperative research and education programs
- b. Providing for a for exchange of scientific and technical information
- c. Fostering personal and official relations among members
- d. Publishing the proceedings of scientific meetings and a newsletter
- e. Cooperating with governments and other relevant organizations
- f. Other means that may be desirable.

2004-05 AMLC Officers

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Contributions to the AMLC Newsletter:

All members of the AMLC (individual and laboratory) are encouraged to send relevant news items at any time, to the newsletter. Relevant news items include, but are not limited to: new facilities, faculty/staff changes, positions available, research programs and initiatives, publications of general interest, awards, visiting scientist opportunities, and education programs. Submitted items should be sent to the AMLC newsletter office by the end of February for inclusion in the Spring issue, and by the end of September for the Fall issue.

Please send your information and comments to:

Dr. Ernesto Weil
Department of Marine Sciences
University of Puerto Rico
P.O. Box 908
Lajas, Puerto Rico, 00667.
FAX: (787) 899-5500/2630.
E-mail: eweil@caribe.net

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32nd SCIENTIFIC MEETING OF THE ASSOCIATION OF MARINE LABORATORIES OF THE CARIBBEAN CURACAO, JUNE 13-17, 2005

REGISTRATION FORM

Name _____

Position : _____

Organization: _____

Address: _____

City: _____ State: _____ Postal Code: _____

Country: _____ Tel: _____ E-mail: _____

Accompanying person (s) _____

Mark (X) your registration status: Early registration Before May 1, 2005 Late registration After May 1, 2005

Members of AMLC

Full (\$ 275.00) _____ (\$ 315.00) _____

Student (\$ 105.00) _____ (\$ 135.00) _____

Accompanying person (\$ 100.00) _____ (\$ 130.00) _____

New members are requested to fill out the attached Membership Form.

Total included with this registration \$ _____

ALL PAYMENTS MUST BE MADE BY BANK DRAFT PAYABLE TO THE CURACAO SEA AQUARIUM

Please send completed registration form with your payment to:

If by postal mail:

Steve Piontek, Education and Research Manager
Curacao Sea Aquarium
P.O. Box 3102
Curacao, Netherlands Antilles

If by courier (e.g. Federal Express):

Steve Piontek, Education and Research Manager
Curacao Sea Aquarium
Bapor Kibra z/n
Curacao, Netherlands Antilles

For information and inquiries, you may contact Mr. Steve Piontek at:

Tel: 0599-9-461-6666 or by E-mail at: education@curacao-sea-aquarium.com

NEW MEMBERSHIP REGISTRATION

TO BE COMPLETED AND SUBMITTED WITH THE REGISTRATION FORM FOR THE 2005 SCIENCE MEETING IN CURACAO

Association of Marine Laboratories of the Caribbean

Thank you for your interest in joining the AMLC. Our membership categories are as follows:

- Student (\$5.00) Regular (\$25.00) (Sponsor (\$30.00
(Sustaining (\$50.00 Patron (\$100.00)

Please note that payment of the registration fee covers your membership for 2005 at the Regular or Student rate. If you wish to join AMLC at the Sponsor level or above, please indicate (above) at which level you are joining, and add the additional amount to your registration payment for the Curacao meeting (June, 2005).

Next, please fill out the following information and mail the completed form with your meeting registration materials.

Name and Address Information:

Name: _____

Address: _____

Scientific interests: _____

Telephone: _____ Fax: _____

E-mail: _____

******* CURRENT AMLC MEMBERS *******

Please note that payment of the meeting registration fee covers your membership at the Regular (\$25.00) or Student (\$5.00) rate. If you wish to pay your dues at the Sponsor level or above, please indicate (below) at which level you wish to support AMLC, and add the additional amount to your registration payment for the Curacao meeting .

- (Sustaining (\$50.00 (Sponsor (\$30.00 Patron (\$100.00)

THANK YOU FOR YOUR SUPPORT OF AMLC!

**32nd SCIENTIFIC MEETING OF THE ASSOCIATION OF
MARINE LABORATORIES OF THE CARIBBEAN
CURACAO, JUNE 13-17, 2005**

ABSTRACT – RESUMEN - FORMAT

The abstract should be in the following IBM or compatible format: Word processor: MS Word 7- or higher. **Font:** Times-Roman (size 11) - **Margins:** 1.0" all sides. **Title** – All in capital letters; font size 11 in bold. Title should be short (2 lines maximum) and include Order and Family of organisms when needed. Scientific names should be in italics. In the next line, name (s) of author (s) with presenter underlined, a complete, but short, address for the senior author and his/her e-mail. **Text:** Leave one line, and then write the 300 word (maximum), single paragraph text (single space between lines) of the abstract, leave one line and write four keywords for the abstract, the session you want to give your presentation, and if it will be an oral presentation or a poster. Please, let us know if you would like to co-chair a session.

Example:

ECOLOGICAL CHARACTERISTICS OF A NOVEL STRATEGY OF ASEXUAL REPRODUCTION IN CARIBBEAN MASSIVE CORALS.

E.Weil*, A.L. Ortiz, H. Ruiz & M. Schärer.

*Department of Marine Sciences, University of Puerto Rico. P.O. BOX 908, Lajas, PR 00667, USA. eweil@caribe.net

Corals can reproduce asexually by at least five described strategies. Only fragmentation and asexual larvae have been reported for the Caribbean. A novel strategy of asexual reproduction was observed in massive colonies of the genera *Diploria* and *Dendrogyra* in the Caribbean. These species produce asexual buds which develop as soft-tissue outgrowths on the ridges, and deposit a well organized skeleton which is not connected to the parent colony. We have termed these propagules **gemma** (pl. gemmae). Gemmae may stay attached until they get large and heavy and/or surge conditions are strong. Detached, surviving gemmae form "rolling stones" or re-attach to the substrate. Some ecological characteristics were assessed by band transects, counts of number of gemmae per colony, depth distribution, etc., in several coral reef areas across the wider Caribbean. Results indicate that: (1) gemmae are widely distributed from Bermuda to Venezuela, and were restricted to shallow areas (< 5 m); (2) in Puerto Rico, *D. clivosa* had a higher abundance of colonies with gemmae (25.5 %) compared to *D. strigosa* (11.7 %) and *D. labyrinthiformis* (8.7 %); (3) *D. strigosa* and *D. clivosa* had significantly higher average number of gemmae per colony (14.9 and 6.8 respectively) than *D. labyrinthiformis* (1.2); (4) the number and size of gemmae was not related to parent colony size; (5) average size of gemmae was similar between the three species in Puerto Rico, and significantly larger in *D. strigosa* (5.49 mm) compared to Venezuela (3.62 mm). Maximum size was found in *D. clivosa* (26 mm). This strategy could have evolved as a response to the environmental instability of shallow reef habitats, and may explain the dominance of *Diploria* in these habitats. Further research on the genetic composition of populations of *Diplorias* in shallow reef habitats, and the ecological consequences of this strategy is needed.

Keywords: Massive scleractinian corals, asexual reproduction, gemmae, Caribbean.

Session: General Caribbean Marine Sciences

Oral Presentation _____

Poster Presentation _____

Willing to chair or co-chair a session _____

Specify subject area of session willing to chair _____