



Caribbean Marine Science



Official Newsletter of the AMLC Published Spring and Fall

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Association News

From the Editors' desk

Greeting to all our members. We hope all of you who attended our Scientific Meeting in Costa Rica had a great time, saw old colleagues and met new friends. Even though many were feeling the pinch of the depressive economy, the meeting was well attended and our charismatic and attentive hosts made all efforts to steer it to another AMLC successful event. We'd like to thank the University of Costa Rica for hosting the event, Jorge Cortés and his team of volunteers for their excellent organizing work, the sponsors, volunteers, and the AMLC Executive Board Members who were involved in the Meeting organization.

Over 100 representatives (41 students and 63 professionals) from 28 countries from the Caribbean, Central and North America, Europe, Middle East, and

Oceania attended the event. There were four excellent plenary talks given by World recognized scientists, 58 oral presentations and 49 posters. We would like to thank the Plenary speakers, Drs. Peter Mumby, Peter Sale, Patricia Miloslavich and Robin Mahon for their excellent contributions. Mr. Aaron Miller from the USA won first prize (\$250.00) for the best Student Oral Presentation. Ms. Chatchanit Arif, a student from Thailand working on her Ph.D at the King Abdullah University for Science and Technology in Saudi Arabia, was the runner-up (\$150.00), and Ms. Natalie Barrantes from Costa Rica won third place (\$100.00). Shruti Arora from the University of the Virgin Islands won first place (\$125) for the best Student Poster Presentation and Emily Broderick from Florida International University won second place (\$125), congratulations to all. The field trips were varied and everybody who participated had a great time.

Proceedings

Dr. Jorge Cortés has informed that the Meeting proceedings are ready and will be shipped shortly. We would like to thank Jorge and his team of co-editors for their quick turn-around of the manuscripts and the publication of the Proceedings, and Revista de Biología Tropical for publishing the proceedings. A pdf version will be available.

In this issue we present Information on a Small Grant Program for Caribbean NGS and other private institutions of the region, and several interesting short articles about mesophotic and "twilight" reefs, the value of coral reef ecosystems, a report on the potential impact of climate change on Latin-America coast lines, mysteries of killer whales, new laws protecting sharks, and new MPA considerations in

Bonaire. Information on upcoming meetings, Summer courses and new books of interest are presented in the respective sessions.

Future Meetings of the AMLC

This year's Executive Board Meeting will be hosted by Rita Peachey and the CIEE Research Station in Bonaire on May 23rd, 24th, and 25th. There will be several rooms available at the CIEE Research Station or you may choose to stay at Capt. Don's Habitat. In order to get the best rate quote from Capt. Don's Habitat, Rita needs to know how many board members are planning to attend this year and how many would prefer to stay at the resort versus the research station.

The cost for accommodation at the research station will be \$50/night for a single room and a caterer will provide breakfast, lunch and dinner for about \$35/day. There is a full kitchen if you want to prepare your own meals. Each of the rooms at the station has 2 to 4 beds and a private bathroom. If you want to share accommodation with a friend, the cost will be \$35/night for each person sharing the room. You can see photos of the research station at www.cieebonaire.org. Capt. Don's will cost about \$140/night for a Deluxe Oceanfront Jr. Suite (which includes breakfast). If you want to extend your stay for a week, the rate will be roughly \$850 for a week because if you stay 6 nights you get the 7th night free. <http://www.habitatbonaire.com/pages/Deluxe-Ocean-Front-Jr.-Suite.aspx> is the link to look at the accommodations at Capt. Don's.

There are several direct flights that come to Bonaire once a week. Delta comes every Saturday from Atlanta, Continental flies a redeye from Houston and from Newark every weekend. American also flies from MIA to Curacao every day. Insel air flies from Charlotte to Bonaire every Wednesday and Saturday but it is not a direct flight. Insel also flies from MIA and Caracas to Curacao every day – I think. Then you can take a local plane to Bonaire – Divi Divi Air or Dutch Antilles Express have flights to and from Curacao several times each day.

Please let Rita know if you are planning to attend and your choice of the resort or the research station for accommodation.

Rita Peachey

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Our next Scientific Meeting scheduled for the early summer of 2013 will be hosted by Peter Gayle in Jamaica, and the 2014 Meeting by Mark Vermeij and CARMABI in the island of Curacao.

AMLC List Server

The purpose of the AMLC list server is to facilitate communication and foster collaboration between and among our members. We hope all AMLC members will take advantage of this service – if you have any news, requests, or questions to distribute to the membership, just send a message to the email address below. On-line discussions among members concerning Caribbean marine issues are encouraged. Only AMLC members in good standing can post to the list. Messages not from a subscribed member will not be accepted. Current AMLC members are automatically subscribed with the list controlled by Dr. Sarah Manuel (smanuel@gov.bm), AMLC's Membership Director, and new members are added as they join. The list server address is: members@lists.amlc-carib.org

Please send contributions for the Newsletters. 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.

Profile

The Council of International Education Exchange (CIEE) Research Station in Bonaire offers semester and summer courses for undergraduate university students and also hosts visiting scientists and faculty-led student groups from overseas. Bonaire is located off the coast of Venezuela in the southern Caribbean and is surrounded by clear, calm waters. It's home to the world famous Bonaire National Marine Park and

the research station maintains close ties to the marine park and other local conservation groups such as Sea Turtle Club Bonaire and the Department of Nature (DROB), which allows students to work closely with conservation professionals. The program is designed to prepare students for jobs or graduate programs in marine ecology and conservation. In addition to a full program of study, the undergraduate program provides dive training that prepares students for AAUS certification with the American Academy of Underwater Sciences.

"Our mission is to provide outstanding educational opportunities to students in Tropical Marine Ecology and Conservation. We strive to provide interdisciplinary marine research opportunities for CIEE students as well as visiting scientists and their students from around the world. Collaboration with ongoing local research and conservation efforts is basic to our mission as is our commitment to provide scientific data, analysis and support to Bonaire's environmental, educational and governmental entities"

More information on courses offered can be found via this link: <http://cieebonaire.org/coralreefecology.html>



Photos of the facilities and laboratory with students.

General Interest

Caribbean Coastal Communities Small Grants Program

Dear AMLC members, Counterpart International, the University of Miami, and the Punta Cana Ecological Foundation, are working in partnership with the Inter-American Development Bank to roll out a Caribbean Coastal Communities Small Grants program. As described in the Request for Expression of Interest (EOI), these grants are intended to support NGOs, community groups, and businesses working at the nexus of ecosystems, communities and economies through the sustainable management of coastal resources and livelihoods development in the Caribbean Region.

Our goal is to put in place the framework for a cross-regional transfer of knowledge and experience gained in the arena of conservation, restoration, fisheries replenishment and the implications on livelihoods and the sustainable development of coastal communities. This is a competitive process for which to identify and scale-up successful models in the Caribbean region. Grant Awardees will benefit through:

- 1- Connecting field practitioners with scientists spanning multiple fields;
- 2- Increased capacity for long-term stewardship of resources in a changing environment;
- 3- Access to training manuals;
- 4- Access to science for decision making;
- 5- Applying research findings to real life development challenges; and
- 6- Increased understanding for successful models linking restoration and livelihood enhancement

We are currently reaching out to our partners for assistance in (1) circulating the attached EOI to qualified applicants, (2) identifying areas of collaboration and synergy within similar programs to reach greater impact, and (3) seeking out co-sponsorship in the form of innovative marketing, media, and outreach support. We intend to leverage this initiative to better educate and inform an array of audiences of the importance of coastal and marine

ecosystems, and actively promote successful models that address mutual interests and mutual benefits to sustainable resource management. Your networks, brands and consumers are all integral stakeholders in shaping the future of our oceans.

We appreciate your support, creative ideas, and potential collaboration coming out of these efforts. If you have any questions or would like more details, please contact Christine Hicks at: Chicks@counterpart.org
Chicks@counterpart.org

**Christine Hicks, Senior Technical Advisor
Counterpart International**

Deep reef ‘twilight zones’ slowly yield their secrets to explorers

Ensnared in a plexiglass bubble some 500 feet beneath the azure waves of the southern Caribbean Sea, Carole Baldwin spied a lumpy oddball of a flesh-colored fish. It looked like an anglerfish, also known as a sea toad. Yet Baldwin, one of the most experienced Caribbean fish specialists alive, had not seen this variety. She directed a technician in the five-person submarine to grab the creature with the vehicle’s suction arm. A squirt of anesthetic slowed the oddball so the arm could drop it into a milk crate strapped to the front of the sub.

Here, on one of 21 dives Baldwin and her colleagues made just off the island of Curacao, was another prize, another species probably new to science. Then the sub dropped. The groggy fish floated out of the crate, roused and wriggled off into the dark.

“There’s always one that gets away,” Baldwin said later in her office at the Smithsonian’s National Museum of Natural History, where a taxidermied swordfish presides from high atop the back wall. But at least a half-dozen newly discovered species did not escape the milk crate this summer.

At the surface, Baldwin photographed each fish and snipped tissue for DNA analysis, to see if the fish were indeed new to science, as she suspected.

While much of the ocean remains a vast unknown and no doubt full of unseen creatures, most of the Caribbean has been well surveyed. Pulling new

species from this sea was “a huge surprise,” Baldwin said. “Everyone thought, ‘Been there, done that.’”

Baldwin is one of a handful of scientists exploring a little-studied twilight zone known as mesophotic, or “middle light,” reefs. Although they lie more than 200 feet below the surface, these reefs resemble their colorful, shallow-water cousins. Big barrel sponges, waving blue sea fans and soft yellow corals thrive, as do bright fish familiar to snorkelers whose rear ends poke above the waves.

“You could put somebody in a submarine, blindfold them, put them in front of a beautiful deep-reef environment and they wouldn’t know the difference,” Baldwin said.

A few intrepid explorers began diving down to deep reefs in the 1980s, most notably deep-scuba expert Richard Pyle in Hawaii. But only in the past few years have scientists such as Baldwin begun dipping into the twilight zone in earnest. That’s because conventional scuba gear limits dives to 200 feet. And technology made famous by the deep-sea submersible Alvin in the 1960s allowed explorers to plunge to amazing depths, far beneath the twilight zone.

“If people come up with that kind of submersible money, they go right past this zone,” said Pyle, based at the Bishop Museum in Honolulu.

“We’re talking about areas that have never been looked at before, for the most part,” said Sylvia Earle, one of the world’s most prominent ocean advocates and an Explorer-in-Residence at the National Geographic Society. “The distance between 200 feet and 1,000 feet [deep] is perhaps the most neglected part of the ocean.”

Researchers need a ride

Baldwin’s voyage to Curacao began with a curious phone call in September 2010. “If you don’t have half an hour, don’t start talking,” said the voice belonging to Adrien “Dutch” Schrier, who owns a resort, an aquarium and a dolphin-encounter business on the island.

To his leisure empire, Schrier had added a \$2.2 million submersible hardened to dive to 1,000 feet, bought from the Canadian company Nuytco. Schrier dubbed it the Curasub and began offering tourist

excursions for \$650. His resort happened to be situated perfectly: off the shoulder of South America, smack next to the continental drop-off. Motor just off Schrier's pier, and the bottom plunges. With a keen eye for fish — for his Seaquarium and for commercial sale — Schrier began noticing species he did not recognize. Through a contact, he found Baldwin and invited her down. "Bad coffee, bad burgers, great diving," Schrier told her.

So Baldwin, along with Ross Robertson from the Smithsonian's Tropical Research Institute in Panama, launched the Deep Reef Observation Project. The goal: Cataloging the biodiversity of the twilight zone across the region. Schrier offered sub rides to Baldwin's crew gratis in May, June and July. It was a great deal, and not just for the price: Very few research submarines operate today.

Alvin, owned by Woods Hole Oceanographic Institute, is in dry dock for retrofitting. Earlier this year, the Harbor Branch Oceanographic Institute, part of Florida Atlantic University, disposed of two other workhorse vehicles, the Johnson-Sea-Links, with 9,000 dives between them. One is now mothballed, the other sold to Brazil. The National Oceanographic and Atmospheric Administration owns none, though it does fund work with two Pisces subs at the University of Hawaii.

"For the U.S., that's about it," said Earle. "It's a disappointing gap." Schrier is eager to fill that gap. He purchased a mother ship for the Curasub from NOAA, the Chapman, which can drop the sub over twilight zones near Belize, Panama and elsewhere. Onboard, Baldwin and other researchers will be able to expand their search for more of the Caribbean's hidden biodiversity. But first, they need funding: no more free rides from Schrier. Baldwin recently applied for a Smithsonian grant, hoping to get another shot at the ugly anglerfish that swam away: "We'll be looking for that one next time."

Hawaiian finds

Beyond the submersibles, there's another option: deep-scuba diving. A self-described "fish nerd," Pyle helped pioneer such dives in the 1980s. "My particular passion for fishes is finding new things," he said, hours after disembarking from a month-long expedition to the Papahānaumokuākea Marine

National Monument in the Northwestern Hawaiian Islands. "The best way to do that on the reef is to just go deeper than anyone had been before."

So Pyle dives the twilight zone reefs, descending to 500 feet with a setup that recycles exhaled gas and uses exotic air mixes to prevent the bends. He has collected thousands of fish from across the Pacific and discovered more than 100 species. For each hour of bottom time — he gets only about 10 minutes at 500 feet — he finds 12 unknown species. "It's an absolutely incredible rate of discovery," said Earle.

In Hawaii, Pyle discovered a "dead zone" at about 200 feet, where temperatures fluctuate daily and limit the number of fish and coral species that can thrive. Below that, where temperatures are more stable, the diversity of the reefs picks up again. Few hard corals exist in the twilight zone, as they depend on symbiotic microorganisms that need sunlight. Fish colors differ, too. More than in the shallows, deep-reef fish tend toward red, which appears black in the depths. Black-looking fish can probably evade predators more easily, Pyle said. It may be that red is "physiologically cheaper" to make than black, he said, so fish have evolved with that color.

Also common are high-contrast color patterns, such as black-and-white, and red-and-white stripes. Pyle surmises that such patterns make it easier for mates to spot each other. Pyle and a handful of other twilight zone researchers have just begun exploring one big question: Can the cooler deep reefs serve as a refuge for shallower species as the oceans warm? In 2007, NOAA gave Pyle a \$250,000, five-year grant to explore the question. For hard corals, which need light, the answer is no. For many fish, the answer may be yes. However, with so little research underway, it's unclear if shallow-reef fish spawn progeny that migrate deeper, or if deep-bred juveniles migrate upwards. Pyle said a DNA-testing project he's leading will help answer the question. In the Northwestern Hawaiian Islands two years ago, Pyle and Randall Kosaki of NOAA found a twilight zone "nursery" teeming with juvenile fish. The find highlighted a favorite message of Pyle's: Conservation, which usually focuses on the shallow reefs, needs to be extended into the twilight zone. "The reef doesn't end at 200 feet," he said.

By Brian Vastag, Published: October 31. The Washington Post

Report: ECLAC Report Examines Climate Change Impacts on Latin America and Caribbean Coasts

December 2011: The UN Economic Commission for Latin America and the Caribbean (ECLAC) has published a report that examines current and future trends in climate variability and their likely impacts on the region's extensive coastline.

The report, prepared by the Environmental Hydraulics Institute of the University of Cantabria, Spain, analyzes and provides an atlas of the current physical conditions and changes detected in key coastal variables in 44,851 miles of LAC coastline, such as average sea level, surface temperature of the sea, salinity, swells, astronomical tides, air temperature anomalies, wind changes and hurricanes. The report further looks at how these variables might be affected by 2040, 2050 and 2070.

The analysis divides results into four basic geographic areas: North America; Central America; South America; and Caribbean islands. Where possible, the report tries to identify subregional differences in the variables. For example, it notes that the fastest sea level rise (three centimeters per year) is in Northern Brazil, Venezuela, Colombia's Caribbean coast and some Caribbean islands, and the slowest in Ecuador.

The report is the first in a series of four, which are planned to be released in 2012 as part of an ECLAC project on climate change and LAC coastal regions financed by the Government of Spain. The second will look in greater detail at the vulnerability and exposure to climate change of LAC coasts, the third will detail probable climate change impacts, and the fourth will evaluate the climate change risks faced by LAC coasts. ECLAC also plans to release support documents on the theories and methodology used to project climate change impacts on LAC's coastal regions and analyze their risks.

Publication (in Spanish):

<http://www.cepal.org/publicaciones/xml/2/45542/ W.447.pdf>

New Laws in California & Marshall Islands Protect Sharks

In October, California and The Republic of the Marshall Islands became the latest entities to pass laws protecting sharks. California joined Hawaii, Washington, Oregon, CNMI, and Guam in banning the sale, trade, and possession of shark fins. It is estimated that 75 million sharks are killed each year for their fins and, in many cases, the fins are cut off while the sharks are alive and the animals are tossed back into the ocean to die. The ban in California goes into effect on January 1, 2012 but existing stocks of fins, such as those in possession by restaurants serving shark fin soup, can be used until January 2013. California is one of the largest consumers of shark fins outside of Asia.

Also this month, The Republic of the Marshall Islands established the world's largest shark sanctuary by ending commercial fishing of sharks in all 768,547 square miles of its Pacific waters. The law bans the sale, trade and possession of sharks, shark fins, or any other shark parts. Under the law, any shark caught accidentally by fishing vessels must be released, and large monetary fines between US\$25,000 to US\$200,000 can be assessed for anyone found to be fishing for sharks or in possession of shark fins. In addition, violators would be fined the market value of the product in their possession.

Reef Check 2011.

Mysteries of Killer Whales Uncovered in the Antarctic

Two of the world's leading experts on the world's top marine predator are now in Antarctica, tagging and photographing a creature whose remarkably cooperative hunting behavior and transmission of knowledge across generations may be rivaled only by humans. On the afternoon of January 10, at the tip of the Antarctic Peninsula, whale researchers Robert L. Pitman and John W. Durban stood on the bridge of a cruise ship, peering through binoculars for signs of killer whales. The Weddell Sea, where English explorer Ernest Shackleton and his men were locked in the sea ice nearly a century ago, was calm and

studded with icebergs. It was raining, an increasingly common occurrence in summer in this rapidly warming part of Antarctica.



Photo by Bob Pitman

Around 3 p.m., Pitman spotted several of the distinctive triangular dorsal fins of killer whales two miles ahead. Soon, roughly 40 killer whales appeared on all sides of the cruise ship, the *National Geographic Explorer*, delighting the nearly 150 passengers on board. Antarctic killer whales “spy-hop” a Weddell seal on an ice floe.

Pitman and Durban stepped into a rubber Zodiac driven by a ship’s naturalist and cruised slowly toward the whales. Two large female killer whales approached, rolled on their sides, and “took a long look at us with wide open eyes as they passed a few feet under the Zodiac,” Pitman later recalled. One of the females surfaced next to the boat, and Durban, cradling a black crossbow, fired a satellite tag onto the middle of the whale’s dorsal fin. When the second female rolled on the surface, Durban fired a dart that would provide a tissue sample for scientific analysis. “Our skin donor,” Pitman said later.

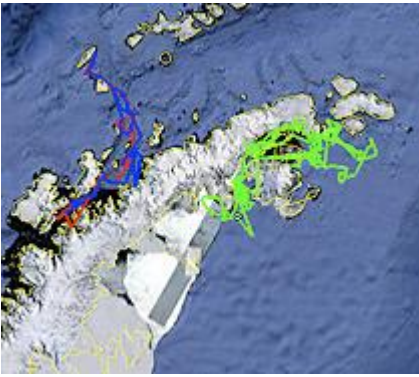
Thus began more than a month of killer whale research in the Antarctic, conducted by two of the world’s leading experts on these top predators, whose killing power, Pitman says, “probably hasn’t been rivaled since dinosaurs quit the earth 65 million years ago.” I was a lecturer aboard the *Explorer*, and was able to watch the pair work for more than a week in the Antarctic.

As many as 50,000 killer whales roam the world’s oceans today, and roughly half of them are believed to live in Antarctic waters. Yet though killer whales

may be the most recognizable creatures in the marine world, great deal about them remains a mystery, especially in the Antarctic, and Pitman and Durban are now gathering basic information about their behavior and feeding habits. This baseline data is particularly important since climate change and other human impacts, such as overfishing and the accumulation of toxic chemicals, are rapidly altering the whales’ habitats and their prey.

Scientists worldwide are still sorting out how many species and sub-species of killer whales — also known as orcas — exist in places like Alaska, the Pacific Northwest of the U.S. and Canada, and the North Atlantic. In Antarctica, Pitman and Durban — who work for the U.S. National Marine Fisheries Service in La Jolla, Calif. — have played a role in identifying three main types of killer whales in Antarctic waters and a fourth in the sub-Antarctic. The populations — likely separate species — differ in their distinctive black, white, and gray patterning; in the shapes of their dorsal fins and heads; in their geographic range; and in their food and foraging habits. Each individual has unique markings on the saddle behind the dorsal fin, and Pitman and Durban — who have amassed a collection of 40,000 photos of killer whales from Antarctic waters — have gotten to the point where they can recognize individuals and extended families. But what has driven the men to pursue killer whale research is not the minutiae of markings or migration routes, but rather the extraordinary culture and habits of these cetaceans, whose cooperative hunting behavior and intergenerational transmission of knowledge is rivaled only by humans, Durban and Pitman contend.

Killer whales — *Orcinus orca* — are long-lived, with females surviving for up to 90 years or more. The whales travel in extended family groups, with offspring generally remaining with their mothers their entire lives. Stable groups of whales join together in pods composed of different matriline (a dominant female and her offspring), and these related whales all communicate in a distinct dialect using an array of clicks, whistles, and pulsed calls. Killer whales — which gestate for 17 months — are believed to recognize their mother’s calls *in utero* and are born with the ability to immediately communicate.



Google Earth/Southwest Fisheries Science Center
An online map tracking three satellite-tagged killer whales

As many as four generations of killer whales will travel together, passing on astonishingly sophisticated group hunting behavior from one generation to the next. “You’ve got individuals that are spending 50, 60, 80 years together, and you can do a lot of things when you’re spending a lot of time with your family and related individuals,” Pitman told me in an interview. “You can hunt cooperatively. You can make sacrifices that other animals wouldn’t make. If you kill 50,000 seals in your lifetime, you get pretty good at it. And if you learn a few things you pass them on to your offspring. It makes them quite remarkable and very human-like in the things they do.” “We have grandmothers, great-grandmothers, and great-great-grandmothers traveling in groups together with younger whales, imparting cultural knowledge,” added Durban.

Three years ago, farther south along the western Antarctic Peninsula, Pitman and Durban spent three weeks observing such behavior among a group of pack ice killer whales, also known as large type-B Antarctic killer whales. The men studied a hunting technique known as “wave-washing,” in which a pod of whales moves through ice floes, its members lifting their heads out of the water — a behavior known as “spy-hopping” — looking for their preferred meal: fat, fish-eating Weddell seals. Once they spotted a seal on an ice floe, the whales called in reinforcements and, two to seven abreast, swam toward the floe and washed the seal off the ice by creating a large wave with powerful strokes of their tails. Pitman and Durban then observed what they call the “butchering” of seals, with the whales first drowning the seals and then meticulously stripping

off their skin to get at the choice flesh.

“It was shocking to see,” said Pitman. “You’re not used to animals doing things that are so canny.”

Pitman and Durban recently boarded the 331-foot *Explorer*, where they remained until mid-February, as guests of Lindblad Expeditions and National Geographic Expeditions. As visiting scientists, they use the ship as a research platform, and even rely on passengers to help take close-up photos of the killer whales’ distinctive markings, an example of the “citizen science” that has helped identify hundreds of individual killer whales in hot spots such as Alaska and the Pacific Northwest. Pitman, 62, who has a sweeping mustache, has worked in the Antarctic for more than two decades and has studied killer whales for the past 15 years. Durban, 35, a burly Englishman with a black beard, first worked with killer whales as a 16-year-old assistant to a pioneering whale researcher in Washington state.

The 40 whales the men encountered in the Weddell Sea likely comprised three matriline and belonged to an “ecotype” — or possibly new species — of Antarctic killer whale they refer to as a “small type-B”, related to the larger type-B “wave-wash” hunters. But little is known about the small type-B’s; Pitman and Durban have occasionally seen them feeding on gentoo and chinstrap penguins, but never on seals, and one of the goals of this year’s research is to get a better sense of what the small type-B’s are eating. The small type-B’s are roughly half the mass of a larger Antarctic killer whale, the type-A, which is found in more open water and hunts minke whales. Type-A males can grow to nearly 30 feet in length and weigh up to 10 tons.

In the three weeks since the female killer whale was tagged, she and her pod have traveled many hundreds of miles in the Weddell Sea, sometimes skirting the pack ice. Durban and Pitman **have tagged 15 Antarctic killer whales with the 1.4-ounce satellite transmitters** over the last three years, and the results have greatly expanded knowledge of their habits, preferred habitats, and migrations. Six of the tagged type-B killer whales made rapid migrations, following a nearly identical northerly trajectory, past the Falkland Islands and beyond to the Atlantic Ocean off

Brazil. One of the whales made a 6,000-mile round-trip journey from the Antarctic Peninsula to Brazilian waters and back again in just 42 days. Durban and Pitman believe the whales make these previously unknown migrations for one main purpose: shedding and renewing their skin, something they would be unable to do in frigid Antarctic waters because they would lose too much heat.

Four days after the scientists tagged the whale in the Weddell Sea, the *Explorer* was off the western Antarctic Peninsula, in the Gerlache Strait, a breathtaking passage flanked on both sides by glaciated mountains. There, the scientists encountered some old friends — an extended family group of roughly 70 small, type-B killer whales that spend much of their time in the strait

One whale made a 6,000-mile round-trip journey from Antarctica to Brazil in just 42 days.

Durban and Pitman photographed nearly all of the whales, and Durban — who possesses a photographic memory for killer whale markings — recognized many of the individuals from earlier encounters. Durban was unable to get positioned for a tagging shot with the crossbow, but 10 days later, on the following cruise, he managed to shoot a \$2,500 satellite tag, as well as a \$4,500 dive-depth tag, onto two killer whales in the Gerlache Strait. The depth tag would reveal some information on feeding habits they had long been looking for.

This is the kind of work that scientists worldwide are doing as they intensify research into a marine mammal long thought of as one species but that likely, in fact, comprises several distinct species. Genetic testing, for example, shows that so-called transient, mammal-eating killer whales in the Pacific Northwest diverged from the resident, fish-eating whales a half-million years ago and should perhaps be recognized as a distinct species, despite being found now in the same waters. This is not a purely academic matter, as distinct species, evolved to live in certain regions and eat certain prey, may be more vulnerable to environmental change. That change is happening rapidly. Many groups of these apex predators have accumulated extremely high levels of PCBs and other toxic chemicals, with potentially harmful effects on

development and reproduction. Global warming is also altering their world and that of their prey. As Arctic summer sea ice melts, for example, what will become of the predator-prey relationship between gray whales and killer whales as they gray whale migration extends deeper into the Arctic Ocean?

Meanwhile, in Antarctica, Pitman and Durban continue to unlock mysteries of killer whales. Last week, the depth tag they affixed to a killer whale in the Gerlache Strait showed that the whales were repeatedly making deep, nighttime dives of up to 1,900 feet off the western Antarctic Peninsula, an indication — for the first time — that these whales were most likely eating fish and squid on or near the sea floor

BY FEN MONTAIGNE

Improving MPA management in Bonaire

IUCN has published a study on the various resilience characteristics of the coral reefs in the Bonaire National Marine Park. It includes results on resilience indicators, benthic cover, coral population structure, algae populations and fish community structure which can determine how the coral reefs respond to climate change threats. The aim of the study is to provide information on how to incorporate resilience information and climate change responses into the Marine Protected Area (MPA) design and management, especially given the recent bleaching event that occurred in 2010-2011.

Bonaire's coral reefs remain among the healthiest and most resilient in the Caribbean. However, the IUCN study highlights that they are threatened by coastal development and artificial beaches, sewage leaching from septic tanks, increasing populations of damselfish that destroy coral, as well as animals and algae such as the *Trididemium* and the *Lobophora* that grow over and out-compete corals. The study argues that these threats could have serious implications for resilience to future climate change and other threats.

The sites were also ranked on their overall resilience and suggestions were made to improve their management. Since Bonaire heavily depends on tourism, where coral reefs are the major attraction, their health and attractiveness can directly influence

the island's economy. Protecting this valuable natural resource is crucial for the livelihoods of the island's inhabitants. There is much to lose economically and socially, as well as in terms of food security, biodiversity and other ecosystem services, if the coral reefs become too degraded.

This study is based on survey conducted from 31 May to 7 June, 2009 as part of the IUCN Climate Change and Coral Reefs Working Group global coral reef resilience assessments. The survey was made possible by the generous support of the National Fish and Wildlife Foundation, the Stichting Nationale Parken Bonaire and the Bonaire National Marine Park manager, Ramon de Leon. Partners included The Nature Conservancy (TNC), Caribbean Research and Management of Biodiversity (CARMABI), the University of Maine and Yale University.

Read the study [*Coral Reef Resilience Assessment of the Bonaire National Marine Park.*](#)

Meetings & Workshops

Interdisciplinary Climate Change Research Symposium. October 13-20, 2012

La Foret Conference and Retreat Center
Colorado Springs, CO, USA.

Participation limited to 30 early-career Ph.D. scholars
Airfare and on-site expenses are supported through grants from NSF and NASA

As our understanding of climate change and its far-reaching ramifications continues to grow, it is imperative for climate change researchers to form strong collaborative bonds that reach across disciplines and other boundaries. Every year the DISsertations initiative for the advancement of Climate Change ReSearch (DISCCRS, pronounced *discourse*) hosts a symposium for early-career climate change researchers. Our goal is to catalyze international, interdisciplinary collaboration while laying the foundation for dynamic, communicative collegial networks that are better-equipped to

understand and respond to the myriad challenges posed by climate change.

During the week-long symposium, the 30 invited DISCCRS Scholars will have the opportunity to present their research, hone interdisciplinary communication and teambuilding skills, and discuss emerging research and trends. Scholars will also have the chance to talk about the societal and professional challenges involved in climate change research, with each other and with established researchers invited to serve as mentors.

Applications will be reviewed by an interdisciplinary committee of research scientists. **The selection committee will favor applicants who plan to engage in interdisciplinary research careers in any subject relevant to the study of climate change, its impacts or its solutions.** We encourage applicants from the **natural and social sciences, mathematics, engineering,** and other fields, so long as their research focus relates to climate change, its impacts or its solutions. Although the emphasis is on the U.S. research system, we welcome applicants from all countries who are interested in learning about the U.S. research system or connecting with U.S. researchers. *Airfare and on-site expenses are supported through grants from NSF and NASA.*

Symposium application instructions:

http://discrs.org/application_instructions

<http://discrs.org>

<http://discrs.org/discrsposter.pdf>

2nd Annual International Symposia of Mycology (ISM-2012). July 30 to August 1, 2012 in Guangzhou, China.

The Symposia includes several sessions dealing with different aspects of mycology, including one full session dedicated to Aspergillosis, the fungal disease affecting sea fans and other octocorals in the Caribbean .

The major sessions are:

ISM-1: Basic Research on Mycology

ISM-2: Antifungal Drug Discovery

ISM-3: Fungal Disease, Diagnosis and Clinical Management

ISM-4: Fungal Biotechnology

For the program details:

http://www.bitlifesciences.com/wcm2012/fullprogram_ism.asp

Ms. Maya Chen
Program Coordinator
Organizing Committee of ISM-2012, China
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Dalian Hi-tech Industrial Zone
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Fax: 0086-411-84799629
Email: maya@bitconferences.com

Instructors: Dr. Samantha de Putron, BIOS and Dr Gretchen Goodbody-Gringley The Coral Reef Ecology summer course at BIOS exposes the student to the reef ecosystem at all organizational levels, from physiological ecology through population biology, community structure to ecosystem dynamics, and ends with consideration of human impacts and climate change. The course has a large practical component, and the field surveys along with complementary laboratory analysis provide training in many techniques commonly used in coral reef research. The format and content of the course is geared to upper-level undergraduates and graduate students. SCUBA certification required.

Any queries may be directed to education@bios.edu

Courses

The Bermuda Institute of Ocean Sciences

The BIOS is offering 2 undergraduate/graduate Summer Courses - the application deadline for both is just coming up; March 15th.

Application forms and further info available here:
http://www.bios.edu/education/summer_courses.html

1-Microbial Oceanography: The Biogeochemistry, Ecology and Genomics of Oceanic Microbial Ecosystems - 17 June – 7 July 2012.

Instructors:

Dr. Craig Carlson, The University of California, Santa Barbara Dr. Stephen Giovannoni, Oregon State University Dr. John Heidelberg, The University of Southern California Dr. Craig E Nelson, University of California, Santa Barbara The recent synthesis of biogeochemistry, microbiology and environmental genomics has made the marine water column one of the most exciting topics of modern ecological research. This course presents an integrated perspective, using a combination of lectures, laboratory experiments, bioinformatics laboratory exercises, and field trips to the open ocean and coral reefs, including an open-ocean research cruise aboard BIOS's new ship.

2. Coral Reef Ecology - 15 July - 5 August, 2012

BIOS 2012 REU Program

The Bermuda Institute of Ocean Sciences has received National Science Foundation Research Experiences for Undergraduates (REU) funding to support 4-8 fellowships for undergraduate student research at BIOS during the 2012 fall semester (Dates: arrive on August 29, 2012 - depart on November 25, 2012). Students will design and conduct independent projects under faculty supervision within several research areas including:

- .- Biology, chemistry and physics of the open ocean
- .- Biology, physiology and biochemistry of reef building corals and reef ecosystems
- .- Aspects of the molecular biology of marine organisms
- .- Environmental chemistry of Bermuda's atmosphere and inshore waters
- .- Effects and consequences of global environmental change

Students who have completed at least two years of undergraduate study and will still be undergraduates in the fall of 2012 are eligible to apply. Minorities and women are especially encouraged. Applicants must be U.S. citizens or permanent residents. We encourage all successful applicants to arrange for independent study credit through their home institutions. Each successful REU applicant will receive a stipend paid at competitive rates. Students will reside on the BIOS campus. Travel expenses, tuition, room and board will be covered by the REU program.

You can apply to BIOS's REU program by downloading an application form (in Word format) at <http://www.bios.edu/education/REUapp.doc> and e-mailing your completed application to the address listed on the form. If you have difficulty with the form, you can contact BIOS's Education Department at education@bios.edu or telephone (441) 297 1880.

If you have any other questions about the program or BIOS, please e-mail education@bios.edu or check <http://www.bios.edu/education/reu.html>.

Applications will be accepted until the program is full. Initial selection of participants will begin May 30. Students will arrive on August 29 and will begin work on August 30. Work will end on November 24, with students departing on November 25.

Caribbean Internships (MEE)

The Marine Ecology Expeditions (M.E.E.) Caribbean Internship Program is offering 3 – 6 month work experience internships in Bonaire, Dutch Caribbean. The hands-on training in coral reef ecology and conservation will provide work experience that is not available at most universities.

The specific skills you learn will depend on ongoing research projects and needs of M.E.E. and its internship partners. Interns gain valuable practical experience while working with M.E.E. and are an integral part of the program by leading high quality expeditions along the coast of Bonaire during the day or night. Examples of skills that might be learned during the internship are prioritizing and scheduling; leading expeditions on coral reefs, mangroves, or seagrasses; fish, algae and invertebrate ID; laboratory skills in feeding ecology; video analysis; nutrient analysis or microbiology; designing and implementing ecological studies; data analysis; report writing; grant writing; public speaking; and assisting with public education and outreach. M.E.E. internships are intense and physically demanding. Many activities are repetitive, and must be done with accuracy and great care to ensure the high quality of the research and public education at M.E.E.

For more information and applications contact coordinator@marineecologyexpeditions.org

Taxonomy and ecology of Caribbean sponges

The Smithsonian Tropical Research Institute, Bocas del Toro Research Station is offering summer course in sponge taxonomy.

Dates: July 16 – 30, 2012

Location: Bocas Research Station, Bocas del Toro, Panama

Registration Fee: \$800 (includes room and board, STRI registration fee, etc.) Some need-based fellowships are available

Instructors: Dr. Cristina Diaz, Museo Marino de Margarita, Venezuela

Dr. Robert Thacker, University of Alabama at Birmingham

Application: This course is directed towards advanced international graduate students, post-docs, and young investigators, and will be conducted in English. Please e-mail your CV, 1 letter of recommendation, and a 1-2 page statement explaining your background and reasons for taking the course, to Rebecca Rissanen at RissanenJ@si.edu before February 1, 2012. To be considered for a need-based fellowship, applicants should send a description of their need, their efforts to obtain funding from other available sources, and a travel budget.

For more information see

http://www.stri.si.edu/sites/taxonomy_training/index.html

This course is supported by the National Science Foundation's Assembling the Tree of Life program under Grant No. 0829986 to R. W. Thacker: "PorToL - The Porifera Tree of Life"

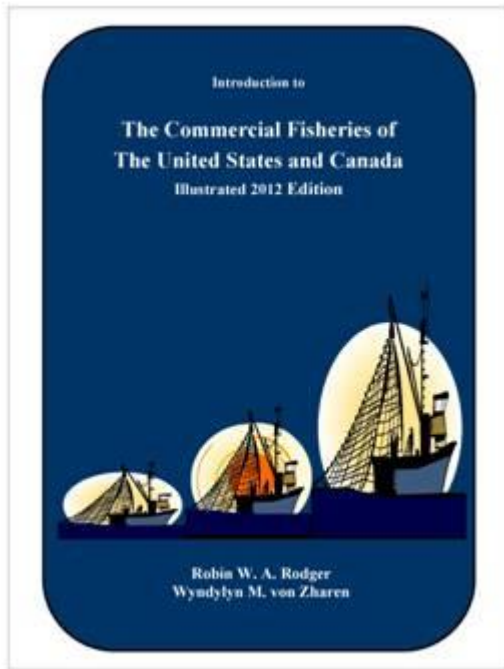
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- ~200 illustrations, hundreds of tables that include biological, economic and US and Canadian landing/value information (5 years).
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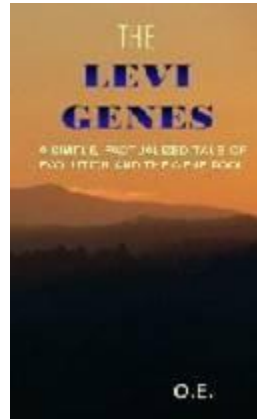
For additional and purchasing information, see the website below:

http://www.CMPpublications.com/na_fisheries

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The Levi Genes by O.E. Vey

A Simple, Factualized Tale of Evolution and the Gene Pool. An Exciting, Hilarious Book – now in KINDLE & NOOK



Welcome to a terrific new book: The Levi Genes. Yes, it's controversial, but that's typical for a book about such sensitive topics as the gene pool, evolution, human screw-ups and religion!

The Levi Genes is sure to keep you laughing & thinking and will spur discussions on many intellectual and philosophical

levels. Share the humor and concepts in *The Levi Genes* with your friends, family, colleagues, co-workers, and associates.

“His examples may be hilarious, but at the same time they are worthy of deep thought.”

Please read *The Levi Genes* and see how it puts satire and humor on top of two serious questions: “How did we get here?” and “Who’s our Daddy?” Please read *The Levi Genes*. Available in Amazon.com

www.outskirtspress.com/bookstore.

Coral Reefs: An Ecosystem in Transition

Zvy Dubinsky and Noga Stambler Editors.
Springer Verlag – 2011.

In the wake of the alarming decline in the vitality of coral reefs worldwide, and its resulting catastrophic effects on the biodiversity of associated biota, it is timely and a topic to revisit, review and update our views of the main processes related to corals, coral reefs, and their myriad of associated denizens. Leading authorities both established and young, have contributed their up-to-date summaries and evaluations of developments in their respective fields

of expertise. The resulting book covers and integrates in one volume materials scattered in hundreds of research articles. The book has 29 chapters distributed among six parts or major topics: History and Perspective, Geology and Evolution, Coral Biology, The Coral Reef Ecosystem, Disturbances and Conservation and Management

Book can be purchased directly from Springer.com or Amazon.com. Price \$ 230.00. If you are a registered author at Springer, you'll get a 33.3% discount.

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 it to the address below, or send the information by e-mail to Sarah Manuel at the e-mail address below.

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Dues

Individual membership dues for 2009-2010 are \$25.00 due in June 2009. You can make your payment with Dr. Laurie Richardson (treasurer) or Dr. Aldo Croquer (Membership Director), whom can be contacted by e-mail at:

amlc.membershipdirector@gmail.com or at their personal e-mails in page 16. If you attended the Dominica meeting, your membership fee for the two years (2009-2010) was included in the registration fee. If you did not attend the meeting, please remit your dues as discussed here. 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 card payments online at www.amlc-carib.org 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 (address on next page).

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Membership Options: Student (US\$5.00) _____

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AMLC Background & Goals

The Association of Marine Laboratories of the Caribbean (AMLC) was founded in 1957 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.

Biannual AMLC scientific meetings are hosted by member laboratories actively conducting marine research in the Caribbean. The host laboratory arranges facilities for research presentations, and logistical arrangements. The AMLC has no designated official language so researchers are free to make their presentations in their native language.

Caribbean Marine Science, published twice per year in English and Spanish, is the 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

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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 March for inclusion in the Spring-Summer issue, and by the end of October for the Fall-Winter issue.

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